

Connectivity, Innovation and Growth:

Fostering an Open Internet in Asia



TRPC January 2017

FOREWORD

The Internet is rapidly becoming the most popular way people access and consume content, such as music, movies, TV shows, sports, social media postings and increasingly smart device apps, for example, web-cams and connected machines in cars and homes. In Asia, which has the highest number of Internet users in the world with 1.8 billion people online¹, the demand for such content is a key driver of demand for broadband access and usage, which in turn incentivizes investment in networks by both public and private players.

Investment in broadband networks — fixed line, fixed-wireless, cellular mobile or Wi-Fi — stimulates an ecosystem of app developers, content producers, smart device manufacturing, and web-based services such as payment systems and cloud computing, that stretch far beyond the initial demand for content itself.

But these gains will not be realized if the Internet becomes restricted by inhibitive policies and/or monopolistic behaviour of incumbent industry players. An open Internet is a necessary precondition for the virtuous cycle to emerge. The vibrant development of the Internet in more advanced digital economies has shown to be based on it being a system open to all and discriminating against none. Arguments that the Internet needs to be restricted, regulated the same way as traditional industries, or that access to content needs to be 'controlled', threaten the virtuous circle that has given rise to so many social and economic benefits.

This is **not** to argue that illegal content such as child pornography, or content that promotes terrorism should be freely available. It is to argue that an open Internet that is non-discriminatory and allows consumers to freely choose and consume content and services is vital to the progress of the economy and society. It is imperative that an open Internet is fostered and protected in Asia as governments and other stakeholders look towards reaping the benefits of a digital economy over the next decade.

This report has been written to be a point of reference for stakeholders across the public and private sectors involved in the digital economy and to facilitate discussions on and about the open Internet.

¹ Accessed 30 September 2016. Internet World Stats (2016) Asia Marketing Research, Internet Usage, Population Statistics and Facebook Information
<http://www.internetworldstats.com/asia.htm>

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EXECUTIVE SUMMARY

AN ABUNDANCE OF DIGITAL CONTENT IS KEY TO DRIVING INTERNET ADOPTION IN ASIA

Inhibitive policies that restrict content will negatively impact national goals of Internet adoption

With a population of 1.8 billion, Asia has the highest number of Internet users in the world, but lags behind other regions in terms of Internet penetration at 45.6% — compared to 89% in North America and 57.4% in the Middle East². The main driver of Internet adoption today is user demand for content — streaming videos, using social media, playing online games — and by 2020, video content is forecast to account for 82% of global IP traffic³. In emerging economies, the demand to go online is facilitated by increasingly affordable mobile data plans and smartphones, which are becoming the go-to platforms for Internet usage. As Internet adoption continues to grow and billions more connected devices come online, data consumption of all sorts will grow exponentially. Asian Internet traffic is expected to grow by a compound annual growth rate (CAGR) of 22%, from 361.7 exabytes in 2016 to 814.2 exabytes per year by 2020⁴.

AN OPEN INTERNET ENABLES A VIRTUOUS CIRCLE OF CONSUMPTION AND INVESTMENT IN NETWORKS

The virtuous circle incentivizes network deployment leading to increased access and use

As users become more comfortable online, they consume more content and create further demand for broadband access. This, in turn, drives investment in network infrastructure and opens the door for further innovation resulting in economic growth. A virtuous circle of consumption (demand) and investment (supply) arises. An open Internet — a level playing field where everyone has the same opportunity to participate, where markets are competitive, where net neutrality principles are adopted, and Internet connectivity is accessible and affordable⁵ — is key to enabling the virtuous circle by ensuring consumers can access and consume content of their choice. By contrast, restrictions on an open Internet can lead to unintended consequences, such as higher prices for connectivity or reduced content offerings, slowing the momentum of the virtuous circle of growth.

² Accessed 30 September 2016. Internet World Stats (2016) Asia Marketing Research. Internet Usage, Population Statistics and Facebook Information <http://www.internetworldstats.com/asia.htm>

³ Cisco (2016) Cisco Visual Networking Index: Forecast and Methodology, 2015-2020.

<http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf>

⁴ Cisco (2016) Cisco Visual Networking Index: Forecast and Methodology, 2015-2020.

<http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf>

⁵ ISOC (2014) The Open Internet, What it is, and how to avoid mistaking it for something else

<http://www.internetsociety.org/sites/default/files/The%20Open%20Internet%20What%20it%20is%20and%20how%20to%20avoid%20mistaking%20it%20for%20something%20else%20.pdf>

COMPETITION IN ISP AND TELECOMMUNICATIONS MARKETS BENEFITS CONSUMERS

Lack of competition results in inflated prices and low quality

Policymakers in Asia face various challenges in addressing the rising demand for data, and open Internet policies are often the underlying solution to ensure accessibility and affordability. In many cases, these challenges can be addressed by allowing for increased competition. Competition in telecommunications markets will lead to lower prices, better coverage, and higher quality. In countries where competition is lacking, consumers suffer from expensive and slow broadband as providers have little incentive to improve or innovate. Even in geographical locations where network providers have little commercial incentive to expand, policymakers can rely on tools such as Universal Service Access Funds (USAFs) to ensure the entire population is connected.

PROMOTING THE USE OF NON-DISCRIMINATORY ZERO-RATING SCHEMES AND DATA PLANS

Non-discriminatory zero-rating schemes promote innovation while enabling access in markets where affordability remains a challenge

The open Internet is based on the principle of non-discrimination, where everyone — users, edge providers and network providers — has an equal opportunity to participate. This should guide zero-rating schemes, which offer data on certain applications or websites free or at a reduced cost to customers. Discriminatory zero-rating schemes which only allow select providers to participate discourage innovation and competition by delivering certain content and services cheaper than others. Even when such schemes appear effective in encouraging adoption of selective Internet content and services in the short-run, they remain detrimental to the long-term development of the Internet economy as they limit consumers' ability to make their own choices. Non-discriminatory zero-rating schemes are open to all providers of the same class of content who can freely participate. These not only uphold the principles of the open Internet, but represent a means of affordable access for consumers to content and services of their choice without creating 'walled gardens' or Internet gatekeepers.

NETWORK MANAGEMENT TOOLS REDUCE BANDWIDTH CONSTRAINTS AND TRANSIT COSTS

Settlement-free interconnection and neutral IXPs lower costs for ISPs and result in a higher quality Internet experience for consumers

The increase of traffic has put strain on the Internet backbone and good network management practices have become increasingly important. Tools such as local caching, content delivery networks (CDNs), and interconnecting through neutral Internet Exchange Points (IXPs) help to bring content closer to the consumer, lower network costs and decrease latency, which ultimately make the distribution of content more efficient. These practices are particularly relevant given that 56% of Asian Internet traffic originates from international sources⁶.

⁶ TeleGeography, (2016) Global Internet Geography
<https://www.telegeography.com/products/global-internet-geography/analysis/regional-analysis/asia/index.html>

I. INTERNET TRAFFIC IS SURGING IN ASIA

In 2016 global IP traffic passed the zettabyte mark (the equivalent of 36,000 years' worth of HD quality video or 250 billion DVDs), and is forecast to grow at a compound annual growth rate (CAGR) of 22% through to at least 2020⁷. By 2020 also it is estimated there will be 50 billion connected devices. These are just two indicators of the exponential growth and reach being achieved by the Internet and the services, content and applications associated with it. At the forefront of this tidal wave of data are streaming video services offered by companies such as Amazon, Google, Netflix, YouTube, and others. As more users come online, yet more companies will emerge to provide services, leading to ever more content consumption and fueling a further rise in data traffic. Beyond these services is a wave of e-services such as e-government, e-health, e-education, online banking, etc. However, the precondition for these developments is investment in networks, and Internet access at affordable prices. Unimpeded Internet access to these services will itself drive the demand for networks and investment in them.

The value of such traffic to the economy is the driver of investment. Southeast Asia's Internet economy is forecast to grow to over USD200 billion by 2025 — **if the necessary infrastructure investments occur and enabling regulations are adopted**⁸. Central to achieving such growth is an open Internet — an environment in which innovators can develop products and services freely, without having to worry that broadband providers will discriminate against certain types of traffic. Or, as it has been described elsewhere, an enabling infrastructure where “consumers can go where they want, when they want”⁹. **An open Internet offers a level playing field in which everyone is able to enjoy the same opportunity to participate, where markets compete freely, networks remain neutral and Internet connectivity is accessible and affordable**¹⁰. **As regulators look to promote and transition to a digital economy, a key focus** should be the ability for consumers to access content and services of their choice.

⁷ Cisco (2015) Internet of Things Will Deliver \$1.9 Trillion Boost to Supply Chain and Logistics Operations

<https://newsroom.cisco.com/press-release-content?articleId=1621819>

⁸ e-conomy SEA, Unlocking the \$200 billion digital opportunity in Southeast Asia

<https://docs.google.com/presentation/d/1Bp4KT-W8RF4ZorPUhts8X-B7QHBhsEnY1T5G7XiFU0/edit#slide=id.p>

⁹ FCC (2015) Open Internet, <https://www.fcc.gov/general/open-internet>

<http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf>

¹⁰ ISOC (2014) The Open Internet, What it is, and how to avoid mistaking it for something else.

<http://www.internetsociety.org/sites/default/files/The%20Open%20Internet%20What%20it%20is%2C%20and%20how%20to%20avoid%20mistaking%20it%20for%20something%20else%20.pdf>

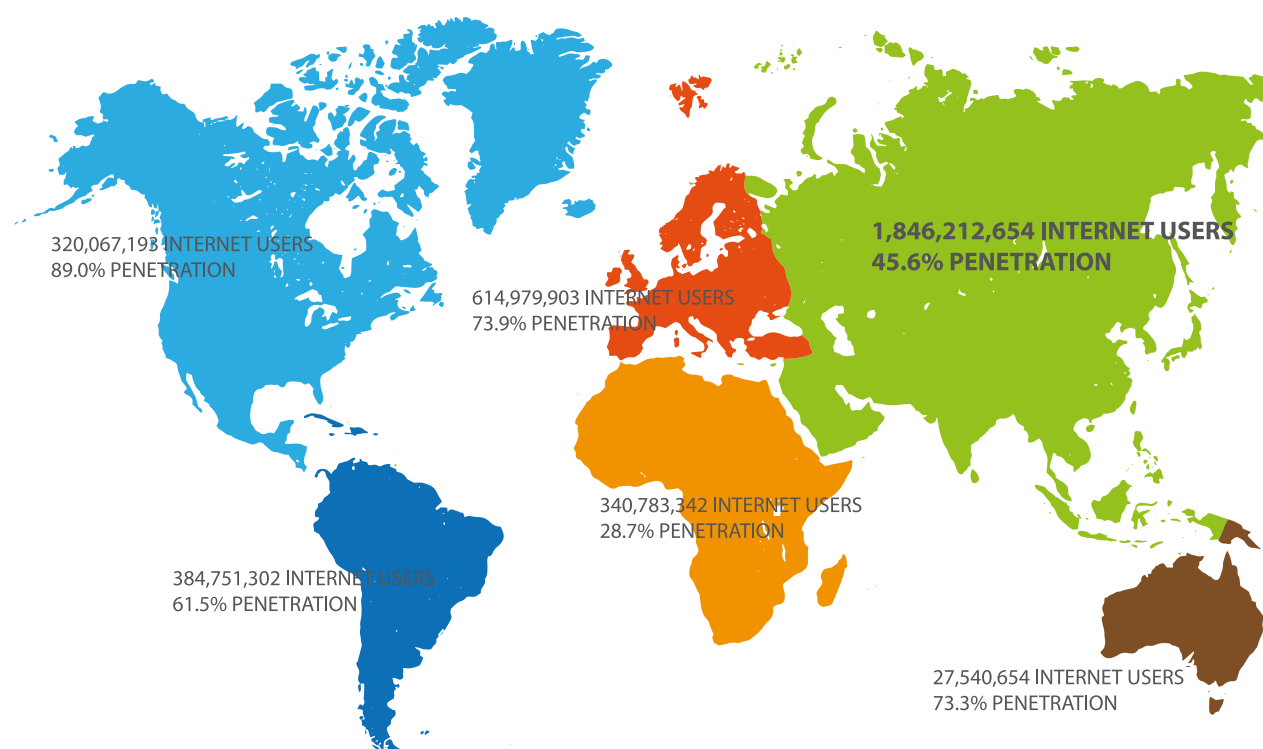


Figure 1: Global Internet Users and Penetration

Source: Internet World Stats (2016) <http://www.internetworldstats.com/stats.htm>, last updated 30 June 2016

Though Asia is home to over four billion people, less than half the region's population is connected to the Internet — 1.8 billion (**Figure 1**)¹¹. While Asia already accounts for half of the world's Internet population, the proportion of the population online in Asia still lags that of North America, Europe, Oceania, and Latin America. Some 55% of the Asian population are not yet connected to the Internet, and thus unable to enjoy access to information, social networking, streaming videos, and online news. They are also unable to gain benefits from e-government services, be financially included, make purchases via e-commerce, benefit from online education and certifications, or be assisted by remote medical facilities. The interaction between why and how people go online initially and the services that they can benefit from is an underlying, but important, theme of this paper.

