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Committee on Information and Communications Technology,
Science, Technology and Innovation

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**Policy issues for information and communications technology:
towards the Asia-Pacific information superhighway**

Master Plan for the Asia-Pacific Information Superhighway

Note by the secretariat**

Summary

In accordance with resolution 71/10 of the Economic and Social Commission for Asia and the Pacific (ESCAP), the 1st meeting of the Working Group on the Asia-Pacific Information Superhighway was held in Incheon, Republic of Korea, in September 2015. At that meeting, it was agreed that a master plan on the Asia-Pacific information superhighway and a regional cooperation framework document would be developed and that they would be mutually reinforcing. The Asia-Pacific Information Superhighway Steering Group was formed to carry out that task. The Master Plan for the Asia-Pacific Information Superhighway was developed based on studies and analyses carried out by ESCAP in the region, consultations with various stakeholders, including representatives of the private sector in April 2016, and discussions at a technical meeting organized in March 2016. The Master Plan contains key strategic initiatives, targeted goals and a timeline in line with the four pillars of the Asia-Pacific information superhighway initiative: strengthening the regional broadband infrastructure; establishing regional Internet traffic and network management systems and policies; enhancing information and communications technology infrastructure resilience; and providing inclusive access to broadband Internet. The Master Plan was considered for endorsement at the 2nd meeting of the Working Group on the Asia-Pacific Information Superhighway, which was held in Guangzhou, China, on 29 and 30 August 2016.

* E/ESCAP/CICTSTI(1)/L.1.

** The present document was submitted late owing to the need to incorporate the outcomes of the 2nd meeting of the Working Group on the Asia-Pacific Information Superhighway, held in Guangzhou, China, on 29 and 30 August 2016."

I. Introduction

1. In the developing region of Asia and the Pacific, less than 15 per cent of the population has access to high-speed Internet, and the situation in the least developed countries has not improved during the last 15 years according to the latest report of the Economic and Social Commission for Asia and the Pacific (ESCAP).¹ To address this issue, ESCAP, in its resolution 71/10, endorsed continued work on the Asia-Pacific information superhighway initiative. The initiative aims to improve regional broadband connectivity through a dense web of open access cross-border infrastructure that will be integrated into a cohesive land- and sea-based fibre network with the ultimate aims of increasing international bandwidth for developing countries in the region, lowering broadband Internet prices and bridging the digital divide in the region.

2. The Asia-Pacific information superhighway initiative complements the commitment of ESCAP member countries to General Assembly resolution 70/125 on the outcome document of the high-level meeting of the General Assembly on the overall review of the implementation of the outcomes of the World Summit on the Information Society, in which the Assembly recognized the urgent need to harness the potential of knowledge and technology for the promotion of the Sustainable Development Goals and the need to find ways to use this potential for development. In 2015, the Commission, in its resolution 71/10, requested the secretariat to promote the sharing of experiences, good practices and lessons learned in information and communications technology (ICT) for disaster risk reduction, management and response and building e-resilience and endorsed the establishment of the Working Group on the Asia-Pacific Information Superhighway. Its 1st meeting was held in Incheon, Republic of Korea, on 1 and 2 September, 2015. It decided to:

(a) Draft a master plan encompassing a long-term vision, targeted goals, specific activities and milestones with regard to the four pillars of the Asia-Pacific information superhighway initiative;²

(b) Draft a regional cooperation framework for the Asia-Pacific information superhighway initiative consisting of the four pillars.

3. The Working Group on the Asia-Pacific Information Superhighway also established the Asia-Pacific Information Superhighway Steering Group, consisting of the members of the Bureau of the Working Group and multi-stakeholder representatives with policy and technical expertise. The primary objective of the Steering Group was to draft a master plan for the Asia-Pacific information superhighway and a regional cooperation framework document.

4. In support of the Asia-Pacific information superhighway initiative, and to create the Master Plan for the Asia-Pacific Information Superhighway, ESCAP carried out a number of analyses and feasibility studies on the existing and missing terrestrial links and estimated demand for broadband services,

¹ United Nations, Economic and Social Commission for Asia and the Pacific, “State of ICT in Asia and the Pacific 2016”, Working Paper (forthcoming).

² Strengthening the regional broadband infrastructure; establishing regional internet traffic and network management systems and policies; enhancing ICT infrastructure resilience; and providing inclusive access to broadband internet.

e-resilience and Internet traffic management in South and West Asia, Central Asia and countries of the Association of Southeast Asian Nations (ASEAN).³ The studies and analyses were carried out in collaboration with other agencies, such as the National Information Society Agency of the Republic of Korea, the Asian Development Bank, LIRNEasia and the Internet Society. These studies were primarily focused on, but not limited to, the status of broadband adoption, fixed and mobile broadband infrastructure, pricing, domestic fibre-optic networks (terrestrial and interregional terrestrial) and international connectivity. With the International Telecommunication Union, ESCAP updates their collaborative broadband network maps.⁴

5. As drafted, the Master Plan requires the institutionalization of an Asia-Pacific information superhighway governance structure to ensure its effective implementation. The secretariat of the Commission, through intergovernmental processes, will ensure coordination, reporting and support. The Master Plan is intended to add value to the subregional initiatives, such as the ASEAN ICT Master Plan, and other initiatives, including member States' national ICT plans and initiatives.

6. The Master Plan for the Asia-Pacific Information Superhighway proposes the establishment of network corridors with the aim of achieving an efficient and effective physical network consisting of both terrestrial cross-border connections and submarine cable landing stations to realize a seamless Asia-Pacific regional information and communication network.

II. Highlights of the Commission's findings

7. Access to international connectivity or transit is largely dominated by submarine cable landings in the Asia-Pacific region. The Commission's analysis of the terrestrial network has shown that many countries in the region have backhaul domestic infrastructure networks that are poorly meshed and follow a "river system" pattern. Furthermore, the limited number of fibre interconnections across countries also limits the availability of total and per capita international bandwidth. This has affected the landlocked countries in particular, which do not have direct access to submarine cable landing stations and have to rely on limited terrestrial cross-border connections.

