

Leveraging Mobile Broadband to Create a Positive Socio-Economic Impact and Transform Thailand into a Digital Economy

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Abstract—The Thai government is determined to transform Thailand from a low-cost manufacturing intensive to technology and innovation intensive country. The government has announced the “Digital Economy Plan” which is expected to promote advancement in business sector, creating new and highly skilled job opportunities, and bridging the digital divide gap in Thailand via social, education and equal access to internet. However, the key to bridging digital divide is creating availability of spectrum to drive broadband infrastructure projects to boost socio-economic development. In order to ensure successful implementation of the Digital Economy Plan, the Thai government needs to play a crucial role in ensuring coordination between all stakeholders including private investors and the telecommunications regulator. Nevertheless, due to limited availability and conflicting interests between stakeholders on spectrum, the regulator and government bodies is certain to face range of obstacles in assignment of spectrum for mobile broadband. The objective of this paper this study aims to put forward the social and economic impact of mobile broadband, international best practices on broadband regulation, positive impact of mobile broadband on different social and economic aspects. A supportive regulatory framework is also recommended to push mobile broadband as a contributor to transforming Thailand into a digital economy.

Index Terms—socio-economic, impact, analysis, spectrum, digital economy, regulator, telecommunication

I. INTRODUCTION

Countries have started investing in ICT particularly in broadband because they know that when combined with other strategic economic and social development policies, widespread internet access is the catalyst to increasing national competitiveness. Widespread and high quality internet connectivity can provide both underserved and urban communities with access to vital information and services, and create opportunities that result in positive social and economic impacts for communities, business, schools, hospital and families. The UN Broadband Commission for Digital Development views broadband as

fundamental to addressing global challenges shown in the Millennium Development Goals (MDGs) of the UN Millennium Declaration [1]

The Millennium Development objectives are very simple where the essence is to make broadband universal, affordable and create widespread reach to connect all households in order to get everyone and anyone online. The Commission believes that ICT can create a digital economy which can transform the way business is done today, and socio economic benefits of broadband are significant when integrated into a country’s holistic development strategy. As shown in Fig. 1, Broadband is a key driver increasing a country’s GDP.

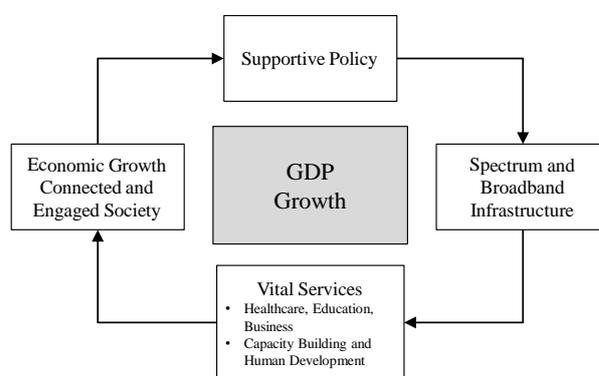


Figure 1. Revised enabling broadband for development framework [1]

While global scale of mobile communications and wired broadband economic impacts are well understood worldwide, this study aims to put forward the social and economic impact of mobile broadband, international best practices on broadband regulation, positive impact of mobile broadband on different social and economic aspects and a supportive regulatory framework is recommended to push mobile broadband as a contributor to transforming Thailand into a digital economy.

II. MOBILE BROADBAND ECONOMY

Presently in Asia Pacific, mobile phones market is expected to experience a dynamic growth in both value and volume terms with a compound annual growth rate of the market in the period 2013–18 is predicted to be 4.2%. and will reach respective values of \$589.4bn in 2019 [2].

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This ensured future growth is expected to last well into the 2020s, mainly from subscribers continuing migration to smart phones. The growth of smart phone or mobile internet users' trend fits with the global trend, as global internet users grew from 1.6 billion to 2.9 billion by 2014, accounting for 40% of global population. This means that 60% of population remains unconnected. Yet GSMA expects mobile broadband subscribers to reach more than 2.4 billion by the end of 2015 and penetration is expected to increase even further to 3.8 billion by 2019, driven by growth mainly from developing countries [3].