The benefits of the Internet are at least proportional to its reach. The sheer scale of the Internet offers societies enormous economies of scale. For example, a 2016 World Bank study points out that in identifying cost savings in e-filing systems of 17% during the first year of implementation, and 39% in the second year, the precondition is the connectivity of the general public to the system¹². E-government in Hong Kong provides an example of scale. Between November 2015 and October 2016 visits to its one-stop portal GovHK website averaged 59,405 per day¹³.

¹¹ Accessed 30 September 2016. Internet World Stats (2016) Asia Marketing Research.

Internet Usage, Population Statistics and Facebook Information, <http://www.internetworldstats.com/asia.htm>

¹² A. Kochanova, Z. Hasnain and B. Larson (2016) Does e-government improve government capacity?

Evidence from tax administration and public procurement.

<http://documents.worldbank.org/curated/en/334481468193734893/pdf/WPS7657.pdf>

¹³ Hong Kong Government (2016) Digital 21 Strategy. Statistics and Figures, <http://www.digital21.gov.hk/eng/statistics/stat.htm>

The benefits of scale are not exclusive to advanced economies. The Philippines Social Security System's shift to using cloud computing saved citizens PHP30 million (USD8 million) in 2016 alone¹⁴. In Vietnam, the launch of its Digital Immunisation Registry has reduced waiting times from two days to 30 minutes, where the rate of people vaccinated on schedule also increased by 10-14%, and newborns were registered 8.5 days after birth on average, as compared to 33.4 days before¹⁵.

The recognition of the importance of the Internet for economic growth and social development among policymakers is reflected in the rising number of national broadband rollout plans and digital economy development programs throughout the region. For example, the Philippines plans to finalize a new National Broadband plan earmarked to cost PHP77-200 billion (USD1.5-4 billion) in 2017¹⁶, while Vietnam's Broadband Development Plan aims to increase nationwide fixed broadband penetration to 40% by 2020, and targets at least 60% of users to have a minimum downstream connection speed of 25Mbps¹⁷. National broadband plans with quantifiable and, in many cases ambitious, targets for both coverage and network speed have become increasingly common as governments seek to achieve the essential first step of providing connectivity.¹⁸

I.I CONNECTIVITY IS ONLY HALF THE CHALLENGE

Providing connectivity is only half the challenge of ensuring users are online. The other half is how to incentivize users to adopt the Internet. As this report will show, content is the common key driver in extending and accelerating Internet adoption. First-time users today are using the Internet to watch videos, play online games, use social networks and communicate with friends and family — increasingly over bandwidth consuming video services such as YouTube, Facebook and FaceTime. To enable, capture, and drive such development, policymakers need to ensure that they have the necessary open Internet policies in place or users' connections or the experiences will be constrained, leading to less demand and less innovation. An open Internet and supporting policies will allow users, service providers and the government to fully realize the benefits of the Internet and allows for innovation to occur from anywhere.

¹⁴ GovInsider (2016) How the Philippines Social Security System Saved US\$8million

<https://govinsider.asia/innovation/how-the-philippines-social-security-system-saved-us8m-in-one-year/>

¹⁵ Path (2016) Path Vietnam and Immreg, Expanding Reach of the Immunization Registry in Vietnam, http://www.path.org/publications/files/ID_vietnam_unf_cs.pdf

¹⁶ T. Cordero (2016) PHL broadband plan for Duterte's signature by Jan. 2017, says DICT.

<http://www.gmanetwork.com/news/story/591730/money/economy/phl-broadband-plan-for-duterte-s-signature-by-jan-2017-says-dict>

¹⁷ TeleGeography (2016) Vietnam's PM approves broadband development programme.

<https://www.telegeography.com/products/commsupdate/articles/2016/01/25/vietnams-pm-approves-broadband-development-programme/>

¹⁸ For a comprehensive list of national broadband policies around the world see Broadband Commission (2015) Broadband policies worldwide 2015.

<http://www.broadbandcommission.org/Documents/publications/NationalBBPolicies-2015.pdf>

Decentralized innovation from startups and edge providers¹⁹ have led to the development of new direct-to-consumer offerings that add value to the public²⁰. An open Internet allows end-users to select the types of content and services they want to use, incentivizes competition, and rewards innovation. In contrast, restricted Internet access leads to a lack of impetus for innovation, fewer relevant services, and less value-added content services, which ultimately affects Internet adoption, use and network investment.

With discussion around the importance of an open Internet still at a developmental stage in the region, this report has been undertaken to further inform and facilitate such conversations and awareness in Asia.

2. DRIVERS OF INTERNET GROWTH IN ASIA

Asia is one of the fastest growing regions in the world in terms of Internet adoption and use. Not only is adoption growing steadily, the demand for data to feed an increasingly voracious appetite for content is growing exponentially. Through this section, we illustrate the rapid growth in Internet adoption across Asia, driven by the demand for data traffic, predominantly video.

2.1 OVERVIEW OF INTERNET ADOPTION IN ASIA

As shown in **Figure 2**, the Asia Pacific, starting from a stronger position than other developing regions, continues to be one of the fastest growing in numbers of Internet users, with a CAGR of 11.52% for 2009 to 2015. Over this six-year period, the Asian Internet population more than doubled, now accounting for almost half of the global Internet population. Unlike the slowdown in growth as Internet uptake reaches maturity in more advanced markets of North America and Europe, there remains a large unconnected population in the Asia Pacific, hence this growth can be expected to continue for some time to come²¹. Much of this is being enabled by the plummeting cost of smartphones and a 'mobile-first'²² approach, especially in emerging Asia.

¹⁹ Edge providers refer to any individual or entity that provides any content, application, or service over the Internet, and any individual or entity that provides a device used for accessing any content, application, or service over the Internet. Code of Federal Regulations (2016) Electronic Code of Federal Regulations 8.2, Definitions (b) Edge provider. http://www.ecfr.gov/cgi-bin/text-idx?SID=45612c59404e918d0819b52425c7bc53&mc=true&node=se471.8_12&rgn=div8

²⁰ A. Klosowski (2016) Net neutrality: Is the mother of innovation under threat? <http://www.thedrum.com/opinion/2016/11/18/net-neutrality-the-mother-innovation-under-threat>

²¹ eMarketer (2016) Slowing Growth Ahead for Worldwide Internet Audience. <https://www.emarketer.com/Article/Slowing-Growth-Ahead-Worldwide-Internet-Audience/1014045>

²² Mobile-first refers to the notion that users are more likely to access the Internet using a mobile device than a traditional desktop computer. Inquirer.net (2014) In 2014 PH to become mobile-first country and other social media trends <https://technology.inquirer.net/34878/in-2014-ph-to-become-mobile-first-country-and-other-social-media-trends>

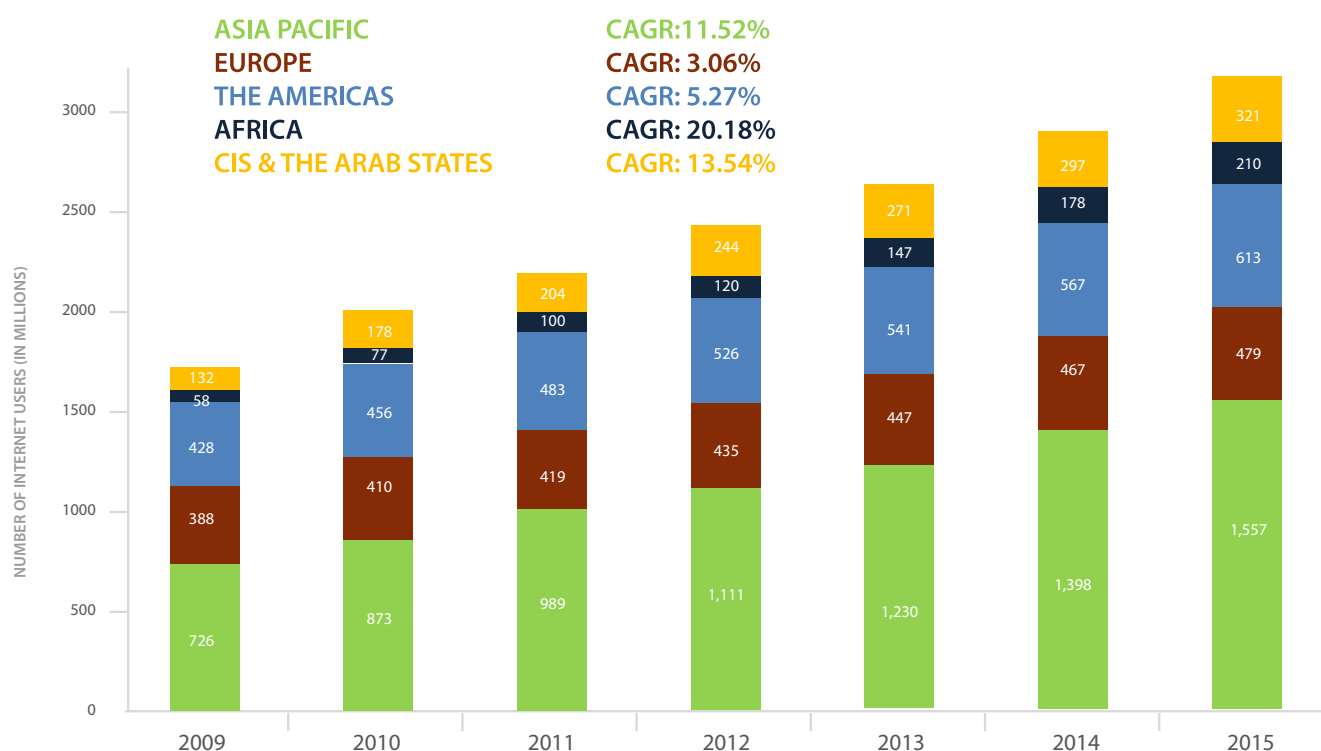


Figure 2 : Global Internet users and growth rates (2009 to 2015)

Source: TRPC analysis based on statistics from ITU Facts and Figures 2016

In emerging Asian economies, ‘mobile first’ approaches are fostering demand for content by offering users an affordable and user-friendly means of access. With services such as WhatsApp, WeChat, Facebook Messenger and Line becoming the primary channels for users to keep in contact and communicate with friends and family, the demand for messaging services and social media has often been an early driver of adoption. Moreover, this low bandwidth, text-based messaging has been migrating to more intense video and audio communication. In cities from Taipei to Perth where free Wi-Fi is widely available, OTT messaging — be it text or video — is the more affordable way of communicating for most users, as compared to regular voice calling or SMS²³. While mobile Internet represents a convenient means of accessing the Internet in many developed countries, across much of Asia mobile Internet represents the only means for going online; often meaning it is not so much ‘mobile first’ as ‘mobile only’.

For the majority of individuals around the globe, a mobile phone is now the main way they access connected services...this is a fundamental shift in the way people access and consume information and content. - We are Social 2016²⁴

²³ eMarketer (2016) Slowing Growth Ahead for Worldwide Internet Audience. <https://www.emarketer.com/Article/Slowing-Growth-Ahead-Worldwide-Internet-Audience/1014045>

²⁴ We are social, Deborah Rosabel (2016) Digital in 2016. Headlines. <http://wearesocial.com/sg/special-reports/digital-2016>

For example, over 70% of Indonesia's Internet traffic originated from mobile devices in 2015²⁵ and a survey of 21 emerging and developing nations by Pew Research found that smartphone ownership climbed from a median of 21% in 2013 to 37% in 2015²⁶. A 30% fall in the price of handsets since 2008 has facilitated the growth in both smartphone and Internet adoption²⁷. By 2021, Vietnam, Thailand and Malaysia will pass the 100% mark for smartphone subscription penetration, while the number of smartphone subscriptions in Bangladesh, Philippines, Myanmar, and Indonesia will more than double as the number of smartphone subscriptions in Asia Pacific reaches 1.7 million²⁸. In India, a smartphone adoption rate of 25% is still comparatively low, but this is changing fast with shipments increasing more than 30% in 2015, illuminating the marked increase in demand. According to Cisco, the average number of connections in the Asia Pacific will grow from 1.9 devices per person in 2015 to 2.8 in 2020. But access is only one part of the equation: IP traffic over smartphones will grow from 8% to 30% over the same period²⁹.

2.2 VIDEO DOMINATES THE GROWTH IN INTERNET TRAFFIC

While the Internet continues to grow steadily in terms of users, Internet traffic growth is exponential due to rising demand for content. As each new user comes online, the data they consume, generate and share increases over time. At the center of the growth in data consumption is video, accounting for 65% of total consumer IP traffic (14,534 petabytes³⁰) in Asia in 2015. By 2020, this figure is expected to reach 82%³¹. The left-side of **Figure 3** shows that while number of broadband subscribers in Asia grew at a CAGR of 10% between 2012 and 2016, bandwidth expanded three times faster at 29%. This growth is mainly driven by video traffic, where the right-side of **Figure 3** shows that from 2009 to 2015, video traffic in Asia grew at an annual accumulated rate of 40.3%. In contrast, total consumer Internet traffic grew at 26.6% over the same period. Internet traffic growth is and will continue to be driven by video traffic in Asia.

²⁵ Techcrunch, H. Harsono (2016) Indonesia will be Asia's next biggest e-commerce market.

<https://techcrunch.com/2016/07/29/indonesia-will-be-asias-next-biggest-e-commerce-market/>

²⁶ Pew Research Center, J. Poushter (2016) Smartphone ownership rates skyrocket in many emerging economies, but digital divide remains.

<http://www.pewglobal.org/2016/02/22/smartphone-ownership-rates-skyrocket-in-many-emerging-economies-but-digital-divide-remains/>

²⁷ A4AI (2016) Affordability Report 2015/16.

