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Economic Cooperation

Enhancing broadband development and internet usages for improving networks and services in APEC member economies

APEC Telecommunications and Information Working Group

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1 Executive summary

This APEC commissioned study evaluates measures to promote broadband development and internet usage by providing relevant information to policy makers and investors, strengthen the governance in member economies and enhance capacity building. A survey was conducted as part of the study to gather first hand country specific insights and supplement the research. However, only seven (MAS, NZ, HKC, PE, VN, THA, CT) out of 21 APEC members participated in the survey. The survey responses generated valuable insights and have been incorporated into the report.

Steady growth of broadband subscriptions in the APEC

Broadband subscriptions in the APEC economies are growing and new access connections continue to be deployed. By the end of 2010 the APEC members had a total of 369mn fixed broadband subscribers on xDSL, Cable, Fixed Wireless Access, FTTx or other fixed technologies, whereby FWA and FTTx are the fastest growing access technologies. Especially FTTx deployments related to Next Generation Broadband Networks are gaining momentum and are no longer the preserve of rich economies. The average mobile broadband penetration in the APEC (35.0%) is significantly higher than the fixed broadband penetration (14.9%) and suggests that mobile technologies play an important role for providing broadband access in the emerging economies. Affordability of broadband access in the APEC varies. While the average for an entry-level broadband subscription is 4.05% of monthly GDP per capita, broadband subscriptions tend to be significantly less affordable by in developing economies. To further increase broadband penetration several other factors besides affordability are relevant. Implementing the right set of regulatory remedies, creating competition in access markets and the right investment decisions are crucial to promote infrastructure development and support broadband growth. However, higher investments into broadband development do not necessarily lead to higher growth rates of broadband penetration. Indeed, broadband penetration growth rates are higher in developing economies. While developed economies focus on costly rural coverage and deploy expensive NGNs, developing economies still have potential to expand on urban broadband deployments that lead to high growth rates in broadband penetration. The annual private investment per capita into the telecommunications sector in the APEC is higher in developed economies (> USD 100) than in developing economies (< 54 USD).

Importance of regulatory and financial intervention for promoting broadband

The APEC members have several regulatory and financial intervention mechanisms for promoting broadband development. Although policies must always be evaluated in a country specific context, common patterns among the APEC member economies can be identified.

Wholesale access obligations such as ULL, BSA or line sharing increase intra-platform competition and product differentiation in dominated markets and lead to higher broadband penetration. 8 out of 9 APEC members that have a fixed broadband penetration greater than 20% mandate ULL obligations while only 3 out of 12 APEC members that mandate ULL have a fixed broadband penetration less than 20%. Regulatory interventions such as ULL, BSA and operational separation can lead to significant achievements such as in the case of New Zealand. The change of the overall regulatory approach led to an 80% increase in broadband subscriptions per 100 inhabitants as well as a significant increase of advertised fixed broadband speed.

Four APEC members that promote service based competition employ an Open Access model on a national level whereby three APEC members have also mandated operational or structural separation obligations on network operators. National or regional Open Access projects usually involve government financial intervention in form of PPP agreements. Among the APEC member economies, Singapore's approach of structural separation of its next generation national broadband network is an example of a PPP driven approach to attain service based competition in the market while creating a natural monopoly for the broadband infrastructure.

For many of the emerging economies, mobile communication is the predominant form of communication and the most important channel for providing broadband connectivity. APEC members with a high mobile to fixed line subscription ratio tend to have a less regulated fixed line regime. It is important that these economies have an efficient and flexible spectrum management regime in place for promoting mobile broadband development. Among the APEC economies, spectrum assignment has mostly been done through competitive auctioning. APEC members have started to increase flexibility of issued licenses by easing up license conditions and allowing secondary trading to reduce inefficient spectrum usage, increase economic efficiency and allow for an agile response to new technologies in the market. AUS, US and NZ have implemented a spectrum trading framework. At least 8 APEC economies have issued technology neutral licenses in the past and embrace the principles of neutrality. APEC members have also started to define roadmaps for the analog/digital switchover which is expected to have a

massive effect on rapidly increasing broadband penetration and coverage in emerging economies. So far, only the US has released the digital dividend spectrum among the APEC economies, while 9 other economies have plans to perform the digital switchover.

Impact of political and socio-economic context on broadband development

Governments and regulatory authorities work together and draft policies and national broadband plans that manifest their commitment for broadband development and internet usage. Policy makers have to be aware of national circumstances such as the political and socio-economic context as well as the market perception of key ICT agents to develop balanced and implementable policies.

Promoting broadband and internet usage on a national level necessitates financial commitment, measurable targets and coordination and governance from all relevant stakeholders. National broadband plans should be straight-forward, realistic in their objectives and traceable to measure success of the implementation. While developed economies have made experiences throughout the implementation of several broadband plans in the past, developing economies are currently making their first experiences.

Independent policy bodies legitimated by laws can facilitate fair market competition and adapt to the needs of rapidly evolving technology markets. In the APEC currently 13 regulatory authorities are independent in their decision making whereas some economies leave the regulatory body with their ministries. A direct link between the degree of independence of NRAs and broadband development can not be drawn for the APEC.

General Agreements on Trade in Services (GATS) and free trade agreements (FTAs) among the APEC economies have been ratified creating different levels of economic freedom in exchanging services between APEC members. While developed APEC economies have committed to lower restrictions in the GATS, developing economies remain protective about ownership and commercial presence. Additional commitments can be introduced outside the GATS through free trade agreements. The ASEAN economies committed to a connectivity master plan with seven action items to foster broadband development, lower trade barriers and harmonize the whole ICT sector in the trade association. Overall there is a link between APEC members with more liberal GATS/FTAs and increased levels of broadband penetration, although it would be wrong to conclude that more liberal commitments are solely responsible for this.

Bridging the digital divide through public policy and regulation

There have been numerous studies on the digital divide in developed and especially developing economies over the past decade and its unfavorable impact in the economy and society. Three major drivers of the digital divide and promoters of the ICT uptake have been identified: accessibility, affordability and technology awareness/skill. These can be significantly influenced through either public policy or regulatory intervention in the telecom market.

Industrial policy is used to promote accessibility and affordability of broadband, while social policy is the key for creating technology awareness and skills in the population. On average, APEC members that participated in the survey have identified regulatory measures, a solid legal framework and government funding priorities as the most important factors for bridging the digital divide. Universal Service Obligations (USO) and the use of a Universal Access and Service Fund (UASF) are major drivers for providing rural broadband access. While USOs have been mostly used in the past on monopoly or dominant market players, there is an increasing trend to distribute funds through the UASF through competitive bidding. The UASF is further complemented by other financing mechanisms such as national and regional Public Private Partnership that also rank high among the survey participants.

Governments have realized that mobile communications represent the most effective means for providing access to voice and data services to the rural and remote population. Mobile communications have a high potential facilitating internet usage in the APEC developing economies, though still remain below potential either because of shortcomings in affordability or technology awareness. Fixed Broadband prices for developed APEC economies are just 0.86% of monthly GNI while prices of developing economies amount to an average of 8.6% of monthly GNI per capita, hence making them less affordable for the general public. Prices have however dropped by 17% from 2008 to 2009 showing a continuing downward trend and making broadband services more affordable.

Consumer demand and consumption feasibility of services are further drivers of internet usage. According to the APEC survey, on average, activities such as Emailing, Internet browsing and social networking have the highest demand and are also deemed to be consumable in rural areas given the current network infrastructure. Activities where demand is estimated higher than consumption feasibility are E-Health services, multimedia video, distance learning and tele-work. Deployments of broadband networks

to rural areas have the potential to close this gap and improve their consumption feasibility.

The APEC broadband survey further indicates that E-Government will have the strongest impact on the government-citizen interaction, closely followed by social networks. Public agencies must account for these new ways of interaction and incorporate them into their daily work. However, several APEC economies still lack public sector capacity to provide E-Government services because of the high investment requirements for infrastructure, software and lack of human capital. It is in the interest of governments to provide qualitative online services to stimulate citizen demand and promote internet usage. Public policy makers should consider E-Government initiatives in tandem with their national objectives of broadband development, especially in rural areas, to ensure digital and social inclusion of their citizens.

2 Disclaimer

The information contained in this report such as the statistics and the regulatory situation is not officially endorsed by the APEC member economies. This report shall not be used as a reference point to official information of the respective APEC economies. It is a pragmatic and comparative study over 21 APEC economies that presents recommendations on “Enhancing broadband development and internet usages for improving networks and services in APEC member economies”.

Research in this study has been done with the best of knowledge and the usage of several official and non-official sources. When available, official sources have been used. The divergence of information from official sources in this report is due to the following reasons[1]. This report contains information and data points based on the following types of sources:

- official sources i.e. from government statistical authorities, OECD, ITU or similar international organizations
- private sources i.e. researched by private research companies, such as Pyramid research, Ovum, Informa
- APEC broadband survey 2011 i.e. the information that was gathered from APEC members by the means of a survey.
- Internet research i.e. using the Internet to research information relevant for this report e.g. on operator websites, websites of NRAs, media announcements

[1] See also Appendix C for further information on the sources used

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3 Introduction

The study “Enhancing broadband development and internet usages for improving networks and services in APEC member economies” has been commissioned by the APEC. It evaluates measures to promote broadband development and internet usage by providing relevant information to policy makers and investors, strengthen the governance in member economies and enhance capacity building (Figure 3-1). A survey was conducted as part of the study to gather first hand APEC member specific insights and supplement the research.

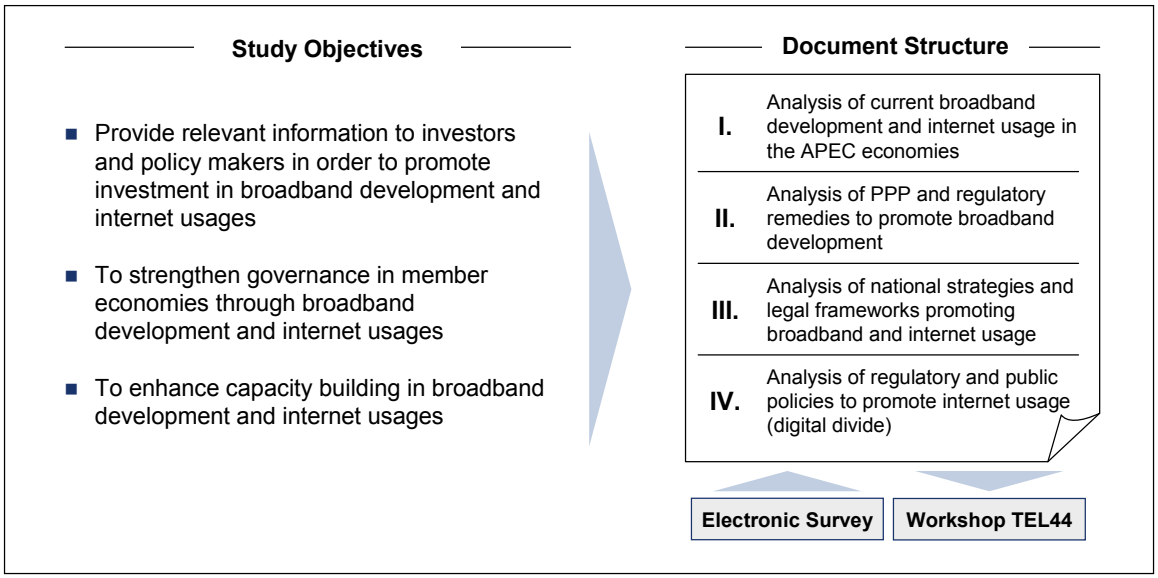

Figure 3-1 Overview of the study objectives and document structure (Source: based on APEC TEL03/2009A RFP)

This study evaluates the above mentioned subject areas in the following chapters separated in four distinctive parts.

Part I of this study covers a review of studies that are related to broadband development and internet usage and includes a comprehensive data compilation taking into account different criteria such as penetration, affordability, coverage, bandwidth and technologies throughout the APEC.

Part II highlights the importance of regulatory and financial intervention and their relevance for promoting broadband development. It evaluates the impact of wholesale access obligations, infrastructure sharing and spectrum management principles to identify best practice regulations within the APEC. Public Private Partnerships as a form of financing broadband deployment in regional and national projects in the APEC are analyzed and their importance discussed.

Part III of the study analyses the legal, political and social environment for the implementation of public policies that can promote broadband development and internet usage. Market restrictions for telecommunication services and scheduled commitments defined under the General Agreement on Trade in Services (GATS) are reviewed and national broadband plans are discussed.

Part IV makes a comparative study of the digital divide in the APEC economies. It identifies three major drivers for the digital divide and discusses how regulatory and public policy intervention can be leveraged to bridge the digital divide. The study concludes by evaluating consumption feasibility of internet services and the relevance of E-Government initiatives across the APEC economies.

A survey was developed for enriching the study with recent country specific cases of the APEC economies and sent out to the APEC representatives in regulatory authorities and public bodies (Figure 3-2). The survey consists of 23 survey questions that cover the broad scope of the study objectives and was performed using an online tool that was published by Email to the survey participants (see appendix for full survey).

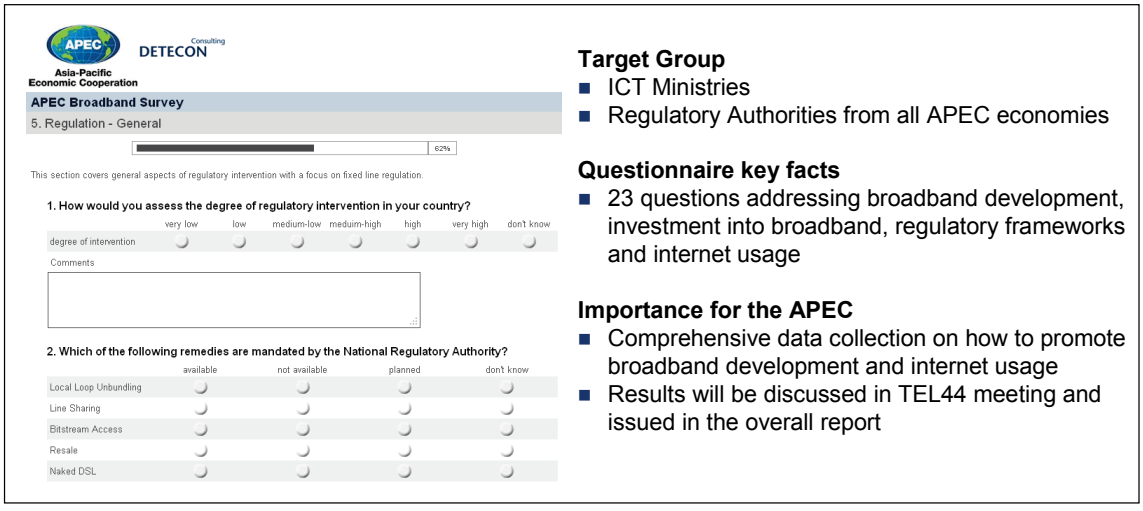

Figure 3-2 APEC broadband survey target group and objectives (Source: Detecon)

Only seven (MAS, NZ, HKC, PE, VN, THA, CT) out of 21 APEC members participated in the survey. However, the available survey responses generated valuable insights and have been incorporated into the following four parts of the study.

4 Part I – Overview of broadband development and investment in the APEC

The growing economic and social importance of broadband is still given as APEC members monitor the progress of broadband in their domestic markets. Broadband penetration in emerging Asia is accelerating due to ongoing decline in xDSL modem pricing and the advent of HSDPA as a wireless alternative to fixed line broadband. Traditional internet activities, meaning “obtaining information” have intensified to participatory activities, the ongoing proliferation of video-based broadband content and the rise of social applications.

Broadband is not only playing a critical success role in the economy, it connects consumers, businesses, governments and facilitates social interaction. Many studies have been carried out over the last decade in the APEC region highlighting the status and the different developments of broadband in each economy. The e-APEC strategy and its goal to enable the people in urban, provincial and rural communities in every economy to have individual or community-based access to information and services via the internet by 2010 have been largely achieved. Embedded are the key principles for broadband development to maximize access and usage, to facilitate continued competition and liberalization, to foster enabling regulatory frameworks and to build confidence in the use of broadband networks and services. Future prospects and the recommendations of APEC ministers are to set an ambitious goal of access to next generation high-speed broadband by 2020 to expand and improve ICT infrastructure for knowledge-based economies in the APEC region. In a recent meeting in Okinawa the commitments towards achieving the goal of universal access to broadband in the APEC region by 2015 were reaffirmed.

The introduction Part I of this study covers a review of studies that are related to broadband development and internet usage and it includes a comprehensive data compilation taking into account different criteria such as penetration, affordability, coverage, bandwidth and technologies throughout the APEC region. The data is used to identify the status of broadband in the APEC region and furthermore to investigate investments into broadband and telecommunication between developed and developing APEC economies. Broadband itself from both mobile and fixed perspective went through different speed and technology transitions over the last decades. For the report we

define fixed broadband as a subscriber line with a transmission speed greater than 256 Kbps. This includes xDSL and cable connections, fiber connections, high-speed fixed wireless connections and other broadband access technologies such as satellite and power lines. Mobile broadband is used to describe internet through a portable modem, telephone or other portable devices based on various wireless technologies. From this perspective we consider all mobile broadband technologies that allow for higher than EDGE transmission rates at 256+ Kbps as shown in Figure 4-1 to make fast data services available on mobile devices.

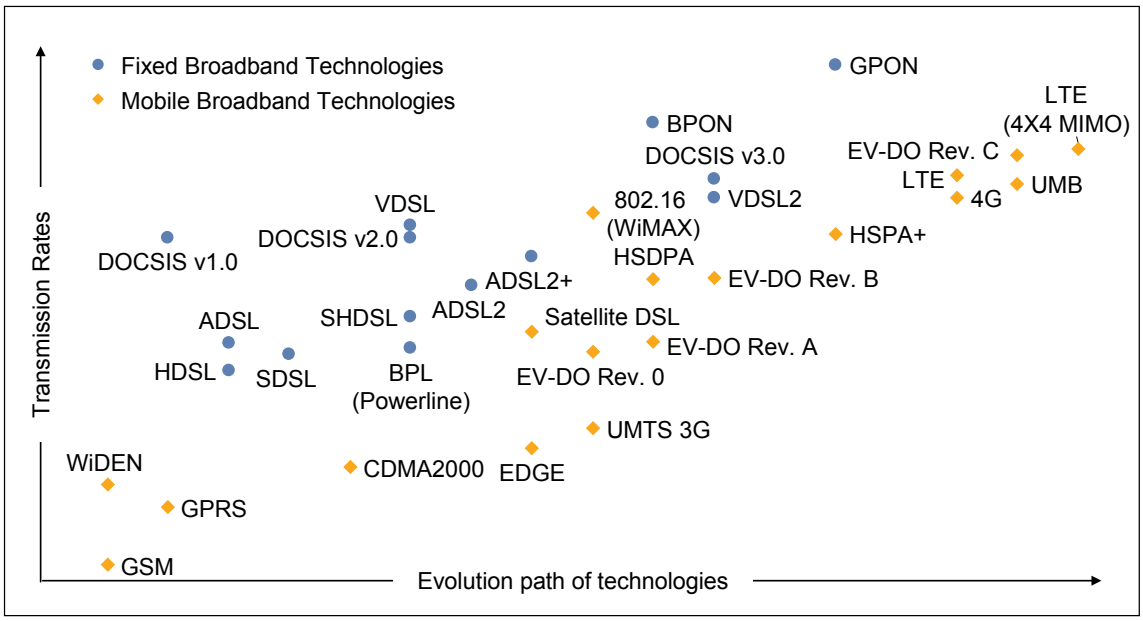

Figure 4-1 Evolution of fixed and mobile broadband technologies (Source: Detecon)

4.1 Broadband penetration in the APEC region

Broadband penetration levels have become an important indicator for the state of broadband markets, as prices, coverage and competition levels are all factors to measure and determine subscriber take-up. Penetration rates further allow policy makers to obtain a clearer picture of the effectiveness of their policies regarding the development of broadband across different economies as well as over time. A relatively slower increase of penetration rate might indicate certain market deficiencies or reflect market or economy-specific factors.

(1) Broadband Penetration is a key metric and indicator for policy makers and regulators to determine the status of broadband usage per economy. On average, the mobile broadband penetration in the APEC is significantly higher than fixed broadband penetration.

4.1.1 Fixed broadband penetration

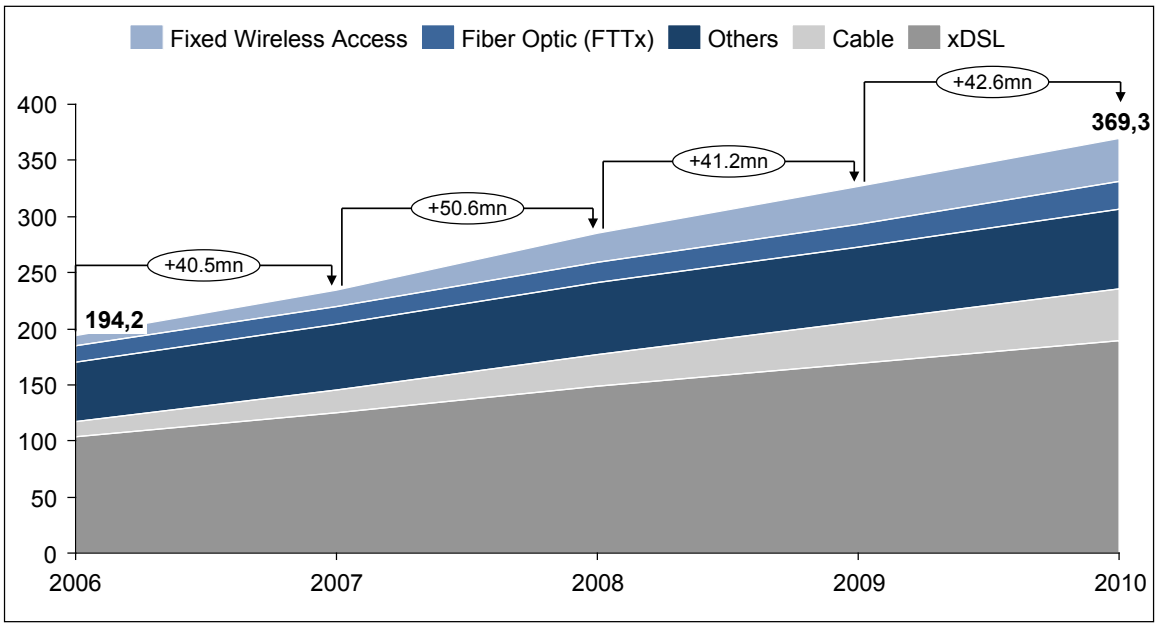

Figure 4-2 Total APEC fixed broadband growth in million of subscribers (Source: Pyramid research)

According to Figure 4-2, fixed broadband subscriptions grew by a total of 90% from 194mn to 369mn in the 21 APEC economies in the period 2006 to 2010. With APEC members coming from both developing and developed economies, the growth of subscribers by technology in the APEC varies. While xDSL subscribers grow steadily by 16.3% cable subscriptions grew only by 7.2% in compound annual growth. The fastest growing technology cluster is Fixed-Wireless Access (FWA) with growth rates higher than 30% reflecting the investment tendencies especially in economies where rural access via fixed line is too expensive.

Broadband development in the APEC economies is still growing and new connections are still increasing end 2010 with a continuous pace. However penetration rates may not capture and reflect the number of subscribers changing their access by technology or upgrade to faster connections.

By end of 2010, the nine APEC member economies ROK, HKC, CDA, JPN, US, NZ, SIN, AUS and CT lead in fixed broadband penetration above the APEC average of 14.9 subscribers per 100 inhabitants. Two members (HKC; ROK) even surpassed the mark of more than 30 subscribers per 100 inhabitants as shown in Figure 4-3.

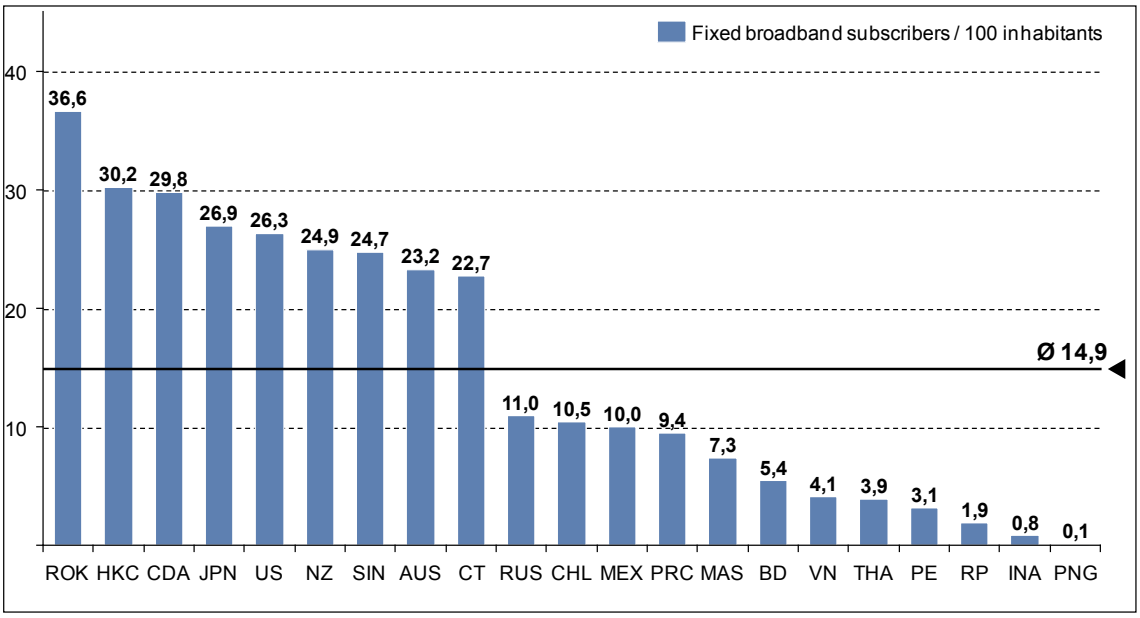

Figure 4-3 Fixed broadband penetration rates per 100 inhabitants (Source: ITU 2010 – broadband refers to total fixed (wired) broadband Internet subscriptions at 256 Kbit/s+ and includes xDSL, FTTx, cable and other technologies)

APEC members deployed different technologies for providing fixed broadband access. Economies with comparatively lower GDP per capita levels generally tend to provide fixed broadband access though xDSL technologies while wealthier APEC members have already advanced deployment of FTTx broadband networks.

APEC members such as ROK, JPN, and HKC currently lead FTTx deployments reflected in high household penetration rates as shown in Figure 4-4. Middle and low income members such as PRC are initiating substantial investment programs dedicated to fiber infrastructure rollout to catch up development. However, FTTx deployments are considerably more challenging in developing markets than in developed ones. The average revenue per FTTx subscriber in Japan is close to USD 100 which is three times as much as the ARPU of similar access in China[2]. While FTTx is widely adopted in Japan today, China is still at a developing stage.

[2] Source: Pyramid research

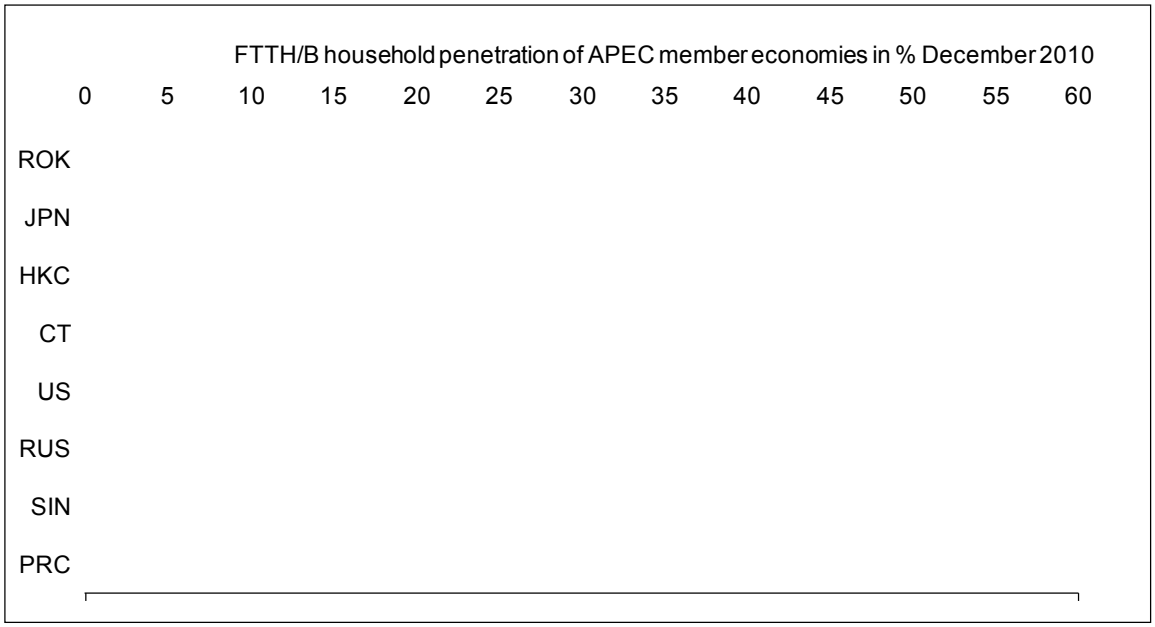

Figure 4-4 APEC economies with more than 1% FTTx penetration per household (Source: FTTH Council, Dec 2010 - The FTTH Global Ranking is based on the FTTH Councils' definition of FTTH/B: it includes both Fiber to the Home (FTTH), where the fiber connection reaches direct to the household, and Fiber to the Building (FTTB), where fiber terminates inside the boundary of a multi-tenant building. The Ranking covers countries with at least 200,000 households where the penetration of FTTH/B has reached 1% of the total number of homes)

Geographic conditions such as geographic dispersion of population and total land mass are influencing the deployment cost of broadband access. Providing a fiber backbone infrastructure between major cities and remote locations can be challenging in large economies with dispersed populations such as AUS, RUS or CDA. It may be also easier for operators in APEC members with smaller land area or heavily concentrated urban areas such as SIN or HKC to connect all users. Cluttered terrain can also be a factor such as in Indonesia consisting of more than 17000 islands whereof 6000 are populated.

(2) Higher population density is a supporting factor to higher broadband penetration. Despite this fact, there are overlying drivers such as investment into broadband infrastructure, regulatory adjustment levers and affordability that drive broadband coverage and penetration.

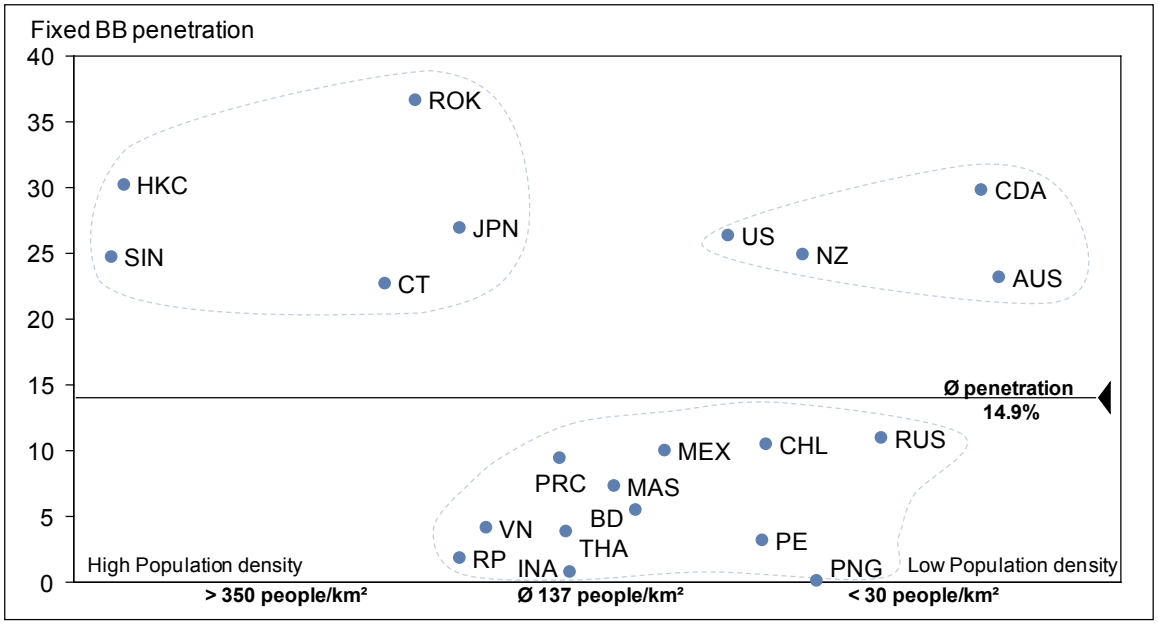

Figure 4-5 Fixed broadband penetration per 100 inhabitants and population density in people per km² end of 2010 APEC economies (Source: ITU, CIA World Fact Book)

Figure 4-5 depicts the different broadband penetration rates along the population density per APEC economy and gives evidence that APEC members with a high average population density have higher broadband penetration than economies with lower population density. Creating access to broadband in those densely populated economies is less expensive than in economies with lower population density. Economies in the cohort of an average population density of 137 people per km² show fixed penetration rates below the average of 14.9% in the APEC. These member economies lack behind extensive fixed network infrastructures from the past. As the deployment of fixed networks to create broadband coverage requires large investments, member economies rather focus on mobile technologies for providing broadband as outlined in the chapter 4.1.2.

However, NZ, CDA and AUS with a lower population density of less than 30 people per km² still display reach higher broadband penetration rates than all developing APEC economies. From an investment perspective the above mentioned economies invest more into their fixed infrastructures compared to APEC members below the average penetration rate. However, neither higher investments nor higher population density are singularly leading to higher broadband penetration. Besides geographic peculiarities there are many other factors to be considered that drive broadband growth and penetration. Those will be discussed in Part II, III and IV of the study.

4.1.2 Mobile broadband penetration

As some economies in the APEC lack a strong and solid fixed infrastructure from the past, mobile technologies provided an alternative to close the gap in broadband access development. Today mobile internet is gaining more and more importance due to geographical necessity (see chapter 4.1.1) or more cost efficient access to rural areas where fixed infrastructure is of low quality or nonexistent. Mobile internet is also gaining attention through the availability of numerous portable devices that foster usage of internet anytime and anyplace.

(3) Mobile broadband penetration is mostly dependent on the availability of 3G mobile technologies. To compete as an alternative to fixed broadband, bottlenecks in spectrum availability and service quality have to be addressed.

As shown in Figure 4-6, 13 APEC economies surpassed the 100% threshold in terms of mobile penetration considering all subscriptions related to 2G technologies or higher. 2G, although being substituted with 3G, is still a common technology to use mobile voice as well as basic data services. Mobile subscriptions with access to data communications at broadband speed in comparison to the overall mobile penetration are lower. ROK, JPN, AUS and HKC are leading in active mobile-broadband subscriptions[3] which is related to their high share of 3G subscriptions.

The average active-mobile broadband subscriptions per 100 inhabitants in the APEC is at 35.0% significantly higher as compared to the fixed penetration of 14.9% and indicates that mobile technologies are important drivers for bridging the digital divide. Nonetheless, developing economies in the APEC that introduced 3G recently have a comprehensive development path ahead to level up to broadband equivalent speed in the mobile segment and roll out 3G networks. Data connectivity on 2G is not always sufficient for basic internet services and as data traffic rise, capacity of bandwidth and spectrum shortage become issues to be addressed by regulators and governments.

