Unleashing the Potential of the Internet for ASEAN Economies

Executive Summary

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Internet Society

TABLE OF CONTENTS

INTRODUCTION

The Association of Southeast Asian Nations (ASEAN) has played a key role in the peace, prosperity and geopolitical stability of its 10 member economies: Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. According to the OECD, ASEAN is one of the fastest growing regions in the world with a projected growth of 5.4% per annum between 2014-2018 and, as a single entity, would be the seventh largest global economy.[1]

To remain competitive, ASEAN members recognize that they must deepen their integration, and hence are establishing the ASEAN Economic Community (AEC) at the end of 2015 to accelerate this process. The *ASEAN Economic Community Blueprint*[2] provides a comprehensive overview of the agenda for transforming ASEAN into a highly competitive, single market and production base.

One of the challenges faced by ASEAN in this process is the vast diversity that exists between and within ASEAN member economies. Regional averages mask huge differences—both in stage of development and quality of life. For example, Singapore has a GDP per capita that is over 60 times higher than Myanmar. Narrowing development gaps, and ensuring equitable and inclusive growth are critical for the successful integration of ASEAN. One of the issues in addressing this challenge is connectivity, and in ASEAN's various masterplans, information and communications technology (ICT) connectivity and with it, Internet connectivity, is recognized as fundamental to deepening regional integration and achieving AEC goals.

Internet penetration across ASEAN countries however, currently varies from as much as 73% of the population in Singapore to little more than 1% in Myanmar. The consequences of this digital divide are profound. As the Internet extends connectivity into machines and things, and becomes more embedded in everyday lives, the cost of not getting online will continue to mount for countries already at a disadvantage, potentially exacerbating the divide.

Bridging the Digital Divide

How can ASEAN address the challenge? By a focus on increasing supply and lowering the cost of Internet access. Particularly in low- and low-middle income ASEAN economies. In this way, Internet penetration rates can be raised and usage increased significantly. A key proposition in this report is that *the multiplier effects from increased Internet usage to the economic and social development of ASEAN member economies are so profound as to warrant a specific and sustained focus*.

Key factors keeping Internet retail prices high in many countries (particularly lower-income countries) are high wholesale prices due to a lack of international bandwidth, and the resulting high Internet transit prices. Other factors affecting Internet affordability include insufficient network coverage and domestic bandwidth capacity, as well as a lack of carrier-neutral Internet exchange points (IXPs) that would otherwise increase the competitiveness of smaller Internet service providers (ISPs). Governments can work closely with ISPs to reduce costs, and promote greater Internet access and usage, by encouraging and facilitating investment in international bandwidth, in domestic

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[1] OECD (2015) , "Countdown 2015: Towards Inclusive and Sustainable Growth in the ASEAN Economic Community," *Remarks by Angel Gurría, OECD Secretary-General, delivered at Davos World Economic Forum*, Jan 24, 2015, http://www.oecd.org/about/secretary-general/countdown-2015-towards-inclusive-and-sustainable-growth-in-the-asean-economic-community.htm
[2] ASEAN (2007), *ASEAN Economic Community Blueprint*, http://www.asean.org/archive/5187-10.pdf

network coverage and facilities sharing, and in peering arrangements between ISPs. However, investment in international and national connectivity to drive down wholesale and retail prices can appear a difficult decision when demand is constrained by low incomes and high prices.

Yet, the real demand for Internet access is frequently hidden, due to the failure of the supply side of the market to be responsive. Economists call this "latent demand", which is only able to appear as "revealed demand" when the supply side is actively growing the market. Under these circumstances where investors in countries such as Cambodia, Lao PDR and Myanmar, may be reluctant to fund networks before they see demand, but without supply there can be no demand to respond to. As the report shows, policy makers need to find ways to encourage the requisite investment in Internet infrastructure to enable greater coverage at affordable prices and demand will be forthcoming.

