



# Economic and Social Council

Distr.: General  
3 August 2016  
Original: English

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## Economic and Social Commission for Asia and the Pacific

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

### Fourth session

Bangkok, 5-7 October 2016

Item 2 of the provisional agenda \*

### Master Plan for the Asia-Pacific Information Superhighway

## Master Plan for the Asia-Pacific Information Superhighway

Note by the secretariat [UNEDITED/DRAFT VERSION]

### *Summary*

Through the ESCAP resolution 71/10, the first meeting of the Asia-Pacific information superhighway (AP-IS) Working Group was organized in September 2015 in Incheon, Republic of Korea. It agreed to develop the AP-IS Master Plan as well as Regional Cooperation Framework Document. Subsequently, the AP-IS Steering Group was formed to develop the documents which were designed to reinforce each other. The Asia-Pacific information superhighway (AP-IS) Master Plan was developed upon the studies and analyses carried out by ESCAP in the region, consultations with various stakeholders including the private sector representatives in April 2016 and expert meeting discussions at a technical meeting organized in March 2016. In the Master Plan, key strategic initiatives, targeted goals and timeline are outlined in line with the AP-IS four pillars: strengthening regional broadband terrestrial backbone network; establishing sufficient Internet exchange points (IXPs); harmonizing Internet traffic management systems and policies; enhancing infrastructure resilience; and providing inclusive access to broadband internet for all. The Master Plan was reviewed and endorsed at

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\* E/ESCAP/CICT(4)/L.1.

the second meeting of the AP-IS Working Group held from 29 to 30 August 2016 in Guangzhou, China.

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## Acronyms

ADB	Asian Development Bank
AP-IS	Asia-Pacific Information Superhighway
ASEAN	Association of Southeast Asian Nations
AIIB	Asian Infrastructure Investment Bank
APCICT	Asian and Pacific Training Centre for Information and Communication Technology for Development
CDN	Content Delivery Network
CP	Content Provider
DFS	Detailed Feasibility Study
DRR	Disaster Risk Reduction
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ICT	Information and Communications Technology
IDC	Internet Data Centre
IFC	International Finance Corporation
IP	Internet Protocol
ISOC	Internet Society
ISP	Internet Service Provider
ITU	International Telecommunication Union
IXP	Internet Exchange Point
LLDCs	Landlocked Developing States
LMC	Lancang-Mekong Cooperation
MoU	Memorandum of Understanding
PPP	Public-Private Partnership
ROM	Rough Order of Magnitude
SDGs	Sustainable Development Goals

SIDS	Small Island Developing States
SPECA	Special Programme for the Economies of Central Asia
SCO	Shanghai Cooperation Organization
SAARC	South Asian Association for Regional Cooperation
TBBC	Terrestrial Broadband Backbone Connectivity
UN	United Nations
USP	University of South Pacific
WB	World Bank

## **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<sup>1</sup> and the situation in the least developed countries has not improved over the last 15 years according to the latest ESCAP report<sup>2</sup>. Therefore, to address this issue, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) through its resolution 71/10<sup>3</sup> embarked upon its initiative the ‘Asia-Pacific information superhighway’ (AP-IS). The AP-IS is an initiative to improve regional broadband connectivity, through a dense web of open access cross-border network infrastructure, integrating them into a cohesive land and sea-based fibre infrastructure with the ultimate aim to increase the international bandwidth for developing countries in the region, to lower the broadband Internet prices and to bridge the digital divide in the region.
2. The AP-IS initiative complements ESCAP member countries’ commitment to the UN General Assembly resolution on the ‘World Summit on Information Society’ (WSIS), in recognition of the urgent need to harness the potential of knowledge and technology for promoting the Sustainable Development Goals (SDG), and to

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<sup>1</sup> <http://www.unescap.org/news/reducing-digital-divide-asia-pacific-information-superhighway>

<sup>2</sup> State of ICT in Asia and the Pacific 2016

<sup>3</sup> Resolution 71/10 document [http://www.un.org/ga/search/view\\_doc.asp?symbol=E/ESCAP/RES/71/10](http://www.un.org/ga/search/view_doc.asp?symbol=E/ESCAP/RES/71/10)

find ways to put this potential for development. In 2015 ESCAP Resolution 71/10<sup>4</sup> called upon the ESCAP secretariat to promote the sharing of experiences, good practices and lessons learned in ICT for disaster risk reduction, management and response, and building e-resilience, thus leading to the formation of AP-IS Working Group. The first meeting of the Working Group was held on 1 – 2 September, 2015 in Incheon, Republic of Korea<sup>5</sup>. The Working Group, having met for the first time, decided on the following:

- a. Draft master plan encompassing the long-term vision, targeted goals, specific activities and milestones with regard to the four pillars of the Asia-Pacific information superhighway<sup>6</sup>; and
  - b. Draft regional cooperation framework for the Asia - Pacific information superhighway that consists of the four pillars.
3. Furthermore, the AP-IS Working Group decided on the establishment of the Steering Group consisting of the members of the bureau and an appropriate number of multi-stakeholder representatives with policy and technical expertise. Subsequently,

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<sup>4</sup> *ibid*

<sup>5</sup> <http://www.unescap.org/events/first-meeting-working-group-asia-pacific-information-superhighway>

<sup>6</sup> Strengthening regional broadband terrestrial back-bone network; establishing sufficient Internet Exchange Points (IXPs), harmonizing Internet traffic management systems and policies; enhancing transmission infrastructure resilience, and providing inclusive access to broadband internet for all

the Steering Group for AP-IS was established. The primary objective of the Steering Group was to draft AP-IS Master Plan and the Regional Cooperation Framework Document (See the TOR of Steering Group in Annex 1).

