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**Review of issues pertinent to the subsidiary structure of
the Commission, including the work of the regional
institutions: information and communications technology**

Asia-Pacific information superhighway: for inclusive and seamless connectivity

Note by the secretariat**

Summary

Member States have expressed their increasing support for a concerted regional approach to improve broadband connectivity. This was highlighted at the fourth session of the Committee on Information and Communications Technology of the Economic and Social Commission for Asia and the Pacific (ESCAP), held in October 2014, at which member States recommended the creation of a working group on the Asia-Pacific information superhighway. Subsequently, the Commission endorsed the recommendation for its creation in resolution 71/10.

Based on ESCAP analysis, the gap in broadband connectivity – as measured by fixed subscriptions – among ESCAP member countries continues to widen and is unlikely to close without targeted interventions. In fact, the broadband expansion observed in Asia and the Pacific has been primarily driven by one country with more than 50 per cent of the fixed broadband subscriptions for the Asia-Pacific region. This trend has increased the region's broadband connectivity share of the global total to more than half. However, the broadband connectivity level among ESCAP members varies significantly, with the slowest progress observed among low-income countries, with a subsequent widening of the digital divide.

The present report outlines mechanisms to ensure that all citizens have opportunities for equal access to the power of broadband Internet and to leverage its full potential towards achieving the Sustainable Development Goals and the goals of the World Summit on the Information Society. In particular, the Asia-Pacific information superhighway initiative aims to consolidate efforts promoting regional connectivity to bridge the digital divide, create an enabling Internet ecosystem and promote the digital economy in the Asia-Pacific region.

* E/ESCAP/72/L.1.

** This document was submitted late due to the need to collect the data and information from the Workshop on Knowledge and Policy Gaps in Disaster Risk Reduction and Development Planning, which was held in Bangkok on 8 and 9 March 2016.

I. Introduction

1. The ability to access affordable and reliable information and communications technology (ICT) infrastructure and services has been deemed a prerequisite for inclusive socioeconomic development, especially since it furthers entrepreneurship, innovation and economic growth, while enabling education, health and the provision of other services in an efficient and effective manner. The central role of ICT in development objectives has been widely recognized, including by the United Nations Conference on Sustainable Development, the World Summit on the Information Society, the Commission on Science and Technology for Development of the United Nations Conference on Trade and Development, and the Partnership on Measuring Information and Communications Technology for Development, of which the Economic and Social Commission for Asia and the Pacific (ESCAP) is a member. In acknowledgement of its value for achieving socioeconomic progress, ICT is sometimes called a “meta-infrastructure” due to its wide-ranging applications in education, finance, commerce, governance and welfare, among other sectors. It has also come to be regarded as a development enabler.

2. In this context, the year 2015 was a milestone, with exciting developments, advances and progress in the ICT sector. The Economist Intelligence Unit forecast that the number of mobile subscribers will reach 7 billion across the globe in 2019.¹ The International Telecommunication Union concluded that significant progress was made globally with regard to target 8.F of the Millennium Development Goals (In cooperation with the private sector, make available the benefits of new technologies, especially information and communications).²

3. The Asian and Pacific region, in particular, has been leading ICT growth in the past decade. Some of the region’s ICT advanced economies top major ICT indicators. The Department of Economic and Social Affairs of the United Nations ranked the Republic of Korea, Australia and Singapore as the top three countries, with Japan in sixth place and New Zealand in ninth, in *E-Government Survey 2014: E-Government for the Future We Want*.³ The ICT Development Index 2015 of the International Telecommunication Union,⁴ which measures ICT access, usage and skills, ranked the Republic of Korea at the top of the list, followed by Hong Kong, China (ninth), Japan (eleventh) and Australia (thirteenth).

4. However, a recent report on the World Summit on the Information Society⁵ points out that the nature and scope of the digital divide have changed and that the broadband digital divide is indeed widening. Unaddressed, this disparity between the advanced and developing economies will lead to exacerbated gaps in ICT access and capabilities and which will subsequently impact development opportunities, due to the very nature of ICT as a meta-infrastructure and development enabler. The General

¹ www.eiu.com/industry/article/1933461577/key-forecasts/2015-08-28.

² International Telecommunication Union, “The world in 2015”, ICT Facts & Figures (Geneva, 2015).

³ Available from <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2014>.

⁴ www.itu.int/net4/ITU-D/idi/2015/.

⁵ United Nations Conference on Trade and Development, *Implementing WSIS Outcomes: A Ten-Year Review* (New York and Geneva, 2015). Available from http://unctad.org/en/PublicationsLibrary/dtlstict2015d3_en.pdf.

Assembly, in its resolution 70/125 on the outcome document of the high-level meeting of the Assembly on the overall review of the implementation of the outcomes of the World Summit on the Information Society, also noted the issue and underlined the critical importance of alignment between the World Summit on the Information Society and the Sustainable Development Goals to capitalize the transformative capabilities of ICT to achieve the Goals.

5. In this context, the present report summarizes the current status of the digital divide, with a focus on fixed and mobile broadband access, the progress made in the implementation of Commission resolutions on regional connectivity and the Asia-Pacific information superhighway, and findings of the Commission.

