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ESCAP

Economic and Social Commission
for Asia and the Pacific

Assessing the Policy Environment for Digital Connectivity and Accessibility in the Asia-Pacific Region



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Natnicha Sutthivana
Yann Duval

ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

WORKING PAPER

Assessing the Policy Environment for Digital Connectivity and Accessibility in the Asia-Pacific Region

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Abstract

The digital connectivity in the Asia-Pacific region is primarily shaped by the availability of ICT infrastructure, the nature of regulatory policies, and the dynamics of competition among service providers. This paper explores the policies and regulations that affect the costs and accessibility of digital infrastructure in the 21 Asia-Pacific economies included in the ESCAP's Regional Digital Trade Integration (RDTII) Database: Australia, Brunei Darussalam, Cambodia, India, Indonesia, Japan, Kazakhstan, Lao People's Democratic Republic (PDR), Malaysia, Nepal, New Zealand, Pakistan, the Philippines, the Republic of Korea, the Russian Federation, Singapore, Thailand, Türkiye, Vanuatu, Viet Nam, and Hong Kong, China. It specifically focuses on trade and investment policies, as well as regional cooperation initiatives in Asia and the Pacific, that have an impact on (1) telecommunications infrastructure and services, and (2) ICT products.

Despite trends towards liberalization, the telecom and ICT sectors in Asia-Pacific economies are generally found to be heavily regulated. The predominance of state monopolies and diverse regulatory approaches across different economies potentially result in high digital connectivity costs and a lack of a competitive environment. This potentially contributes to a significant divide in digital infrastructure quality and accessibility observed across the region.

Drawing on data from ESCAP's Regional Digital Trade Integration (RDTII) Database, this paper discusses a variety of trade and investment policies that shape competition in the telecom market. These policies range from the liberalization of telecommunications services and participation in regional trade agreements and cooperation initiatives, to rules governing foreign entry and foreign participation in public procurement.

In addition, the paper underscores the significance of adhering to the WTO Telecom Reference Paper as well as capitalizing on opportunities from regional trade agreements to establish guidelines for regulatory coherence, interoperability and the resolution of telecommunication disputes. Although numerous regional arrangements exist, the scope of commitments varies widely. Notably, except for the CPTPP, RCEP and North-South agreements, the obligations tend to be vague and more limited in scope.

Furthermore, the significance of reducing trade barriers on ICT equipment and services in enhancing the affordability and efficiency of digital infrastructure for connectivity cannot be overstated. The region has generally reduced tariff barriers encountered by businesses and end-users in accessing ICT products. Although many Asia-Pacific economies have not yet joined the ITA or its expanded version, several have lowered tariffs on ICT goods through regional trade agreements, thereby achieving substantial coverage of zero-duty tariff lines. However, ICT products are extensively subject to non-tariff measures (NTMs), such as licensing, certification and labelling requirements. Here lies a considerable opportunity for improvement, particularly in simplifying the extensive

certification processes for imported ICT products and diverse technical standards applied.

Keywords: digital connectivity, telecommunication services, digital divide, Asia-Pacific, digital trade, investment

JEL Codes: F13, F23, L43, L52, L86, L96, K33, O38, Q01

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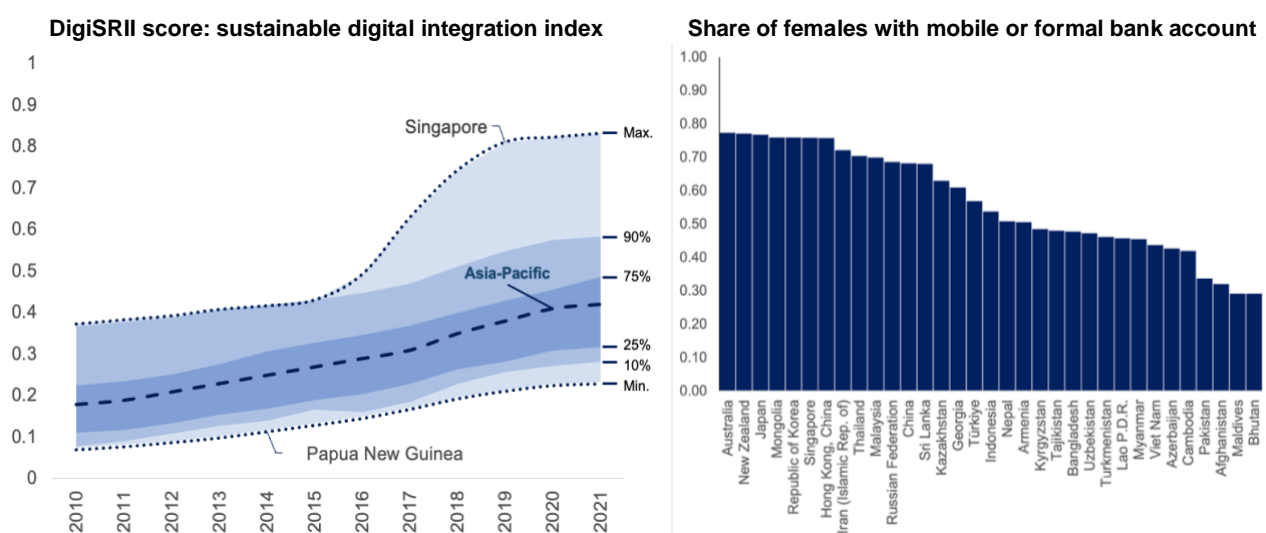
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1. The state of play in digital infrastructure and access in Asia and the Pacific

Digital infrastructure is the backbone of the digital economy, consisting of both physical components such as hardware, cables, data centres and ICT devices, and intangible components like software and online platforms. This infrastructure enables digital connectivity, allowing data transmission between individuals, machines and various combinations thereof. High-quality connectivity is essential for the adoption of new technology, remote access to healthcare, education and employment. According to the Alliance for Affordable Internet (A4AI), the meaningful connectivity covers four elements, which are (i) a fast connection (4G mobile connection as the minimum threshold), (ii) an appropriate device (a smartphone and wide range of device types), (iii) enough data (unlimited broadband connection, including data packages), and (iv) regular Internet (daily access).⁴

Although digital infrastructure investment has been prioritized in many Asia-Pacific economies, a significant digital divide is still evident (figure 1) – 75 per cent of Asia-Pacific economies record less than half the sustainable digital integration level of Singapore, the top-performer of the index. One area where this gap is evident is in the gender divide in the use of mobile or formal bank accounts. Indeed, countries like Afghanistan, Bhutan, Maldives and Pakistan are considerably distant from advanced countries such as Australia, New Zealand or Japan where shares of female access to mobile banking are highest. In addition, digital divide also appears within countries between urban and rural areas, men and women, people with disabilities and different age groups (box 1).

Figure 1: Increasing integration into the digital economy, accompanied by significant disparity in the Asia-Pacific region, 2023

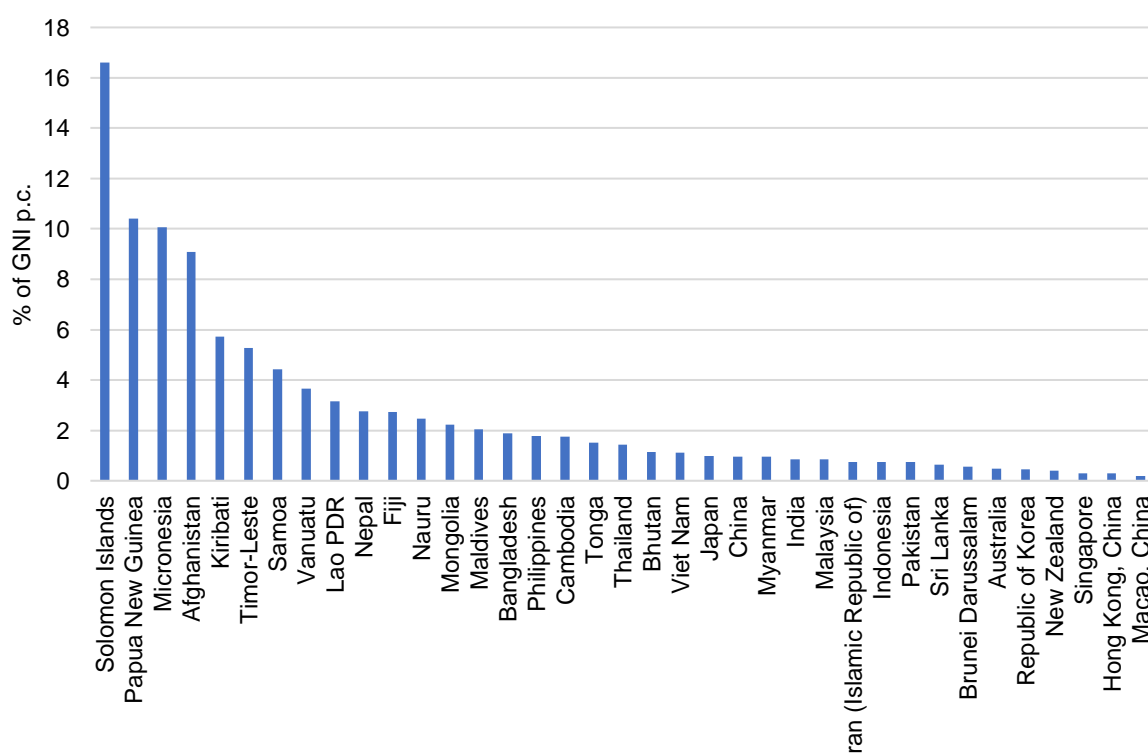


⁴ The Alliance for Affordable Internet (A4AI) introduced the concept of meaningful connectivity in 2020 to help policymakers set targets for better quality and affordable access. For details, see <https://a4ai.org/meaningful-connectivity/>.

