High Speed Broadband Network in Malaysia

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Executive Summary

The impact of broadband penetration on a country's economy and its importance in ensuring the competitiveness of the country in the global market is commonly acknowledged and is of increasing concern to politicians and policy makers. Therefore governments have started to develop national broadband strategies and to implement National Broadband Networks (NBN) to ensure rapid and comprehensive broadband rollout. As NBNs are often funded by tax payer money, or by telecom customers and service providers through Universal Service Provision contributions, it is important to assess effectiveness, efficiency and impact of such support. This report assesses the government-led High Speed Broadband (HSBB) initiative in Malaysia. It discusses the HSBB, and provides some recommendations for future policy discussions on optimal strategies for deployment of NBNs.

In 2008 a Private Public Partnership (PPP) agreement was signed between the Malaysian government and Telekom Malaysia (TM) to build a High Speed Broadband (HSBB) Network. It was estimated to cost MYR 11.3 billion (USD 3.5 billion) with the government funding MYR 2.4 billion (USD 740 million). During Phase 1, 1.3 million premises were to be passed by FTTH (Fiber To The Home) while residential high rise buildings in the industrial areas around Kuala Lumpur were to be connected with VDSL2 (Very high bit rate digital subscriber line).

Phase 1 of the Malaysian HSBB network implementation was launched in 2010 in a record 18 month period and 1.4 million premises were passed by 2012. The take up of HSBB was also impressive with over 600,000 subscriptions (i.e. 43% take up of houses / premises passed) by June 2013. Four major operators had signed up for HSBB access services where HSBB is repackaged and sold to their own customers, and 19 had signed up for HSBB transmission services used to enhance their own backhaul network.

While the HSBB initiative can be considered a success due to its fast rollout and high take up, there are some issues which can be considered non-conducive to competition in the Broadband market. Firstly due to pre-conceived views that fiber technology is the most superior technology and that FTTH is needed for national competitiveness, policy makers did not even consider wireless as a viable option for the access layer for urban and suburban areas implemented under the HSBB program. It is also noted that, the latest mobile technology LTE (Long Term Evolution) is now able to provide speeds of 10 – 30 Mbps, which is the same range currently provided by TM through HSBB.

Secondly the process of selecting TM, the fixed incumbent as the service provider for HSBB was not transparent. No other service provider was given the opportunity to bid for the tender, and when a less well-known fiber optic infrastructure provider High Speed Broadband Technology (HSBT) proposed to implement HSBB in partnership with a foreign funder without government subsidy, it was rejected for reasons which are undisclosed.

If the government followed a transparent competitive tender process with predetermined selection criteria including expected network parameters such as coverage, speed, quality of service level without specifying the technology, even if TM was selected, the perception that the government preferred a single operator could have been avoided.

While HSBB has been called an open access network, wholesale prices are not regulated or transparent and the terms and conditions of access are not made public. Prices are commercially negotiated between TM and service providers. This may result in discriminatory pricing which can harm competition.

It is also noted that funding for phase 2 of HSBB has been allocated in the Malaysian 2014 Budget. Exact terms and conditions were still in the process of being finalized at the time of writing this report. It is hoped that phase 2 will follow a more transparent process conducive to competition.

1 Introduction

1.1 Background

It is generally accepted that broadband plays a key role in society, impacting the economy, productivity, and employment (Katz, 2010; ITU, 2012; Qiang, Rossotto, & Kimura, 2009). One World Bank study done on 120 countries between 1980 and 2006 showed that for every ten percentage point increase in penetration of broadband services, there would be an increase in economic growth by 1.3 percentage points. This growth effect from broadband is significant and stronger in developing countries than in developed countries (Qiang, Rossotto, & Kimura, 2009). A more recent study by McKinsey on 57 aspiring nations including Malaysia, showed that the Internet's impact on the Malaysian economy is among the highest of the countries studied, at 4.1 percent of GDP (Nottebohm, Manyika, Bughin, Chui, & Syed, 2012).

Due to many reasons such as perceived lags in broadband roll-out in rural areas, increase national competitiveness in industrial areas, governments intervene by encouraging rapid broadband rollout through funding of National Broadband Networks (NBNs). Government initiatives range from constructing new fiber / transmission / backhaul networks to implementation of Fiber to the Home (FTTH).

Some of these fiber networks are implemented by the incumbent as in Malaysia or by incumbent-led special purpose vehicles as in India. In particular, governments are investing directly or through universal service funding in the rollout of backhaul and local-access fiber. Fiber access rollout which is funded by telecom customers and operators but not accompanied by appropriate access regulation may adversely affect competitive operators' addressable market and substantially inflate costs. In the face of declining revenues from the fixed segment of the market, these government led fiber NBN initiatives are also seen as a way of supporting competitiveness of the fixed incumbent.

This case study discusses the government led High Speed Broadband (HSBB) initiative in Malaysia. It will assess the effectiveness, efficiency and impact for future policy discussions on optimal strategies for deployment of NBNs. HSBB is a FTTH initiative being deployed by Telekom Malaysia (TM) and the Government of Malaysia via a Private Public Partnership (PPP).

1.2 The rationale for building a High Speed Broadband Network

The Malaysian government has been considering broadband connectivity as an area of competitive concern since 1998. The first of the 10 National Policy Objectives in the Communications & Multimedia Act (CMA) 1998 states the aspiration to turn Malaysia into a Communications & Multimedia (C&M) Global Hub. One of the building blocks to accomplish this vision is to put in place an efficient broadband network and ensure sufficient subscription to the services (MCMC, KTAK, 2006).

The Malaysian National Broadband Plan (NBP) was approved in Oct 2004 (MCMC, KTAK, 2006). The objectives of the NBP are given below.

a. Generate adequate supply in terms of broadband infrastructure, via various available technologies deemed appropriate by 2008;

b. Stimulate demand to ensure efficient take-up of broadband services via suitable content & applications services;

c. Explore various funding mechanisms to finance the project; and

d. Identify gaps in existing regulations and where necessary, introduce new ones to facilitate broadband rollout.