4. In support of the AP-IS initiative, ESCAP has carried out a number of analyses and feasibility studies<sup>7</sup> on the existing and missing terrestrial links, estimated demand for broadband services, e-resilience and Internet traffic management in South and West Asia, Central Asia and ASEAN countries. The studies and analyses were carried out in collaboration with other agencies such as the National Internet Society Agency (NIA) of the Republic of Korea, ADB, LIRNEasia and the Internet Society (ISOC). These studies primarily focused on the status of (but not limited to) broadband adoption, fixed and mobile broadband infrastructure, pricing, domestic fibre optic network (terrestrial and inter-regional terrestrial), and international connectivity. In collaboration with ITU, ESCAP also updates ESCAP-ITU broadband network maps<sup>8</sup>.
5. This Master Plan elucidates the vision, targeted goals, specific activities and milestones with regard to the four pillars: strengthening regional broadband terrestrial back-bone network;

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<sup>7</sup> Documents on ESCAP studies and findings are available at <http://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/publications?page=1>

<sup>8</sup> <http://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/asia-pacific-information-superhighway-maps>

establishing sufficient Internet exchange points (IXPs); harmonizing Internet traffic management systems and policies; enhancing transmission infrastructure resilience; and providing inclusive access to broadband internet for all. To ensure effective implementation of the Master Plan, it would require to institutionalize an AP-IS governance structure. The ESCAP secretariat, through the intergovernmental process, will ensure coordination, reporting and support to effective implementation. The Master Plan is intended to add value to the sub-regionals initiatives e.g. ASEAN ICT Master Plan and other initiatives, including the respective member states' National ICT Plans and initiatives.

6. The Master Plan proposes the establishment of network corridors that aim to achieve 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.

#### **I.i. Highlights of ESCAP'S findings**

7. Access to international connectivity or transit is largely dominated by submarine cable landings in the Asia-Pacific region. ESCAP's analysis of the terrestrial network has shown that many countries in the region have backhaul domestic infrastructure 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 been affecting the landlocked countries in particular, which do not have direct access to a submarine cable landing station and have to rely on limited terrestrial cross-border connections.

8. To date, ESCAP has conducted a number of studies in three sub-regions - South and West Asia, Central Asia and ASEAN. The findings from the studies are summarized as follows:

**A. State of ICT in Asia-Pacific**

9. Over 52% of the global fixed broadband subscriptions come from the geographic ESCAP member countries, followed by Europe (21.9%) and North America (14.1%). 74% 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 is driven by China (PR) alone. High-income ESCAP countries are more digitally inclusive while low-income ESCAP members show sign of digital divide. Fixed broadband growth is spreading to the emerging countries, albeit slowly and unevenly.
10. In addition, the study discussed a strong correlation between quality of regulation and fixed broadband penetration. Regarding total mobile broadband subscriptions, a phenomenal growth has been observed across emerging economies, overtaking advanced countries. However, if weighted with

population, it is clear that advanced countries have much higher penetration rates. The report also analyzed the broadband digital divide in ESCAP member countries and found that unless targeted policies are implemented, the digital divide is going to widen in the coming years.

#### **B. Central Asia+5 countries**

11. Central Asia+5 countries<sup>9</sup> have done relatively well in mobile communication through improved coverage and availability of affordable devices. However, there is a significant variation in Internet adoption across the 10 countries with varying penetration rate. This has been attributed primarily to a high cost of the Internet services. While most countries in the sub-region remain significantly below the global average (10%), Azerbaijan, Georgia and Kazakhstan all have fixed broadband penetration rates above the global average, with Armenia only slightly below. In mobile broadband, the Kyrgyz Republic, Kazakhstan, Azerbaijan and Armenia all perform well against the global average.
12. However, the Central Asia+5 countries, even taken together as a whole, lack adequate international bandwidth. This is in stark contrast to other sub-regions such as ASEAN, which has sufficient

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<sup>9</sup> Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan

bandwidth. Furthermore, most of these countries are heavily dependent on their neighbours for access to international bandwidth.

13. The infrastructural connections of these ten economies with the rest of the world mostly comprise of terrestrial landing cables and submarine cables, in the cases of Pakistan and Georgia. These ten economies are surrounded by the Russian Federation in the north, the People's Republic of China (PRC) in the east, 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+5 is blessed with a number of inter-connected terrestrial cable networks running through the sub-region such as the Trans Asia Europe (TAE) line, the Europe-Persian Express Gateway (EPEG), and the Trans-Eurasian Information Superhighway (TASIM). These cable systems could be tapped for international bandwidth by the landlocked countries. Furthermore, these cable systems further presents 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 ten 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 Central Asia+5 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. ASEAN 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 Singapore and Thailand. Cambodia, Indonesia, Myanmar, Viet Nam and Lao PDR would require additional investments to expand their domestic networks.
16. The observation on quality of the backbone network and Internet traffic exchange connectivity among ASEAN countries indicates noticeable differences within the sub-region. The worst case in the assessment showed the international backbone trunk line download speed of 0.15Mbps, latency of 230msec and tromboning index<sup>10</sup> of 35. The best case showed the download speed of 50.1Mbps, latency of 7.5msec and tromboning index of 1.

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<sup>10</sup> Tromboning index is defined as Internet routing distance/straight line distance from the source to the destination of a packet.

All these cases indicate that the backbone network connectivity and the Internet traffic exchange and management systems in the sub-region are significantly inefficient. The 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 (terrestrial) interconnectivity and a high cost or high price structure. The regional Internet transit prices in some countries like Cambodia, Lao PDR, Myanmar, and the Philippines were found ten times more expensive than that of Singapore.

17. The international connectivity in most of the ASEAN countries is relatively weak with the exception of Singapore, Malaysia and Philippines. Cambodia relies on backhaul agreements with other neighbouring countries for international connectivity. Indonesia has a weak and limited interregional connectivity and strongly depends on Singapore for its transit capacity. The only landlocked country, Lao PDR, in the ASEAN sub-region, has no direct connectivity to submarine cable networks.

#### **D. South- and West-Asian countries**

18. Analysis of telecommunications, Internet markets and broadband infrastructure in nine countries in the sub-region (Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka and Turkey) reveals a sharp disparity among the countries in terms of the bandwidth availability. Such a disparity in bandwidth in the sub-region is detrimental to economic growth, social

development and inclusiveness. The weak terrestrial fibre optic connectivity has been the root cause of the sub-regions bandwidth inequality<sup>11</sup> - low-capacity, high-cost and unreliability. This has further led to an expensive consumer and wholesale pricing of bandwidth, and limited availability and penetration of advanced ICT services and applications, including broadband<sup>12</sup>.