Source: Compilation from ESCAP's DigiSRII database, retrieved from <https://riva.negotiatetrade.org/#/riooverview>, accessed 5 May 2023.

According to ITU (2021), telecommunication and ICT services, including mobile voice, mobile data and fixed broadband services, have become more affordable, and the price tends to be lower across the world. Nonetheless, the affordability of these services is diverse in the Asia-Pacific region. The telecom services in certain economies, in China for example, are at low prices, below 1 per cent of gross national income per capita (GNI p.c.), while other economies exhibit prices above 15 per cent GNI p.c. (ITU 2021) (figure 2).⁵

Figure 2: Mobile-data prices as a percentage of GNI p.c., and monthly data allowance, 2019



Source: Compilation by authors, based on ITU Price Baskets (IPB), accessed on May 2023 at <https://www.itu.int/net4/ITU-D/ipb/#ipbrank-tab>

Note: Data correspond to the GNI p.c. in 2019. The mobile data broadband basket refers to a data plan with a monthly allowance of at least 1.5 GB, irrespective of the device used, over a 3G or higher data transmission network. GNI p.c. value are World Bank data.

Challenges in ensuring digital infrastructure and services are primarily found in marginal or rural areas, where the free market often fails to provide access due to a lack of commercial viability for private operators. In contrast, these services tend to be more concentrated in populated and profitable areas. To address this disparity, government intervention in remote areas is essential to bridge the digital divide. In line

⁵ ITU/UNESCO Broadband Commission for Sustainable Development set a target for 2025 that entry-level broadband services should be affordable in developing countries at less than 2% of monthly Gross National Income (GNI) per capita. For more information, see <https://www.broadbandcommission.org/broadband-targets/> and <https://www.itu.int/en/mediacentre/backgrounders/Pages/affordability.aspx>

with this, the paper presents a comprehensive overview of trade and investment policies that influence the accessibility of digital services, the affordability of digital infrastructure, and the availability of Information and Communication Technology (ICT) products. It includes a detailed discussion on policies related to competition in the telecommunications market and the availability of products crucial for the development of digital infrastructure.

Box 1. Digital divide in the Asia-Pacific region

The percentage of an individual using the Internet is increasing as household Internet access grows. Notably, the mobile market plays the main part, since 96 per cent of the Asia-Pacific population has access to the mobile broadband network in 2022 (ITU, 2021 and GSMA, 2022). These trends have also been driven by the COVID-19 pandemic since 2020. The pandemic has emphasized the importance of connectivity for social and economic inclusion (UNDP, 2021). Nonetheless, it widens the digital divide within the Asia-Pacific region.

Internet user penetration and broadband download speed vary widely across the region. In 2021, the percentage of individual access to the Internet was more than 80 per cent in Australia, Brunei Darussalam, Malaysia, New Zealand, Malaysia, Singapore and Hong Kong, China. While in populous and less-developed economies, such as Bangladesh and Pakistan, and Pacific Island economies, Papua New Guinea and the Solomon Islands, user penetration reaches only 20 per cent.⁶

The mobile and fixed broadband download speeds between the advanced and landlocked economies in the region are diverse. The advanced digital economies, such as China, Japan and the Republic of Korea, have higher average national mobile broadband download speeds of 202 Mb/s, 29 Mb/s and 122 MB/s, respectively, compared to 17 Mb/s in the landlocked economies. The fixed broadband download speed in Thailand of 109 Mb/s and in the Republic of Korea of 103 Mb/s were four times higher than the average in Asia and the Pacific (ESCAP, 2021a).

The significant digital divide appears in rural areas and marginalized communities. The rural area tends to have a lower rate of speed and access, and groups such as women, people with disability and the ageing population are found to have less access to digital tools. The divides can be expressed on multiple dimensions, including the lack of access to effective broadband, appropriate ICT devices and the ability to use digital technologies.

In 2023, the proportion of women using the Internet in the region is 54 per cent against 59 per cent of men (ESCAP-UNCTAD-UNIDO, 2023). ESCAP 2021b concludes a similar finding that the gender divide is related to the rural-urban digital divide. Female

⁶ ITU Country ICT data, percentage of individuals using the Internet, available at <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

entrepreneurs, labourers and students were impacted more than other groups, especially during the pandemic. Hence, harmonizing the level of connectivity, accessibility and affordability should be accomplished. The hard and soft digital infrastructures should be accessible to all in order to bridge digital divides.

2. Trade and investment policies affecting competition in the telecom market

Trade and investment policies at the international level frequently interact with and influence domestic regulations. Specifically, international trade agreements can establish minimum standards for the regulation of telecommunications and often mandate that countries open their telecommunications markets to foreign service providers. These standards typically address issues such as fair competition, interconnection pricing and the independent regulator of telecommunications entities. Furthermore, obligations in these agreements may involve reducing or removing limits on foreign ownership, granting licences to foreign telecommunications operators, or ensuring non-discriminatory practices in public procurement for infrastructure projects. As a result, domestic regulations might need adjustments to meet these requirements, thereby promoting a competitive environment in the telecom market. Such an environment enhances quality, affordability and access, ultimately fostering economic growth and social development.

According to the ESCAP's Regional Digital Trade Integration Index (RDTII) 2.0 dataset for 2023, the telecom regulatory environment in 21 Asia-Pacific sample economies is heavily regulated, offering substantial scope to enhance market competition (ESCAP-ECA-ECLAC, 2023 and forthcoming; ESCAP-UNCTAD-UNIDO, 2023). Similarly, the OECD's Services Trade Restrictiveness Index (STRI) for telecommunication services confirms the same for 13 Asia-Pacific sample economies. In this section, the following matrices are examined using the data from ESCAP's RDTII 2.0: regulating telecom market structure, adhering to international frameworks, openness to foreign entry and foreign participation in public procurement.

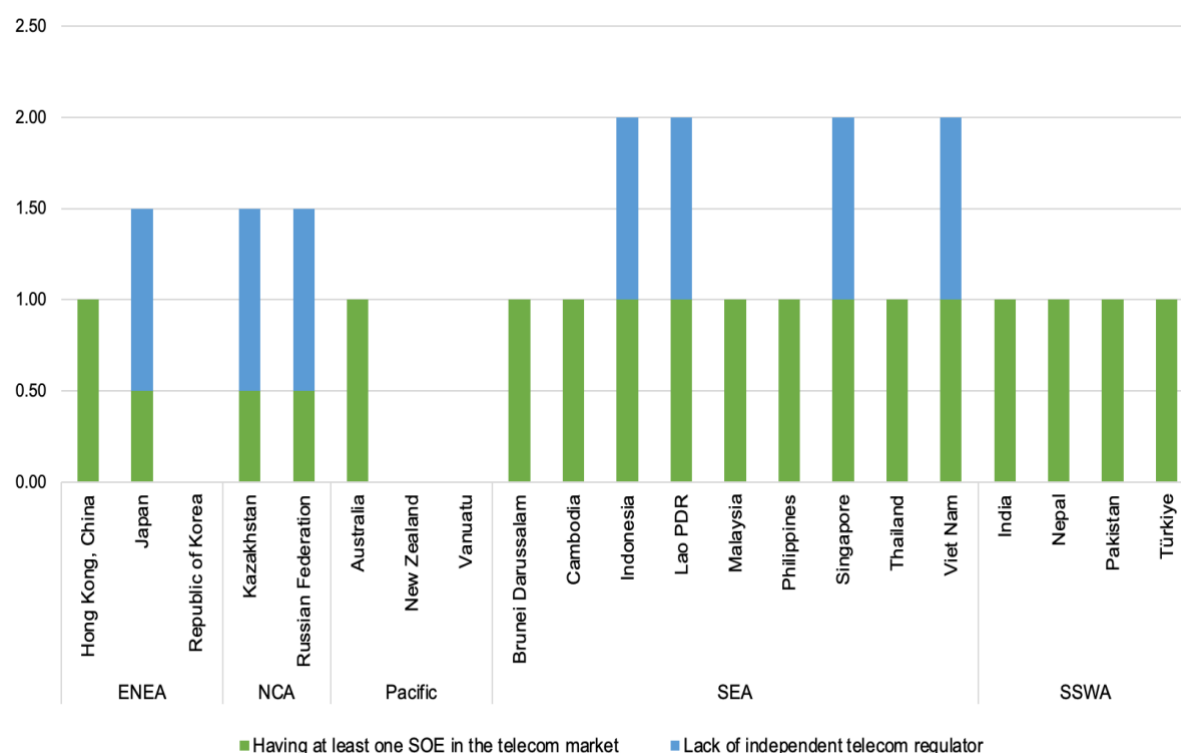
2.1 Telecom market structure

In the Asia-Pacific region, the telecom markets are characterized by a significant presence of dominant players, including both state-owned and privately-owned companies. Although private firms are allowed to operate, the extensive presence of state-owned enterprises (SOEs) in the telecom sector stands out as a distinctive feature of this region (ESCAP-UNCTAD-UNIDO, 2023). Among the 21 economies in the RDTII dataset, 18 of them have at least one government-controlled telecom company (figure 3, and Annex 1).