<http://1e8q3q16wyc81g8l3h3md6q5f5ewpengine.netdna-cdn.com/wp-content/uploads/2016/04/A4AI-2015-16-Affordability-Report.pdf>, p9

²⁸ TechTrade Asia (2016) Asia Pacific smartphone use to surpass rest of world combined.

<http://www.techtradeasia.info/2016/06/asia-pacific-smartphone-use-to-surpass.html>

²⁹ Cisco (2016) The Zettabyte Era: Trends and Analysis.

<http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.pdf>

³⁰ 1 petabyte is one quadrillion bytes or 10¹⁵ bytes. 1 Petabyte can hold approximately 20 million 4-door filing cabinets full of text.

³¹ Cisco (2016) Cisco Visual Networking Index: Forecast and Methodology, 2015-2020.

<http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf>

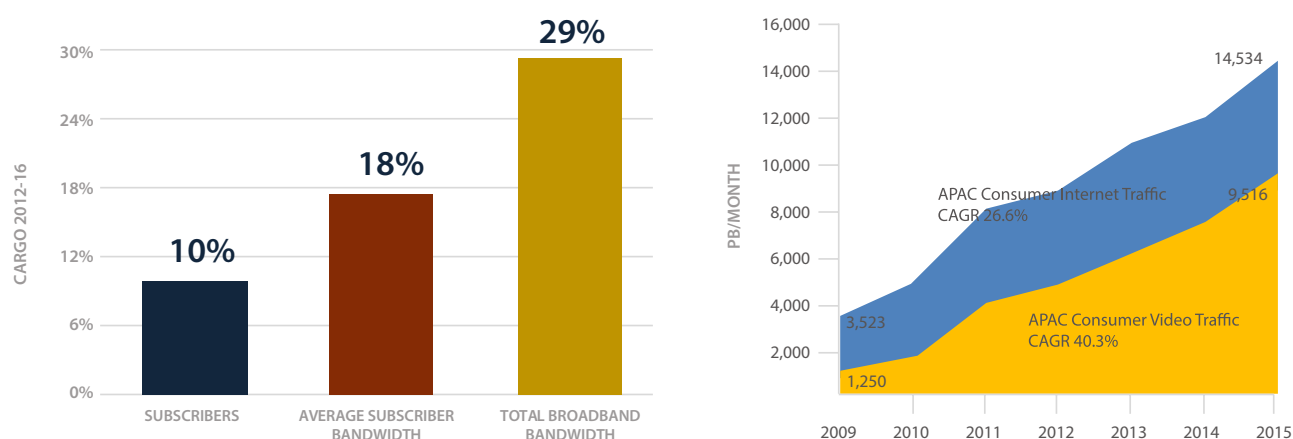


Figure 3 : Broadband subscriber and bandwidth growth (2012 to 2016); video traffic growth (2009 to 2015) in Asia

Source: TRPC analysis based on statistics from Cisco VNI reports; TeleGeography 2016 Global Internet Geography, Asia

Within Asia, India and Indonesia are displaying some of the highest growth rates for Internet video consumption in the world (**Figure 4**). In China, some 91% of consumers already “binge watch” content, with over 50% watching more than two hours of video a day³².

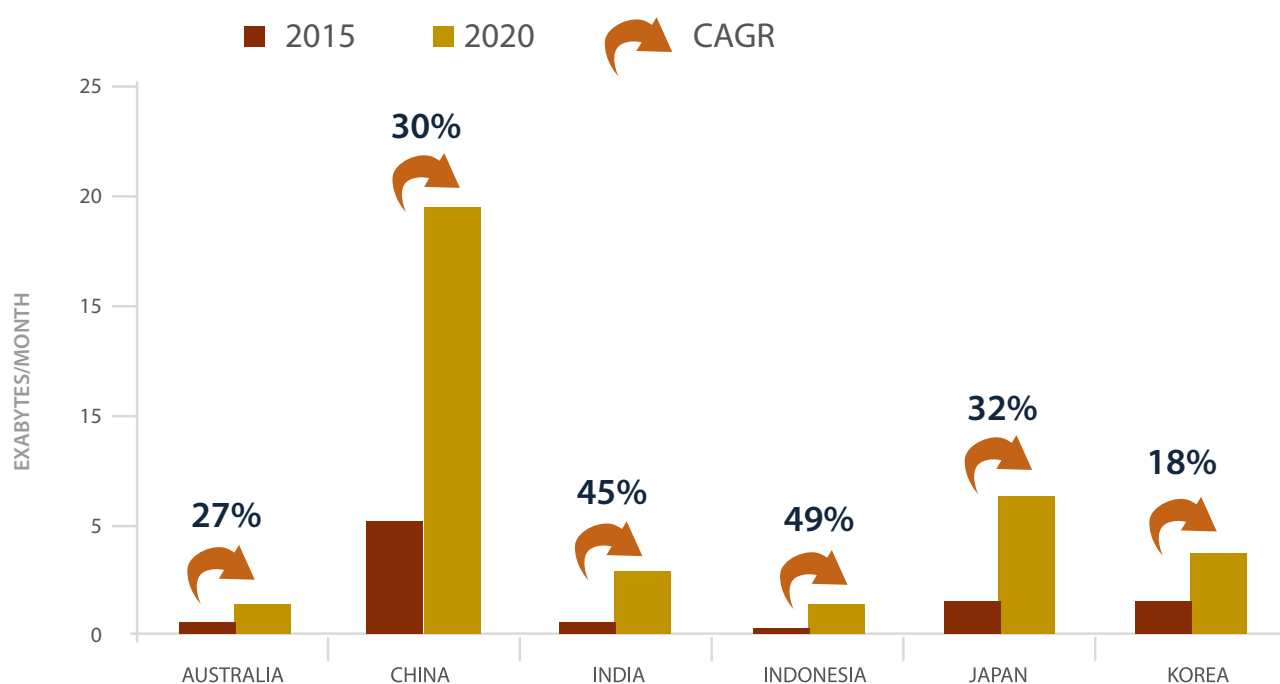


Figure 4 : Internet video growth in the Asia Pacific (2015 to 2020)

Source: TRPC analysis based on statistics from Cisco VNI report

³² D. Wijaya (2015) Viki Media Kit. http://www.slideshare.net/dellawijaya/viki-media-kit-2015?gid=6477baad-e8f9-4a17-8b65-1a9106c57e9a&v=&b=&from_search=22

In Southeast Asia, Thailand has the highest Internet TV penetration at 76% of users, followed by the Philippines at 71%³³; Thailand also ranks in the top 10 YouTube viewing countries worldwide (and first in Southeast Asia)³⁴ demonstrating the strong preference for on-demand viewing by consumers – the ability to watch what they want to watch, when they want to watch it and across various devices. Already, Asia is leading the transition (tied with North America) to using paid video-on-demand programming content, with 35% of users indicating that they do so, well above the global average of 26%³⁵. The relative openness of the Internet in these markets has allowed users to benefit from innovations that either provide alternatives to traditional TV broadcasts, or make watching such broadcasts far more accessible and convenient. Openness and competitive markets help with this growth.

Hong Kong and Singapore demonstrate how competitive telecom markets with open Internet policies have been able to drive the surge in mobile data usage. As shown in **Figure 5**, total mobile data usage (including 2.5G, 3G, and 4G) in Hong Kong grew from an average 4.1MB per user per month in 2006 to 1,441MB per user per month in July 2016. In Singapore, mobile data more than doubled from 5.33 petabytes to 11.39 petabytes, or (about 2,000MB per user per month), in the four years from 2012 to 2016. These are two of the most open and connected Internet markets in the world. They are also two of the smallest countries in population size. By contrast, a tech-savvy user market like the Philippines with comparatively poor communications infrastructure and sub-optimal traffic management, showed an average data traffic per connection of 527MB in Q3 2015³⁶. Though growth rates differ country by country, content continues to drive user adoption and the increases in data consumption.

³³ Nielsen (2014) Online video is reshaping Southeast Asia's media landscape.

<http://www.nielsen.com/apac/en/insights/news/2014/online-video-reshaping-southeast-asian-media-landscape.html>

³⁴ The Nation, A. Pornwasin (2016) Thailand is still number one for YouTube viewers in Southeast Asia.

<http://www.nationmultimedia.com/news/business/etc/30297423>

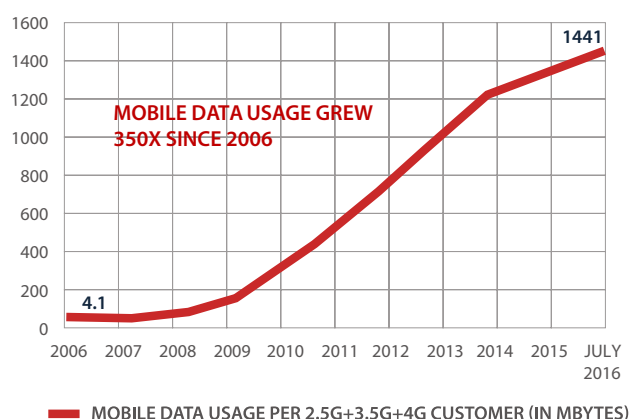
³⁵ Nielsen (2016) Video on demand. How worldwide viewing habits are changing in the evolving media landscape.

<http://www.nielsen.com/content/dam/nielsen-global/eu/docs/pdf/Nielsen-global-video-on-demand.pdf>

³⁶ GSMA Intelligence (2016) Philippines

HONG KONG

MOBILE DATA USAGE (IN MBYTES)
PER 2.5G+3G+4G CUSTOMER,
12/2006-7/2016
MONTHLY AVERAGE IN DECEMBER



SINGAPORE

MOBILE DATA USAGE (IN PETABYTE)
2Q12-2Q16, MONTHLY AVERAGE

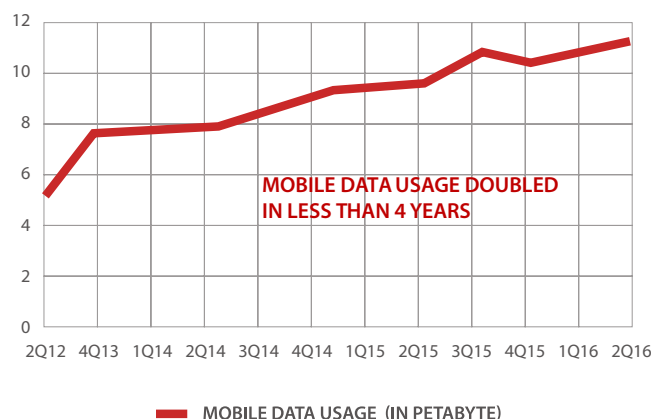


Figure 5: Mobile data usage in Hong Kong (Dec 2006 to Jul 2016), and Singapore (2Q 2012 to 2Q 2016)

Source: OFCA Key Statistics for Telecommunications in Hong Kong.

http://www.ofca.gov.hk/filemanager/ofca/en/content_108/wireless_en.pdf

IMDA Telecommunications Facts & Figures.

<https://www.imda.gov.sg/industry-development/facts-and-figures/telecommunications#9x>

2.3 CONTENT DRIVES BOTH ADOPTION AND USE

According to the World Economic Forum (WEF), the primary driver of user adoption is content such as news, entertainment from streaming videos, social media and online games. Secondary motivations include utilities, such as e-government services and online education. In other words, entertainment and social communications are early drivers of Internet use. Not surprisingly, the maturity of the content ecosystem in any given market is positively correlated with the level of Internet penetration (**Figure 6**). Countries with a greater depth of available, relevant, and diverse content offerings have higher Internet penetration. While video forms the largest portion of content traffic, the demand for social media, music, gaming, and information services is also driving demand for faster and better networks in Asian markets. As the WEF noted, once users begin consuming such services, secondary levels of demand for services such as e-education and e-government begin emerging strongly, usually premised on the localization (in language and context) of successful offerings in the market.

³⁷ B. El-darwiche et al (2015) Understanding Digital Content and Services Ecosystems:

The Role of Content and Services in Boosting Internet Adoption, WEF Global Information Technology Report 2015.

<http://reports.weforum.org/global-information-technology-report-2015/1-3-understanding-digital-content-and-services-ecosystems-the-role-of-content-and-services-in-boosting-internet-adoption/>

³⁸ B. El-darwiche et al (2015) Understanding Digital Content and Services Ecosystems:

The Role of Content and Services in Boosting Internet Adoption, WEF Global Information Technology Report 2015.