In order to achieve the objectives of the NBP, a Broadband study on Malaysia was commissioned and was conducted by McKinsey in 2006. A Cabinet Committee on Broadband was formed in 2007 in order to implement these findings.

The National Broadband Plan of Malaysia also mentions that "by 2010, many neighboring jurisdictions in the Asia-Pacific region will already have commenced fibre-to-the-home (FTTH) as well as fibre speed wireless options including HSPDA, WiMAX and/or WiBro which will be able to bring forth deliver at least 100Mbps to the desk" (MCMC, KTAK, 2006). Therefore it seems that the government believed that both fiber and wireless technologies would be comparable in speed at the time of finalizing the NBP in 2006.

In 2007, Telekom Malaysia (TM) approached the government with a proposal to build a FTTH network in the main industrial areas of Malaysia including the Klang Valley with partial government funding which they claimed would help achieve the first objective of the NBP by increasing the supply of broadband infrastructure in Malaysian core regions. This was the beginning of the implementation of the High Speed Broadband (HSBB) Network which was agreed between TM and the government in September 2008. HSBB implementation commenced end 2008, and initial HSBB services were launched in 2010 along with the launch of the National Broadband Implementation Strategy, also known as the National Broadband Initiative (NBI).

1.2.1 National Broadband Implementation Strategy (National Broadband Initiative - NBI)

According to the NBI, the following benefits were expected with the increase of broadband access and usage:

- Impact on Gross Domestic Product (GDP) contribution of the country (based on the statistics for year 2008, the communications and multimedia industry contributed 6.1% in terms of revenue to the country's GDP).
- Increased national competitiveness and ability to attract Foreign Direct Investment (FDI).
- Enabler for knowledge-based economy.
- Job Creation. With the achievement of 50% broadband household penetration, it was estimated that 135,000 new high value jobs will be created in the ICT sector.
- Spin-off effects in other sectors such as engineering, local content development and broadcasting. (National ICT Council Malaysia, 2010).

At a political level high speed broadband was seen as a mechanism to transform Malaysia into a high-income country. Prime Minister Dato´ Sri Mohammad Najib bin Tun Abdul Razak stated that *"High speed broadband is a key enabler to transform Malaysia as a middle-income nation to a high-income nation".*

While the NBI is mainly driven through supply side initiatives, it also encompassed initiatives to increase demand through increasing the awareness, attractiveness and affordability of broadband services.

The two main supply-side initiatives under this strategy in Malaysia are the High Speed Broadband (HSBB) project which is deploying FTTH to deliver speeds over 10Mbps in industrial areas including Klang Valley and the Broadband for General Population (BBGP) project targeting other areas using ADSL and wireless Broadband with average speeds of 2Mbps. BBGP is funded by the Universal Service Provision (USP) fund as it focuses on the coverage of less profitable rural areas. Over 60 operators have bid and are implementing projects to provide connectivity in low access regions of the country under this project (Yardley, 2012).

The USP fund was established under the provision of section 204 of the Communications and Multimedia Act (CMA) 1998. The Communications and Multimedia USP Regulations 2002 (the USP Regulations) stipulate that all service providers whose net revenue derived from designated services exceeds RM 2 million (USD 600,000) in a calendar year have to contribute 6% of their weighted net revenue to the USP fund. (Ahmad, 2010)

The USP also includes a claw-back mechanism where any operator who has contributed to the USP fund can claw back up to 50 percent for implementation of projects that would improve broadband penetration and serve the general population as approved by the Malaysia Communication and Multimedia Commission (MCMC).

A number of other initiatives have also been implemented to stimulate demand using Universal Service Provision. In order to increase awareness, broadband carnivals, broadband and ICT training (content development, hardware/ software maintenance, etc) and promotional campaigns through mass media have been organized.

In order to make broadband more attractive to the public, e-government, e-health, e-education and e-commerce initiatives have been introduced. My1Content portal has been implemented to encourage content development and commercialization of creative content by the Multimedia Development Corporation of Malaysia (MDeC).

The government has also tried to ensure affordability by the distribution of 1Malaysia Netbooks to secondary school children and Introduction of affordable Broadband packages. The Government has also introduced a tax rebate for broadband consumers.

Figure 1 shows the main elements of NBI.

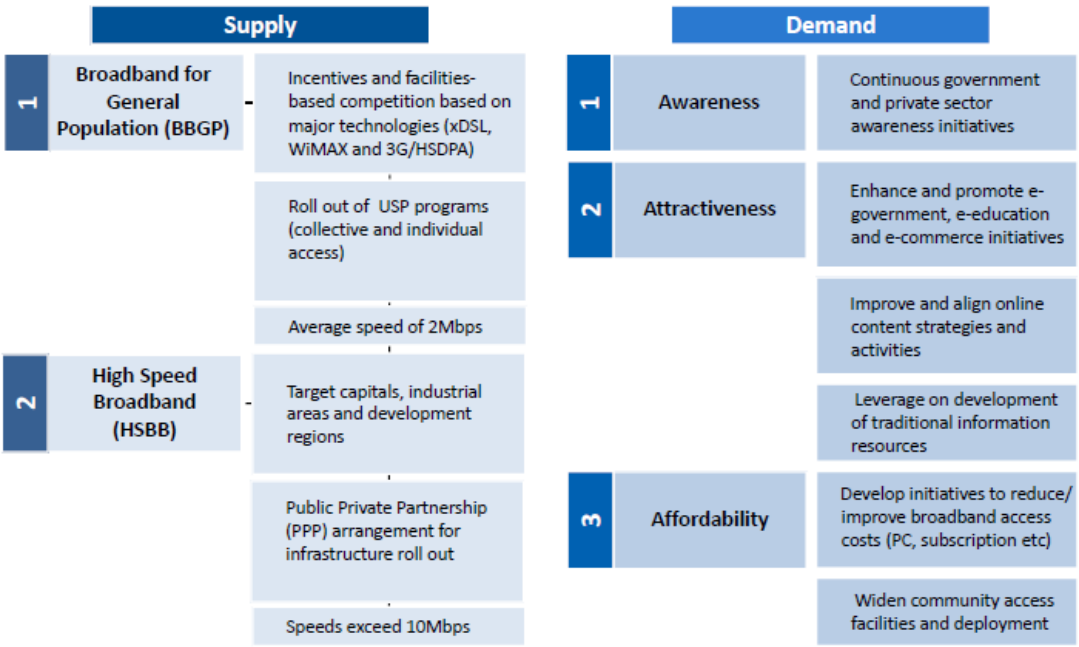


Figure 1 - National Broadband Implementation Strategy of Malaysia

Source: (MNIC, 2010)