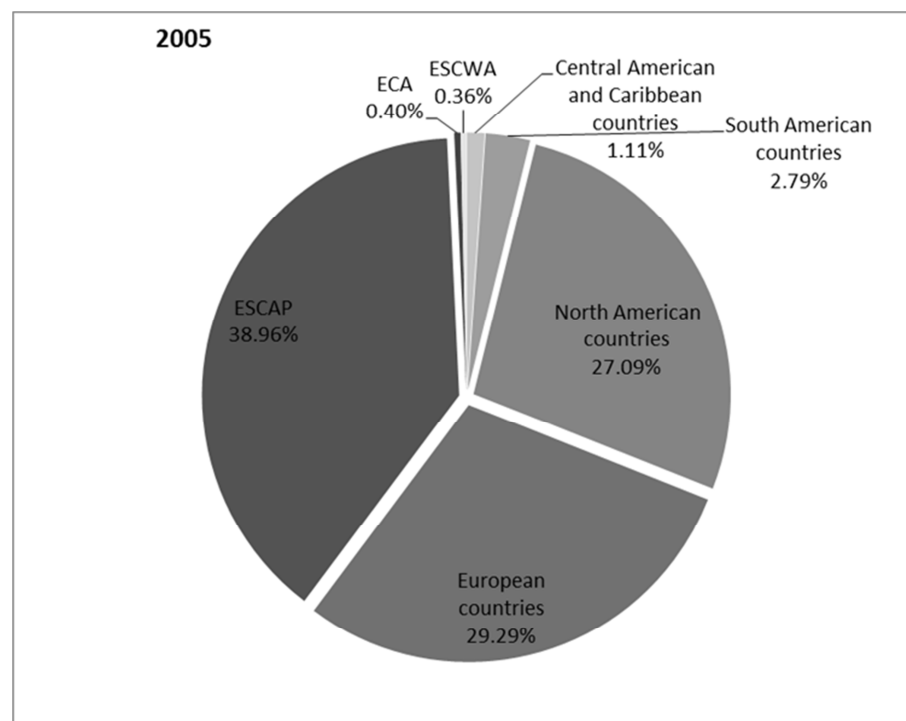
II. Characteristics of the digital divide in the Asia-Pacific region

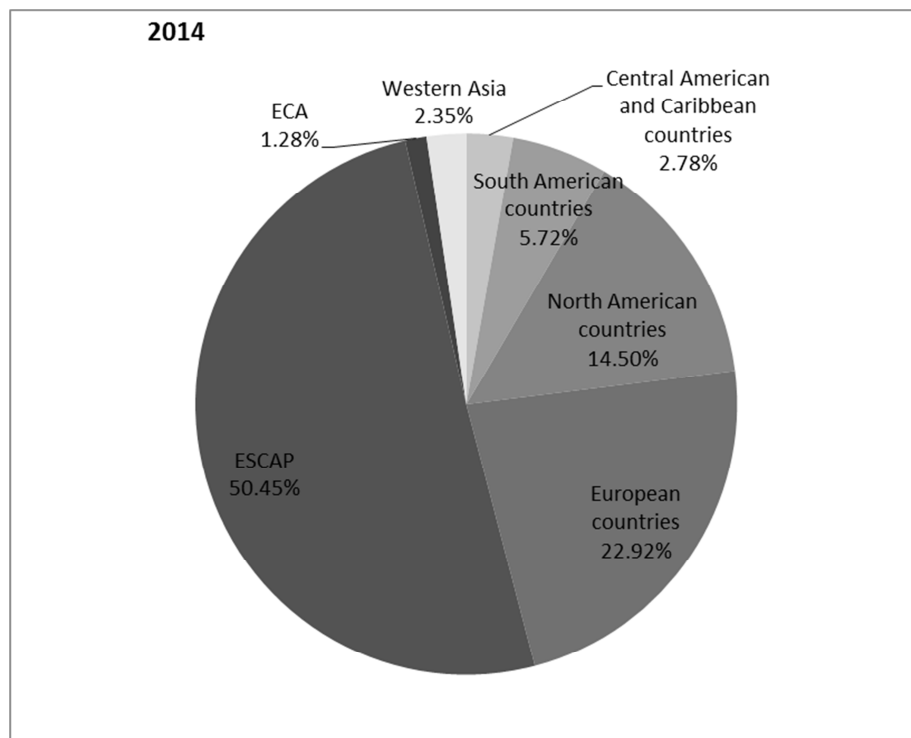
6. Section II provides a big picture view of where the region is now in terms of fixed and mobile broadband subscription, broadband growth patterns over the past 15 years, and how the region fares vis-à-vis other regions. The section identifies salient features and characteristics which define the growth and development of broadband in the region.

A. Fixed broadband

7. The Asia and the Pacific region has witnessed a phenomenal growth in fixed broadband access. For the first time, more than 50 per cent of the global fixed broadband subscribers are registered in the ESCAP region, followed by Europe (23 per cent) and the Americas (23 per cent).² This is a dramatic increase from 2005 when broadband subscribers in the Asia-Pacific region constituted 39 per cent of the global total fixed broadband subscribers, followed by the Americas (31 per cent) and Europe (29 per cent) (figure I).