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

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<sup>11</sup> Documents on ESCAP studies and findings are available at [http://www.unescap.org/sites/default/files/Broadband\\_Infrastructure\\_South%26West\\_Asia.pdf](http://www.unescap.org/sites/default/files/Broadband_Infrastructure_South%26West_Asia.pdf)

<sup>12</sup> Among the countries that were analyzed in the study it was noted that Turkey's per-capita international Internet bandwidth was more than 30 Kbps, while Bangladesh's was only 0.3Kbps, a ratio of 100 to 1 . Countries such as Bangladesh, India and Nepal (which together account for one-fifth of the world's population) has per-capita international Internet bandwidth at less than 1 Kbps; bandwidth in the Islamic Republic of Iran, Pakistan and Sri Lanka is also extremely weak, at 2.2 Kbps or less while by comparison, western Europe average is approximately 100 Kbps . The annual 1 Mbps broadband subscription plus installation as % of nominal GDP per capita varies from extremely affordable (Turkey), affordable (Sri Lanka), reasonable (Bhutan, India, Maldives, and Islamic Republic of Iran), somewhat expensive (Pakistan) to very expensive (Nepal and Bangladesh).

(Bhutan, Nepal, Sri Lanka, Turkey, Maldives, and Islamic Republic of Iran) in the report.

#### **E. Pacific Region ICT status**

20. ESCAP is yet to carry out studies in the Pacific sub-region. However, reforms in the telecommunications sector in 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 among Pacific populations with benefits including better access to health, education, market information, financial services and information at times of natural disasters<sup>13</sup>.

## **II. AP-IS Vision and Four Pillars**

21. In this background, the Vision of the AP-IS is articulated as follows: 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 (SDG) and stimulate digital economy in Asia and the Pacific.

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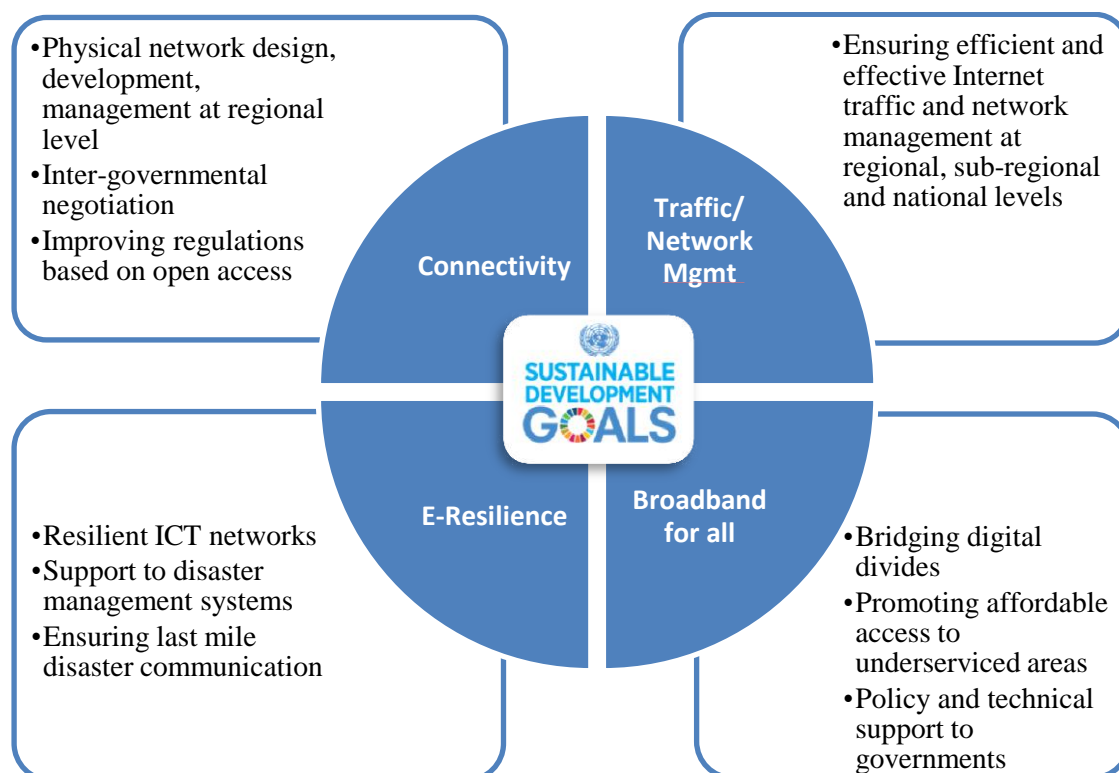
<sup>13</sup> Ofa SV (2012), “Telecommunications Regulatory Reform in Small Island Developing States: the impact of WTO's telecommunications commitments”

22. Despite the substantial gains reaped from broadband Internet across all sectors, progress has been unevenly spread across Asia and the Pacific and it remains to be one of the most digitally-divided regions in world. The widening digital divide is a legitimate source of concern in the ESCAP region. Therefore, to address this concern, the AP-IS concept was defined at the first meeting of the AP-IS Working Group based on the above mentioned research and analysis that identified gaps, opportunities and need for regional cooperation in 4 pillars as illustrated in the Diagram 1:

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

*Diagram 1: Four Pillars of the Asia-Pacific information superhighway*





23. Through ESCAP and ITU collaboration the ITU interactive map of the Information Superhighway was developed<sup>14</sup>. In turn, the interactive map has identified a number of missing terrestrial fibre optic links as well as the submarine cable choke points.