In developing countries that do not have extensive fixed network, wired broadband can only reach few urban cities. In this case, wireless or mobile broadband plays a significant role as a cost effective substitute in bridging the internet access gap between urban and rural communities. So, majority of the 60% unconnected populations which are mainly from developing countries is more likely to gain internet access through mobile broadband rather than fixed broadband.

The global digital divide can be largely bridged by mobile networks, which already provides communication access to billions worldwide. In 2014, 2.4 billion people had access to mobile broadband via smart phones of which 1.8 billion are from developing countries. Although statistics state that one in three people globally have mobile broadband access, there is still a dramatic difference between developed and developing countries. [3]

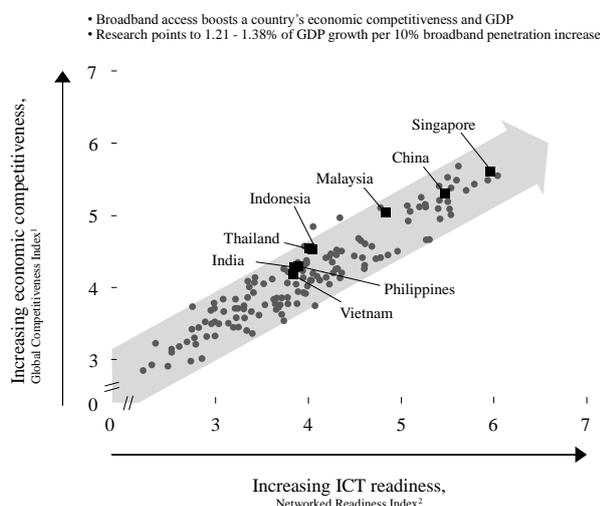


Figure 2. ICT readiness is strongly correlated with global economic competitiveness [4],[5]

1. Global Competitiveness Index: Composite index of indicators relating to institutions, infrastructure, macroeconomy, health, education, market efficiency, technological readiness, business sophistication, and innovation.

2. Networked Readiness Index: Composite index of indicators relating to electricity, mobile-network coverage, international Internet bandwidth, secure Internet servers and accessibility of digital content, affordability of services (prepaid and fixed broadband tariffs and Internet and telephony competition), and skills.

In Asia Pacific region alone, mobile industry has seen rapid growth in recent year, both in terms of subscribers and revenues. At the end of 2015, the subscriber in this region is predicted to rise to 1.95 billion. The forecast will rise to 2.4 billion by 2020 [3]. Asia Pacific is the second fastest growing region. The subscriber penetration rate in most of the south-east Asian markets, such as Thailand, Malaysia, Indonesia and Vietnam each stands at 45% on average which is close to global average but is forecast to reach 60% exceeding global average by 2020. As a result, with the growing trend of mobile phone penetration, mobile is without a doubt playing the most crucial role in bridging digital divide in APAC region, providing internet access to previously unconnected populations. [3]

In the past, the lack of internet access has hindered unconnected population's opportunity for equal access for information and is the main obstacle for developing countries in reaping benefits from social and economic development. According to GSMA, "Increasing mobile internet access for under-served communities in developing countries has been shown to deliver wide spread social and economic benefits, improving productivity and economic growth for populations and economies and local populations" [3]. According to Analysys Mason, additional 1000 new broadband connections is estimated to increase 33 new jobs and 10% point increase in penetration of mobile broadband connections will result in increase GDP increase of 0.26% to 0.92% [6] The GSMA Intelligence report revealed that, "in 2013, the mobile industry made a total contribution of 4.7% of GDP in the Asia Pacific region" [3]. The direct contribution from mobile is at 320 billion dollars equivalent to 1.7% of GDP. What's more, as a healthy ICT sector has a strong spillover effect, further every ICT job creates about three jobs in other industries as well [7]. Further, World Economic Forum analysis concluded that there is a strong positive correlation between ICT readiness and an economy's competitiveness as shown in Fig. 2 [8].

Overall mobile broadband is a key contributor of economic development, social welfare, and bridging the gap in digital divide particularly in developing countries. The positive impact of broadband penetration is evidenced from countries in Asia Pacific such as Japan, South Korea and Australia where mobile is delivering a range of innovative and new broadband services to consumers and boosting economic growth and productivity in the value chain. A perfect example of a country benefiting from broadband is South Korea, which is emerging as a start hub and achieved success mainly from very well planned out supportive government policies. This will increase development in South Korea, increase jobs, economic growth and it has been known to become a fast adopter of new technologies.