2 Malaysian Telecommunication Landscape

As in the rest of the world, fixed telephone penetration in Malaysia has been decreasing, in contrast to mobile penetration, since the 1990s. According to Figure 3, mobile SIMs per 100 overtook fixed access paths per 100 starting 2004 in Malaysia.

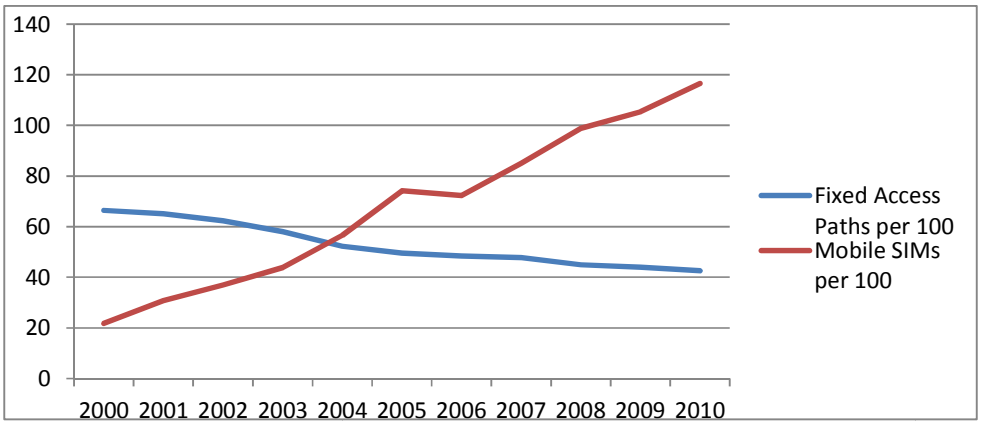


Figure 2 - Comparison of Fixed Access Paths and mobile SIMs per 100 inhabitants
Source: Author using MCMC data from
http://www.skmm.gov.my/skmmgovmy/files/attachments/Q4%202010%20Text.pdf

While Telekom Malaysia had a monopoly on fixed voice, currently there are four major mobile operators, Maxis, Celcom, Digi and U mobile. Figure 4 shows the market share of each operator.

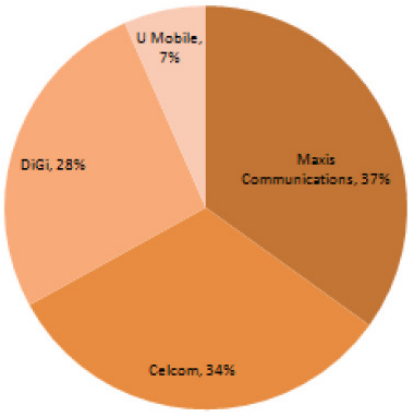


Figure 3 - Mobile Market Shares of each operator
Source: (Paul Budde Communication, 2013)

As in Figure 5, wireless broadband also overtook fixed broadband subscriptions by 2009, and is continuing to grow with the introduction of LTE in Malaysia which enables mobile broadband to reach speeds of 10-30 Mbps comparable with the currently available fixed broadband connections.

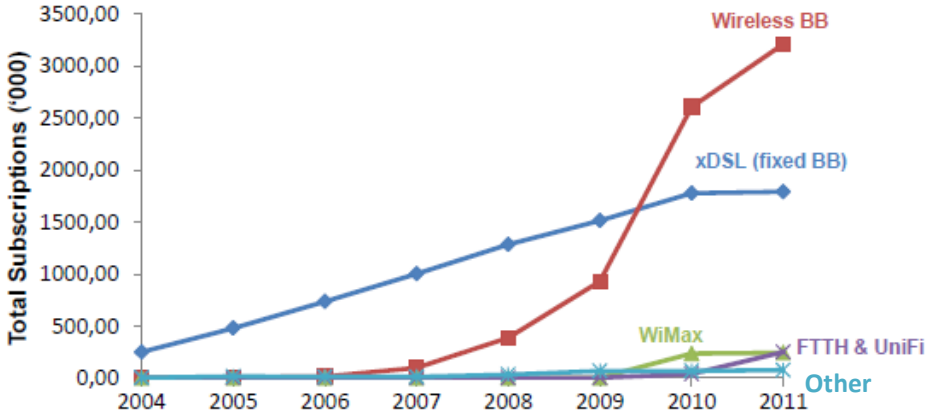


Figure 4 - Broadband subscription growth
Source: (MCMC, 2012)

Currently TM has 88 percent of the fixed broadband market share. Prior to the HSBB network, the most popular broadband network was Streamyx ADSL connectivity provided by TM. Copper infrastructure has not been effectively unbundled in Malaysia, therefore TM has had a monopoly on this network while other operators were providing wireless broadband networks. TIME dotcom (TDC) is the other major fixed broadband service provider in Malaysia. They have been providing fibre optic-based telecommunications solutions, including private leased lines and dedicated Internet services to large corporations, government organisations and enterprises that demand continuous connectivity, since 1996 when they first started.

TDC has made considerable headway in the consumer segment, with the country's first 100% fibre-optic broadband service with speeds of up to 100Mbps (TIME dotCom, 2013).

Before the advent of wireless broadband in the market TM had virtual control of the copper local loop, but by 2010 TM's market share of net broadband additions had fallen to only 20%. The first quarter of 2011 saw an abrupt change in the fixed vs. mobile new

subscriber rate as their fiber optic network, branded "Unifi" was launched and was being taken up by consumers (Einstein, 2011).