In the Asia-Pacific region, Governments frequently maintain majority ownership in telecom companies. In countries such as Brunei Darussalam, Cambodia and India, government ownership in telecom companies reaches 100 per cent. In addition, in some instances these state-owned companies also wield significant market power. For example, Viet Nam's publicly-owned companies, Viettel (owned by the Ministry of Defense), VNPT (Viet Nam Posts and Telecommunications Group, owned by the Commission of the Management of State Capital and Enterprises), and Mobifone hold more than 90% of the fixed telephone service, mobile telephone and mobile broadband market shares. Thailand's National Telecom Public Company (NT), fully owned by the Government, is a dominant firm in the economy fixed-line telephone service market.

However, it is encouraging that many Asia-Pacific economies have independent telecom regulators. Such a setup is seen as a way to promote fair competition and improve market transparency (ESCAP-UNCTAD-UNIDO, 2023), because these regulators are not accountable to telecommunication service providers.

Figure 3: Presence of State-Owned Enterprises and absence of independent regulators in telecom sector, 2023



Source: Compilation by authors based on ESCAP's RDTII, accessed on December 2023 at <https://dtri.uneca.org>.

2.2 International frameworks

WTO frameworks

The WTO frameworks establish rules and guidelines that encourage fair competition, transparency and non-discriminatory practices, ultimately benefiting telecom users both in households and the business sector. Adhering to international frameworks is supposed to promote a more competitive and harmonized telecom environment.

Specifically, the WTO Telecom Reference paper has been established, supplementing the WTO General Agreement on Trade in Services (GATS) Annex on telecommunications which ensures reasonable access and the use of public telecommunications services. The Telecom Reference Paper contains a set of best practices for policy reform in the telecommunications sector. It encompasses six frameworks concerning a pro-competitive environment – competitive safeguards, interconnection, universal services obligation, public availability of licensing criteria, independent regulators, and allocation and use of scarce resources. This legally binding regulatory framework applies to the WTO member States that appended the document to their schedules of commitments, and is enforceable through the WTO dispute settlement mechanism. Notably, the flexible nature of the Telecom Reference Paper, which allows members to fully or partially undertake the commitments, facilitate member States – including developing economies – to adopt the Paper. It is encouraging that all 21 Asia-Pacific sample economies in the RDTII database have adopted the Telecom Reference Paper. Seventeen economies have committed to it by appending the document in whole to their schedules of commitments (figure 4).⁷

In addition, given the critical role that government procurement plays in developing telecommunications infrastructure, the WTO Government Procurement Agreement (GPA) is crucial in fostering a competitive environment within the telecommunications sector. The WTO GPA is a plurilateral agreement aiming to open government procurement markets to international competition, which allows member States to voluntarily determine their coverage schedules. However, within the 21 RDTII sample economies, only six have committed the telecom sector to the GPA. Among these, Australia, New Zealand, and Hong Kong, China have included schedules that are relevant to both telecommunication services (CPC 752) and telecommunications related services (CPC 754) (figure 4).

Regional approaches

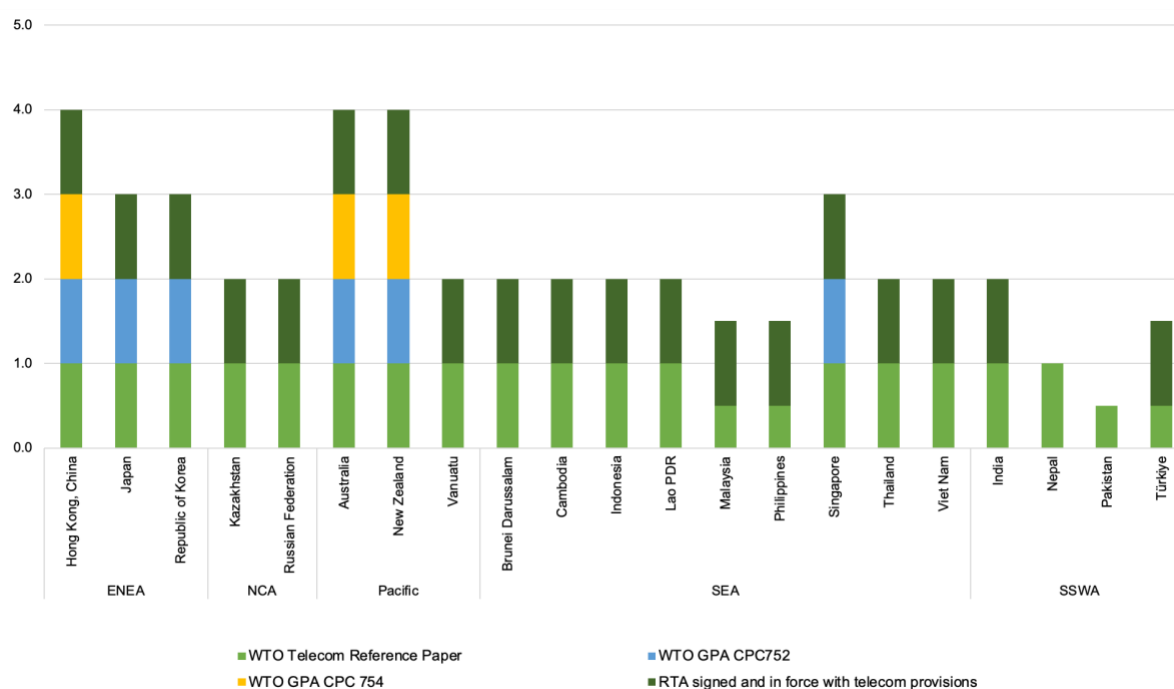
Telecommunications tend to be covered in a number regional and subregional initiatives, including regional trade agreements (RTAs). Among the 21 sampled economies, all except Nepal and Pakistan have RTAs that include provisions specific

⁷ When a country commits in whole, it agrees to implement all the principles and guidelines outlined in the WTO Telecom Reference Paper. If a country commits in part, it adopts only certain elements or principles of the Reference Paper.

to telecommunications (figure 4). Most economies⁸ negotiated the telecom provisions through the plurilateral agreements, such as Regional Comprehensive Economic Partnership (RCEP), Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), Eurasian Economic Union (EAEU), and Pacific Agreement on Closer Economic Relations (PACER) Plus.

Many RTAs notified to the WTO have adopted the WTO rules on telecommunication services, namely the GATS Annex on telecommunications and the Telecom Reference Paper, as a baseline and added further clarifications (WTO, 2022). For instance, the Telecommunication Annex 8B of the RCEP and Chapter 13 of the CPTPP cover measures in accordance with the WTO baseline's scope, including obligations on the access to and use of public telecommunications networks or services. Provisions regarding suppliers of public telecommunications networks or services, such as interconnection, universal service, licensing and allocation and use of scarce resources are also incorporated.

Figure 4: Participation in international frameworks and RTAs related to telecom in sample Asia-Pacific economies, 2023



Source: Compilation by authors based on ESCAP's RDTII, accessed on December 2023 at <https://dtri.uneca.org>.

Note: For the Telecom Reference Paper, a score of 0.5 indicates partial appending to the Reference Paper, while the score of 1.0 indicates full appending. For the WTO GPA, the Russian Federation and Kazakhstan have negotiated accession to the GPA. India, Indonesia, Malaysia, Pakistan, Philippines, Thailand, Türkiye, and Viet Nam are observers. Additionally, the RTA captures at least one signed and in force agreements with telecom provision.