[3] „Active mobile-broadband subscriptions" refers to the sum of active standard mobile-broadband subscriptions and dedicated mobile-broadband data subscriptions. Data for this indicator is collected by Wireless Intelligence/GSMA directly from the operators. The ITU is using data from Wireless Intelligence (see "ITU - Measuring the Information Society 2011"), because so far only very few countries have reported this indicator to the ITU. See appendix for further details on this indicator

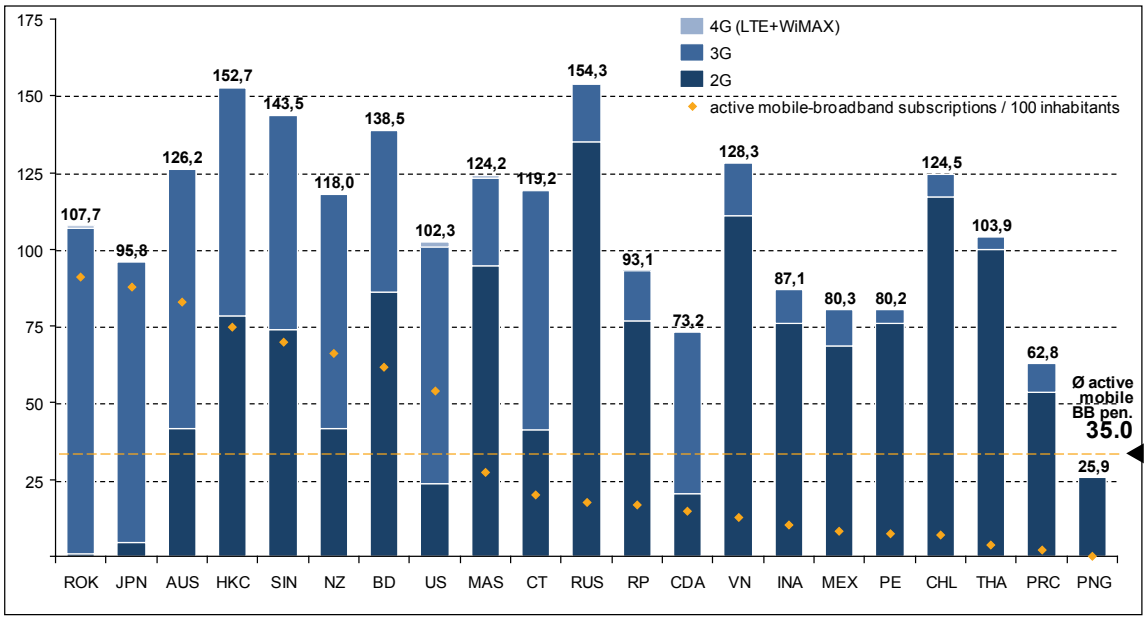

Figure 4-6 Mobile subscribers on 2G and higher technology generation in subscribers per 100 inhabitants in Q4/2010, sorted by active mobile-broadband subscribers per 100 inhabitants. (Source: Wireless Intelligence/GSMA, Data on active mobile-broadband subscriptions for CT is based on Q1/2011 data of the National Communications Commission)

Mobile data with equivalent speed to broadband services is also determined by the amount of spectrum allocated for mobile communication on different mobile technologies and the different license types. As the report details further in Part II, it is crucial to be efficient with spectrum management of the digital dividend in order to promote cost efficient mobile broadband coverage to rural and remote areas.

Towards 4G technologies, especially long term evolution (LTE), most of the economies have no commercial offerings yet, although most APEC members have committed to elaborate LTE in trials and field tests. LTE is driving the discussion around technological innovation with significant proportion of investments flowing into trials and network development. Operators are still cautious about market development and demand of such services. So far only HKC, USA, JPN, SIN, KOR, RP and CDA have commercial LTE service offerings in place.

4.2 Affordability of Broadband

The affordability and thus prices of broadband have an impact on broadband penetration and can be strong determinants for broadband take-up. The affordability and prices for broadband connections vary widely across the APEC economies and are commonly lower in developed markets than in developing markets. A comparison of prices between APEC members is problematic as speeds and the service quality vary for the different broadband technologies. Mobile broadband plans were not considered in the following

graphics due to lack of data availability and difficulties in comparing comprehensive pricing of mobile tariffs.

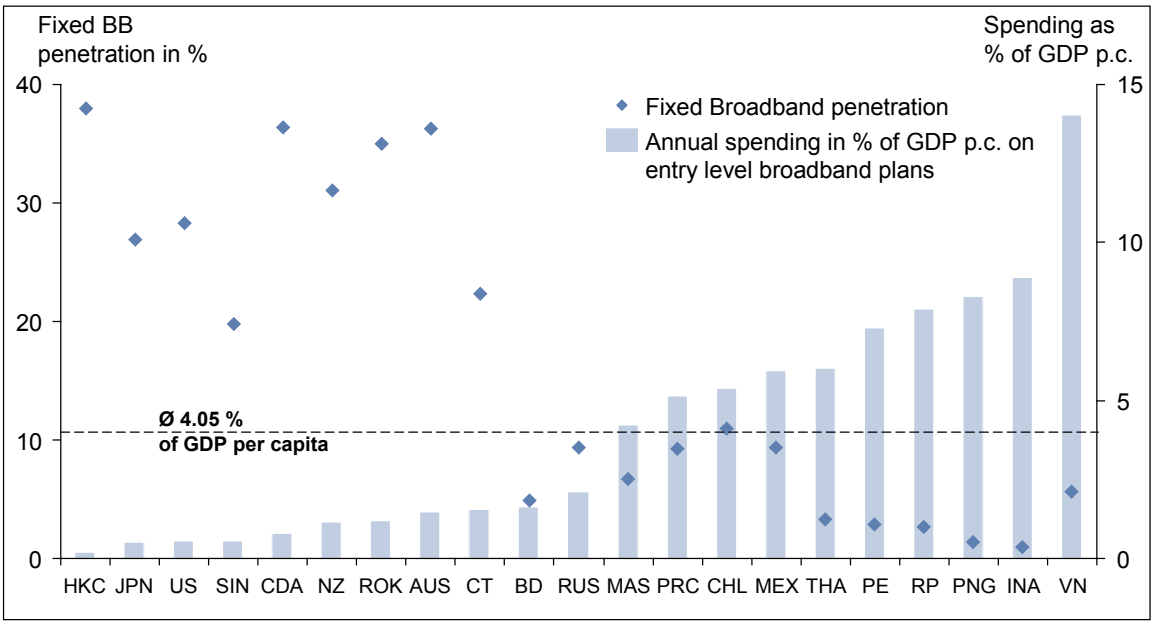

Figure 4-7 Broadband affordability in annual spending on entry level subscriptions (DSL) as percentage of GDP per capita in 2010 (Source: internet research – market pricing of entry level and high level broadband packages of main Cable and DSL operators in April 2010)

Considering the offered prices per incumbent for fixed broadband access as of December 2010 (Figure 4-7), broadband is affordable in most of APEC economies below the threshold of 4.05% annual GDP spending per capita. The measure is corresponding approximately to the OECD figure of the average of 3% monthly income on entry level broadband plans. It is worth noting that subscribers in rural or remote areas have to pay higher charges than the ones in urban areas where connectivity comes at a price. As affordability is driving the adoption of broadband, prohibitively high-priced broadband plans are less likely to foster broadband take up and also increase the digital divide. Where entry packages are priced below 4.05% of annual spending, broadband penetration is significantly higher with the exception of Brunei Darussalam and Russia. APEC economies above the 4% threshold could use various means also from a regulatory perspective to drive prices further down to an affordable income level and promote faster adoption of broadband. Part IV of the study will further elaborate the connection between affordability and the digital divide.

(4) Affordability of broadband access is crucial to drive faster broadband adoption. Affordability is influenced by various levers such as the right set of regulatory remedies, creating competition in access markets or the right investment vehicles to promote infrastructure development.

Recent OECD broadband statistics[4], considering the evolution of representative broadband subscriptions between 2005 and 2008 indicate a price decrease of subscriptions over time. A sample of comparable broadband plans across the OECD between 2005 and 2008 showed that prices for the same or slightly improved service fell on average 14% for DSL and 15% for cable. For example, in the US, the average DSL broadband plan with 3072 Kbps cost USD 36.99 by 2005, whereas a plan with similar speed was only USD 30.00 in 2008.

With regards to transmission rates, at the same time speeds increased for DSL on average by 22% and for cable by 30% through all OECD countries. For instance, the US cable operator Comcast offered cable internet at 6144 Kbps for USD 67.95 in 2005. By 2008 speed was upgraded to 12000 Kbps while the monthly charge dropped down to USD 42.95. Reviewing only APEC economies out of the OECD (AUS, JPN, ROK, MEX, NZ and USA) the price decrease of DSL subscriptions was around 7% per year, while speed increased by 52%.

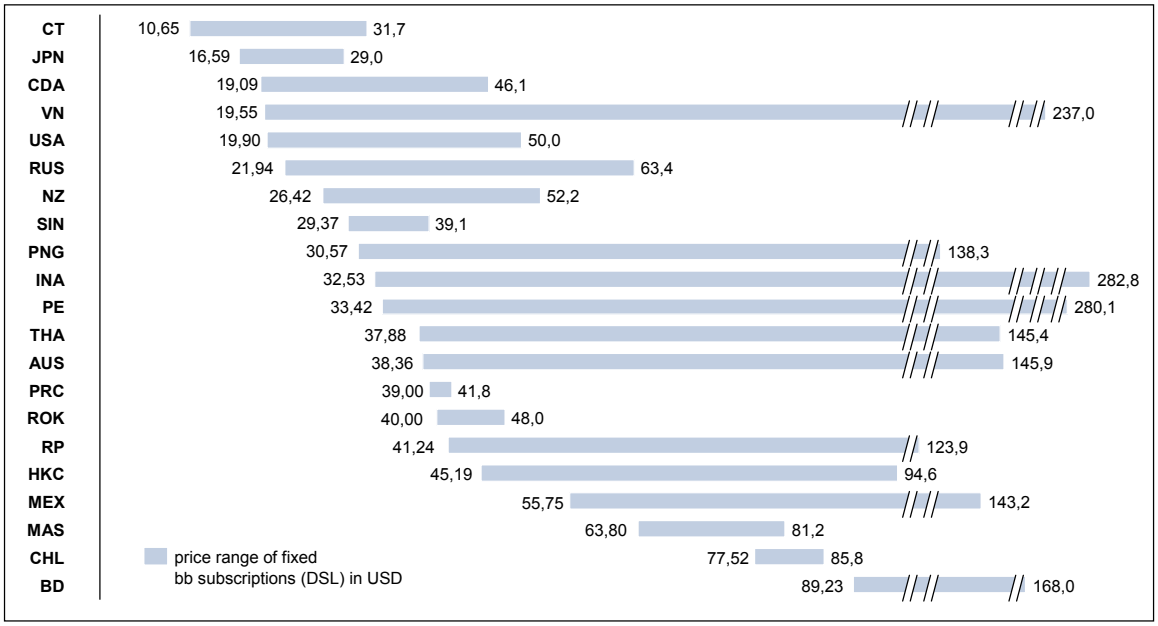

Figure 4-8 Monthly fixed broadband subscription price range entry level to high-end access in USD end of 2010 PPP adjusted (Source: internet research – market pricing of entry level and high level broadband packages of main Cable and DSL operators in April 2010)

Differentiated service levels of broadband reflected in bandwidth and transfer volume have an influence of the wide range of broadband prices in each APEC economy. The entry plan packages as depicted in Figure 4-8 are as low as USD 10.65 per month in Chinese Taipei and can go up as high as to USD 89.23 in Brunei Darussalam. Figure

[4] OECD Broadband Portal 12/2010

4-8 only takes into account DSL platforms and neglects the underlying bandwidth of the different broadband offerings.

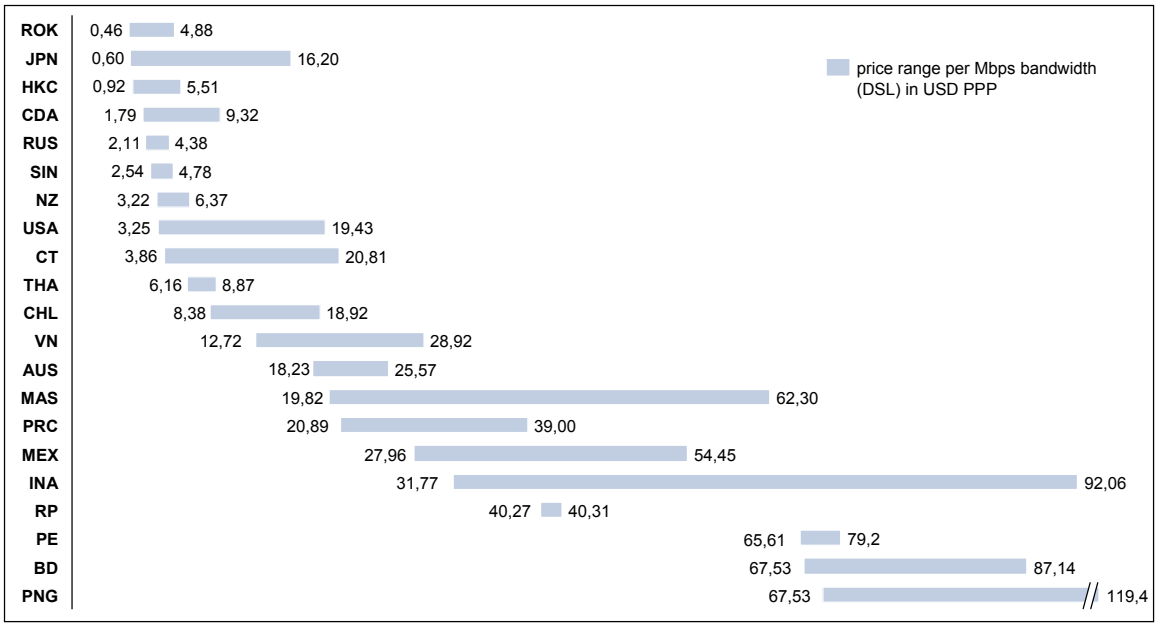

Figure 4-9 Price per Mbps of DSL broadband plans 2010 in USD PPP (Source: internet research – market pricing of entry level and high level broadband packages of main Cable and DSL operators in April 2010)

The ranking of the most affordable access price regarding fixed broadband subscriptions in the APEC changes when calculating the ratio of price per Mbps across the entry and high-end DSL packages. As shown in Figure 4-9, the best ratio with the lowest charge per Mbps has ROK followed by the other developed economies JPN, HKC and CDA. In other APEC economies the price per Mbps is multifold higher ranging up to USD 67.53 adjusted to purchasing power parity seen in PNG.

Both figures above, allow only limited possibility to describe correlations between broadband affordability and fixed penetration due to difficult comparability of broadband packages. Broadband has affected the prices for several related telecommunication services where operators bundle various services together to double play (internet and telephony) or triple play (internet, telephony and television) offers.

Operators have a high interest in maintaining stable prices and thus revenue streams out of their broadband business. Measures taken vary by adding more quality, more services to the access or increasing the speed of up and downlink. With a favorable regulatory framework in place, flexibility for operators is increased to tailor broadband service offerings that meet market demand and disposable income of customers.

Next to pricing levels of broadband subscriptions, affordability of terminal equipment is also a major obstacle for internet usage in economies. A measure of PC penetration per household indicates the number of residential households that can potentially access the

internet. Figure 4-10 correlates GDP per capita with PC household penetration levels for APEC economies. As expected, APEC economies with higher GDP per capita tend to have increased levels of household penetration. A further evaluation of affordability and internet usage can be found in Part IV of this study.

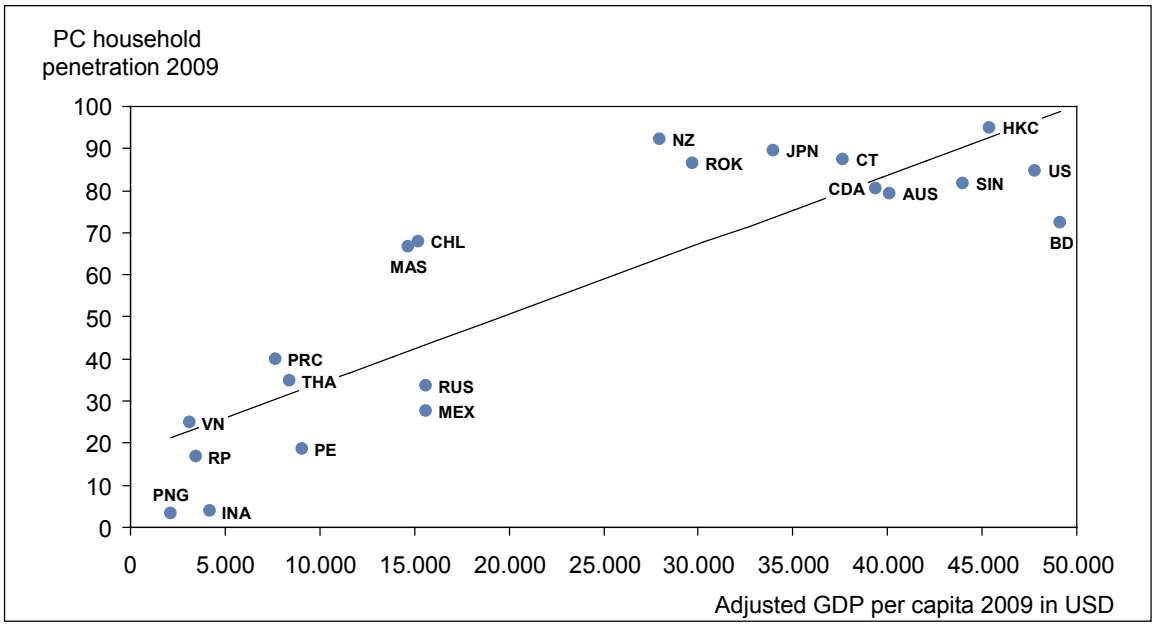

Figure 4-10 Correlation of PC residential household penetration and GDP per capita for year 2009 in all APEC economies (Source: ITU)

4.3 Internet usage

The value of broadband emerges through the various services provided, the availability of applications and services as well as the content that is made accessible. New content-rich broadband applications and new usage patterns are one of the key drivers of broadband demand and uptake. The availability of broadband has reinforced common activities such as e-mail, news and information, online shopping and furthermore brought new forms of usage and innovation (e.g. video streaming, podcasts, high-definition television over broadband) to households. Internet experience appears as an important factor in determining the overall online literacy and emergence of the information society in the APEC region.

As outlined in Figure 4-11 the importance of basic internet activities is determined by communication such as e-mailing and social networking while other activities such as researching personal interests, weather, news and sport as well as entertainment such as gaming are on the rise. Pure browsing through the internet seems to have less relevance whereas the creation of knowledge is gaining importance. Furthermore the amount of people using the internet to manage their lives online is growing.

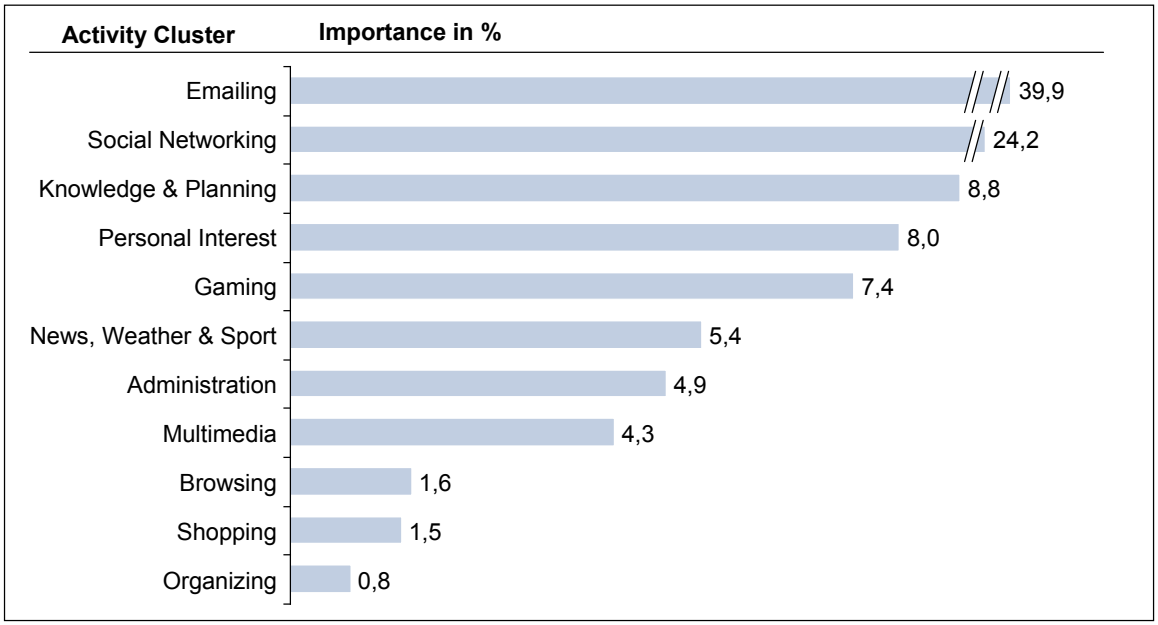

Figure 4-11 Average importance of internet activities in selected APEC economies end of 2010 in %. APEC members covered are AUS, CDA, INA, JP, KOR, MAS, RP, SIN, THA, US, HKC, PRC, MEX, RUS, VN (Source: TNS Infratest 2010 – interviewing consumers "Digital Life study").

(5) Broadband enables people to access various internet services that shift social life and consumption from offline to the online world. Common internet activities such as browsing and emailing from the past are enriched by holistic planning, knowledge generation and digital media consumption.

There is evidence that different socio-economic groups have internet access and use it differently and despite the progress in broadband usage and access, socio-economic gaps are evident. Best in class examples how to deal with the digital divide and encounter gaps through policies or regulatory intervention are stated in Part IV of the study.

4.3.1 Broadband services

From an operator point of view, Voice over IP (VoIP) and Internet Television over IP (IPTV) are the most common and wide spread services that are running on broadband infrastructure or requiring broadband speed. Circuit switched telephony is substituted more and more by packet switched services, although the overall penetration of VoIP lines in households in the APEC is still low at 15,4% but with a growing tendency. Reviewing the share of VoIP lines per household and per broadband connections, developed APEC economies have a higher share of VoIP than the developing

economies. In JPN and ROK more than 50% of the households use VoIP already as shown in Figure 4-12.

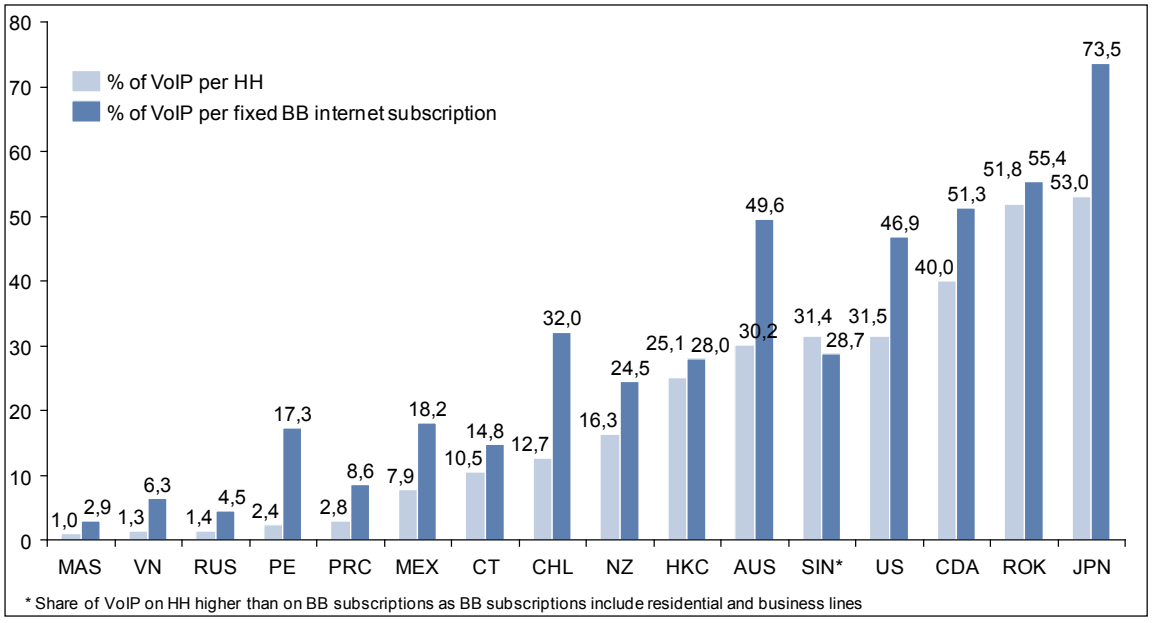

Figure 4-12 VoIP penetration as % of fixed BB connections and households in selected economies by 2010 (Source: ITU, Pyramid research)

Key drivers of the development of packet switched telephony are the availability of service providers, affordability and the quality of the broadband connection. From another perspective fixed-mobile substitution is strengthening the effect of declining circuit switched telephone lines while the migrating to all-IP networks.

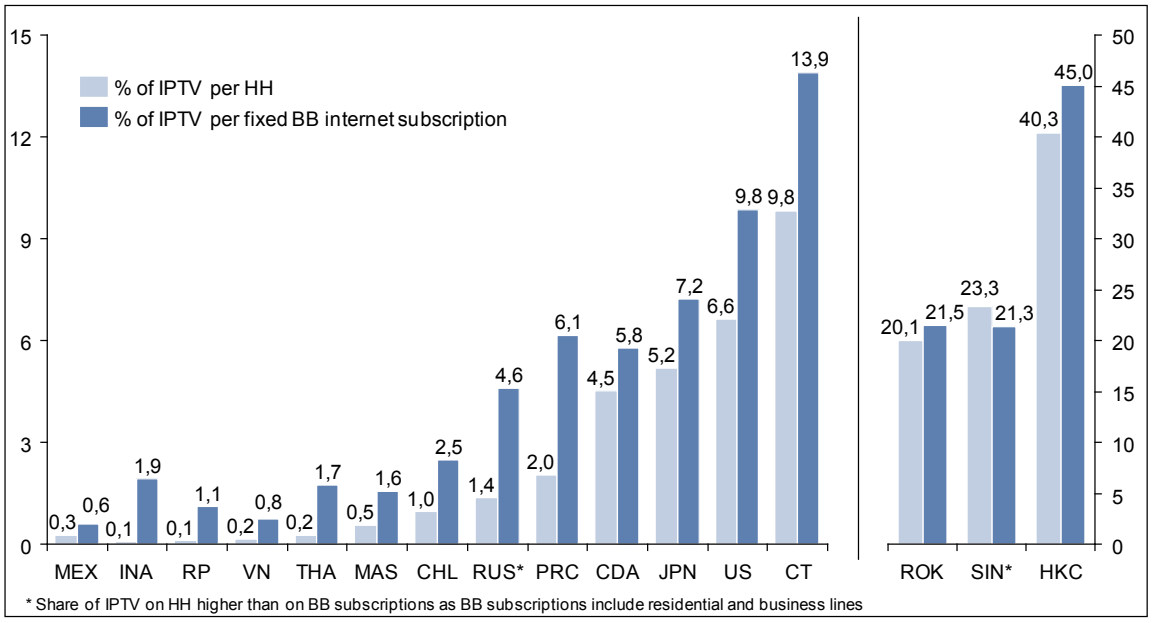

Figure 4-13 IPTV penetration as % of fixed BB connections and households in selected economies by 2010 (Source: ITU, Pyramid research)

IPTV is still in its infancy, where only ROK, SIN and HKC manage IPTV as a competitive substitute to normal television services. The high requirements on bandwidth and quality of fixed network infrastructure make it difficult to promote IPTV as a mass market product. Over the last couple of years operators invested heavily into their triple play offerings and content agreements with lower than expected return. In some economies IPTV offers compete against strong public broadcast stations which offer television for free reducing the consumer's willingness to pay for IPTV.

The future success of the above mentioned broadband services and usage pattern in general as well as all other internet applications in specific will be determined by the consumption feasibility, the perceived value add and the ease of use of the dedicated target groups. Continuous decline of prices in bandwidth could make services affordable but the usage pattern and the social behavior of the people with access to the internet determine the success or failure of such services. Internet usage, the terminus digital divide connected to it and especially how internet changes the dynamics of interaction between citizens and the government is discussed in Part IV of the report.

4.4 Comparing broadband investments

Broadband investments in developed and developing economies in the APEC region largely vary according to the outline and objective of the different national broadband plans. Figure 4-14 links fixed broadband penetration with the overall investment volume into broadband announced in 2009 and 2010 per inhabitant referring to available figures of investment from national broadband plans.

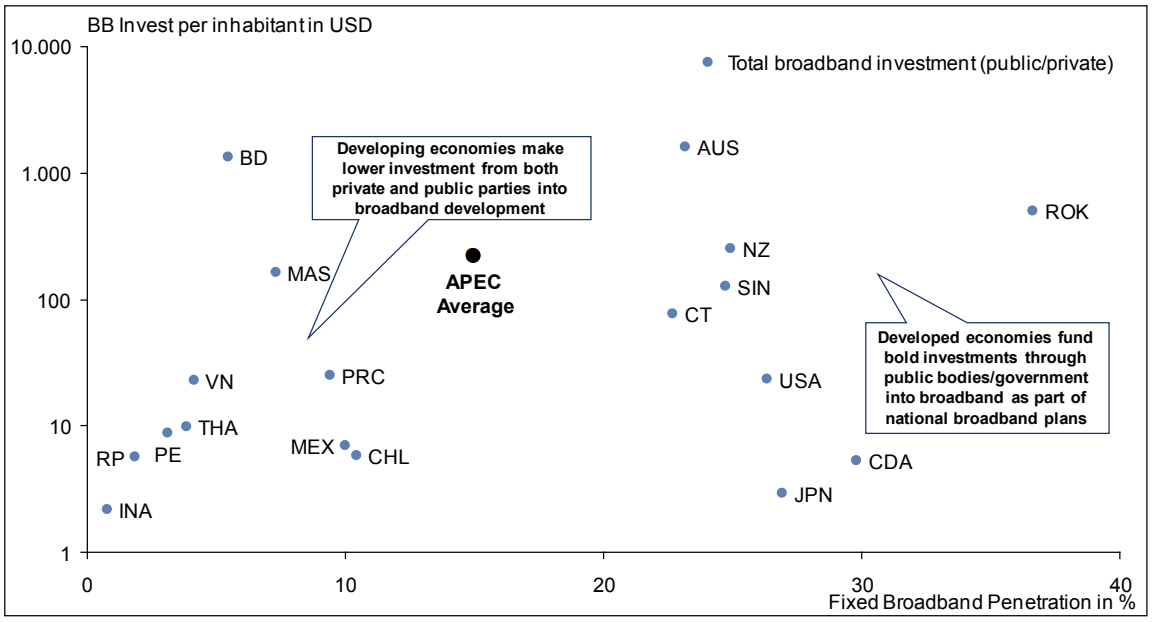

Figure 4-14 Public and private broadband investments in the APEC, HKC does not invest, missing data for PNG and RUS (Source: ITU, APEC Broadband Survey 2011, internet research - National Broadband plans, media announcements, full list of sources see Appendix A1)

(6) Developed APEC economies invest more into broadband per capita than developing economies. Coverage for rural broadband increases investment per capita of developed economies.

The different broadband initiatives from all APEC economies have multiple objectives and are partially aligned to an overall economic stimulus plan. National broadband plans (NBP) commonly target:

- Investments into infrastructure or the upgrade existing links to build faster fixed-line and wireless next-generation networks
- Expansion of broadband access to rural areas where access is currently unavailable
- Promotion of dedicated broadband services that require high-speed access networks such as eGovernment, IPTV, VoIP or eHealth.

With an overall investment volume of USD 24.6 billion, South Korea is investing on the upper end per inhabitant while accounting for a fixed broadband penetration of 36.6% at the end of 2010. The investment plan aims for high-speed internet services to be upgraded to 1 Gbps by 2012, and for wireless broadband services to be upgraded to 10 Mbps. Existing communication networks are also being migrated to more cost efficient IP-based systems. The central government as well as private telecom operators are participating in the 2-year investment plan. Furthermore, the home-grown WiBro standard is used as a way to boost speeds and by reallocating spectrum in the 800 MHz and 900 MHz bands with preference given to new operators and latecomers to the market. Behind the governments plan might not only stand the high-speed access to broadband services but from another perspective industry politics involved as cutting-edge technology leader. Only the economies BD and AUS invest more than USD 1000 per inhabitant. Where Brunei Darussalam is upgrading their IT gateways for more than USD 550mn, the Australian Government will invest AUD 27.5bn towards an AUD 35.9bn project to build a network that will provide access to high-speed broadband to 100 per cent of Australian premises. The government's aim is that by 2020, Australia will be among the world's leading digital economies based on key indicators such as broadband penetration and usage rankings. Both economies BD and AUS distort the investment average per inhabitant due to their multifold higher amounts. As displayed in Figure 4-14

the APEC average investment per inhabitant is at USD 232; excluding the two economies the average drops down to USD 72.

On the other side are the developing APEC economies that have the objective to catch up in broadband penetration, affordability and coverage, although the average investment volume per population is significantly lower. Thailand's cabinet approved the investment of over USD 650mn over five years by state-owned operators on a nationwide broadband network. The network is expected to cover at least 80% of the population by 2015 and at least 95% by 2020. The spread between different development speeds becomes clearer by considering the broadband penetration against the background of investment from public and private sectors and how the investment volume is influencing the growth rates of broadband penetration.

On a long-term perspective looking into the investment on telecommunication[5] over time, there is an equivalent pattern to dedicated broadband investment analysis as elaborated above: developing economies in the APEC lack behind the average amount per population invested on telecommunication as shown in Figure 4-15.

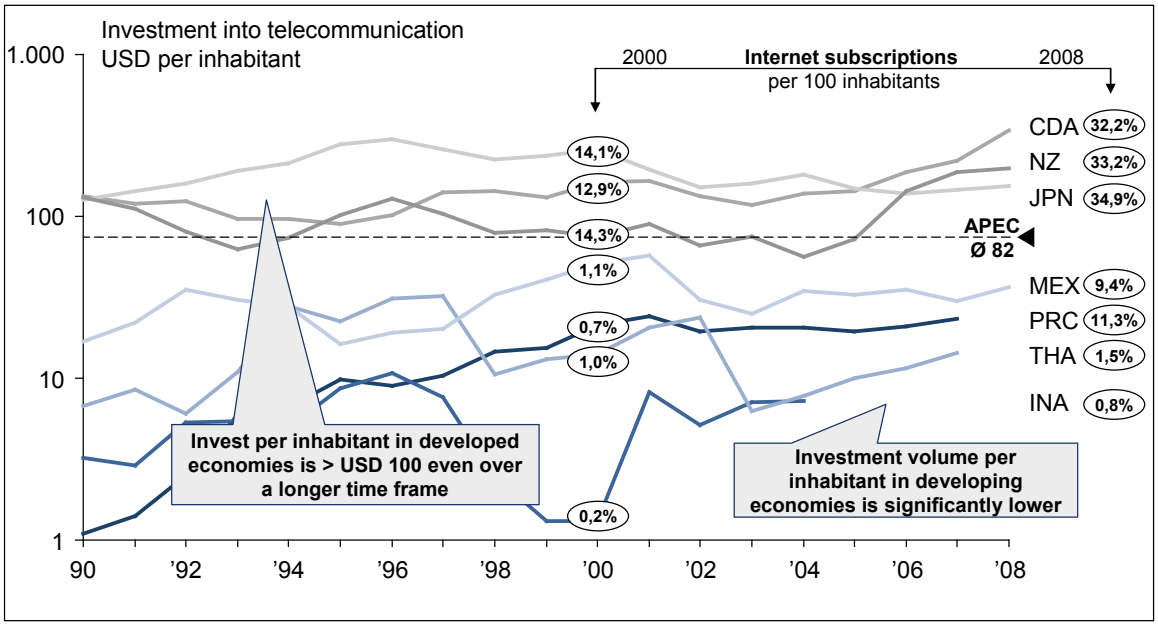

Figure 4-15 Investments into telecommunications in USD and internet subscriptions per 100 inhabitants in selected APEC economies (Source: ITU)

Nonetheless different tendencies of the speed of developing economies become clear comparing investments per capita and the growth of internet subscription between 2000

[5] ITU World indicator: gross annual investment in telecom (including fixed, mobile and Internet services) for acquiring property and network as annual capital expenditure.

and 2008. While Mexico and China managed to increase their internet subscriptions tenfold with steady increasing investments per inhabitant, other developing economies such as Thailand or Indonesia lack behind according to ITU figures.

China is an excellent example of how continuous and structured investments into telecommunication (and also broadband) can make internet available to the masses. Investments per inhabitant were USD 1 in 1990 and increased to more than USD 20 in 2007, in the same time internet subscriptions raised from 0.7% in 2000 to 11.3% in 2007. The current broadband stimulus plan allocates about USD 22 bn granted from seven ministries that participate to provide new fiber deployments across the economy including the Ministry of Industry and Information Technology, the National Development and Reform Commission, the Ministry of Science, the Ministry of Finance, the Ministry of Land, Housing and Urban-Rural Construction, and the State Administration of Taxation. In the developed APEC economies, investment into telecommunication seems to be stable above the average of USD 82 per inhabitant while the growth curve of internet subscriptions is flattening.

(7) Higher investments in broadband are not necessarily yielding higher growth rates of broadband penetration. Investments to increase coverage in rural or remote areas in developed economies are not reflected in higher penetration.

Broadband penetration arrived at saturation levels while investments flow into the deployment of next generation high-speed broadband networks. Figure 4-16 describes the average investment volumes into telecommunication over the period of 2000 and 2008 in all APEC economies according to ITU data.