### II.i. Connectivity

24. The AP-IS initiative advocates enhancing seamless regional broadband fibre optic backbone connectivity by upgrading and increasing the resilience of, and integrating cross-border, intra and inter regional broadband backbone networks, which will lead to open access and more well-balanced undersea and terrestrial

<sup>14</sup> <http://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/asia-pacific-information-superhighway-maps>

networks. In addition, the AP-IS initiative advocates leveraging existing regional connectivity opportunities offered by the Asian Highways and Trans-Asian Railway, 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 AP-IS initiative also seeks to establish operation models of terrestrial cables, facilitates the formation of trans-border terrestrial cable networks and enhances the quality and efficiency of transition, so as to put the completed terrestrial cable resources into more efficient use and to promote regional interconnectivity. These aspects are highlighted in the Regional Cooperation Framework Document E/ESCAP/CICTSTI(1)/3.

## **II.ii. Traffic and Network management**

25. The AP-IS initiative also promotes enhancing the Internet traffic exchange and management systems and harmonizing related policies in a more efficient and effective manner, domestically as well as at the sub-regional and regional levels, which will lead to better quality of service. This pillar aims to establish sufficient Internet exchange points (IXPs) within the region, harmonize the Internet traffic management practices, principles, and related policy and regulatory frameworks towards more open, neutral and

non-discriminatory ways, and lay out the general principles on the IXPs.

### **II.iii. E-resilience**

26. The AP-IS initiative aims to enhance the resilience of existing/planned ICT infrastructure through methods such as enhanced network diversity recognizing the importance of resilient infrastructure to sustainable development, together with the critical role played by ICTs in disaster risk reduction and management.

### **II.iv. Broadband for All**

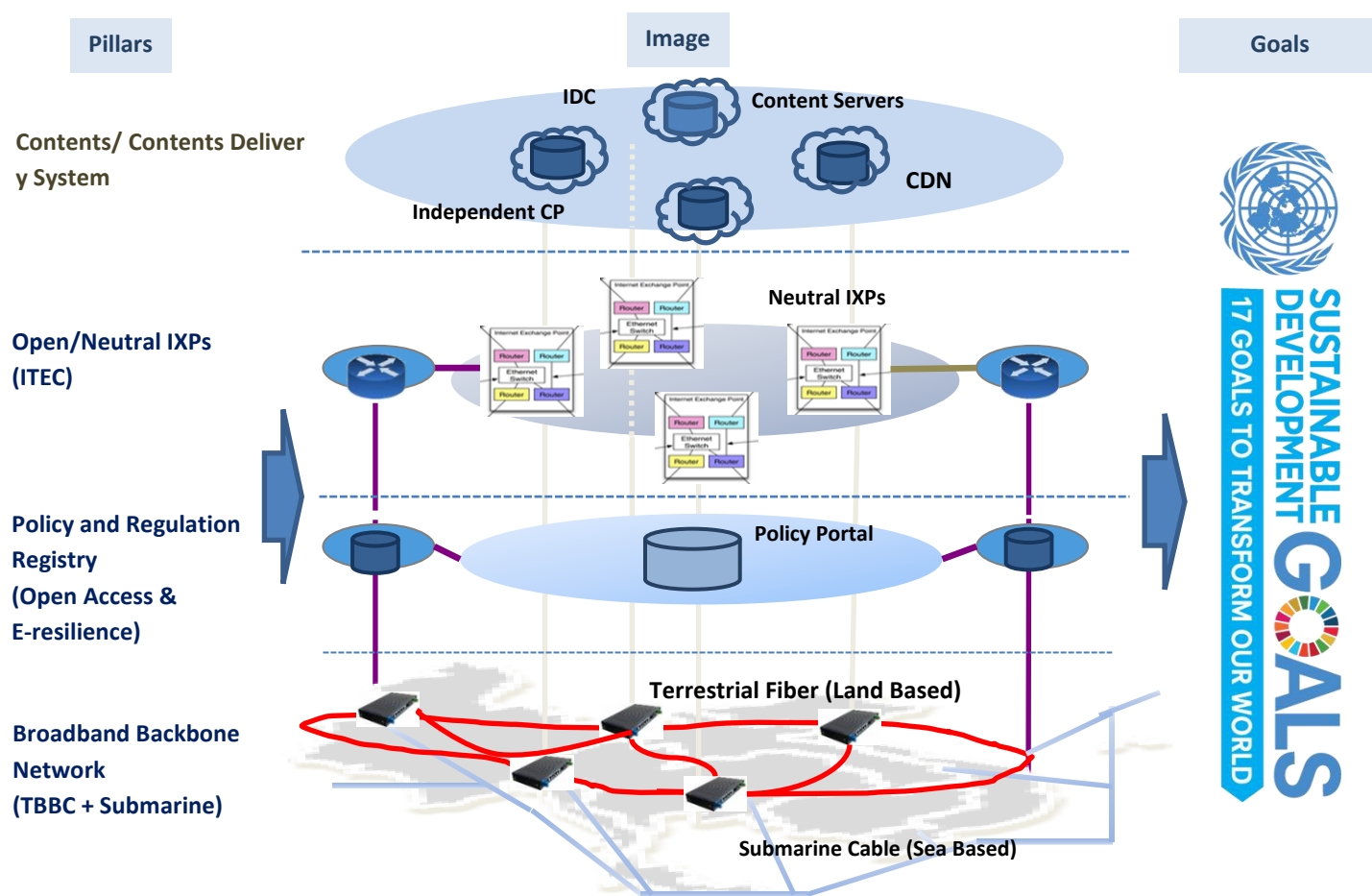
27. The AP-IS initiative supports the necessary environment that will lead to the promotion of inclusive access for all, acknowledging the special needs and challenges faced by the least developed and landlocked developing countries. Besides enhancing international fibre optic backbone connectivity, the AP-IS initiative also drives the development of domestic ICT infrastructure in related countries, including domestic backbone and backhaul networks, access network and Internet Data Center (IDC), etc. The improvement of domestic ICT infrastructure can promote large-scale broadband expansions by lowering broadband costs per capita. The effective use of IDC can absorb the demand for international bandwidth and promote the development of domestic ICT applications.