⁸ Of the 19 sample economies with telecom agreements, all economies except India are the parties to the plurilateral agreements with telecom provision or chapter (Australia, Brunei Darussalam, Cambodia, Hong Kong-China, Indonesia, Kazakhstan, Japan, Lao PDR, Malaysia, New Zealand, the Philippines, Republic of Korea, Russian Federation, Singapore, Thailand, Türkiye, Viet Nam and Vanuatu). India participates only through bilateral RTAs, such as Australia-India, India-Japan, India-Malaysia, India-Republic of Korea and India-Singapore.

Major Regional Trade Agreements (RTAs) in the Asia-Pacific region typically include a chapter on telecommunications services (table 1). Specifically, the CPTPP agreement is more comprehensive, with specific and binding obligations that surpass those found in other RTAs. It even includes institutional mechanisms, such as establishing a Committee on Telecommunications, to review and monitor its implementation. The RCEP and North-South comprehensive agreements, such as the Indonesia-EFTA agreements, share several similarities with the CPTPP. However, a significant difference is the absence of institutional mechanisms for monitoring implementation and settling disputes.

Other regional initiatives, such as those of APEC, ASEAN, CAREC and South Asian countries, focus more on setting common goals and visions than establishing concrete obligations. For example, the APEC Telecommunications and Information Working Group, established in 1990, aims to ensure that all people in the Asia-Pacific region have affordable access to ICT and the Internet through the exchange of information, identification of best practices and capacity-building (APEC, 2023). Similarly, ASEAN member States have adopted action plans and framework agreements to enhance ICT competitiveness in the region. These initiatives encourage sharing best practices, capacity-building and establishing working groups.

Table 1: Comparative analysis of regional agreements with telecommunication or digital connectivity provisions

Regional frameworks/ focused scope	Digital connectivity and accessibility				Enforcement and implementation
	International roaming	Interconnection	Spectrum management	Universal service	
1. APEC Telecommunications and Information Working Group Strategic Action Plan 2021-2025	X	X	Share regulatory updates on spectrum management.	Exchange information and best practices on universal telecommunications/ ICT service strategies. Develop Next-Generation Universal Service Obligations frameworks (USO 2.0).	Establish three Steering Groups for knowledge sharing and capacity building
2. Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) Chapter 13 Telecommunications	Cooperate on transparent and reasonable rates for international mobile roaming services, including wholesale roaming services. Update rates for retail international mobile roaming services to other Parties.	a.) Ensure public telecommunications services and major suppliers provide interconnection with suppliers of another Party. b.) Publicly disclose interconnection offers and agreements with a major supplier in its territory.	a.) Allocate and use scarce resources, including frequencies, in an objective, timely, transparent, and non-discriminatory manner. b.) Publicly disclose the current status of allocated frequency bands (excluding government uses). c.) Encourage to rely on market-based approaches.	Right to define the universal service obligation. The obligation should be transparent, non-discriminatory, and competitively neutral.	a.) Incorporate specific provisions on enforcement and resolutions of telecommunication disputes, for example, sanctions and suspension of licences; administrative proceedings; and review and appeal to resolve the arising telecom dispute. b.) Establish a Committee on Telecommunications to monitor the implementation by enabling responsiveness to technological and regulatory developments.

Regional frameworks/ focused scope	Digital connectivity and accessibility				Enforcement and implementation
	International roaming	Interconnection	Spectrum management	Universal service	
3. Indonesia-European Free Trade Association (EFTA) Comprehensive Economic Partnership Agreement Annex XIII Telecommunications Services	X	Same as CPTPP (a. and b.)	Same as CPTPP (a. and b.)	Same as CPTPP.	<p>a.) No specific enforcement provisions on telecommunications.</p> <p>b.) Telecommunications Services constitute an Annex within the Service Chapter of this Agreement. The Parties commit to review the Trade in Services Chapter at least every three years or more frequently. The dispute settlement Chapter is applicable for any dispute in breach of this Agreement.</p>
4. Republic of Korea-Republics of Central America Free Trade Agreement Chapter 13 Telecommunications	X	<p>Same as CPTPP (a.)</p> <p>b. Require suppliers of public telecommunications services to file their interconnection contracts.</p>	Same as CPTPP (a. and b.)	Same as CPTPP.	Same as CPTPP (a.)
5. Central Asia Regional Economic Cooperation (CAREC) Digital Strategy 2023	X	N/A	N/A	N/A	<p>a.) Establish implementation principles and governance structure, including a CAREC Digital Strategy steering committee.</p> <p>b.) Set key implementation priorities, such as sharing best practices and establishing a monitoring system for digital transformation progress and impact.</p>

Regional frameworks/ focused scope	Digital connectivity and accessibility				Enforcement and implementation
	International roaming	Interconnection	Spectrum management	Universal service	
6. Regional Comprehensive Economic Partnership (RCEP) Annex 8B Telecommunications Services	Cooperate on transparent and reasonable rates for international mobile roaming services, including wholesale roaming services.	Same as CPTPP (a) Same as ROK-Central America (b) Same as CPTPP (b)	Same as CPTPP (a, b, c)	Same as CPTPP	Same as CPTPP (a.) Quite similar to Indonesia-EFTA (b.), but with a longer period for review (5 years instead of 3 years).
7. ASEAN Digital Masterplan 2025	Lowering roaming rates for mobile data services across ASEAN. Review previous ASEAN initiatives to reduce roaming charges. Re-examine the costs and benefits of achieving the proposed goal.	N/A	Ensure harmonized spectrum allocation across the region. Adopt a regional policy to deliver best practice guidance on the spectrum.	N/A	a.) Set eight desired outcomes, including enabling actions and timelines. The monitoring and implementation have been specified under each outcome.
8. ASEAN Framework on International Mobile Roaming 2017	Encourage telecommunications operators in ASEAN to provide transparent and affordable international mobile data roaming service on a daily-flat rate basis.	X	X	X	a.) Establish Implementing Bodies (designated telecom regulatory body) of each Participant responsible for monitoring and coordinating, including providing advice to encourage their operator(s) to negotiate with the operator. b.) Review implementation every six months.

Regional frameworks/ focused scope	Digital connectivity and accessibility				Enforcement and implementation
	International roaming	Interconnection	Spectrum management	Universal service	
9. ASEAN Siem Reap Declaration 2017	Promote transparent and affordable international mobile roaming services.	Promote regional connectivity (direct connectivity and Internet exchange points) and link landlocked developing countries to regional and global opportunities via access to the international fibre optic network, including submarine cables in the region.	Promote harmonized radio spectrum regulations, notably accelerating the Analogue Switch Off (ASO) and digital migration in the 700 MHz band.	Promote universal, equitable and affordable access to ICT	a.) Share best practices and undertake a mid-term review to take stock of the progress and identify areas for improvement.
10. Pacific ICT Ministers Dialogue 2023 (Lagatoi Declaration)	X	X	X	X	a.) Instruct senior officials to develop a Pacific ICT and Digital Transformation Action Plan, which the Action Plan will be reviewed at the next Pacific Ministerial Dialogue in 2025.

Regional frameworks/ focused scope	Digital connectivity and accessibility				Enforcement and implementation
	International roaming	Interconnection	Spectrum management	Universal service	
11. South Asian Telecommunication Regulators Council (SATRC) Action Plan*	<p>Recommend to adopt a uniform and transparent roaming tariff, and avoid double taxation.</p> <p>Ensure negotiation with the local operators and implementation of the recommendations.</p>	<p>Recommend ISPs to procure their own international capacity directly instead of obtaining it from the incumbent telecom operators.</p> <p>Suggest establishing and connecting Internet Exchange Points (IXPs) to reduce the costs of international Internet connectivity.</p>	<p>Encourage the harmonized spectrum towards implementing 5G services, including developing a proper 5G implementation policy.</p>	<p>Recommend to establish a national broadband network rollout project providing a full suite of voice and broadband products and services on a wholesale basis.</p>	<p>a.) Establish a Working Group on Policy, Regulation and Services to deal with the issues related to policy, regulation and services in the region, and a Working Group on Spectrum to deal with the issues related to spectrum management, monitoring, sharing and coordinated efficient use of spectrum.</p>

Source: Author's compilation.

Note: 'X' refers to the absence of specific aspects of digital connectivity and accessibility. 'N/A' refers to when information is not available.

*The information about the South Asian Telecommunication Regulators Council (SATRC) Action Plan was taken from joint statements, reports, and approaches, such as Joint Statement by SATRC members for the Adoption of Regional Mobile Roaming SAPIV-REP-10; and Approaches to Spectrum Harmonization for 5G in SATRC Countries.

2.3 Foreign entry

FDI policies can play a crucial role in fostering competition, affordability, and wider access to digital infrastructure. By attracting international capital, technology, and expertise, these policies can stimulate competitive markets, driving down costs and expanding digital connectivity.