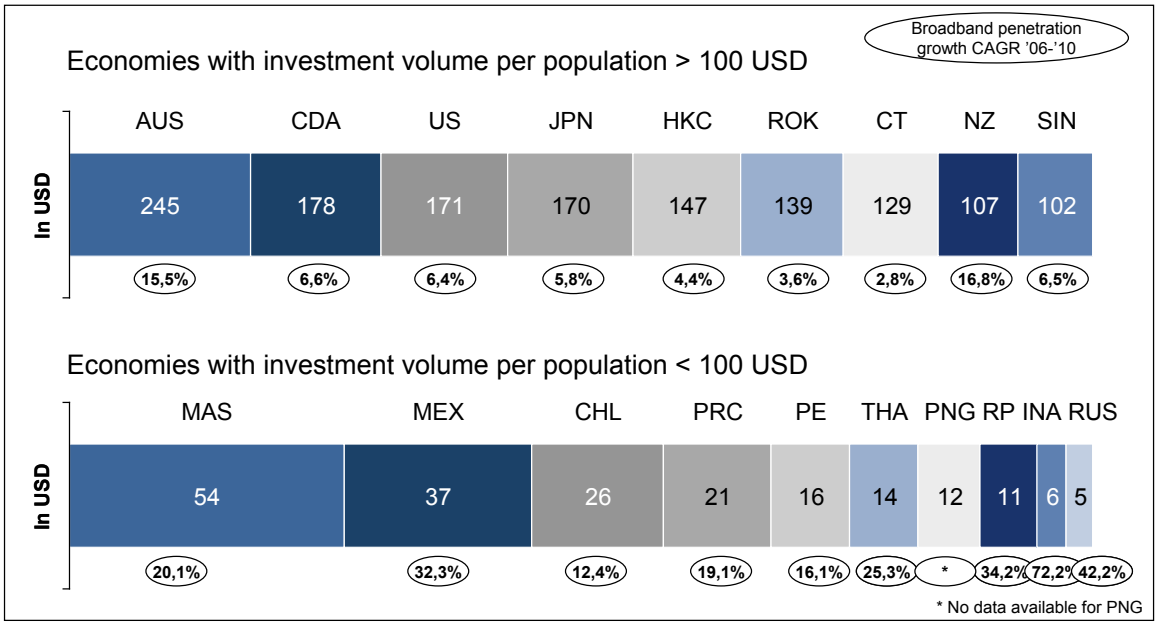

Figure 4-16 Average annual investment into telecommunication (fixed, mobile, internet services) between 2000 and 2008 per pop in USD. BD and VN omitted due to missing data (Source: ITU).

Developing economies are below the USD 100 threshold of investment into telecommunication whereas broadband penetration growth is still in the double digit stage. Despite the lower amount per population spent in developing economies, the impact of the investment is much higher regarding the growth CAGR of broadband penetration in comparison to developed economies. Higher spending of developed economies on telecommunication matches the higher costs resulting from rural broadband rollout in areas with lower population density as well as the upgrade to newest high-speed technology available being on top of the technology innovators curve.

The odds standing out are New Zealand and Australia with higher growth rates than their developed pier economies. Higher growth of broadband penetration is not necessarily attributed to higher investment volumes only but additionally fostered from adjusted regulatory policies that allow more competition or better affordability.

To fulfill the APEC goals of universal access, developing economies have to set the right instruments in order to catch up development of infrastructure by any means of technology and overall broadband penetration. Part II and III deal with these topics regarding infrastructure sharing as well as infrastructure investments via public private partnerships, as well as broadband promotion via national broadband plans. The following Part II is dedicated to review of regulations, remedies and their effectiveness to promote broadband development and investment in the APEC.

5 Part II – Promoting Broadband in the APEC

It is clear that broadband services significantly benefit the development of an economy which is why broadband development programs are on the top of the agenda of government telecommunication bodies and regulatory authorities. However, the question of how to best cope with the high investment cost for deploying broadband services as well as promoting these to create competitive markets for the benefit of customers still remains challenging.

Although policies must always be evaluated in the specific context of an economy, there are common patterns among the APEC members how promotion of broadband was successfully implemented in the past.

In general there are two different approaches that National Regulatory Authorities (NRA) follow for regulating telecommunication markets:

- Regulators that follow the ladder of investment approach that ultimately leads into infrastructure based competition. As will be seen in chapter 5.1, the regulatory regime of Hong Kong, China serves as a good example of intense infrastructure based competition and proponent of the ladder of investment approach.
- Regulators that regard infrastructure as public utility and promote network deployment through Public-Private Partnerships leading into service based competition. Chapter 5.2 will highlight the implication of this approach and discuss it on economies that promote service based competition such as Singapore.

Both approaches have different implications for market regulation, particularly access regulation and price levels of wholesale products.

Part II has been structured into two chapters which describe the types of interventions to promote broadband development: regulatory policy intervention dealing with access obligations, infrastructure sharing and spectrum management, and industrial policy intervention dealing with financing models for infrastructure investments.

5.1 Regulatory policy intervention

Regulatory policy intervention defines provisions set by regulatory authorities that directly or indirectly shape telecommunication markets without the use of direct public spending or other financial means. Policies can either be related to regulating market

competition by e.g. mandating infrastructure access obligations or regulating technical parameters e.g. spectrum management.

5.1.1 Market regulation

Successful promotion of broadband development is related to ensuring market competition and access pricing. The regulator has several remedies at its disposal for the abuse of dominance of incumbents such as unbundling of local loops, line sharing or infrastructure sharing obligations.

In line with the ladder of investment hypothesis (Figure 5-1), new entrants would usually enter the market by using the incumbent's wholesale services to develop their markets, establish their brand and buildup a strong financial basis. Competition thereby starts on service level e.g. resale, in the market. As the market matures, the new entrant moves up the ladder to more capital intensive infrastructure based competition to achieve higher product differentiation through own technologies or more innovative services.

(8) NRAs following the ladder of investment approach start with service based competition and lead to infrastructure based competition.

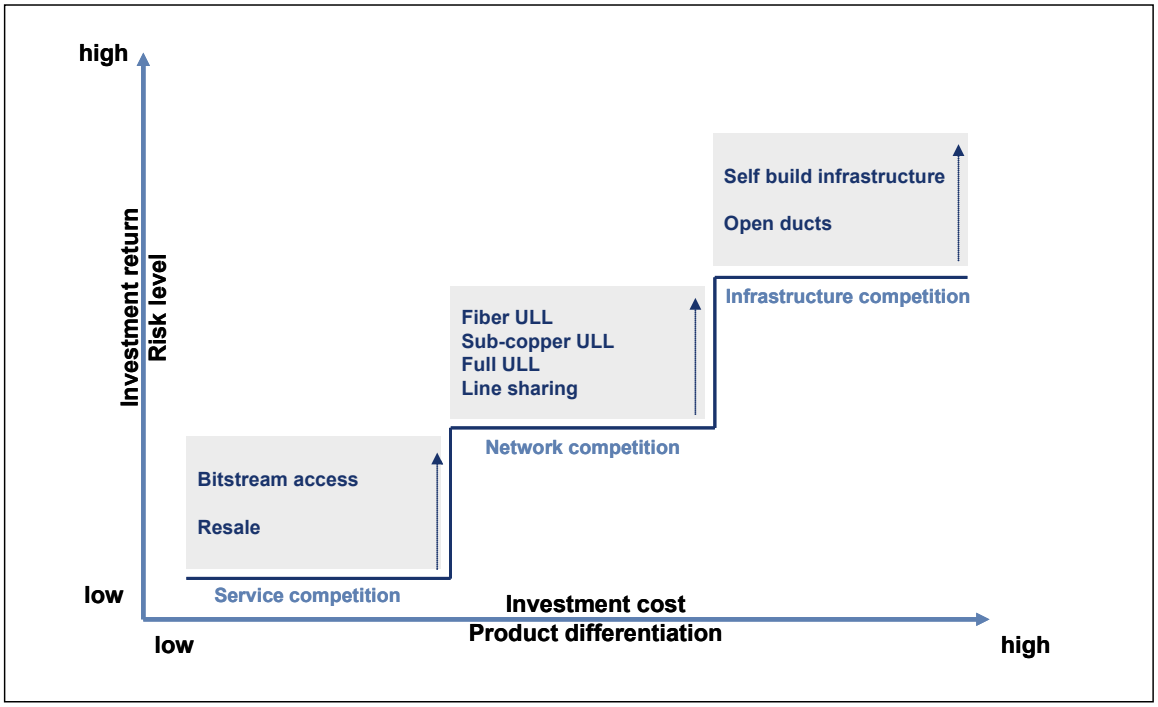

Figure 5-1 Ladder on investment – from service to infrastructure based competition (Source: Detecon)

Service based competition implies that alternative operators are competing on the same infrastructure (intra-platform) while infrastructure-based competition implies competition between different platforms (inter-platform) such as Copper/DSL, Fiber, Cable or WiMAX. However, it is up to the regulator to identify the current stage of telecom markets and mandate appropriate remedies taking into account the attractiveness of market investment and the timeframe for increasing broadband penetration and coverage in the economy.

The following chapter evaluates different regulatory obligations in the APEC economies and highlights how and when these are effectively used to develop the national broadband market.

5.1.1.1 Wholesale access obligations

(9) Wholesale access obligations increase intra-platform competition and product differentiation in dominated markets and lead to higher broadband penetration.

Since the incumbent does not grant access to all interconnection points per default (Figure 5-1), the regulator might see fit to mandate access to infrastructure or other wholesale services of the incumbent. While not specifically discussed in this chapter, it shall be noted that the effectiveness of remedies imposed on the incumbent always depends on the method of pricing access products e.g. cost-based, retail-minus or commercial terms. This chapter provides an overview on Unbundling, Bitstream Access, naked DSL, resale and line sharing in the APEC economies.

ULL has been argued to increase competition in the market and increase customer choice. It allows alternative operators to enter a market and build a customer base without incurring high costs of immediate infrastructure deployment. Once established in the market the alternative operator can increase investment in its own network.

Economies Fixed BB penetration / 100 inhabitants < 20%	ULL	Economies Fixed BB penetration / 100 inhabitants > 20%	ULL
Chile	yes	Australia	yes
Thailand	yes	Canada	yes
Viet Nam	yes	Japan	yes
Brunei Darussalam	no	Republic of Korea	yes
China	no	New Zealand	yes
Indonesia	no	Singapore	yes
Malaysia	no	Chinese Taipei	yes
Mexico	no	United States	yes
Papua New Guinea	no	Hong Kong, China	no
Peru	no		
Philippines	no		
Russia	no		
Economies with ULL obligation	**25%**	Economies with ULL obligation	**89%**

Table 5-1 Overview of ULL requirements in APEC economies. Economies with high broadband penetration tend to have an ULL requirement (Source: ITU, Ovum, internet research – NRA websites)

Out of the 21 APEC economies, 11 currently mandate some form of ULL on copper or fiber (Table 5-1). However, it is interesting to note that compared to the less developed broadband markets only 3 out of 12 economies mandate ULL. Almost all developed broadband markets mandate ULL requirements, the only exception being Hong Kong, China which has already abolished its ULL regime in 2004.

Hong Kong, China implemented local loop unbundling when the fixed market was first liberalized in 1995 to facilitate competition and increase product offerings in the market. The favorable high density urban structure of Hong Kong, China with its many tall apartment buildings and comparatively low network access cost per customer led to strong network competition. By 2004, operators were already covering a large portion of Hong Kong, China and broadband penetration had increased significantly. The government decided to end mandatory ULL and gradually phase out ULL to let carriers negotiate interconnection terms on a commercial basis. That way the government aimed to incentivize operators to increase investment in their own network infrastructure to extend broadband network coverage.

New Zealand mandated ULL and BSA provisions as well as operational separation in a response to underperformance in broadband penetration in 2006. By 2008, the incumbent separated service provision into 3 organizational units; access, wholesale and retail. The change of the overall regulatory approach led to an 80% increase in broadband subscriptions per 100 inhabitants as well as a significant increase in advertised fixed broadband speed (Figure 5-2). At the same time, investments in New Zealand's telecommunication infrastructure between 2006 and 2009 continued to rise

with a 21% CAGR[6]. In a response to participate in the government's ultra-fast broadband initiative, the incumbent is further considering voluntary structural separation into separate companies.

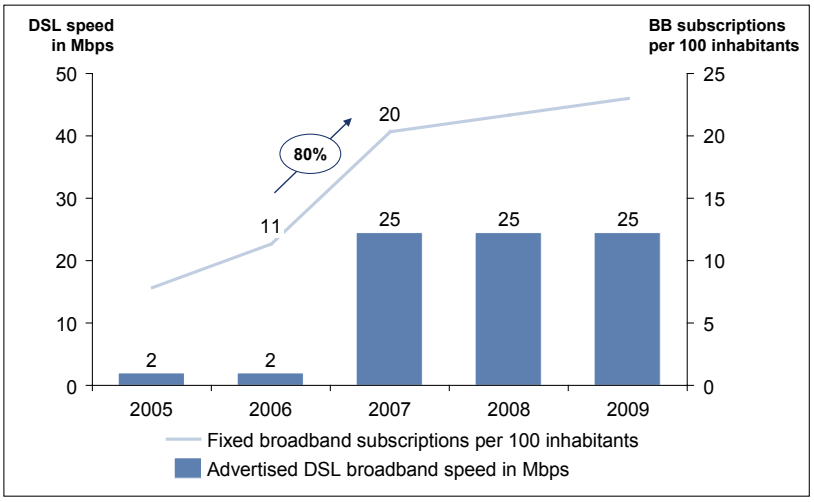

Figure 5-2 New Zealand fixed broadband subscriptions per 100 inhabitants increased by almost 80% between 2006 and 2007 (Source: ITU, OECD)

APEC economies that possess very high speed broadband networks have already unbundled fiber cables as the means to increase service based competition and to develop more innovative services. Japan mandated to unbundle copper lines in 2000 and subsequently mandated unbundling of fiber in 2001. Regulation of access together with other measures taken by the Japanese regulator led to an explosive increase of broadband connections in Japan from 2001 to 2004 with a CAGR of 97% (Figure 5-3).

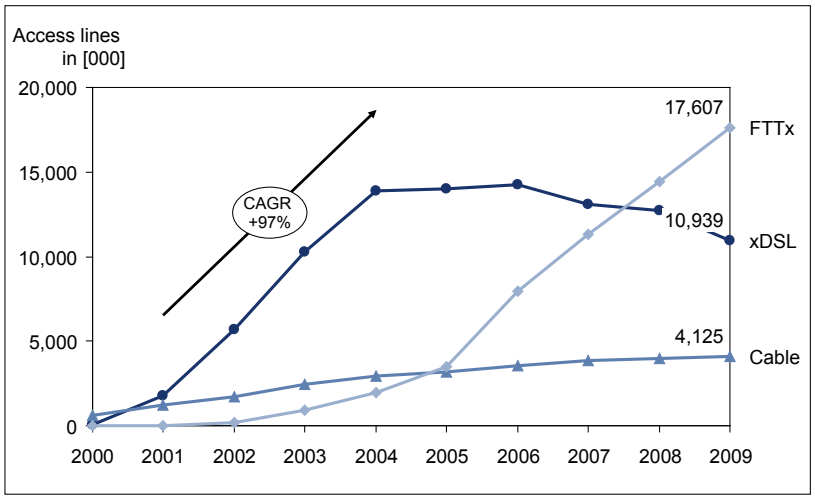

Figure 5-3 Development of broadband connections in Japan show explosive growth of xDSL connections after end of 2001 (Source: Pyramid research)

[6] ITU World Telecommunication ICT indicators 2010 – I81

Surprisingly investment into the fiber infrastructure continued to flourish, also because of significantly lower pricing of copper ULL compared to ULL fiber. Today Japan has developed into a market with one of the highest broadband penetration rates in the world at very consumer friendly prices.

Korea follows a different ULL approach than Japan. The ULL regime for copper including full unbundling and line sharing was implemented in 2001 and extended in 2003 to include fiber. There was not much demand for copper ULL due to its slower speed and the easier deployment of fiber because of the beneficial housing infrastructure in Korea. To stimulate investment into the fiber infrastructure, the incumbent is only required to unbundle fiber laid before 2004. Providing access to wholesale broadband services through Bitstream access is also required by the incumbent, however, demand has been low due to unprofitable (retail-minus based) pricing.

Table 5-2 contains the summarized findings of regulatory obligations for wholesale access within the APEC member economies, excluding measures of anticompetitive use of in-building wiring which was omitted due to non-availability of information in the APEC.

APEC economies	ULL	BSA	Naked DSL	Resale	Line sharing	Degree of regulation
Australia	yes	no	-	yes	yes	-
Brunei Darussalam	no	-	-	-	-	-
Canada	yes	no	yes	yes	yes	-
Chile	yes	yes	yes	-	yes	-
China	no	no	-	no	no	-
Hong Kong, China	no	no	no	no	no	low
Indonesia	no	-	-	-	-	-
Japan	yes	yes	-	-	yes	-
Republic of Korea	yes	yes	no	no	yes	-
Malaysia	no	yes	no	no	no	medium-high
Mexico	no	no	no	no	no	-
New Zealand	yes	yes	yes	yes	no	medium-low
Papua New Guinea	no	-	-	-	-	-
Peru	no	yes	no	yes	no	medium-high
Philippines	no	-	-	-	-	-
Russia	no	-	-	-	-	-
Singapore	yes	no	-	-	yes	-
Chinese Taipei	yes	no	yes	yes	yes	high
Thailand	yes	yes	no	yes	yes	very high
United States	yes	no	yes	no	no	-
Viet Nam	yes	-	yes	yes	no	high

Table 5-2 Overview of regulatory remedies in APEC member economies in year 2010. The degree of regulation is taken from the survey question “how would you assess the degree of regulatory intervention in your country?”. Only 7 of 21 APEC members participated in the survey. Data not available for fields with a ‘-‘. (Source: ITU, Ovum, internet research – NRA websites, APEC broadband survey 2011)

5.1.1.2 Infrastructure sharing

(10) Sharing passive and active infrastructure can promote efficient deployment of new network infrastructure, especially in rural areas. Mechanisms for sharing of risks and rewards are required for effective implementation.

Infrastructure sharing can either be mandated by the NRA through e.g. wholesale access obligations as described in chapter 5.1.1.1, or voluntarily on the basis of commercial terms. Infrastructure sharing helps to address the high cost of network deployment and low investment incentives particularly in rural underserved areas. Active and passive fixed and mobile components can be shared (Figure 5-4).

	Mobile	**Fixed**
Passive	Masts, pylons, cables	Ducts, power supplies
Active	Radio network controllers	Switches, lit fiber, backbone elements

Figure 5-4 Examples of passive and active infrastructure components (Source: Detecon)

Voluntary infrastructure sharing between private operators can be an attractive alternative to self-built infrastructure since infrastructure sharing agreements can provide the following incentives:

- Reduce cost per served customer e.g. to counter decreasing revenues or increasing network load
- Lower capital expenditures with reduced financial risk.
- Rapid rollout of capacity and entering of new markets

(11) Private infrastructure sharing agreements are scrutinized by competition law and can shift market power from the dominant operator.

Competition law can play a key role when operators engage in private infrastructure sharing agreements that have the potential to distort market competition. New Zealand's competition law prohibits conduct that can e.g. substantially lessen competition or that contains exclusionary provisions which can happen if operators engage in infrastructure sharing agreements with geographic separation. Furthermore, private infrastructure

sharing agreements do not exclude operators from regulation. Indeed it is possible that the newly formed private partnership can shift market power and create a new dominant market participant that eventually must be regulated as a whole. However, this study does not further elaborate on specific cases of inter company agreements and alliances due to the limited access to information regarding this subject within the APEC.

Governments should pass the appropriate laws to empower national regulators to issue policies that are adapted to national circumstance. While infrastructure sharing provisions reduce the market entry barrier, alternative operators must still have the necessary incentives to invest in their own infrastructure. Policy makers and regulators must balance both to attain a healthy ICT market. Likewise, to promote deployment of new infrastructure by incumbent operators despite infrastructure sharing requirements, a reasonable approach of risk sharing should be considered or forms of Public Private Partnerships should be evaluated.

Among the APEC economies, 11 out of 21 economies have adopted some form of mandated passive infrastructure sharing (Table 5-3).

Economies fixed BB penetration / 100 inhabitants < 20%	**passive infra. sharing**	**Economies fixed BB penetration / 100 inhabitants > 20%**	**passive infra. sharing**
Brunei Darussalam	yes	Australia	yes
China	yes	Canada	yes
Indonesia	yes	Singapore	yes
Malaysia	yes	United States	yes
Peru	yes	Chinese Taipei	yes
Thailand	yes	Japan	no
Chile	no	New Zealand	no
Mexico	no	Hong Kong, China	no
Papua New Guinea	-	Republic of Korea	-
Philippines	-		
Russia	-		
Vietnam	-		
Economies that mandate sharing of passive infrastructure	**50%**	Economies that mandate sharing of passive infrastructure	**56%**

Table 5-3 APEC economies that mandate some form of passive fixed and mobile infrastructure sharing. Data not available for fields with a '-'. (Source: ITU, Ovum, internet research – NRA websites)

In many developing economies, mobile networks carry a far greater importance for providing broadband services and universal access and service than fixed line networks. As mobile coverage is increasingly less relevant as a competitive advantage by itself, operators are looking for ways to reduce the high investment costs associated with network deployment and boost their revenues by leasing out their infrastructure assets. Hence, voluntary infrastructure sharing agreements based on commercial terms between two private operators are gaining in importance.

Indonesia provides a good case of how sharing of mobile towers facilitated rapid broadband development, stimulated investment and improved universal service provision. In the early stages of Indonesia's wireless telecommunications industry, towers were built and owned by the telecommunications operators. Between 2000 and 2008, seven new entrants entered the wireless telecommunications market and licenses were awarded, creating significant demand for new network infrastructure, including towers. The need to rollout networks quickly in order to gain a significant coverage footprint resulted in new entrants outsourcing their tower construction requirements to independent tower companies.

Regulation encouraged the rapid development of mobile infrastructure by mandating that tower operators must provide equal opportunity to all telecom operators for jointly usage. During this period, as new telecommunication operators sought to build up their coverage footprint, established telecommunication operators had to cope with quality and capacity issues, as they came under pressure to swiftly accommodate increases in usage and to maintain good network quality. As a result, the incumbent telecommunication operators and the new operators as well as independent tower operating companies contributed to a CAGR of 24% from 2006 to 2009 in the number of towers in Indonesia.

5.1.1.3 Open Access

Open Access (OA) to network infrastructure is gaining relevance for coping with the substantial cost of Next Generation Broadband Network deployment while enabling high levels of network utilization by promoting service based competition. It is a form of infrastructure sharing that allows non-discriminatory access of alternative operators to network infrastructure for providing their wholesale and retail services. Full OA is implemented as a 3 tier approach, separating the network, wholesale and retail operations as is done e.g. in Singapore. Australia implements OA as a 2 tier approach that separates wholesale from retail and focuses mainly on retail competition. Economies that have open access requirements such as Singapore on its next generation national broadband network regard the network infrastructure as public utility and tend to favor service based competition. This will be further elaborated in chapter 5.2 in the context of public private partnerships.

OA can involve the regulator to mandate structural separation of the incumbent or to provide incentives for the incumbent to undergo voluntary separation of its network, wholesale and retail operations. Structural separation is a profound remedy that has to

be applied carefully, since it can lead to positive and negative effects on the whole ICT ecosystem. The key challenge is to balance non-discriminatory downstream competition and investment incentives into new network infrastructure.

APEC economies	Mandated separation	Open Access projects	Details
Australia	yes	national	The NBN in Australia is a wholesale only open access broadband network. Customer services will gradually be migrated from the copper and hybrid fibre-coaxial networks to the NBN as the NBN is rolled out.
New Zealand	yes	national	Mandated operational separation. Incumbent considers voluntary structrual separation to participate in the government's ultra-fast broadband initiative.
Singapore	yes	national	3 tier open access NG National Broadband Network with structurally separated network, access and retail operations.
Malaysia	no	national	Incument is deploying a high speed broadband network in a Private Public Partnership with the government and promises Open Access for wholesale on commercial terms.
Canada	no	regional	3 tier open access NGN SuperNet in Alberta, Canada built in large by government funds and in part by private funds of Bell Canada.
United States	no	regional	Municipal projects such as Utah Telecommunications Open Infrastructure Agency (UTOPIA). OA Fiber network connecting 500K people in 16 cities.

Table 5-4 APEC economies that have mandated structural separation or have national/regional Open Access projects (Source: internet research – media announcements, Ovum)

Table 5-4 lists several of the APEC members with plans to implement or already implemented OA networks on a regional or a national level with or without mandating structural separation of the incumbent. While it is difficult to evaluate the isolated effect of structural separation on broadband investments and development, it appears that the combination of different regulatory remedies and incentives can lead to positive outcomes.

(12) Structural separation promotes service based competition and, if balanced right with other regulatory and industrial policy, can lead to increased broadband penetration.

OA does not always need to be driven and financed on a national level nor does it require mandated separation by the NRA. Local governments and municipalities have already invested into efforts to promote broadband development and coverage. The government of Alberta, Canada has deployed a broadband fiber network called the

SuperNET in 2005 that is operated as a 3-tier open access network wholesaling capacity to ISPs. Since then, communities with access to broadband have more than doubled and the number of new ISPs operating in Alberta has increased by several magnitudes to more than 80, leading to service based competition.

5.1.2 Technical regulation – Spectrum Management

(13) Mobile services play a key role in achieving coverage in most developing economies. Fixed access regulation is less relevant in these economies because large fixed infrastructures are less developed.

For many of the emerging economies, mobile communication is the predominant means of communication and the most important channel for providing broadband connectivity. For these economies, a poor copper infrastructure and eventual geographic disparity make it expensive and cumbersome to deploy fixed broadband networks and cover rural areas. Consequently mobile broadband technologies such as 3G, LTE, WiMAX tend to play a much more important role and provide a better way to deliver cost efficient broadband services in the near future.

It is important that NRAs recognize that a flexible and efficient regulatory framework for managing the scarce spectrum is the key for providing the necessary incentives for investments while promoting broadband coverage of rural and commercially less profitable areas.

It is also apparent that regulatory practices tend to differ in economies without extensive fixed network in a way that fixed regulation is less intensive. It can be observed that APEC member economies with a high mobile to fixed line subscription ratio tend to have a less regulated fixed line regime (Table 5-5). Even more so it is important that these economies have an efficient and flexible spectrum management regime in place for promoting mobile broadband development.

APEC economies	ULL	BSA	Naked DSL	Resale	Line sharing	Ratio mobile to fixed line subscriptions
Canada	yes	no	yes	yes	yes	1.4 :1
Chinese Taipei	yes	no	yes	yes	yes	1.8 :1
Republic of Korea	yes	yes	no	no	yes	1.9 :1
United States	yes	no	yes	no	no	2.0 : 1
China	no	no	-	no	no	2.4 : 1
New Zealand	yes	yes	yes	yes	no	2.5 : 1
Australia	yes	no	-	yes	yes	2.7 : 1
Japan	yes	yes	-	-	yes	2.7 : 1
Hong Kong, China	no	no	no	no	no	2.9 : 1
Singapore	yes	no	-	-	yes	3.6 : 1
Mexico	no	no	no	no	no	4.3 : 1
Chile	yes	yes	yes	-	yes	4.6 : 1
Indonesia	no	-	-	-	-	4.7 : 1
Brunei Darussalam	no	-	-	-	-	5.1 : 1
Russia	no	-	-	-	-	5.1 : 1
Viet Nam	yes	-	yes	yes	no	5.6 : 1
Malaysia	no	yes	no	no	no	7.0 : 1
Peru	no	yes	no	yes	no	8.3 : 1
Thailand	yes	yes	no	yes	yes	9.2 : 1
Philippines	no	-	-	-	-	13.6 : 1
Papua New Guinea	no	-	-	-	-	15.0 : 1

Table 5-5 Overview of fixed line regulation compared to the mobile to fixed line subscriptions ratio per economy. APEC members with a high mobile subscription ratio tend to have less fixed line regulations. Data not available for fields with a '-'. (Source: ITU, Ovum, internet research – NRA websites)

(14)*Efficient spectrum management lowers market entry barriers, increases competition and leads to higher broadband penetration and geographic coverage.*

While the effects of an efficient spectrum management system shall not be discussed at this place, focus shall be put onto the regulatory levers directly related to spectrum management as applied in the APEC. The evaluation was performed based on the following four dimensions:

Spectrum availability of range and bandwidth for provisioning broadband services has a strong impact on required investment levels for network deployment, market pricing and coverage.

Spectrum assignment and pricing can be done competitive or administrative resulting in differences in pricing of licenses. Market demand and public policy objectives should be evaluated to choose the appropriate assignment mechanism. Otherwise increased artificial costs of licenses can delay the introduction of services and broadband deployment speeds.

Coverage obligations imposed on the licensee can help to rollout network infrastructure in rural, less profitable areas, however they can also deter investments or increase price levels and therefore have to be carefully balanced.

Spectrum trading and liberalization can increase economic efficiency of spectrum management and competition in downstream markets through technology-/service neutral usage and tradable spectrum rights

Among the APEC economies, Spectrum assignment has mostly been done through competitive auctioning (Table 5-6). While awarding licenses through auctioning has become the norm, the right choice of the spectrum assignment framework is dependent on many factors and cannot be simply replicated from other economies. Looking at recent spectrum assignments in APEC economies for WiMAX and LTE services all economies but Japan chose some form of auctioning to award licenses. Japan specifically assigned spectrum to several operators for LTE and WiMAX services without charge, however imposing license conditions to achieve target market penetration levels for the new services.

APEC economies	2G status	Assignment method	3G status	Assignment method	4G status	Assignment method	WiMAX status	Assignment method
Chinese Taipei	yes	comp.	yes	comp.	yes	comp.	yes	comp.
Republic of Korea	yes	-	yes	admin.	yes	-	yes	-
New Zealand	yes	comp.	yes	comp.	yes	comp.	yes	-
Japan	yes	-	yes	admin.	yes	admin.	yes	-
Hong Kong	yes	comp.	yes	comp.	yes	comp.	-	-
United States	yes	-	yes	comp.	planned	-	yes	-
China	yes	-	yes	admin.	planned	-	-	-
Australia	yes	-	yes	comp.	planned	-	yes	-
Singapore	yes	-	yes	comp.	planned	-	yes	-
Russia	yes	-	yes	comp.	planned	-	yes	comp.
Malaysia	yes	comp.	yes	comp.	planned	-	yes	-
Peru	yes	comp.	yes	comp.	planned	-	yes	-
Canada	yes	-	yes	comp.	-	-	yes	-
Mexico	yes	-	yes	comp.	-	-	planned	-
Chile	yes	-	yes	comp.	-	-	planned	-
Indonesia	yes	-	yes	comp.	-	-	yes	comp.
Brunei	yes	-	yes	-	-	-	-	-
Vietnam	yes	comp.	yes	comp.	-	-	yes	-
Thailand	yes	comp.	no	comp.	-	-	-	-
Philippines	yes	-	yes	admin.	-	-	yes	-
Papua New Guinea	yes	-	-	-	-	-	-	-

Table 5-6 Overview of spectrum assignment mechanisms for different mobile technologies. Duplicates are possible since some licenses, particularly in the recent past, are service-/technology neutral. Data not available for fields with a '-'. (Source: Ovum, internet research – media announcements, APEC broadband survey 2011)

To reduce inefficient spectrum usage, increase economic efficiency and allow for an agile response to new technologies in the market, the APEC member economies have started to increase flexibility of issued licenses by easing up on license conditions and

allowing secondary trading. AUS, US and NZ have implemented a spectrum trading framework (

Table 5-7). New Zealand and Australia have already introduced a spectrum trading framework in 1989 and 1992 respectively, however experienced only a relatively low demand of spectrum trade and have since been reworking the framework to simplify transactions and minimize uncertainty. The US which has implemented rules to govern spectrum trading in 2003 has seen a high demand in trades and has created a liquid secondary market.

Furthermore, there is an increasing trend that NRA's tend to issue licenses that are technology neutral and service neutral to give operators greater flexibility how to use the spectrum under changing conditions. At least 8 APEC economies have issued technology neutral licenses in the past or in recent auctions.

Coverage obligations are frequently used by APEC members when issuing licenses. APEC members asked in the broadband survey averaged at 50-75% of population coverage obligations when issuing licenses in the past, well recognizing that the obligations vary depending on the frequency bands and the objectives that the NRA is following at the time of issuance.

APEC economies	Spectrum Trading	Spectrum liberalization tech. neutral	Spectrum liberalization service neutral	Spectrum refarming framework
Australia	yes	-	-	yes
Brunei Darussalam	-	-	-	-
Canada	-	-	-	-
Chile	-	-	-	-
China	-	-	-	-
Hong Kong, China	no	yes	yes	yes
Indonesia	-	-	-	-
Japan	-	-	-	-
Republic of Korea	-	-	-	-
Malaysia	-	yes	yes	yes
Mexico	-	-	-	-
New Zealand	yes	yes	yes	yes
Papua New Guinea	-	-	-	-
Peru	no	yes	planned	planned
Philippines	-	-	-	-
Russia	-	-	-	-
Singapore	-	yes	-	-
Chinese Taipei	-	planned	-	planned
Thailand	no	yes	no	planned
United States	yes	yes	yes	yes
Viet Nam	no	yes	no	yes

Table 5-7 Overview of spectrum license conditions of recent auctions in the APEC economies. Data not available for fields with a '-'. (Source: APEC broadband survey 2011, Ovum, internet research)

(15) The digital dividend will have a massive effect on rapidly increasing broadband penetration and coverage in emerging economies

The upcoming analog/digital switchover in many APEC economies provides a grand opportunity for increasing mobile broadband coverage and introducing innovative services into the market. The superior propagation characteristics of the digital dividend frequency band allow for a rapid rollout of infrastructure at reduced cost and make it perfect for rural network coverage.

The potential benefit of leveraging the newly available spectrum is particularly large for APEC economies with comparatively low mobile broadband coverage while developed economies need new spectrum to increase capacity of mobile networks for coping with the exponential internet traffic growth.

So far, only the US has released the digital dividend spectrum among the APEC economies, while 9 other economies have plans when to perform the digital switchover (Table 5-8).

APEC economies	status - 4G license	Status - Digital dividend	active mobile bb subscr. / 100 inhabitants
Republic of Korea	completed	planned	91.0
Japan	completed	planned	87.8
Australia	planned	planned	82.7
Hong Kong, China	completed	not started	74.5
Singapore	planned	-	69.7
New Zealand	completed	planned	66.2
Brunei Darussalam	-	-	61.4
United States	completed	completed	54.0
Malaysia	planned	planned	27.2
Chinese Taipei	completed	planned	20.1
Russia	-	-	17.4
Philippines	-	-	16.6
Canada	-	-	14.8
Viet Nam	not started	planned	12.8
Indonesia	-	-	10.3
Mexico	-	-	8.3
Peru	planned	planned	7.2
Chile	-	-	7.1
Thailand	-	planned	3.8
China	-	-	2.0
Papua New Guinea	-	-	0.0

Table 5-8 License status for 4G networks and the analog/digital switchover. Several economies have already assigned spectrum for 4G services (e.g. 2.5Ghz), while only the US has already auctioned the digital dividend spectrum. Data not available for fields with a '-'. (Source: Wireless Intelligence, Ovum, APEC broadband survey 2011)

Economies such as PE and VN with low mobile broadband penetration can significantly benefit from the digital dividend. Likewise, economies in the medium range of mobile broadband penetration such as NZ and MAS can further increase geographic coverage while already highly penetrated economies such as JPN and KOR can use the digital dividend for improving network capacity. Regarding LTE/4G services, APEC member economies have either already issued specific licenses on higher frequency bands or permit 4G services through service neutral licenses.

The US has been leading the way of freeing and allocating the digital dividend spectrum in 2008. While the effects of additional broadband penetration and coverage due to the newly available digital dividend spectrum cannot be quantified yet since commercial offerings are still under development, it can be observed that increased investment has gone into the US telecommunications sector since 2007. Likewise inter platform competition will increase likely to the benefit of customers because cable companies have acquired spectrum licenses and can enter the market with quadruple play offerings.

5.2 Industrial policy intervention

This chapter discusses industrial and financial policy intervention measures primarily focused on the effectiveness of Public Private Partnerships for promoting broadband development.

5.2.1 Public-Private Partnerships

Public Private Partnerships (PPP) are contractual agreements between public and private entities that allow for sharing risks, rewards and resources and should ideally create a win-win situation for all deal participants. PPPs actively involve the government during some stage of a project and involve a form of funding that can be through co-investment, favorable loans or grants.

PPPs have long been used by governments for developing joint projects with private companies especially for large infrastructure projects that involve transportation-, energy- and water sector. PPP investments into the telecoms sector in APEC developing economies have been fluctuating over the past 10 years (Figure 5-5).