Figure I
Global shares of total fixed broadband subscriptions in 2005 and 2014



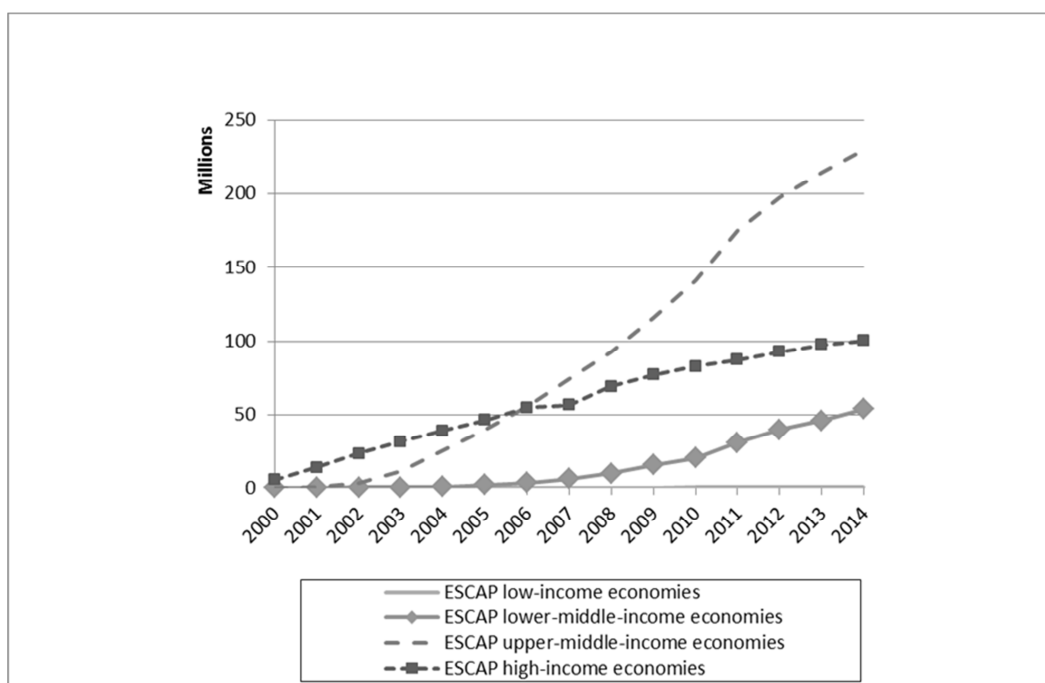


Source: International Telecommunication Union data 2014, analysed by ESCAP.

Abbreviations: ECA, Economic Commission for Africa; ESCWA, Economic and Social Commission for Western Asia

8. However, performance is unevenly distributed across ESCAP sub-regions. ESCAP analysis revealed that 72 per cent of the fixed broadband subscribers reside in North and North-East Asia, followed by 11 per cent in South-East Asia and 7 per cent in South and South-West Asia. Figure II shows that upper-middle income countries have grown much faster than those in other income groups, especially the low-income group, which registered only marginal improvements. When further disaggregated by country, it becomes clear that the region's expansion in fixed broadband access is driven by China, which now has more than 50 per cent of the total of the fixed broadband subscriptions in the region (figure III).

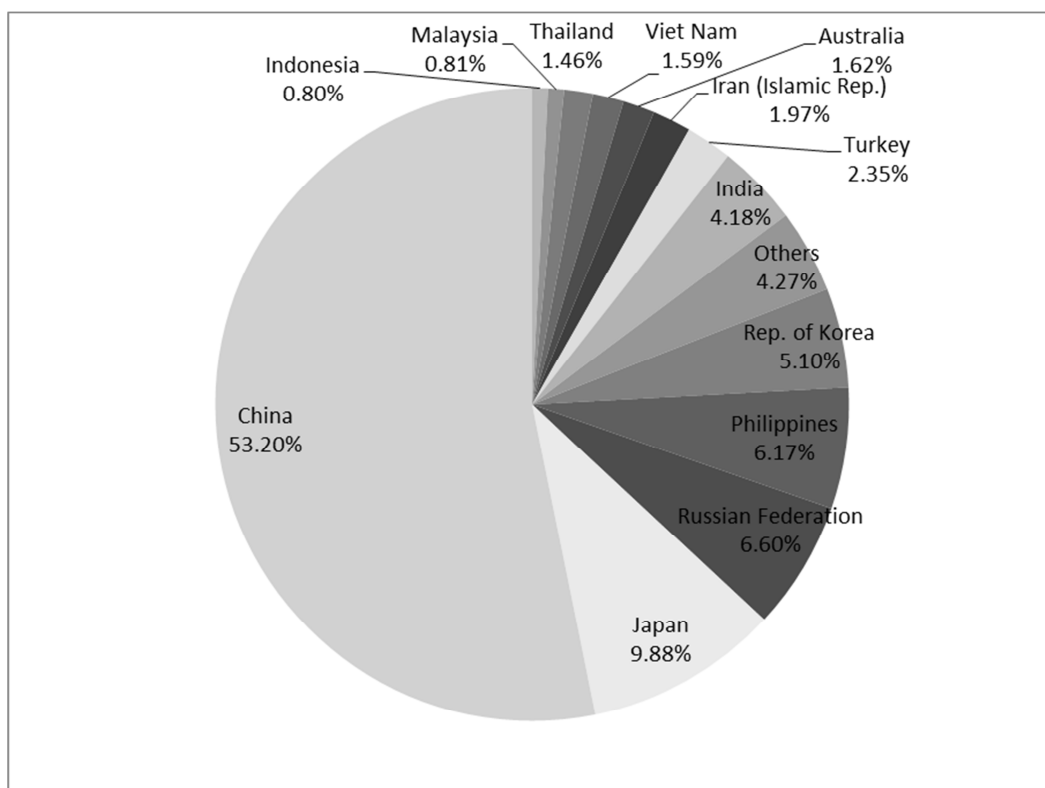
Figure II
Total fixed broadband subscriptions from 2000 to 2014



Source: International Telecommunication Union data from 2014, analysed by ESCAP.

Note: The data for ESCAP low-income economies is statistically close to 0 and therefore does not appear clearly on the chart.

Figure III
Shares of total fixed broadband subscriptions in 2014



Source: International Telecommunication Union data from 2014, analysed by ESCAP.

9. Thus, across the region, a divergent pattern emerges in the uptake of fixed broadband. On the one hand, China has demonstrated an exponential increase in the total number of fixed broadband subscriptions, while the slowest growths are among countries with low-income economies, even when the size of the total population is taken into account.