## **III. AP-IS layered-map of network structure**

28. The AP-IS could also be described with the layered map of network structure, which mainly explains functional differences in each layer of the network as shown in the *Figure 1*, with the functional layers that make up broadband backbone network layer, policy and regulation layer, open neutral IXP layer, and contents/contents delivery layer. The broadband backbone network layer shall be made up of well-balanced, seamless submarine, and terrestrial fibre networks after development of identified missing links at the national, sub-regional and regional levels. The policy and regulation layer represents a regional governance system or regional coordination body that coordinates intermediate IP routing and peering or transit, and negotiate with regulators to set network neutrality and non-discriminatory right of access to the backhaul for the newcomers.
29. The open neutral IXPs layer ensures domestic IP traffic exchange among domestic ISPs, regional direct IP peering/transit among neighbouring countries. It is possible to have direct fibre interconnection between IXPs to support the ISPs who need diversified connectivity to the IXPs or ISPs in other countries. The contents or content delivery (CDN) layer serves as the Internet data center, where the independent providers provide contents through the content delivery network. For example, the CDN service providers and contents provider (CP) have a very important role in

the point that they reduce cross-border Internet traffic by caching more contents in the local servers.

Figure 1: AP-IS Layered Map



Source: ESCAP: Pre-Feasibility Study on the Asia-Pacific Information Superhighway in the ASEAN Sub-region

#### IV. Medium-term objectives of AP-IS

30. In the current timeframe of the Master Plan from 2016 to 2018, the AP-IS medium-term objectives focus on three aspects; (a) seamless, affordable and reliable regional broadband connectivity, the well-balanced sea- and land-based connectivity and the internet traffic exchange management; (b) promoting e-resilience; and (c)

promoting inclusive broadband access in the underserved areas and narrowing the digital divide.

31. The regional broadband connectivity initiatives should be carried out to build on the existing research and analyses and lead to concrete initiatives through: (a) identifying missing links<sup>15</sup>, (b) tapping cross-sectoral synergies for fibre-optic deployment, and (c) improving regulatory frameworks and promoting open access to critical infrastructure.
32. In order to address the issue of high transit costs, the establishment of sufficient number of Internet exchange points (IXPs) at domestic and sub-regional levels and the establishment of common principles on Internet traffic exchange need to be carried out to prevent Internet traffic tromboning, as well as improve service quality at regional backbone network at the cross-border, inter- and intra-regional Internet service.
33. Regarding the inclusive broadband access, the objectives include improvements in regulatory frameworks and market practices in Asia-Pacific region which often limit competition in both the international transit and national backbone segments of broadband transmission markets. Successful policy and regulatory

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<sup>15</sup> <http://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/resources>

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 base stations. Furthermore, accelerating reforms to foster competition on broadband transmission markets is also seen as a key priority to lower the costs of broadband.

## **V. Proposed AP-IS network corridors**

34. In the physical term, the sub-regional network corridor could be defined as the cross-border, intra- and inter-regional broadband infrastructure. The network corridor links will be composed mainly of fibre optic cables, ducts and conduits that cross neighboring countries, sub-regions and inter-regions. The network corridor through the sophisticated physical network infrastructure will play an important role in determining connectivity and price of international bandwidth in Asia and the Pacific. Each of the sub-regional network will thus be connected to another sub-regional network through a corridor using the respective sub-regional's identified main IXPs. 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 AP-IS Regional Cooperation Framework Document.

35. The establishment of IXPs in each country and in turn connected to the identified sub-regional IXPs, which will also be the point of presence (PoPs) for external connectivity to Europe and America, will constitute as one main component of network corridor. In total five network corridors have been identified for AP-IS as shown in the Figure 2. The Russian-Chinese fibre optic cable system is considered a network corridor as it will serve as alternate terrestrial routes for international connectivity.

*Figure 2: Proposed Asia - Pacific Network Corridors*



## **VI. Regional partners for the AP-IS**



36. Partnership is an essential building block in this AP-IS Master Plan, as AP-IS covers a wide geographical area as well as various layers of networks, while the main development of the infrastructure is normally undertaken by the private sector. It is anticipated that through the regional partnership comprising of private sector, governments, international agencies, NGOs, research institutes and regional/international financial institutions, the coordination, harmonization, implementation and funding opportunities for various AP-IS projects could be elaborated, while sharing expertise, good practices and lessons learned.
37. Regional partners (*Figure 3*) constitute multiple stakeholders working together within the common AP-IS initiative framework. Within this framework, separate regional groups are represented in the Working Group (WG) and Steering Group (SG) which are proposed to transform into the AP-IS Advisory Board in the Regional Cooperation Framework Document. Regional cooperation framework and possible financing options are elaborated in the AP-IS Regional Cooperation Framework Document.
38. Collaboration and partnership, including with entities in other socioeconomic sectors, would be essential to leverage existing regional connectivity opportunities offered by the Asian Highway, Trans-Asian Railway and other trans-border infrastructure, in order to utilize the right-of-way of existing and planned transport

networks for rapid, cost-effective deployment of optical fibre across and within countries.