8. To date, ESCAP has conducted a number of studies in three subregions: South and West Asia, Central Asia and the ASEAN region. The findings are summarized below.

A. The state of information and communications technology in the Asia-Pacific region

9. More than 52 per cent of global fixed broadband subscriptions come from ESCAP member countries, followed by European countries (21.9 per cent) and North American countries (14.1 per cent). Seventy-four per cent of fixed broadband subscriptions in the ESCAP region are in East and North-East Asia, and more than half of the region's fixed broadband subscriptions are driven by

³ See www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/publications?page=1.

⁴ www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/asia-pacific-information-superhighway-maps.

China alone. High-income ESCAP countries are more digitally inclusive, while low-income ESCAP members show signs of the digital divide. Fixed broadband growth is spreading to emerging countries, albeit slowly and unevenly.

10. In addition, in the working paper, State of ICT in Asia and the Pacific 2016, a strong correlation between the quality of regulation and fixed broadband penetration was identified. Regarding total mobile broadband subscriptions, phenomenal growth has been observed across emerging economies, which are overtaking advanced countries. However, if weighted by population, it is clear that advanced countries have much higher penetration rates. Researchers analysed the broadband digital divide in ESCAP member countries and found that unless targeted policies are implemented, the digital divide will widen in the coming years.

B. Central Asian countries

11. Central Asia⁵ has done relatively well in mobile communications due to improved coverage and the availability of affordable devices. However, there is significant variation in Internet adoption across these 10 countries, with varying penetration rates. This has been attributed primarily to the high cost of Internet services. While most countries in the subregion remain significantly below the global average (10 per cent), Azerbaijan, Georgia and Kazakhstan all have fixed broadband penetration rates above the global average, with Armenia only slightly below. In mobile broadband, Armenia, Azerbaijan, Kazakhstan and Kyrgyzstan all perform well against the global average.

12. However, the Central Asian countries, even taken together as a whole, lack adequate international bandwidth. This is in stark contrast to other subregions, such as the ASEAN region, which has sufficient bandwidth. Furthermore, most of these countries are heavily dependent on their neighbours for access to international bandwidth.

13. The infrastructure connections of these 10 economies with the rest of the world mostly comprise terrestrial landing cables although Pakistan and Georgia have access to submarine cables. These 10 countries are surrounded by the Russian Federation in the north, China in the east, the Islamic Republic of Iran and Pakistan in the south, and Turkey in the west. These neighbouring countries could provide additional international bandwidth terrestrially as well as through submarine cables to the landlocked countries. Furthermore, Central Asia has a number of interconnected terrestrial cable networks running through the subregion, such as the Trans-Asia-Europe line, the Europe-Persian Express Gateway and the Trans-Eurasian Information Superhighway. These cable systems could be tapped for international bandwidth by the landlocked countries. Furthermore, these cable systems present an opportunity for alternative redundant routes to the existing choke points in the current undersea cable system.

14. While broadband penetration is generally low, consumers and businesses across the 10 countries are increasingly accessing the Internet through wireless broadband rather than fixed broadband. This trend is prevalent due to lack of or insufficient fixed line infrastructure, revealing major weaknesses in the

⁵ For the purposes of the Asia-Pacific information superhighway initiative: Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan and Uzbekistan.

Central Asian countries. It has also been noted that most of these countries in particular lack the necessary fixed backbone infrastructure required to support the emerging demand for wireless communications.

C. Association of Southeast Asian Nations countries

15. ASEAN countries have made extensive investments in fibre and other broadband infrastructure (domestic as well as international). However, a wide gap in the level of access and services exists among the ASEAN countries. The average Internet speed in ASEAN countries falls below the world average, except in Singapore and Thailand. Cambodia, Indonesia, the Lao People's Democratic Republic, Myanmar and Viet Nam would require additional investments to expand their domestic networks.

16. Observations of the quality of the backbone network and Internet traffic exchange connectivity among ASEAN countries indicate noticeable differences within the subregion. In the worst case, the assessment showed an international backbone trunk line download speed of 0.15 megabits per second, a latency of 230 milliseconds and a tromboning index⁶ of 35. In the best case, the assessment showed a download speed of 50.1 megabits, a latency of 7.5 milliseconds and tromboning index of 1. This indicates that the backbone network connectivity and the Internet traffic exchange and management systems in the subregion are significantly inefficient. Broadband penetration in ASEAN is also still very low, with large gaps between countries. It was also noted that there is relatively weak land-based interconnectivity and a high cost or high price structure. The regional Internet transit prices in some countries, such as Cambodia, the Lao People's Democratic Republic, Myanmar and the Philippines, were 10 times more expensive than those in Singapore.

17. International connectivity in most ASEAN countries is relatively weak, except in Malaysia, the Philippines and Singapore. Cambodia relies on backhaul agreements with other neighbouring countries for international connectivity. Indonesia has weak and limited interregional connectivity and strongly depends on Singapore for its transit capacity. The only landlocked country in the ASEAN subregion, the Lao People's Democratic Republic, has no direct connectivity to submarine cable networks.

D. South and West Asian countries

18. An analysis of telecommunications, Internet markets and broadband infrastructure in nine countries in the subregion (Bangladesh, Bhutan, India, the Islamic Republic of Iran, Maldives, Nepal, Pakistan, Sri Lanka and Turkey) revealed a sharp disparity among the countries in terms of bandwidth availability. Such a disparity is detrimental to economic growth, social development and inclusiveness. This weak terrestrial fibre-optic connectivity has been the root cause of the subregion's bandwidth inequality and low capacity, high cost and unreliability.⁷ It has led to expensive consumer and

⁶ A tromboning index is defined as Internet routing distance/straight line distance from the source to the destination of a packet.