But this is only the first step. ASEAN economies, building upon connectivity, are giving rise to an Internet economy in which Internet companies such as ISPs, content providers and social media add significantly to GDP. However, to fully unleash the potential of the Internet across the region, ASEAN members need to move towards a fully developed digital economy and digital society in which Internet protocol (IP)-enabled networks and services form an underlying infrastructure that is embedded in *all* economic and social activities. A digital economy enables access to and sharing of information and knowledge, as well as collaboration over long distances. It enables access to markets – on both the supply and demand sides – that were previously inaccessible; it streamlines business processes, enhances productivity and lowers transaction and distribution costs. Perhaps most importantly, it fosters innovation in ideas that can be turned rapidly into products and services for widespread distribution in very short timespans.

Transitioning from an Internet Economy to a Digital Society

Fundamental to this transition is the adoption of technologies, business practices and public policies that encourage the **interconnectivity** of networks of all kinds[3], and the **interoperability** of applications and content across different platforms and networks. Interconnectivity and interoperability greatly diversifies the range of communications, products and services that it becomes possible to produce. In an automated teller machine (ATM) network, for example, *interconnectivity* allows customers to access their bank accounts from any ATM on the network; if systems are *interoperable*, money transfers, e-commerce payments to third parties, payroll, government disbursements, and so on, can all be done through the same ATM machines.

Having a longer-term view on successfully transitioning from an Internet economy to a digital economy is vital for business, government and civil society. Seeing the establishment of the Internet economy in isolation risks dramatically underestimating the benefits to be wrought from the transition to a digital economy, and therefore the need to put in place the two enabling components at an early stage. These are: 1) the need to interconnect networks to achieve the economies of scale, required to stimulate innovation and economic growth; and 2) the need to create the

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[3] This should be not confused with the common definition of the Internet, which is the "network of networks." The networks here refer to previously proprietary networks such as payments, airlines, businesses and public networks, becoming interconnected.

interoperability of platforms across different networks so that applications and content can be shared and made ubiquitously available to the larger market.[4]

This transition from basic Internet connectivity to the interconnectivity of networks and interoperability of systems is a progression lower-income ASEAN countries are able to put in place early on. With the emphasis that ASEAN is placing on regional connectivity and integration, lower-income countries have a real opportunity to leapfrog iterative build and development cycles and transform into digital economies and digital societies by connecting and enabling their populations. ASEAN as a whole benefits from an expansion of the market and market demand. By laying these foundations early, it will be far easier for the AEC to achieve its goal of rapid integration across the region.

KEY COMPONENTS

Figure 1 illustrates the key components of a digital economy and society. Underlying everything it is important to establish the technical capacity to **interconnect** different networks, and for different pieces of software and applications to **interoperate**. This provides the basis for the emergence of **multi-modal platforms**. On these platforms, users are able to access the same applications and content from a variety of different devices, some fixed like a PC or an Internet-connected TV, others are wireless and mobile such as a tablet or a smartphone. These multi-modal platforms enhance collaborative work processes, allowing people to communicate and share information from any number of devices and locations. For example, a logistics company can coordinate its fleet of vehicles using real-time data conveyed simultaneously to all depots via smartphones, tablets or computers. With data roaming and interconnection with networks in neighbouring countries, the information can seamlessly enable cross-border trade and deliveries. Ultimately, the transition to a fully integrated digital economy and digital society is achieved where digitally delivered services are inclusive and empower those at the margins of society, including in areas such as health, education, disaster risk management, and the empowerment of vulnerable and disadvantaged groups.

As an economy progresses from building the technical capacity to establishing multi-modal platforms, and to realizing a fully integrated digital economy and society, the levels of connectivity, interoperability and socio-economic value increase, as indicated by the arrows on the right of the figure.

Interconnectivity

The interconnection of networks is a well-established practice in telecommunications, so anyone on one network can call or receive calls from anyone on another network.[5] On the Internet, it works slightly differently. Through the Internet anyone can, in principle, connect to anyone else and to any application or content posted on the World Wide Web, although in practice this is sometimes restricted by local policies and regulations. The difference from the public telecommunications

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[4] In economic terms this is called economies of scope. A simple way of understanding these two concepts is to imagine a farmer who has to pay for a field on which to graze sheep. The more sheep available to sell for their meat the greater the economies of scale because the cost of the field is spread over a greater number of sheep. If the farmer now also starts selling their wool the range of products gets wider and the cost of the field is spread even more thinly due to the economies of scope.