*Figure 3: Regional Partners*



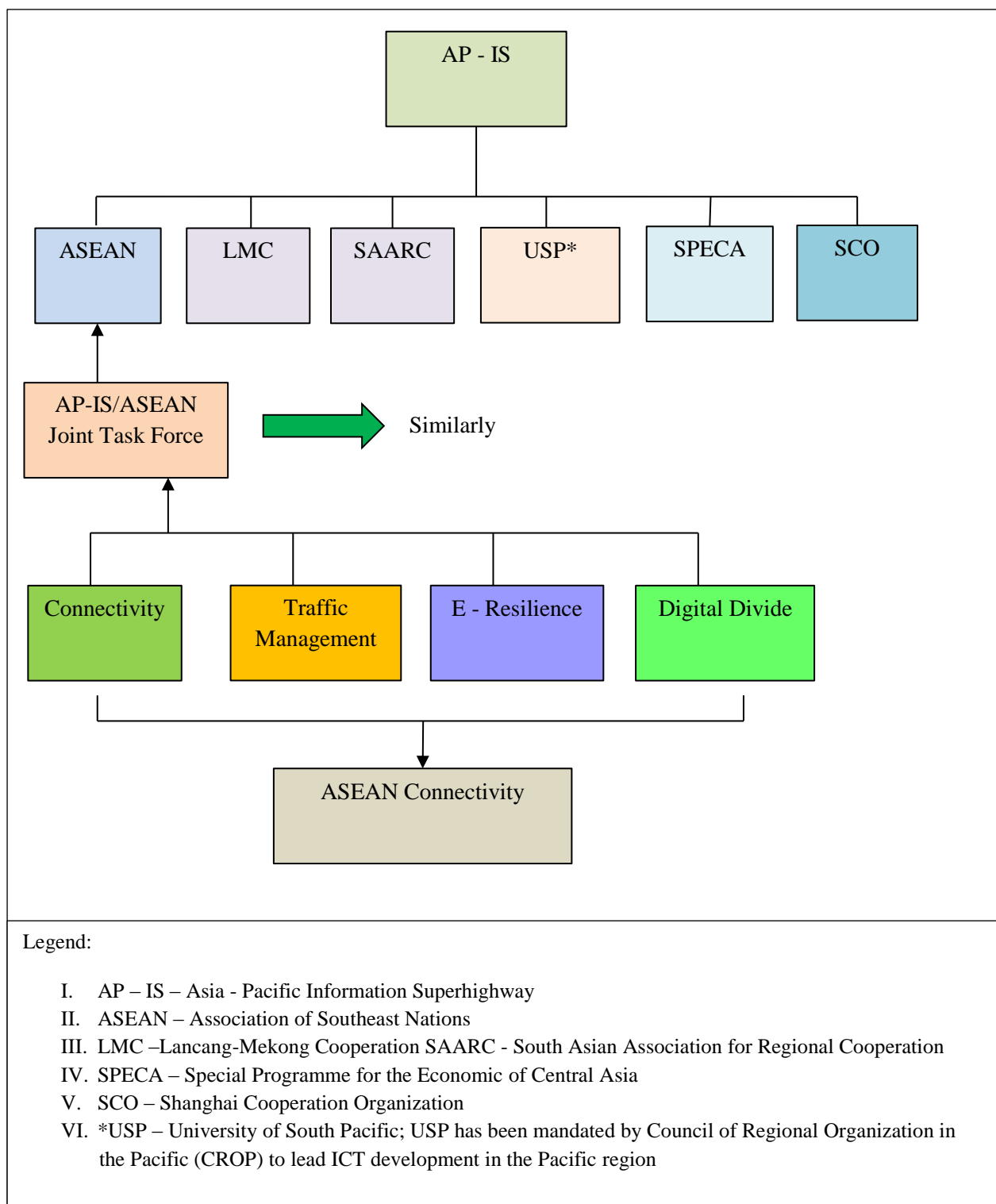
## VII. AP-IS governance structure

36. The proposed AP-IS governance structure is intended to support the effective implementation of the AP-IS activities, as illustrated in the *Figure 4*. It consists of the overall AP-IS regional layer, under which each sub-regional corridor will be supported by a joint task force. The envisaged activities will be developed around the above mentioned four pillars of AP-IS which then should facilitate the implementation of the sub-regional and national ICT initiatives. As shown in the *Figure 4* the subcommittee/sub-working group will be tasked to discuss and identify issues pertaining to (a) connectivity, (b) traffic

management, (c) e-resilience and (d) digital divide for the respective sub-regions.

37. The proposed governance structure has been designed to align with the sub-regional initiatives so that it meets the needs of the sub-regions as well as the overall objectives of AP-IS. In addition, the governance structure will further be augmented by capitalizing on relevant international expertise from international and specialized agencies such as the ITU, APT, the World Bank, ADB, AIIB and other financial institutions. It will also include other institutions such as the Internet Society, LIRNEAsia and other research institutes/think tanks as partners for realize the AP-IS initiative.
38. As the regional layer will consist of monitoring, coordination and advisory function, expected to be undertaken by Advisory Board, reporting subsequently to various inter-governmental bodies through the ESCAP secretariat, as described in the Regional Cooperation Framework Document.

Figure 4: Proposed governance structure for AP-IS network corridors with an example of ASEAN



## VIII. AP-IS strategic initiatives 2016-2018

39. In the above background, the below AP-IS strategic initiatives are proposed for 2016-2018 to seek to achieve the improvement of broadband connectivity in the Asia-Pacific region:

*Table 1: AP-IS strategic initiatives 2016-2018*

<b><i>Initiative 1: Identification, coordination, deployment, expansion and integration of the regional backbone networks at cross-border, intra- and inter-regional levels in collaboration with member countries and sub-regional organizations</i></b>		
<b>Areas of focus</b>	<b>Description</b>	<b>Responsible</b>
Integrated regional backbone & interconnectivity  • Terrestrial fibre network • Coherent mesh network	<ul style="list-style-type: none"> <li>• Identify missing links</li> <li>• Design hybrid mesh and ring structure of resilient regional terrestrial backbone network</li> <li>• Plan center node establishment for low cost and reliable delivery of traffic</li> </ul>	
Operation models of trans-border terrestrial cables	<ul style="list-style-type: none"> <li>• Study operating models and standards, and quality standards, etc. of trans-border terrestrial cable networks</li> </ul>	
Domestic broadband infrastructure	<ul style="list-style-type: none"> <li>• Examine domestic backbone network routes in less developed countries (LDCs)</li> <li>• Help develop broadband network development strategies in LDCs</li> <li>• Develop and plan data centers</li> </ul>	
<b>Supporting-activities</b>	<b>Description</b>	
1.1 Conduct detailed feasibility studies in some corridors, taking into account the special needs and challenges of LLDC, LDC and SIDS <sup>16</sup>	<ul style="list-style-type: none"> <li>• To determine traffic, revenue, and preliminary costs and affordability</li> <li>• To determine special needs and challenges for LLDC, LDC and SIDS</li> <li>• To coordinate the infrastructure development planning with the member countries and private sectors among SIDS</li> </ul>	ESCAP, members countries, research institutes, think tanks, sub-regional organizations and financial institutions
1.2 Update AP-IS transmission maps	<ul style="list-style-type: none"> <li>• Maximize cross-sectoral synergy or utilize existing roads and rail road infrastructure</li> <li>• Update the AP-IS transmission map</li> </ul>	ESCAP, ITU and member countries
1.3 Rough order of magnitude (ROM)	<ul style="list-style-type: none"> <li>• Explore cost estimation in collaboration with suppliers where applicable.</li> </ul>	ESCAP, private sector