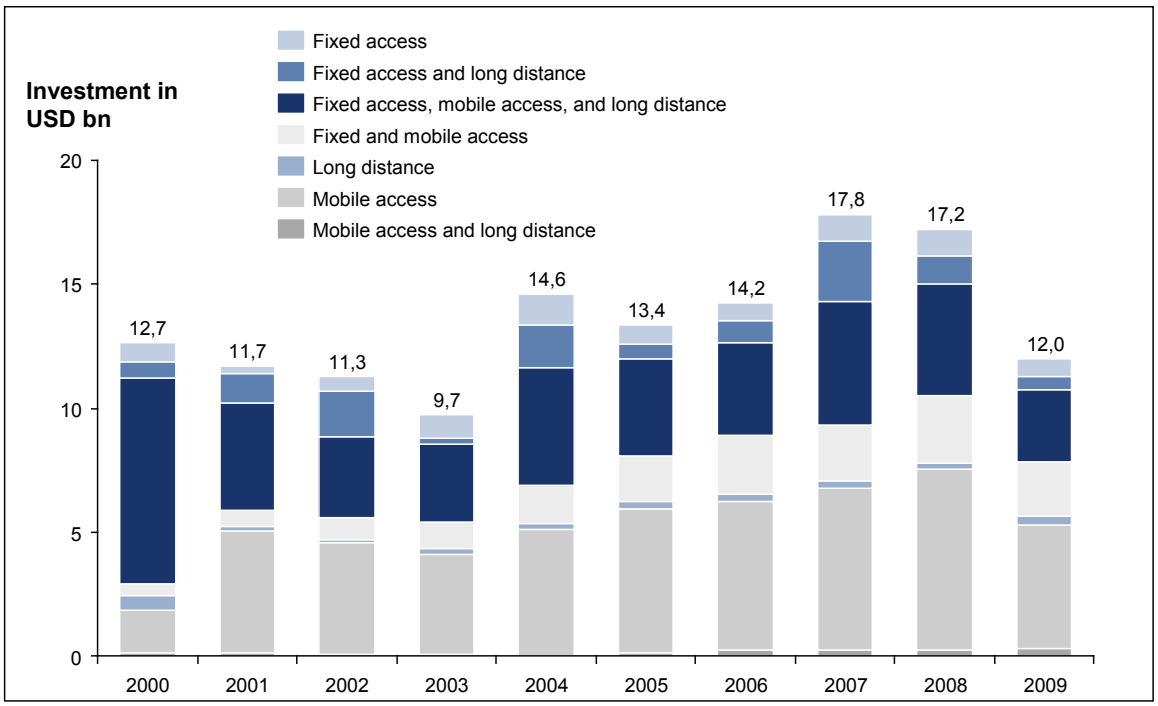

Figure 5-5 PPP investments into the telecoms sector for 11 selected APEC developing economies (CHL, PRC, INA, MAS, MEX, PNG, PE, RP, RUS, THA, VN; Source: World Bank, PPI database)

In general, PPP agreements can take several forms, some common being build-operate-transfer (BOT), build-own-operate (BOO), lease contracts and other derivatives.

APEC members that follow a PPP approach for developing their next generation broadband infrastructure usually do not follow the ladder of investment philosophy that leads into infrastructure based competition. Instead they regard infrastructure as public utility and promote broadband open access through service based competition. This behavior is reasonable since the government and the private partners are not interested in duplicating the physical infrastructure. This also implies that the regulator would tend to mandate specific wholesale access obligations and reduced access prices to facilitate service based competition.

Open access projects discussed in chapter 5.1.1.3 usually involve government participation in form of PPP agreements. Among the APEC member economies, Singapore's approach of structural separation of its next generation national broadband network is an example of a PPP driven approach to attain service based competition in the market while creating a natural monopoly for the broadband infrastructure. Singapore used competitive tendering to award the deployment of its NBN to a passive and an active infrastructure company, assigning SGD 750mn and SGD 250mn respectively in grants. This PPP agreement is similar to a Build-Own-Operate Model, whereby the government does not take any ownership interest. However, selected operators of the passive and active infrastructure must comply with government regulations that stipulate open access requirements and structural separation.

The Malaysian government also engaged in a PPP with Telekom Malaysia to deploy a high speed broadband network in line with its goals set out in the national broadband plan. The government will invest RM2.4bn and the incumbent will bear RM8.9bn in the initial phase of network deployment (ratio 1:3.7) recognizing that large scale fiber deployment might not be commercially viable otherwise. The investment ratio shows that it is important that public investment should stimulate private investment, not substitute it.

(16) PPPs create commercial incentives for operators to enable rapid large scale rollouts of cost intensive Next Generation broadband networks.

Promoting PPPs

Governments need to create a beneficial environment for engaging private entities in PPP agreements as the means for developing broadband. This requires a proper internal setup of government mechanisms as well as favorable agreement terms of PPPs for creating commercial incentives for private entities and generating demand during the PPP tendering process.

Internal and external requirements have to be met by governments to attract private sector interest in PPP and finally close the deal. Capacity building of the agency, increase in responsiveness and employee training to acquire the relevant skill set are important internal factors.

(17)An established PPP framework as well as public sector capacity are important prerequisites for drawing private interest into PPP.

Building up the administrative capacity to deal with evaluating and awarding PPP projects requires not only knowledge of the telecoms sector, but also specific financial and legal skills and is important to provide a supportive environment for attracting private investors to engage in joint projects. Failure to do so can significantly slow down the upfront negotiations and lead to a significant increase in project costs or to abandoning negotiations after all.

Furthermore, the government is advised to setup a commercially attractive deal environment, including a transparent tendering process, specify required ROI levels and clear conditions when public money is released to private partners.

Governments can often draw on their previous experiences of PPP projects from non telecommunication sectors for building capacity and establishing an appropriate PPP framework for the telecommunication sector.

6 Part III - Impact of political and socio-economic context on broadband development

Communication based on broadband technology has become a powerful engine of intellectual, economic, social and cultural progress which is a significant factor of political life in society. The development of broadband communication is a critical factor in overcoming the mutual distance and disunity, the preservation of cultures and economic and political state integrity.

Part III of the report is diagnosing the economies' legal, political and social environment for the implementation of public policies that could encourage broadband development and internet usage. Connected to the environment are institutional frameworks in which stakeholders are involved when it comes to the deployment and implementation of policies. Apart from that, the study reviews market entry barriers and foreign direct investment restrictions for telecommunication services and the scheduled commitments defined under the General Agreement on Trade in Services (GATS). Next to GATS, free trade agreements (FTA) are reviewed with regards to scheduled commitments towards the development of broadband and internet usage. Furthermore national broadband plans are discussed with regards to their importance of achieving broadband targets set out by ICT ministries.

6.1 Socio-political context analysis for policy implementation

Public policies have been an important factor for stimulation of both demand and supply of broadband. Most governments are well aware of the importance of the development of broadband communication for economic growth, employment uptake and social welfare in general. The information society fundamentally requires a sophisticated and reliable broadband infrastructure as the transmission link among citizens to use and access an ever growing grid of electronic services and goods. The diverse political, legal and the social contexts of the APEC members are difficult to compare and make it complex to determine the best possible mix of environmental factors that foster broadband development and internet usage.

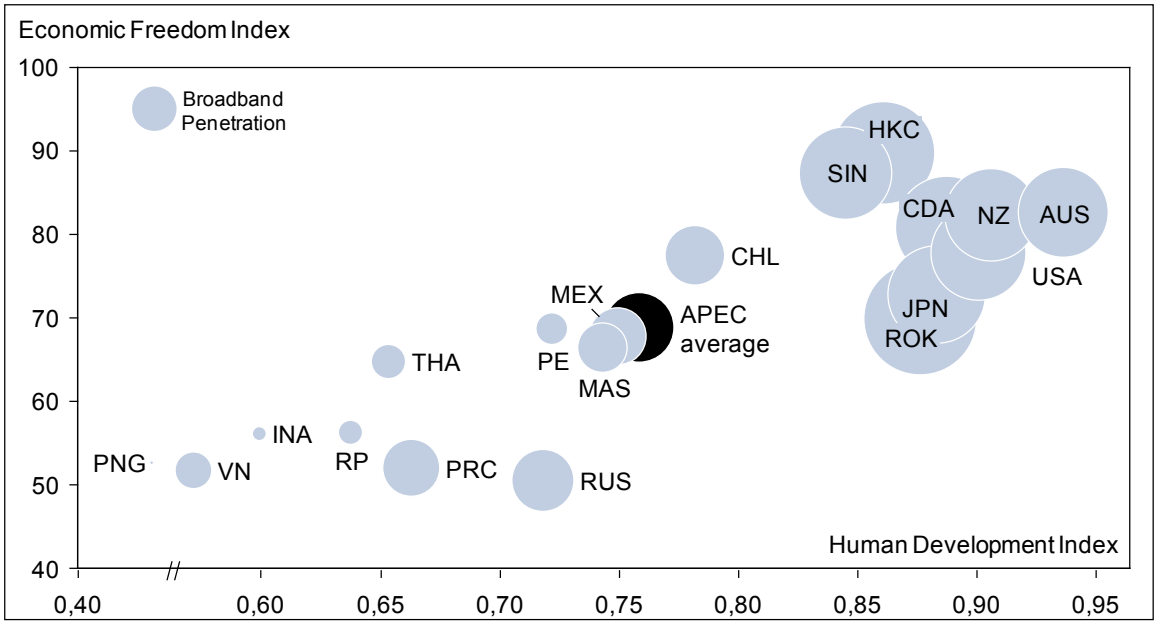

Figure 6-1 Context matrix mapping Economic Freedom, Human Development Indices and fixed broadband penetration. Data for CT and BD is not available. (Source: The Heritage Foundation 2011, United Nations 2011, Detecon)

Figure 6-1 shows the Economic Freedom Index on the Y-axis that measures the political situation consisting of various freedoms such as business and trade freedom, fiscal, monetary and financial freedom as well as labor freedom. The Human Development Index on the X-axis measures the social situation of the economy, including health, education and living standards. Figure 6-1 indicates the tendency that higher human development and economic freedom potentially lead to higher broadband penetration rates. The same economies with higher human development and relatively high economic freedom (SIN, CDA, ROK, USA, NZ, AUS, HKC, JPN) show also higher technology awareness and skill as analyzed later in Part IV of the report.

(18) Policy makers must consider the stage of human development, the social and political environment to formulate appropriate policies that can be realistically implemented.

Higher human development and technology awareness can be supportive to faster adoption of measures for promoting broadband. Despite those tendencies, there is no causality as the objectives of policies largely vary and are challenging to compare. Public policies or regulatory interventions should take into account the economies' existing industrial structure and competition, its knowledge base and culture reflecting different social contexts.

(19) Independent and coordinated policy bodies are enabled to promote broadband development and internet usage by facilitating fair market competition. A sound legal framework enables national regulatory authorities to effectively implement policies.

The level of competition per relevant ICT market in the APEC is showing different patterns. 13 APEC economies have made competition legally permissible for all markets as outlined in Figure 6-2.

	Domestic fixed long dist	International fixed long dist	Wireless local loop	DSL	Cable modem	VSAT	Leased lines	Fixed Wireless Broadband	Mobile	Cable TV	IMT 2000	Internet services	Inter-national gateways
Australia[1]	C	C	P	C	C	C	P	P	C	C	C	C	P
Brunei Darussalam[2]	P	P	...	...	...	...	P	...	M	...	...	P	P
China[1]	P	...	...	...	...	...	...	C	...	...	P	...	P
Indonesia[2]	P	P	P	C	C	C	C	C	C	C	C	C	C
Japan	C	C	C	C	C	C	C	C	C	C	C	C	C
Korea (Rep.)[2]	C	C	C	C	C	...	C	...	C	...	C	C	...
Malaysia[1]	C	C	C	C	C	C	C	C	C	C	C	C	C
New Zealand	P	C	C	C	M	C	C	P	C	M	C	C	C
Papua New Guinea[2]	M	M	M	...	...	M	M	...	M	M	M	P	...
Philippines[2]	C	C	C	C	...	C	C	...	C	C	C	C	...
Singapore	C	C	C	C	C	C	C	C	C	...	C	C	C
Thailand	C	C	C	C	...	...	C	...	C	...	...	C	C
Viet Nam[2]	C	C	C	C	C	C	C	...	C	C	...	C	C
Russia[2]	D	D	...	...	...	...	M	...	C	C	...	...	...
Canada	C	C	C	C	C	...	C	C	C	C	C	C	C
Chile	C	C	C	C	C	C	C	C	C	C	C	C	C
Mexico[2]	C	C	C	C	C	C	C	C	C	C	C	C	...
Peru[1]	C	C	C	C	C	...	C	C	C	C	C	C	...
United States	C	C	C	C	C	C	C	C	C	C	C	C	C

[1] 2009 data; [2] pre-2009 data, no data for HKC and CT

Note: This table reflects w hat is legally permissible; therefore it may not reflect the actual number of operators in the market.

M - Monopoly; P - Partial competition; C - Full competition; ... - Not available

Source: ITU World Telecommunication Regulatory Database

Figure 6-2 Overview of competition level in the APEC economies for related broadband markets (Source: ITU)

Especially for DSL and for cable markets with the exception of New Zealand, all economies introduced frameworks that allow competitive market structures from a legal perspective. Wireless local loop and fixed wireless broadband markets remain partially competitive in AUS, INA and NZ. The only economy with consistent monopolistic structure is Papua New Guinea. Broadband markets where competition is made permissible allow for policies that foster and regulate supply and demand towards efficient markets. The legal permissibility towards competition alone is not sufficient but requires ministries and regulatory authorities to implement fair and efficient markets.

(20) The success of the implementation of broadband policies is dependent on the implementers' ability to consider and anticipate specific market factors in the overall implementation process and furthermore measure the successful implementation.

The challenges of implementing broadband and internet promoting policies are multifold and highly dependent on the unique market characteristics in each economy and also on the maturity of broadband. Objectives of such policies can include the promotion of fair market competition and the provision of a level-playing field of all key agents in the business environment.

The Global Competitiveness Report[7] reveals a comprehensive picture about problematic factors in the APEC economies that inhibit to do or create businesses successfully. Those factors highlight special market characteristics that may affect the implementation of broadband policies. An overview of the most problematic factors perceived in the APEC economies is outlined in Figure 6-3. The figure shows 12 problematic factors, the average amount of responses per factor and the highest value given by the APEC economies.

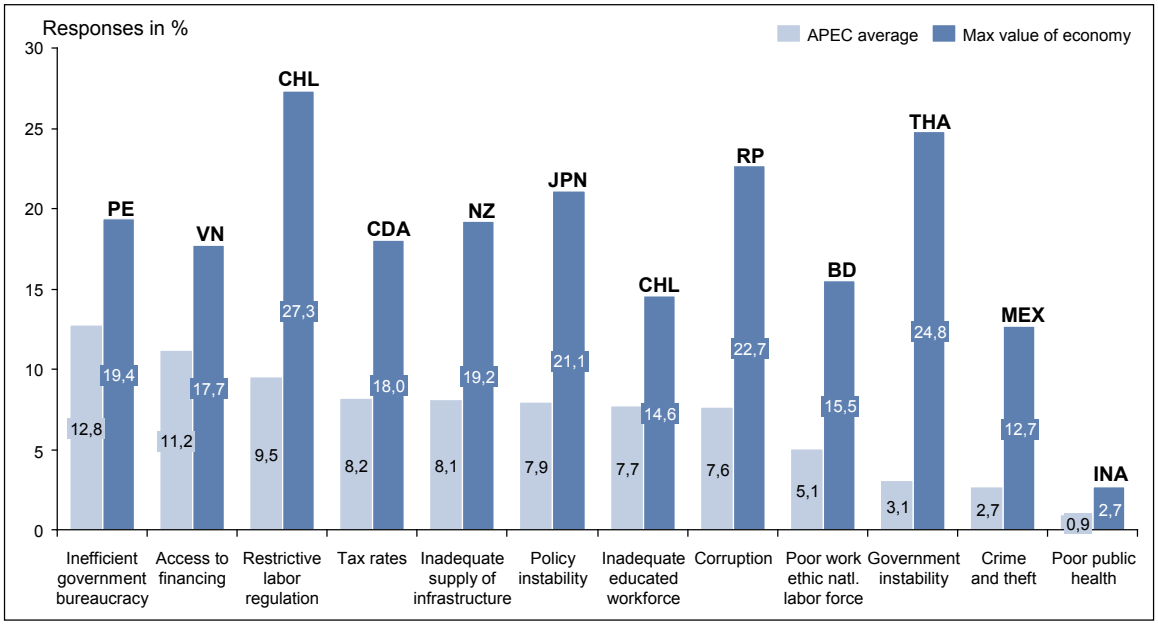

Figure 6-3 The 12 most problematic factors for doing business, APEC economies without PNG. From a list of factors, respondents were asked to select and rank the five most problematic for doing business in their economy. The bars in the figure show the responses in % sorted by the APEC average rank (Source: WEF Global Competitiveness Report 2010/2011)

[7] The Global Competitiveness Report is a yearly report published by the World Economic Forum and assesses the ability of economies to provide high levels of prosperity to their citizens. The Global Competitiveness Index measures the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity.

Inefficiency and bureaucracy of governments are perceived as the most problematic factors in the APEC, followed by the access to financing and restrictive labor regulation. Tax rates and inadequate supply of infrastructure are also perceived as problematic factors while doing business. Criteria such as policy instability, corruption or government instability seem to have less relevance on average in the APEC, although there are economies which rank those factors as the most problematic (JPN, RP and THA).

The factors - although not only reflecting telecommunication businesses only - partially give an idea of the market players' perspective and how they perceive regulatory authorities and policy bodies. The perception is also relevant for policy makers to tailor policies to national circumstance and improve implementability.

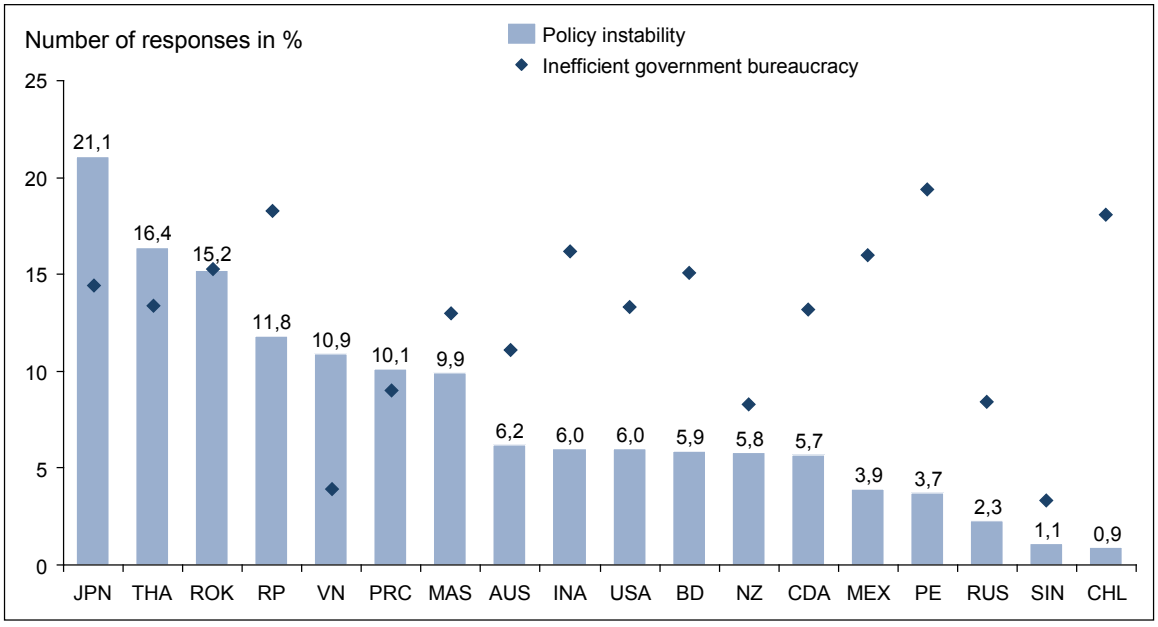

Figure 6-4 List of most problematic factors for doing business, a comparison of policy instability and inefficient government bureaucracy (Source: WEF Global Competitiveness Report 2010/2011)

Figure 6-4 shows two relevant factors (policy instability and inefficient government bureaucracy) that are closely related to policy making and implementation. Singapore that is successful in its implementation of broadband policies has low policy instability and low inefficient government bureaucracy. However, while JPN and ROK exhibit high values for both criteria, the approach towards implementation of broadband policies is effective as evident from their high broadband penetration rates. Hence, both factors do not necessarily indicate smoother or easier implementation of broadband policies.

Successful deployment of policies is also dependent on the setup of the authority responsible for the overall implementation process. According to the WEF Global Competitive Report, Singapore's authorities are assessed as the best in the world for the lack of corruption in the country, government efficiency and low instability in policies.

Strong and autonomous authorities seem to be a positive factor in implementing broadband promoting policies. In the case of Singapore, especially the broadband policy making and its implementation followed a very structured approach and included many consultations with the industry. The result is reflected in national competitiveness from a new infrastructure that ensures open access to the next generation broadband network, to maximize the potential of service innovation. The policy approach to promote the National Broadband Network acknowledges the fully-liberalized market that the economy has already developed. As Singapore is an innovator of broadband policies and following an effective approach towards policy making, the economy itself is profiting from supportive factors both social and political as outlined in Figure 6-5.

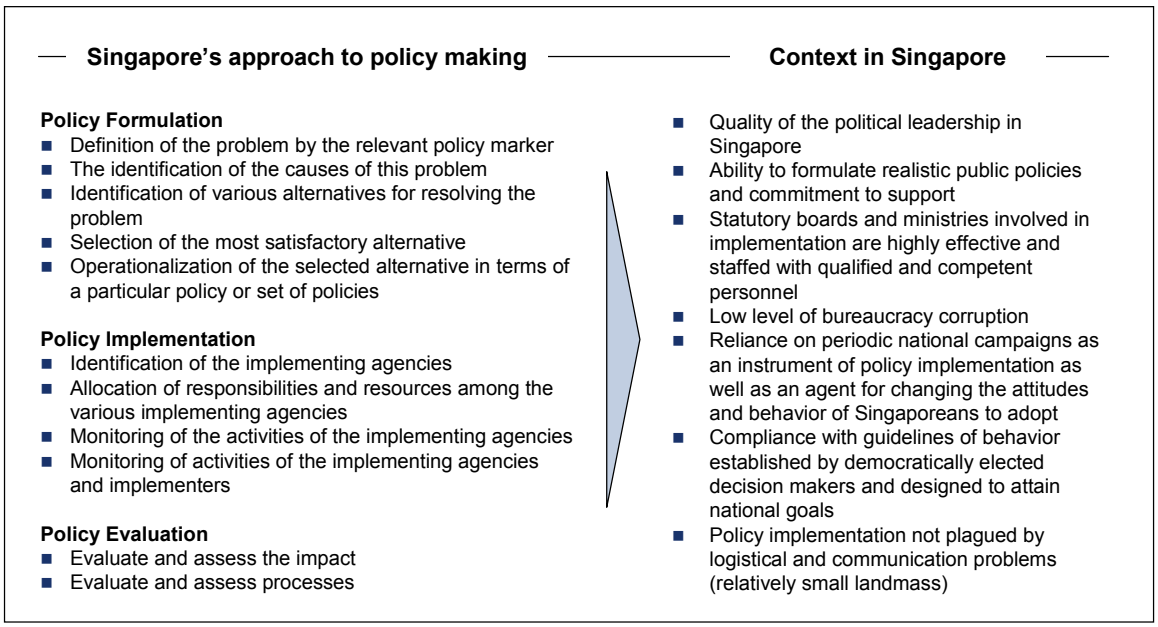

Figure 6-5 Singapore's approach to policy making and efficient implementation (Source: Asian Journal of Public Administration)

Reviewing other APEC economies, a range of institutional structures have been attempted that aim to establish broadband promotion in the APEC economies. Japan and Korea established and empowered one agency that spearheads policy development and implementation where a single organization is in charge for implementing policy and ensuring consistent and efficient promotion of broadband. Furthermore both economies enacted laws supporting their broadband vision and policies and used them to secure stability in policy deployment and cooperation from the ministries involved.

Political circumstances often hold governments back from reforming organizational structures as many economies still have legacy administrative systems that can affect effective policy implementation.

	Regulatory Body	founded	Autonomous	Legal Document that created the Authority	Financed by
USA	**Federal Communications Commission** (FCC)	1934	Yes	The Communications Act of 1934	Spectrum fees: 20% Regulatory fees: 78% Other: Credit Program Account and Economy Act Reimbursables: 2%
CDA	**Canadian Radio Television and Telecommunications Commission** (CRCT)	1968	Yes	Canadian Radio-television and Telecommunications Commission Act	Regulatory fees: 100%
RP	**National Telecomunications Commission** (NTC)	1979	Yes	EO546	Government appropriation: 100%
SIN	**Infocomm Development Authority of Singapore** (IDA)	1992	Yes	TAS Act 1992 and subsequently superseded by the IDA Act 1999	Licence fees: 76% Spectrum fees: 24%
HKC	**Office of the Telecommunications Authority** (OFTA)	1993	Yes	Telecommunications Ordinance	Licence fees: 84.3%
PE	**Organismo Supervisor de Inversión Privada en Telecomunicaciones** (OSIPTEL)	1994	Yes	Decreto Legislativo 702	0.5% of operator gross revenues
MEX	**Federal Telecommunications Commission** (COFETEL)	1996	Yes	Decreto de Craci6n de la Comisión Federal de Telecomunicaciones	Government appropriation: 100%
MAS	**Communications and Multimedia Commission** (MCMC)	1998	Yes	Malaysian Communications and Multimedia Commission Act 1998	-
NZ	**Commerce Commission of New Zealand** (ComCom)	2001	Yes	The Telecommunications Act 2001	-
THA	**National Telecomunications Commission** (NTC)	2004	Yes	Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunication Services	Licence fees: 50.8% Numbering fees: 39.32%
AUS	**Australian Communications and Media Authority** (ACMA)	2005	Yes	Australian Communications / Media Authority Act 2005	Government appropriation: 100%
CT	**National Communications Commission** (NCC)	2006	Yes	Radio and Television Act 2006	Government appropriation: 100%
ROK	**Korea Communications Commission** (KCC)	2008	Yes	Korea Communications Commission Establishment and Operation Act	Government appropriation: 100%
VN	**Ministry of Post and Telematics** (MPT)	2002	No	Post and Telecommunications Ordiance 2001	-
JPN	**Ministry of Internal Affairs and Communications** (MIC)	-	No	-	-
PRC	**Ministry of Industry and Information Technology** (MIIT)	-	No	-	-
RUS	**Ministry for Communications and Informatization of the Russian Federation** (Minsvyaz)	-	No	-	-
CHL	**Subsecretaria de Telecommunicacaiones** (SUBTEL)	1978	No	-	Government appropriation: 100%
PNG	**Papua New Guinea Radiocommunication and Telecommunication Technical Authority** (PANGTEL)	1997	No	-	Licence fees
BD	**Authority for Info-communications Technology Industry** (AiTi)	2003	No	Authority for info-communications technology industry of Brunei Darussalam Order, 2001	Other
INA	**Badan Regulasi Telekomunikasi Indonesia** (BRTI)	2003	No	Minister of Communications' Decree No.31 regarding Establishment Indonesian Telecommunication Regulatory Body	Government appropriation: 100%

Figure 6-6 Overview of regulatory authorities and their status of autonomy (Source: ITU)

Regulatory authorities have the important role to prevent market failure and ensure fair market competition. According to ITU data in Figure 6-6, 13 regulatory authorities in the APEC are autonomous in their decision making. From a financial perspective five of those autonomous regulators are even funded independent from license or spectrum fees or from a share of the operators' gross revenues as in the case of Peru. 8 economies are either not autonomous in their decision making or leave regulatory powers at the ministerial bodies.

Autonomy in decision making and independence do not necessarily reflect better policy making or implementation. For example, although the NRA in Japan is not autonomous in its decision making, policy formulation and implementation have achieved impressive broadband growth.

However, autonomous regulatory authorities tend to be less prone to be influenced by external parties which can pursue different interests from the NRA. Thereby NRAs can

focus on their policy objectives for promoting broadband and can eventually make decisions that are inconvenient for market participants, but effective in promoting broadband development.

6.2 FTA and GATS related to broadband

A robust ICT infrastructure together with skilled human resources and an efficient regulatory environment is critical for enabling ICT as an engine of trade, economic growth, innovation and better governance. The General Agreements on Trade in Service (GATS) and the Free Trade Agreements (FTA) ASEAN, SAFTA, NAFTA and TPP regulate the trade of telecommunication services and thus the use of broadband and internet applications on an economic level. The agreements further determine the boundaries for scheduled commitments of the economies that are part of the trade associations. While the GATS treaty has been agreed among all APEC economies, FTAs are agreements between two or more economies and can extend the GATS commitments. As the APEC member economies consist of both, developed and developing economies, the restrictions in the General Agreement on Trade in Services (GATS), as well as the number of Free Trade Agreements (FTA) differ significantly as described in the following two paragraphs.

6.2.1 General Agreements on Trade in Services per APEC economy

All APEC members have signed the GATS treaty and must adhere to mandatory general obligations such as the principle of most-favored nation (MFN). Through the MFN principle it guarantees access to and the use of public basic telecommunications networks and services in a transparent, reasonable and non-discriminatory basis (i.e. all trading partners are treated the same). Depending on their willingness, individual economies make various levels of special commitments which appear in schedules to open their telecommunications sector and state how open the sector will regulated. This determines foreign firms' ability to establish a commercial presence and/or sell telecommunication services, both domestically and across borders. Each participating economy determines the scope (type of services covered) and scale (level of liberalization) of its commitments and has the right to regulate the sector in the manner it deems appropriate, as long as firms from all trading partners are provided the same treatment.

In addition to commitment schedules, APEC members have the option to add onto their schedules a reference paper that provides principles to guide the development of regulations in the context of competition in the supply of telecommunications networks

and services. Within the GATS, telecommunication services are separated into two categories:

- *Basic telecommunication services* include all services, both private and public that involve end-to-end transmission of information such as voice and data transmission (fixed and wireless), facsimiles and paging.
- *Value-added services* are services that add value to the customers' information by enhancing form or content or providing storage and retrieval, including online data exchange and management, e-mail and voice mail.

(21) Developed economies in the APEC have committed to lower restrictions in the GATS with regards to the different modes of supply than developing economies. Most of the restrictions exist in the field of market access by limiting commercial presence or ownership.

Broadband is not a dedicated subject to the GATS, although it has aspects from both basic telecommunication services and value-added services.

Table 6-1 summarizes the different restrictions of the APEC economies made in the telecommunication sector under GATS. While Japan is very unrestrictive, Papua New Guinea and the Philippines restrict market access in almost every service category.

APEC Economy	Restriction in the GATS	Fixed Broadband Penetration
Japan	very low	26.9%
Hong Kong, China	low	30.2%
Australia		23.2%
Singapore		24.7%
Canada	medium	29.8%
Korea, Republic of		36.6%
New Zealand		24.9%
United States		26.3%
Brunei Darussalam		5.4%
Chinese Taipei	medium to high	22.7%
Mexico		10.0%
Malaysia		7.3%
Peru		3.1%
China	high	9.4%
Thailand		3.9%
Indonesia	very high	0.8%
Viet Nam		4.1%
Philippines		1.8%
Papua New Guinea		0.1%

Table 6-1 Qualitative evaluation of restrictions towards market access and national treatment in the GATS. CHL and RUS omitted due to missing data (Source: WTO, ITU, Detecon)

Generally speaking, developing broadband economies have a tendency to declare more restrictions in the GATS. While many market access restrictions remain, in general some economies show preference towards commitments that facilitate commercial presence by foreign firms. This is attributed to the desire to attract foreign investment and put domestic firms under competitive pressure. On the other hand, some economies are hesitant to open markets up to the cross-border supply of telecommunication services over which governments could not exercise regulatory control. The involvement of developing economies in efforts to liberalize trade in telecommunication services reflects the extent to which reforming the sector is seen as an economic and social priority. By liberalizing telecommunication sectors, the economies view their scheduled commitments as the means to attract investment, increase export opportunities and facilitate economic development in ICT.

Although initial accomplishments since inception of the GATS treaty have been significant, latest negotiations focus on the rapid developments in telecommunication markets and services that present new challenges not covered in the GATS yet such as is for most broadband services.

The following section gives an exemplary summary of the telecommunication sector specific commitments regarding market access and obligations that members agree to comply with. The complete list of all APEC economies is to be found in the appendix.

Hong Kong, China (low restriction): Hong Kong, China is fairly unreserved in terms of regulations. Commercial presence in market access for value added services must take place in form of a company, listed in the Company Ordinance. The presence of natural persons in the field of value added services and packet-switched data transmission services is unbound except for intra-corporate transfer of general managers, senior managers and specialists, which is set out in an attachment.

Malaysia (mid/high restriction): For packet switched public data network service and all other services under the topic “basic telecommunication service”, commercial presence is only possible through acquisition of shares of existing licensed public telecommunications operators. Foreign shareholding is only allowed up to 30%. Commercial presence in the fields mobile data services and “data transmission service” (covering electronic mail, voice mail, online information and database retrieval), is restricted to 30% for foreign shareholder and only possible through joint-venture corporation with Malaysian individuals or Malaysian-controlled corporations.

Thailand (high restriction): In Thailand, every sector is regulated. For cross border supply in the field of data base access service and online information and/or data processing services, service providers must use public telecommunication network under national telecommunication authorities. In both cases, commercial presence is only allowed for Thai registered companies, with no more than 40% foreign shareholding and investment.

Philippines (very high restriction): The Philippines have a very high level of regulation. Each sector is limited for foreign associates, only a maximum 40% foreign shareholding is allowed. Licenses have to be enfranchised either by the domestic public telecommunications carriers (in case of online information and data base retrieval) or by the Congress of the Philippines. In the area of packet-switched data transmission services, all managers and executives of the handling company have to be nationals, in all other sectors, no special regulation is given.

6.2.2 Free Trade Agreements (FTA)

Where GATS do not apply or refer to other commitments, free trade agreements regulate trade between economies bilaterally or multilaterally.

(22) The signed FTAs among the APEC members vary in the number of agreements and in the type between bi- and multilateral agreements. The ASEAN connectivity master plan has the broadest implications to broadband and internet usage.

While some economies in the APEC take part only in a few bilateral or multi-lateral agreements, others have high number of signed FTAs as shown in Table 6-2. Developing economies in the APEC such as PNG, INA or RP have signed fewer agreements, whereas Singapore's network of FTA has expanded to cover 10 unilateral and FTAs and 3 regional FTAs with 24 trading partners.. Comparing the stage of broadband development to the amount of signed free trade agreements there is no correlation evident. Although, it is worth noting that 12 economies have ratified trade agreements with the ASEAN, a geo-political and economic organization of 10 countries (INA, MAS, RP, SIN, THA, BD, VN, Laos, Cambodia and Burma). Specific commitments scheduled in the FTAs relating to broadband and internet usage are limited and mostly aim at basic telecommunications. The Singapore-Australian free trade agreement for example (SAFTA) relates to "telecommunication service" in chapter 4. Therein are agreed free direct and indirect investments without restrictions. Additionally, full access to public telecommunication and service network are granted to each other. As of

December 2004, the Singaporean investment in Australia was AUD 19.1bn. One notable non-real estate deal includes the Singaporean operator SingTel's acquisition of the operator Optus in 2001.

APEC Economy	Amount of ratified FTAs per economy	Fixed Broadband Penetration
Australia	6 + ASEAN	23.2%
Brunei Darussalam	1 + ASEAN + TPP	5.4%
Canada	4 + EFTA + NAFTA	29.8%
Chile	13 + EFTA + EC + TPP	10.5%
China	7 + ASEAN	9.4%
Chinese Taipei	3	22.7%
Hong Kong, China	2	30.2%
Indonesia	1 + ASEAN	0.8%
Japan	10 + ASEAN	26.9%
Malaysia	2 + ASEAN	7.3%
Mexico	9 + EFTA, NAFTA, EC	10.0%
New Zealand	5 + ASEAN + TPP	24.9%
Papua New Guinea	1 + PICTA	0.1%
Peru	4 + EC	3.1%
Philippines	1 + ASEAN	1.8%
Republic of Korea	3 + ASEAN + EFTA	36.6%
Russia	4 + CEZ + CIS	11.0%
Singapore	10 + ASEAN + EFTA + TPP	24.7%
Thailand	4 + ASEAN	3.9%
United States	9 + NAFTA + CAFTA-DR	26.3%
Viet Nam	1 + ASEAN	4.1%

Table 6-2 Ratified FTAs of APEC economies and fixed broadband penetration (Source: WTO, ITU)

The most relevant free trade areas are the AFTA (ASEAN free trade area) and the NAFTA (North American Free Trade Agreement). Relevant developments in the free trade areas regarding broadband are described in the following:

ASEAN: The Association of Southeast Asian Nations (ASEAN) has several plans in place to have an integrated ICT market by 2015. Therefore a Master Plan on Connectivity has been set up whereof one part is targeting the acceleration of ICT infrastructure development and services. Action items are:

- to establish an ASEAN Broadband Corridor (ABC) and develop locations to offer quality broadband connectivity that enables seamless usage of broadband services and applications to connect and enhance ICT development
- to promote diversity of international connectivity among the ASEAN members by 2015

- to establish an ASEAN internet exchange network to facilitate peering amongst the ASEAN internet service providers, reduce latency, increase speeds and lower costs by 2013
- to promote network integrity, information security and data protection across ASEAN by 2015
- to review Universal Service Obligations and similar policies to ensure that infrastructure covered under these policies are broadband internet capable by 2015
- to prioritize and expedite roll-out of broadband internet capable infrastructure to schools by 2015
- and to conduct a feasibility study on a Single Telecommunications Market in the ASEAN after 2015

Aside from the connectivity roadmap, PPP initiatives for the ICT industry shall be developed and best practice PPP models are to be shared among the business community.