Figure 6 shows Broadband Market Share growth from 2010 to 2012. While the total number of broadband subscriptions has been increasing the shares of the major players seem to be constant since 2010.

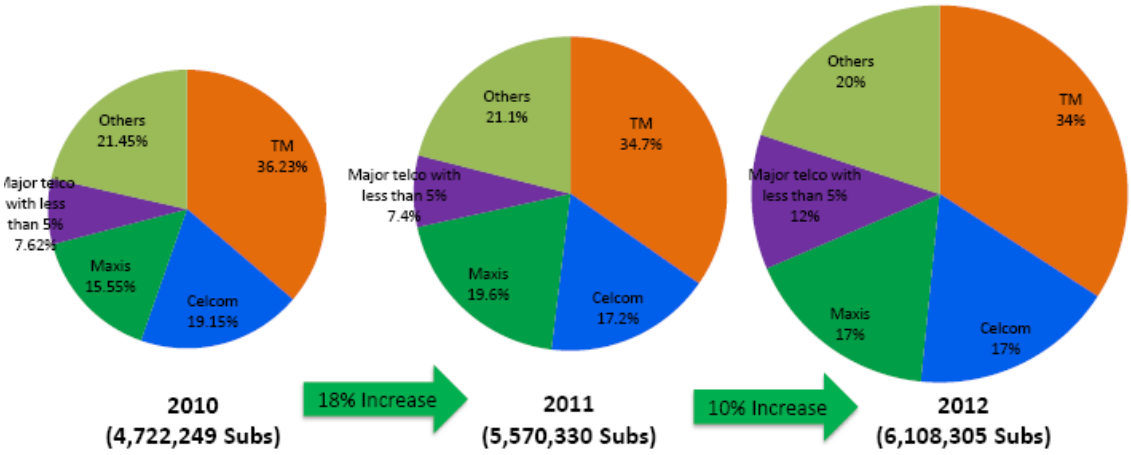


Figure 5 - Broadband Market Share from 2010 -2012
Source: (MCMC, 2013)

Others: Jaring, Airzed, OCE, Y-Max, VDSL, SAINS, Izzinet, Danawa, Asiaspace, Clearcom, Baycom, Infolient, Nextwave, Extiva, Teliti, IX, DACS, Macrolynx, Verizon, AT&T, MyKris, Citi, 1M Netbook & 3G

The popularity of mobile broadband is also evident from the latest mobile handphone survey conducted by the regulator MCMC. The percentage of mobile phone users with a Smartphone has doubled in 2012 since 2011 from 12 percent to 26 percent. Figure 7 shows 35.4 percent of feature phone users intend to upgrade their phone to a Smartphone in 2013 which will further increase broadband uptake in Malaysia.

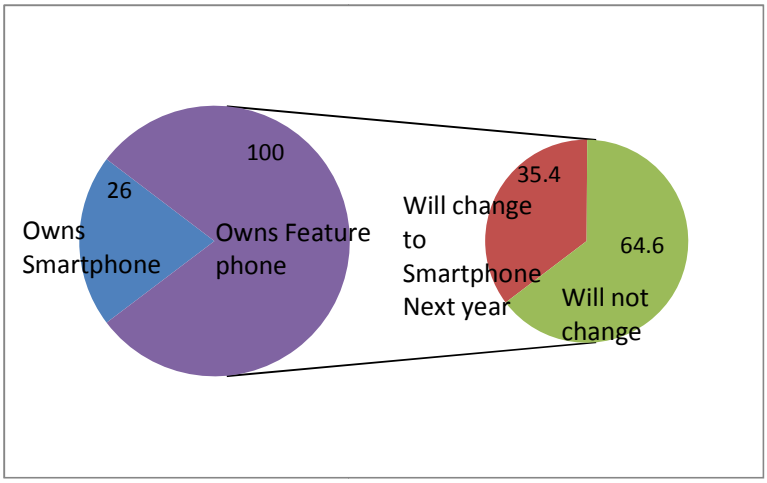


Figure 6 - Mobile phone ownership according to MCMC survey
Source: Author based on MCMC data
http://www.skmm.gov.my/skmmgovmy/media/General/pdf/130717_HPUS2012.pdf

3 High Speed Broadband Network (HSBB)

In 2008 an agreement was signed between the Malaysian government and Telekom Malaysia to build a High Speed Broadband Network. Phase 1 was estimated to cost MYR 11.3 billion (USD 3.5 billion) and was to be completed by 2018. HSBB had a target of passing 1.3 million premises by 2012 with FTTH or VDSL2 for residential high rise buildings with connection speeds above 10Mpbs. Phase 1 covers the industrial areas around Kuala Lumpur including Inner Klang Valley, and Iskandar.

International capacity was also to be increased as part of the project through the deployment of TM's first private international submarine cable system, Cahaya Malaysia. It is TM's wholly owned 2-fiber-pair system within the 6-fiber-pair Asia Submarine-cable Express (ASE) system linking Malaysia to Japan, Hong Kong, the Philippines and Singapore built in collaboration with Japan's NTT Communications Corporation (NTT Com), Philippine Long Distance Telephone Company (PLDT) and Singapore's StarHub (Singh, 2013).

The Malaysian government opted for a supply-driven HSBB network as they did not want to wait till there were speed bottlenecks before upgrading the network due to the time lag between identification of these bottlenecks and building the network. The Malaysian government also expected the supply driven implementation would be faster and more cost effective due to economies of scale when deploying a large network rather than upgrading the network bit by bit as the demand for faster broadband increased. The implementation plan was based on the analysis by McKinsey Consulting in 2007 on the future expected demand/ speeds etc.

According to MCMC, TM was chosen as the GoM's private partner as they already had the largest fiber network with over 200,000 km of fiber compared with Maxis' 10,000 km fiber network, TIME's 11,202.5 km, and Fibrecomm (a consortium of Malaysian Resources Corporation Bhd (MRCB), Tenaga Nasional Bhd (TNB) and TRI Celcom) owning 98,000 km. Creation of a wholly new implementing entity was expected to take too much time and therefore was rejected.