⁷ United Nations, Economic and Social Commission for Asia and the Pacific, "An in-depth study on the broadband infrastructure in South and West Asia". Available from www.unescap.org/sites/default/files/Broadband_Infrastructure_South%26West_Asia.pdf.

wholesale pricing of bandwidth and the limited availability and penetration of advanced ICT services and applications, including broadband.⁸

19. Both fixed and mobile broadband infrastructure in the subregion could be significantly expanded. The price of Internet transit varies from very reasonable (Turkey), to moderate (India), to expensive for the rest of the countries in the subregion. With the exception of India and the Islamic Republic of Iran, which enjoy excellent submarine cable-based international connectivity, the international connectivity of the rest of the countries in the subregion varies from sufficient, somewhat weak to weak. Bhutan and Nepal, the two landlocked countries in the subregion, are entirely dependent on India for international submarine connectivity. The competition in the subregion's markets is competitive (India), somewhat competitive (Bangladesh and Pakistan) and less competitive (Bhutan, the Islamic Republic of Iran, Maldives, Nepal, Sri Lanka and Turkey).

E. Status of information and communications technology in the Pacific

20. ESCAP has yet to carry out studies in the Pacific subregion. However, reforms in the telecommunications sector of the Pacific islands have resulted in a major expansion in terms of connectivity through submarine cables. The impact of mobile phones and Internet access has been widespread, with benefits that include better access to health, education, market information, financial services and information at times of natural disasters.⁹

III. Vision and the four pillars

21. As a pillar of regional connectivity, the Asia-Pacific information superhighway initiative shall be a catalyst to develop seamless regional broadband networks which improve affordability, reliance, resilience and coverage and thereby address the causes of digital divides, develop the Internet ecosystem to support the implementation of the Sustainable Development Goals, and stimulate the digital economy in Asia and the Pacific.

22. Despite the substantial gains reaped from broadband Internet across all sectors, progress has been uneven across Asia and the Pacific, which remains one of the most digitally divided regions in world. The widening digital divide is a legitimate source of concern. To address this concern, the Asia-Pacific information superhighway concept was defined at the

⁸ Turkey's per capita international Internet bandwidth was more than 30 kilobytes per second, while Bangladesh's was only 0.3 kilobyte per second, a ratio of 100 to 1. Countries such as Bangladesh, India and Nepal (which together account for one fifth of the world's population) have per capita international Internet bandwidth at less than 1 kilobyte per second; bandwidth in the Islamic Republic of Iran, Pakistan and Sri Lanka is also extremely weak, at 2.2 kilobytes per second or less, while, in comparison, the average in Western Europe is approximately 100 kilobytes per second. The annual 1 megabit per second broadband subscription plus installation as a percentage of nominal gross domestic product per capita varies from extremely affordable (Turkey), affordable (Sri Lanka), reasonable (Bhutan, India, the Islamic Republic of Iran and Maldives), somewhat expensive (Pakistan) to very expensive (Bangladesh and Nepal).

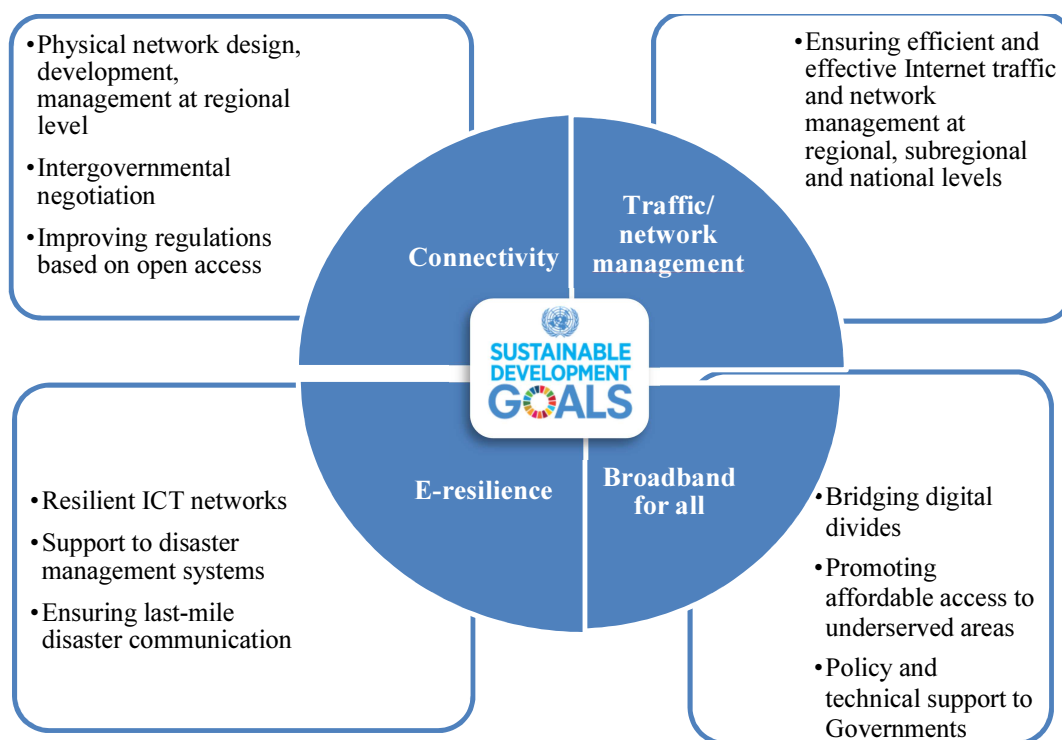
⁹ Siopé Vakataki'Ofa, *Telecommunications Regulatory Reform in Small Island Developing States: The Impact of the WTO's Telecommunications Commitment* (Newcastle upon Tyne, Cambridge Scholars Publishing, 2012).

1st meeting of the Working Group on the Asia-Pacific Information Superhighway based on the above-mentioned research and analysis that identified gaps, opportunities and the need for regional cooperation on topics related to the four pillars (figure I):

- (a) Physical infrastructure upgrade and interconnection;
- (b) Internet traffic management;
- (c) Building regional network resilience;
- (d) Promoting broadband access in underserved areas.