<sup>16</sup> Landlocked least developing countries and small island developing states

***Initiative 2: Establishing a sufficient number of IXPs at national and sub-regional levels and setting common principles on Internet traffic exchange to prevent Internet traffic tromboning, to decrease the transit cost and improve service quality***

Areas of Focus	Description	Responsible
Harmonized Internet traffic exchange & management  <ul style="list-style-type: none"> <li>Enhance regional, sub-regional and national IXPs</li> <li>Remove entry barriers to the new ISPs and promote fair market competition</li> </ul>	<ul style="list-style-type: none"> <li>Promote non-discriminatory direct bilateral peering/transit between neighbouring states' ISPs</li> <li>Establish Intra/Inter-regional, neutral IXPs</li> <li>Establish national IXPs for the domestic traffic to be exchanged inside the state</li> </ul>	
Supporting Activities	Description	Responsible
2.1 Regional diagnostic study	<ul style="list-style-type: none"> <li>Conduct diagnostic study, analyze best-practices in Internet traffic exchange/management in the region</li> </ul>	ESCAP, ITU, APT, member countries and private sectors
2.2 In-depth study on traffic production volume	<ul style="list-style-type: none"> <li>Carry out studies on traffic volume, destination and distribution, routing and distance including overall Internet service quality both national and regional levels</li> </ul>	ESCAP in consultation with private sector and member countries
2.3 IXP system & operation model	<ul style="list-style-type: none"> <li>Recommend set up of IXPs, including operating principle and governance model</li> </ul>	ESCAP, research institutes and private sector
2.4 Rough order of magnitude (ROM)	<ul style="list-style-type: none"> <li>Estimating cost in collaboration with device vendors or partner entities</li> </ul>	ESCAP in consultations with the private sector

***Initiative 3: Regional social and economic studies***

Areas of Focus	Description	Responsible
<b>3</b> Analysis of the economic and social impacts of future and near-future ICT trends	<ul style="list-style-type: none"> <li>Review technological advancements and discern their impacts on economy and society for the inclusive development of ICT that allows policymakers to make informed decisions</li> </ul>	ESCAP, private sector, other UN agencies and financial institutions

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

Areas of Focus	Description	Responsible
4.1 Terrestrial fibre links to international connectivity	<ul style="list-style-type: none"> <li>Explore ways to strengthen e-resilience in fibre link to Europe</li> <li>Exploring to provide additional bandwidth for landlocked Central Asian countries</li> </ul>	ESCAP, member countries, private sector and financial institutions
4.2 Diversified routes including co-deployment of fibre optic cables embedded on the Asian Highway and the Trans-Asian Railway	<ul style="list-style-type: none"> <li>Explore fibre optic route diversification capitalizing on the Asian Highway and Trans-Asian railway infrastructure</li> </ul>	ESCAP and member countries

4.3 Protecting critical infrastructure with disaster risk reduction	<ul style="list-style-type: none"> <li>Integrate approach to plan infrastructure development incorporating disaster management from design stage</li> </ul>	ESCAP, research institutes, UN agencies and private sectors
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***Initiative 5: Policy and regulations for leveraging existing infrastructure, technology and inclusive broadband initiatives***

Areas of Focus	Description	Responsible
5.1 Submarine cable backhaul & cross-border affordability and infrastructure sharing	<ul style="list-style-type: none"> <li>Develop cross-border infrastructure sharing policy based on the above studies, consultations and partnerships</li> </ul>	Member countries and sub-regional organizations
5.2 Local/National government networks accessibility to IXP and peering/transit at IXP	<ul style="list-style-type: none"> <li>Develop policy on infrastructure sharing, accessibility to IXP</li> </ul>	Member countries and sub-regional organizations
5.3 National ICT policy and regulatory frameworks	<ul style="list-style-type: none"> <li>Update national policies and regulations to enable the infrastructure development and inclusive broadband</li> <li>Enable policies that lead to open access, non-discriminatory pricings, competition and innovations.</li> <li>Regulatory reforms pertaining to telecom, taxes &amp; customs duties</li> </ul>	ESCAP, other UN agencies, sub-regional organizations and member countries

***Initiative 6: Capacity Building***

Areas of Focus	Description	Responsible
6.1 Institutional and individual capacity building	<ul style="list-style-type: none"> <li>Capacity building, sharing of good practices and lessons learned in regional level pertaining to network traffic management and monitoring, deploying of fibre terrestrial/submarine.</li> </ul>	ESCAP, all member countries, research institutes, private sector and other UN agencies.

***Initiative 7: AP-IS Project funding mechanism based on Public Private Partnership (PPP)***

Areas of Focus	Description	Responsible
7.1 Formulation of AP-IS funding platform	<ul style="list-style-type: none"> <li>Explore and formulate mechanism to fund AP-IS project in partnership with WB, ADB, AIIB and other financial institutes</li> <li>Explore public funding arrangements and public-private partnerships (PPP), special purpose vehicle (SPV) for the promotion of infrastructure development</li> </ul>	ESCAP, UN agencies, sub-regional organizations, private sectors, financial institutions and member countries