The trend of opening up the telecommunications sector to FDI has been growing in the Asia-Pacific region. For instance, Indonesia removed telecommunication services from the list of restricted sectors in 2021, allowing for 100 per cent foreign ownership in the telecom sector. In the same year, India also approved foreign investment in the telecom sector up to 100 per cent, an increase from the previous limit of 49 per cent.⁹ Furthermore, in 2022, the Philippines amended legislation to lift the 40 per cent FDI limits in the telecom sector, allowing for 100 per cent foreign ownership.

However, some economies still maintain limits on foreign ownership and control. For example, Brunei Darussalam, the Republic of Korea, Thailand, and Viet Nam limit foreign ownership in the telecom sector only to the minority stake of 49 per cent shares.¹⁰

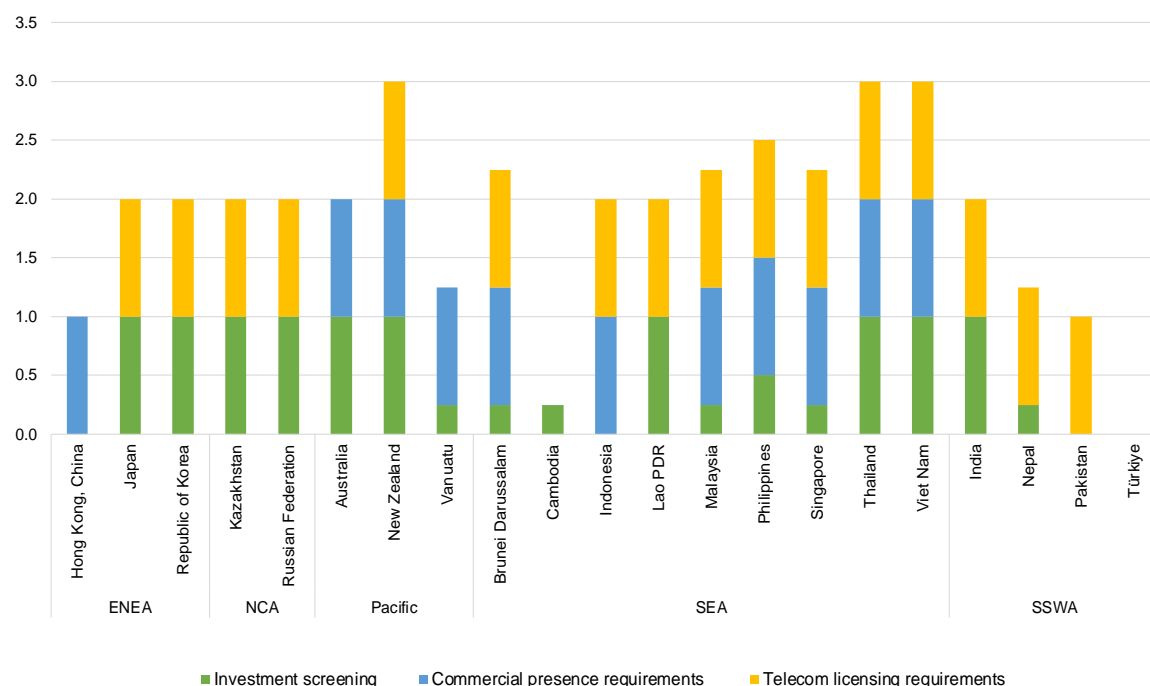
There are other regulatory policies that impact foreign entry into the telecom sector. These include licensing requirements, investment screenings, and commercial presence requirements (figure 5). In particular, the region implements complicate licensing requirements, such as mandating telecom service providers to acquire multiple licenses to operate their services or imposing discriminatory conditions and fees solely on foreign operators.¹¹

⁹ FDI in India is governed by automatic route and approval route. Under the automatic, foreign investors do not subject to Government approval or Reserve Bank approval. While, under the approval route (known as the Government route), investors are required prior approval from the Government or specified agencies. Previously, India permitted 100% FDI in telecommunications, but approval of the Government is required for FDI above 49%. For more information about the FDI limit raised in India, see Press Note No.4 of 2021 (issued 6 October 2021).

¹⁰ See Licensing and Regulatory Framework of the Authority for Info-communications Technology Industry of Brunei Darussalam (AiTi) for Brunei Darussalam. And Telecommunications Business Act and Foreign Business Act for Thailand.

¹¹ For example, Nepal imposes a cap on the maximum number of licenses for facility providers. No other licenses will be issued for five years after the two licenses have been issued for the development of telecommunication infrastructure. Kazakhstan requires telecom service providers to connect their channels to a public network controlled by a state-owned telecom company as a condition for obtaining a license. India imposes a one-time license fee for “the Unified License” for foreign investment in telecommunication services generally and sector-specific licenses for wireless and wired connection (see ESCAP’s RDTII database at <https://dttri.uneca.org/escap/home>).

Figure 5: Regulatory challenges for foreign investment in the telecom sector of sample Asia-Pacific economies, 2023



Source: Compilation by authors based on ESCAP's RDTII accessed on December 2023 at <https://dtri.uneca.org>.

2.4 Public procurement

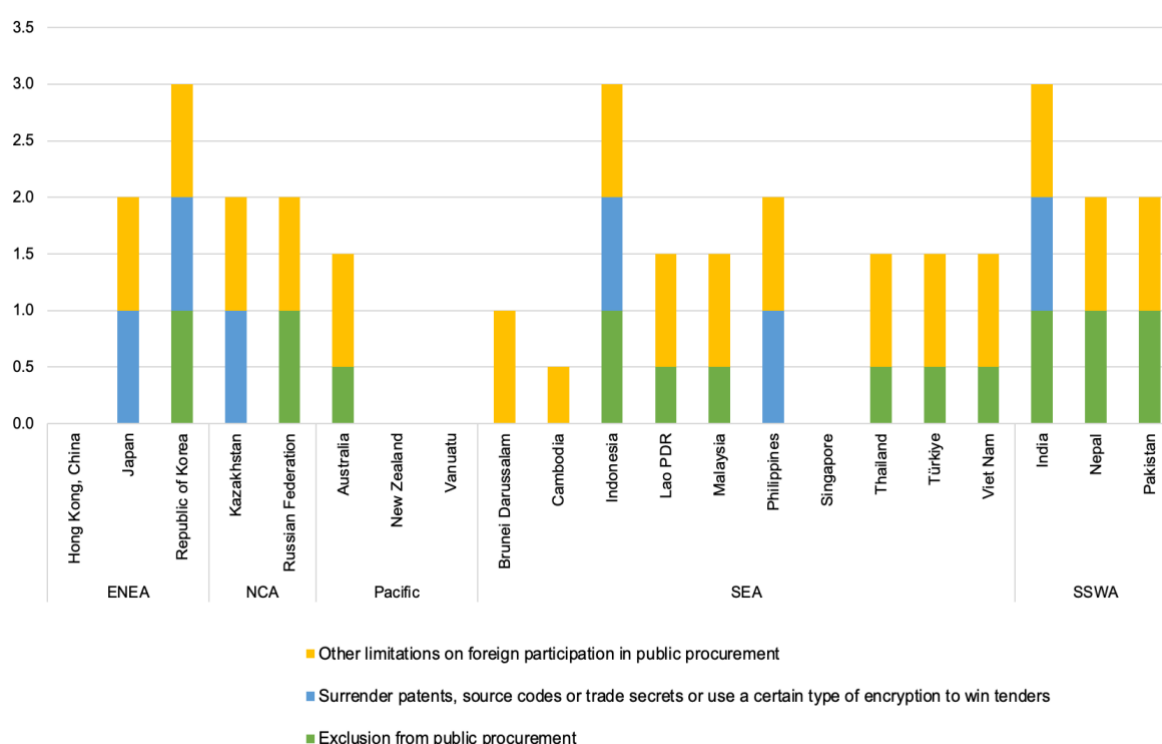
By establishing transparent and non-discriminatory rules for public purchasing telecom services and infrastructure, the policy can encourage a level playing field for market players. Additionally, Governments can design procurement policies that prioritize universal access, promoting infrastructure development in underserved and remote regions.

Public procurement rules typically apply across different sectors, including telecommunications. In eighteen of the 21 RDTII sampled economies, limitations are placed on foreign participation in public procurement (figure 6). In countries like India, Indonesia, and Viet Nam, foreign bidders can participate in procurement only when local goods or services cannot be procured at competitive prices or are not available locally.¹² Alternatively, foreign operators have to join with local firms to be eligible bidders. Indonesia, Lao PDR, Pakistan, Philippines, and Thailand explicitly state that local firms receive priority in public procurements.

¹² New Zealand, Singapore, Vanuatu, and Hong Kong; China have established an open public procurement regime despite the general trend. Specifically, New Zealand has enacted specific provisions on equal treatment to all suppliers and explicitly prohibited discrimination against foreign suppliers. For more information, see New Zealand's Government Procurement Rules.