3.1 HSBB Funding

A Private Public Partnership agreement was signed between the Malaysian government and Telekom Malaysia (TM) to build a high speed broadband network at an estimated cost of MYR 11.3 billion (USD 3.5 billion). The government contributed MYR 2.4 billion (USD 740 million) on an incurred claims basis based on project milestones reached by TM. The balance was to be funded by internally generated funds and borrowings by TM.

The Government's contribution of MYR 2.4 billion (USD 740 million) was decided based on HSBB project profitability analysis conducted by TM. It was mostly to make up for the lower net present value (NPV) of serving areas such as new housing estates and new industrial zones which, despite being in Malaysia's urban core, were nevertheless regarded as non-profitable by TM.

Just before the agreement was signed in 2008, High Speed Broadband Technology (HSBT), a fiber infrastructure provider (but not operator), proposed a cheaper alternative to the government. HSBT proposed a network costing MYR18 billion (USD 5.37 billion) over 10 years without government funding, with investment expected to come from Middle Eastern investors (Paul Budde Communication, 2013). As HSBT was not an operator, it would not have competed with the service providers who use the fiber network, and therefore would have been positioned to provide an open access

network. At the time of writing the report, the author had not received any explanation on why this offer was rejected.

It is stated that the HSBB network will be shared on an open access basis by MCMC (MCMC, 2013). Yet, there is no public document setting out the terms and conditions of access or implementation of which the cost-orientation of prices and non-discrimination terms between TM's retail arm and other competitive providers. Prices are commercially negotiated between TM and service providers. In comparison under the European State Aid rules, provision of public funding to broadband infrastructure projects is dependent on a commitment to open access. The related guidelines consider open access to mean effective, transparent and non-discriminatory wholesale access to the subsidized network. In addition to open access obligations, the conditions for receiving aid include detailed mapping of private infrastructure, open tender processes, technological neutrality and claw-back mechanisms (OECD, 2013). These safeguards are aimed to promote competition while fostering rapid roll-out of broadband networks. In the case of HSBB neither an open tender nor technology neutrality appear to have been taken into account by the GoM before the decision to subsidize the TM network.

However, as part of the PPP agreement, TM has to meet some social obligations to support the government's national agenda. The main social obligations are listed in Table 1. There are also some revenue-sharing mechanisms with the government. From 2014-2017, TM has to pay the government MYR 50 million (USD 15.5 million) per year; from 2018-2025 revenue sharing will be formula-based. If HSBB sales go beyond what is projected during this period TM has to pay the government (the difference between actual and projected sales) x (revenue per customer) x 0.2. This is the claw back mechanism for the government in case TM forecasts low sales figures in their analysis to show low project NPV during the agreement stage when the government contribution was decided. The agreement also says that if the total MYR 11.3 billion (USD 3.5 billion) is not expended, 20 percent of unused funds has to be returned to the government.

The exact terms of the PPP were not disclosed as it is covered by the Official Security Act.

Activity	**Est cost (in millions)**
Providing connectivity to government offices	MYR 300 (USD 93)
Building cyber centers in rural areas	MYR 125 (USD 39)
Promotion of broadband to the public	MYR 150 (USD 46)
Training programs at cyber centers	MYR 50 (USD 15.5)
2014 - 17 (50 M per year)	MYR 200 (USD 62)
Total	**MYR 825 (USD 255)**

Table 1 – Cost of obligations to government until 2017
Source: Author, based on interviews with TM and MCMC.

Overall it seems that there are some payback mechanisms included in the PPP agreement between TM and the government. But considering that the government grant is MYR 2.4 billion (USD 740 million), and TM is committed to spending MYR 825 million (USD 255 million), this leaves a government grant of 1.575 billion (USD 490 million) which has been given to TM but not to any of the other operators (without considering the time value of money which would increase the value of the grant). If the government grant was given considering that telecom service providers would not have moved fast enough to provide high speed broadband in these industrial areas due to

profitability issues, then it should have conducted a competitive process allowing other operators to bid for the grant. Then the government should have signed a PPP with the winner of the grant with disbursements tied to implementation milestones.

In its 2014 budget, Malaysia's government committed a total of MYR 3.4 billion (USD 966 million) for the next phase of the HSBB project. Of that total, MYR 1.8 billion (USD 560 million) will be invested in the expansion of coverage in urban areas, with around 2.8 million households expected to benefit. A further MYR 1.6 billion (USD 50 million) will be spent on expanding HSBB services to around two million consumers in suburban areas. The conditions of the HSBB phase 2 agreements are still being negotiated between the government and TM at the time of writing the report. The government hopes that this HSBB expansion will help Malaysia reach the milestone of 75 percent household broadband penetration by the end of 2015.

3.2 HSBB Technology

The Malaysian government intends to implement a stable broadband network with speeds higher than 10Mbps and scalable up to 100Mbps (MNIC, 2010). The technology i.e. a FTTH with VDSL2 (Very-high-bit-rate digital subscriber line) was chosen for high rise residential buildings.

The two common methods of implementing FTTH are point-to point (P2P) and Point to multipoint (P2MP). The most common P2MP access mechanism used to deploy FTTH is GPON (ITU-T G.984). PTP is more conducive for competition as a dedicated fiber connection is provided to each home, and any operator can easily access any particular end user by connecting to the relevant fiber(i.e. allow full unbundling of the fiber local loop). The GPON networks usually incur lower costs than PTP as some of the access network is shared with other users (in a similar way to a cable network) even though each customer has their own connection into their home. The access to different customers must be managed electronically by the network operator as it uses point to multipoint fiber to the premises in which unpowered optical splitters are used to enable a single optical fiber to serve multiple premises (Yardley, 2012).

TM had chosen to use GPON (Gigabit Passive Optical Network) topology.