<http://reports.weforum.org/global-information-technology-report-2015/1-3-understanding-digital-content-and-services-ecosystems-the-role-of-content-and-services-in-boosting-internet-adoption/>

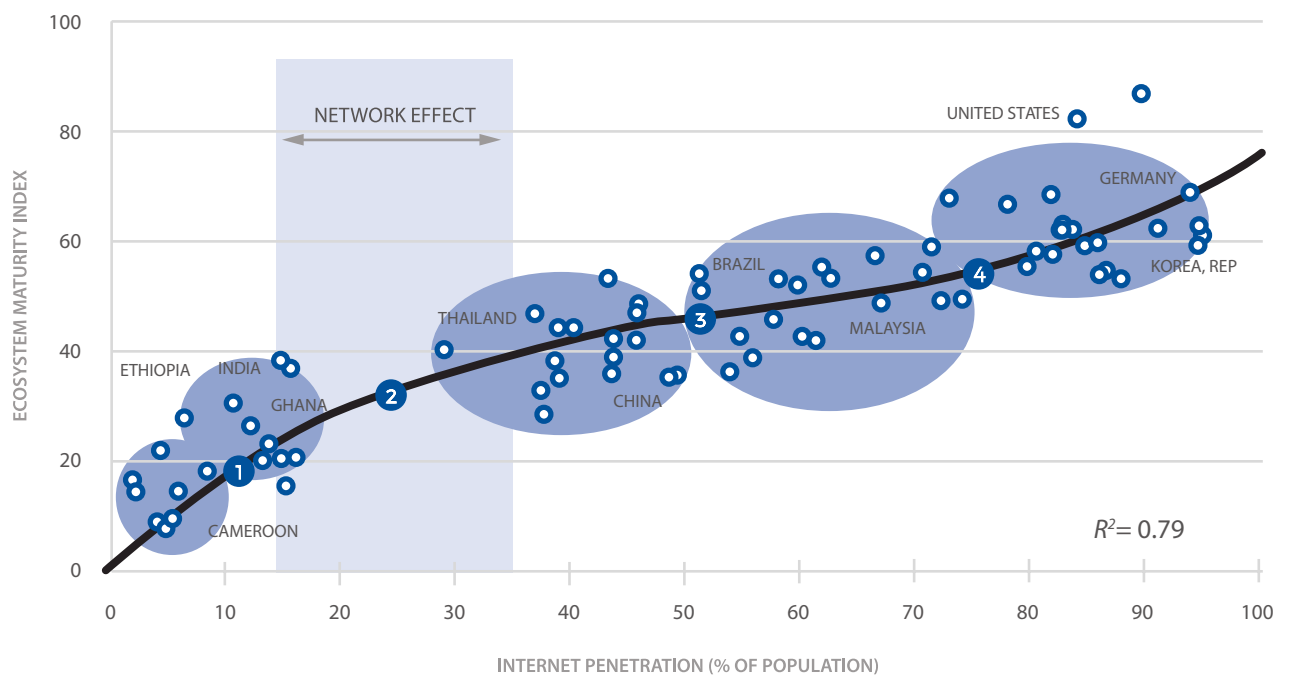


Figure 6 : Strategy & Ecosystem maturity vs. Internet penetration

Source: B. El-darwiche et al (2015) Understanding Digital Content and Services Ecosystems: The Role of Content and Services in Boosting Internet Adoption, WEF Global Information Technology Report 2015, <http://reports.weforum.org/global-information-technology-report-2015/1-3-understanding-digital-content-and-services-ecosystems-the-role-of-content-and-services-in-boosting-internet-adoption/>

Aside from a strong demand for video content, Asian users are also known for their extensive social network usage. As a group, Indonesians, Malaysians, Filipinos, Singaporeans, Thais and Vietnamese had the highest global social network penetration, where on average 77.4% of users visited a social platform at least once a month in 2015³⁹. In particular the Philippines is known as the social media capital of the world with users spending an average of 53 hours a week in 2014 on social media – 11 hours higher than the global average⁴⁰. Without localized content and network effects, this consumption of social media would not occur.

³⁹ The Drum, J. Glenday (2015) Facebook drives Southeast Asian social network usage.

<http://www.thedrum.com/news/2015/11/25/facebook-drives-southeast-asian-social-network-usage>.

⁴⁰ Vulcan Post (2014) Research Confirms: The Philippines is Still the Social Media Capital of the World.

<https://vulcanpost.com/12971/research-philippines-social-media/>.

'The network effects of social media, where an increase in usage leads to a direct increase in value for other users, means that as more users use social media, its value rises exponentially. This in turn attracts more users, driving the demand to come online.'

The case of Cambodia highlights the importance of local content in driving Internet adoption, especially in non-native English countries. After ICANN (Internet Corporation of Assigned Names and Numbers) enabled the use of non-Latin characters in domain names in 2010, the Internet in Cambodia began having more relevant local content and was adopted by more people. In the following year, Facebook Khmer, a Cambodian developed free app that allowed users to view Facebook in Khmer was launched⁴¹. The creation of more local content helped Cambodia's Internet penetration grow from 0.5% in 2009 to over 11% in 2016, with the highest year-on-year growth of 60% in 2011⁴². Internet adoption has tripled since 2011 (**Figure 7**) and today 93% of Cambodian Internet users are watching videos daily on their mobile devices⁴³.

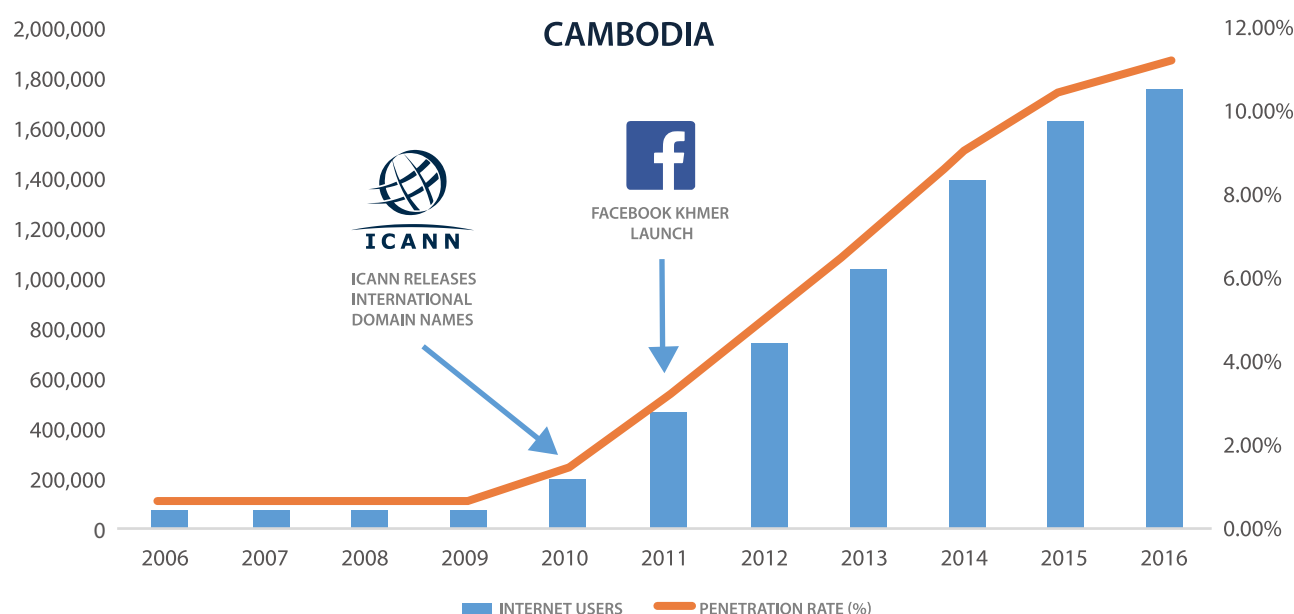


Figure 7: Cambodia Internet Growth and Penetration (2006 to 2016)

Source: TRPC research and Internet Live Stats (accessed 2016) <http://www.internetlivestats.com/internet-users/cambodia>

In addition to their affinity for social media and videos, Asians are also avid online gamers. For example, the UK-based SuperAwesome found that Southeast Asian children aged 6-14 were 14% more active on mobile games than their US peers⁴⁴ and a study by Yahoo Flurry found that Asian users spent more time on mobile games than any other category of app. App Annie found that Japanese users play gaming apps more than three times as frequently as US users⁴⁵. In fact, 48% of smartphone applications downloaded in Vietnam are games⁴⁶.

⁴¹ Voice of America, Tharm (2011) Facebook App Released for Cambodian Users, <http://blogs.voanews.com/khmer-english/musings/2011/06/10/facebook-app-released-for-cambodian-users/>

⁴² Voice of America, Tharm (2011) Facebook App Released for Cambodian Users, <http://blogs.voanews.com/khmer-english/musings/2011/06/10/facebook-app-released-for-cambodian-users/>

⁴³ ET Brand Equity (2016) 39% of Internet connected Indians watch online videos daily, <http://brandequity.economicstimes.indiatimes.com/news/digital/39-of-internet-connected-indians-watch-online-videos-daily-study-ly-study/55545006>

⁴⁴ Venturebeat, D. Takahashi (2016) Southeast Asian kids are 20% more active on mobile than U.S. kids, <http://venturebeat.com/2016/01/13/southeast-asian-kids-are-20-more-active-on-mobile-than-u-s-kids/>

⁴⁵ C. Klotzbach (2015) The Asia Report: Leading the Shift from Entertainment to Utility, <http://flurrymobile.tumblr.com/post/122249889285/the-asia-report-leading-the-shift-from>

⁴⁶ App Annie & Dentsu (2016) Understanding the Mobile Games Market in Japan, http://files.appannie.com/s3.amazonaws.com/reports/Understanding-Mobile-Games-Market-Japan-EN.pdf?mkt_tok=eyJpIjoIOTRSall6Vm1QVEU1TWpVeClnQlOjTbGVpdFNJOXZDajc0VHhxbk4yZXRLd2R0a3lrTVVpbTJvb000Y1R1cWpFcm4wdW54MnM3SDVMWkxzelBzNEtBeihpVHEzSstrMmoQZlF1NW9QZ

⁴⁷ MGF (2016) Understanding Asia: Factfile for the top ten asian and south east asian mobile gaming markets, <http://www.globalmgf.com/wp-content/uploads/2016/04/MGF-Understanding-Asia-Market-Report.pdf>



IMPORTANCE OF GAMING IN DEVELOPING SOUTH KOREA'S INTERNET ECONOMY

Gaming is a great example of how content can deeply impact and drive growth in the Internet economy. South Korea currently enjoys one of the fastest broadband networks and highest Internet

penetration rates in the world. In the late 1990s, the popularity of real-time strategy games drove users to 'PC bangs' or cybercafes, where they could play online games at high speeds – not yet widely available in homes at that time⁴⁸. Online gaming and 'PC bangs' are widely acknowledged for their role in bringing the Internet into people's daily lives, and bringing Korea to the Internet age⁴⁹. Today, gaming is no longer merely a form of entertainment in South Korea, but has become part of its mainstream culture. It has evolved into a sizable industry with leading gamers employed full-time, earning six-figure contracts and competing for large prizes⁵⁰. Following the rise of the South Korean gaming culture, the government shifted to providing services online.

"This trend [playing online games at PC bangs] brought Korea to the Internet age faster than any other country" - Prof. Jungmihn Jamie Ahn, Hallym University⁵¹

From 1999 to 2006 the government created 11 major e-government initiatives including Cyber Korea 21, e-Korea Vision 2006, e-procurement, customs e-clearance, a knowledge portal, and the Ten Million People Internet Education Project⁵². Reflecting the government's continued commitment, Korea topped the UN E-Government Development Index ranking each year between 2010 and 2014, and continues to be the highest ranked country in Asia in 2016⁵³. The government has been a major supporter of content creation, recognizing the role of content in driving Internet adoption and the Internet economy. To bolster this effect, KOTRA (Korea Trade-Investment Promotion Agency) has created a USD1 billion investment fund to support the expansion of the Internet industry⁵⁴.

⁴⁸ Rousse-Marquet (2013) Online gaming: An integral part of the South-Korean culture.

<http://www.inaglobal.fr/en/video-games/article/online-gaming-integral-part-south-korean-culture>

⁴⁹ J. J. Ahn (2012) Broadband Policy in South Korea: The Effect of Government Regulation on Internet Proliferation.

[http://www.ptc.org/ptc12/images/papers/upload/PTC12_Broadband%20WS%20_Jamie%20Ahn%20\(Paper\).pdf](http://www.ptc.org/ptc12/images/papers/upload/PTC12_Broadband%20WS%20_Jamie%20Ahn%20(Paper).pdf)

⁵⁰ P. Zhou (2016) South Korea Computer Gaming Culture.

<http://geography.about.com/od/culturalgeography/a/South-Korea-Computer-Gaming-Culture.htm>

⁵¹ J. J. Ahn (2012) Broadband Policy in South Korea: The Effect of Government Regulation on Internet Proliferation.

[http://www.ptc.org/ptc12/images/papers/upload/PTC12_Broadband%20WS%20_Jamie%20Ahn%20\(Paper\).pdf](http://www.ptc.org/ptc12/images/papers/upload/PTC12_Broadband%20WS%20_Jamie%20Ahn%20(Paper).pdf)

⁵² World Economic Forum (2015) Global Information Technology Report 2015 <http://reports.weforum.org/global-information-technology-report-2015/1-3-understanding-digital-content-and-services-ecosystems-the-role-of-content-and-services-in-boosting-internet-adoption/>

⁵³ United Nations (2016) E-Government Survey 2016. <http://worksapce.unpan.org/sites/Internet/Documents/UNPAN96407.pdf>

⁵⁴ S. Song (2015) K-wave Boosts Economic Growth. <http://koreajoongangdaily.joins.com/news/article/Article.aspx?aid=3003773>

Korea's next iteration of their Internet economy, after gaming and government adoption, has become very data heavy – driven by video, 31% of smartphone users watch mobile video on a daily basis, while another 25% watch mobile videos weekly; similarly, 22% of tablet users watch mobile video on a daily basis with 26% watch mobile videos weekly⁵⁵. As shown in **Figure 8**, the country's data usage patterns reveal a high consumption of services such as video and social networking. Video consistently accounts for the largest mobile traffic use at 55.4%, followed by web portals (16.8%) and social networking (15.6%). Video also represents the largest absolute growth in data consumption between 2013 and 2016, with average monthly data usage per user expected to rise to 6GB by the end of 2016. Local operators are currently looking to bolster their own video content to increase data traffic⁵⁶. Aside from the rise in online content, increased consumption leads to investments back into improving and extending the network.