	<ul style="list-style-type: none"> <li>Explore respective government funding options on IXP construction and operations</li> </ul>	
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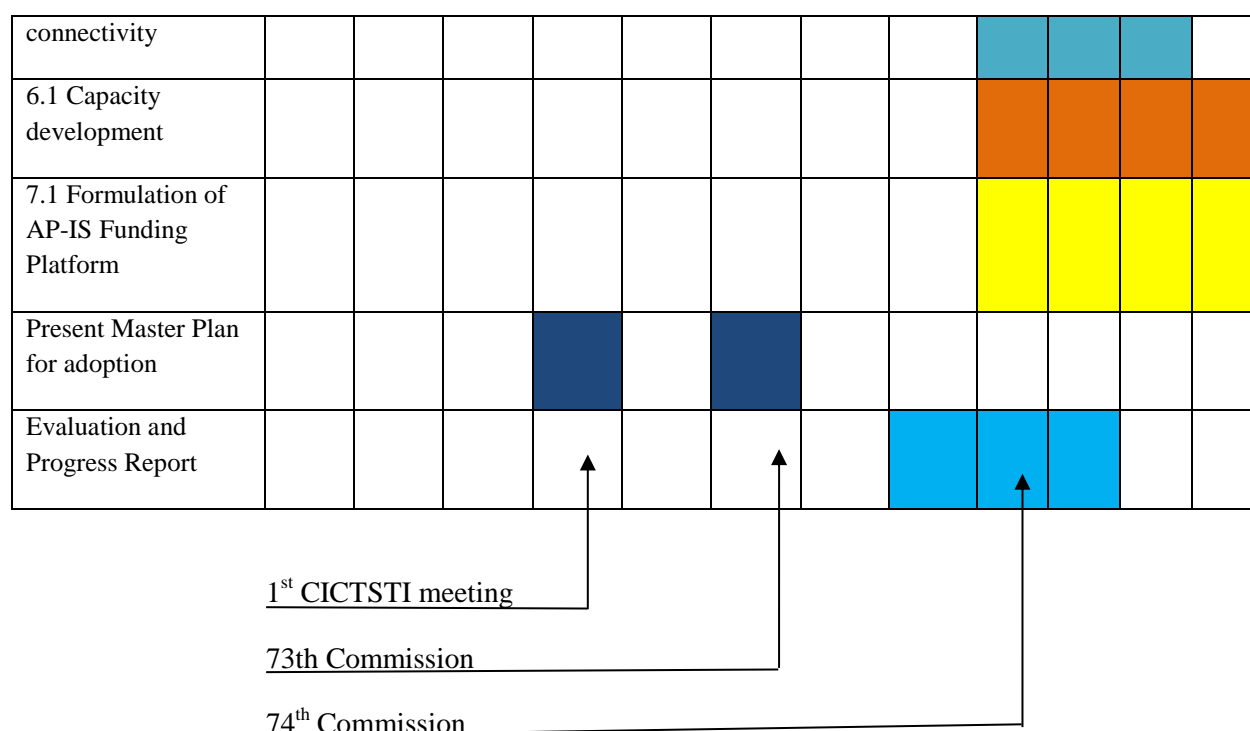
## IX. Implementation plan

40. The timeline for the Master Plan is set to 2016-2018. In 2018, the first review is proposed for the progress report to be submitted to the second session of the Committee on Information and Communications Technology, Science, Technology and Innovation 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 Regional Cooperation Framework Document.

*Table 2: AP-IS Implementation Plan 2016-2018 (activities not exhaustive)*

Action Items	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
Advisory Group to be established and operational												
1.1 Conduct feasibility studies												
2.3 IXP system & 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												





## Annex 1: AP-IS Steering Committee Terms of Reference (TOR)

### Background

41. The ESCAP Commission, at its 71st session, adopted a resolution 71/10 which established the Asia-Pacific Information Superhighway (AP-IS) Working Group. The first meeting of the Working Group took place in September 2015 in Incheon, Republic of Korea. The Working Group decided to establish a Steering Group to develop the AP-IS master plan, among others. Please find below the pertinent information on the Working Group meeting as well as AP-IS in general:

- a. <http://www.unescap.org/events/first-meeting-working-group-asia-pacific-information-superhighway>
- b. <http://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway>

42. In this background, the below Terms of Reference was developed for the functioning of the Steering Group:

#### **A. Membership Criteria**

43. Due to the nature of the assigned activities, the Steering Committee will be established with the membership of non-profit organizations, research institutes and experts from the member country governments (representing in their personal capacity) as multi-stakeholder representatives with policy and technical expertise.
44. The Steering Committee should have geographical representation, at least one representative from 1) the Pacific, 2) East and North-East Asia, 3) South-East Asia, 4) South Asia and 5) Central Asia.
45. Chairperson of the Steering Committee will be selected from the members: as the Steering Committee will report to the Working Group, the Chair will not be elected from the Working Group Bureau members.

#### **B. Steering Group Size**

46. In order for the group to be manageable, the Steering Committee members would not exceed 15, including the Bureau members.

#### **C. Objectives**

47. The primary objective of the Steering Committee is to develop the draft Asia-Pacific Information Superhighway Master Plan and draft regional cooperation framework, as agreed upon by the Working Group in September 2014.
48. The drafts will be presented to the Second Working Group meeting tentatively scheduled in June 2016, and the approved versions will be presented at the Committee on ICT and STI in October 2016 for the adoption.
49. The Steering Committee members will be supported in its function by the ESCAP Secretariat.
50. The ESCAP Secretariat will provide an online platform which will be used as repository of information, documents and materials, as well as the space for exchange of views and communications.
51. The Steering Committee will meet in person if necessary; and will be invited to the second Working Group meeting.
52. If the Working Group agrees, the Steering Committee may continue its functions even after the presentation of the drafts to the Working Group as a technical advisory body to the Working Group.
53. The work of the Steering Committee will be reviewed by and consulted with other stakeholders such as the private sector, UN and international agencies and development banks.

**D. Outlines of the draft Master Plan and regional cooperation framework (as agreed upon by the Working Group)**

54. The Master Plan should include the long-term vision, targeted goals, specific activities, milestones with regard to the four pillars of 1) strengthening regional broadband backbone network, 2) establishing sufficient IXPs and harmonizing Internet traffic management systems and policies; 3) enhancing transmission infrastructure resilience and 4) providing inclusive access to broadband Internet for all.
55. The draft regional cooperation framework includes the amendments to the Asian Highway and Railway agreements, public financing arrangements, public-private partnerships for the promotion of infrastructure development.