Moreover, the stipulation to surrender source codes, encryption keys, and trade secrets as a prerequisite for participating in public tenders is present. Such requirement is controversial and may not align with the WTO Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement principles¹³, as firms might be reluctant to partake in these tenders, fearing the loss of their proprietary information (ESCAP-UNCTAD-UNIDO, 2023). Specifically, six sample economies, namely India, Indonesia, Japan, Kazakhstan, the Philippines, and the Republic of Korea requires the bidder to submit the source codes of hardware and/or software, including cloud computing and network equipment (figure 6).¹⁴ Apart from the ICT products, the Philippines requires foreign consultants to transfer their technology and knowledge, possibly patents and trade secrets, as a condition to be hired under public procurement.¹⁵

Figure 6: Regulatory challenges for public procurement in the sample Asia-Pacific economies, 2023



Source: Compilation by authors based on ESCAP's RDTII accessed on December 2023 at <https://dtri.uneca.org>.

¹³ WTO TRIPS Agreement sets out the minimum standards of protection to intellectual property rights, including copyrights and related rights, trademarks, industrial rights, patents, the layout-designs of integrated circuits, and undisclosed information (trade secrets and test data).

¹⁴ India's Policy on Adoption of Open Source Software for Government of India and Framework for Adoption of OSS in eGovernance applications; Indonesia's Government Regulation No.71/2019, Japan's Management Standards for Information Security Measures for the Central Government Computer Systems, the Philippines' Republic Act 9184 (Government Procurement Reform Act), particularly the 2003, 2009, and 2016 Implementing Rules and Regulations, and the Republic of Korea's Electronic Government Act, Cryptographic Module Testing and Validation Guidelines, Cryptographic Module Validation Standards.

¹⁵ Republic Act 9184 (Government Procurement Reform Act).

3. Trade Policies pertaining to ICT products

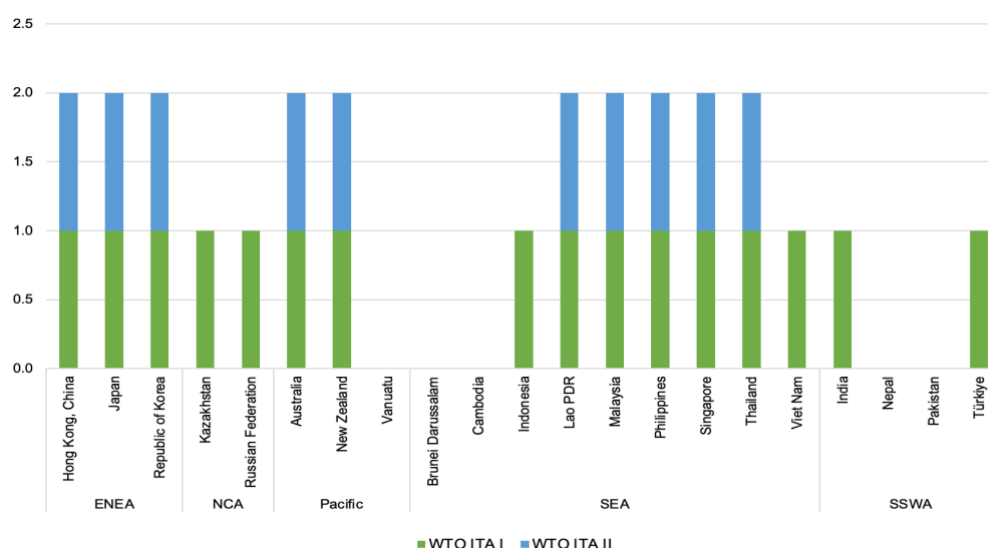
ICT products are vital for the digital economy. Reducing trade barriers on these products fosters digital connectivity and productivity. Trade restrictions can hinder the use of digital infrastructure, making it essential to develop affordable and accessible ICT products alongside telecommunication services. This ensures users can fully utilize these services with the necessary devices and equipment.

According to ESCAP-ECA-ECLAC (2023), Asia-Pacific economies have low tariffs and non-tariff measures on ICT products. The average Asia-Pacific RDTII score especially for tariffs are also lower than that of the Africa and the Latin America and the Caribbean (LAC) regions. These low scores indicate that the region's trade policies have been effective in reducing the overall burden on businesses and end-users when it comes to accessing ICT products.

3.1 Tariff barriers

The WTO Information Technology Agreement (ITA) promotes tariff liberalization in ICT goods.¹⁶ Products listed in the ITA (I and II) encompass roughly 97 per cent of global trade of ICT products (WTO, 2017).¹⁷ Though many Asia-Pacific economies have yet to participate in the ITA or its expanded version (figure 7), several have reduced ICT goods tariffs through regional trade agreements, achieving significant zero-duty tariff line coverage (ESCAP-ECA-ECLAC, 2023).

Figure 7: Asia-Pacific economies in ITA I and ITA II, 2023



Source: Author's compilation based on ESCAP's RDTII on December 2023 at <https://dtri.uneca.org>.

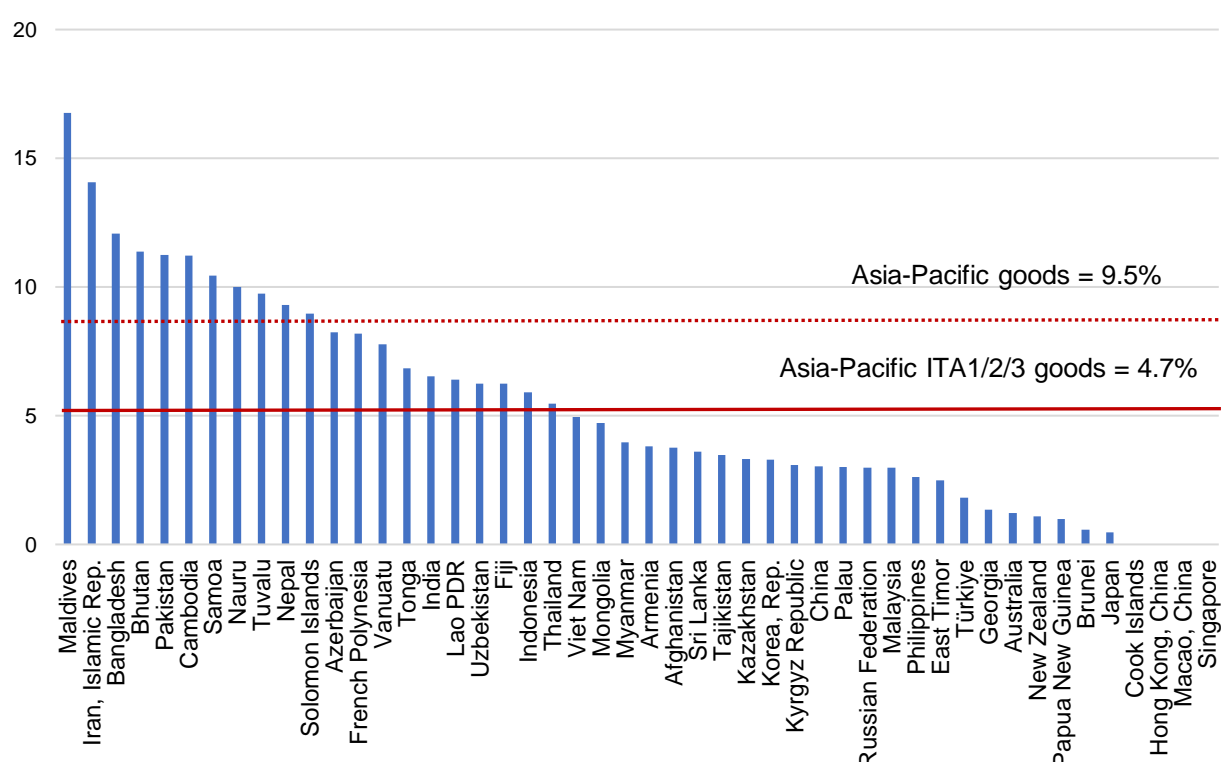
¹⁶ ITA I, established in 1996, requires members to eliminate customs duties on wide range of ICT products, including computers, telecommunication equipment, semiconductors, software, as well as most of the parts and accessories of these products. In 2015, ITA II expanded coverage by removing tariffs on 201 additional items. The lists of ITA I and ITA II, see WTO, 1996 and WTO, 2015, respectively.

¹⁷ ITA III list is proposed by the Innovation Technology and Innovation Foundation (ITIF). The list includes additional 250 ICT products, see Ezell S. and Dascoli L. 2021.