Figure I

Four pillars of the Asia-Pacific information superhighway



23. ESCAP and the International Telecommunication Union collaborated on an interactive map of the information superhighway.¹⁰ The interactive map has been used to identify a number of missing terrestrial fibre-optic links as well as submarine cable choke points.

A. Connectivity

24. The Asia-Pacific information superhighway initiative advocates enhancing seamless regional broadband fibre-optic backbone connectivity by upgrading and increasing the resilience of and integrating cross-border intra- and interregional broadband backbone networks, which will lead to open access and better balanced undersea and terrestrial networks. In addition,

¹⁰ www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/asia-pacific-information-superhighway-maps.

the initiative advocates leveraging existing regional connectivity opportunities offered by the Asian Highway and the Trans-Asian Railway networks, as well as other trans-border infrastructure, to utilize the rights of way of existing and planned transport networks and to achieve rapid, cost-effective deployment of optical fibre across and within countries. Besides developing regional terrestrial fibre-optic cables, the Asia-Pacific information superhighway initiative also seeks to establish operation models of terrestrial cables, facilitate the formation of trans-border terrestrial cable networks and enhance the quality and efficiency of transition, so as to put the completed terrestrial cable resources to more efficient use and to promote regional interconnectivity. These aspects are highlighted in the Asia-Pacific Information Superhighway Regional Cooperation Framework Document.¹¹

B. Traffic and network management

25. The Asia-Pacific information superhighway initiative also promotes enhancing Internet traffic exchange and management systems and harmonizing related policies in a more efficient and effective manner, domestically as well as at the subregional and regional levels, which will lead to better quality of service. This pillar aims to establish sufficient Internet exchange points within the region, harmonize Internet traffic management practices, principles and related policy and regulatory frameworks in more open, neutral and non-discriminatory ways, and set out general principles on Internet exchange points.

C. E-resilience

26. The Asia-Pacific information superhighway initiative aims to enhance the resilience of existing/planned ICT infrastructure through methods such as enhanced network diversity, while recognizing the importance of resilient infrastructure to sustainable development and the critical role played by ICT in disaster risk reduction and management.

D. Broadband for all

27. The Asia-Pacific information superhighway initiative supports an environment that will lead to the promotion of inclusive access for all, acknowledging the special needs and challenges faced by least developed and landlocked developing countries. In addition to enhancing international fibre-optic backbone connectivity, the initiative also drives the development of domestic ICT infrastructure in related countries, including domestic backbone and backhaul networks, access network and internet data centres, among others. The improvement of domestic ICT infrastructure can promote large-scale broadband expansions by lowering broadband costs per capita. Effective use of Internet data centres can lead to the absorption of the demand for international bandwidth and the promotion of the development of domestic ICT applications.

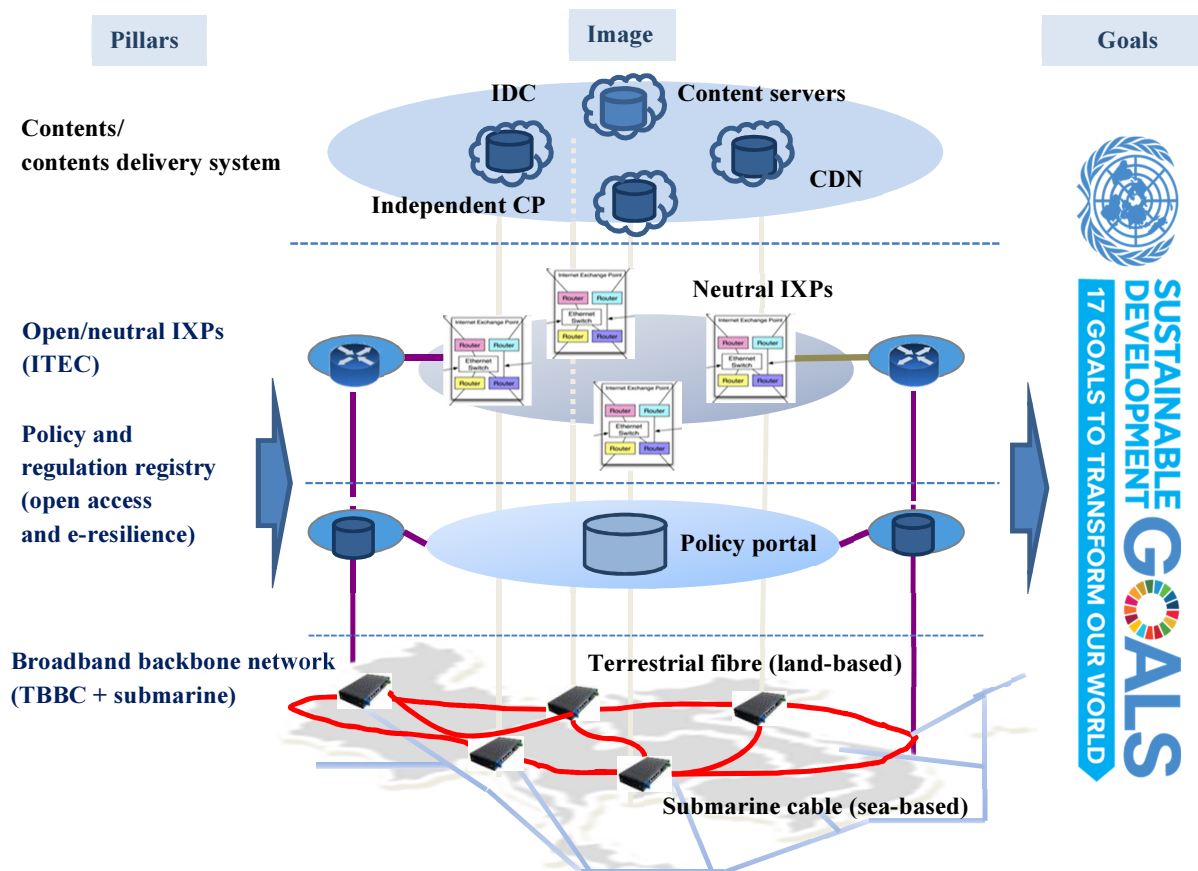
¹¹ E/ESCAP/CICTSTI(1)/3.