TM is currently providing multiple retail and wholesale services over HSBB. They are offering a bundle known as UniFi which comprises of a fixed telephone connection, a broadband connection (speeds vary from 5Mbps to 20Mbps) and an IPTV connection.

HSBB Access is a high speed access product that enables other operators to deliver IP-based value added application services to end–users via the HSBB network. Figure 9 shows the basic diagram. This service is provided by giving service providers access to the Broadband Termination Unit (BTU) at the customer premises. It has four ports which are made available to other operators on a first-come-first-served basis subject to availability of a port at the BTU. Maxis has subscribed to HSBB Access and is providing end customers with a bundled package including broadband connection (10Mbps to 30Mbps), IPTV in partnership with Astro and mobile connection. TIME dotCom was the first operator to offer bundled packages including IPTV along with a FTTH broadband connection but its consumer segment revenue has been affected due to 'UniFi'.

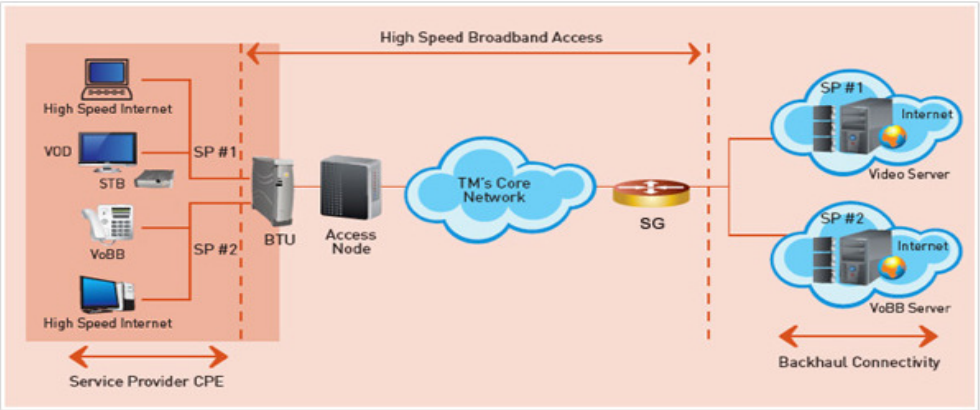


Figure 7 - HSBB Access Service

Source: (Telekom Malaysia, 2010)

HSBB Transmission service enables service providers to connect different locations through HSBB. Figure 10 shows the diagram. TM does not lease dark fiber which is not possible with GPON technology, they only provide bandwidth services.

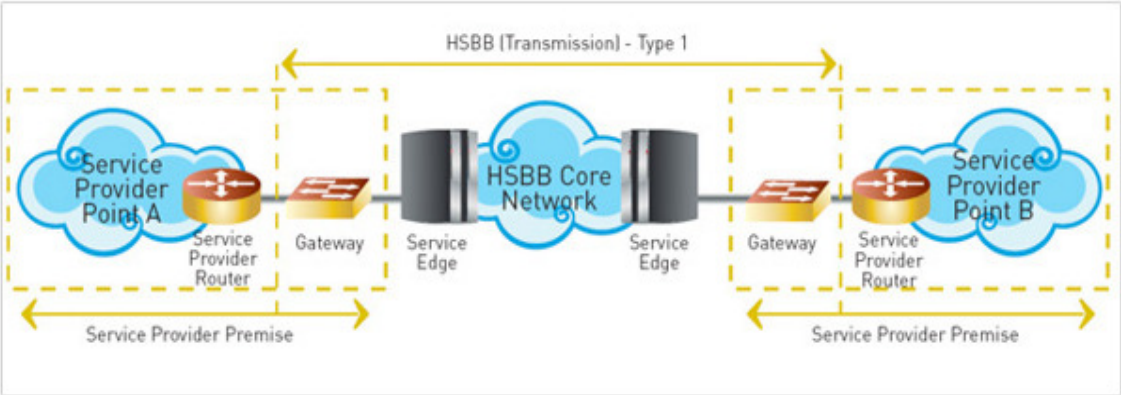


Figure 8 - HSBB Transmission

Source: (Telekom Malaysia, 2010)

It is clear that fiber is critical especially for backbone network of a country, but there are also other less costlier methods such as mandating that duct and dark fiber be installed alongside trunk roads when they are being built or repaired (if fiber competition does not already exist on that route). The cost would be incremental to the road development cost and can be recouped from private operators wishing to access the network.

In section 1 it is mentioned that the government considered that mobile would reach speeds comparable to fibre. While fiber is accepted to be the most efficient and effective for the backhaul network, the government did not even consider wireless broadband technologies for the access layer of the HSBB network. Currently mobile LTE can provide 75Mbps theoretically and an average of about 10Mbps – 30Mbps with potential for improvement with new technologies such as cognitive radio.

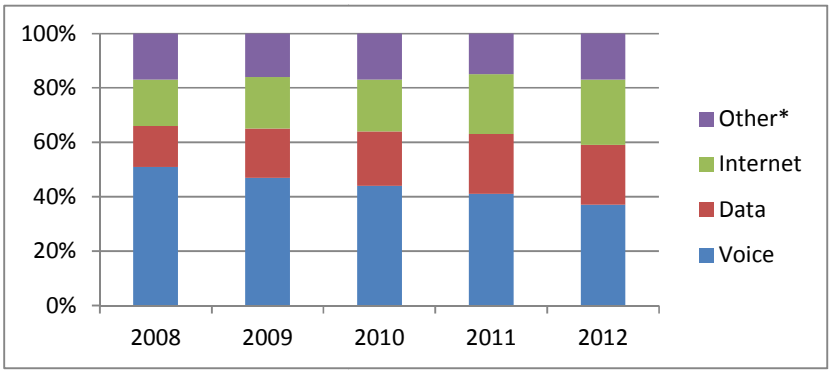
3.3 Telekom Malaysia (TM)

Telekom Malaysia (TM) Berhad was formerly the Telecom Department of Malaysia. It was incorporated on 12 October 1984 and renamed Syarikat Telekom Malaysia Berhad (STMB). TM is currently a government linked company with 28.7 percent directly owned by the government, and another 25 percent owned by government related companies.