In addition to the connectivity master plan, reduction on tariff and non-tariff barriers is to be agreed. To ensure same technical standards all over the ASEAN region, Mutual Recognition Agreements (MRA) will be signed by the members. As of today, MRAs between SIN and INA, SIN and BD, and SIN and MAS have been initiated. Furthermore the ASEAN is planning to have all ICT regulations harmonized by the end of 2011.

While the ASEAN agreed on handling the telecommunication sector according to the GATS with AUS, NZ and ROK, a closer cooperation in the information and telecommunication industry is agreed with JPN. From an investment perspective the trade in service agreement (TIS) with China targets to increase investments in telecommunication services.

NAFTA: The NAFTA, including CDA, USA and MEX, committed to eliminate tariffs and non-tariff barriers in the telecommunications sector between each other. Chapter 13 of the agreement states no restrictions are applicable on access to telecommunications networks and on the provision of enhanced or value-added services. Furthermore, the adoption of telecommunication standards is ensured. Chapter 3 mentions the elimination of tariffs on telecommunication equipment.

6.3 Promoting broadband on a national level

Increasingly, broadband internet service is seen critical to a nation's physical infrastructure and economic growth. Universal access, increased use and adoption of broadband service are policy goals stated in national broadband plans or broader national ICT strategies which almost all APEC member economies published.

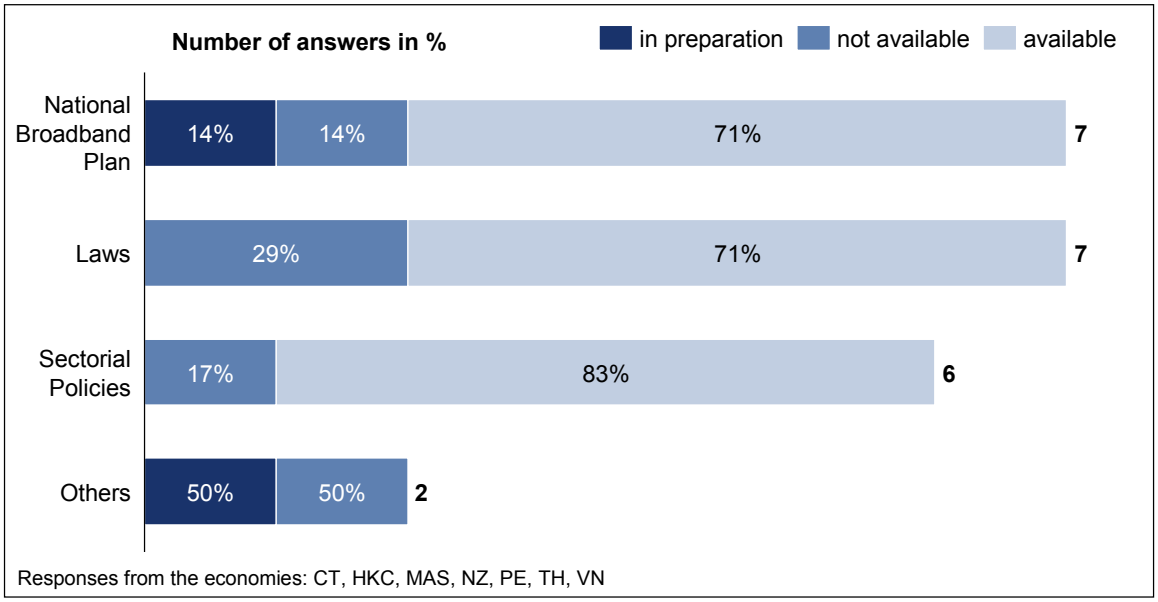

Figure 6-7 Availability of national documents to promote broadband, survey-participating APEC economies (Source: APEC Broadband Survey 2011)

The APEC broadband survey (Figure 6-7) reveals that laws or a national broadband plan are either in place or underway to promote broadband on a national level. The economies CT, MAS, NZ, TH and VN have a national broadband plan available already and PE is in preparation of the plan. Among the survey responses also sectoral policies are available whereas other kinds of documents are not planned or are in preparation as in the case of Peru.

Drilling down into the details of the broadband plans and reviewing the measures, funding, stakeholders and goals associated to the development of broadband, each economy is addressing specific measures relevant for their broadband and internet promotion. Results from the APEC broadband survey on measures for promoting broadband access and internet usage will be discussed in Part IV of the study.

(23) Promoting broadband and internet usage on a national level necessitates financial commitment, measurable targets, coordination and governance from all relevant stakeholders. The plan itself has to be straight-forward, realistic in its objectives and traceable to measure success of the implementation.

The promotion of broadband and internet usage outlined in National Broadband Plans can be subdivided into general information, funding and investment, key performance indicators and general objectives. Figure 6-8 outlines the common building blocks of national broadband plans that help to compare plans to each other. Most important key dimensions are funding and key performance indicators which provide the basis for measuring the plan's implementation progress.

Although measurement and transparency during the implementation phase is important, not all economies publish comprehensive progress reports or list completed projects funded by government. The broadband plan website of Canada is exemplary as it publishes all approved projects, the name of the bidding company, the region together with the amount of potential households and the technology deployed and allows tracking the implementation of the project along its measurement criteria.

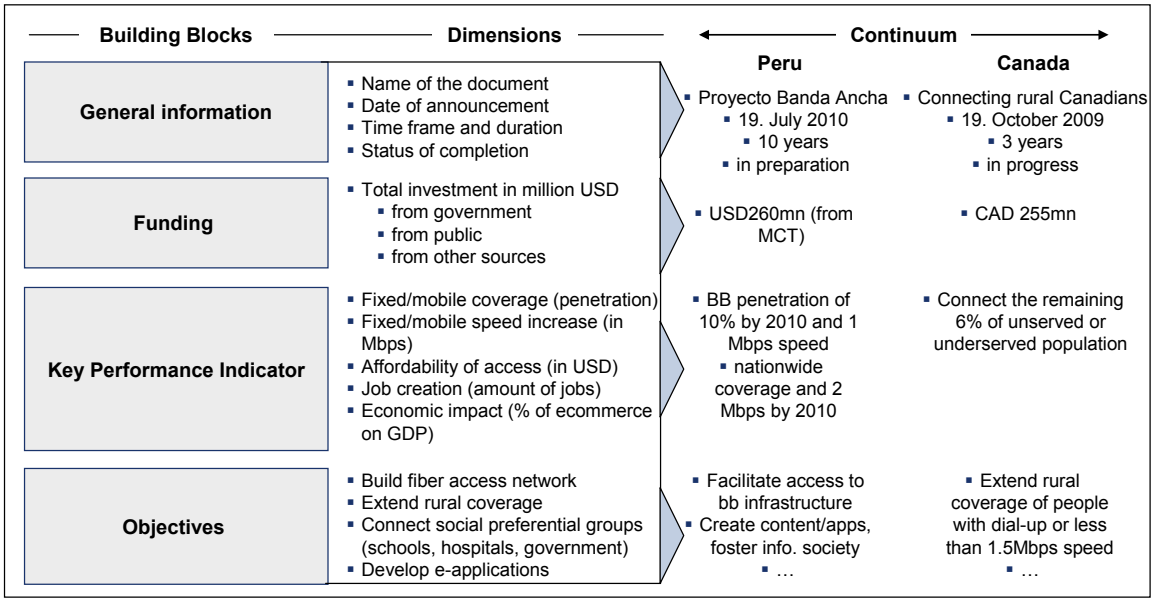

Figure 6-8 Building blocks of a national broadband plan (Source: Detecon)

Short summaries of representative national broadband plans referring to deployments of Next Generation Broadband Networks, expansion of rural coverage or infrastructure speed upgrades are briefly outlined below. A summary of all national broadband plans or national documents relating to broadband are listed in the appendix.

Canada announced in January to accelerate and expand federal investment in infrastructure with almost CAD 12bn in the economic action plan. Within the overall stimulus funding, the goal of the broadband component is to close the remaining broadband access gaps even though the country is one of the most connected in the world. The scope of the broadband plan is to extend broadband coverage to all and

connect the 6% of unserved (no access to the Internet or dial-up service only) or underserved (broadband speeds of less than 1.5 Mbps) households to broadband. Allocated funds to the broadband initiative total at CAD 225mn where the financial approach is also encouraging the private sector to develop the rural broadband infrastructure.

Singapore announced its Next Generation Broadband Network in January 2009 with the provision of speeds of 1Gbps and beyond. 60% of homes and offices shall have access to this new, pervasive, all-fiber network within 2 years, whereas all homes and offices shall be connected to the ultra high-speed and pervasive Next Generation National Broadband Network by 2013. The approach involves structural separation of new national broadband network as has been discussed in Part II. From an investment perspective the plan allocates about SGD 1bn and will provide additional funding support (SGD 183mn) to the Intelligent Nation Masterplan which includes NGN as a key initiative.

Malaysia's National IT Council (NITC) announced the National Broadband Initiative in 2010 with the target setting for broadband to reach 50% household penetration by 2010. To achieve this, the government has identified a strategy that encompasses both, supply and demand aspects of broadband. For the high economic impact areas, broadband services shall be upgraded to 10+ Mbps. Furthermore, the government has signed a public private partnership with the agreement with incumbent Telekom Malaysia (TM) to roll out high-speed broadband infrastructure in those selected areas. Initially, the government planned to invest MYR 4.8bn of the total amount. The project will be carried out in phases of which phase 1 will amount to MYR 11.3bn covering 1.3mn premises passed of which the government will co-invest MYR 2.4bn for a period of three years to build the first phase of the country's High Speed Broadband (HSBB) project. From the demand side, the NITC is encouraging broadband awareness, attractiveness and affordability through further initiatives.

New Zealand government's goal for broadband investment is to accelerate the roll-out of ultra-fast broadband to 75% of the population, concentrating in the first six years on priority broadband users such as businesses, schools and health services, plus green field developments and certain tranches of residential areas. The initiative will be supported by government investment of up to NZD 1.5bn alongside additional private sector investment and be directed to open access infrastructure. From the rural perspective key objective of the government is to achieve improved coverage of fast broadband services so that 97% of households and enterprises are able to access

broadband services of 5 Mbps or better. Ultra-fast broadband shall be made available to 97% of New Zealand schools serving 99.7% of New Zealand students. The objectives shall be achieved through progressive network upgrades over the next 10 years.

Peru is in the preparation phase of its national broadband plan under the name "Proyecto Banda Ancha" after a course of workshops and consultations between government and telecommunication industry. Among transports and telecommunication the elaborated plan targets to achieve a broadband penetration of 10% at speeds of at least 1 Mbps by 2015 and at a later stage in 2020 a nationwide coverage of at least 2 Mbps. From the supply-side, the initiative promotes the provision of adequate infrastructure and competitiveness of services, the facilitation of the deployment of transport and access networks and adheres to increase the level of competition. From the demand side, stipulations are initiated to shape the information society and facilitate the user access to broadband internet services, increase the creation of content and applications and develop skills and capabilities of people to the best exploitation of the full broadband potential. For the efficient rollout of fiber, further infrastructure projects shall incorporate requirements to build ducts in order deploy telecommunication infrastructure more efficiently. Furthermore, various legislations concerning the regulatory framework, governing of the Telecommunications Investment Fund (FITEL) and rules on sharing of telecommunication infrastructure shall be reviewed and amended accordingly. The Ministry of Transport and Communication announced in 2009 to invest USD 260mn to expand telecom services in rural areas.

Thailand's cabinet approved the National Broadband Policy in November 2010 including an investment of over USD 650mn over five years by state-owned operators on a nationwide broadband network. The network is expected to cover at least 80% of the population by 2015 and at least 95% by 2020 ensuring standard quality of service and reasonable service fee. In addition, cities that are economic and regional hubs should have high-speed fiber optic cable broadband with a minimum speed of 100 Mbps by 2020. The plan further considers a universal equitable access to education, public health, disaster monitoring and warning, and other public services through a broadband network in order to reduce inequality and closing the digital divide.

6.3.1 Conclusion on National Broadband Plans

The reviewed national documents all follow the structure and building blocks as outlined in Figure 6-8, however the scope of those plans can be described as "broad" and measurement is not easy in every case. As not all economies publish status reports on their broadband plans, it is challenging to evaluate whether national broadband plans

yield the targeted results or are effectively implemented. In the case of Canada, since February 2011, 91 sub-projects were granted and about 225000 households were connected on track with the targets according to the broadband initiative. The advanced broadband economies such as Japan, Singapore or Korea have already completed several iterations of implementation of national strategies and are at a stage of follow up for advanced development or extensions of existing initiatives. Developing broadband economies are still at the early stages of formulation or implementation of broadband plans and will gain insightful knowledge in the course of implementation process.

7 Part IV – Internet usage and digital divide

7.1 Digital divide in the APEC

There have been numerous studies on forming of a digital divide in developed and especially developing economies over the past decade and its unfavorable impact on the economy and society. This chapter broadly discusses the digital divide with regards to internet usage in the APEC member economies and shall loosely refers to the emerging gap between people who participate in the "information society" within an economy and those who do not. Consumption of internet services is separately discussed in chapter 7.3.

(24) Three major factors are drivers of the digital divide and promoters of ICT uptake: accessibility, affordability and technology awareness/skill

The digital divide of an economy is driven by three major factors that can be significantly influenced through either public policy or regulatory intervention in the telecom market (Figure 7-1).

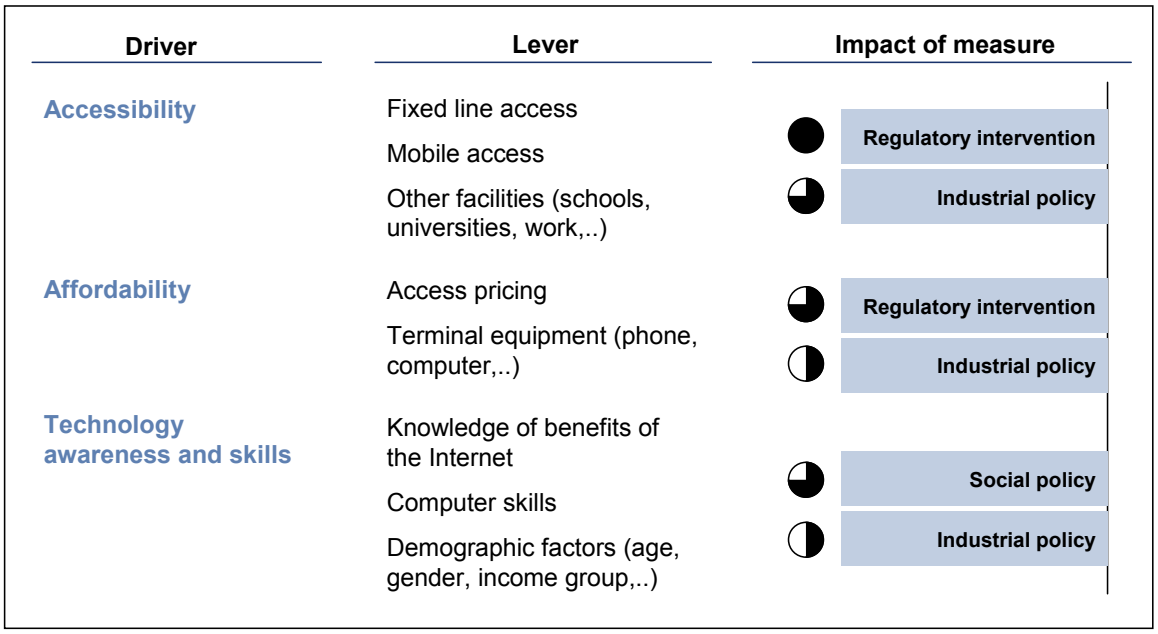

Figure 7-1 Drivers of the digital divide and their respective levers and qualitative assessment of the impact of measures how to promote access, affordability and technology skills and awareness (Source: Detecon)

Access to mobile or fixed line internet is a prerequisite for consumers to participate as digital citizens in the information society. Access can exist either directly in the households or spatially offsite at local hubs or other facilities such as schools,

universities or place of employment. Access bandwidth determines which services can be consumed and is a driver of the digital divide in the context of broadband access.

Having access to internet services, one must further account for *affordability* of access e.g. the xDSL subscription price or the mobile data package as well as for terminal equipment prices such as for mobile devices and desktop computers.

Finally, *technology skills and awareness* are drivers of the digital divide. However, compared with accessibility and affordability, skills are an ICT enabler driving internet usage once the ICT services are accessible and affordable. Naturally for people to participate in the information society, they need to be informed of all the possibilities of the information society that exist. Non-awareness, which is often the case in lower developed economies, can be a major inhibiting factor for internet usage. Likewise consumers need technology skills for using a computer or mobile device which in turn is dependant on demographic factors such as age, gender and income group.

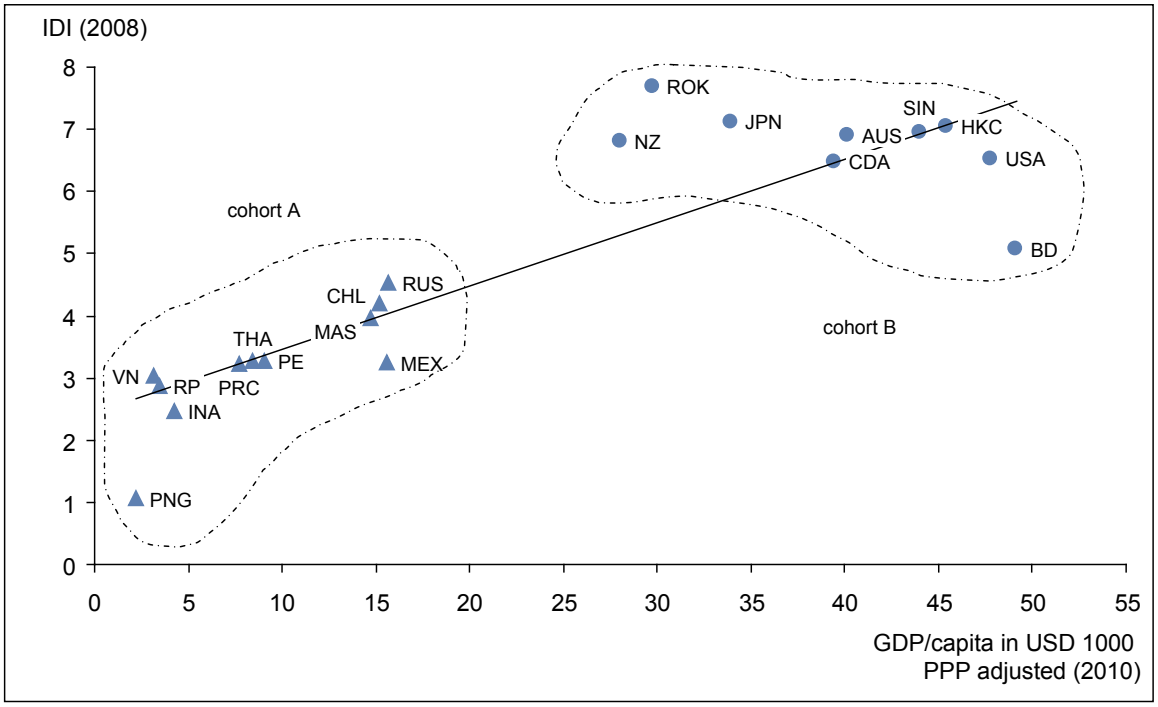

Figure 7-2 The comparison of APEC economies by GDP per capita over the ICT Development Index yields two cohorts of APEC economies. The digital divide in cohort A economies is expected to be much higher than in cohort B countries. CT omitted due to missing data (Source: ITU)

The ICT Development Index[8] (IDI) is a composite index that tracks the overall development of economies towards becoming an information society. It maps part of the three key drivers – accessibility, affordability, technology skill – on KPIs to measure

[8] See appendix for further explanation of the ICT Development index

access to internet services, and gives an indication of the prevalent digital divide in the APEC member economies.

The IDI has been developed by the ITU and was used in Figure 7-2 to plot the APEC economies based on their adjusted GDP per capita. Two cohorts can be identified and distinguished into developing economies, cohort A, and developed economies, cohort B. While this serves as a distinction into different GDP per capita groups, it does not fully reflect the digital divide consistently within the cohorts, e.g. CHL and RUS with an IDI > 4 can already be considered fairly developed by this indicator.

(25) Total economic wealth measured in GDP per capita is a strong indicator for the prevalent digital divide. Relative income inequalities within an economy are less relevant.

However it is interesting to observe that income inequalities within an economy do not strongly correlate with the IDI. As illustrated in Figure 7-3, the income disparity of the APEC member economies is compared to the IDI by using the Gini coefficient.

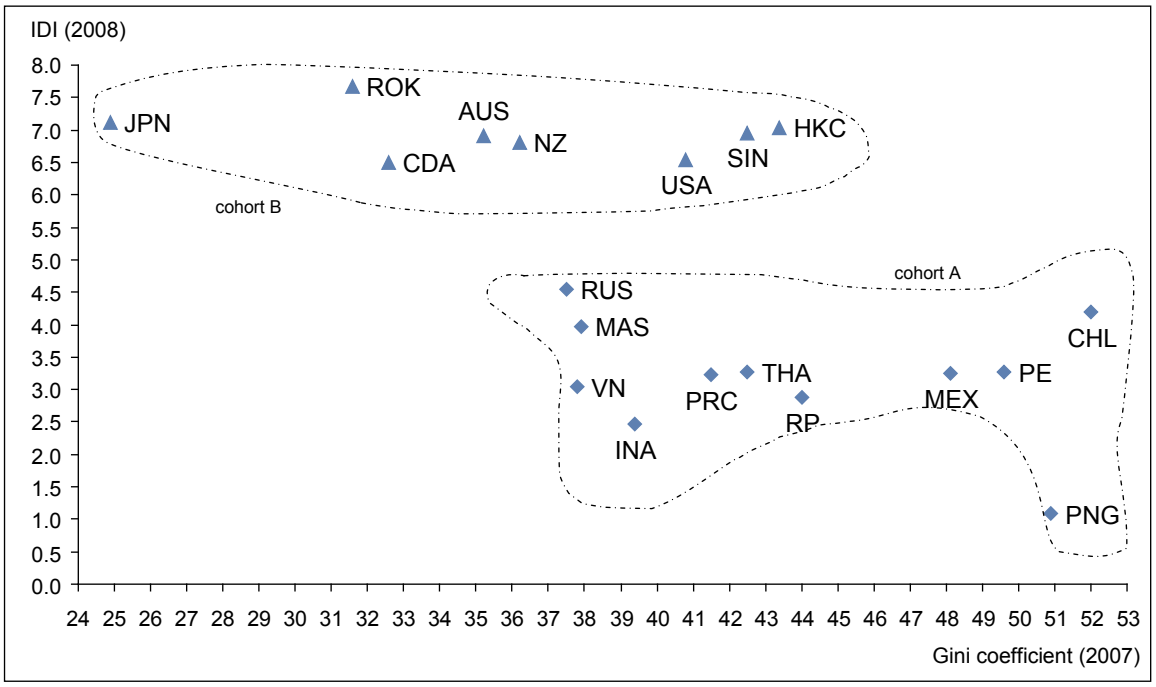

Figure 7-3 Comparison of income inequalities in APEC economies with the IDI do not yield a strong correlation. BD and CT have been omitted due to missing data (Source: ITU, World Bank)

The Gini coefficient is a common measure of relative inequality within an economy and indicates that e.g. income in JPN (24.9) is more evenly distributed than in HKC (43.4). Despite the uneven distribution of wealth in JPN and HKC, both economies have similar IDIs. This indicates that relative income inequalities within an economy are less relevant

in measuring the digital divide than the actual total wealth measured in GDP per capita as discussed in Figure 7-2.

Governments have realized that mobile communications represent the most effective means for providing access to voice and data services to the rural and remote population. They have started to take measures for implementing regulatory policies to promote broadband development in rural areas.

(26)Affordability and technology awareness are the major obstacles for increasing internet usage in APEC economies, while accessibility through mobile technologies is already given in many cases.

Figure 7-4 illustrates that there is still a widening gap emerging in developing economies of cohort A. There are 2.4 times more mobile subscribers per 100 inhabitants than actual internet users in percentage of population (ratio 1:0.29) in cohort A. Meanwhile developed economies of cohort B register only 0.48 times more mobile subscribers per 100 inhabitants than internet users in percentage of population (ratio 1:0.68).

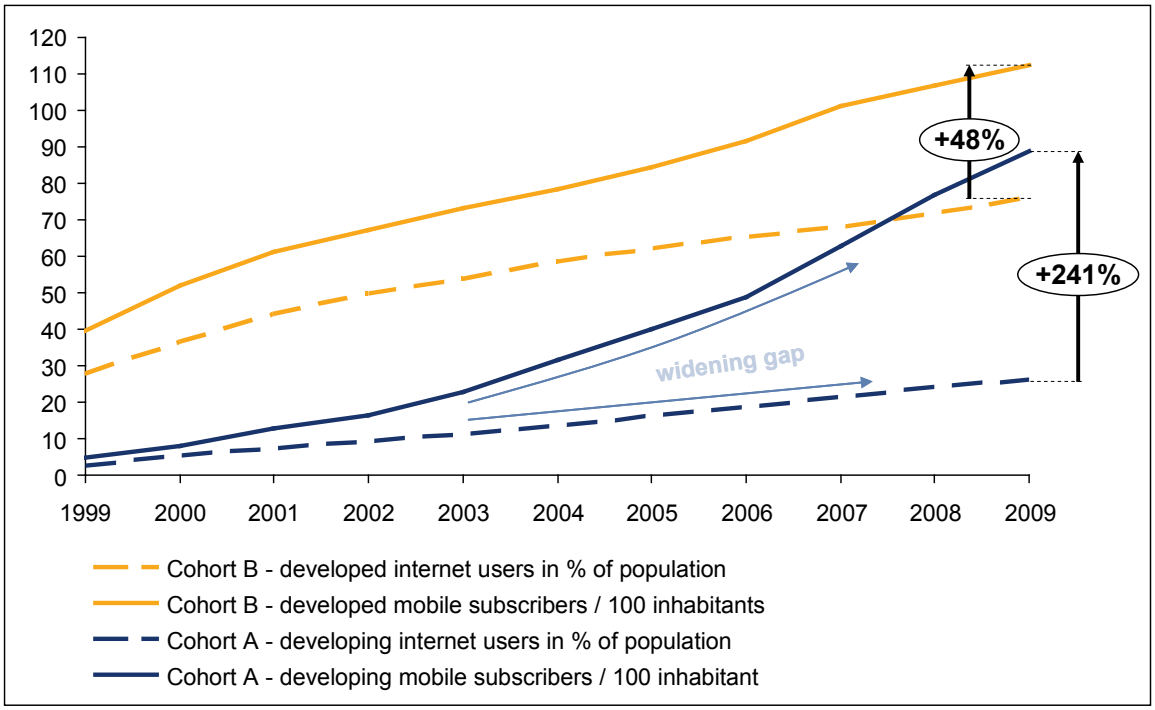

Figure 7-4 Comparison of mobile subscribers per 100 inhabitants with the percentage of estimated internet users over the population of developed (cohort B) and developing economies (cohort A) within APEC. Estimated internet users include fixed and mobile internet users. The widening gap in cohort A illustrates the potential for addressing the digital divide with mobile technologies (Source: ITU).

Figure 7-4 shows the high potential of mobile communications to close the widening gap as access to internet services is in many cases already possible, though not used either because of affordability or technology awareness.

Looking at the two cohorts, significant differences in affordability of telecommunication services and in particular broadband services exist. Figure 7-5 compares the affordability of ICT services of cohort A and B in the years 2008 and 2009 by using the ITU developed ICT Price basket[9]. The ICT Price basket is a composite index that maps fixed, mobile and broadband service pricing as a percentage of the adjusted monthly GNI per capita, indicating the relative affordability of ICT telecommunication services in an economy.

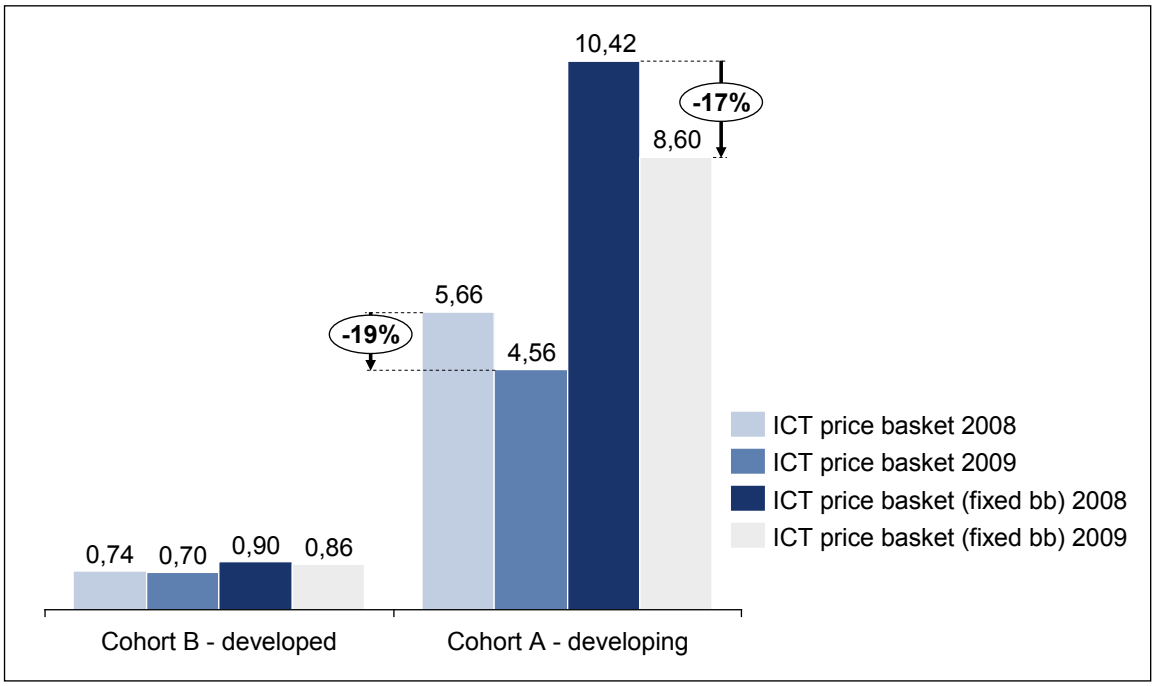

Figure 7-5 Affordability of ICT services and in particular fixed line broadband services in developed and developing APEC economies show significant differences when compared as a percentage of the monthly GNI per capita. BD, CT, PNG are not included (Source: ITU)

Figure 7-5 shows that ICT telecommunication services including fixed, mobile and broadband subscriptions are significantly more expensive in the APEC developing economies when measured as a percentage of the monthly GNI per capita. While broadband prices for cohort B economies are just 0.86% of monthly GNI, prices of cohort A economies amount to an average of 8.6% of monthly GNI per capita, hence making them less affordable for the general public. Fortunately, as telecommunication markets develop, prices are dropping i.e. broadband prices have dropped by 17% from 2008 to 2009 for cohort A economies making these services more affordable.

The IDI and broadband affordability are strongly correlated and there seems to be a critical pricing threshold at about 2% of monthly GNI per capita where increased ICT

[9] See appendix for further explanation of the ICT Price basket

uptake occurs and leads to elevated IDI ratings. Figure 7-6 illustrates this correlation and highlights broadband affordability as a key driver for ICT development.

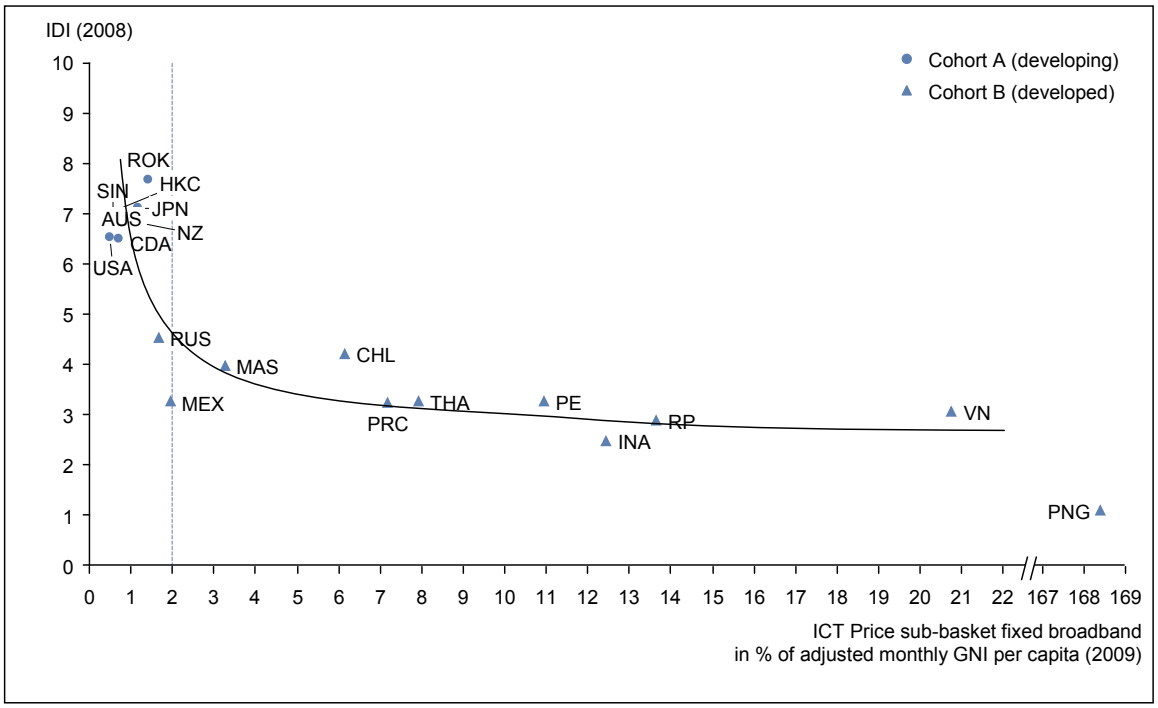

Figure 7-6 Correlation of the ICT Price sub-basket for fixed broadband and the ICT Development Index of APEC economies. CT and BD omitted due to missing data (Source: ITU)

7.2 Bridging the Digital Divide

The digital divide and its correlation with broadband access, affordability and technology skills have been discussed in chapter 7.1. For reaping the benefits of an information society and bridging the digital divide, governments of the APEC members have two primary means of promoting broadband development and internet usage: Public policy measures and regulatory intervention.

APEC members have been asked in the survey to name their top 3 measures for promoting broadband access and internet usage. As highlighted in Figure 7-7 the study yielded different results dependent on the current development and objectives of the APEC economies. While HKC's top measures focus on a pro-competition and a light-handed regulatory approach for promoting broadband access, NZ is focusing on government investment into layer 1 and 2 networks. PE considers its national broadband plan and the stimulation of demand as well as the inclusion of population in the information society as crucial among infrastructure investments by the FITEL fund. Promoting internet usage in NZ is mainly left to private sector initiatives, while PE plans to boost internet usage by establishing various online information platforms and e-government portals. The measures can be further categorized as public policy measures or regulatory intervention and examples are discussed in the following chapters.

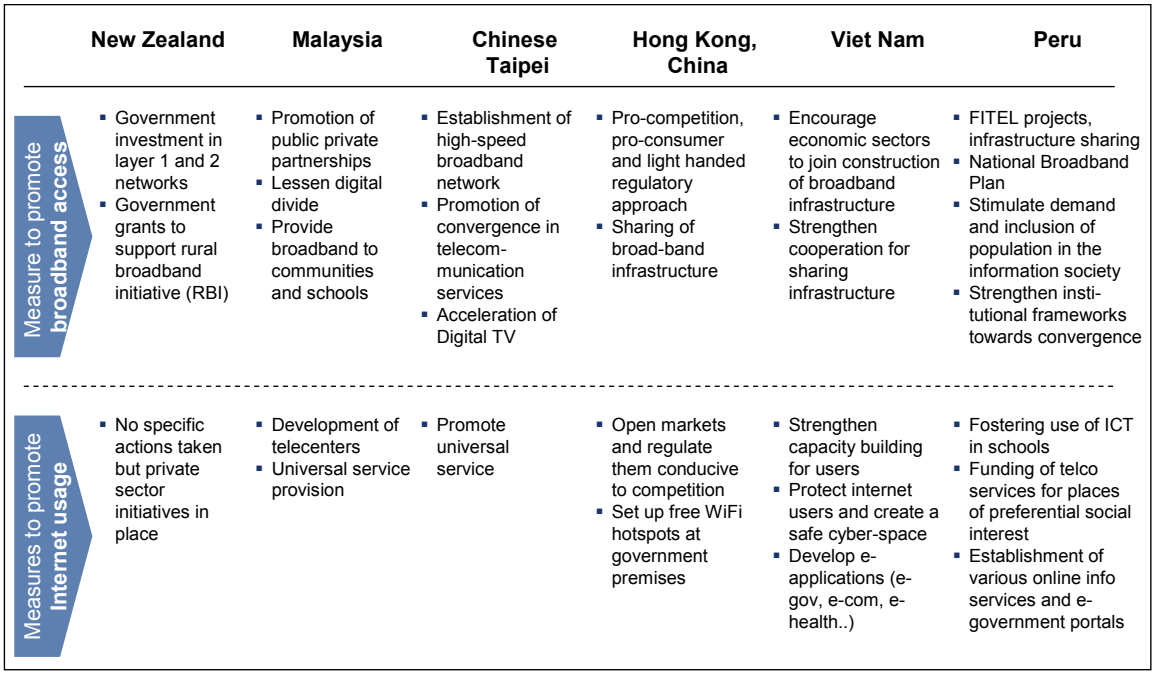

Figure 7-7 Top measures to promote broadband access and internet usage in the APEC from participating economies in the survey (Source: APEC Broadband Survey 2011)

7.2.1 Public policy intervention

As discussed in Part III, a clear and supportive legal framework as well as strong institutions are vital for implementing public policy and regulatory measures in the market.