[5] This is not always the case and sometimes a regulator feels it necessary to mandate interconnection and to regulate the interconnection charges of the incumbent or dominant network.

networks is that ISPs traditionally have no regulatory right to "peer" with other ISPs. They are required to negotiate their own terms, or find aggregators or third-parties through whom they can transit traffic.

Figure 1. The Digital Economy Conceptual Framework
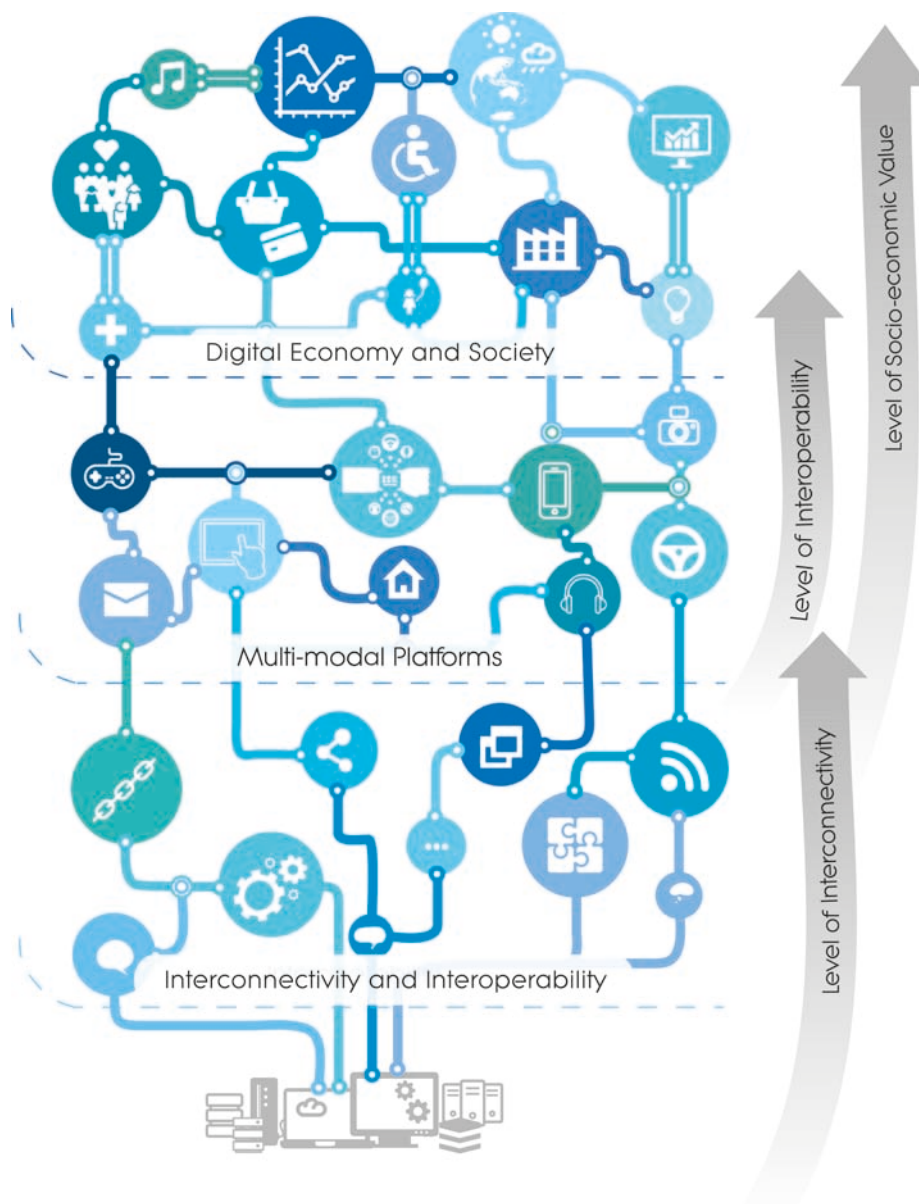
Outside of the telecommunications sector, networks such as vendor payment networks allowing payment by e-money cards, debit and credit cards, bank ATM networks, airline booking and travel agency networks, e-health networks linking hospitals and clinics, and innumerable others, have been much slower to interconnect. In some cases this is for security reasons, in others because vendors wish to be exclusive. But over time, the advantages of being able to interconnect and offer customers more options have been seen to encourage greater user response. In the more developed ASEAN economies such as Singapore and Malaysia, network interconnection is generally quite advanced, but less so for lower-income countries with less IP-enabled networks. In these countries the issues are related to the adoption of technical standards, and the compatibility of the different