Consequently, the Asia-Pacific region generally has low average tariffs on ICT goods. In 2022, the average effectively applied tariff was 9.5 per cent, while for WTO ITA-listed goods, it was 4.7 per cent (figure 8) (ESCAP-UNCTAD-UNIDO, 2023). The region, however, displays considerable diversity in ICT tariffs, ranging from 0 per cent (Cook Islands, Hong Kong; China, Macao; China, and Singapore) to around 17 per cent (Maldives). Furthermore, countries like Brunei Darussalam, Cambodia, Iran (Islamic Republic of), Maldives, and Tuvalu, have higher average ITA product tariffs than their average total goods tariffs.

Figure 8: Average Effectively Applied Tariffs on ICT goods by Asia-Pacific economy, 2022

(per cent)

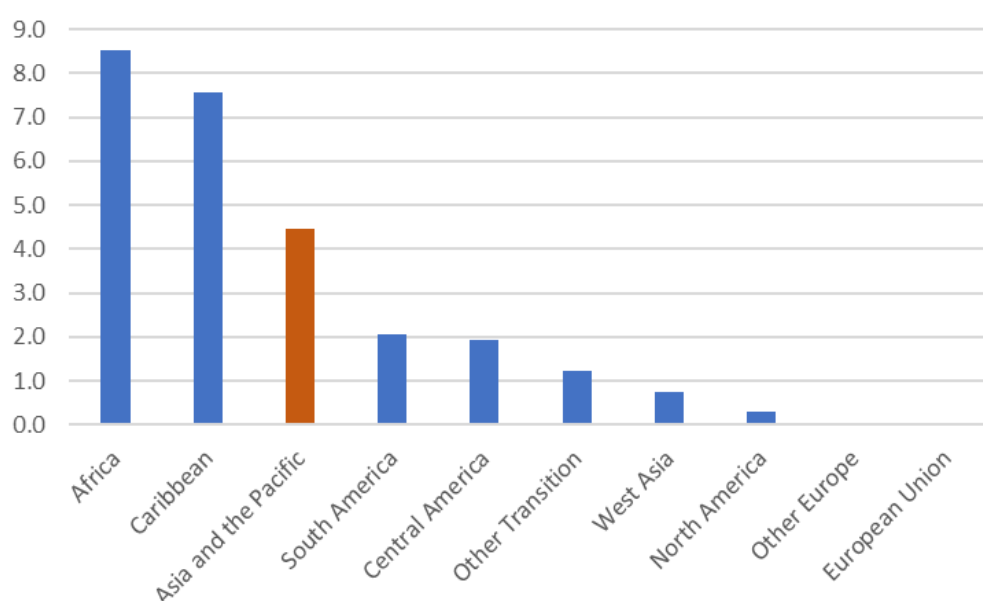


Source: Compilation by authors using TRAINS data, downloaded from wits.worldbank.org on 30 April 2023

Note: The ICT goods are products included in the ITA I, II, III lists, which are available from Annex of WTO 1996, WTO 2015, and Ezell S. and Dascoli L. 2021, respectively.

Moreover, the intra-Asia Pacific tariff rate for ITA is approximately 4.5 per cent, higher than intra-regional tariffs in all other regions except for Africa and the Latin America and the Caribbean (figure 9). This underscores the potential benefits of regional cooperation to remove tariff barriers on ICT goods.

Figure 9: Intra-regional effectively applied tariffs on ICT goods by region, 2022



Source: Compilation by authors using TRAINS data, downloaded from wits.worldbank.org on 30 April 2023

Note: The ICT goods are products included in the ITA I, II, III lists, which are available from which are available from Annex of WTO 1996, WTO 2015, and Ezell S. and Dascoli L. 2021, respectively.

3.2 Non-tariff measures (NTMs)

ICT products are extensively subject to non-tariff measures (NTMs), such as licensing, certification, and labelling requirements for products like smart televisions and mobile phones. Electrical products must comply with domestic standards related to radio transmissions, electromagnetic interference (EMI), or electromagnetic compatibility (EMC).¹⁸ These non-tariff measures are implemented for various reasons, such as ensuring product safety, protecting consumer interests, or addressing environmental concerns. However, they can also lead to added complexities and increased costs for businesses engaged in the trade of ICT products. This is particularly true when the setting of NTMs lacks transparency or deviates from internationally accepted technical standards (ESCAP-UNCTAD-UNIDO, 2023).¹⁹

In the 21 Asia-Pacific sample economies, technical standards and testing requirements generally follow good practices (figure 10). Most allow foreign businesses to participate in public consultations for technical standard-setting bodies. Many of these economies accept testing results from recognized foreign certifications or accredited foreign laboratories for ICT products, streamlining the process of

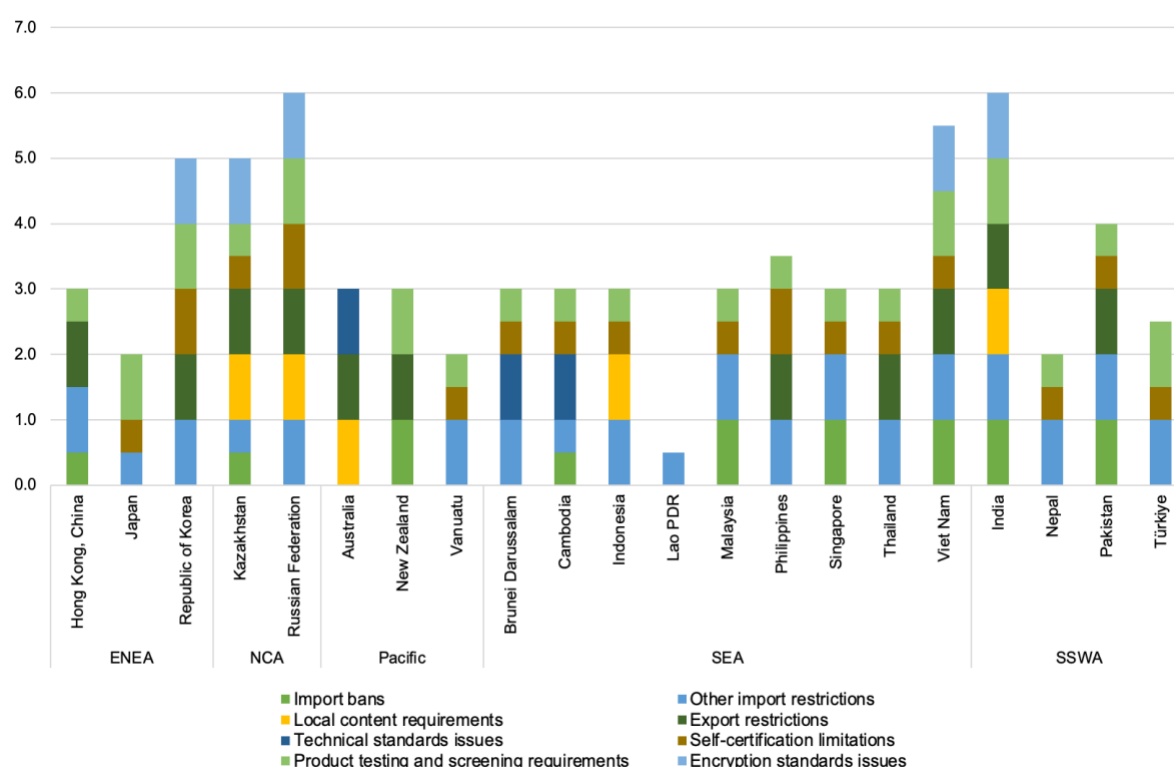
¹⁸ The EMC testing measures whether electrical devices can function in the environment without interfering with surrounding equipment by emitting radiation. While the EMI testing gauges whether electrical products can function in the presence of a certain amount of electromagnetic interference. Different requirements and interpretations of the definition of EMC and EMI in the United States and the European Union could cause confusion when it comes to testing (Hayes, 2021) (ESCAP, ECA, ECLAC, 2022).

¹⁹ In some cases, these measures can be perceived as protectionist, limiting market access and creating inefficiencies in the global market (UNCTAD and WTO, 2019).

bringing products to market and reducing the burden on businesses by avoiding redundant testing.

In most sample economies, foreign businesses are not permitted to submit self-declaration through supplier declaration of conformity (SDoC) for imported ICT products. However, the economies accept third party-certification from Conformity Assessment Bodies (CABs) in economies with Mutual Recognition Arrangements (MRAs). However, in certain economies with extensive certification processes, foreign suppliers are required undergo mandatory certification and local laboratory testing. This adds challenges and costs for businesses importing ICT products due to complex regulatory environments and potential repetitive testing processes. Local content requirements and import bans are less common, but when they occur, they can potentially increasing costs and limiting consumer choice. Export restrictions, including bans, licenses, and pre-approval requirements, are imposed in less than half of the 21 sample economies, generally targeting dual-use products (electronic products potentially fit for military use) to control sensitive technology dissemination and maintain national security.