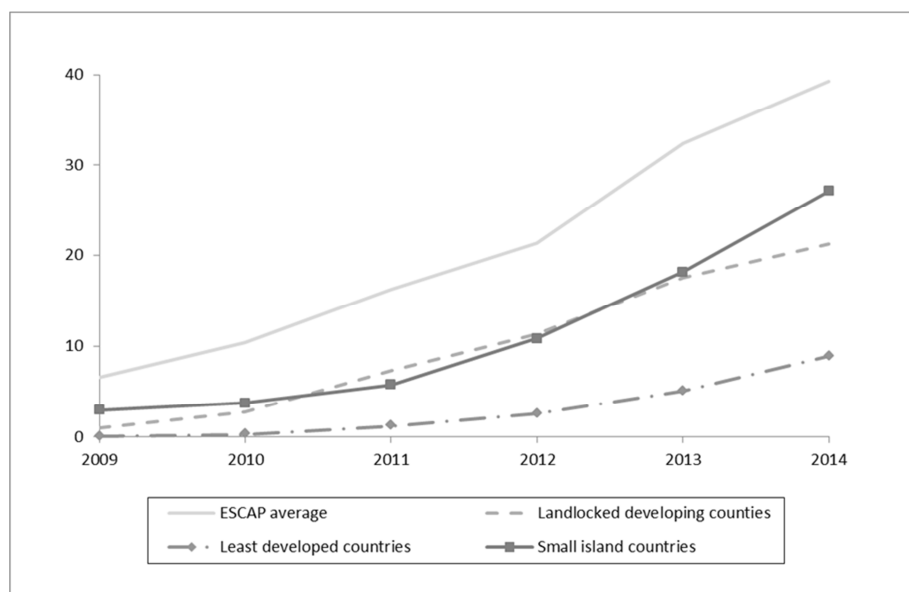
B. Mobile broadband

10. The Asia-Pacific region performed much better with mobile broadband uptake. Increasing expansion of mobile subscriptions over time indicates expanding access among the majority of people and the increased capacity of their mobile devices (figure IV). On the whole, mobile broadband is the market segment that is growing fastest, driven primarily by the uptake and greater availability of mobile devices and the many subscription plans that are available in the market.

11. Also, mobile subscription expansion seems to have captured the latent demand for high-speed access to data, information and communications services, especially among countries where Internet subscription growth has been slow.

Figure IV

Average mobile broadband subscriptions per 100 inhabitants in countries in the Asia-Pacific region



Source: International Telecommunication Union data from 2014, analysed by ESCAP

Note: Active mobile broadband subscriptions per 100 inhabitants refers to the sum of standard mobile broadband and dedicated mobile-broadband subscriptions to the Internet. It covers the actual and not potential subscribers (that is, not the number of those who have mobile phones capable of providing broadband access).

12. Mobile broadband has many advantages. It allows users to access the Internet wherever and whenever required, with the capability to connect to fixed networks, such as Wi-Fi. Furthermore, mobile broadband does not require individual physical infrastructure to reach each home and can often be a comparatively cheaper option compared to fixed broadband installation.

13. However, mobile broadband alone is not sufficient to support and expand the digital economy, which requires the creation of new services, products and employment opportunities. It requires reliable, robust,

affordable and resilient fixed broadband networks, which are also needed to sustain the expansion of mobile broadband further, not only to densely populated urban areas but also to remote and rural areas.

C. Total subscriber number and population-weighted subscription rate

14. The total number of broadband subscribers has significant impacts on the market size in the digital economy. In China, for instance, more than 200 million fixed broadband subscribers can offer and purchase goods and services online, although the number of fixed broadband subscribers per 100 inhabitants is 14.9. Thus, the total number of fixed broadband subscribers is an essential indicator to gauge the size of the digital market and to consider possible online business opportunities.

15. At the same time, the subscriber number per 100 inhabitants is another, equally important indicator which can point to the level of digital inclusion in any given society. For instance, the Philippines had 23 million fixed broadband subscribers in 2014, which might mean a relatively small market, but they represented 23.3 per cent of the population. This means that online public services, such as e-health and e-learning, could reach almost a quarter of the population on their broadband networks.

D. Summary

16. In summary:

- The broadband growth commonly observed in Asia and the Pacific has been primarily driven by growth in China (more than 50 per cent of the fixed broadband subscribers); if China is excluded, the broadband growth in the rest of the ESCAP region shows significant divergence.
- If the current trend continues, the digital divide in fixed broadband will continue to widen.
- Mobile broadband has encountered phenomenal growth in the Asia-Pacific region.
- It is unlikely that mobile broadband as a means of communication will drive growth in the digital economy and the expansion in broadband services and applications without significant underlying fixed broadband networks.
- The total number of broadband subscribers is an important indicator of the market size and commercial opportunities for the digital economy.
- From the perspective of social inclusion, a higher percentage of broadband subscribers is a more important indicator of inclusiveness.

III. Recommendations of the Working Group on the Asia-Pacific Information Superhighway

17. With the objective of improving broadband connectivity and addressing the digital divide in the Asia-Pacific region, the Commission, at its seventy-first session, adopted resolution 71/10 on the Asia-Pacific information superhighway. As mandated by the resolution, the Working Group on the Asia-Pacific Information Superhighway was established and

held its first meeting in Incheon, Republic of Korea, on 1 and 2 September 2015. The Working Group brought together ICT policymakers from Governments in the region, broadband infrastructure experts, and representatives of civil society and the private sector.