technical standards adopted.[6] It is important that these considerations are built into the development of the Internet economy at an early stage.

Interoperability

Compatible standards are important for interoperability across interconnected networks. A prominent example is the sharing of video, audio and image files across mobile and social media networks. This cannot happen if the applications and content cannot work across different operating systems and platforms used by the network operators. One of the major benefits of interoperability arises when different enterprise networks interconnect to offer opportunities for collaborative working, supply sourcing, or information sharing, contributing to market development and productivity. Connecting interoperable networks to deliver social services, such as e-government services, is yet another dimension of the transition to a digital society.

The e-government effort is far from new but it is entering a new chapter brought about by these advances. Open government data and cloud computing, coupled with consumerization of mobile devices, have enabled a range of new opportunities for governments and civil society. Under increasing pressure to provide easier access to public information and government services, many countries are integrating multichannel service delivery. Citizen touch-points that governments are able to consider now range from the physical channels such as counter and voice services, to online means such as Internet access through PCs, mobile phones and tablets, and to emerging media like mobile apps and social media. And these alternative contact channels all have to interoperate to allow the seamless flow of information across different devices and applications, and across different government offices.

It is no overstatement to say that the successful launch of the AEC in late 2015 will depend upon the ability of ASEAN nations to interconnect. Without better interconnectivity and interoperability the growth of e-commerce, for example, will be muted, and the ultimate aim of a digital economy and society—in which Internet-based digitally delivered services are able to achieve inclusiveness and empower those at the margins of society – will be forestalled.

FINDINGS

ASEAN Internet Connectivity Status

Internet penetration

ASEAN, while diverse, can be clustered into three groups by Internet penetration rates:
- Cluster 1 (above 60%): Singapore (SG), Brunei (BR), Malaysia (MY)
- Cluster 2 (25%-50%): Thailand (TH), the Philippines (PH), Vietnam (VN)
- Cluster 3 (1%-20%): Indonesia (ID), Cambodia (KH), Lao PDR (LA), Myanmar (MM)

Most countries find themselves in the cluster corresponding to their respective income level (according to World Bank classifications), but not so for Indonesia and Thailand. In both cases they are found in a lower Internet clustering than might be expected. Clearly, therefore, **per capita GDP is**

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[6] Interconnection requires compatible, but not necessarily the same, technical standards.

not a complete guide in determining the level of Internet penetration of a given economy. Various market and policy conditions play a significant role in driving—or constraining—Internet adoption, as identified below.

Table 1. ASEAN Internet Connectivity Status

Cluster	Country	Income Group	Internet Users (%, 2013)	Growth of Internet Users (CAGR 2009-2013)	Wireless Broadband Penetration (%)	Intl Capacity per capita (kbps)
1	**Singapore**	High-income	73%	1%	137%	258.3
1	**Malaysia**	Upper-middle	67%	3%	14%	15.6
1	**Brunei**	High-income	65%	6%	7%	n/a
2	**Vietnam**	Lower-middle	44%	14%	22%	5.2
2	**Philippines**	Lower-middle	37%	43%	28%	5.5
2	**Thailand**	Upper-middle	29%	6%	53%	6.6
3	**Indonesia**	Lower-middle	16%	22%	36%	1.0
3	**Lao PDR**	Low-income	13%	46%	2%	0.4
3	**Cambodia**	Low-income	6%	59%	10%	0.8
3	**Myanmar**	Low-income	1%	38%	1%	0.3

Source: World Bank Indicators 2014, Internet Society Global Internet Report 2014, ITU World Telecommunication/ICT Indicators database 2014

Wholesale and retail prices

In lower-income countries the prices of Internet connectivity can be prohibitive for many citizens. The data shows that **Internet transit charges are lower in countries with more international connections to submarine cables,** and these **lower wholesale prices will be passed on wherever there are locally competitive ISP markets.** In lower-income countries, where demand is constrained by low incomes and high prices, policies need to encourage investment in supply to drive down both wholesale and retail prices to the point where latent demand can show itself.