IV. Asia-Pacific information superhighway layered map of the network structure

28. The Asia-Pacific information superhighway can also be described with a layered map of the network structure, which primarily explains functional differences in each layer of the network, as shown in figure II, such as the broadband backbone network layer, the policy and regulation layer, the open neutral Internet exchange point layer and the content/content delivery layer. The broadband backbone network layer shall be made up of well-balanced seamless submarine and terrestrial fibre networks after identification of missing links at the national, subregional and regional levels. The policy and regulation layer represents a regional governance system or regional coordination body that coordinates intermediate Internet Protocol (IP) routing and peering or transit and negotiates with regulators to set network neutrality and non-discriminatory rights of access to the backhaul for the newcomers.

29. The open neutral Internet exchange points layer ensures domestic IP traffic exchange among domestic Internet service providers and regional direct IP peering/transit among neighbouring countries. It is possible to have direct fibre interconnection between Internet exchange points to support the Internet service providers who need diversified connectivity to Internet exchange points or Internet service providers in other countries. The content or content delivery layer serves as the Internet data centre, where independent providers provide content through the content delivery network. The content delivery network service providers and content provider have a very important role in that they reduce cross-border Internet traffic by caching more content on local servers.

Figure II
Asia-Pacific information superhighway layered map



Source: ESCAP and National Information Society Agency, *A Pre-Feasibility Study on the Asia-Pacific Information Superhighway in the ASEAN Sub-region: Conceptualization, International Traffic & Quality Analysis, Network Topology Design and Implementation Model* (Bangkok, 2016). Available from www.unescap.org/sites/default/files/ASEAN%20report%20final.pdf.

Abbreviations: CDN, content delivery network; CP, content provider; IDC, Internet data centre; ITEC, Internet traffic exchange connectivity; IXP, Internet exchange point; TBBC, terrestrial broadband backbone connectivity.

V. Medium-term objectives of the Asia-Pacific information superhighway

30. For the current time frame of the Master Plan, 2016 to 2018, the medium-term objectives focus on three aspects: (a) seamless, affordable and reliable regional broadband connectivity, with well-balanced sea- and land-based connectivity and Internet traffic exchange management, (b) the promotion of e-resilience and (c) the promotion of inclusive broadband access in underserved areas and narrowing the digital divide.

31. Regional broadband connectivity initiatives should build on existing research and analyses and lead to concrete initiatives by (a) identifying missing links,¹² (b) tapping cross-sectoral synergies for fibre-optic deployment and (c) improving regulatory frameworks and promoting open access to critical infrastructure.

32. Sufficient numbers of Internet exchange points at domestic and subregional levels and common principles on Internet traffic exchange need to be established to prevent Internet traffic tromboning and to improve service quality for regional backbone networks for cross-border inter- and intraregional Internet service in order to address the issue of high transit costs.

33. The objectives for inclusive broadband access include improvements to the regulatory frameworks and market practices in the Asia-Pacific region which often limit competition in both the international transit and national backbone segments of broadband transmission markets. Successful policy and regulatory measures in this respect will involve simplifying licensing regimes for access to submarine and cross-border connections and reducing the exclusive control of incumbents on international gateways and submarine cable land-based stations. Furthermore, accelerating reforms to foster competition on broadband transmission markets is also seen as a key priority to lower the costs of broadband.

VI. Proposed network corridors for the Asia-Pacific information superhighway

34. Physically, the subregional network corridor is the cross-border intra- and interregional broadband infrastructure. The network corridor links will be composed mainly of fibre-optic cables, ducts and conduits that cross neighbouring countries, subregions and regions. The network corridor, through the sophisticated physical network infrastructure, will play an important role in determining connectivity and the price of international bandwidth in Asia and the Pacific. Each of the subregional networks will be connected to another subregional network through a corridor using the respective subregion's main Internet exchange points. The physical networks will be supported by harmonized policies and regulations as well as measures to promote e-resilience and inclusive broadband access, including regional cooperation, as illustrated in the Asia-Pacific Information Superhighway Regional Cooperation Framework Document.

35. The establishment of Internet exchange points in each country, which in turn will be connected to the subregional Internet exchange points, which will also be the point of presence for external connectivity to Europe and America, will constitute one main component of the network corridor. In total, five network corridors have been identified for the Asia-Pacific information superhighway (figure III). The Russian-Chinese fibre-optic cable system is considered a network corridor as it will serve as alternate terrestrial routes for international connectivity.

¹² See www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/resources.

Figure III
Proposed network corridors in Asia and the Pacific



Abbreviations: ASEAN, Association of Southeast Asian Nations; SIDS, small island developing States.