Therefore, it is critical more now than ever for developing countries to allocate more spectrum bands for mobile broadband to facilitate the development of telecommunications network to accommodate the exponential growth of subscribers for smartphones and mobile broadband. As countries that fail to catch up on

broadband penetration will likely be left behind and result in adverse effects on a national competitiveness and ultimately permanent negative impact on socio-economic development of the country.

As disruptive innovation from mobile broadband continues to transform business and consumer lifestyle, industry boundaries will continue to diminish originating a broad array of innovative mobile dependent businesses, thus creating “mobile ecosystems”. Most importantly, the benefits of new mobile ecosystems are not limited to developing countries but are expected to create an even higher value by aiding governments to overcome socio-economic challenges eventually reducing access to information and income inequality eventually shrinking the rate of poverty. In addition, a vibrant ICT sector may also contribute to more equitable social development and a more transparent and efficient public sector.

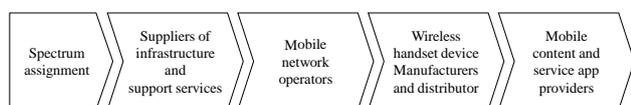


Figure 3. Mobile ecosystem

In the next sections a situational analysis of Thailand’s economy is discussed and the role played by spectrum management in digital economy is also put forward.

III. THAILAND ECONOMY

Thailand’s economy is the second largest among 10 ASEAN member countries, after Indonesia. The country has performed relatively well in the past few years despite setbacks from severe floods in 2012 [9], [10]. The country saw a real growth of 2.3% yoy (year on year) in fourth quarter of 2014, which rose by just 0.6% from third quarter of the same year. Although the full year GDP growth of 0.7% in 2014 slipped from 2.9% in 2013 [11], the persistent efforts of the government to boost the economic growth will gain traction in the coming quarters of 2015. Hence, Business Monitor International (BMI) forecasts the real GDP growth to be 4.1% in 2015. Private consumption registered a positive growth of 1.9% yoy in last quarter of 2014 but it is a large drop of 2.2% from previous quarter and this decline is largely because of the decrease in spending on durable goods [9]. Ultimately, a positive outlook on recovery of Thai economy is due to continuous effort of government in stimulating fiscal spending [12] and export growth of 4.9% yoy which offset the 3.8% contraction from previous quarter.

Looking at the monetary policy in the first quarter of 2015, The Bank of Thailand (BOT) has retained an interest rate of 2% for the seventh time [11], stating that current monetary conditions are sufficient to support economic growth. Perhaps the most significant sign of recovery in Thai economy is largely owed to the inflation trend, which continues to plunge since 2011, from 3% in 2013 to 1.9% in 2014. To outweigh the negative impact of raising daily minimum wage to 300 THB (\$10 USD) introduced since first quarter of 2013, the government has reduced corporate income tax, first from 30% to 23% in 2012 and

then to 20% in 2013. To improve business conditions and boost economic growth, the government has declared that the contraction in corporate income tax will be continued through to 2015 (tax year) [9], [13].

Investor confidence and manufacturing sector has taken a serious blow because of several factors that occurred consecutively in the past years. This included Japan’s Tsunami which caused supply chain disruptions in 2011, Thailand’s country’s severe floods that lasted into 2012 and strong political headwinds resulting from significant differences in political views causing intractable tension between rural poor and urban middle-upper classes. Nevertheless, the military government has impressed its priority in reviving the ailing economy and has approved 8 years transport infrastructure plans that will come to a completion in 2022 [13]. Although political risks still remain, these infrastructure projects should help improve consumer and investor confidence to a certain degree. Despite all the noise from political uncertainty, there is still hope for investors since there are signs of long-term economic growth and investor friendly environment [13].

Presently, Thailand is one of the world’s most important electrical and electronics manufacturers, constituting nearly a US\$60 billion sector. The sector has thrived and expanded continuously for more than three decades, playing a vital role in improving the country’s economy as a major export earner, and also being the regional leader in Southeast Asia in electronics and electrical manufacturer. Moreover, investment in telecommunications and retail businesses also gather growth to meet the growing future demand for data and telecommunications [12].