18. At its first meeting, the Working Group further refined the four concrete areas which make up the Asia-Pacific information superhighway initiative. First, the Working Group emphasized the need to act together to upgrade the physical broadband infrastructure across the Asia-Pacific region. That will include adding new fibre-optic cables to create a seamless regional broadband network. Second, the Asia-Pacific region will need to work together on improving Internet traffic management to reduce the number of costly inefficiencies in the way data is routed within and between countries of the region. Third, regional dialogue and concerted actions can yield Internet transmission networks that are more robust and resilient to natural disasters. Given the all-important role of information and communications in building resilience to disasters, the Working Group determined that strengthening infrastructure resilience is a priority. Fourth, the Working Group recognized that regional cooperation could help the Asia-Pacific countries expand access to broadband Internet by promoting partnerships and good practices on delivering broadband access in underserved areas.

19. Having identified these principles for regional action, the Working Group prepared a master plan for the Asia-Pacific information superhighway initiative, with targeted goals and specific activities in each action area. The Working Group established a steering group to ensure regular follow-up and progress in its activities and called upon the secretariat to pursue its analytical and capacity-building efforts to promote better broadband connectivity in the region. More importantly, the Working Group highlighted the need to strengthen the regional cooperation framework within which regional connectivity initiatives materialize. The promotion of co-deployment of fibre-optic networks along Asian highways and railways was identified as one way to materialize the Asia-Pacific information superhighway. In this regard, the Working Group agreed to request amendments to the Intergovernmental Agreement on the Asian Highway Network and the Intergovernmental Agreement on the Trans-Asian Railway Network. Furthermore, the members decided to encourage public funding arrangements and public-private partnerships for the promotion of infrastructure development and inclusive access.

IV. The Asia-Pacific information superhighway initiative

20. Section IV lists the key pillars of the Asia-Pacific information superhighway initiative, followed by some of the analysis and research conducted by the secretariat.

A. Improving physical infrastructure connectivity for information and communications technology by building missing links

21. The current terrestrial networks of fibre-optic cables in developing countries in Asia and the Pacific are typically dominated by submarine access to international transit. While backhaul (national) networks are increasingly interconnected terrestrially in the Organization for Economic Cooperation and Development countries, developing countries⁶ backhaul networks are poorly meshed and follow a “river system” pattern. These networks spread

⁶ Including most ESCAP countries.

from submarine landing stations and thin out into countries' hinterlands.⁷ The limited number of fibre interconnections across countries also limits the availability of total and per-capita international bandwidth. Landlocked countries are affected more severely, with limited direct access to a submarine cable landing station, and they rely on a few outdated terrestrial connections. Bandwidth could be improved in these countries through deliberate efforts to interconnect national fibre-optic backbone networks with those of neighbouring countries through state-of-the-art high-speed connections.

22. In this context, the required improvements in regional fibre-optic networks can be realized either through improvements to existing infrastructure (notably by upgrading the capacity of transmission and routing equipment) or by deploying new fibre-optic connections. Simply upgrading existing transmission capacity can be a viable option when network redundancy and competition for international transit issued are already resolved. However, in many ESCAP developing countries, deployment of additional fibre-optic connections is often a preferable option in order to improve market competitiveness and network redundancy.

23. Fibre deployment involves different types of costs. It is generally agreed, however, that the dominant constituent in fibre deployment costs is, by far, civil engineering works. A recent review of available literature by ESCAP staff⁸ shows that, in general, close to 80 per cent of the costs of deploying terrestrial fibre networks is associated with digging, trenching and laying down the conduits in which fibre is subsequently laid. Moreover, securing rights of way for the passage of fibre, as well as construction permits, can be a time-consuming and complicated process.

24. Thus, there is a strong incentive to resort to infrastructure-sharing to deploy fibre optics between major population centres, at reduced costs. This involves deploying fibre, or at least the ducts for subsequent fibre deployment, along infrastructure, such as major roads, railways, power transmission lines, pipelines or waterways. This is the case with high-voltage electricity transmission networks which also use fibre for optical ground wire. Road transport will increasingly require fibre optic cables to consolidate and transmit information in the context of future intelligent transport systems. Some of the fibre deployed along these infrastructure networks can be used for telecommunication and Internet data traffic purposes. ESCAP countries should seek to tap into the numerous cross-country or pan-regional infrastructure deployment projects that are facilitated by the current high economic growth in the areas of transport, energy and water, among others. ESCAP member States could decide to systematically co-deploy fibre along regional infrastructures, on an open-access basis. In this regard, ESCAP member countries, in Commission resolution 71/10, endorsed the recommendation of the Committee on Information and Communications Technology to consider amendments to the Intergovernmental Agreement on the Trans-Asian Railway Network and the Intergovernmental Agreement on the Asian Highway Network so as to include co-deployment.

⁷ Organization for Economic Cooperation and Development, "International Cables, Gateways, Backhaul and International Exchange Points", OECD Digital Economy Papers, No. 232 (2014).

⁸ Rémi Lang and Tiziana Bonapace, "Harnessing Cross-sectoral Infrastructure Synergies", Information and Communications Technology and Disaster Risk Reduction Division, Staff Working Paper (Bangkok, ESCAP, 2014). Available from www.unescap.org/resources/working-paper-harnessing-cross-sectoral-infrastructure-synergies.

25. Furthermore, regulatory frameworks and market practices in Asia and the Pacific can limit competition in both the international transit and national backbone segments of broadband transmission markets. This is typically the case when such conditions maintain incumbents in dominant positions through the control of key infrastructure, such as cable land base stations or international gateways. Accelerating reforms to foster competition on broadband transmission markets is seen as a key priority for lowering the costs of broadband for final consumers. Successful policy measures in this respect involve simplifying the licensing regimes for access to submarine and cross-border connections and reducing the exclusive control of incumbents on international gateways and submarine cable land base stations.⁹

26. Open-access requirements involve allowing all duly licensed operators to obtain access to the fibre infrastructure (or fibre infrastructure services) on an equal non-discriminatory footing on a transparent and cost-recovery pricing basis. Open-access typically requires establishing clear guidelines of non-discrimination between telecom operators and access to the utility infrastructure at fair prices, which include the recovery of costs in addition to a small profit margin. Rental and maintenance charges of passive infrastructure may need to be regulated to ensure that the physical infrastructure owner receives adequate incentives to continue building and maintaining it. The objective of promoting open-access to fibre (and other key data transmission infrastructure) is obviously to foster competition and thereby reduce broadband prices. Open-access requirements should systematically be enforced when public funding is used to build transmission infrastructure in Asia and the Pacific.