Figure 10: Non-tariff measures applied on ICT products by Asia-Pacific economies, 2023



Source: Compilation by authors based on ESCAP's RDTII, accessed on December 2023 at <https://dtri.uneca.org>.

4. Conclusion

This paper provides an overview of digital trade policies and regulations that influence the costs and accessibility of digital infrastructure across 21 Asia-Pacific economies, as outlined in the ESCAP's Regional Digital Trade Integration (RDTII) Database. It highlights the critical role of trade and investment policies, alongside regional cooperation efforts, in shaping the telecommunications infrastructure and services, as well as the ICT products sector.

While a significant shift towards trade and investment liberalization in the telecom and ICT sectors is observed across Asia-Pacific economies, the substantial presence of state monopolies and varied regulatory frameworks leads to elevated digital connectivity costs and stifled competition. The absence of effective telecom market competition risks compromising the quality of digital infrastructure and its inclusive accessibility.

Moreover, analysing data from the ESCAP's RDTII Database outlines the diverse trade and investment policies sculpting the competitive landscape in the telecom sector. The paper illustrates how domestic regulations and competition policies are woven into broader global and regional trade and cooperation frameworks. Specifically, it highlights the critical importance of aligning with the WTO Telecom Reference Paper and leveraging regional trade agreements to foster regulatory coherence, interoperability, and dispute resolution within the telecommunications services. While numerous trade agreements include telecommunications chapters, the extent of their commitments greatly varies. Notably, except for the CPTPP, RCEP, and North-South agreements, the obligations tend to be vague and more limited in scope.

Moreover, the paper underscores the need to lower trade barriers on ICT equipment and services to make digital device needed for digital connectivity more accessible and affordable. Although there has been a general trend towards reducing tariff barriers, substantial room for enhancement still exists in the area of non-tariff measures (NTMs). Efforts should focus on addressing the diverse regulations and standards, including licensing, certification, and labelling requirements. Moreover, it's important to simplify the intricate certification processes for imported ICT products and ensure domestic standards align with international ones.

List of references

- Asia-Pacific Economic Cooperation (APEC) (2023). Telecommunications and Information. Available at <https://www.apec.org/groups/som-steering-committee-on-economic-and-technical-cooperation/working-groups/telecommunications-and-information>
- Ezell S. and Dascoli (2021). How an Information Technology Agreement 3.0 Would Bolster Global Economic Growth and Opportunity. 16 September. Information Technology and Innovation Foundation (ITIF). Available at <https://itif.org/publications/2021/09/16/how-an-information-technology-agreement-3-0-would-bolster-global-economic-growth-and-opportunity/>
- Global System for Mobile Communications Associations (GSMA) (2022). The mobile economy Asia Pacific. Available at <https://www.gsma.com/mobileeconomy/asiapacific/>
- Hayes, S. (2021). EMC vs. EMI Testing: What's the Difference, and What Do I Need to Consider? Element Materials Technology, 21 December. Available at <https://www.element.com/nucleus/2017/whats-the-difference-emc-vs-emi>
- International Telecommunication Union (ITU) (2021). Digital trends in Asia and the Pacific 2021. Information and Communication Technology Trends and Developments in the Asia-Pacific region, 2017-2020. Available at https://www.itu.int/pub/D-IND-DIG_TRENDS_ASP.01
- United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) (2021a). Visualizing Broadband Speeds in Asia and the Pacific. Working paper, 26 May. Available at <https://www.unescap.org/kp/2021/visualizing-broadband-speeds-asia-and-pacific-0>
- _____ (2021b). Promoting Meaningful and Affordable Access to Broadband Internet for Inclusive Development. ESCAP/77/11, 3 February. Available at https://www.unescap.org/sites/default/d8files/event-documents/ESCAP_77_11_E.pdf
- _____, United Nations Economic Commission for Africa, and United Nations Economic Commission (ECA) of Latin America and the Caribbean (ECLAC) (2022). Regional Digital Trade Integration Index (Version 1): A Guide. Available <https://www.unescap.org/kp/2022/rdtii-version1>
- _____, United Nations Economic Commission for Africa, and United Nations Economic Commission (ECA) of Latin America and the Caribbean (ECLAC) (2023). Digital Trade

Regulatory Review for Asia-Pacific, Africa, and Latin America and the Caribbean. Report, 22 February. Available at <https://www.unescap.org/kp/2023/dtr>

_____. (forthcoming). Digital Trade Regulatory Review for Asia-Pacific, Africa, and Latin America and the Caribbean 2024. Available at <https://repository.unescap.org/handle/20.500.12870/6848>

_____, United Nations Conference on Trade and Development (UNCTAD), and United Nations Industrial Development Organization (2023). Asia-Pacific Trade and Investment Report 2023/24: Unleashing Digital Trade and Investment for Sustainable Development, 6 December. Available at <https://www.unescap.org/kp/2023/APTIR2023>

United Nations Development Programme (UNDP) (2021). Accelerating Universal Digital Connectivity. Policy Brief, 3 December. Available at <https://www.undp.org/asia-pacific/publications/accelerating-universal-digital-connectivity>

World Trade Organization (1996). Ministerial Declaration on Trade in Information Technology Products. WT/MIN (96)/16. Singapore, 13 December. Available at https://www.wto.org/english/docs_e/legal_e/itadec_e.pdf

_____. (2015). Ministerial Declaration on the Expansion of Trade in Information Technology Products. WT/MIN (15)/25. Nairobi, 16 December. Available at <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:WT/MIN15/25.pdf&Open=True>

_____. (2017). 20 Years of the Information Technology Agreement. Available at https://www.wto.org/english/res_e/booksp_e/ita20years_2017_full_e.pdf

_____. (2022). Communication Break Down: Typology of Telecommunication Provisions in Regional Trade Agreement, 14 January. Available at https://www.wto.org/english/res_e/reser_e/ersd202202_e.pdf

Databases

United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). Regional Digital Integration Index (RDTII). Available at <https://dtri.uneca.org>

Organisation for Economic Co-operation and Development (OECD). Services Trade Restrictiveness Index (STRI) on Telecommunication Services. Available at <https://sim.oecd.org/Default.ashx?lang=En&ds=STRI&d1c=tc&cs=tc>

Annex 1. Examples of state-owned enterprises and independent regulators in Asia-Pacific telecommunications

State-owned enterprises	Independent regulators
Australia: National Broadband Network (NBN)	Australia: Australian Communications and Media Authority (ACMA)
Brunei Darussalam: Unified National Networks (UNN)	Brunei Darussalam: Authority for Info-communications Technology Industry (AITI)
Cambodia: Telecom Cambodia	Cambodia: Telecommunication Regulator of Cambodia (TRC)
India: Bharat Sanchar Nigam Limited (BSNL); Indian Telephone Industries Limited (ITI); Mahanagar Telephone Nigam Limited (MTNL); Telecommunications Consultants India Limited (TCIL); Bharat Broadband Nigam Limited (BBNL)	India: Telecom Regulatory Authority of India (TRAI)
Indonesia: PT Telekomunikasi Indonesia (Persero)	Malaysia: Malaysian Communications and Multimedia Commission (MCMC)
Japan: Nippon Telegraph and Telephone Corporation (NTT)	Nepal: Nepal Telecommunications Authority (NTA)
Kazakhstan: JSC Kazakhtelecom	New Zealand: Commerce Commission
Lao PDR: Lao Telecommunication Public Company (Lao Telecom)	Pakistan: Pakistan Telecommunication Authority (PTA)
Malaysia: Telekom Malaysia Berhad (TM)	Philippines: National Telecommunications Commission of the Philippines (NTC)
Nepal: Nepal Doorsanchar Company Limited (NDCL)	Republic of Korea: Korea Communications Commission (KCC)
Pakistan: Pakistan Telecommunication Company Ltd. (PTCL)	Thailand: National Broadcasting and Telecommunications Commission (NBTC)
Philippines: Philippine Long Distance Telephone Company (PLTD)	Türkiye: Information and Communication Technologies Authority (ICTA)
Russian Federation: Rostelecom	Vanuatu: Telecommunications and Radiocommunications Regulator (TRBR)
Singapore: Temasek Holdings (Private) Limited; Singapore Telecommunications Ltd. (SingTel); ST Telemedia (STT)	Hong Kong, China: Communications Authority (CA)
Thailand: National Telecom Plc. (NT)	
Türkiye: Türk Telecom, Turkcell, Türksat	

Viet Nam: Viet Nam Posts and Telecommunications Group (VNPT) and Viettel	
Hong Kong, China: China Mobile Hong Kong Company Limited (CMHK), China Telecom Global Limited, and China Unicom (Hong Kong)	

Source: Compilation by authors based on ESCAP's RDTII, accessed on December 2023 at <https://dtri.uneca.org>.



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