(27) Industrial policy is used to improve accessibility and affordability of broadband services, while social policy is the key for creating technology awareness and skills in the population.

Building an information society requires a coordinated public policy approach and can take the form of a national information society policy (NISP)10 that integrates industrial-, social-, telecommunication- and technology policies into a comprehensive framework for developing an information society. National Broadband Plans as discussed in Part III are drafted in line with public policy objectives and many focus on providing broadband accessibility. Figure 7-8 holds an excerpt of public policy measures that enable accessibility, affordability and technology skill that are discussed in this chapter for the APEC economies. The importance and effect of public policy intervention can be understood on the case of Korea which had several master plans over the past decades that addressed accessibility, affordability and technology skills though targeted industrial policies[11].

Looking at public policy measures, access to broadband is largely driven by government financing projects in tandem with regulatory measures e.g. NZ had seen significant increase in broadband connections and speeds after mandating improved wholesale obligations for the fixed line market. NZ also has several initiatives that fund its NGN as well as to provide rural broadband access through its rural broadband initiative funded partly by government appropriation and a levy on telecom operators. Several other government funded broadband access projects within the APEC have been discussed that are driven by industrial policy initiatives using PPPs, grants, loans or other hybrid forms of financing. APEC members also connect communal facilities with broadband and supply terminal equipment to reach remote areas to improve affordability. This is being done for schools, universities, libraries, hospitals and other relevant facilities. HKC is

[10] See National Information Society Policy, UNESCO IFAP, Paris 2009

[11] See Informatization While Paper 2010, NIA, 2010, http://www.korea.go.kr; E-Government of Korea Best Practices, NIA, 2009, http://www.korea.go.kr; Broadband Korea: Internet case study, ITU, 2003

also setting up free WiFi hotspots at government premises throughout the territory. PE has been capitalizing on its public internet cafes in urban and rural areas and promotes the use of E-Government services in these venues.

Driver	Lever	Public policy intervention
Accessibility	Fixed line access Mobile access Other facilities (schools, universities, work,..)	Infrastructure financing (PPP, loans, grants, tax exemptions,..) Public ICT infrastructure projects Universal Access and Service policy
Affordability	Access pricing Terminal equipment (handsets, computers,..)	ICT sector policy for promoting competition, GATS, FTA Subsidizing equipment for public schools and communities in rural areas
Technology awareness and skills	Knowledge of benefits of the Internet, Computer skills Demographic factors (age, gender, income group,..)	Education policy (ICT curricula, distance learning programs, teacher training) ICT capacity building Promote ICT culture (e.g. scholarships)

Figure 7-8 Public policy measures for improving accessibility, affordability and technology skills to bridge the digital divide (Source: Detecon)

APEC members should have a legal framework that clearly mandates which entity is to develop and implement the Universal Access and Service policies (UAS) and manage Universal Access and Service Fund (USAF). This establishes credibility and enforceability of the policy. The notion of a clear and legal mandate should also include the regulatory framework by itself, empowering the NRA to quickly and effectively intervene in the market as it is done by several APEC members such as the US (Telecommunications Act) and HKC (Telecom Ordinance).

Public policies can also be directed to improve affordability of broadband services and terminal equipment such as computers or mobile devices. APEC members can influence access prices by sector policies which increase market competition. As outlined in Part III of the study APEC economies have agreed to scheduled commitments according to GATS and FTAs that liberalize domestic markets, encourage investment and reduce financial obstacles. Other sector polices include promotion of ICT industries through cooperation between the government and private ICT entities. Furthermore, governments can grant targeted tax exemptions on software sales and ICT equipment for improving affordability.

Finally, social and education policy define actions that lead to skilled, technology aware citizens. This requires buildup of capacity in the education system as well as initiatives promoting ICT in society. In PE the Ministry of Education has made efforts to introduce ICT in schools through the education project "Huascaran" which was created to promote distance education services, educational networks and educational portals, and plays an essential role in encouraging the use of ICTs. Various portals and online information services have been developed, such as the Administrative Transparency Portal that is managed by the Ministry of Economy and Finance. Through this portal, citizens can access government accounts, information, services and administrative procedures in different government departments. Once broadband services are available, distance learning programs and vocational training further increase the skill level of citizens and benefit the overall economy.

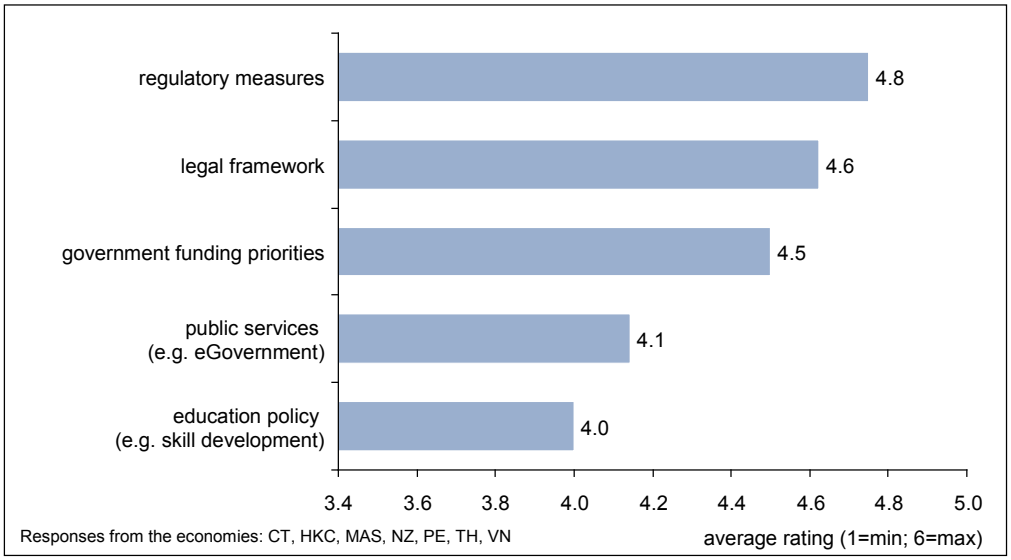

Figure 7-9 APEC members asked in the survey to evaluate importance of public policy measures for reducing the digital divide (Source: APEC Broadband survey 2011)

On average, APEC members that participated in the survey have identified regulatory measures and a solid legal framework as the most important factors for bridging the digital divide. APEC members such as RUS have included access to information and information protection in federal law to strengthen its importance and implementation through public policy objectives.

Government funding priorities, such as investments into rural broadband through PPPs have been rated as very important by most APEC members. Other economies such as HKC do not invest into network infrastructure at all.

APEC members consider public services such as E-Government and education policy are on average comparatively less significant for reducing the digital divide. However,

both measures carry high importance when it comes to general internet usage as will be described in chapter 7.3.1. One explanation is while accessibility and affordability are prerequisites for the broadband take up, ICT skills are merely a supplemental enabler. Hence, the major challenge for reducing the digital divide initially lies in regulatory measures supported by statutes or national policies for providing affordable broadband access.

7.2.2 Regulatory intervention

The NRAs role of bringing broadband to the masses can be assessed by looking at the levers for driving accessibility and affordability. As shown in Figure 7-10, regulatory intervention such as wholesale access obligations and spectrum management are important measures of driving accessibility and have already been thoroughly discussed in Part II of the study.

(28) Regulatory intervention by NRA has a strong impact on providing broadband access as well as improving affordability of services.

Several further regulatory remedies can be used by the NRA to influence affordability of ICT services in the market such as regulatory pricing and margin squeeze testing. Technical regulation, particularly standardization efforts in spectrum management improve economies of scale and lead to more affordable terminal devices and network components.

Driver	Lever	Regulatory intervention
Accessibility	Fixed line access Mobile access	Wholesale access obligations (ULL, BSA, naked DSL,..) Infrastructure sharing requirements Separation requirements Efficient Spectrum Management Universal Service (USO, UASF)
Affordability	Access pricing Terminal equipment (handsets, computers,..)	Regulatory pricing (cost- vs. retail-minus) Margin squeeze testing Accounting separation Technical regulation (Standardization, Spectrum Mngt., Digital dividend)

Figure 7-10 Measures of regulatory intervention for achieving accessibility and affordability of broadband and bridging the digital divide (Source: Detecon).

As part of the APEC broadband survey, APEC members have been asked to rank the importance of measures for promoting rural broadband. Figure 7-11 shows that Universal Service Obligations (USO) and the use of a UASF are major drivers for providing rural broadband access. While USOs have been mostly used in the past on monopoly or dominant market players, there is an increasing trend to distribute funds through the UASF though competitive bidding.

Peru's UASF called FITEL has been created in 1993 and financed through a percentage levy on all telecom operators in the market. A program of regional connectivity has been developed through the decentralization process promoting the intensive use of ICT. By this program, the government funds telecommunications services in rural areas and places of preferably social interest, in order to promote access for people in rural areas to telephony and internet services. FITEL manages the national PPP initiatives for the Peruvian telecommunications sector and has carried out several projects to provide broadband access in rural areas such as 'Banda Ancha Rural', awarded to Rural Telecom in 2007 or 'Banda Ancha para localidades aisladas', awarded to Telefonica del Perú in 2009. Funds are allocated using a competitive tendering mechanism and awarded to the bidder that requires the least subsidy.

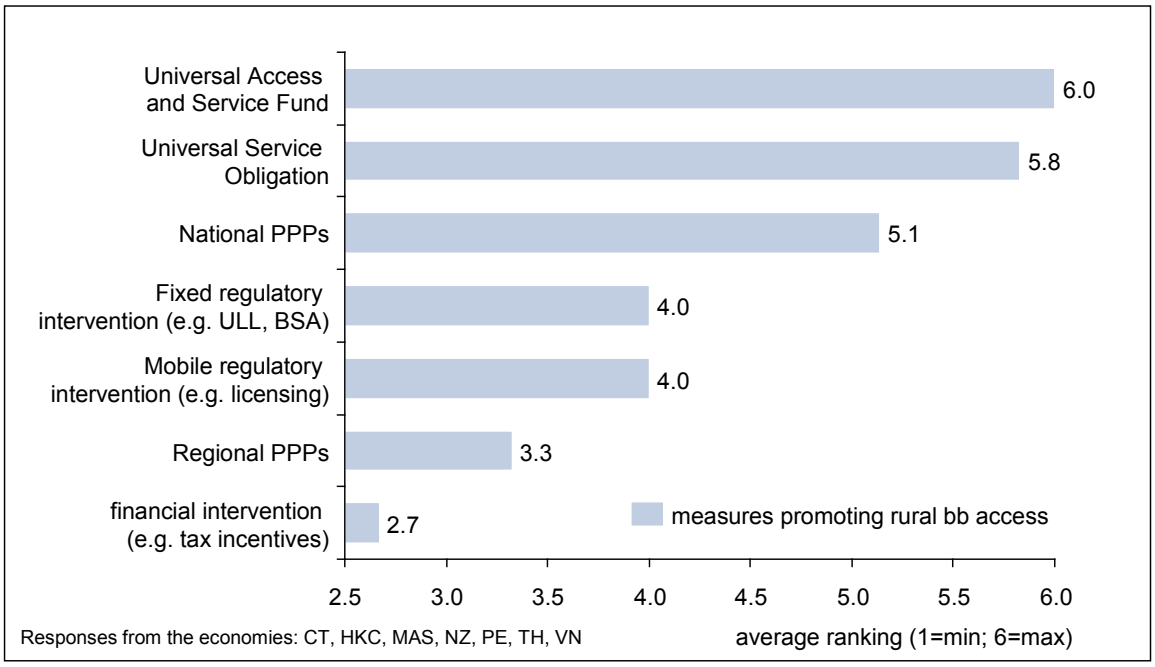

Figure 7-11 APEC members asked in the survey to rank the measures for promoting rural broadband access (Source: APEC broadband survey 2011)

USO also carries high importance for CT, THA, MAS and HKC. CT has multiple universal service providers and includes broadband in its universal service policy objectives. The project "Broadband Access to every village" has been completed end of

2007 and CT's NRA has been continuing to expand its USO for providing broadband access to rural and remote areas. Other economies such as INA use the funds of the UASF for upgrading the national backbone to improve bandwidth between the many islands before investing into access.

The UASF is further complemented by other financing mechanisms such as national and regional Public Private Partnership that also rank high among the survey participants. These can be funded through the UASF as in the case of PE or through other government budgets e.g. as stated in National Broadband Plans discussed in Part III. VN is driving national PPP initiatives for universalizing access to public telecommunication networks in rural areas and internet broadband for all schools and universities.

Although important and with significant impact as shown in Part II of this study, the general sentiment of the survey participants shows a lower importance of fixed and mobile regulation when it comes to ranking it with other choices such as USO or UASF. Still, wholesale access obligations are important measures to facilitate broadband development and access and are in use by most APEC members.

7.3 Internet usage

While the previous chapters have focused on the digital divide driven by accessibility, affordability and technology skill set, consumption of internet services and participation in the internet society are further dependent on content and quality of consumable services available to digital citizens.

(29)Accessibility and affordability are prerequisites to internet usage while technology awareness/skill is an enabler to internet usage. Demand is further generated by content and service availability as well as their respective quality.

This chapter focuses on the consumer demand and consumption feasibility of services in the APEC and outlines the measures how APEC members promote internet usage.

7.3.1 Consumer demand and consumption feasibility of services

Figure 7-12 compares consumer demand and consumption feasibility of services in rural and remote areas as seen by the NRAs and ICT ministries that participated in the APEC broadband survey.

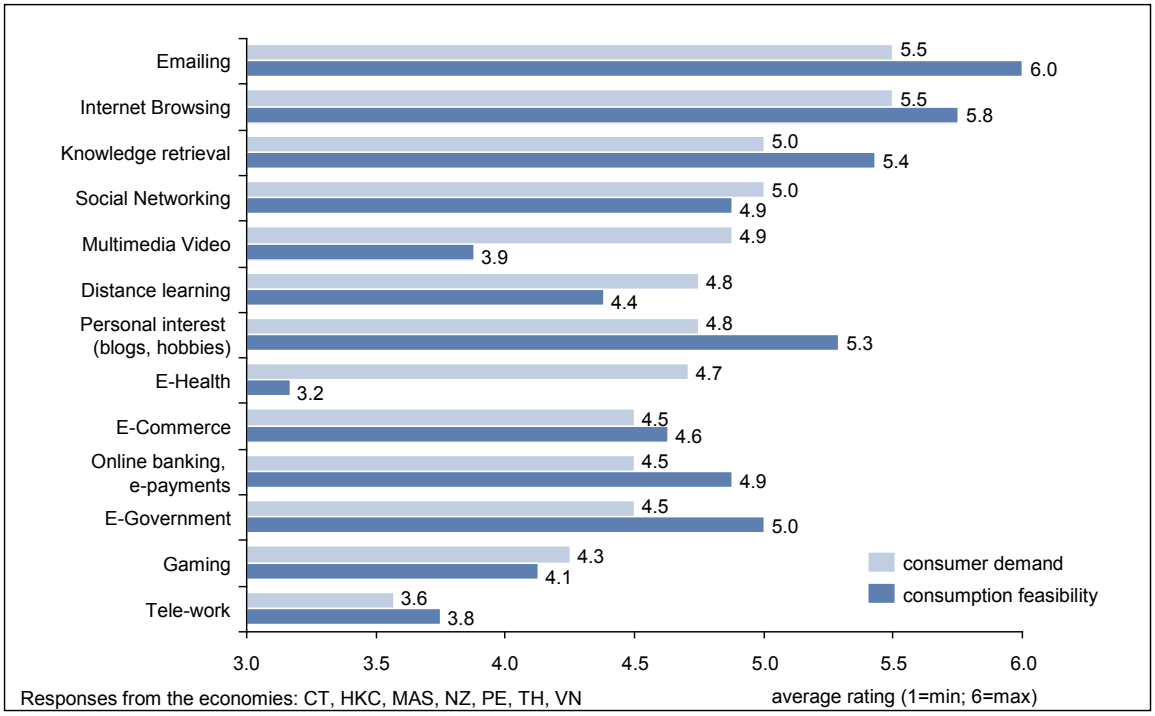

Figure 7-12 APEC members asked in the study to evaluate consumer demand of services in rural areas and compare with the consumption feasibility of these services in rural areas (Source: APEC Broadband study 2011)

On average activities such as Emailing, Internet browsing and Social Networking have the highest demand and are also deemed to be consumable in rural areas given the current network infrastructure. Activities where demand is higher than consumption feasibility are E-Health services, multimedia video, distance learning and Tele-work. Deployments of broadband networks to rural areas have the potential to close this gap and improve consumption feasibility. Particularly E-Health has great potential to improve productivity and treatment quality at rural hospitals as well as increase the reach of treatments though telemedicine. The high rating of consumption feasibility of E-government services provides also a good basis for APEC economies to introduce or to further extend their E-Government services.

Figure 7-13 contains the responses of the APEC Broadband survey and compares measures of promoting general internet usage with measures for reducing the digital divide. While the average maximum ratings for promoting general internet usage tend to be lower than those for reducing the digital divide in rural areas, the top ranking also differs. Government funding priorities, E-Government and education policy lead the list of measures followed by regulatory measures and a supportive legal framework. However, these are average ratings and exclude economies where measures have not been implemented, i.e. HKC and NZ do not focus on government funding priorities at all.

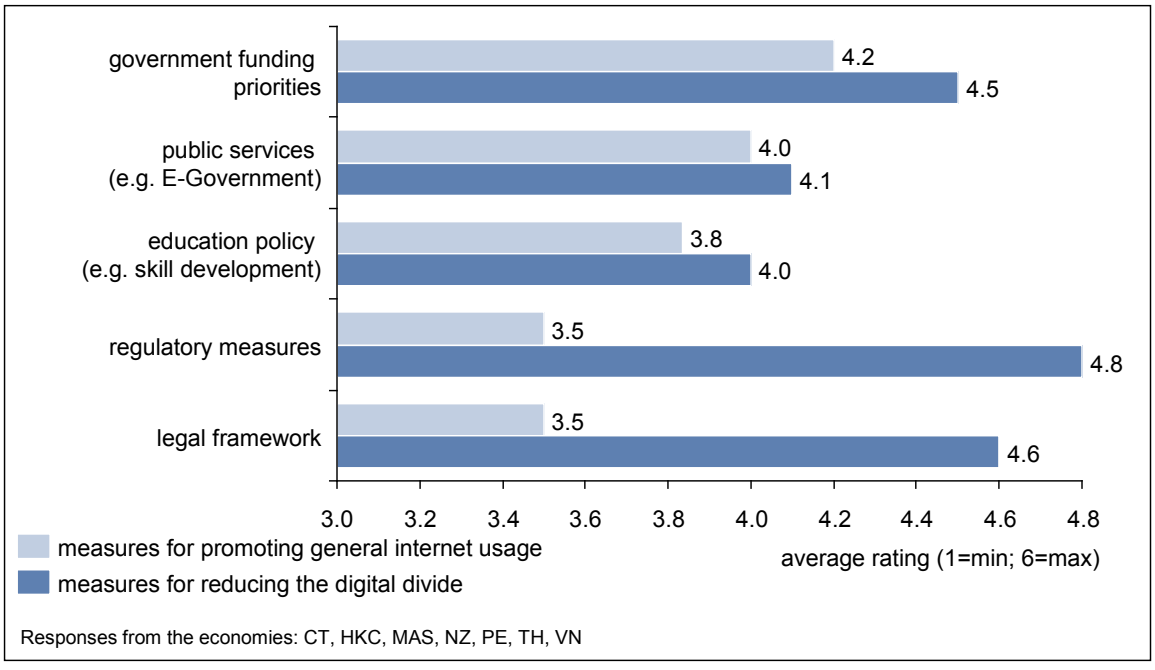

Figure 7-13 APEC members asked in the survey to evaluate importance of public policy measures for promoting general internet usage. Ratings reflect relevance of measures only for economies where the measures have been implemented (Source: APEC broadband survey 2011).

Governments can promote internet usage by providing content and services themselves that are in demand by their citizens (Figure 7-12) and buildup the required capacity to deliver their services. In addition, content promotion policies can be defined to stimulate content development and further create demand among potential internet users. ROK has had several content promotion frameworks in the past starting with establishing legislation and supporting bodies to promote government run programs to evolving to industry specific policies for Media, Broadcast, Online gaming and WebTV. Other APEC economies have integrated content promotion frameworks into their national broadband plans together with infrastructure development goals. However, the focus mostly remains in developing E-Government and E-Health offerings in the local markets. Further examples of APEC member initiatives for promoting internet usage have also been covered in Figure 7-7.

The APEC broadband survey further indicates that E-Government will have the strongest impact on the government-citizen interaction, closely followed by social networks. The results are summarized in Figure 7-14.

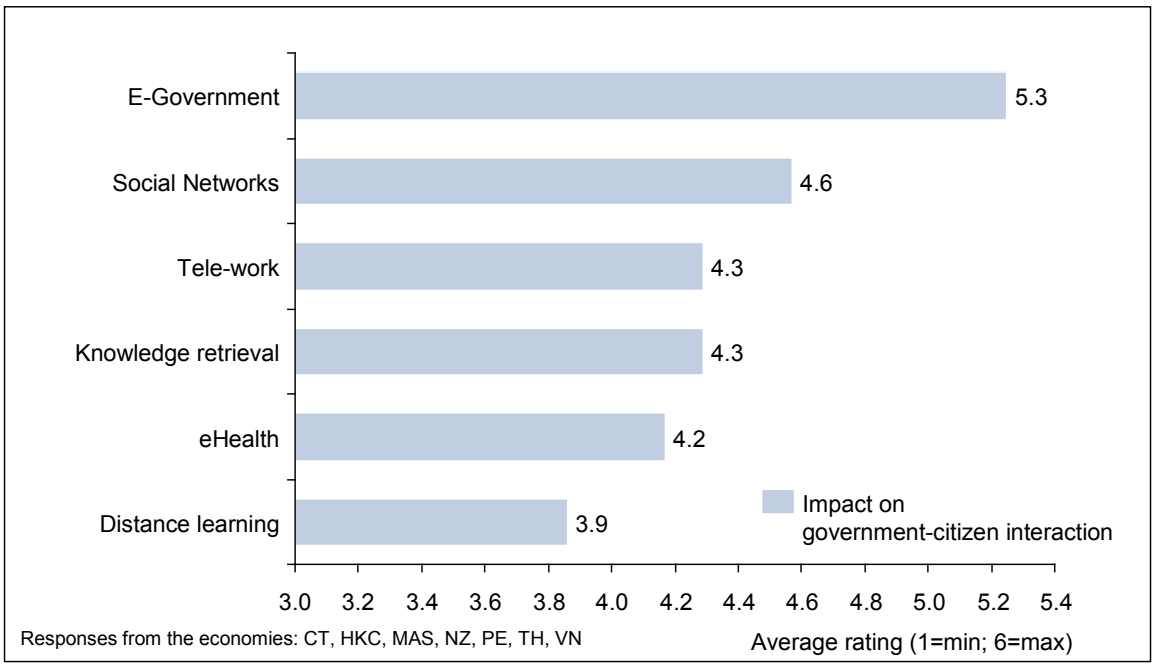

Figure 7-14 APEC members asked in the study to evaluate services according to their impact in changing the interaction between citizens and the government (Source: APEC Broadband study 2011)

ICT integration in public agencies has had a profound impact on increasing efficiency and transparency, while also changing the way citizen interact with the government. Social media has already started to transform public agencies and cannot be ignored in the decision making process. Citizens e.g. in the US are actively following politicians blogs and twitter sites and often have the possibility to directly interact with public

officials. Public agencies must account for these new ways of interaction and incorporate them into their daily work.

(30)E-Government and social networks are changing the interaction between citizens and public agencies. Consumption feasibility of both in rural areas is often given.

The E-Government Development Index[12] (EGDI) developed by the United Nations, is a composite index that measures the capacity of public administrators to use ICT for carrying out public services. Hence, the EGDI is a supply side measure that is used to compare economies relative to each other. Table 7-1 ranks the APEC economies based on the EGDI and compares them to the E-Participation Index[12] (EPI) which indicates the degree of potential citizen interaction through services offered by public agencies. Hence the EPI measures the usefulness and deployment of services that are offered by the public sector.

APEC economies	EGDI	Rank 2010	Rank 2008	Trend	EPI
Republic of Korea	0.8785	1	6	5	1
United States	0.851	2	4	2	0.7571
Canada	0.8448	3	7	4	0.7286
Australia	0.7863	8	8	0	0.9143
Singapore	0.7476	11	23	12	0.6857
New Zealand	0.7311	14	18	4	0.7714
Japan	0.7152	17	11	-6	0.7551
Malaysia	0.6101	32	34	2	0.6571
Chile	0.6014	34	40	6	0.3429
Mexico	0.515	56	37	-19	0.3714
Russia	0.5136	59	60	1	0.1286
Peru	0.4923	63	55	-8	0.1714
Brunei Darussalam	0.4796	68	87	19	0.1714
China	0.47	72	65	-7	0.3714
Thailand	0.4653	76	64	-12	0.0857
Philippines	0.4637	78	66	-12	0.1857
Viet Nam	0.4454	90	91	1	0.0857
Indonesia	0.4026	109	106	-3	0.1286
Papua New Guinea	0.2043	171	166	-5	0.0143

Table 7-1: APEC economies ranked based on the E-Government development Index. CT and HKC omitted due to missing data. The overall ranking in 2010/2008 includes all economies of the United Nations report (Source: United Nations E-Government Survey 2010).

Developed economies leading the EGDI show an increasing trend compared with all economies surveyed by the UN. ROK is the leading economy in terms of E-Government capacity and E-Participation and offers a wide range of highly efficient and interactive services. Korea's leading position in government-citizen interaction is founded in its

[12] See appendix for further explanation of the EGDI and EPI

comprehensive master plans over the past decades. These plans and their implementation paved the way of information society development and increase of ICT use through specific policies promoting E-Government (e.g. information databases, e-elections, e-procurement system), E-Commerce (e.g. revised laws and regulations, improved online payment-, logistics- and security systems), E-learning (e.g. ICT use in schools, multimedia supported learning) and tele-work (e.g. supportive laws and regulations).

Developing economies tend to have lower EGDI scores since high investment into infrastructure, software and government capacity building are required to provide E-Government services. Further inhibiting factors can be lack of human capital as well a heterogeneous ICT infrastructure. However, the relative EPI ranking can differ from the EGDI e.g. PRC ranks in the EGDI lower quartile of the APEC economies, while its EPI is in the upper half of the APEC. This can be interpreted as although PRC's capacity for providing E-Government services ranks relatively low, PRCs service offering in terms of information dissemination and citizen interactivity is relatively high. Indeed, PRC's public agencies have started to enter a dialogue with citizens through e.g. online discussion forums and considered the feedback in public policy making.

It is in the interest of governments to provide qualitative online services to stimulate citizen demand and promote internet usage. Public policy makers should consider E-Government initiatives and broadband development as a part of their NISPs to ensure digital and social inclusion of their citizens.

8 Conclusion

This study evaluates measures for enhancing broadband development and internet usage in the APEC economies. In this context the following key findings are of particular interest:

Broadband access and internet usage in the APEC

- The average mobile broadband penetration in the APEC (35.0%) is significantly higher than the fixed broadband penetration (14.9%) and suggests that mobile technologies play or will play an important role for providing broadband access in the emerging economies.
- Among the fixed line technologies, on average, xDSL usage still dominates in the overall amount of lines, while FTTx has the highest CAGR.
- Higher investments in broadband are not necessarily yielding higher growth rates of broadband penetration. While developed economies focus on costly rural coverage and deploy expensive NGNs, developing economies still have potential to expand on urban broadband deployments that lead to high growth rates in broadband penetration. The annual investment per capita into the telecommunications sector in the APEC is higher in developed economies (> USD 100) than in developing economies (< 54 USD).

Regulatory and financial intervention for promoting broadband development

- NRAs that follow the ladder of investment approach ultimately lead into infrastructure based competition. NRAs that regard infrastructure as public utility and promote network deployment through Public-Private Partnerships, lead into service based competition. Both approaches have different implications for market regulation, particularly access regulation and price levels of wholesale products.
- Wholesale access obligations increase intra-platform competition and product differentiation in dominated markets and lead to higher broadband penetration. 8 out of 9 APEC members that have a fixed broadband penetration greater than 20% mandate ULL obligations while only 3 out of 12 APEC members that mandate ULL have a fixed broadband penetration less than 20%.

- Sharing passive and active infrastructure can promote efficient deployment of new network infrastructure, especially in rural areas. Mechanisms for sharing of risks and rewards are required for effective implementation. Private infrastructure sharing agreements are scrutinized by competition law and can shift market power from the dominant operator.
- Mobile broadband technologies play a key role in achieving coverage in most developing economies. Fixed access regulation is less relevant in these economies because large fixed infrastructures are less developed. An efficient and flexible spectrum management framework is required to develop mobile broadband markets. It lowers market entry barriers, increases competition and leads to higher broadband penetration and geographic coverage.
- The digital dividend will have a massive effect on rapidly increasing broadband penetration and coverage in emerging economies. The superior propagation characteristics of the digital dividend frequency band allow for a rapid rollout of infrastructure at reduced cost and make it perfect for rural network coverage. So far, only the US has released the digital dividend spectrum among the APEC economies, while 9 other economies have plans to perform the digital switchover.
- PPPs create commercial incentives for operators to engage into large scale rollouts of cost intensive Next Generation broadband networks. PPPs in the APEC are used to finance national and regional NGNs. Governments need to create a beneficial environment for engaging private entities in PPP agreements. An established PPP framework and public sector capacity are important prerequisites for drawing private sector interest into PPP.

Importance of the political and socio-economic context for broadband development

- Policy makers must consider the stage of human development, the social and political environment to formulate appropriate policies that can be realistically implemented. The success of the implementation of broadband policies is dependent on the implementers' ability to consider and anticipate specific market factors in the overall implementation process and measure the success of the implementation.
- A solid legal framework is essential to enable NRAs to effectively implement policies. In addition, autonomous regulatory authorities tend to be less prone to be influenced

by external parties which can pursue different interests from the NRA. 13 regulatory authorities in the APEC are independent in their decision making.

- Developed economies in the APEC have more liberal scheduled commitments in the GATS with regards to the different modes of supply than developing economies. Most of the restrictions exist in the field of market access by limiting commercial presence or ownership. The signed FTAs among the APEC members vary in the number of agreements and in the type between bi- and multilateral agreements. The ASEAN connectivity master plan has the broadest implications on broadband and internet usage.
- National broadband plans (NBP) are essential for promoting broadband and internet usage. Financial commitments, measurable targets, coordination and governance of all relevant stakeholders are anchored in the NBP. The NBP itself has to be straight-forward, realistic in its objectives and measurable in its success of implementation.

Bridging the digital divide in the APEC

- Total economic wealth measured in GDP per capita is a strong indicator for the prevalent digital divide. Relative income inequalities within an economy are less relevant.
- Three major factors are drivers of the digital divide and promoters of ICT uptake: accessibility, affordability and technology awareness/skill:
    - Accessibility through mobile technologies is already given in many cases, while affordability and technology awareness are the major obstacles for increasing internet usage in APEC economies. Fixed Broadband prices for developed APEC economies are only 0.86% of monthly GNI while prices of developing economies amount to an average of 8.6% of monthly GNI per capita, making them less affordable for the general public.
    - Affordability of broadband access is crucial to drive faster broadband adoption. It is influenced by various levers such as the right set of regulatory remedies, creating competition in access markets or the right investment vehicles to promote infrastructure development.
    - Technology skill/awareness is an enabler to internet usage and requires upfront accessibility and affordability. Social policy is the key for creating technology awareness and develop human capital.

- Industrial policy is used to promote accessibility and affordability of broadband. On average, APEC members that participated in the survey have identified regulatory measures, a solid legal framework and government funding priorities as the most important factors for bridging the digital divide.
- Regulatory intervention by NRA has a strong impact on providing broadband access as well as improving affordability of services. Universal Service Obligations (USO) and the use of a Universal Access and Service Fund (UASF) are major drivers for providing rural broadband access. While USOs have been mostly used in the past on monopoly or dominant market players, there is an increasing trend to distribute funds through the UASF through competitive bidding.
- Consumer demand and consumption feasibility of services are further drivers of internet usage. According to the APEC survey, on average, activities such as Emailing, Internet browsing and Social Networking have the highest demand and are also deemed to be consumable in rural areas given the current network infrastructure.
- E-Government and social networks are changing the interaction between citizens and public agencies. Consumption feasibility of both in rural areas is often given. APEC economies must build public sector capacity to account for these new ways of interaction and incorporate them into their daily work.

A Appendix

A.1 National Broadband Plans

Economy	Name of the document	Source
Australia	General information on broadband from the Australian Government	http://www.dbcde.gov.au/broadband
	National Broadband Network Policy	http://www.minister.dbcde.gov.au/media/media_releases/2009/022
Brunei	National Broadband Blueprint	http://www.mincom.gov.bn/index.php?option=com_docman&Itemid=77&task=doc_download&gid=1
Canada	Canadas Economic Action Plan	http://www.actionplan.gc.ca/
	Broadband Canada Connecting Rural Canadians	http://www.broadband.gc.ca
Indonesia	Extending Telecommunications in Rural Indonesia	http://www.gpoba.org/gpoba/project/P102476
	Indonesian Group against Digital Divide	http://igadd.org/
Japan	u-Japan Policy	http://www.soumu.go.jp/menu_seisaku/ict/u-japan_en/index.html
	National Broadband Initiative	http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/Releases/NewsLetter/Vol12/Vol12_16.pdf
	e-japan Strategy (Broadband infrastructure deployment through competition)	http://www.kantei.go.jp/foreign/it/network/0122full_e.html
	e-japan Strategy II (Competition & special measures for not profitable areas)	http://www.kantei.go.jp/foreign/policy/it/0702senryaku_e.pdf
	IT New Reform Strategy (Fair competition & private sector incentives)	http://www.kantei.go.jp/foreign/policy/it/ITstrategy2006.pdf
	i-japan Strategy	http://www.kantei.go.jp/foreign/policy/it/i-JapanStrategy2015_full.pdf
Republic of Korea	u-Korea Master Plan	http://www.ipc.go.kr/servlet/download?pt=/ipceng/policy&fn=u-KOREA+Master+Plan+.pdf
	Building an Information ultra Highway	http://world.kbs.co.kr/english/news/news_science_detail.htm?no=4360
Malaysia	National Broadband Plan	http://www.nitc.my/view_file.cfm?fileid=5
	National Broadband Initiative	http://www.skmm.gov.my/index.php?c=public&v=art_view&art_id=324
New Zealand	Broadband Initiative Consultation paper	http://www.med.govt.nz/upload/63958/Final-broadband-initiative-consultation-document.pdf
	General information on broadband from the ICT ministery	http://www.med.govt.nz/templates/StandardSummary____40551.aspx
	Digital Strategy	http://www.med.govt.nz/upload/11162/Digital%20Strategy%202.0%20FINAL.pdf
Philippines	The National Broadband Network (NBN) Project	http://www.chrispforr.net/row2/chrisphil7/nbn/nbn.htm
Singapore	Next Generation National Broadband Network (NBN)	http://www.ida.gov.sg/News%20and%20Events/20080926174755.aspx?getPagetype=20
	Wireless@Singapore	http://www.ida.gov.sg/Programmes/20061027174147.aspx?getPagetype=36
	Singapores Broadband Future iN2015 initiative	http://www.tif.trpc.com.hk/papers/2007/jun/briefing_0706.pdf
Thailand	National Broadband Policy	http://www.mict.go.th/article_attach/Broadband_ENG.pdf
United States	National Broadband Plan - Connecting Americas	http://www.broadband.gov/
	American Recovery and Reinvestment Act of 2009	http://www.recovery.gov/
Chinese Taipei	Broadband Access for Every Village	http://www.cht.com.tw/CHTFinalE/Web/CSR/index.php?cat_id=1162
	e-Taiwan	http://www.etaiwan.nat.gov.tw/
	Digital Convergence Policy Initiative	http://www.gio.gov.tw/ct.asp?xItem=72839&ctNode=2463&mp=807
Hong Kong	Digital 21 Strategy	http://www.info.gov.hk/digital21/eng/strategy/2008/Foreword.htm
China	General Information on Broadband (Chinese Language only)	www.miit.gov.cn/
Chile	Digital Development Strategy	http://www.estrategiadigital.gob.cl/quienes/doc/ed_2007_2012/Digital_Strategy.pdf
Peru	Peru E-Government Master Plan	http://www.ongei.gob.pe/pdf/egovernment.pdf
	Proyecto banda ancha	http://www.mtc.gob.pe/portal/proyecto_banda_ancha/actas.html
Vietnam	"Bringing Vietnam soon to be the powerful ICT country"	http://www.vnpt.com.vn/en/News/NewsEvents/View/tabid/219/newsid/13322/seo/Broardband-goals-should-be-neutral-in-technology/Default.aspx
Mexico	Plan Nacional de Desarrollo	http://pnd.calderon.presidencia.gob.mx/economia-competitiva-y-generadora-de-empleos/telecomunicaciones-y-transportes.html

Figure 8-1 List of national broadband plans and national documents promoting broadband or internet usage, documents. RUS and PNG not available. Hyperlinks last checked on 30/03/2011 (Source: Public available documents, Detecon)

A.2 Summary of National Broadband Plans

Brunei Darussalam's ministry of communication issued a national broadband blueprint beginning 2009 with seven objectives referring to an enhancement of competition, bridge over the digital divide, developing the information society, support of industry growth, support of e-government, implementation of the e-Strategy and making broadband a utility (commodity). Key performance indicators are a broadband household penetration of 40% by 2010 and 75% by 2015, whereas FTTH should contribute 60% of that by that time. Affordability of broadband shall be reduced to BND 10 of a monthly broadband

subscription per 1 Mbps by 2015. The regulatory authority AiTi is also working on a broadband strategy document which has not been published yet.