It is a monopoly in fixed voice and had a considerable market share in the mobile communications market after its acquisition of Celcom, a cellular phone company and merging with its own mobile operation arm, TMTouch. In April 2008, TM Group officially demerged with TMI the regional mobile operator. Celcom remained under TMI, which later changed its name to Axiata (Sumardi & Othman, 2011). Broadband has become Telecom Malaysia's core business since the demerger of its mobile business in 2008.

Telekom Malaysia's total revenues was MYR 9.99 billion (USD 3 billion) in 2012, up from MYR 9.15 billion (USD 2.8 billion) in 2011, growing at 9.2%, the strongest TM performance since the demerger in 2008 (Telekom Malaysia, 2012). The operator's fixed-line segment has been experiencing a decline in revenue for some years. However, the declines were offset by the growing consumer broadband and enterprise data services. Figure 11 shows how the fixed voice segment has declined from 51% to 37% of total revenue, while the Internet and Data segments have increased. (Telekom Malaysia, 2012)

Figure 9 - Telekom Malaysia's revenue share by product segment - 2008 – 2013



*Other comprise other telco and non-telco services i.e. ICT-BPO, MMU tuition fees, customer projects, Yellow Pages

Source: Author based on TM Annual report data

https://www.tm.com.my/AboutTM/InvestorRelations/Pages/AnnualSubstainabilityReport.aspx

Since the 2008 demerger, TM had a rather low ROE but then almost doubled from 2009 to 2010 as per figure 12.

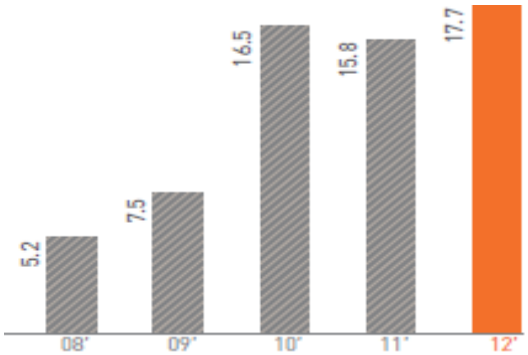


Figure 10 - Return on Shareholder's Equity from 2008 – 2012
Source: (Telekom Malaysia, 2012)

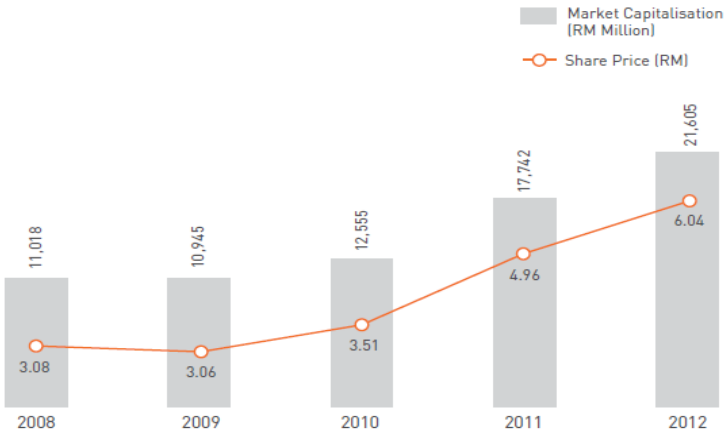


Figure 11 - Market Capitalization / Share Price
Source: (Telekom Malaysia, 2012)

It can be seen that TM showed dramatic improvements both in terms of Market Capitalization and ROE from 2010 onwards. Reports suggest that this might be attributable to the launch of HSBB in 2010 and the continued growth of sales among other reasons such as its attractive dividend policy (InsiderAsia, 2012).

3.4 HSBB Progress

Since the launch of HSBB in 2010, take up of UniFi, the bundled package sold by TM, has been very good. The implementation of HSBB can be considered as a success as it met or exceeded its implementation targets.

One of the key indicators of success of HSBB and BBGP was to reach a target of 50 percent Household broadband penetration by 2010 from 11 percent in 2006. This target was achieved by 2010 with household broadband penetration reaching 55.6 percent. It is continuing to increase and has reached 67.1 percent by June 2013. The estimated number of Internet users in Malaysia is 19 million, but this figure is based on subscriptions, and no survey has been conducted. There are significant shortcomings in the current method of estimating the number of Internet users, where no survey on Internet use has been done as the government use an arbitrary multiplier. An alternative method of estimating Internet users based on the income and education components of the Human Development Index (HDI) has been proposed to the International Telecommunication Union (ITU) as research has found the existence of a strong correlation between the number of Internet users and the education and income

components of the HDI in countries where a survey on Internet use has been conducted. Using the correlation it is possible to impute the proportion of Internet users in a country based on the countries' education and income components of the HDI index. According to this alternative method there are only 12 million Internet users in Malaysia and not 19 million (Gunaratne & Samarajiva, 2013). This also leads one to question the validity of how some of the other indicators have been calculated.

According to MCMC, to date, UniFi has been made available in 102 areas nationwide with over 1.43 million premises passed surpassing the target of 1.3 million premises passed by 2012. Through the HSBB project TM has deployed 46,986 km fiber nationwide. International capacity has also been increased from 682Gbps to 1.74Tbps by completing the international submarine cable system, Cahaya Malaysia, which lands at Tseung Kwan O, Hong Kong. TIME dotCom (TDC) has also invested on International bandwidth anchoring its business on the 9,000km Cross Peninsular Cable System, a fibre-optic network which runs from Thailand to Singapore through Malaysia. Following the acquisition of the Global Transit and AIMS group of companies in May 2012, TDC has a 10% stake in the Unity submarine cable connecting Japan and the US (MayBank IB, 2013).

There has also been high take up of HSBB wholesale services as well. Maxis, Celcom, Packet1 and REDTone have signed up for HSBB access and 19 Companies have signed up for HSBB Transmission services for the carriage of data communications between transmission points with total bandwidth of 90Gbps for 232 links.