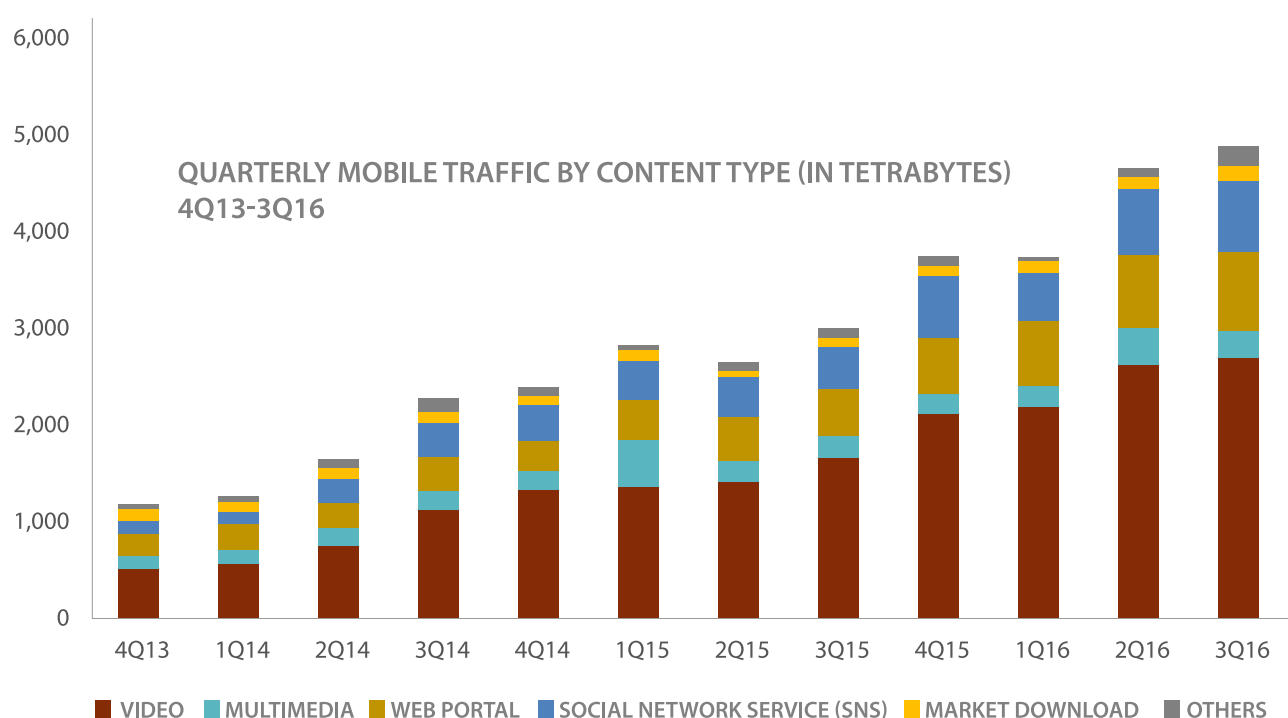


Figure 8 : South Korea quarterly mobile traffic by content type (Q4 2013 to Q3 2016)

Source: MSIP September 2016 wireless data traffic statistics. <http://www.msip.go.kr/web/msipContents/contents.do?mid=MTQ2>

⁵⁵ Statista (2016) Statistics and facts on Internet usage in South Korea. <https://www.statista.com/topics/2230/internet-usage-in-south-korea/>

⁵⁶ Asiae (2016) 1인당 월 데이터 사용량 6GB 시대 임박, <http://view.asiae.co.kr/news/view.htm?idxno=2016110711233783610>

2.4 AN OPEN INTERNET ENABLES A VIRTUOUS CIRCLE

An open Internet allows for the free flow of content and services, which in turn drives investment, innovation and economic growth. In other words, it creates a virtuous circle of consumption (demand) and investment (supply) (**Figure 9**).

“Internet openness...spurs investment and development by edge providers, which leads to increased end-user demand for broadband access, which leads to increased investment in broadband network infrastructure and technologies, which in turns leads to further innovation and development by edge providers.”
- FCC⁵⁷

As demonstrated earlier, access to and the delivery of content and services supplies, and then creates, further demand for broadband access. Better and faster network infrastructure is required as users start demanding more bandwidth, prompting ISPs to invest into network deployment. This improves connectivity, which sponsors or enables the further development of more innovative content and services to be delivered, which in turn drives demand for access, and so on.

⁵⁷ FCC (2010) In the Matter of Preserving the Open Internet Broadband Industry Practices, https://apps.fcc.gov/edocs_public/attachmatch/FCC-10-201A1.pdf

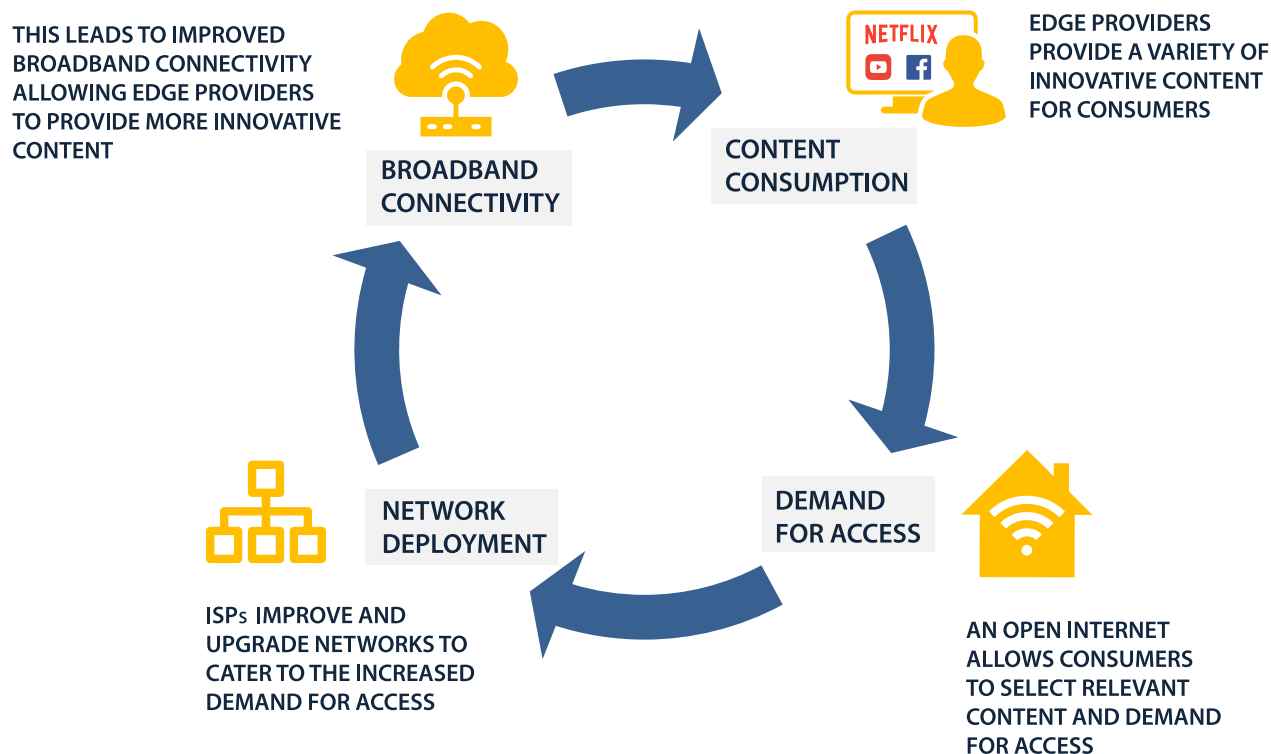


Figure 9 : The virtuous circle

Source: TRPC

Key to this growth is an open Internet — as it allows users to access the content of their choice, whenever they choose. This means that users are not restricted to offerings only available by a specific network provider, but have the freedom to decide if they would prefer to watch a clip on YouTube, a TV drama on a local platform, or a movie from Amazon or another streaming provider. Restrictions placed on an open Internet can lead to **unintended consequences**, such as higher prices on content and connectivity and more limited content availability, thereby constraining adoption and usage. In this case, rather than the self-perpetuating momentum of a virtuous circle, the market instead may see iterative growth instead of exponential growth; or worse, the emergence of a vicious circle, whereby content, investment and innovation all migrate elsewhere because of artificial constraints on demand, and the consequent loss in supply, further depressed demand and so on.

To enable a virtuous circle of development, governments need to create favorable market conditions. For example, Hong Kong, Singapore, and South Korea's more open and competitive markets have enabled these economies to reap the benefits of Internet adoption. The governments in these countries liberalized their telecommunications industries early on to allow for competitive markets, leading to faster and better broadband connectivity, and more affordable Internet access, and a wealth of content and services. As demonstrated earlier, consumers in these economies have voracious appetites for content, but they are not unique in this regard. Enabling demand drives further connectivity improvements, leading to more innovative content and services, and onto further demand.

In the next section, we look at the benefits of greater Internet adoption, and how an open Internet can advance social and economic progress.

2.5 CONTENT PAVES THE WAY TO OTHER ONLINE SERVICES

“... as consumers started spending more time online, business services accelerated their adoption of Internet as a service channel, leading to growth in business-to-consumer services such as financial services, e-government services, and customer care.” - WEF⁵⁸

As users go online and become more familiar with online portals and platforms, they get used to the convenience, gain confidence with using the Internet, and are more willing to try new services – such as online tax payments or online courses. According to a Journal of Medical Internet Research study, individuals from low socioeconomic positions that have familiarity and skills in using the Internet have higher capacity to use it for health, increasing capital, searching for jobs, financial resources, or educational programs. In the study's findings, medium and high entertainment users were positively associated with higher health information searches⁵⁹.

⁵⁸ WEF, B. El-darwiche et al (2015) Understanding Digital Content and Services Ecosystems: The Role of Content and Services in Boosting Internet Adoption. WEF Global Information Technology Report 2015. <http://reports.weforum.org/global-information-technology-report-2015/1-3-understanding-digital-content-and-services-ecosystems-the-role-of-content-and-services-in-boosting-internet-adoption/>

⁵⁹ R. F. McCloud et. al (2016) Entertainment or Health? Exploring the Internet Usage Patterns of the Urban Poor: A Secondary Analysis of a Randomized Controlled Trial. Journal of Medical Internet Research, vol 18, no.3, http://www.jmir.org/article/viewFile/jmir_v18i3e46/2

Increased adoption leads to greater e-government engagement as well. Internet usage in Malaysia (**Figure 10**) shows the substantial rise in the adoption of e-government services from 20% in 2009 to 60% in 2014 — due in no small part to users becoming both more familiar and comfortable with using the Internet in general.

The growing number of Malaysian Internet users meant the government could expand their offerings to more e-services. They moved from seeing the provision of services online as a complementary strategy to seeing it as a primary mode of engagement — and as a cost saving mechanism. **Figure 10** demonstrates that in 2009 the Internet was being used for leisure activities and searching for information rather than accessing government services. But while the use for leisure and searching for information grew steadily from 2009 to 2014, government services offerings grew significantly faster. Increased e-government opportunities is but just one example of how the increased usage of the Internet also has spurred user adoption for other sectors and services.

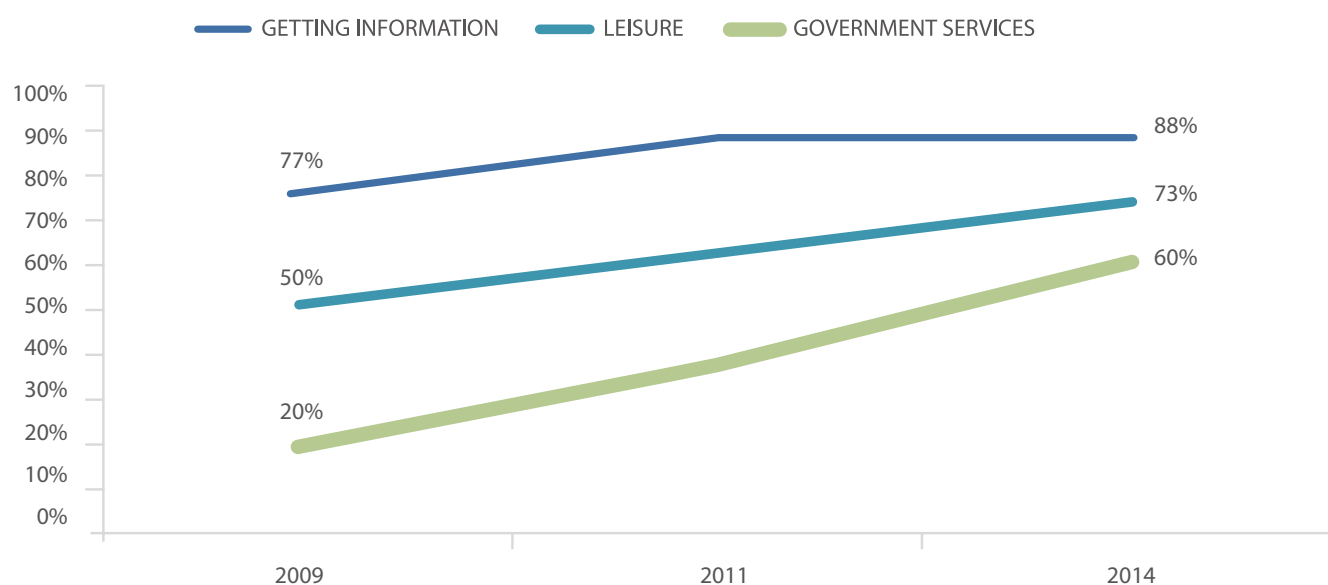


Figure 10 : Malaysia's use of the Internet (2009 to 2014)

Source: TRPC analysis, SKMM Household Use of the Internet Survey 2008-2011; Internet Survey 2014; ITU Percentage of Individuals using the Internet

In order to ensure the benefits of the open Internet, policies and regulations need to protect against gatekeeping and other anti-competitive behaviors that restrict access and ultimately threaten Internet adoption, growth, and innovation. In the following section of the report, we examine policies around the region that have promoted Internet adoption, usage and can serve as a guide for policymakers around the region.