Hong Kong, China with the highest fixed broadband penetration rate in the APEC announced its Digital 21 strategy in 2008 with five key action areas. The policy aims at facilitating a digital economy, promoting advanced technology and innovation, developing Hong Kong, China as a hub for technological cooperation and trade, enabling the next generation of public services and building an inclusive, knowledge-based society. As integral part of the strategy, ICT indicators of development are measured and tracked in annual reports over time. Investment into broadband is not intended from the government or public authorities; in fact it is up to the operators to invest in the infrastructure.

Indonesia has not published any national documents regarding the broadband development, although the ministry of communication requested from the Indonesia Group Against Digital Divide (IGADD) to formulate a plan for mobilize investments that bring meaningful broadband to 50mn Indonesians in four years, including those at the bottom of the pyramid. Furthermore there have been funds granted from the Global Partnership on Output-based Aid (GPOBA) for extending telecommunications infrastructure and services in a pilot area of 4139 villages in rural Indonesia benefiting about 758210 people.

Japan has numerous policies and initiatives in place that all partially cover broadband issues. The latest policy issued in 2004 called “u-Japan” aimed to achieve a ubiquitous network society by 2010, in which anything and anyone can access networks and transmit information from anywhere at anytime. From a financial perspective, the annual budget for FY 2009 and 2010 includes a broadband infrastructure rollout plan for the rural areas, in order to address the digital divide and to enable broadband access for use by cable TV, telecenters and disaster prevention programs. The budget is to be fully funded by the government and planned for the current fiscal year. Construction of broadband infrastructure is to be assigned to the private sector and contract awards are based on a competitive bidding process.

Mexico issued its National Development Plan for Telecommunications and Transport in 2007 for the consecutive 5 years. The plan shall ensure access and coverage expansion of infrastructure, transport and communications services both nationally and regionally. Mexicans shall be able to communicate and move swiftly and timely throughout the country. To foster telecommunication services, the plan foresees six different strategies implemented to tackle the areas: market competition, building the information society,

technological infrastructure, regulatory frameworks, financing schemes for application development and mechanisms for higher investment into infrastructure. The goal is to develop the technical infrastructure and enable connectivity to reach a broadband coverage of 60% of the overall population. The incumbent operator Telmex announced beginning of 2010 to spend MXN 10bn into infrastructure and internet improvements.

Papua New Guinea has not published any national documents that promote broadband development or internet usage on a national level.

The Republic of the Philippines established a USD 329mn internet broadband project in 2007 to create seamless connectivity among all national and local government agencies as well as local government units. This National Broadband Network Project aimed to enhance the delivery of services to the people by cutting short the time used for waiting for decisions and replies to queries. The project was suspended on September 22, 2007 for contractual issues with the vendor and two months later cancelled by the President.

Chinese Taipei has announced in July 2010 the "Digital Convergence Policy Initiative (2010-2015)." With the completion of the Initiative, by 2015 an estimated 80% of all households in Chinese Taipei will have 100Mbps fixed-line broadband access, with 7.2 million fiber optic subscriptions and 21 million Wireless broadband subscriptions. By that time the penetration of digital cable TV is expected to reach 75% and emerging video services is expected to reach 50%.

Viet Nam has set a number of broadband targets according to the project “Bringing Viet Nam soon to be the powerful ICT country” for 2015 and 2020. By 2015, the economy aims to have rolled out broadband to every community, to have connected all schools to the internet and to have 20% to 30% of households with a PC take-up broadband internet. In 2020, 50-60% of the households shall have PC and broadband internet of which 25-30% shall be on fiber access. VNPT will invest USD 1 bn for fiber cable installation to every community whereas the operator Viettel is implementing the broadband strategy by using 3G technology.

Australia’s National Broadband Network will provide access to high speed broadband to 100 per cent of Australian premises. It will connect 93 per cent of homes, schools and businesses to a high speed fibre network capable of providing broadband speeds of up to 1 gigabit per second (Gbps). All remaining premises will be served by a combination of next generation fixed wireless and satellite technologies providing peak speeds of 12 megabits per second (Mbps).

The United States' broadband plan is part of the American Recovery and Reinvestment Act and was developed by the Federal Communications Commission in numerous workshops, commentary sessions and public hearings. The plan is exploring several key elements of broadband deployment and use. From an investment point of view the USD 2.5bn are allocated to provide broadband service to unserved areas and improve services in underserved areas. USD 4.7bn of funds are allocated towards the Broadband Technologies Opportunities Program to provide and improve access for consumers in unserved areas, to provide support for public interest schemes facilitating access to broadband, to improve broadband uptake by public safety agencies and to stimulate demand for broadband. Furthermore, the plan considers the freeing of 500 MHz spectrum, partially to use mobile broadband services.

The Republic of Korea announced its second broadband plan in February 2009 after completion of the Broadband Convergence Network (BcN). The plan announced by the Korea Communications Commission aims to strengthen Korea's position as one of the world's leading IT economies by increasing broadband speeds tenfold backed by a total investment of KRW 34tr, whereof of KRW 1.3tr is coming from government budget and KRW 32.8tr from private funds. By 2012 the ambitious project will replace 70% of the country's circuit-switched network used for fixed-line telephony, will supply 14mn subscribers with converged broadband network services at 100 Mbps speed and will launch 3.9G/4G ultra broadband services that will enable users to transmit data at an average speed of 10 Mbps wireless connections. Furthermore the government also plans to expand existing digital broadcast coverage from 87% to 96%.

A.3 Summary of GATS

Australia: Australia has settled a quite open policy concerning the telecommunication sector. Package switched services and mobile data services are restricted in terms of commercial presence and market access. No restrictions apply for on-line information, data base retrieval, electronic mail or value added services.

Brunei Darussalam: Brunei Darussalam is placing restrictions by other means than the GATS. At current, most of the areas covered are subject to special agreements and not applicable to the GATS. Telecommunication services, including online information and database retrieval, electronic data interchange and value-added facsimile services are unbound expect for the area cross-border supply, which has to be undertaken by using the public telecommunication network.

Chile: For all telecommunication services, regulations are subject to a commission, license or permit and have to be authorized from the Sub department of Telecommunication.

People Republic of China: Cross Border supply telecommunication services, including value added services, online information- and data retrieval and processing, are not regulated under the GATS, but under special commitments. Restrictions in commercial presence were changed after Chinas accession to the WTO in 2001. Today, foreign shareholding is restricted to 50% all over the country. Foreign investment on packet-switched data transmission services on the domestic market is restricted to 49%.

Canada: Canada has some restriction in place, including packet-switched data transmission services, especially in the area of commercial presence for foreign investment in facilities-based telecommunications service where the voting share must not exceed 46.7%. Nonetheless, some of the sub-sectors have been opened to 100% and competition rules have been regulated, although they are still limited in some areas of Canada. Reviewing the limitations on national treatment of facilities-based telecommunications, 80% of the directors' boards of the companies have to be Canadian.

Republic of Korea: For the telecommunication services, which includes packet-switched data transmission & mobile data services, the provision of all services in the field of cross border supply is subject to commercial arrangements with licensed Korean service suppliers. Commercial presence is restricted to 49% for foreign governments, foreign persons or juridical persons, if the largest shareholder is a foreign government or person. Furthermore, no license will be granted to a juridical person, whose voting share

is owned by a person more than 33% or respectively 10% in case of wireline-based voice telephone services. In all cases, the largest shareholder must be Korean.

Japan: No restrictions apply except for horizontal commitments on the presence of natural persons.

Mexico: Mexico has no regulations on cross border supply for packet-switched data transmission services, except that international traffic must be routed through the facilities of an enterprise that has a license granted by the Ministry of Communications and Transport (SCT). In the case of value added services, a permit is required in order to provide services using radio-electric space. Furthermore in terms of commercial presence, foreign capital is only allowed up to 49%. Additionally, a permit from the SCT is required in order to establish private networks and supply value- added services.

Papua New Guinea: Telecommunication is remaining a monopole under the incumbent TELIKOM PNG Ltd. which has the ability to license other service providers.

Peru: For the area “other telecommunication services”, including packet-switched data transmission services and mobile data services, there are no restrictions for the local market. In matters of service for national and international long-distance communications, suppliers must use the carrier services granted in exclusivity until June 1999.

Chinese Taipei: Telecommunication services and packet-switched data transmission services are not regulated in the area of cross border supply. Companies working with satellite-based mobile communications services need to coordinate with licensed companies. Same rules apply for the commercial presence in the mobile data service sector. In all these cases, commercial presence is regulated strictly, as non Chinese-Taipei shareholding may not exceed 20%. Furthermore, the head and the majority of the director’s board must be Chinese-Taipei citizen, although indirect investments of up to 60% are allowed. In the area of value added communication service, including online information/data base retrieval and online information and/or data processing, no regulations are listed.

USA: Other telecommunication services, including packet-switched data transmission and mobile data services are not regulated in the field of cross-border supply, but in terms of commercial presence. Direct commercial presence is only allowed up to 20% for non-us-governments and citizens. Email services, online information and/or data processing services, as well as online information and data base retrieval are not regulated.

Viet Nam: Cross border supply for wire and satellite based services on basic telecommunication, including packet-switched data transmission services and internet exchange service, is regulated through commercial arrangements. Commercial presence for foreign capital in non-facilities based services is restricted to 65%, in facilities-based services to 49%. Same restrictions are given to value added services and internet access services, although the non- facilities based services are restricted to 51%, facilities based services to 50%.

New Zealand: In every area of Telecommunication Service foreign shareholding is limited to 49.9%. Furthermore, at least half of Board directors are required to be New Zealand citizens.

Singapore: Singapore is not pursuing many regulations under the GATS, where foreign association can be very high. For cross border supply in the area of value added network services, the set up of a local branch is required. Concerning commercial presence, a cumulative total of 73.99% foreign shareholding, based on 49% direct investment and 24.99% indirect investment is allowed.

Indonesia: Nearly every service under the telecommunication section is restricted. In the matter of packet switched public data network service, cross border supply is only possible through networks of the operator PT Indosat and PT Satelindo. Until 2005, the same regulations were given for international internet access services. Commercial presence for foreign entity in both areas is restricted to joint venture and joint operation and only up to a share of 35%. The presence of natural person for management and technical expert for a joint venture company are limited to 20 persons. In the area of electronic mail service and file transfer services, commercial presence access is granted for five foreign service provider companies, in addition to existing companies. National Treatment for foreign investors differs from local companies, as higher paid-up capital is required from foreign service suppliers. The presence of natural persons is limited for directors and technical experts.

A.4 Definition ICT Development Index (IDI)

Definition of the ICT Development Index as specified by “Measuring the Information Society”, V1.01, 2010, ITU-D. Please see source document for detailed definition of the sub-indices.

Item	Weights (indicators)	Weights (Sub-index)
ICT access		
Fixed telephone lines per 100 inhabitants	0.2	
Mobile cellular telephone subscriptions per 100 inhabitants	0.2	0.4
International Internet bandwidth per Internet user	0.2	
Proportion of households with a computer	0.2	
Proportion of households with Internet access at home	0.2	
ICT use		
Internet users per 100 inhabitants	0.33	
Fixed broadband Internet subscribers per 100 inhabitants	0.33	0.4
Mobile broadband subscriptions per 100 inhabitants	0.33	
ICT skills		
Adult literacy rate	0.33	
Secondary gross enrolment ratio	0.33	0.2
Tertiary gross enrolment ratio	0.33	

A.5 Definition ICT Price basket

Definition of the ICT Price Basket as specified by “Measuring the Information Society”, V1.01, 2010, ITU-D. Please see source document for detailed definition of the sub-indices.

Item	Normalize	Weights (Sub-index)
Fixed telephone Monthly subscription 30 local calls (15 peak and 15 off-peak calls) of three minutes each	divided by national average GNI per capita	0.33
Mobile cellular 25 outgoing calls (on-net, off-net and to a fixed line, and for peak, off-peak, and weekend periods) in predetermined ratios	divided by national average GNI per capita	0.33
Fixed broadband internet Monthly subscription to an entry broadband plan (based on 1 Gigabyte)	divided by national average GNI	0.33

A.6 Definition E-Government Index (EGDI)

Definition of the E-Government Development Index as specified by “United Nations E-Government Survey”, 2010, United Nations. Please see source document for detailed definition of the sub-indices.

Item
Online service index
Points for emerging information services
Points for enhanced information services
Points for transaction services
Points for connected approach
Telecommunication index
Personal computer index
Internet user index
Telephone index
Mobile subscription index
Fixed broadband index
Human capital index
Adult litercy index
Gross enrollment index

A.7 Definition E-Participation Index (EPI)

Definition of the E-Participation Index as specified by “United Nations E-Government Survey”, 2010, United Nations. Please see source document for detailed definition of the sub-indices.

Item
Points for E-Information
Points for E-Consultation
Points for E-Decision making

A.8 Definition “active mobile broadband subscriptions”

Active mobile broadband subscriptions refers to the sum of active standard mobile-broadband subscriptions and dedicated mobile-broadband data subscriptions.

Standard mobile subscriptions (only included with active use): Includes mobile subscriptions with advertise data speeds of 256 kbit/s or greater and which have been used to make an Internet data connection via IP in the previous 3 months. To be counted, the subscription must allow access to the greater Internet via HTTP and must have been used to make a data connection using the Internet Protocol in the previous three months. Standard SMS and MMS messaging do not count as an active Internet data connection even if they are delivered via IP.

Dedicated mobile-broadband subscriptions: Subscriptions to dedicated data services over a mobile network which are purchased separately from voice services either as a

stand-alone service (modem/dongle) or as an add-on data package to voice services which requires an additional subscription. All dedicated mobile data subscriptions with recurring subscription fees are included as “active data subscriptions” regardless of actual use. Pre-paid mobile broadband plans require active use if there is no monthly subscriptions. This could also include mobile WiMax subscriptions.

A.9 Survey

Raw format

The survey was conducted using an online tool and converted into the following form for reference purposes

APEC Broadband Survey

1. APEC Broadband Study (TEL03/2009A)

The following online survey is part of the APEC broadband study "Enhancing broadband development and internet usages for improving networks and services in APEC member economies" conducted by Detecon Asia Pacific Co. Ltd. in collaboration with the APEC-Tel (TEL03/2009A).

The objective of the study is to
• Provide relevant information to investors and policy makers in order to promote investment in broadband development and internet usages
• To strengthen governance in member economies through broadband development and internet usages
• To enhance capacity building in broadband development and internet usages

An important part of the study is to survey APEC member economies for gathering important information on broadband development and internet usage to generate further insights for the study.

We would kindly like to invite you to take part in the study by filling out the survey below which has been structured as follows:
1: General Information
2: Broadband Development and Investment
3: Regulatory environment - fixed and mobile
4: Internet usage

It takes about ~30 minutes to complete the survey.

All questions require an answer. If you cannot answer a question or it is not comprehensive enough, please use the question's comment box or select "I don't know".

For your time and participation we would like to thank you very much in advance. Should you have any further questions regarding the survey, please do not hesitate to contact us at info-asia-pacific@detecon.com.

2. General Information

The first part of the survey covers general information about the agency and country you are working in.

Please make sure to include your contact details in case any clarifying questions are needed.

*** 1. Please select the institution you are working for.**

◯ National Regulatory Authority

◯ Government (ICT ministry or equivalent)

Other

*** 2. Please select the country of the institution you are working in.**

*** 3. Please provide some general information about yourself.**

Name, First Name	
Name of agency	
Department:	
E-Mail Address:	
Phone Number:	

APEC Broadband Survey

3. Broadband Investment

This section covers aspects of broadband investment and financing

*** 1. Please indicate which platforms (fixed, mobile, other) and what layer (access, aggregation, backbone) you focus your investments in.**

Please use the drop-down boxes below to indicate the average amount of total funds per year per item (in USD).

	access network	aggregation network	backbone
fixed infrastructure			
mobile infrastructure			
other infrastructure (alternative technologies)			

Comments

*** 2. Looking at the total funds invested as stated in question above, which investment vehicles were used for investing?**
Please estimate the approximate split in percent. All items must add up to 100%.
Example Grants: 30% PPP: 20% Loans: 50% other: 0%

	Investment split in %
Grants	
Loans	
Public Private Partnership (PPP)	
Other	

Please comment on your choice

*** 3. Please indicate whether there have been Public-Private Partnerships (PPP) projects for broadband development in your country in the past, currently ongoing and planned on regional and national level.**

	past projects	ongoing projects	planned projects	I don't know
Regional/Municipal PPP projects				
National PPP projects				

Comments

APEC Broadband Survey

*** 4. Please briefly list the main Public Private Partnership initiatives (national or regional) in the telecommunications sector that**

- **have been successful / effective**
- **have been less successful / not desired result**
- **are ongoing / planned**

4. Broadband development

This section covers information that is related to how broadband development is implemented in your country.

*** 1. Please indicate what kind of plans, decisions or enactments are in place for promoting broadband.**

	available	not available	in preparation	don't know
National Broadband Plan	◯	◯	◯	◯
Sectorial Policies	◯	◯	◯	◯
Laws	◯	◯	◯	◯
Other	◯	◯	◯	◯

Comments

*** 2. Please name the top 3 measures for promoting broadband access in your county**

Measure 1

Measure 2

Measure 3

3. Please briefly describe the measures mentioned above.

APEC Broadband Survey

*** 4. Please rank the following measures according to their importance for promoting rural broadband access in your country.**

For ranking, please select only 1 rank per row. Please skip selection of the measures that do not exist in your country.

	1 least important	2	3	4	5	6	7 very important
Universal Service Obligation	◯	◯	◯	◯	◯	◯	◯
Universal Access and Service Fund	◯	◯	◯	◯	◯	◯	◯
Fixed regulatory intervention (e.g. ULL, BSA)	◯	◯	◯	◯	◯	◯	◯
Mobile regulatory intervention (e.g. Licensing)	◯	◯	◯	◯	◯	◯	◯
financial intervention (e.g. tax incentives)	◯	◯	◯	◯	◯	◯	◯
National Public Private Partnerships	◯	◯	◯	◯	◯	◯	◯
Regional Public Private Partnerships	◯	◯	◯	◯	◯	◯	◯

Please comment on your choices (e.g. If an answer does not apply, further explanation is needed)

5. Regulation - General

This section covers general aspects of regulatory intervention with a focus on fixed line regulation.

*** 1. How would you assess the degree of regulatory intervention in your country?**

	very low	low	medium-low	meduim-high	high	very high	don't know
degree of intervention	◯	◯	◯	◯	◯	◯	◯

Comments

*** 2. Which of the following remedies are mandated by the National Regulatory Authority?**

	available	not available	planned	don't know
Local Loop Unbundling	◯	◯	◯	◯
Line Sharing	◯	◯	◯	◯
Bitstream Access	◯	◯	◯	◯
Resale	◯	◯	◯	◯
Naked DSL	◯	◯	◯	◯

Comments

APEC Broadband Survey

6. Regulation - Spectrum Management

This section covers aspects of regulatory intervention focusing on technical regulation and Spectrum Management practices.

*** 1. Please indicate how spectrum assignment for the licenses of 2G, 3G, 4G, WiMAX has been done/planned.**

Please use the comment field in case of service neutral assignmentsand to further explain your choices.

	assignment mechanism	status
2G		
3G		
4G		
WiMAX		

Comments

*** 2. Please describe the current status of the items below.**

	status
Spectrum assignment for digital dividend	
Existence of spectrum refarming framework	
Existence of spectrum trading framework	
Existence of spectrum liberalization - technology neutrality	
Existence of spectrum liberalization - service neutrality	

Comments

*** 3. In general, please indicate the tendency for using coverage obligations when issuing licenses for mobile phone/broadband usage.**

	0%-25%	25%-50%	50%-75%	75%-100%	don't know
Degree of population coverage obligation	◯	◯	◯	◯	◯
Degree of geographic coverage obligation	◯	◯	◯	◯	◯

Comments

7. Internet usage

This section focuses on general aspects of internet usage in your country

APEC Broadband Survey

*** 1. Please name the top 3 measures to promote internet usage in your country**

Measure 1

Measure 2

Measure 3

*** 2. Please briefly describe the measures mentioned above.**

*** 3. Please evaluate the impact of public policy for promoting general internet usage in your country.**
Please select 'not implemented' if a measure does not apply in your country.

	least imporant				very important	not implemented
regulatory measures	◯	◯	◯	◯	◯	◯
legal framework	◯	◯	◯	◯	◯	◯
government funding priorities	◯	◯	◯	◯	◯	◯
education policy (e.g. skill development)	◯	◯	◯	◯	◯	◯
public services (e.g. eGovernment)	◯	◯	◯	◯	◯	◯

Comments

*** 4. Please evaluate the impact of public policy for reducing the digital divide in your country.**
Please select 'not implemented' if a measure does not apply in your country.

	least imporant				very important	not implemented
regulatory measures	◯	◯	◯	◯	◯	◯
legal framework	◯	◯	◯	◯	◯	◯
government funding priorities	◯	◯	◯	◯	◯	◯
education policy (e.g. skill development)	◯	◯	◯	◯	◯	◯
public services (e.g. eGovernment)	◯	◯	◯	◯	◯	◯

Comments

8. Internet Usage

This section focuses on the different patters on how people use the internet and how governments and regulators promote this usage.

APEC Broadband Survey

*** 1. Please estimate the consumer demand of the following services in rural and remote areas, given full broadband access availability in your country.**

i.e. if everybody has broadband access, which of the following services would be used?

	low demand					high demand	don't know
eHealth	○	○	○	○	○	○	○
eGovernment	○	○	○	○	○	○	○
Distance learning programs	○	○	○	○	○	○	○
Tele-work	○	○	○	○	○	○	○
eCommerce	○	○	○	○	○	○	○
Online banking, e-payments	○	○	○	○	○	○	○
Social Networking	○	○	○	○	○	○	○
Multimedia Video	○	○	○	○	○	○	○
Emailing	○	○	○	○	○	○	○
Knowledge retrieval	○	○	○	○	○	○	○
Gaming	○	○	○	○	○	○	○
Internet Browsing	○	○	○	○	○	○	○
Personal interest (blogs, hobbies)	○	○	○	○	○	○	○

Comments

APEC Broadband Survey

*** 2. Please evaluate the consumption feasibility of the following services in rural and remote areas, given the current broadband access availability in your country.**

i.e. with the current availability of rural broadband access, which of the following services can be used?

	not feasible					feasible	don't know
eHealth	○	○	○	○	○	○	○
eGovernment	○	○	○	○	○	○	○
Distance learning programs	○	○	○	○	○	○	○
Tele-work	○	○	○	○	○	○	○
eCommerce	○	○	○	○	○	○	○
Online banking, e-payments	○	○	○	○	○	○	○
Social Networking	○	○	○	○	○	○	○
Multimedia Video	○	○	○	○	○	○	○
Emailing	○	○	○	○	○	○	○
Knowledge retrieval	○	○	○	○	○	○	○
Gaming	○	○	○	○	○	○	○
Internet Browsing	○	○	○	○	○	○	○
Personal interest (blogs, hobbies)	○	○	○	○	○	○	○

Comments

*** 3. Please rank the following services according to their impact in changing the interaction between citizens and the state.**

	least impact					highest impact	don't know
eHealth	○	○	○	○	○	○	○
eGovernment	○	○	○	○	○	○	○
Distance learning programs	○	○	○	○	○	○	○
Tele-work	○	○	○	○	○	○	○
Knowledge retrieval	○	○	○	○	○	○	○
Social Networks	○	○	○	○	○	○	○

Comments

List of survey respondents

APEC member	Malaysia
Type of agency	National Regulatory Authority
Name, First Name	HISHAMRUDIN, MAZLAN
Name of agency	MALAYSIAN COMMUNICATIONS AND MULTIMEDIA COMMISSION
Department	BROADBAND MANAGEMENT
E-Mail Address	hishamrudin.mazlan@cmc.gov.my
Phone Number	60386888185

APEC member	Hong Kong, China
Type of agency	National Regulatory Authority
Name, First Name	SIN, Kwok Kei
Name of agency	Office of the Telecommunications Authority (OFTA)
Department	EA1
E-Mail Address	kksin@ofta.gov.hk
Phone Number	n/a

APEC member	Thailand
Type of agency	Government (ICT ministry or equivalent)
Name, First Name	Phiromswad, Panida
Name of agency	TOT Public Company Limited
Department	Strategic Department
E-Mail Address	ppanida@tot.co.th
Phone Number	6625759173

APEC member	Peru
Type of agency	National Regulatory Authority
Name, First Name	Gallo, Mario
Name of agency	Organismo Supervisor de la Inversión Privada en Telecomunicaciones - OSIPTEL
Department	Lima
E-Mail Address	mgallo@osiptel.gob.pe
Phone Number	(511)+2251313

APEC member	Peru
Type of agency	Government (ICT ministry or equivalent)
Name, First Name	Moschella, Fiorella
Name of agency	Ministry of Transports and Communications
Department	Direction of Regulation and International Affairs of Communications
E-Mail Address	fmoschella@mintc.gob.pe
Phone Number	(511) 6157800

APEC member	Viet Nam
Type of agency	Government (ICT ministry or equivalent)
Name, First Name	Quyen, Nguyen Quy
Name of agency	MIC Viet Nam
Department	International Cooperation Dept.
E-Mail Address	nqquyen@mic.gov.vn
Phone Number	+84-4-3822 9377

APEC member	Chinese Taipei
Type of agency	National Regulatory Authority
Name, First Name	LIN, Yung-Yu
Name of agency	National Communications Commission
Department	Planning
E-Mail Address	yungyu@ncc.gov.tw
Phone Number	+886-2-23433973

APEC member	New Zealand
Type of agency	Government (ICT ministry or equivalent)
Name, First Name	March, Frank
Name of agency	Ministry of Economic Development
Department	Communications and IT Policy Group
E-Mail Address	frank.march@med.govt.nz
Phone Number	6421494165

Completed full survey responses

Please select the institution you are working for.	Response Other	National Regulatory Authority	National Regulatory Authority
Please select the country of the institution you are working in.	Response	Malaysia	Hong Kong, China
Please provide some general information about yourself.	Name, First Name	HISHAMRUDIN, MAZLAN	SIN, Kwok Kei
	Name of agency	MALAYSIAN COMMUNICATIONS AND MULTIMEDIA COMMISSION	Office of the Telecommunications Authority (OFTA)
	Department:	BROADBAND MANAGEMENT	EA1
	E-Mail Address:	hishamrudin.mazlan@cmc.gov.my	kksin@ofta.gov.hk
	Phone Number:	60386888185	
Please indicate which platforms (fixed, mobile, other) and what layer (access, aggregation, backbone) you focus your investments in. Please use the drop-down boxes below to indicate the average amount of total funds per year per item (in USD).	fixed infrastructure - access network	between $50-$100mn	no investment
	fixed infrastructure - aggregation network	between $50-$100mn	no investment
	fixed infrastructure - backbone	between $50mn-$100mn	no investment
	mobile infrastructure - access network	no investment	no investment
	mobile infrastructure - aggregation network	no investment	no investment
	mobile infrastructure - backbone	no investment	no investment
	other infrastructure (alternative technologies) - access network	no investment	no investment
	other infrastructure (alternative technologies) - aggregation network	no investment	no investment
	other infrastructure (alternative technologies) - backbone	no investment	no investment
	Comments		The government of HKC does not use public money to fund telecommunications infrastructure.
Looking at the total funds invested as stated in question above, which investment vehicles were used for investing? Please estimate the approximate split in percent. All items must add up to 100%. Example Grants: 30% PPP: 20% Loans: 50% other: 0%	Grants - Investment split in %		
	Loans - Investment split in %		
	Public Private Partnership (PPP) - Investment split in %	100%	
	Other - Investment split in %		
	Please comment on your choice		
Please indicate whether there have been Public-Private Partnerships (PPP) projects for broadband development in your country in the past, currently ongoing and planned on regional and national level.	Regional/Municipal PPP projects - past projects		
	Regional/Municipal PPP projects - ongoing projects		
	Regional/Municipal PPP projects - planned projects		
	Regional/Municipal PPP projects - I don't know		
	National PPP projects - past projects		
	National PPP projects - ongoing projects	ongoing projects	
	National PPP projects - planned projects		
	National PPP projects - I don't know		
	Comments		
Please briefly list the main Public Private Partnership initiatives (national or regional) in the telecommunications sector that have been successful / effective, have been less successful / not desired result,are ongoing / planned	Open-Ended Response	High Speed Broadband (HSBB) Project between Government and Telekom Malaysia through Public Private Partnership Agreement.	
Please indicate what kind of plans, decisions or enactments are in place for promoting broadband.	National Broadband Plan	available	not available
	Sectorial Policies	available	
	Laws	available	available
	Other		
	Comments		Under Section 36AA of Telecommunications Ordinance (TO), the Telecommunications Authority (TA) may direct a licensee to coordinate and cooperate with another licensee specified by the Authority in the public interest to share the use of any facility owned or used by it.
Please name the top 3 measures for promoting broadband access in your county	Measure 1	public private partnership for high speed broadband	Pro-competition, pro-consumer and light-handed regulatory approach
	Measure 2	broadband to general population	Sharing of infrastructure

	Measure 3	universal service provision	
Please briefly describe the measures mentioned above.	Open-Ended Response		
Please rank the following measures according to their importance for promoting rural broadband access in your country. For ranking, please select only 1 rank per row. Please skip selection of the measures that do not exist in your country.	Universal Service Obligation	6	6
	Universal Access and Service Fund	7 very important	
	Fixed regulatory intervention (e.g. ULL, BSA)	2	
	Mobile regulatory intervention (e.g. Licensing)	3	
	financial intervention (e.g. tax incentives)	4	
	National Public Private Partnerships	5	
	Regional Public Private Partnerships	1 least important	
	Please comment on your choices (e.g. If an answer does not apply, further explanation is needed)		
How would you assess the degree of regulatory intervention in your country?	degree of intervention	meduim-high	low
	Comments		
Which of the following remedies are mandated by the National Regulatory Authority?	Local Loop Unbundling	planned	available
	Line Sharing	planned	
	Bitstream Access	available	
	Resale	planned	
	Naked DSL	don't know	
	Comments		Mandatory Type II interconnection (i.e. local loop unbundling) at building level is maintained becasue “Bottleneck” may still exist inside buildings
Please indicate how spectrum assignment for the licenses of 2G, 3G, 4G, WiMAX has been done/planned. Please use the comment field in case of service neutral assignmentsand to further explain your choices.	2G - assignment mechanism	competitive	competitive
	2G - status	completed	completed
	3G - assignment mechanism	competitive	competitive
	3G - status	completed	completed
	4G - assignment mechanism		competitive
	4G - status	planned	completed
	WiMAX - assignment mechanism	competitive	
	WiMAX - status	completed	
	Comments		
Please describe the current status of the items below.	Spectrum assignment for digital dividend - status	planned	not started
	Existence of spectrum refarming framework - status	completed	completed
	Existence of spectrum trading framework - status	i don't know	not started
	Existence of spectrum liberalization - technology neutrality - status	completed	
	Existence of spectrum liberalization - service neutrality - status	completed	
	Comments		
In general, please indicate the tendency for using coverage obligations when issuing licenses for mobile phone/broadband usage.	Degree of population coverage obligation	don't know	50%-75%
	Degree of geographic coverage obligation	don't know	
	Comments		
Please name the top 3 measures to promote internet usage in your country	Measure 1	development of telecenters	Open the market and formulate regulatory framework that is conducive to competition.
	Measure 2	universal service provision	Set up WiFi hotspots at government premises throughout the territory and provide the public with free access to broadband Internet service therein.
	Measure 3		
Please briefly describe the measures mentioned above.	Open-Ended Response		
Please evaluate the impact of public policy for promoting general internet usage in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	2	5 very important
	legal framework	2	4
	government funding priorities	4	not implemented
	education policy (e.g. skill development)	4	
	public services (e.g. eGovernment)	5 very important	3

	Comments		
Please evaluate the impact of public policy for reducing the digital divide in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	4	5 very important
	legal framework	5 very important	4
	government funding priorities	3	not implemented
	education policy (e.g. skill development)	4	
	public services (e.g. eGovernment)	5 very important	3
	Comments		
Please estimate the consumer demand</u> of the following services in rural and remote areas, given full broadband access availability in your country. i.e. if everybody has broadband access, which of the following services would be used?	eHealth	3	don't know
	eGovernment	3	4
	Distance learning programs	5	3
	Tele-work	2	3
	eCommerce	4	4
	Online banking, e-payments	4	4
	Social Networking	5	5
	Multimedia Video	5	5
	Emailing	6 high demand	6 high demand
	Knowledge retrieval	6 high demand	3
	Gaming	5	4
	Internet Browsing	5	6 high demand
	Personal interest (blogs, hobbies)	5	4
	Comments		
Please evaluate the consumption feasibility of the following services in rural and remote areas, given the current broadband access availability in your country. i.e. with the current availability of rural broadband access, which of the following services can be used?	eHealth	3	don't know
	eGovernment	4	6 feasible
	Distance learning programs	4	6 feasible
	Tele-work	2	6 feasible
	eCommerce	6 feasible	6 feasible
	Online banking, e-payments	6 feasible	6 feasible
	Social Networking	6 feasible	6 feasible
	Multimedia Video	4	6 feasible
	Emailing	6 feasible	6 feasible
	Knowledge retrieval	6 feasible	6 feasible
	Gaming	5	6 feasible
	Internet Browsing	6 feasible	6 feasible
	Personal interest (blogs, hobbies)	6 feasible	6 feasible
	Comments		
Please rank the following services according to their impact in changing the interaction between citizens and the state.	eHealth	4	
	eGovernment	6 highest impact	5
	Distance learning programs	4	
	Tele-work	3	
	Knowledge retrieval	6 highest impact	
	Social Networks	6 highest impact	
	Comments		

Please select the institution you are working for.	Response	Government (ICT ministry or equivalent)	National Regulatory Authority
	Other		
Please select the country of the institution you are working in.	Response	Peru	Peru
Please provide some general information about yourself.	Name, First Name	Moschella, Fiorella	Gallo, Mario
	Name of agency	Ministry of Transports and Communications	Organismo Supervisor de la Inversión Privada en Telecomunicaciones – OSIPTEL
	Department:	Direction of Regulation and International Affairs of Communications	Lima
	E-Mail Address:	fmoschella@mintc.gob.pe	mgallo@osiptel.gob.pe
	Phone Number:	(511) 6157800	(511)+2251313
Please indicate which platforms (fixed, mobile, other) and what layer (access, aggregation, backbone) you focus your investments in. Please use the drop-down boxes below to indicate the average amount of total funds per year per item (in USD).	fixed infrastructure - access network	up to $50mn	no investment
	fixed infrastructure - aggregation network		no investment
	fixed infrastructure - backbone		no investment
	mobile infrastructure - access network	up to $50mn	no investment

	mobile infrastructure - aggregation network		no investment
	mobile infrastructure - backbone		no investment
	other infrastructure (alternative technologies) - access network		no investment
	other infrastructure (alternative technologies) - aggregation network		no investment
	other infrastructure (alternative technologies) - backbone		no investment
	Comments	It only considers the average amount already invested. The fixed infrastructure also considers Internet access.	OSIPTEL is the Peruvian National Regulatory Authority, whose mandate is to regulate, supervise and oversee, within the scope of its competence, the market development of public telecommunications services and the behavior of the operating companies, with other companies and users, ensuring service quality and efficiency, by regulating the balance of market tariffs and facilitating efficient use of public telecommunications services. Therefore, OSIPTEL does not invest in deploying telecommunications networks. Universal Service Fund (FITEL), managed by MTC, and co-chaired by OSIPTEL (President of OSIPTEL is member of the Board of Directors), designs and co-finances the deployment of rural networks with private operators.
Looking at the total funds invested as stated in question above, which investment vehicles were used for investing? Please estimate the approximate split in percent. All items must add up to 100%. Example Grants: 30% PPP: 20% Loans: 50% other: 0%	Grants - Investment split in %	100%	
	Loans - Investment split in %		
	Public Private Partnership (PPP) - Investment split in %		
	Other - Investment split in %		
	Please comment on your choice	The grants are given through the Telecommunication Investment Fund (FITEL)	As mentioned above, OSIPTEL is the Peruvian National Regulatory Authority. We don't invest in deploying telecommunications networks.
Please indicate whether there have been Public-Private Partnerships (PPP) projects for broadband development in your country in the past, currently ongoing and planned on regional and national level.	Regional/Municipal PPP projects - past projects		past projects
	Regional/Municipal PPP projects - ongoing projects		ongoing projects
	Regional/Municipal PPP projects - planned projects		
	Regional/Municipal PPP projects - I don't know		
	National PPP projects - past projects	past projects	past projects
	National PPP projects - ongoing projects	ongoing projects	ongoing projects
	National PPP projects - planned projects	planned projects	planned projects
	National PPP projects - I don't know		
	Comments	The Telecommunications Investment Fund (FITEL), is not properly an Public Private Partnership; it consist in giving grants to the private operators to promote the develop of telecommunications in rural areas. However, the projects have a national scope, and are under the State supervision.	OSIPTEL is supporting that public funds co-finance the national fiber backbone via private public partnerships.