Though individual broadband penetration is meeting its targets, only one percent of Malaysian businesses advertise online, ranking the country in the bottom 10 percent of the 57 "aspiring" countries studied by McKinsey including Argentina, Hungary, Malaysia, Mexico, Morocco, Nigeria, Taiwan, Turkey, and Vietnam.The average Internet-enabled SME in Malaysia derives only 14 percent of its revenue from online advertising compared with 17 percent in the rest of the aspiring world. Many SMEs do not use the Internet for business. According to this same study around 66 percent of the Malaysian SMEs used e-government services, and Malaysia is the 2nd highest according to the e-government index (Nottebohm, Manyika, Bughin, Chui, & Syed, 2012). According to MCMC, One of the main challenges of increasing the take up of HSBB is that people who already have 1Mbps/ 2Mbps connections are satisfied and do not feel the need to upgrade. Further in an interview CEO of TM Datuk Sri Zamzamzairani Mohd Isa has claimed that over 90% of its UniFi base was on the 5MB line and that many customers are happy with the service level, and that this presents a tough challenge for TM to upsell its customers (Singh, Broadband Powers TM's Growth, 2013). If most customers are satisfied with the 1/ 2 or 5MB connections, this brings up the question of whether speeds of 10M and above is necessary, and if not, the latest wireless broadband technologies could also have provided the necessary level of service.

4 Conclusion

The Malaysian government has been considering broadband connectivity as an area of competitive concern since 2002, when discussions on a National Strategy commenced. The Malaysian National Broadband Plan (NBP) was approved in Oct 2004 (MCMC, KTAK, 2006). The objectives of the NBP were to generate adequate supply in terms of broadband infrastructure, stimulate demand explore various funding mechanisms and identify gaps in existing regulations.

With the objective of increasing broadband infrastructure, the Malaysian government agreed to grant MYR 2.4 billion (USD 740 million) to Telekom Malaysia (TM) in order to subsidize their High Speed Broadband (HSBB) Network in 2008. The Malaysian government saw improving broadband connectivity in industrial areas as a way of increasing national competitiveness and turning Malaysia into a communication and multimedia global hub. At the onset the Malaysian HSBB network implementation seems to be successful as Phase 1 was completed within a record 18 months and was launched by 2010. By 2012 it surpassed its target of passing 1.3 million premises and reached over 1.4 million. It has met (exceeded some) its implementation milestones and has reported savings in TM's 2011 Annual Report.

The take up of HSBB was also impressive with over 600,000 subscriptions (i.e. 43% take up among homes / premises passed) by June 2013 even though around 90% have subscribed to the 5MB package. Four major operators have signed up for HSBB access services, and 19 have signed up for HSBB transmission services. While HSBB has been described as an open access network, there is no price regulation; prices are commercially negotiated between TM and service providers. Wholesale access prices are not transparent or regulated which may act to reduce the level of wholesale competition in comparison to other markets. For HSBB to be really open access there should be public documents setting out the terms and conditions which would reflect it being non-discriminatory.

The government funding in the form of a PPP with quarterly disbursements tied to implementation was an incentive to ensure that the implementation was not delayed. But could TM's investment plan have been completed without government funding, especially as it is implemented in industrial areas? It seems possible considering that the fiber optic infrastructure provider High Speed Broadband Technology (HSBT) proposed to implement HSBB in partnership with a foreign funder without a government subsidy, but was rejected for unknown reasons.

Even if assistance by the government was needed to deploy quality broadband services, a competitive process where all other operators were allowed to bid, might have been more conducive to competition. This would have given other operators providing fiber-optic based solutions such as Time dotCom and HSBT the opportunity to bid for the HSBB project and compete with TM for grant funding / participation in a PPP. With the grant of MYR 2.4 billion (USD 740 million), the incumbent operator has been given a considerable advantage. Even if part of it has to be paid back the rest is a grant. The provision of easy capital appears to have improved the health of the company after its demerger, as can be seen from the increase of share prices and ROE of TM in 2010.

Another issue to explore is whether the technology had to be FTTH, or could it have been fiber backbone with a mobile access network. As mentioned in section 1.2, in the NBP it is stated that the government had already considered the fact that while wireless broadband services were not capable of providing fibre optic speeds in 2006, by 2010 they expected them to meet similar speeds. Currently LTE services have already been introduced in Malaysia with average speeds of 10-30 Mbps. The initial target of HSBB was providing broadband with speeds of 10Mbps which can also be reached with mobile broadband at a much cheaper cost. It is also expected that with newer technologies such as cognitive radio, release of digital dividend etc, mobile broadband will be able to provide higher speeds and better quality of service in the future. The demand for mobile broadband in Malaysia is clear as Smartphone penetration has doubled last year and seems to be continuing to increase.

If the government followed a more technology neutral approach to the boundaries / uses of technology at different points of broadband network implementation where only network parameters such as speed, quality of service levels etc. were defined for different stages of the network such as Access, Transmission and all interested service providers were asked to bid for the project this would have ensured a more efficient, effective and less costly HSBB.

Then the implementation of a PPP with disbursements tied to milestones would have ensured that the project was completed within the stipulated time as well. Even if TM was chosen after due process, the perception that the government favors the incumbent could have been avoided.

Funding for phase 2 of HSBB has also been allocated in the 2014 budget. Exact terms and conditions were still in the process of being finalized at the time of writing this report. In order to encourage further deployment of broadband, considering that the wireless technologies are catching up, and that the current demand is mainly for the lower speed package of 5MB, the government should follow a more transparent process which is technology neutral. They should conduct a tender process specifying parameters such as speed, quality of service, number of connections etc, and allow all interested operators to compete at different stages of providing the network such as at access layer/ transmission layer etc. Before deciding on the required speed they should conduct a demand-side survey, as well as consider future needs of the consumers. They should also ensure that it is open access with transparent pricing which would discourage discriminatory pricing. This would promote network investment, prevent the uneconomic duplication of facilities and strengthen competition.

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