3. THE OPEN INTERNET IS VITAL TO ASIA'S DIGITAL GROWTH

Rising Internet adoption is being accompanied by a surge in data traffic as users increasingly demand more bandwidth in order to consume more and more content. However, in much of developing Asia, regulators and telecom operators are facing a challenge in handling this upsurge in demand for bandwidth. Unfortunately, sometimes they end up suppressing it as they attempt to iteratively manage growth based on past linear models of development, as opposed to planning for exponential growth. The corresponding lack of market openness and competition leads to overpriced services as providers have little incentive to improve affordability, accessibility, or quality of service.

While some infrastructure and deployment constraints are due to natural geographical limitations and capacity shortages, others relate to regulatory and economic constraints. This latter set of issues are choices that governments and policymakers can address by promoting competition, incentivizing network deployment where necessary, and upholding the principles of an open Internet. What is increasingly apparent is the importance of promoting a coherent digital agenda for economic growth and overall social development. Data access and traffic growth should guide government engagement with both telecom operators and edge providers, and shape their agenda for incentivizing both network deployment and management.

In looking to manage the growth in connectivity and adoption there can be a temptation to forego openness – either to promote immediate opportunities for investment or to protect national champions. Examples of this are burdensome interconnection fees, protecting incumbent providers or allowing discriminatory zero-rating schemes. Such actions are short-sighted and risk missing out on long-term gains from increased access, reduced prices and increased demand. A less-than-open Internet limits competition, hinders access to international markets, dulls the development of local content and service, and undermines innovation.

Across Asia, discussions around the benefits and challenges of an open Internet are relatively nascent. But even at this early stage, we can see countries such as Hong Kong and Singapore with more competitive and open markets doing vastly better in terms of access, affordability and adoption. This section will look into good Internet policies in various Asian markets that have proved successful to serve as a guide to policymakers in the region in promoting and providing affordable Internet access to all their citizens.

3.1 AN OPEN INTERNET PROMOTES INNOVATION

Openness and making sure everyone can participate in the digital economy are the fundamental requirements for competition and innovation. An open Internet allows for entrepreneurs and innovators to compete freely against larger companies and network providers – many of which have their own content offerings and commercial motivations to limit or skew access. This defines the importance of net neutrality: ensuring a level playing field for new and established players alike. If innovation is to be promoted amongst Asian countries, it is important that these principles are protected in order for local digital ecosystems to develop.

“The Internet is a great level playing ground for both small and big services. Part of what makes the Internet so full of innovation is the platform allowing small startups to innovate and succeed. Today, startups like Flipkart, Snapdeal, Housing, and Zomato have created a big positive change in the way business is done”. - Shwetank Dixit, Program Manager of Extensions and Developer Relations at Opera⁶⁰

The central debate of net neutrality thus far has been around whether network providers should be allowed to charge edge providers for interconnecting with their networks – prioritizing certain traffic by creating “fast lanes” for their preferred content and services⁶¹. Such actions may inadvertently lead to edge providers raising prices to afford the additional fees or reducing investments into developing content and services – constraining future innovation and the entrance of new players. The lack of net neutrality also reduces consumers’ ability to choose freely as choices are made for them by network intermediaries. Under net neutrality, the principle of non-discrimination informs the business models of both content and network providers benefitting consumers and creating a competitive environment for innovation.

Within much of developing Asia, markets are still less than fully competitive and often in need of improvements in service quality. In fixed and mobile broadband networks, the lack of competition has resulted in slower broadband speeds with higher prices. In content and service markets, the lack of competition and openness means a lack of variety – ultimately affecting adoption, investment, and innovation by restricting the virtuous circle.

⁶⁰ S. Dixit (2016) On Net Neutrality in India, <http://shwetankdixit.com/blog/net-neutrality-in-india/>

⁶¹ Cyber Telecom (2016) Internet Interconnection, <http://www.cybertelecom.org/broadband/backbone2.htm>

3.2 THE ROLE OF COMPETITION IN IMPROVING AFFORDABILITY AND QUALITY OF SERVICE

Without competition in the national backbone network, countries have seen slower broadband speeds at inflated prices. Incumbent players – some with as much as 80% market share – have been slow to improve their broadband infrastructure because of misaligned incentives and no one competing with them for customers⁶². The lack of competition coupled with ownership of the last mile infrastructure allows them to maintain higher prices without losing users. Without proper incentives and regulations, countries with dominant ISPs will continue to lag behind in both speed, penetration, and user adoption of the Internet.

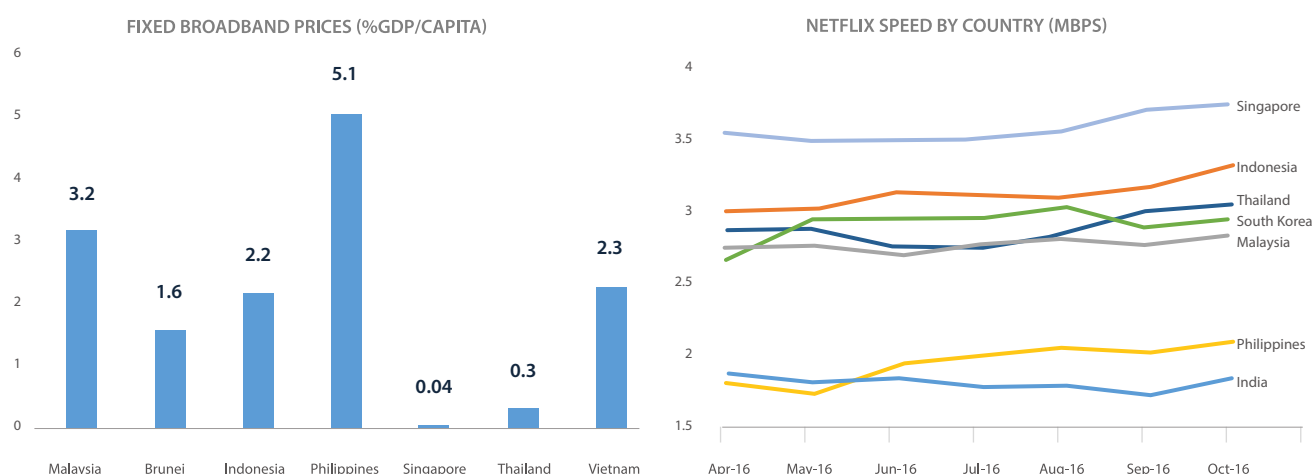


Figure 11: Fixed broadband pricing and Netflix average speed by country

Source: TRPC, ISOC (2014): Unleashing the Potential of the Internet for ASEAN Economies.

http://www.internetsociety.org/sites/default/files/ASEAN_ISOC_Digital_Economy_Report_Full_0.pdf

TRPC, Netflix Global Averages (2016) <https://ispspeedindex.netflix.com/global/>

⁶² TeleGeography (2016) Globalcomms Database, Malaysia Country Profile

The Philippines struggles with slow speed and high cost in both the fixed and mobile broadband markets, but the government's recent commitment to deregulation and market liberalization offers hope for positive change. According to Akamai, the Philippines has one of the lowest average broadband connection speeds in Asia at 4.3 Mbps⁶³. Using Netflix's Global Average data (**Figure 11**, right side), we see that the average peak connection for all devices in the Philippines is the second worst in the region, after only India. With only two ISPs, Philippine fixed broadband prices are the highest in Southeast Asia as a percentage of GDP per capita. The silver lining for the Philippines is that both speed and prices are set to improve as the Philippine government is pushing for the introduction of a third mobile operator through a spectrum auction in 2017, and has drafted plans for a national broadband infrastructure to improve accessibility in remote areas. Furthermore, a bill on free public Wi-Fi recently passed the first reading in Senate in December 2016⁶⁴.

Encouraging network competition has been shown to be the most effective force for driving access and service. In 2000, half the world's countries were served by a single mobile network; today only 3% of the global population is in that position. In developing countries, this shift has been accompanied by an 80% drop in prices⁶⁵. Across much of Asia, fixed broadband access is often not a viable option – meaning that mobile Internet is the only choice for users to go online. Given the mobile-first nature of much of Asia the limited, though growing, broadband access in itself is not a problem. But without effective competition in both the access and backbone markets, Internet will often be more expensive, of lower quality, and with poorer service.

The introduction of telecom competition typically leads to existing players lowering prices and expanding service. For example, in Singapore, when MyRepublic, a potential fourth-telco entrant, announced prospective mobile data plans of SGD2 per GB, the three existing competing telcos immediately followed suit offering existing customers the ability to double their existing data cap limits for discounted additional prices ranging from SGD3-5.90 per GB. Similarly, when low-cost operator Taiwan Star Telecom entered the market offering comparatively half-priced unlimited 4G plans in 2014, the big three operators (Taiwan Mobile, Chunghwa and Far EasTone Telecommunication) also moved to slash prices. In Thailand, the fixed broadband market began expanding in 2005 only after new telecom licenses were granted to private operators that allowed them to deploy their own infrastructure and ended overpriced leasing arrangements with government-linked incumbents⁶⁶.

⁶³ Akamai (2016) State of the Internet Q2 2016.

<https://www.akamai.com/us/en/multimedia/documents/state-of-the-internet/akamai-state-of-the-internet-connectivity-report-q2-2016.pdf>

⁶⁴ Newsbytes (2016) Bill on free Wi-Fi in public places hurdles first hearing in Senate. <http://newsbytes.ph/2016/12/15/bill-on-free-wi-fi-in-public-places-hurdles-first-hearing-in-senate/>

⁶⁵ Frontier Economics (2015) Benefits of network competition and complementary policies to promote mobile broadband coverage - A report prepared for the GSMA. <http://www.gsma.com/publicpolicy/wp-content/uploads/2015/02/Benefits-of-network-competition-and-complementary-policies-to-promote-mobile-broadband-coverage-Report.pdf>

⁶⁶ TeleGeography (2016) Globalcomms Database, Thailand Country Profile

COMPETITION IN MYANMAR'S TELECOMMUNICATION MARKET LEADS TO CHEAPER INTERNET AND GREATER COVERAGE

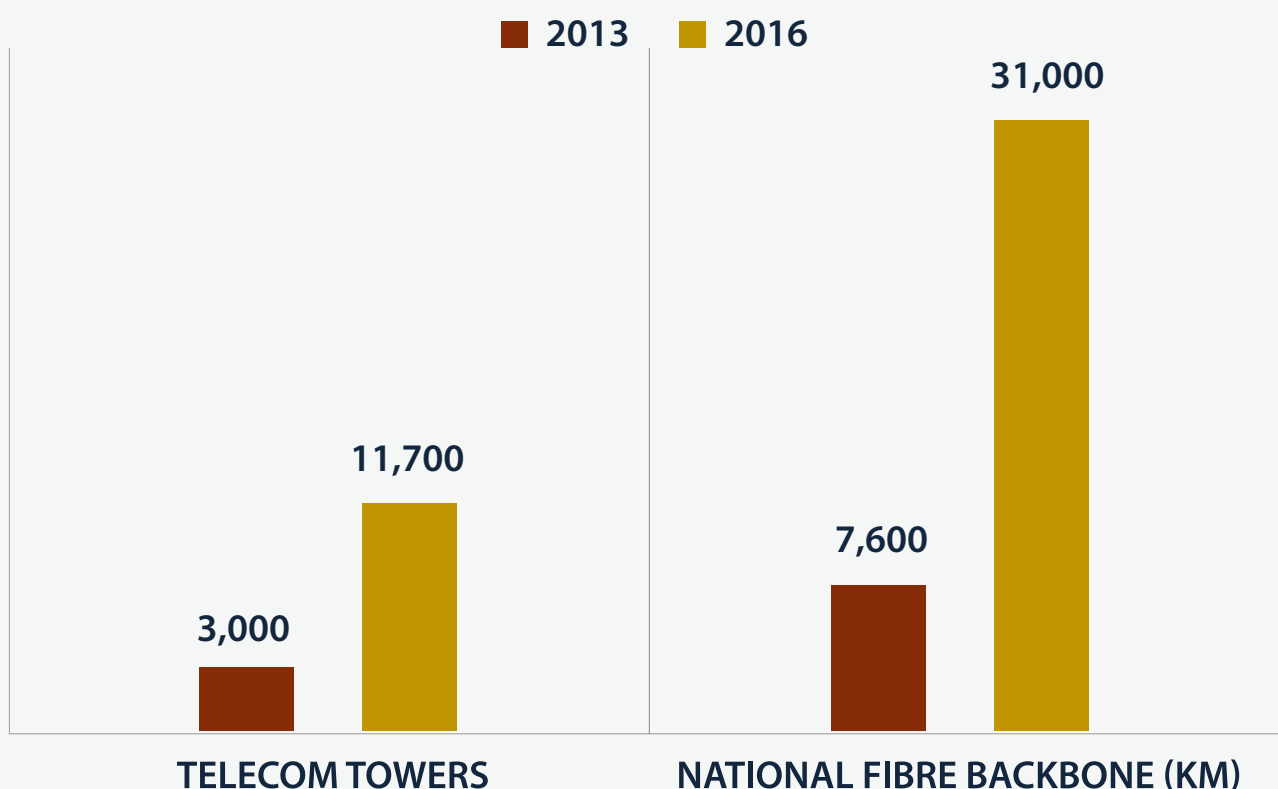


Figure 12: Myanmar infrastructure growth (2013 to 2016)

