

The Evolution of High Speed Broadband Technology and its Impact on Malaysian Society

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Abstract: This paper discusses the evolution of the High Speed Broadband (HSBB) technology and its impact to the society and population in Malaysian. It is also elaborate on the development stages of this technology in Malaysia as has been announced by the Malaysian government. In addition, a strength-weakness-opportunity-threat (SWOT) analysis approach is used in cross-examining the impact of high speed broadband technology. Secondary data source mostly from Telekom Malaysia were used and the content analysis approach was used in interpreting the SWOT.

Key words: SWOT • Telecommunication • Broadband Technology • High Speed broadband

INTRODUCTION

In 1960s, Malaysia has moved forward to be among of the pioneer countries that used computer systems and networking in government agencies. However, the evolution of the internet technology was taking place around 1990s where both government and private sectors in Malaysia were striving to use the computers as a tool in many applications. The emergence of new technologies and network infrastructure plus the needs of citizen to be exposed to the outside challenging world, then the government of Malaysia has come out with two legislations enacted to give effect to the new regulatory model: The Communications and Multimedia Act 1998 and The Malaysian Communications and Multimedia Commission Act (1998).

Information and communication technology (ICT) in Malaysia has entered people's lives in numerous ways – be it in terms of communication, logistics or in their working environment. Sizeable investments have been recorded in ICT over the years. For instance, in the Tenth Malaysian Plan, 2011-2016 while a total of US\$6 billion was allocated for enhancing ICT diffusion throughout the country in the Ninth Malaysian Plan, 2005-2010). This trend shows the importance given by the country for ICT

to accelerate the economic competitiveness of Malaysia. Apart from the public sector, the private sector in Malaysia is a major user of ICT products and services.

Now, Malaysia has moved forward to excel in a very wide scale IT application mainly in providing the advanced and high speed internet infrastructure. The development of High Speed Broadband (HSBB) technology and infrastructure in Malaysia started in 2010 when the main Malaysia's telecommunication provider, Telekom Malaysia (TM) has officially launched their three pioneer areas to be covered with complete fiber infrastructure using the Fiber-To-The-Home (FTTH) technology. Shah Alam, Subang Jaya, Taman Tun Dr Ismail and Bangsar are the initial four areas that have been covered by TM HSBB services at the time of service launching in March 2010 [1].

The Overview of the High Speed Broadband System: IT Infrastructure in Malaysia is well developed to be able to support R&D, communicate knowledge and information enhancing service support to both public and businesses. Private organizations like Telekom Malaysia (TM), MIMOS and GITN are among of the telecommunication backbones in providing the necessary infrastructure support in Malaysia [2].