Nevertheless, Thailand’s automotive sector and export of automotive and parts is the leading industry, followed by industrial machinery and equipment, crude oil, chemicals and appliances. Then again due to fall in demand of exports globally, exports in Thailand had a drop in exports [12] by 0.3% valued at \$224.8 billion in 2014 [11]. The fall in export value is also due to a drop in agricultural commodity prices [12] and the decline in China’s economy, which accounts for highest importer of Thai products [9].

Thailand has focused on an open policy on foreign direct investment which has been the main driving force in creating employment, promoting industrialization, economic growth and technology transfer [12], [14]. Foreign Direct Investment increased by 1% amounting to US\$14.7 billion in 2014, after a sharp downward decline by 13% in 2013. The increase is due to increase in political stability since mid 2014. Overall, Ease of Doing Business for investors ranking in Thailand is 17 out of 183 countries since total of all business related tax including corporate tax, employer paid social security contribution, and others are relatively low in comparison to other countries amounting to just 30% [9].

IV. SPECTRUM MANAGEMENT AND DIGITAL ECONOMY PLAN IN THAILAND

In the recent years, the government has introduced a number of policies and pro-broadband access frameworks in order to create ICT landscape in Thailand. The

government initiated ICT projects are Smart Thailand 2020 project, the third ICT Master Plan 2014–2018, the USO Master Plan for Provision of Basic Telecommunication Services (2012–14) and the National Broadband Policy (2009). In most cases, the ICT frameworks overlap creating redundant resources and most frameworks just provide general guidelines rather than actionable and quantifiable goals that must be met.

In fourth quarter of 2014, the Thai government declared a new Digital Economy Plan that aims at increase positive socio-economic development through digitization of the Thai economy, pushing Thailand to be the digital forefront in the Association of South-East Asian Nations region. This plan has been marked as high urgency to lead the development of the Thai economy and placed under the direct supervision of Deputy Prime Minister.

The Thai government is determined to transform Thailand from low cost manufacturing intensive to technology and innovation intensive country. The government is convinced that this effort in transforming Thailand into a digital economy will boost the Thai economy bring about healthy competition in the business sector, create new and highly skilled job opportunities and bridge the information access gap between Thai through social, education and information access through the internet.

As a part of the time towards achieving spectrum management in Thailand, the National Broadcasting and Telecommunications Commission (NBTC) as an independent regulator, is responsible for licensing enough spectrum to feed the demand of both commercial and non-commercial users.

V. SOCIO-ECONOMIC IMPACT ANALYSIS OF SPECTRUM LICENSING AND BROADBAND INFRASTRUCTURE IN THAILAND

Currently, the three existing mobile operators in Thailand are using 900 MHz, 1800 MHz, 850 MHz and 2100 MHz to support their 2G, 3G or even 4G services. These spectrum bands are critical for the three largest operators to ensure continued availability of mobile services. Further, increase in spectrum availability must be made to expand the availability of mobile broadband to meet the growing demand or even to add new technologies such as transition from 3G to LTE 4G technology, thereby supporting the government’s mobile broadband objective to digitalize our economy in Thailand.

Two years after the 2.1 GHz 3G license auction in Thailand, research conducted by GSMA and Analysys Mason research concluded that mobile broadband networks have reached 70-80% population coverage [6]. The rapid migration of users to 3G devices with 3G connections accounting for more than 50% of total subscribers by 2014 is also owing to the fastest network rollouts in the world. NBTC analysis indicates that we should 3G connections should reach 80% or more of total subscriber base by end of 2017 [15].

The mobile industry structure is such that the

concentration ratio (99% market share) rests upon three large operators, Advanced Info Service (AIS), Digital Total Access Communication (DTAC) and True Corp. Two other operators, CAT and TOT, which are state owned, hold just 1% of the market share (illustrated in Fig. 4).

All three mobile market dominators provide 2G and 3G services using GSM, GPRS, EDGE, W-CDMA and HSPA+ technologies. While AIS holds limited spectrum bands and no longer holds IMT recommended band for 4G due to concessionaire contract expiration of 1800 MHz (DPC contract) ended in 2013 and 900 MHz in 2015. On the other hand, DTAC and Truemove have already launched 4G services using LTE, in the 2.1GHz spectrum previously awarded for delivery of 3G services. Further 900MHz and 1800MHz 4G auctions are scheduled to award the licenses by end of 2016 should increase the availability of spectrum to fully complete the transition to 4G.