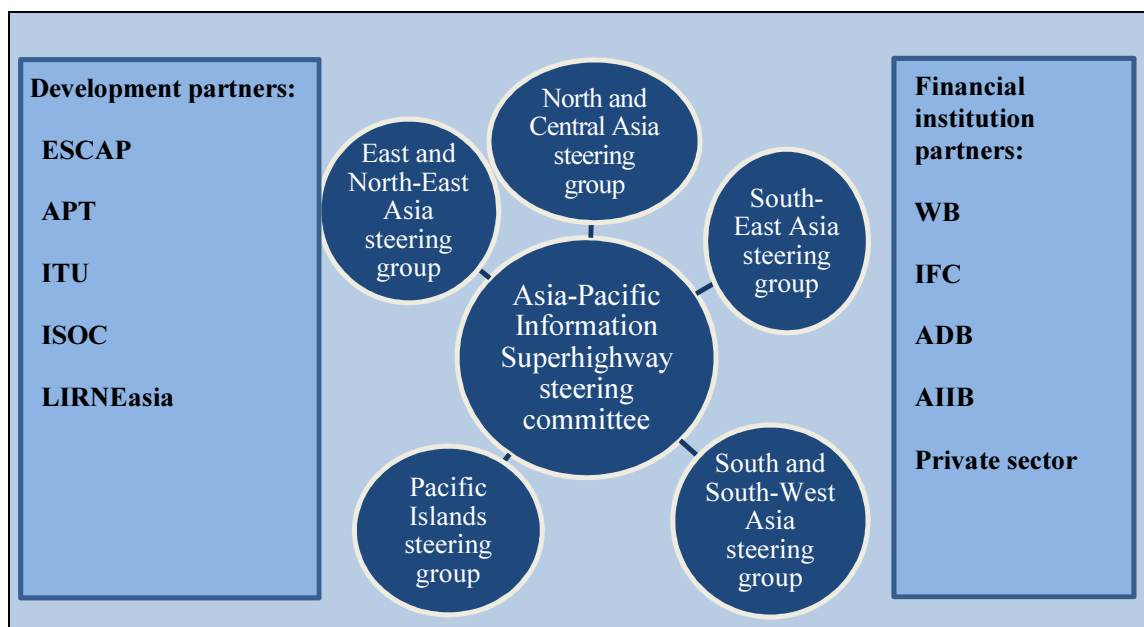
VII. Regional partners for the Asia-Pacific information superhighway

36. Partnerships are an essential building block in the Master Plan for the Asia-Pacific Information Superhighway, as the information superhighway covers a wide geographic area and comprises various layers of networks, and the infrastructure will be primarily developed by the private sector. It is anticipated that, through the regional partnership comprising the private sector, Governments, international agencies, non-governmental organizations, research institutes and regional/international financial institutions, the coordination, harmonization, implementation and funding opportunities for various Asia-Pacific information superhighway sub-projects could be secured, while at the same time sharing expertise, good practices and lessons learned.

37. Regional partners constitute many stakeholders working together within the common framework of the Asia-Pacific information superhighway initiative (figure IV). Within this framework, there are five subregional steering groups consisting of members of the steering committee. Development partners and financial institution partners continue to provide support through their respective mandates at the national, subregional and regional levels to member States. Further details about a regional cooperation framework and financing options are contained in the Asia-Pacific Information Superhighway Regional Cooperation Framework Document.

38. Collaboration and partnerships, including with entities in other socioeconomic sectors, are essential to leveraging existing regional connectivity opportunities offered by the Asian Highway and the Trans-Asian Railway networks and other trans-border infrastructure, in order to use rights of way of existing and planned transport networks for the rapid, cost-effective deployment of optical fibre across and within countries.

Figure IV
Regional partners

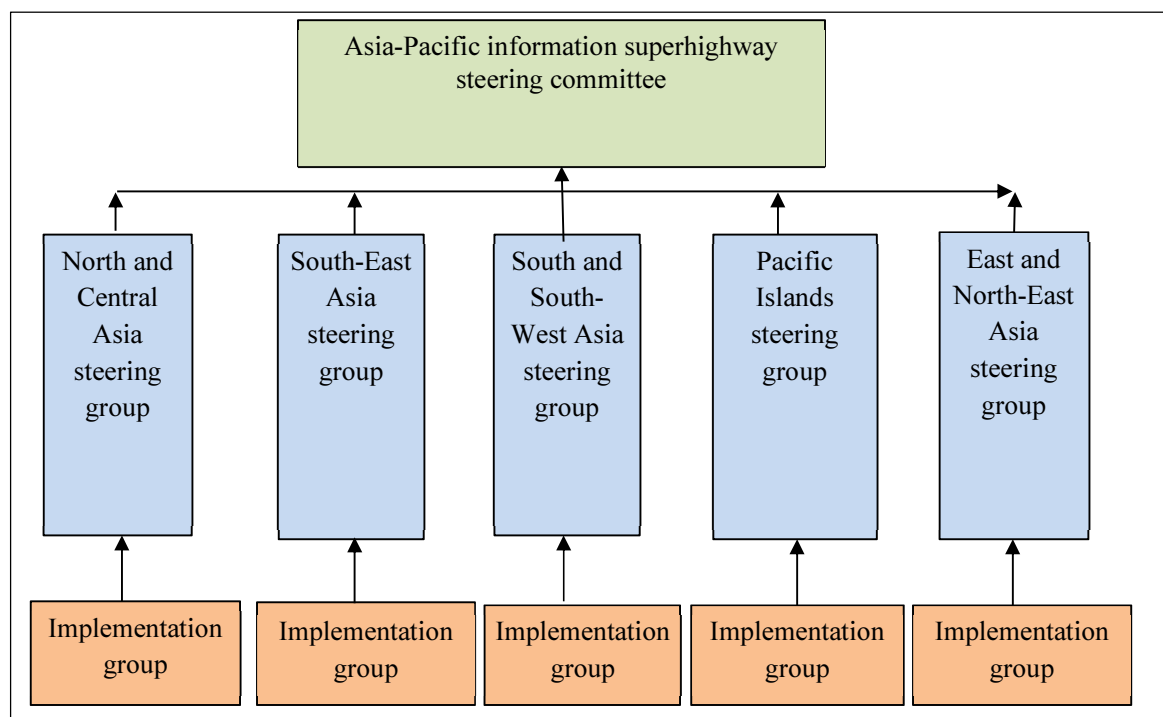


Abbreviations: ADB, Asian Development Bank; AIIB, Asian Infrastructure Investment Bank; APT, Asia-Pacific Telecommunity; ESCAP, Economic and Social Commission for Asia and the Pacific; IFC, International Finance Corporation; ISOC, Internet Society; ITU, International Telecommunication Union; WB, World Bank.