Source: Posts and Telecommunications Department, cited from the Myanmar Times, 12 Dec 2016.
<http://www.mmtimes.com/index.php/business/technology/21466-ministry-puts-mobile-penetration-at-90-percent.html>

Even in emerging economies, an increase in competition is shown to have a profound impact on affordability and accessibility. In 2013, Myanmar opened its telecommunication sector to allow for two foreign providers, Qatar's Ooredoo and Norway's Telenor, to compete against state-owned carrier Myanmar Post and Telecommunications (MPT). As a result, the price of a mobile SIM card in Myanmar dropped from USD250 in 2013 to USD1.27 in 2016⁶⁷. This has seen mobile penetration rates rise from 7% in 2012 to 90% in 2016, while the number of Internet users has risen from 2 million to 39 million – with most users going online through mobile 3G broadband⁶⁸. In parallel, market competition has also led to increased mobile and fixed broadband infrastructure investment. **Figure 12** shows the dramatic growth and investment in the telecom towers and fiber backbone between 2013 and 2016.

⁶⁷ Bloomberg, J. Motlagh (2014) When a SIM Card Goes From \$2,000 to \$1.50.
<https://www.bloomberg.com/news/articles/2014-09-29/myanmar-opens-its-mobile-phone-market-cuing-carrier-frenzy>

⁶⁸ A. K. Nyunt (2016) Ministry puts mobile penetration at 90 percent.
<http://www.mmtimes.com/index.php/business/technology/21466-ministry-puts-mobile-penetration-at-90-percent.html>

The competitive nature of the telco market is not unique to Asia. Around the world when regulators encourage competition in telecommunication markets, consumers typically benefit as network providers need to compete in order to attract customers. This results in lower prices, faster connections, increased coverage, and better service offerings. In the Netherlands, competition has led to Dutch telecom provider KPN's doubling of its mobile broadband data cap from 5 to 10GB to enable users to watch videos on its iTV Online app, while keeping prices unchanged⁶⁹.

Expanding Internet access remains the first and fundamental priority for governments across Asia. Remote and rural regions in developing Asia are often less populated and less affluent than urban centres. Such areas are often underserved by network operators who do not find it commercially viable to invest into network deployment in these areas. Policymakers can employ the use of USAFs to extend access to these areas by subsidizing network rollouts. These programs can be fundamentally important because, as with the introduction of new content, they promise to both highlight and aggregate nascent or unrecognized demand. Once a rural or underserved community has coverage and citizens begin enjoying the benefits from network access, it becomes very difficult for them to turn such access off – as has been shown in studies and practical experience time and again. For government and society, the economies of scale and scope that result from having everyone on the network are important. USAF funding can come directly from the government, through public-private partnerships (PPP)s, in the form of levies on ISPs or through reverse subsidies (which should not come from inflated interconnection charges)⁷⁰. In 2013, there were some 16 USAFs in the Asia Pacific, including 11 active programs⁷¹.

EXAMPLES OF THE USE OF USAFS IN ASIA

THAILAND - In January 2016, the Thai government announced its plan to roll out a national broadband network to provide 70,000 villages with low-cost Internet service with a minimum speed of 30Mbps. The initiative will be funded with THB20 billion (USD550 million) from the proceeds of spectrum auctions and THB18 billion from the country's Universal Service Obligation Fund, which has already financed broadband access in 7000 districts⁷².

MALAYSIA - As of December 2014, the Malaysian government had implemented 6,336 successful universal service provision (USP) projects for underserved areas and groups, including 1Malaysia Internet Centres, 1Malaysia Wireless Villages, and Telecommunication Towers⁷³. Appointed service providers neither incur losses, nor do they make profits when implementing the program as the Malaysian regulator only reimburses the expenses incurred at costs. Prior to 2008, the USP program had been focused on building out the communications infrastructure, however, advancements in technology and consumer demands since have shifted the focus towards addressing content, access and application use, as well as affordability of communications and multimedia services⁷⁴.

⁶⁹ Rewheel (2015) Banning Zero Rating leads to higher volume caps.

http://dfmonitor.eu/downloads/Banning_zero-rating_leads_to_higher_volume_caps_06022015.pdf

⁷⁰ Broadband Commission (2015) Broadband policies worldwide 2015. <http://www.broadbandcommission.org/Documents/reports/bb-annualreport2015.pdf>. p67

⁷¹ ITU (2013) Universal Service Fund and digital inclusion for all. http://www.itu.int/en/ITU-D/Regulatory-Market/Documents/USF_final-en.pdf

⁷² TeleGeography (2016) State-backed national broadband network set for rollout 'in next twelve months'.

<https://www.telegeography.com/products/commsupdate/articles/2016/01/15/state-backed-national-broadband-network-set-for-rollout-in-next-twelve-months/>

⁷³ SKMM (2014) Annual Report. <http://www.skmm.gov.my/skmmgovmy/media/General/pdf/SKMM-USP-2014.pdf>

⁷⁴ Ladcomm Corporation, GSMA (2013) Universal Service Fund Study.

http://www.gsma.com/publicpolicy/wp-content/uploads/2016/09/GSMA2013_Report_SurveyOfUniversalServiceFunds.pdf

In the past, policymakers have seen interconnection payments as implicit subsidies and have expected telcos to use this money to build out infrastructure. The interconnection fees model has proved to not be effective in attaining the goal of network expansion, as it distorts incentives and does not expand broadband deployment. Interconnection fees may inadvertently lead edge providers to raise prices or forego investment opportunities in their core business of creating compelling content. Such requirements would directly contradict the idea of the open Internet by restricting the ability of content and service providers to participate on an even playing field.

3.3 NON-DISCRIMINATORY ACCESS

Zero-rating schemes and various types of promotional data packs have become increasingly popular among mobile operators across Asia. This enables consumers to access free or differentially priced data via certain applications. As the discussion on zero-rating is still developing in Asia, regulators need to remain wary of the perceived short-term benefits of discriminatory plans as they can appear effective in the short-term by promoting Internet adoption and usage (of the particular selected zero-rated services – especially high profile services). But they are inevitably detrimental to long-term development as they restrict access to alternative providers at competitive terms, erode innovation and depresses the ability of new and small entrepreneurs to participate in the digital economy⁷⁵. Recognizing this, in 2015, civil society groups in India garnered strong support through a campaign to protect net neutrality⁷⁶. Discriminatory zero-rating and promotional data plans can also dull competition by allowing ISPs and large OTTs to act as gatekeepers and create a ‘walled garden’ of available information, thereby shaping the content that users can access and retaining the right to censor at will.

"Harmful forms of price discrimination will eat away the neutrality of the internet. Wider Internet access is a noble goal, but we will not achieve it by betraying the goal of an innovative, fair, transparent and vibrant Internet"
- Vijay Shekhar Sharma, founder of Indian payment platform Paytm⁷⁷

⁷⁵ M. Baker (2015) Zero Rating and the Open Internet.

<https://blog.lizardwrangler.com/2015/05/06/zero-rating-and-the-open-internet/>

⁷⁶ Internet Freedom Foundation (2016) Net Neutrality. <https://internetfreedom.in/>

⁷⁷ Economic Times (2016) Paytm parent One97 calls for an innovative, fair, transparent and vibrant internet.

<http://economictimes.indiatimes.com/tech/internet/paytm-parent-one97-calls-for-an-innovative-fair-transparent-and-vibrant-internet-in-india/articleshow/50525338.cms>

While policymakers in some countries may have been quick to preserve net neutrality by mandating a hard ban on all forms of zero-rating, it is the discriminatory aspect, rather than zero-rating per se which poses the problem. Non-discriminatory zero-rating means that if a segment of the market is zero-rated, such as say an audio service offering – then all such services (e.g. Spotify, Pandora, Deezer, GetMe! Radio) have the opportunity to be similarly zero-rated under the same scheme without discrimination based on application, ability to pay, or prohibitive technical requirements. These schemes have low barriers of entry for new participants and are open for anyone to participate, thereby promoting competition and innovation. Non-discrimination ensures that content and services markets remain competitive and that consumers have the most available content at their fingertips. When evaluating the impact of zero-rating and low cost data schemes, policymakers need to keep the interests of both small players and end-consumers in mind in order to avoid fostering anti-competitive behavior, which will undermine a market's ability for innovation in the long-run. Non discriminatory zero-rating schemes can be one of the emerging private sector solutions for managing consumer demand for data.

Telecom Service Providers (TSPs) “may take advantage of owning the primary access of the consumer by offering better, unlimited connectivity, free or near free, when using their own service or service of their partner, while offering limited or capped connectivity at higher price when consumer accesses some other website/platform. This may be perceived to be an anticompetitive move that stifles innovation and competition, leaving absolute power in the hands of the TSPs”. - Telecom Regulatory Authority of India⁷⁸

⁷⁸ Telecom Regulatory Authority of India (2015) Consultation Paper on Differential Pricing for Data Services. <http://www.trai.gov.in/WriteReadData/ConsultationPaper/Document/CP-Differential-Pricing-09122015.pdf>

EXAMPLES OF NON-DISCRIMINATORY ZERO-RATING SCHEMES

Examples of non-discriminatory zero-rating schemes include: Video-Onz by U Mobile and Video Freedom by DiGi in Malaysia, Entertainment Pack by M1 in Singapore, and BingeOn by T-Mobile in the US.



In developing economies, various alternative models have also emerged to offer non-discriminatory zero-rated or low cost Internet access. In Armenia, for example, Vivacell-MTS On zero-rated all data between 2 am and 8 am on select service plans to encourage consumers to complete data-heavy tasks when there was idle network capacity⁷⁹. Across markets in Africa and the Middle-East, Orange and Mozilla partnered to offer access and service bundles for less than USD40 including a smartphone, data (up to 500 Mb for six months), voice and text services⁸⁰. Earned data schemes like Wowbox by Grameenphone in Bangladesh offer data in exchange for performing an action (e.g. completing a survey, watching an advertisement) — the data can be used to access any site or service⁸¹. The Telecom Regulatory Authority of India (TRAI) has also issued recommendations on “Encouraging Data Usage in Rural and Remote Areas” based on the principle of non-discrimination. In its recommendations, TRAI suggests employing a government incentivized model, where the government uses part of the USOF (Universal Service Obligation Fund) to provide a reasonable amount of monthly data free of charge to all subscribers in rural and remote areas⁸².

For such schemes to be truly non-discriminative, they need to adhere to three main requirements:

1. That they are open to the entire class of content to participate;
2. They do not require payment for participation; and
3. They have low technical barriers to entry (so they do not discriminate against startups and new entrants with low technical skills).

⁷⁹ Sandvine (2016) Vivacell offers zero-rated package, <https://www.sandvine.com/downloads/general/success-stories/vivacell-mts-offers-a-zero-rated-perk.pdf>

⁸⁰ Orange (2015) Orange launches breakthrough all-inclusive digital offer to deliver mobile internet to millions more across Africa and the Middle East, <http://www.orange.com/en/Press-Room/press-releases-2016/press-releases-2015/Orange-launches-breakthrough-all-inclusive-digital-offer-to-deliver-mobile-internet-to-millions-more-across-Africa-and-the-Middle-East>

⁸¹ G. Daniels (2015) Wow! That's how to use zero rating to stimulate paid traffic, <http://www.telecomtv.com/articles/telcos-and-service-providers/wow-that-s-how-to-use-zero-rating-to-stimulate-paid-traffic-12969/>

⁸² Telecom Regulatory Authority of India (2016) Recommendations on Encouraging Data usage in Rural Areas through Provisioning of Free Data, http://www.trai.gov.in/WriteReadData/WhatsNew/Documents/Recommendations_19122016.pdf

3.4 TOOLS AND APPROACHES FOR GOOD NETWORK MANAGEMENT

ISPs and content providers employ a range of network management tools to ensure the best possible user experience for their customers. According to TeleGeography, in 2016 Internet traffic originating internationally accounted for 56% of total Asian usage (22,700 Gbps out of 40,638 Gbps). However, this proportion has been steadily declining through the decade (from 64% in 2010), in strong part due to better network management techniques, such as local caching and the emergence of neutral IXPs in Asian countries⁸³.