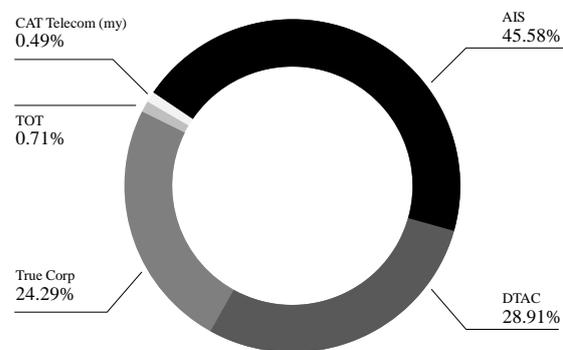
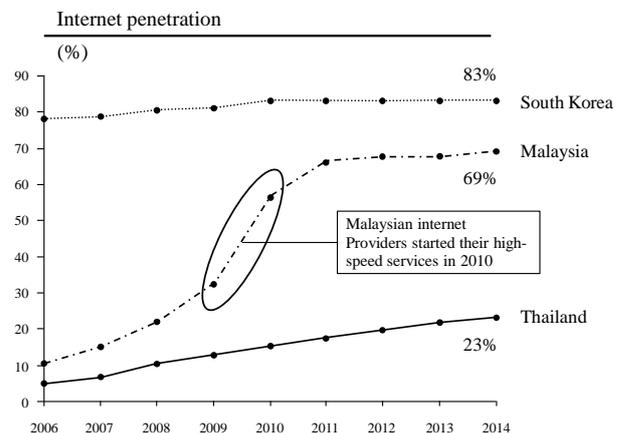


Figure 4. Total mobile market share of connections [6]

Spectrum licensing has already had a profound impact on all aspects of life and particularly even more so with developing countries like Thailand. As mobile is now the crucial technology, spectrum will play a leading role in supporting the digital economy by increasing availability of mobile broadband. Realizing the full potential of this digital economy will require collaboration between all players in the mobile ecosystem, including mobile operators and other ecosystem players as well as through collaboration with the government, regulator, and other industry stakeholders.



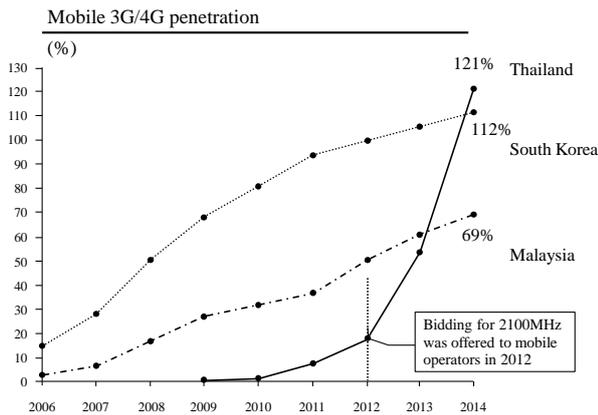


Figure 5. Mobile 3G/4G penetration in Thailand, South Korea and Malaysia

Illustrated Fig. 5, although the rate of internet penetration is much lower in Thailand than in Malaysia and South Korea, Thailand’s rate of accessibility to 3G/4G mobile system is growing briskly. This mobile channel will be key for Thailand to stimulate economic activities under Digital Economy Policy [16].

Fig. 6: Thailand’s e-Commerce market is small compared to Malaysia’s and South Korea’s but is fast-growing. Social media in Thailand, on the other hand, is thriving with half of the population using social media [16].