27. In collaboration with the International Telecommunication Union, the secretariat has been mapping the existing fibre infrastructure, as well as conducting a series of in-depth subregional studies on broadband infrastructure, and has facilitated the identification of bilateral connectivity in the greatest need of upgrade.¹⁰ The maps reveal pairs of countries between which current transmission infrastructure has been identified as non-existent, or as insufficient due to the obsolescence of current linkages.

28. In support of the Asia-Pacific information superhighway initiative in general and the Working Group in particular, the secretariat also conducted a series of studies to identify missing links, gaps in traffic and network management, and the level of digital divides as well as the nature of digital opportunities or dividends.

1. Central Asia

29. A recent report¹¹ found that Central Asian countries have done relatively well in the telecommunications sector, notably in mobile communications through improved coverage and availability of affordable devices. The high mobile penetration rates indicate mobile phones are naturally becoming the driver of Internet adoption. However, within the

⁹ International Telecommunication Union, *Trends in Telecommunication Reform 2013: Transnational Aspects of Regulation in a Networked Society* (Geneva, 2013).

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

¹¹ Asian Development Bank; United Nations, Economic and Social Commission for Asia and the Pacific; and Internet Society, *Unleashing the Potential of the Internet in Central Asia, South Asia, the Caucasus and Beyond* (2015). Available from www.unescap.org/resources/unleashing-potential-internet-central-asia-south-asia-caucasus-and-beyond.

subregion there is a significant variation in Internet adoption. The slow adoption of Internet and fixed broadband, in particular, has been mainly caused by the high prices of services. Most of these countries heavily depend on their neighbours for access to international bandwidth, with the exception of Pakistan and Georgia. Pakistan, together with the Islamic Republic of Iran, has the potential to provide access to international submarine cables and offer greater bandwidth to the subregion.

2. South-East Asia

30. Association of Southeast Asian Nations (ASEAN) countries have made extensive investments in fibre and other broadband infrastructure (domestic as well as international). The submarine cable network in the ASEAN region has significantly expanded, and submarine capacity within the region is expected to be adequate to meet the emerging demand. However, an recent study¹² identified possible missing trans-border terrestrial links. The recommended trans-border terrestrial links are between (a) Indonesia and Malaysia, (b) the Lao People's Democratic Republic and Yunnan Province, China, and (c) Viet Nam and Yunnan Province. These links could accelerate the subregion's ICT growth and expand access to broadband services. Taking into account geography, domestic infrastructure, the level of Internet traffic and current international connectivity, the report also recommends that Thailand, Viet Nam and Singapore be selected as intra-ASEAN centre nodes.

3. South and West Asia

31. A study on South and West Asia,¹³ which focused on ICT connectivity in nine countries (Bangladesh, Bhutan, India, the Islamic Republic of Iran, Maldives, Nepal, Pakistan, Sri Lanka and Turkey), reveals a sharp disparity among the countries studied. The bandwidth inequality in the subregion is attributed to inequalities in the penetration, quality and affordability of consumer telecommunications and broadband services, the availability of new technology, and the overall development of telecommunications and Internet markets. Such disparity in bandwidth in the subregion is detrimental to economic growth, social development and social integration. Both fixed and mobile broadband infrastructures are limited in South Asia, in general.

4. The Pacific

32. Reforms in the telecommunications sector in the Pacific islands have resulted in a major expansion of connectivity. The impact of mobile phones and Internet access has been widespread among Pacific populations, with benefits such as better access to health, education, market information and financial services and information at times of natural disasters. The impact has been predominantly positive and shows the potential of ICT to overcome

¹² United Nations, Economic and Social Commission for Asia and the Pacific and National Information Society Agency, "Technical Report: 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" (ESCAP, 2016). Available from www.unescap.org/resources/pre-feasibility-study-asia-pacific-information-superhighway-asean-sub-region.

¹³ Michael Ruddy and Esra Ozdemi, "An in-depth study on the broadband infrastructure in South and West Asia", ESCAP Working Paper (Bangkok, 2015). Available from www.unescap.org/resources/depth-study-broadband-infrastructure-south-and-west-asia-0.

the tyranny of distance and isolation that frustrates the pursuit of inclusive sustainable development in the small and geographically scattered Pacific islands. Despite progress, Pacific islands need to catch up with other ESCAP subregions in terms of meaningful access to Internet connectivity (fixed broadband). The Pacific (excluding Australia and New Zealand) is behind most ESCAP subregions with the exception of South and South-West Asia. The key to continuing success is private sector investment and a credible pro-competitive regulatory regime.

B. Regional Internet traffic and network management

33. The telecommunications networks comprising the Asia-Pacific information superhighway consist of cables and hardware as well as complex and interconnected software. In order for these systems to function effectively, the components need to be well coordinated. For example, Internet traffic has long been designed around the principle of self-regulation and cooperation. This approach has often been identified as one of the conditions which have promoted the rapid network growth and great value created by Internet adoption. These network protocols and governance systems, such as domain name systems and routing mechanisms, are just as critical as the cables and hardware. Experience has shown that failures in Internet traffic management can be just as disruptive to communications systems as hardware failures in physical components.