VIII. Governance structure of the Asia-Pacific information superhighway

39. The proposed governance structure of the Asia-Pacific information superhighway is intended to support the effective implementation of activities of the initiative (figure V). It consists of the overall Asia-Pacific information superhighway regional layer (steering committee), under which each subregional corridor (steering group) will be supported, where necessary, by an implementation group consisting of telecommunications operators. Activities will be developed around the four pillars, which should facilitate the implementation of the subregional and national ICT initiatives. As shown in figure V, the steering groups will be tasked with discussing and identifying issues pertaining to connectivity, traffic management, e-resilience and the digital divide for each subregion.

Figure V
Proposed governance structure for the Asia-Pacific information superhighway network corridors



40. The proposed governance structure has been designed to align with the subregional initiatives so that it meets the needs of the subregions and dovetails with the overall objectives of the Asia-Pacific information superhighway initiative. In addition, the governance structure will capitalize on relevant international expertise from international and specialized agencies, such as the International Telecommunication Union, the Asia-Pacific Telecommunity, the World Bank, the Asian Development Bank, the Asian Infrastructure Investment Bank and other financial institutions. It will also include other institutions such as the Internet Society, LIRNEasia and other research institutes/think tanks as partners. Membership of each subregional steering group will not be limited to member States of that particular subregion, but will be open to all ESCAP member States.

41. The regional layer will consist of monitoring, coordination and advisory functions, which will subsequently report to various intergovernmental bodies through the ESCAP secretariat, as described in the Asia-Pacific Information Superhighway Regional Cooperation Framework Document.

IX. Strategic initiatives 2016-2018

42. The proposed strategic initiatives of the Asia-Pacific information superhighway for 2016-2018 seek to improve broadband connectivity in the Asia-Pacific region (table 1).

Table 1

Strategic initiatives of the Asia-Pacific information superhighway 2016-2018

Initiative 1: Identification, coordination, deployment, expansion and integration of the regional backbone networks at the cross-border intra- and interregional levels, in collaboration with member countries and subregional organizations

Areas of focus	Description	Party responsible
Integrated regional backbone and interconnectivity	<ul style="list-style-type: none"> Identify missing links Design hybrid mesh and ring structure of resilient regional terrestrial backbone network Plan centre node establishment for low cost and reliable delivery of traffic 	LIRNEasia
<ul style="list-style-type: none"> Terrestrial fibre network Coherent mesh network 		
Operation models of trans-border terrestrial cables	<ul style="list-style-type: none"> Study operating models and standards and quality standards, inter alia, of trans-border terrestrial cable networks 	
Domestic broadband infrastructure	<ul style="list-style-type: none"> Examine domestic backbone network routes in less developed countries Help develop broadband network development strategies in least developed countries Develop and plan data centres, cloud information-sharing and other affordable alternatives 	
Supporting activities	Description	Party responsible
1.1 Conduct detailed feasibility studies in some corridors, taking into account the special needs and challenges of landlocked developing countries, least developed countries and small island developing States	<ul style="list-style-type: none"> Determine traffic, revenue, and preliminary costs and affordability Determine special needs and challenges for landlocked developing countries, least developed countries and small island developing States Coordinate infrastructure development planning with member countries and the private sector among small island States 	ESCAP, member countries, research institutes, think tanks, subregional organizations and financial institutions
1.2 Update Asia-Pacific information superhighway transmission maps	<ul style="list-style-type: none"> Maximize cross-sectoral synergy or utilize existing roads and railroad infrastructure Update the Asia-Pacific information superhighway transmission map 	ESCAP, International Telecommunication Union and member countries
1.3 Rough order of magnitude	<ul style="list-style-type: none"> Explore cost estimation in collaboration with suppliers where applicable 	ESCAP, private sector

Initiative 2: Establish a sufficient number of Internet exchange points at the national and subregional levels and set out common principles on Internet traffic exchange to prevent Internet traffic tromboning, decrease transit costs and improve service quality

Areas of focus	Description	Party responsible
Harmonized Internet traffic exchange and management • Enhance regional, subregional and national Internet exchange points • Remove entry barriers to new Internet service providers and promote fair market competition	• Promote non-discriminatory direct bilateral peering/transit between neighbouring States' Internet service providers • Establish intra-/interregional, neutral Internet exchange points • Establish national Internet exchange points for the domestic traffic to be exchanged inside the State	
Supporting activities	Description	Party responsible
2.1 Regional diagnostic study	• Conduct diagnostic study, analyse best practices in Internet traffic exchange/management in the region	ESCAP, International Telecommunication Union, Asia-Pacific Telecommunity, Asia Pacific Network Information Centre, member countries and the private sector
2.2 In-depth study on traffic production volume	• Carry out studies on traffic volume, destination and distribution, routing and distance including overall Internet service quality at the national and regional levels	ESCAP, in consultation with the private sector, Asia Pacific Network Information Centre and member countries
2.3 Internet exchange point system and operation model	• Recommend set-up of Internet exchange points, including operating principle and governance model	ESCAP, Asia Pacific Network Information Centre, research institutes and the private sector
2.4 Rough order of magnitude	• Estimate cost in collaboration with device vendors or partner entities	ESCAP, in consultation with the private sector

Initiative 3: Regional social and economic studies

Areas of focus	Description	Party responsible
Analysis of the economic and social impacts of future and near-future ICT trends	<ul style="list-style-type: none"> • Review technological advancements and discern their impacts on economies and society for the inclusive development of ICT that allows policymakers to make informed decisions • Conduct needs assessment of ICT development in ESCAP countries, taking into account the special needs and challenges of landlocked developing countries, least developed countries and small island developing States • Conduct capacity-building on enhancing the productive use of broadband connectivity 	ESCAP, United Nations Educational, Scientific, and Cultural Organization, the private sector, other United Nations agencies and financial institutions