Mobile phones and wireless devices

In all ASEAN countries, mobile phone usage has overtaken fixed line usage, and as the cost of mobile devices such as smartphones and tablets falls, there is a clear trend towards an even greater usage of mobile devices to access the Internet. The use of pre-paid data cards for mobile devices offers low-income users the option to buy data packages in small affordable units. Wireless is now often the preferred choice over fixed line access owing to the convenience of being able to carry the device (portability) and use it anywhere (mobility).

Nevertheless, **there are significant gaps in national network coverage in several ASEAN countries that urgently need to be plugged if Internet access is to become universal.** The need to hand-off high volumes of data traffic requires investment in local backhaul and national backbone networks. This is especially true as telecoms and mobile network operators shift towards offering multi-platform content and apps that can be accessed by a variety of different devices, thereby widening the scope of the market and generating even more traffic.

Broadband

Broadband connectivity penetration rates are even more skewed than basic Internet connectivity, with Singapore being far ahead of all others. But **of greater significance is the role of wireless**

broadband as the growing means of Internet access for low- and middle-income citizens of ASEAN economies. This is fortuitous given that it is far easier and cheaper to construct mobile cellular networks than fixed-line networks. But to achieve national coverage that goes beyond the main cities of a country, comprehensive coverage by a fixed-line backhaul network remains a necessity. This is still to be achieved in most of the lower-income countries.

Network capacity

The capacity of both the international bandwidth coming into a country and the national backhaul bandwidth available within a country, are major constraints on Internet connectivity in the economies concerned. This is a chicken-and-egg problem as the lack of Internet development means that traffic volumes and revenues are insufficient to attract private sector investment in these networks. On the other hand, insufficient network capacity chokes off access to the Internet, keeps prices high and the quality of service low. **The role of government in cases of market failure is to help bridge the gap between supply and pent-up demand until a sustainable virtuous cycle of Internet development can be started.**

IXPs

One of the ASEAN-wide problems is the general lack of carrier-neutral peering locations. Without carrier-neutral peering, non-incumbent carrier ISPs have no choice but to trombone their Internet traffic overseas and back again, adding to costs and latency. **The lack of international bandwidth and the anti-competitive market conditions for IXPs and ISPs translate into unaffordable Internet access and poor speed in countries that are most in need of it.** This leaves ASEAN with not only a digital divide *within* countries between those served and those not served, and those who can afford and those who cannot afford; but also *between* countries for those with and without sufficient bandwidth. The digital divide between ASEAN countries is therefore not confined to basic access and pricing, but also includes areas of coverage and service speeds.

Overall, the impetus for ASEAN to address the connectivity divide is clear. **On the supply side, access to international bandwidth should be a priority for Cambodia, Lao PDR and Myanmar alongside national backbone networks that can provide access to that bandwidth.** These are primarily large capital expenditure projects, but once made the incremental costs can fall rapidly as demand responds to supply. **On the demand side, two key elements are pricing and the availability of low-cost access devices**. Pricing is a commercial issue for the service providers, and the more open the market is to competition, the more innovative pricing packages can become. The good news on access is that a new generation of low-cost smart devices has entered the markets, but it remains important that restrictions on imported devices do not deny the benefits from being realized.

Moving Towards the Digital Economy and Digital Society

Enabling the transition from an Internet economy to a fully developed digital society is a challenge for all countries within ASEAN, and one that will depend to a large extent upon two factors: the extent of the interconnection of networks (giving rise to economies of scale); and the breadth of interoperability of network platforms (giving rise to economies of scope). The key policy concern here is the need to promote awareness and appreciation of these issues *even while the Internet*

economy is being created. For example, the adoption of technical standards should be considered from this perspective.