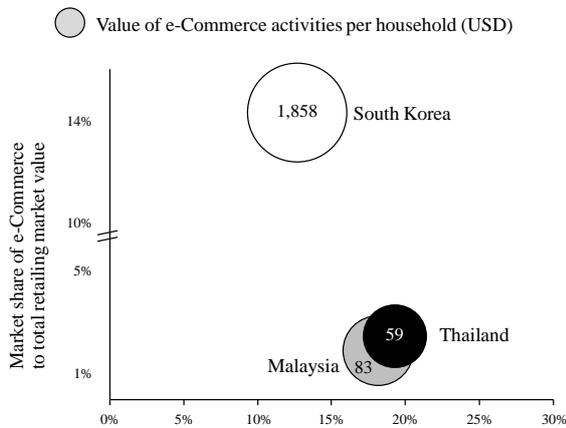


Figure 6. Korea Malaysia comparison of e-commerce industry in South Korea, Thailand and Malaysia

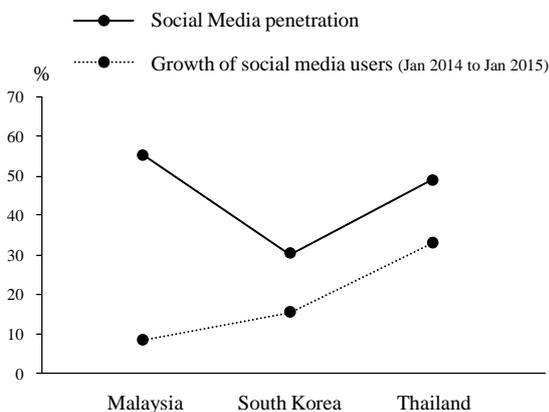


Figure 7. Social media penetration and growth of social media users

The report issued by the International Telecommunication Union (ITU), measuring the Information Society REPORT 2014, now in its sixth year, provides a global view of the developments being made in information and communication technology, the cost and affordability of these services, and provides the ICT Development Index ranking performance on ICT infrastructure, use and skills.

According to GSMA, Thailand’s ICT Development Index rank improved considerably, being ranked in 2013 at 81st of 166 countries, from 91st in 2012; its regional, the Asia-Pacific, rank is 10th and ranked 3rd in ASEAN, which is led by Singapore and Malaysia [6].

A key factor in Thailand's improved IDI was the nationwide 2.1GHz 3G network expansion from the success in the auction in late 2012. More remarkable improvement was registered in the usage ranking, where Thailand now stands at 71st, up from its previous rank at 105th. In the skills sub-index Thailand is at 61st. According to ITU, Thailand’s highly improved wireless market during 2012-2013 is the key to upwards jump in IDI ranking. With the increase in 7 million mobile cellular subscriptions and 28 million new wireless broadband subscriptions added in one year, Thailand experienced a major jump. Penetration rates stand at 138 percent for mobile-cellular and 52 percent for wireless-broadband services by end 2013. This is one of the highest wireless broadband penetration rates in Asia and the Pacific, only surpassed by the region's high income economies.”

VI. ANALYSIS OF SPECTRUM AND BROADBAND INFRASTRUCTURE CONTRIBUTED TO THE DIGITAL ECONOMY PLAN FOR THAILAND

The rapid development of the broadband infrastructure has had a transformative impact on individuals and society across the nation. The impact is as broad as it is deep, impacting both the economic and social aspects of life.

The mobile ecosystem already makes a significant contribution to economic growth in Thailand. In this section, a supportive regulatory framework is recommended to push mobile broadband as a contribution to transforming Thailand into a digital economy.

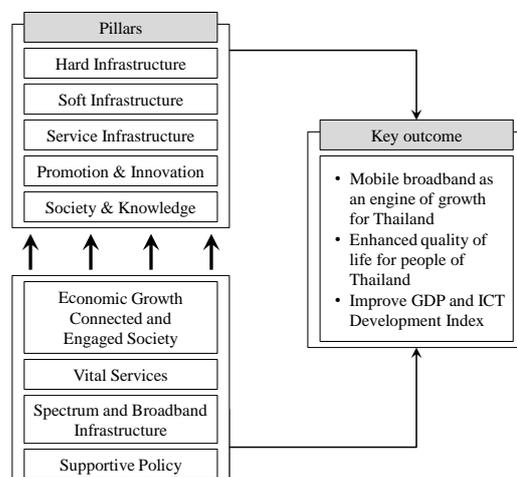


Figure 8. Mechanism of the proposed framework

We use the framework in Fig. 1 integrating to the five pillars of the Thailand's Digital Economy Plan as the proposed framework to create recommendations to achieve the objectives of the Thai government. Finally, the proposed framework is illustrated in Fig. 8.