Please briefly list the main Public Private Partnership initiatives (national or regional) in the telecommunications sector that have been successful / effective, have been less successful / not desired result,are ongoing / planned	Open-Ended Response		• Have been successful / effective The Universal Service Fund (FITEL), which manages the PPP initiatives for the Peruvian telecommunications sector, has carried out several projects to provide broadband access in rural areas: oï 'Banda Ancha Rural', awarded to Rural Telecom in 2007. oï 'Banda Ancha para localidades aisladas', awarded to Telefonica del Perú in 2009. oï 'Banda Ancha Rural Juliaca – Puerto Maldonado', awarded to America Movil in 2010. oï 'Buenos Aires - Canchaque', awarded to Winner Systems in 2010. oï 'Banda Ancha VRAE y Camisea - Lurin' , awarded to Gilat to Home in 2010. •Have been less successful / not desired result Regarding the project 'Banda Ancha Rural', it has experienced some delays for assuming that incumbent operator would have enough capacity in its edge facilities in order to provide it to the rural operator. Negotiations in order to co finance new capacity delayed the project. There have been concerns in 'Banda Ancha Rural Juliaca – Puerto Maldonado' project since the project was conceived for a vertical integrated operator that c
Please indicate what kind of plans, decisions or enactments are in place for promoting broadband.	National Broadband Plan Sectorial Policies Laws Other Comments	in preparation available available	in preparation in preparation in preparation in preparation In the last two decades, many laws and regulations as well as National Telecommunications Guidelines and Frameworks have been issued, enacted and implemented. These initiatives enabled great achievements in the sector, however, the high dynamism of the telecommunication sector imposes new challenges such as broadband and convergence, therefore, the policies are being focused in that direction.
Please name the top 3 measures for promoting broadband access in your county	Measure 1 Measure 2 Measure 3	FITEL Projects National Broadband Plan Project of Optical Fiber Backbone	Measures to make broadband infrastructure and appropriate broadband service offerings, available to the population. In this sense we need to promote the construction of a fiber-based nationwide backbone, improve the regulations that rule infrastructure sharing issues, and remove local government's barriers for the deployment of infrastructure of telecommunications. We also need to improve measures to promote competition especially in the access networks. Measures to stimulate demand and the inclusion of the population in the Information Society, we can achieve this objective by making sales Tax exemption for lower price personal computers, enforce connectivity to health facilities and schools, encourage the creation and development of innovative digital content and applications, and e-government; and propose a strategic training plan aimed at developing national capacities and skills in using ICT among the population. Measures to strength the Institutional Framework oriented to the convergent environment of Information and Communication Technologies, in order to integrate levels of planning, design, implementation and evaluation of all public policies and strategies, and to assure that institutions can accomplish the mandates and objectives for which they have been created.
Please briefly describe the measures mentioned above.	Open-Ended Response	4.ï The FITEL projects consist on giving grants and supervise its execution. Nowadays, there are three projects for universal access to broadband (North, Central and South of the country). The measures mentioned above are in process.	Measure 1: Due to the insufficient infrastructure and relatively low competence in Peru, some measures are needed to promote the deployment of high capacity transport networks, eliminate barriers that prevent deployment of access networks, and increase competition levels especially in the presence of a strong dominant. Measure 2: some of the proposed initiatives are intended to readily provide broadband Internet access to users. Other proposals try to increase the generation of content and applications whereas measures for building digital abilities and capacities are also addressed. Measure 3: In this group, the measures are focused in integrating the planning, implementation and evaluation stages of public policies for both telecommunications and information services. Also, initiatives that seek improving statistics measurements are included. Sometimes also public institutions are moved by uncoordinated goals, politics or lobbyist pressures from dominants that impede to achieve their mandated objectives.

Please rank the following measures according to their importance for promoting rural broadband access in your country. For ranking, please select only 1 rank per row. Please skip selection of the measures that do not exist in your country.	Universal Service Obligation		
	Universal Access and Service Fund	7 very important	
	Fixed regulatory intervention (e.g. ULL, BSA)	6	4
	Mobile regulatory intervention (e.g. Licensing)	5	
	financial intervention (e.g. tax incentives)	3	5
	National Public Private Partnerships	4	6
	Regional Public Private Partnerships	2	7 very important
	Please comment on your choices (e.g. If an answer does not apply, further explanation is needed)	where is not marked theres no measured implemented.	Please consider that rural is not similar in Peru than in other countries, even urban – marginal areas in Peru lack heavily broadband services. In Peru rural mean strongly isolated.
How would you assess the degree of regulatory intervention in your country?	degree of intervention	low	meduim-high
	Comments		The degree of regulatory intervention is neither intensive nor overwhelming, but seek for a healthy growth of the market. Basically, OSIPTEL regulates fixed telephony tariffs, interconnection, DSL bitstream access and leased lines. OSIPTEL is also the competition authority, and has power to regulate both ex-ante and ex-post. Also, OSIPTEL's policies try to increase competition and fair market rules. One of the ex-ante rules that is under study is the Significant Market Power framework which is expected to be issued within the next two years. It should be noted that OSIPTEL does not regulate mobile telephony nor broadband tariffs.
Which of the following remedies are mandated by the National Regulatory Authority?	Local Loop Unbundling	not available	not available
	Line Sharing	not available	not available
	Bitstream Access	available	available
	Resale	available	available
	Naked DSL	not available	planned
	Comments	About bitstream access, the National Regulatory Authority issued the measure but is not yet implemented.	Nowadays, OSIPTEL is working on preparing the regulation of Bitstream Access at IP and ATM level. This regulation must be ready at the end of the present year.
Please indicate how spectrum assignment for the licenses of 2G, 3G, 4G, WiMAX has been done/planned. Please use the comment field in case of service neutral assignmentsand to further explain your choices.	2G - assignment mechanism	competitive	competitive
	2G - status	completed	completed
	3G - assignment mechanism	competitive	competitive
	3G - status	completed	completed
	4G - assignment mechanism	competitive	competitive
	4G - status	not started	planned
	WiMAX - assignment mechanism	competitive	competitive
	WiMAX - status	planned	completed
	Comments	Almost all spectrum in bands 800 MHz and 1900 MHz for 2G and 3G has already been assigned. Last 25 MHz in band 1900 MHz has been allocated in a bidding process this year to one bidder, but assignment is pending. In March, Ministry has instructed the Promotion Agency (Proinversión) to make the arrangements for bidding the band 1.7/2.1 GHz for 4G services. The process is in force. Ministry has allocated band 700 MHz for public telecommunication services. Refarming provisions are under study, considering the migration of assignments for broadcasting stations. Regarding WIMAX, it is necessary to point out that Peru does not regulate technology but services, so operators can choose the technology that consider the best to provide services. There are some bands that can be used for Wimax deployments, 3.5 GHz, 2.5 GHz and 2.3 GHz. Spectrum in band 3.5 GHz was assigned by auction many years ago and operators are using the band for broadband deployments. Band 2.5 GHz was assigned for wireless cable many years ago, mainly in the city of Lima. Spectrum available in such band after the refarming process was assig	2G and 3G services are offered in 850 and 1900MHz bands. This year, it is expected that either the 700 MHz or 1.7/2.1GHz band will be auctioned. In these bands, operators will offer 3G and 4G services. In the 2.5GHz and 3.5 GHz band, mobile WiMAX networks have moderately been implemented. In Peru, assignments of bands are technologically neutral, they are attributed for a particular public telecommunications services (i.e. mobile communications) and not to specific technologies or stages of technologies (GSM, 2G, 3G, 4G).
Please describe the current status of the items below.	Spectrum assignment for digital dividend - status	planned	planned
	Existence of spectrum refarming framework - status	planned	not started

	Existence of spectrum trading framework - status	i don't know	not started
	Existence of spectrum liberalization - technology neutrality - status	completed	completed
	Existence of spectrum liberalization - service neutrality - status	i don't know	planned
	Comments	In March 2011, Ministry allocated band 700 MHz for public telecommunication services. Also a working document was published for comments, in order to have the industry opinion regarding the frequency arrangement to be used in such band. Ministry is studying comments received. In the case of digital dividend band, Ministry is evaluating the timeframe and other provisions for the migration of broadcasting stations authorized in band 698-746 MHz.	Peru has already chosen the digital television standard, and the digital dividend –which is in its early steps, has not yet been implemented. However, the national spectrum authority has issued a modification in the Peruvian Attribution Frequency Plan (PNAF), where the 700MHz band (698-806MHz) has been reserved for public telecommunications services.
In general, please indicate the tendency for using coverage obligations when issuing licenses for mobile phone/broadband usage.	Degree of population coverage obligation	don't know	don't know
	Degree of geographic coverage obligation	75%-100%	don't know
	Comments		There is not a position about this issue. For example, in the last auction (portion of 1900MHz band) there were not population/geographic coverage obligations, and the unique obligation was to bring broadband access to a group of public schools. However, even though past spectrum auctions had considered coverage obligations, the main focus was the sum of money obtained from the auction.
Please name the top 3 measures to promote internet usage in your country	Measure 1	FITEL projects	Fostering the use of Information and Communications Technologies (ICT) in schools.
	Measure 2	National Broadband Plan	Funding for telecommunications services in rural areas and places of preferential social interest declared by the Telecommunications Investment Fund (FITEL).
	Measure 3	Project of Optical Fiber Backbone	The establishment of various e-government portals and online information services.
Please briefly describe the measures mentioned above.	Open-Ended Response	4.- The FITEL projects consist on giving grants and supervise its execution. Nowadays, there are three projects for universal access to broadband (North, Central and South of the country). The measures mentioned above are in process.	•The Ministry of Education has made efforts to introduce ICT in schools through the Education Project "Huascaran", which was created to promote distance education services, educational networks and educational portals; playing an essential role in encouraging the use of ICTs. •Through the decentralization process, a program of regional connectivity had been developed, promoting the intensive use of ICT. By this program, the government funds telecommunications services in rural areas and places of preferably social interest (declared by the Telecommunications Investment Fund-FITEL), in order to promote access for people in rural areas to telephony and Internet services. •Various portals and online information services have been developed, such as the Administrative Transparency Portal, managed by the Ministry of Economy and Finance. Through this portal (http://www.peru.gob.pe), citizens can access to government accounts, information, services and administrative procedures in different government departments.
Please evaluate the impact of public policy for promoting general internet usage in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	4	3
	legal framework	4	3
	government funding priorities	5 very important	5 very important
	education policy (e.g. skill development)	2	4
	public services (e.g. eGovernment)	5 very important	4
	Comments		
Please evaluate the impact of public policy for reducing the digital divide in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	5 very important	4
	legal framework	5 very important	4
	government funding priorities	5 very important	5 very important
	education policy (e.g. skill development)	2	5 very important
	public services (e.g. eGovernment)	5 very important	3
	Comments		

Please estimate the consumer demand</u> of the following services in rural and remote areas, given full broadband access availability in your country. i.e. if everybody has broadband access, which of the following services would be used?	eHealth	2	6 high demand
	eGovernment	2	5
	Distance learning programs	5	5
	Tele-work	3	3
	eCommerce	4	4
	Online banking, e-payments	4	5
	Social Networking	6 high demand	3
	Multimedia Video	6 high demand	5
	Emailing	6 high demand	5
	Knowledge retrieval	5	5
	Gaming	6 high demand	1 low demand
	Internet Browsing	6 high demand	5
	Personal interest (blogs, hobbies)	6 high demand	3
	Comments	Based on ENAHO Oct - Nov - Dec 2010.	
Please evaluate the consumption feasibility of the following services in rural and remote areas, given the current broadband access availability in your country. i.e. with the current availability of rural broadband access, which of the following services can be used?	eHealth	don't know	2
	eGovernment	6 feasible	3
	Distance learning programs	5	3
	Tele-work	4	1 not feasible
	eCommerce	5	2
	Online banking, e-payments	6 feasible	2
	Social Networking	6 feasible	1 not feasible
	Multimedia Video	5	2
	Emailing	6 feasible	6 feasible
	Knowledge retrieval	6 feasible	don't know
	Gaming	5	1 not feasible
	Internet Browsing	6 feasible	5
	Personal interest (blogs, hobbies)	6 feasible	3
	Comments		
Please rank the following services according to their impact in changing the interaction between citizens and the state.	eHealth	don't know	5
	eGovernment	5	5
	Distance learning programs	4	5
	Tele-work	6 highest impact	3
	Knowledge retrieval	6 highest impact	4
	Social Networks	5	4
	Comments		

Please select the institution you are working for.	Response	Government (ICT ministry or equivalent)	Government (ICT ministry or equivalent)
	Other		
Please select the country of the institution you are working in.	Response	Thailand	Viet Nam
Please provide some general information about yourself.	Name, First Name	Phiromswad, Panida	Quyen, Nguyen Quy
	Name of agency	TOT Public Company Limited	MIC Viet Nam
	Department:	Strategic Department	International Cooperation Dept.
	E-Mail Address:	ppanida@tot.co.th	nqquyen@mic.gov.vn
	Phone Number:	6625759173	+84-4-3822 9377
Please indicate which platforms (fixed, mobile, other) and what layer (access, aggregation, backbone) you focus your investments in. Please use the drop-down boxes below to indicate the average amount of total funds per year per item (in USD).	fixed infrastructure - access network	between $0.5-1bn	
	fixed infrastructure - aggregation network	I don't know	
	fixed infrastructure - backbone	between $0.5-1bn	
	mobile infrastructure - access network	between $1-2bn	
	mobile infrastructure - aggregation network	I don't know	
	mobile infrastructure - backbone	between $1-2bn	
	other infrastructure (alternative technologies) - access network	between $100-500mn	
	other infrastructure (alternative technologies) - aggregation network	I don't know	
	other infrastructure (alternative technologies) - backbone	between $100-500mn	
	Comments		I do not know.

Looking at the total funds invested as stated in question above, which investment vehicles were used for investing? Please estimate the approximate split in percent. All items must add up to 100%. Example Grants: 30% PPP: 20% Loans: 50% other: 0%	Grants - Investment split in % Loans - Investment split in % Public Private Partnership (PPP) - Investment split in % Other - Investment split in % Please comment on your choice	80%	I do not know.
Please indicate whether there have been Public-Private Partnerships (PPP) projects for broadband development in your country in the past, currently ongoing and planned on regional and national level.	Regional/Municipal PPP projects - past projects Regional/Municipal PPP projects - ongoing projects Regional/Municipal PPP projects - planned projects Regional/Municipal PPP projects - I don't know National PPP projects - past projects National PPP projects - ongoing projects National PPP projects - planned projects National PPP projects - I don't know Comments	planned projects planned projects	I don't know I don't know
Please briefly list the main Public Private Partnership initiatives (national or regional) in the telecommunications sector that have been successful / effective, have been less successful / not desired result,are ongoing / planned	Open-Ended Response		1) National PPP Initiative #01: Universalising Public Telecommunications Services and Networks in rural and remote ereas which developed by VNPT Group. This initiative has been deploying more than ten years. 2) Natinal PPP Initiative #2: Universalising Internet Broadband access to all schools and universities in Viet Nam which developed by Viettel Group. ...
Please indicate what kind of plans, decisions or enactments are in place for promoting broadband.	National Broadband Plan Sectorial Policies Laws Other Comments	available available available	available not available not available don't know Now we are developing the Strategic Master Plan on development of ICT sector from now to 2020 which was approved by Vietnamese Prime Minister in last year 2010. For deploying successfully this Master Plan, we are planning to build up all policies and regulatories in connection with ICT development.
Please name the top 3 measures for promoting broadband access in your county	Measure 1 Measure 2 Measure 3	per household per port per user	Encouraging all economic sectors to join into construction, development and operation of broadband infrastructure. Strengthening cooperation between public telecommuniction services and networks suppliers in sharing infrastructure. Developing e-applications (E-health, E-government, E-commerce ...)
Please briefly describe the measures mentioned above.	Open-Ended Response		
Please rank the following measures according to their importance for promoting rural broadband access in your country. For ranking, please select only 1 rank per row. Please skip selection of the measures that do not exist in your country.	Universal Service Obligation Universal Access and Service Fund Fixed regulatory intervention (e.g. ULL, BSA) Mobile regulatory intervention (e.g. Licensing) financial intervention (e.g. tax incentives) National Public Private Partnerships Regional Public Private Partnerships Please comment on your choices (e.g. If an answer does not apply, further explanation is needed)	7 very important 6 3 4 2 5 1 least important	5 4 2 3 1 least important 7 very important 6
How would you assess the degree of regulatory intervention in your country?	degree of intervention Comments	very high	high
Which of the following remedies are mandated by the National Regulatory Authority?	Local Loop Unbundling Line Sharing	planned don't know	available not available

	Bitstream Access	don't know	don't know
	Resale	don't know	available
	Naked DSL	don't know	available
	Comments		
Please indicate how spectrum assignment for the licenses of 2G, 3G, 4G, WiMAX has been done/planned. Please use the comment field in case of service neutral assignmentsand to further explain your choices.	2G - assignment mechanism	competitive	competitive
	2G - status	completed	completed
	3G - assignment mechanism	competitive	competitive
	3G - status	not started	completed
	4G - assignment mechanism	I don't know	I don't know
	4G - status	I don't know	I don't know
	WiMAX - assignment mechanism	competitive	competitive
	WiMAX - status	completed	planned
	Comments		
Please describe the current status of the items below.	Spectrum assignment for digital dividend - status	planned	planned
	Existence of spectrum refarming framework - status	planned	completed
	Existence of spectrum trading framework - status	planned	completed
	Existence of spectrum liberalization - technology neutrality - status	planned	i don't know
	Existence of spectrum liberalization - service neutrality - status	planned	i don't know
	Comments		
In general, please indicate the tendency for using coverage obligations when issuing licenses for mobile phone/broadband usage.	Degree of population coverage obligation	75%-100%	75%-100%
	Degree of geographic coverage obligation	50%-75%	75%-100%
	Comments		
Please name the top 3 measures to promote internet usage in your country	Measure 1	email	Strengthening awareness and capacity building for users
	Measure 2	news	Protecting internet end-users, creating a secured and safe cyberspace.
	Measure 3	shopping	Developing e-application (E-gov, E-com, E-health, E-Learning ...)
Please briefly describe the measures mentioned above.	Open-Ended Response		
Please evaluate the impact of public policy for promoting general internet usage in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	5 very important	4
	legal framework	4	4
	government funding priorities	not implemented	5 very important
	education policy (e.g. skill development)	not implemented	4
	public services (e.g. eGovernment)	not implemented	2
	Comments		
Please evaluate the impact of public policy for reducing the digital divide in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	5 very important	5 very important
	legal framework	5 very important	4
	government funding priorities	not implemented	5 very important
	education policy (e.g. skill development)	not implemented	5 very important
	public services (e.g. eGovernment)	not implemented	5 very important
	Comments		
Please estimate the consumer demand</u> of the following services in rural and remote areas, given full broadband access availability in your country. i.e. if everybody has broadband access, which of the following services would be used?	eHealth	5	6 high demand
	eGovernment	6 high demand	5
	Distance learning programs	6 high demand	4
	Tele-work	5	don't know
	eCommerce	5	3
	Online banking, e-payments	5	3
	Social Networking	6 high demand	4
	Multimedia Video	5	3
	Emailing	6 high demand	3
	Knowledge retrieval	6 high demand	4
	Gaming	5	3
	Internet Browsing	6 high demand	4
	Personal interest (blogs, hobbies)	6 high demand	3
	Comments		

Please evaluate the consumption feasibility of the following services in rural and remote areas, given the current broadband access availability in your country. i.e. with the current availability of rural broadband access, which of the following services can be used?	eHealth	6 feasible	1 not feasible
	eGovernment	6 feasible	6 feasible
	Distance learning programs	6 feasible	2
	Tele-work	6 feasible	4
	eCommerce	6 feasible	2
	Online banking, e-payments	6 feasible	2
	Social Networking	6 feasible	5
	Multimedia Video	6 feasible	3
	Emailing	6 feasible	6 feasible
	Knowledge retrieval	6 feasible	5
	Gaming	6 feasible	3
	Internet Browsing	6 feasible	6 feasible
	Personal interest (blogs, hobbies)		6 feasible
	Comments		
Please rank the following services according to their impact in changing the interaction between citizens and the state.	eHealth	5	2
	eGovernment	5	6 highest impact
	Distance learning programs	6 highest impact	2
	Tele-work	5	4
	Knowledge retrieval	5	3
	Social Networks	6 highest impact	5
	Comments		

Please select the institution you are working for.	Response	National Regulatory Authority	Government (ICT ministry or equivalent)
	Other		
Please select the country of the institution you are working in.	Response	Chinese Taipei	New Zealand
Please provide some general information about yourself.	Name, First Name	LIN, Yung-Yu	March, Frank
	Name of agency	National Communications Commission	Ministry of Economic Development
	Department:	Planning	Communications and IT Policy Group
	E-Mail Address:	yungyu@ncc.gov.tw	frank.march@med.govt.nz
	Phone Number:	+886-2-23433973	6421494165
Please indicate which platforms (fixed, mobile, other) and what layer (access, aggregation, backbone) you focus your investments in. Please use the drop-down boxes below to indicate the average amount of total funds per year per item (in USD).	fixed infrastructure - access network	I don't know	
	fixed infrastructure - aggregation network	I don't know	
	fixed infrastructure - backbone	I don't know	between $1-2bn
	mobile infrastructure - access network	I don't know	
	mobile infrastructure - aggregation network	I don't know	
	mobile infrastructure - backbone	I don't know	
	other infrastructure (alternative technologies) - access network	no investment	
	other infrastructure (alternative technologies) - aggregation network	no investment	
	other infrastructure (alternative technologies) - backbone	no investment	
	Comments	The average amount of total funds per year is 1.6 billion.	Ultrafast broadband (UFB) network project currently underway and due for completion in 6-10 years. Intended to provide FTTH covering 75% of population.
Looking at the total funds invested as stated in question above, which investment vehicles were used for investing? Please estimate the approximate split in percent. All items must add up to 100%. Example Grants: 30% PPP: 20% Loans: 50% other: 0%	Grants - Investment split in %	10%	
	Loans - Investment split in %	0%	
	Public Private Partnership (PPP) - Investment split in %	90%	100%
	Other - Investment split in %	0%	
	Please comment on your choice		Crown is investing an estimated 50% of total cost
Please indicate whether there have been Public-Private Partnerships (PPP) projects for broadband development in your country in the past, currently ongoing and planned on regional and national level.	Regional/Municipal PPP projects - past projects		
	Regional/Municipal PPP projects - ongoing projects	ongoing projects	ongoing projects

	Regional/Municipal PPP projects - planned projects Regional/Municipal PPP projects - I don't know National PPP projects - past projects National PPP projects - ongoing projects National PPP projects - planned projects National PPP projects - I don't know Comments	ongoing projects	
Please briefly list the main Public Private Partnership initiatives (national or regional) in the telecommunications sector that have been successful / effective, have been less successful / not desired result,are ongoing / planned	Open-Ended Response	are ongoing	as in q1
Please indicate what kind of plans, decisions or enactments are in place for promoting broadband.	National Broadband Plan Sectorial Policies Laws Other Comments	available available not available not available	available available
Please name the top 3 measures for promoting broadband access in your county	Measure 1 Measure 2 Measure 3	Establishment of High-Speed Broadband Network Promotion of Convergence in Telecommunications Services Acceleration of Digital TV	Govt investment in Layer 1 & 2 networks(s) Govt grants to support rural broadband initiative (RBI)
Please briefly describe the measures mentioned above.	Open-Ended Response	Next-Generation-Network Deployment Converged Technology Promotion, Mobile Value-Added Service Application, HDTV Development; Acceleration in Digital Cable TV and Switch-over	M1 is as in UFB. M2 is intended to reach 85% of households with at least 5Mb/s. 97% of schools to have fibre connection, inlcuding both UFB abd RBI.
Please rank the following measures according to their importance for promoting rural broadband access in your country. For ranking, please select only 1 rank per row. Please skip selection of the measures that do not exist in your country.	Universal Service Obligation Universal Access and Service Fund Fixed regulatory intervention (e.g. ULL, BSA) Mobile regulatory intervention (e.g. Licensing) financial intervention (e.g. tax incentives) National Public Private Partnerships Regional Public Private Partnerships Please comment on your choices (e.g. If an answer does not apply, further explanation is needed)	7 very important 6 5 4 1 least important 2 3	4 6 5 7 very important
How would you assess the degree of regulatory intervention in your country?	degree of intervention Comments	high	medium-low
Which of the following remedies are mandated by the National Regulatory Authority?	Local Loop Unbundling Line Sharing Bitstream Access Resale Naked DSL Comments	available available not available available available	available available available
Please indicate how spectrum assignment for the licenses of 2G, 3G, 4G, WiMAX has been done/planned. Please use the comment field in case of service neutral assignmentsand to further explain your choices.	2G - assignment mechanism 2G - status 3G - assignment mechanism 3G - status 4G - assignment mechanism 4G - status WiMAX - assignment mechanism WiMAX - status Comments	competitive completed competitive completed competitive completed competitive completed	competitive completed competitive completed competitive planned competitive planned
Please describe the current status of the items below.	Spectrum assignment for digital dividend - status Existence of spectrum refarming framework - status Existence of spectrum trading framework - status Existence of spectrum liberalization - technology neutrality - status	planned planned i don't know planned	planned planned completed i don't know

	Existence of spectrum liberalization - service neutrality - status	i don't know	i don't know
	Comments		
In general, please indicate the tendency for using coverage obligations when issuing licenses for mobile phone/broadband usage.	Degree of population coverage obligation	50%-75%	don't know
	Degree of geographic coverage obligation	50%-75%	don't know
	Comments		not applicable
Please name the top 3 measures to promote internet usage in your country	Measure 1	universal service	no specific actions taken: private sector initiatives
	Measure 2		
	Measure 3		
Please briefly describe the measures mentioned above.	Open-Ended Response	by promoting rural universal broadband service to increase the internet usage	
Please evaluate the impact of public policy for promoting general internet usage in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	4	1 least imporant
	legal framework	4	3
	government funding priorities	2	not implemented
	education policy (e.g. skill development)	4	5 very important
	public services (e.g. eGovernment)	4	5 very important
	Comments		
Please evaluate the impact of public policy for reducing the digital divide in your country. Please select 'not implemented' if a measure does not apply in your country.	regulatory measures	5 very important	5 very important
	legal framework	5 very important	5 very important
	government funding priorities	4	5 very important
	education policy (e.g. skill development)	4	4
	public services (e.g. eGovernment)	4	4
	Comments		
Please estimate the consumer demand</u> of the following services in rural and remote areas, given full broadband access availability in your country. i.e. if everybody has broadband access, which of the following services would be used?	eHealth	6 high demand	5
	eGovernment	6 high demand	5
	Distance learning programs	5	5
	Tele-work	4	5
	eCommerce	6 high demand	6 high demand
	Online banking, e-payments	5	6 high demand
	Social Networking	5	6 high demand
	Multimedia Video	5	5
	Emailing	6 high demand	6 high demand
	Knowledge retrieval	5	6 high demand
	Gaming	5	5
	Internet Browsing	6 high demand	6 high demand
	Personal interest (blogs, hobbies)	5	6 high demand
	Comments		
Please evaluate the consumption feasibility of the following services in rural and remote areas, given the current broadband access availability in your country. i.e. with the current availability of rural broadband access, which of the following services can be used?	eHealth	4	3
	eGovernment	5	4
	Distance learning programs	5	4
	Tele-work	4	3
	eCommerce	6 feasible	4
	Online banking, e-payments	6 feasible	5
	Social Networking	5	4
	Multimedia Video	4	1 not feasible
	Emailing	6 feasible	6 feasible
	Knowledge retrieval	5	4
	Gaming	5	2
	Internet Browsing	6 feasible	5
	Personal interest (blogs, hobbies)	5	5
	Comments		
Please rank the following services according to their impact in changing the interaction between citizens and the state.	eHealth	5	4
	eGovernment	5	5
	Distance learning programs	2	4
	Tele-work	5	4
	Knowledge retrieval	2	4
	Social Networks	2	4
	Comments		

B Glossary

#

2G	2nd Generation
3G	3rd Generation
4G	4th Generation

A

ABC	ASEAN Broadband Corridor
ACMA	Australian Communications and Media Authority
ADSL	Asymmetric Digital Subscriber Line
ADSL2	Asymmetrical Digital Subscriber Line 2
ADSL2+	Extended Bandwidth ADSL2
AFTA	ASEAN Free Trade Area
AITI	Authority for Info-communications Technology Industry
APEC	Asia-Pacific Economic Cooperation
ARPU	Average Revenue Per User
ASEAN	Association of Southeast Asian Nations
AUD	Australian Dollar
AUS	Australia

B

BB	Broadband
BD	Brunei Darussalam
BcN	Broadband Convergence Network
BND	Brunei Dollar
BPON	Broadband Passive Optical Network

BPL	Broadband over Power Line
BSA	Bitstream Access
BRTI	Badan Regulasi Telekomunikasi Indonesia

C

CAD	Canadian Dollar
CAGR	Compound Annual Growth Rate
CDMA	Code Division Multiple Access
CDA	Canada
CEPT	Common Effective Preferential Tariff
CHL	Chile
COFETEL	Federal Telecommunications Commission
ComCom	Commerce Commission of New Zealand
CPE	Customer Premise Equipment
CRCT	Canadian Radio Television and Telecommunications Commission
CT	Chinese Taipei

D

DOCSIS	Data Over Cable Service Interface Specification
DSL	Digital Subscriber Line

E

EDGE	Enhanced Data rates for GSM Evolution
EFTA	European Free Trade Association
EGDI	E-Government Development Index
EPI	E-Participation Index
EV-DO	Evolution-Data Only

F

FCC	Federal Communications Commission
FDI	Foreign Direct Investment
FITEL	Fondo de Inversión en Telecomunicaciones
FTA	Free Trade Agreement
FTAs	Free Trade Agreements
FTTB	Fiber To The Building
FTTC	Fiber To The Cabinet/Curb
FTTH	Fiber To The Home
FWA	Fixed Wireless Access

G

GATS	General Agreement on Trade in Services
Gbps	Giga bits per second
GDP	Gross Domestic Product
GHz	Gigahertz
GNI	Gross National Income
GPON	Gigabit Passive Optical Network
GPOBA	Global Partnership on Output-Based Aid
GPRS	General Packet Radio Service
GSM	Global System for Mobile communication

H

HSDPA	High Speed Downlink Packet Access
HSPA+	High Speed Packet Access Evolution
HDSL	High bit rate Digital Subscriber Line
HKC	Hong Kong, China

HH	Household
HSBB	High Speed Broadband

I

ICT	Information and Communication Technology
IDA	Infocomm Development Authority
IDI	ICT Development Index
IFAP	Information for All Programme
IGADD	Indonesia Group Against Digital Divide
IMT	International Mobile Telecommunications
INA	Indonesia
IP	Internet Protocol
IPTV	Internet Protocol Television
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union

J

JPN	Japan

K

Kbps	Kilo bits per second
KCC	Korea Communications Commission
KPI	Key Performance Indicator
KRW	Korean Won

L

LLU	Local Loop Unbundling
LTE	Long Term Evolution

M

MAS	Malaysia
Mbps	Mega bits per second
MCMC	Malaysian Communications and Multimedia Commission
MCT	Ministry of Transport and Communication
MEX	Mexico
MFN	Most favored nation
MIC	Ministry of Internal Affairs and Communications
MIIT	Ministry of Industry and Information Technology
MIMO	Multiple Input Multiple Output
Minsvyaz	Ministry for Communications and Informatization of the Russian Federation
MPT	Ministry of Post and Telematics
MRA	Mutual Recognition Agreement
MXN	Mexican Peso

N

NAFTA	North American Free Trade Agreement
NBP	National Broadband Plan
NCC	National Communications Commission
NetCo	Network Company
NGA	Next Generation Access
NGN	Next Generation Network
NITC	National IT Council

NISP	National Information Society Policy
NRA	National Regulatory Authority
NTC	National Telecommunications Commission
NZSCEP	New Zealand-Singapore Closer Economic Partnership
NZ	New Zealand
NZD	New Zealand Dollar

O

OA	Open Access
OECD	Organisation for Economic Co-operation and Development
OFTA	Office of the Telecommunications Authority
OpCo	Operating Company
OSIPTEL	Organismo Supervisor de Inversión Privada en Telecomunicaciones

P

PANGTEL	Papua New Guinea Radiocommunication and Telecommunication Technical Authority
PC	Personal Computer
PE	Peru
PNG	Papua New Guinea
PPP	Purchasing power parity
PPP	Private Public Partnerships
PRC	People's Republic of China

Q

QoS	Quality of Service

R

RM	Malaysian ringgit
ROK	Republic of Korea
RUS	Russia
RP	Republic of the Philippines

S

SAFTA	Singapore-Australia Free Trade Agreement
SCT	Secretaría de Comunicaciones y Transportes México
SDSL	Symmetric Digital Subscriber Line
SGD	Singapore Dollar
SHDSL	Single-pair High-speed Digital Subscriber Line
SIN	Singapore
SMS	Short Message Service
SUBTEL	Subsecretaria de Telecommunicacaiones

T

THA	Thailand
TPP	Trans-Pacific Partnership
TIS	Trade in Service Agreement
TM	Telekom Malaysia

U

UAS	Universal Access and Service
ULL	Unbundled Local Loop
UMB	Ultra Mobile Broadband
UMTS	Universal Mobile Telecommunications System

UN	United Nations
US	United States
USAF	Universal Access and Service Fund
USD	United States Dollar
USO	Universal Service Obligation

V

VDSL	Very high speed Digital Subscriber Line
VDSL2	Very high speed Digital Subscriber Line 2
VN	Viet Nam
VoIP	Voice over Internet Protocol
VSAT	Very Small Aperture Terminal

W

WiMAX	Worldwide interoperability for Microwave Access
WiFi	trademark describing technologies such as WLAN
WiDEN	Wideband Integrated Digital Enhanced Network
WiBro	Wireless Broadband
WLAN	Wireless Local Area Network
WEF	World Economic Forum
WTO	World Trade Organization

C Sources

This report uses the following sources and refers to these throughout the report. Not all of the reports used in this study are publically available.

International organizations, think tanks

CIA World Fact Book, https://www.cia.gov/library/publications/the-world-factbook/

FTTH council, http://www.ftthcouncil.org/

GSM Association (GSMA), http://ww.gsm.org

Wireless Intelligence, http://www.wirelessintelligence.com

International Telecommunications Union (ITU), http://www.itu.int/

The Heritage Foundation, http://www.heritage.org/

Organization of Economic Cooperation and Development (OECD), http://www.oecd.org

TNS Infrastest, http://www.tns-infratest.com/

United Nations (UN), http://www.un.org

World Bank, http://www.worldbank.org/

World Economic Forum (WEF), http://www.weforum.org/

World Trade Organization (WTO), http://www.wto.org/

Private research companies

Informa, http://www.informa.com/

Ovum, http://www.ovumkc.com/

Pyramid Research, http://www.pyramidresearch.com/index.htm

Primary research

APEC Broadband survey 2011 – this is the survey that was sent out to all 21 APEC economies during the course of the study. Only 7 APEC members have completed the survey report. The results can be found in Appendix A.

Detecon, http://www.detecon.com/ap – Consulting company and author of this study. Reference used when referring to original content generated by Detecon.

Internet research – Usage of the internet and public information such as media announcements, NRA websites, Operator websites, 3rd party aggregator websites to attain information