In lower-income ASEAN economies, progress towards interconnectivity and interoperability is intermittent, but significant steps have been initiated, particularly in the areas of e-commerce and access to financial services. This includes the deployment of digital payment platforms extending financial services to populations previously without access. In May 2013, for example, Indonesia's three major mobile operators—Telkomsel, Indosat and XL—jointly made their mobile money networks interoperable. This is one of the first examples of its kind anywhere in the world, and as such is a landmark and a benchmark for ASEAN.

Governments in ASEAN countries have also made progress through various e-government projects. The increasingly ubiquitous nature of mobile networks means that governments have new ways to provide services to citizens, potentially lowering the cost of service delivery while increasing reach and return. At the same time, this of course reinforces the need to focus on mobile devices as the new platform for content and service delivery. In some cases, a lack of interoperability of applications has delayed full implementation of various e-government initiatives as they tend to fall into departmental silos that do not interconnect, and are seldom conceived collaboratively across government agencies.

RECOMMENDATIONS

1. **Prioritise Access to Wireless Networks …**
    Countries with bandwidth constraints need investment to acquire more international bandwidth, but to justify the investment, measures to stimulate demand, much of which is latent, also need to be in place. Policy makers and industry need to work together on the two major determinants of demand: accessibility and affordability. In practical terms, for most citizens this means gaining access to wireless networks. The most direct way to stimulate demand is *to encourage the extension of wireless networks to unserved and under-served areas.*

2. **… and Affordability of Network Access …**
    To ensure affordability of access, ISPs and other service providers who need to lease bandwidth should do so at competitive prices. But wholesale prices can only be brought down if there is a more plentiful supply of bandwidth available on an equal access basis. If ownership of bandwidth is monopolized then steps need to be taken to ensure it is available on fair commercial terms to maximize consumer welfare. One of the most effective ways to reduce the cost of IP transit traffic is to promote carrier-neutral IXPs. Different models to ensure affordability of network access exist such as regulations on the dominant carrier, an independent third party wholesale model, or targeted state-investment. *It is important that whatever the model, policy makers in ASEAN make affordable network access a priority.* By removing the bandwidth bottleneck, the full economic and social benefits of the Internet economy can be achieved and the path towards a fully developed digital economy embarked upon.

3. **… as well as Affordability of Devices.**
    The counterpart to reducing network access prices is to increase access to affordable access devices. In the first instance this means removing obstacles to the supply of such devices. This extends to policies towards imports and equipment type approval procedures. ***ASEAN countries should seriously consider, for example, ways to accelerate relevant MRAs (Mutual Recognition Arrangements) that simplify and speed up certification of imports.*** Policy makers should also ensure that the device distribution and retail networks are fully competitive, and carefully review any tie-in arrangements imposed by carriers that might be considered discriminatory and therefore anti-competitive.

4. **Promote Infrastructure Sharing and Equal Access …**
    Where facilities are dominated by one or two carriers, equal access should be required, with regulator-approved reference interconnection offers (RIOs) to protect weak new entrants. ***There should be support for the sharing of scarce resources such as towers and ducts to maximize services competition; as well as the sharing of certain radio spectrum*** (or dynamic spectrum assignment) to utilize frequencies in bands of under-used or unused spectrum.

5. **… along with the Transition to IPv6**
    The assignment of IPv6 addresses will become increasingly important as a multitude of Internet-connected devices proliferate. Within ASEAN, only Malaysia and Singapore score significantly in terms of IPv6 adoption; both economies focused upon building smart cities and applications, including M2M connections such as smart meters and environmental sensors. This is an issue that ASEAN governments need to take seriously – ahead of the onset of a shortage of IPv4 addresses in their respective countries. ***ASEAN governments should clearly timetable the expected transition in their economies to IPv6.***

6. **Interconnectivity Needs to be Proactively Promoted by Government …**
    Most economies in the region are only at the beginning of the growth curve of Internet interconnectivity. And while most public carrier networks do interconnect, in cases where incumbents impose excessive charges, regulators need to consider the use of RIOs to ensure fair competition; while in non-carrier proprietary networks, such as third party payment networks, ***governments need to work with industry to find ways to maximize the social and economic benefits of interconnection to users***. Various models of good practices exist, ranging from voluntary agreements to state-supported clearance systems and it is important that policy makers and the industries concerned are aware of the mutual advantages of interconnectivity to grow the Internet economy as a bridge to the digital economy.