TABLE I. SUPPORTIVE POLICY ELEMENT

Five Pillars	Key areas
Hard infrastructure	<ul style="list-style-type: none"> To support the government's digital economy plan, NBTC must ensure that there is sufficient spectrum for the mobile industry to achieve quality of service and affordable mobile service price for end consumers. NBTC is actively involved in the WRC-15 and will create a harmonized band plan for Thailand with coordination with other regions particularly in ASEAN to meet long-term goals. NBTC will develop a regulatory framework that allows voluntary sharing of infrastructure among mobile operators. The government and NBTC must encourage the telecommunications industry to participate in infrastructure investment through public-private sectors partnership policy (PPP). The framework, ideally, should facilitate all types of infrastructure sharing, involving the sharing of both passive and active components of mobile network. The policy can help reduce the cost of extending network coverage, particularly into remote areas.
Soft infrastructure	<ul style="list-style-type: none"> Exponential demand for mobile data raises legitimate concerns on privacy and cyber security. The government and policy makers must educate and improve the quality of digital services to ensure citizens' privacy. The government should initiate digital identity plan to provide secure authentication mechanism for mobile services. The identity plan should harmonize and comply with the new Cyber Security Act.
Service Infrastructure	<ul style="list-style-type: none"> The government and NBTC carry a wider responsibility for fostering and helping to create the trusted framework. The fundamental of the trusted framework created by the government should hinder potential on citizens' adoption of the e-government system.
Promotion & Innovation	<ul style="list-style-type: none"> The government should initiate Digital Community Programs to narrow the gap between those who engage in the digital economy and those who do not. Training Program Initiative should be installed to deliver training through a mix of group session to enable participants to engage in basic online activities. Such as accessing government services.
Society & Knowledge	<ul style="list-style-type: none"> The government should initiate Virtual Interactive Education Programs to assist in the development and delivery of new models of education services and knowledge resources to students and citizen. The Broadband for seniors and disabled persons Program should be initiated to ensure that all community groups have the skills and confidence necessary to participate in digital economy.

TABLE II. SPECTRUM/BROADBAND INFRASTRUCTURE ELEMENT

Spectrum and Broadband Infrastructure	
Five Pillars	Key areas

Spectrum and Broadband Infrastructure	
Hard infrastructure	<ul style="list-style-type: none"> NBTC must increase spectrum allocations for telecommunication networks to support growing data use. NBTC must evaluate international practices and initiate net neutrality regulation to allow quality of service and remove any hindrance to speeding up network and access to all information. The government and NBTC should drive regulatory enablers across all industries (automotive, utilities, manufacturing, consumer, electronics etc.)
Soft infrastructure	<ul style="list-style-type: none"> Harmonization is following regional or global spectrum assignment and band plan to avoid any technical issues and to benefit from decreased cost in economic of scale in terms of equipment. Further harmonization can benefit by ensuring cost efficiency in roll-out of networks, cheap consumer devices, reduced cross-border interference and international roaming. Spectrum could be a great source of revenue for government. However, the regulator and government must also consider the long term benefits on socio economic development, job creation, increased investment and economic growth rather than short-term revenues. According to GSMA, "high spectrum prices generate government revenue in the short-term, but bring undesirable long-term costs that could be passed on to consumers and translate into higher tariffs, resulting in lower adoption of mobile services".[3] NBTC and related regulators must collaborate to establish clear regulation on telecommunication infrastructure fund to advocate lower investment in telecommunication sector. NBTC should promote policies that encourage greater network sharing agreements to enable cost efficiencies.
Service Infrastructure	<ul style="list-style-type: none"> New mobile technologies are profoundly changing the way in which people and business interact with the government services. Therefore, the e-government platform needs to be able to support all operating systems to enable connectivity effectively. The government needs to improve the affordability on mobile services, especially when considering low-income levels in some groups of people and especially in those segments of the population who have still to gain access to the e-government services. The government should provide a cloud platform and mobile-based services through government agencies and introduce open source-based standards. It will accelerate the growth of small and medium-sized enterprises and support the export activities.
Promotion & Innovation	<ul style="list-style-type: none"> The government and NBTC should collaborate to promote affordable data services and smart mobile devices. As the affordability of smart mobile devices and data services, consumers and businesses will further increase productivity, allowing local small and medium enterprises to participate in the mobile value chain by producing local content, software and application.
Society & Knowledge	<ul style="list-style-type: none"> The government and NBTC must collaborate to build awareness and increase ICT literacy in Thailand. The government and NBTC must also ensure promotion of local content and m-applications to for education and even m-applications tailored to specific industries to incentivize the businesses and citizens to enter the digital economy.