Caching has become the prevalent method for data delivery among large edge providers and ISPs. Google Global Cache servers, for example, handle 70-90% of the company's cacheable content, the majority of which are YouTube videos, while Facebook caches 98% of its live video content in caches closer to the end user⁸⁴. Caching data locally or in regional hubs lowers international transit costs for ISPs, often significantly. By moving content closer, their customers benefit from reduced latency – ensuring a better user experience. With the economics of international transit, it makes empirical sense for an ISP to cache any information that is frequently accessed by their customers. This data can be cached in local data centers or through content delivery networks (CDNs) operated by large content providers and private companies such as Akamai and Cloudflare in regional hubs. Similarly, smaller content companies can utilize these regional hubs to interconnect to the backbone to take advantage of the reduced latency and lower transit costs – however it only makes economic sense for companies to interconnect with CDNs once they provide more than a certain level of traffic.

Open and settlement free interconnection between ISPs and CDNs allows content providers of various sizes to compete on a level playing field. For example, Netflix's Open Connect program allows ISPs to peer directly with Netflix on settlement – free interconnect terms, or to install the company's Open Connect appliance directly into their network to cache content and pre-position content during off-peak hours to avoid congested periods⁸⁵. Open Connect further enables ISPs to generate very low amounts of long-haul traffic relative to the amount of the content they deliver to end users – an important network management approach in an era of surging network traffic. Additionally, CDNs can provide data analytics that can reduce overhead costs by minimizing foreign-hosting and improving network oversight. According to one estimate, the impact of CDNs on website performance increased revenue by 1% for every 100 milliseconds of improvement to page load time⁸⁶.

⁸³ TeleGeography, (2016) Global Internet Geography <https://www.telegeography.com/products/global-internet-geography/analysis/regional-analysis/asia/index.html>

⁸⁴ TeleGeography (2016) Global Internet Geography, Capacity and Traffic Trends, <https://www.telegeography.com/products/global-internet-geography/analysis/capacity-and-traffic-trends/index.html>

⁸⁵ Netflix (2016) Netflix Open Connect, <https://openconnect.netflix.com/en/>

⁸⁶ Global Dots (N.D) Content Delivery Network Explained, <http://www.globaldots.com/content-delivery-network-explained/#Benefits-of-Content-Delivery-Networks>

When established on a neutral interconnect basis, IXPs with open, efficient, professional access are useful tools in managing the rising demand for data. For example, in Mongolia local latency was reduced to less than 10 milliseconds per transaction from a minimum of 1300 milliseconds with the establishment of the independent Mongolian IXP (MIX). Previously, the ISPs interconnected in Hong Kong or the US⁸⁷. Similarly, the Nepal IX (NPIX) is recognized for its role in keeping domestic traffic local, rather than having domestic traffic sent to an international interconnection point before returning to its domestic destination. Central to its success was the participation of all major ISPs, the government, and the National Research Network. In 2011, domestic bandwidth facilitated by the NPIX rose by 28%, and by 2013 NPIX was saving members up to USD100,000 monthly – a reduction in costs that can be passed directly to customers and enables the ISPs and telcos to engage in further network construction⁸⁸.

Singapore, Hong Kong, and Tokyo are established international Internet hubs for exchanging traffic and hosting content. These markets enjoy far lower transit costs than recently developed markets such as Jakarta and Bangkok. The 2016 median monthly IP transit price per Mbps in Jakarta is roughly USD9 and in Bangkok USD10, while comparatively it is only USD3.15 in Hong Kong and Singapore and USD3 in Tokyo⁸⁹. By encouraging international and local ISPs, cloud, and content providers to interconnect and freely exchange traffic, these countries have created more direct routes – important for bandwidth-heavy content such as video streaming and online games and the reduction of latency.

It was precisely for these reasons that Singapore's regulator the then Infocomm Development Authority (IDA), now the Infocomm Media Development Authority (IMDA), proposed the establishment of the Singapore Internet Exchange (SGIX) in 2009 to strengthen Singapore's position as an infocomm hub, lowering interconnectivity costs for local and international ISPs, improving network resiliency, and providing an enhanced online experience for consumers⁹⁰.

"The SGIX promotes efficient interconnectivity for the Internet in Singapore by providing a central, carrier-neutral point for traffic exchange" - IMDA⁹¹

⁸⁷ IXP Toolkit (N.D) Mongolia, <http://www.ixptoolkit.org/content/mongolia>

⁸⁸ OECD (2013) Internet Traffic Exchange, Market Developments and Policy Challenges, [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/CCP/CISP\(2011\)2/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/CCP/CISP(2011)2/FINAL&docLanguage=En); OECD (2013) International Cables, Gateways, Backhaul and Internet Exchange Points, <http://oecdinsights.org/wp-content/uploads/2014/02/International-cables-gateways-IXPs.pdf>

⁸⁹ TeleGeography (2016) Median Monthly 10 GgE IP Transit Prices in Selected Cities, 2013-2016, <https://www.telegeography.com/products/global-internet-geography/capacity-and-pricing-data/summary-data-and-charts/index.html>

⁹⁰ IDA (2013) Singapore Internet Exchange Fact Sheet, https://www.imda.gov.sg/-/media/imda/files/industry%20development/infrastructure/sgix_factsheet.pdf?la=en

⁹¹ IMDA (2016) Singapore Internet Exchange, <https://www.imda.gov.sg/industry-development/infrastructure/next-gen-national-infocomm-infrastructure/singapore-internet-exchange>

The SGIX now has three points-of-presence in the country, and boasts 92 peering members – including all local ISPs, many domestic and international telecom carriers and major cloud and content providers such as Netflix, Google, Microsoft, and Cloudflare⁹². When SGIX first began in 2009, it had 11 members, but as an open, neutral IXP, it has attracted a large membership of domestic and international providers. This has allowed it to maintain low costs for peering and low entry requirements for participation.

Similarly, Hong Kong's Internet eXchange (HKIX) has become one of the most important peering locations in Asia, helping keep intra-Asia traffic within the region⁹³. Neutrality is seen as the key success factor for HKIX, with some 253 participants and a settlement-free interconnection point. HKIX saw a sevenfold growth of international bandwidth capacity between 2011 to 2016⁹⁴.

However not all IXPs are neutral. Some are established by incumbent ISPs, which end up dictating the terms of connecting, charging high fees for interconnection or discriminating against rival ISPs – effectively negating the potential benefits. Some countries are recognizing that non-neutral IXPs are increasing costs and slowing down speeds. For example, the relatively slow Internet speeds of the Philippines (see **Figure 11**) can be somewhat attributed to the lack of market competition, and is compounded by the lack of peering between the two main ISPs, Globe and PLDT⁹⁵. But in June 2016, the two dominant Philippine telcos signed a bilateral peering arrangement after six years of negotiations. This will allow direct local traffic exchange between PLDT's Philippine Internet Exchange (PhIX) and Globe's Globe Internet Exchange (GIX) – saving both companies up to USD20 million a year in operational expenditure⁹⁶. This is a substantial development in the Philippine Internet backbone as it will allow traffic to stay within the country, and will hopefully result in faster speeds and lower costs for consumers. Before this agreement, as much as 70% of domestic traffic had to be routed through overseas transit points in Hong Kong and the United States – increasing latency and costs⁹⁷.

Others, for example the National Internet eXchange of India (NIXI) India, are constrained by policies which make them less efficient than their potential. NIXI was formed as a carrier-neutral IXP, but restricts participation only to licensed telecom carriers⁹⁸. The NIXI's average yearly peak volume of traffic is 63Gbps (aggregated for all seven national locations)⁹⁹ – in contrast to tiny Hong Kong's HKIX of 700Gbps¹⁰⁰. Unfortunately, NIXI does not allow bilateral interconnection arrangements, therefore anyone looking to participate in NIXI needs to pay for interconnect access with all of the NIXI ISPs, regardless if they use the interconnect ports or not. This ultimately discriminates against content providers and CDNs from participating in NIXI, as well as smaller domestic content and cloud providers, and results in less than 10% of the country's Internet traffic being served through the exchanges¹⁰¹.

⁹² SGIX (2016) Peering Members, <http://www.sgix.sg/peering-members/>, accessed 7 Dec 2016

⁹³ C. Cheng (2016) HKIX Updates at HKNOG 3.0, http://www.hkix.net/hkix/Presentation/HKNOG_2016.pdf

⁹⁴ TeleGeography (2016) Global Internet Geography, Hong Kong Country Profile, International Internet Bandwidth, <https://www.telegeography.com/products/global-internet-geography/capacity-and-pricing-data/country-profiles/hong-kong/index.html>

⁹⁵ PLDT agreed to join the neutral Philippines Open Internet Exchange (PHOpenIX) to peer with the government in September 2015, and President Duterte is working on opening up the telecommunications market to greater competition.

⁹⁶ The deal comes with 3Gbps per month free traffic peering threshold.

⁹⁷ Chrisee Dela Paz (2016) PLDT, Globe sign IP peering deal after 6 years, <http://www.rappler.com/business/industries/telecommunications-and-media/136614-pldt-globe-ip-peering-agreement>

⁹⁸ Rappler (2015) Globe to PLDT: Open up IP peering to improve internet speed, <http://www.rappler.com/business/industries/telecommunications-and-media/107319-globe-ip-peering-arrangement>

⁹⁹ A. Bhatia (2012) Understanding NIXI and it's policies, <https://anuragbhatia.com/2012/10/networking/understanding-nixi-and-its-policies/>

¹⁰⁰ NIXI (2016) Traffic Analysis for all locations, yearly graph (1 day average), <http://www.nixi.in/mrtg.php>, accessed 7 Dec 2016

¹⁰¹ HKIX (2016) HKIX Switching Statistics, yearly graph (1 day average), <http://www.hkix.net/hkix/stat/aggt/hkix-aggregate.html>, accessed 7 Dec 2016

¹⁰² Economic Times, V. Nishtala (2014) Net exchanges in India may help cut cost, <http://economictimes.indiatimes.com/tech/internet/net-exchanges-in-india-may-help-cut-cost/articleshow/45486259.cms>

Policymakers can promote the establishment and development of local caching and neutral IXPs by creating and enabling the necessary legal, regulatory and investment frameworks in the context of a liberalized telecommunications market. While such tools complement the development of local Internet ecosystems, they are not a universal solution to the accessibility challenges of affordable and bandwidth capacity. Nevertheless, the benefits of such network management tools will become increasingly important as more users come online to consume ever increasing amounts of content and to become participants in the digital economy.

CONCLUSION & RECOMMENDATIONS

"The Web as I envisaged it, we have not seen it yet. The future is still so much bigger than the past." - Tim Berners-Lee, inventor of the Internet

The exponential growth of data traffic will continue to accelerate as more and more users come online. This report illustrates that while there has been a steady growth in Internet adoption, the demand for bandwidth has increased even faster, with video content leading the way. An open Internet is key for this abundance of content to drive Internet adoption. As users become more comfortable online, they consume more and more content and create further demand for broadband access. This, in turn, drives investment into network infrastructure which opens the door for further innovation and economic growth. A virtuous circle of consumption (demand) and investment (supply) is then created.

Asian governments must recognize the importance of the open Internet and move toward establishing the necessary regulatory frameworks to ensure fair and equitable growth. Otherwise, they risk finding themselves in a position where supply is unable to accommodate societal demand – creating a vicious circle of user disappointment, high prices, and limited access. The exponentially increasing demand for data must be managed and regulated properly to ensure the positive benefits of the Internet.

This report has looked at the ways countries in Asia have, and can, address the challenges associated with increasing Internet adoption and the surging demand for bandwidth. Many governments have prioritized Internet adoption – the fundamental requirement for building and promoting a digital economy as the future driver of growth – in their development plans. To ensure that all citizens have affordable access some have created public-private partnerships to expand roll out. Both networks and governments should focus on encouraging competition by upholding the principles of non-discrimination – for example in zero-rating schemes – and enabling good network management practices – such as caching and the promotion of neutral IXPs. To ensure growth and innovation, policymakers must continue to support the fundamentals of the open Internet.

The findings in this report lead toward the following recommendations that may serve as a guide for policymakers in Asia:

INCENTIVIZE AFFORDABLE DATA PRICES AND FASTER CONNECTIONS THROUGH COMPETITION IN NATIONAL ISP AND TELECOMMUNICATIONS MARKETS

Increasing the number of telecommunications and ISP players in specific Asian markets has resulted in higher data caps, reduced prices and increased connectivity.

SUPPORT NETWORK DEPLOYMENT THROUGH USAFs AND PUBLIC-PRIVATE PARTNERSHIPS

In Asian countries where network deployment, particularly to rural areas, lacks investment, USAFs and other forms of public-private partnerships have been shown to increase connectivity.

PROMOTE INTERNET ADOPTION AND INNOVATION THROUGH NON-DISCRIMINATORY ZERO-RATING SCHEMES

Zero-rating schemes that are applied in a non-discriminatory way to an entire class of content can help achieve the goal of extending affordable access without inhibiting consumer choice and innovation.

ENCOURAGE PEERING AND CACHING AS NETWORK MANAGEMENT TOOLS

As Internet traffic grows and presents a strain on the backbone, edge providers are able to work with ISPs to lower transit costs through caching and peering to deliver a higher quality consumer experience. This should be encouraged through requiring settlement-free interconnection and participation in neutral IXPs.

The success, scale and impact of the Internet is due to the decentralized and open architecture upon which it was designed. By allowing for and encouraging innovation, the Internet has revolutionized society, introduced new forms of communication, and created more content and services that ultimately will benefit the entire population and drive growth in Asia.



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