7. **… while Interoperability Needs to be Built into all Services Delivery**
    The essence of a digital economy are applications that work seamlessly across different networks, support productivity, and are essential to the wider provision of services such as health and education. ***In public sector services and applications, interoperability, especially of apps across mobile networks, should be built into all future planning requirements***, with the ultimate focus on end-user services. Interoperability would be difficult to achieve without full consideration into openness of standards. Open Internet standards allow devices, services, and applications to work together across a wide and dispersed network without falling into the traps of commercial tie-ins or backward compatibility and ultimately foster innovations to arise. In the private sector, policy makers should work with the industry in cases where

interoperability would significantly enhance public welfare. The financial services and payment systems sectors are a case in point.

8. **Governments Need to Lead in Using ICTs to Extend Inclusion…**
Governments themselves have the opportunity to show a leadership role in the way digital services can be delivered, either in a very targeted way or in a holistic manner. This report identifies progress being made in e-government developments around the ASEAN region, including health, education and disaster risk management services. The report also identifies the vast potential for extending financial, health, and educational inclusion to otherwise marginalized communities given the ubiquity of mobile devices and the growing availability of smart mobile devices, even at the bottom of the pyramid. *But with many of these populations still considered 'uneconomic' by the private sector, governments need to play a leading role in extending inclusion to these communities.* This may be one of the most important initiatives for addressing the digital divide and attacking poverty and illiteracy across ASEAN.

9. **… by Recognizing the Importance of Mobile First**
ASEAN is effectively a mobile-first group of economies with many first time users now increasingly coming online via mobile devices at the outset. And with the growing access to low-cost smartphones becoming ubiquitous across the region, this trend will only grow. *Governments need to recognize the mobile centricity of their populations and adjust their Internet access and national digital economy plans accordingly, along with developing mobile first programmes.* Existing applications designed for the desktop can no longer be simply 'retro-fitted' on to the mobile; while that may have been palatable in the past, applications and processes now need to be designed and made for mobile platforms – natively, if they are to work securely and intuitively.

10. **… and Promoting Capacity Building as a Key Part of Empowerment**
Empowerment of persons often marginalised in society has long been an objective of governments and NGOs, using digital networks to spread the benefits of the Internet. The Internet offers unprecedented opportunities for women and people with disabilities (PWDs) to break out of social silos and for economies to embrace otherwise undervalued resources. The Internet offers important ways to empower people who are marginalized due to gender or disability by offering the means of communication and inclusion, but also ICT skillsets whereby they can play a full and productive part in society. However, the evidence suggests that many ASEAN countries still have a long way to go in building these objectives into their ICT planning provisions to address the social inequalities that persist. *Policy makers are urged to not only involve women and PWDs directly in the consultation and planning processes, and give such policies a more prominent place in national priorities, but to also focus on the distribution of resources and the capacity building that enables both access and participation.* The exclusion of so many from the social mainstream is a major loss to the economy.

In conclusion, there are clearly steps governments can take to encourage and accelerate the shift from basic connectivity for Internet access towards a more fully-interconnected and interoperable digital economy. The benefits of a shift from the economies of scale of an Internet economy to the economies of scope of a digital economy will be truly transformative.

By connecting the world, working with others, and advocating for equal access to the Internet, the Internet Society strives to make the world a better place. The Internet Society engages in a wide spectrum of Internet issues, including policy, governance, technology, and development. We establish and promote principles that are intended to persuade governments to make decisions that are right for their citizens and each nation's future. Everything we do is based on ensuring that a healthy, sustainable Internet is available to everyone – today and for the next billion users.

For more information, visit www.internetsociety.org

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