TABLE III. VITAL SERVICES ELEMENT

Vital Services	
Type	Key Areas
Education	The mLearning program initiative should be included in online educational resources, a cloud-computing solution in a low-maintenance and easy-to-use model and relevant training for teachers. Mobile devices allow teachers and students access educational content ubiquitously.
Agriculture	The mAgriculture program initiative should be launched to increase income and productivity of small farmers through mobile devices. According to GSMA, it can be used to “service to farmers providing information on weather, crops and other usual information. Without access to timely information, farmers are vulnerable to factors such as weather, pests and disease, which can destroy their crops, harm their livestock, and keep them stuck in the cycle of poverty.”
Health	Mobile health can allow patients suffering from illnesses to transmit data to the e-health platforms using their mobile devices. It can facilitate delivery of basic medical care to remote and underserved populations hence reducing mortality rates from child birth, infant mortality rate, mitigating the spread of infectious disease and creating awareness of HIV and much more.
Skill Training	Mobile phones into a low-cost educational tool and is an excellent for launching m-training. According to GSMA, “users can dial a short code and access bi-lingual audio-lessons and also test their English language skills through their mobile. This system can be enhanced to other kinds of training contents.”
Financial Service	The mMoney can be used for banking especially for mte area users who are unbanked populations they can transfer money, pay utility bills, and other types of payments in a safe and secure method. The government and related regulators should work together to establish enabling regulatory frameworks for the non-bank mobile money.
Digital Commerce	The mCommerce should be adopted. Retailers have been using mobile technologies to merge their online and physical stores into a multichannel shopping consumer proposition to boost their revenues. This includes mobile apps, digital walk-in stores, social shopping (using social media to enhance the shopping experience), and interactive in-store services.
Entrepreneurs	The mEntrepreneur program initiative should be launched for small businesses to encourage investment and mobile is the key to small business sustainability and profitability.

TABLE IV. ECONOMIC GROWTH/SOCIETY ELEMENT

Economic Growth Connected and Engaged Society	
Economic Growth	Digital ecosystem and mobile broadband can have direct and indirect contribution to GDP by mobile operators and the wider ecosystem, an increasing in the national GDP can be attributed to the increased productivity created by the widespread use of mobile broadband technology.
Society	Mobile broadband is already delivering social benefits in Thailand. The government and policy makers need to realize the potential socio-economic benefits in the areas of health, education and agriculture, and have the most to gain in terms of financial inclusion via mobile services. Closing the citizen gap in mobile ownership and use, including for mobile broadband, as well as developing mobile services which meet the needs of citizen, is a key consideration for operators and policymakers to realize the potential contribution of mobile services.

VII. CONCLUSION

Mobile broadband is a critical enabler in achieving the Government of Thailand to transform the country into a digital economy and boosting digital inclusion. This paper illustrated that the impact of mobile spectrum and broadband infrastructure is profound, from improving productivity and driving the creation of new businesses and skilled jobs, to delivering mobile healthcare and financial services and enabling smart cities. As described in this paper, the mobile sector in Thailand is already supporting the achievement of the five pillars of the government of Thailand’s Digital Economy Plan. The contributions of the mobile sector towards achieving the five pillars of the plan are summarized in section IV. The result of analysis in this paper estimate that if the Thai Government and NBTC, the telecommunications regulator, are able to achieve the Digital Economy Plan and the 900MHz and 1800MHz spectrum auction plan, broadband connections penetration in the country could increase from 50% in 2013 to 125% by 2020. This research also strongly highlights that to achieve the transformation to Digital Economy, the collaboration between the government and NBTC is critical. Further, a consistent with that of WRC15 harmonized spectrum band plan will contribute largely to enabling the transition to Digital Economy. The result of analysis puts forward the power of mobile broadband to expand broadband coverage in urban and underserved rural areas will benefit Thailand in all industry sectors. Overall, this research aims to highlight that the government’s commitment to build an extensive broadband infrastructure is a key step towards creating a digital economy.

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