34. A regional approach – or at least coordinated subregional approaches – can add significant value compared to more chaotic approaches. If coordination is lacking, countries may choose to improve international connectivity by negotiating on their own for transit capacity with neighbouring countries without contemplating the impact of such decisions on the wider region. Such bilateral approaches have contributed to the existing fragmentation of backbone networks in the region. Developing bilateral relationships with networks in other countries, without an overarching regional framework, also limits competition at cross-border links and international gateways. A cohesive regional network, however, brings less connected countries directly into the global Internet, stimulating overall demand and, ultimately, leading to lower broadband prices and improved economic growth overall. Among the technical tools available to address these issues are content delivery networks and Internet exchange points, which are explained below.

35. An Internet exchange point is one of the most critical pieces of the Internet's infrastructure. Internet exchange points are a physical location where different networks meet to exchange traffic with each other and thereby keep local traffic flows local. Internet exchange points which facilitate the open sharing and coordination of traffic at the Internet service provider-level promote higher performance at lower prices. The establishment of additional regional and subregional Internet exchange points, therefore, should form a key part of efforts to develop pan-Asian terrestrial networks. This is made possible by facilitating the local exchange of local traffic. Dependency on submarine cable decreases as the development of well-balanced terrestrial networks is promoted.

36. The benefits of an Internet exchange point include (a) keeping local Internet traffic within a local infrastructure and reducing costs associated with traffic exchange between networks, (b) building the local Internet community and developing human technical capacity, including better network management skills and routing, (c) improving the quality of Internet services and driving demand by reducing delay and improving end-user experiences,

and (d) attracting hosting of key Internet infrastructures within countries as a convenient hub.

37. A significant amount of traffic originates and terminates in the ASEAN region but is routed through the United States of America or Europe. This traffic pattern is known as tromboning. For instance, an analysis of the routes from Thailand to each ASEAN country found that tromboning can be quite severe for Cambodia, Indonesia, Myanmar and the Philippines. In particular, the routes are unnecessarily long, even though Myanmar and Cambodia are neighbouring countries to Thailand. This phenomenon impacts transit price by overusing expensive backhaul network capacity for traffic which could be handled locally. Because the traffic goes back and forth over international submarine cables, domestic services are also at potential risk of failure, if failures are experienced on submarine cable systems. Thus, efficient and effective network management is required to avoid tromboning.

C. E-resilience

38. Redundancy and resilience should be explicitly considered when promoting telecommunications infrastructure enhancement. Specifically, rules regarding critical infrastructure and essential facilities such as undersea cable stations should take into account the need to reduce systemic risk. Especially in small island countries where there are few suitable sites, planners should earmark locations that are the least vulnerable and ensure that they are made available to ICT infrastructure operators.

39. In addition, a proactive approach to leveraging ICT for e-resilience should encourage private sector suppliers to diversify locations of critical infrastructure and to deploy multiple technologies; one example of this is ensuring that backup satellite connectivity is maintained even after fibre connectivity is widely deployed. Reliance on undersea cables should be balanced by terrestrial cables where possible. Promotion of resilient network infrastructure through a diversity of cable routes should also be a policy objective.

40. The work related to e-resilience is in line with the recommendations of the Committee on Disaster Risk Reduction at its fourth session, held in October 2015. The Committee requested the secretariat to expand its support to disaster information management and e-resilience as part of regional disaster risk reduction efforts and strengthen the synergies between ICT and disaster risk reduction.

41. The secretariat has undertaken a series of research and analyses to identify gaps and opportunities in promoting e-resilience. A recent study¹⁴ identified emerging trends and innovative uses of ICT for better preparation for natural disasters, with a specific focus on ICT infrastructure. Telecommunications networks are highly interdependent systems, which include fibre-optic backbone components, neighbourhood switches and end-user services. Technologies for delivering mobile services, such as cell phone towers, are of increasing importance for delivery of data in developing countries. Recent disasters in the ESCAP region, such as those experienced by Nepal, have demonstrated that while a properly planned and implemented fibre-optic backbone can be quite disaster resilient, delivery of services in the last kilometre can be much more problematic.

¹⁴ Shamika Sirimanne and others, “Enhancing E-resilience of ICT Infrastructure: Gaps and Opportunities in Disaster Management”, Technical brief, (Bangkok, ESCAP, 2015). Available from www.unescap.org/resources/enhancing-e-resilience-ict-infrastructure-gaps-and-opportunities-disaster-management.

42. In the case of Nepal, the national core telecommunications backbone, which has seen significant improvements in network performance, stayed functional during the Gorkha earthquake in 2015. However, other components of the network, such as cell phone towers, suffered significant damage, making it very difficult to restore communications to hard-hit areas of the country. This experience helps illustrate the importance of proactive investment, as in the case of the fibre-optic backbone, as well as a systems approach which examines the complete service delivery chain. It is high time for hazard risks to be considered when ICT infrastructure, in particular backbone and broadband networks, is planned and developed; it is also important to ensure that those risks are also taken into account in the protection and maintenance of existing infrastructure.

D. Promoting inclusive access and narrowing the digital divide

43. Access to and use of ICTs in rural and remote areas are often affected by a number of challenges, including limited infrastructural development due to geographic locations and higher costs for delivering attendant services. Mountains and other topographic barriers impede infrastructural development, and the maintenance of any existing infrastructure is likely to receive less attention in rural areas. There is also a perception that demands for ICT services are lower in rural areas due to a lack of customers, compared to more densely populated urban areas. As a result, those living in rural and remote areas tend to have comparatively limited access to ICT. This is the emerging rural-urban divide.