Initiative 4: Enhancing ICT infrastructure resilience in the Asia-Pacific region

Areas of focus	Description	Party responsible
4.1 Terrestrial fibre links to international connectivity	<ul style="list-style-type: none"> • Explore ways to strengthen e-resilience in fibre link to Europe • Explore the provision of additional bandwidth for landlocked Central Asian countries 	ESCAP, member countries, the private sector and financial institutions
4.2 Diversified routes, including co-deployment of fibre-optic cables embedded in the Asian Highway and the Trans-Asian Railway networks	<ul style="list-style-type: none"> • Explore fibre-optic route diversification capitalizing on the infrastructure of the Asian Highway and Trans-Asian Railway networks 	ESCAP, and member countries
4.3 Protecting critical infrastructure with disaster risk reduction	<ul style="list-style-type: none"> • Integrate approach to plan infrastructure development, incorporating disaster management from design stage 	ESCAP, research institutes, United Nations agencies and the private sector
4.4 Cybersecurity preparedness	<ul style="list-style-type: none"> • Support and review national ICT preparedness for cybersecurity 	Asia Pacific Network Information Centre, World Bank and other regional and international organizations
4.5 Introduction of Internet Protocol version 6	<ul style="list-style-type: none"> • Support preparedness for Internet Protocol version 6 	Asia Pacific Network Information Centre

Initiative 5: Policy and regulations for leveraging existing infrastructure, technology and inclusive broadband initiatives

Areas of focus	Description	Party responsible
5.1 Submarine cable backhaul and cross-border affordability and infrastructure sharing	<ul style="list-style-type: none"> Develop cross-border infrastructure-sharing policy based on the above studies, consultations and partnerships 	Member countries and subregional organizations
5.2 Local/national government networks accessibility to Internet exchange point and peering/transit at Internet exchange point	<ul style="list-style-type: none"> Develop policy on infrastructure sharing, accessibility to Internet exchange point 	Member countries and subregional organizations
5.3 National ICT policy and regulatory frameworks	<ul style="list-style-type: none"> Update national policies and regulations to enable infrastructure development and inclusive broadband Enable policies that lead to open access, non-discriminatory pricing, competition and innovation Regulatory reforms pertaining to telecommunications, taxes and customs duties 	ESCAP, United Nations agencies, subregional organizations and member countries

Initiative 6: Capacity-building

Areas of focus	Description	Party responsible
6.1 Institutional and individual capacity-building	<ul style="list-style-type: none"> Capacity-building, sharing of good practices and lessons learned at the regional level pertaining to network traffic management and monitoring, deployment of terrestrial/submarine fibre 	ESCAP, all member countries, research institutes, the private sector and United Nations agencies
6.2 Technical training	<ul style="list-style-type: none"> Technical training on establishing Internet service provider and cybersecurity 	Asia Pacific Network Information Centre

Initiative 7: Asia-Pacific information superhighway project funding mechanism based on public-private partnerships

Areas of focus	Description	Party responsible
7.1 Formulation of an Asia-Pacific information superhighway funding platform	<ul style="list-style-type: none"> Explore and formulate a mechanism to fund the Asia-Pacific information superhighway project in partnership with the World Bank, the Asian Development Bank, the Asian Infrastructure Investment Bank and other financial institutes Explore public funding arrangements and public-private partnerships and special purpose vehicles for the promotion of infrastructure development Explore government funding options on Internet exchange point construction and operations Collect information on ICT project funding mechanisms in the Asia-Pacific region 	ESCAP, United Nations agencies, subregional organizations, the private sector, financial institutions and member countries

X. Implementation plan

43. The timeline for the Master Plan is 2016 to 2018 (table 2). In 2018, the first review of progress will be submitted to the Committee on Information and Communications Technology, Science, Technology and Innovation at its second session, in 2018. Given that some activities may need to be implemented beyond 2018, the Master Plan will be updated and revised after the first review, as described in the Asia-Pacific Information Superhighway Regional Cooperation Framework Document.

Table 2

Asia-Pacific information superhighway implementation plan 2016-2018 (activities not exhaustive)

Action item	2016				2017				2018			
	1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4
Steering committee to be established and operational												
1.1 Conduct feasibility studies												
2.3 Internet exchange point system and operation model												
3. Regional social and economic studies												
4.1 Study route diversification as part of e-resilience												
5.1 Undertake policy initiatives for cross-border connectivity												
6.1 Capacity development												
7.1 Formulation of Asia-Pacific information superhighway funding platform												
Present Master Plan for adoption												
Evaluation and progress report												

First session of the Committee

Seventy-third session of the Commission

Seventy-fourth session of the Commission

Annex I

Terms of reference of the Asia-Pacific Information Superhighway Steering Committee

I. Membership criteria

1. The membership of the Asia-Pacific Information Superhighway Steering Committee shall consist of all member States of the Economic and Social Commission for Asia and the Pacific (ESCAP) and, due to the nature of the assigned activities, it will also consist of multi-stakeholder representatives of non-profit organizations and research institutes with policy and technical expertise and experts from member country Governments (in their personal capacity).
2. The Bureau shall be elected by Steering Committee members for a term of one year.
3. The Steering Committee shall meet once a year.
4. The Chair of the Steering Committee shall be elected by the members of the Steering Committee.
5. The Steering Committee shall be supported in its functions by the secretariat.

II. Objectives

6. The Steering Committee shall monitor the implementation of the Master Plan for the Asia-Pacific Information Superhighway and the Asia-Pacific Information Superhighway Regional Cooperation Framework Document, coordinate subregional work, provide policy guidance and, if necessary, set up a technical advisory group.

Annex II

Terms of reference of the Asia-Pacific Information Superhighway subregional steering groups

I. Membership criteria

1. The membership of the Asia-Pacific Information Superhighway subregional steering groups shall consist of member States of the Economic and Social Commission for Asia and the Pacific (ESCAP) from the subregion concerned as well as any other ESCAP member States interested in subregional work.
2. The bureau of each steering group shall be elected by ESCAP member States from the subregion for a term of one year.
3. The chair of each steering group shall be elected by the members of that steering group.
4. Each steering group shall be supported in its functions by the secretariat.

II. Objectives

5. Each steering group shall monitor the implementation of subregional ICT projects, provide policy guidance and, if necessary, set up an implementation group.
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