44. According to ESCAP estimates, in 2014, approximately 52.3 per cent of the population in the Asia-Pacific region lived in rural areas.¹⁵ Governments, including those at the local level, must take a greater interest in the development of a strategic plan for broadband deployment to under-connected areas to ensure that citizens living in rural and remote areas also benefit from the economic and social opportunities offered by access to the Internet. In addition, with the growing recognition of the potential of ICT to drastically improve the way people work and live, including in the agricultural sector, demand for high-speed broadband in rural areas will only increase with time. Together with international and regional physical infrastructure, traffic and network management and e-resilience, it is critical to review how the networks could reach end users and narrow the digital divides.

V. Linking the Asia-Pacific information superhighway initiative to the 2030 Agenda for Sustainable Development

45. ICT helps accelerate sustainable socioeconomic development and will play an even greater role in the post-2015 era as the world turns to the implementation of the Sustainable Development Goals. Fixed and mobile broadband Internet, in particular, is a powerful facilitator in the flow of information across societies and promotes knowledge exchange, while driving innovation and economic growth. Broadband-enabled technologies, such as smart grids, intelligent transport systems, integrated water management systems and big data, are some of the efficiencies that will drive growth in all sectors of the economy. The Internet also plays an important

¹⁵ United Nations, Economic and Social Commission for Asia and the Pacific, *Statistical Yearbook for Asia and the Pacific 2014*, (ST/ESCAP/2704). Available from www.unescap.org/sites/default/files/ESCAP-SYB2014_0.pdf.

role in modernizing government services and enhances the interaction and accountability between public administrations, citizens and businesses. These are only some of the potential benefits of broadband Internet that will make a tangible difference in the lives of people around the world.

46. As such, two target areas of the Sustainable Development Goals with high relevance to the Asia-Pacific information superhighway initiative are target 9.1 (Develop quality reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all) and means of implementation 9.c (Significantly increase access to ICT and strive to provide universal and affordable access to the Internet in least developed countries by 2020). They are detailed below.

47. Target 9.1 is particularly well suited to the goals of the Asia-Pacific information superhighway initiative. Concrete steps for addressing the digital divide and the priority action areas identified above have been identified in the initiative. The approach will be further established and refined in the Asia-Pacific information superhighway master plan being developed by the Working Group, which will be combined with the outcome of deliberations at the intergovernmental levels.

48. Means of implementation 9.c is also well suited to one of the pillars of the Asia-Pacific information superhighway initiative, which is achieving universal and affordable access to ICT. In order to encourage the realization of Target 9.1, member countries should consider enabling affordable Internet access through reforms that foster market competition, such as the establishment of an independent regulator, reduction of tariffs and encouragement of open access to network infrastructure. In addition, measures such as the incentivization of network operators to expand their coverage, as well as making competitive, transparent frequency spectrum allocations, may further enhance availability and affordability of broadband access and services.

49. In the ESCAP region, both fixed and mobile broadband Internet have great potential to promote economic growth and the development of social capital. Further, as a cross-cutting and enabling technology, ICTs are widely acknowledged as playing a pivotal role in many aspects of the 2030 Agenda for Sustainable Development. For these reasons, the growing digital divide in the ESCAP region should be considered a matter of urgent priority.

50. Furthermore, 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 was adopted in December 2015.¹⁶ In it, Ministers and heads of delegations reiterated the importance of ICT to achieving the Sustainable Development Goals and called for accelerated efforts to implement the World Summit on the Information Society action lines. They also invited regional commissions to continue their work in the implementation of those action lines and their contribution to the review thereof, including through regional reviews.

51. The potential of the Asia-Pacific information superhighway initiative to address these issues offers member countries a tangible option for moving forward on internationally agreed development goals and should be carefully considered by member countries in their efforts to make the promises of the Sustainable Development Goals a reality.

¹⁶ General Assembly resolution 70/125.

52. Against this backdrop, the Committee on Information and Communications Technology, Science, Technology and Innovation is scheduled to hold its first session in October 2016. The Committee will review the draft master plan of the Asia-Pacific information superhighway initiative, the role of ICT in achieving the Sustainable Development Goals and the regional review of the World Summit on the Information Society action line implementation, among others.

53. In summary, the Asia-Pacific information superhighway initiative is a strategic regional initiative which not only provides critical infrastructure and a foundation for communication purposes but also will help to launch various socioeconomic services and applications to accelerate the achievement of the Sustainable Development Goals. Additionally, with its primary objectives of providing inclusive access and narrowing the digital divide in Asia and the Pacific, it is an initiative at the heart of the World Summit on the Information Society.

VI. Issues for consideration by the Commission

54. In view of the above, the Commission may wish to provide guidance to the secretariat in the following areas:

(a) Continued support to the Working Group and its steering group and the secretariat's research and analysis on ICT connectivity;

(b) Facilitation of the co-deployment of fibre-optic networks along the Asian highway and railway networks, as recommended by the Working Group, in order to develop cross-sectoral synergies in promoting enhanced use of ICT in various socioeconomic sectors;

(c) Alignment of the Asia-Pacific information superhighway initiative to the Sustainable Development Goals and the World Summit on the Information Society, as the initiative is well positioned to serve as a platform to launch various initiatives related to the Goals, which can facilitate their achievement and help to implement World Summit on the Information Society action lines;

(d) The role of the secretariat in the monitoring and review of the World Summit on the Information Society implementation and coordination of United Nations agencies at the regional level;

(e) Preparation for and deliberations at the first session of the Committee on Information and Communications Technology, Science, Technology and Innovation, which will be held in October 2016;

(f) Sharing of experience, good practices and lessons learned in promoting public-private partnerships and innovative financing mechanisms to develop seamless and resilient broadband networks and inclusive access in the region.