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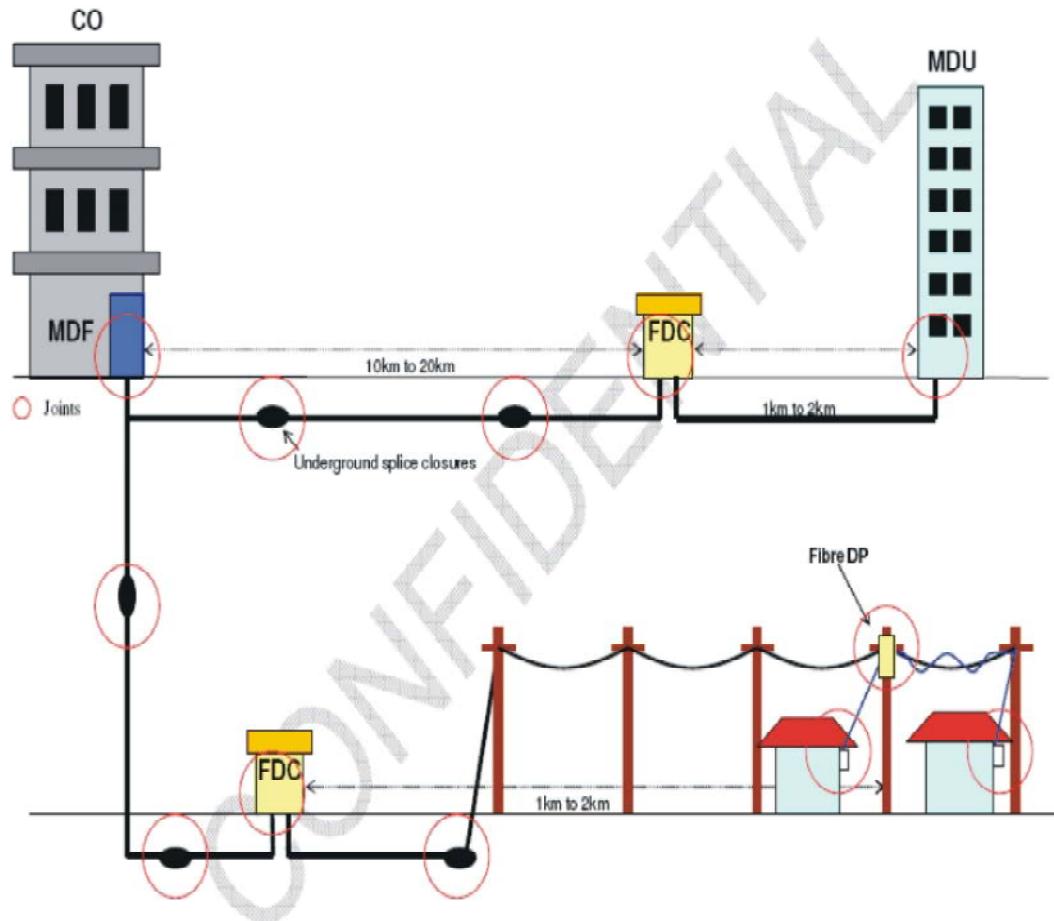


Fig. 1: Standard FTTH Network

Essentially, the HSBB technology is driven over an IP network via fiberized infrastructure. It is basically a broadband service that offers bandwidth delivered at network speeds of 10Mbps and above. In contrary, the normal broadband connections deliver bandwidth at network speeds ranging between 384kbps and 4Mbps only.

The HSBB products carry their own brand name according to the service providers. For instance, TM as the main provider and of the HSBB service stands up in the market with their namely *UNIFI HSBB* product. UNIFI is a wired high speed broadband service and the optimum service from UNIFI can be enjoyed by wired connectivity only. [3]. While for the wireless capability is provided as an additional benefit to the wired service with some limitations. UNIFI service is considered successfully installed only if all triple play services of phone, High Speed Internet and HypTV are fully activated. As for Maxis, *Maxis high speed internet* is its main product of HSBB that offered to the customers. All of these products

are delivered for high speed internet services via fiberized network technology.

Basically, there are two types of installation for these HSBB products that can be defined as the landed property installation and the installation for the high rise building. The main components and equipment of this high speed broadband connection for these two types of installation are defined in the table below:

There is a slightly difference in the components and equipment used for high rise and landed buildings. For landed building it will utilize a fully fiberized network or FTTH technology while for high rise, the fiber network will end up at the subscriber distribution frame (SDF) that is usually located at the first floor of the building. The broadband termination unit (BTU) used in this two types of installation is different as their interface to the different network that are fiber and copper. BTU type ONU is usually used to interface with fiber network in the FTTH technology while the BTU-VDSL is used in a high rise building that use the existing in house copper wiring.

Table 1: The Equipment and Service of HSBB

Equipment & Service of HSBB	
Landed Property (FTTH)	High Rise Property
•Fiber Termination Box (FTB)	•Wall Socket
•Fiber Wall Socket (FWS)	•ADSL Splitter
•Broadband Termination Unit (BTU-ONU)-acts as a modem	•Broadband Termination Unit (BTU-VDSL)-act as a modem
•Residential Gateway (RG)- acts as a router	•Residential Gateway (RG)- acts as a router
•Set Top Box (STB)	•Set Top Box (STB)
•Ethernet Cable	•Ethernet Cable
•Telephone Cable	•Telephone Cable

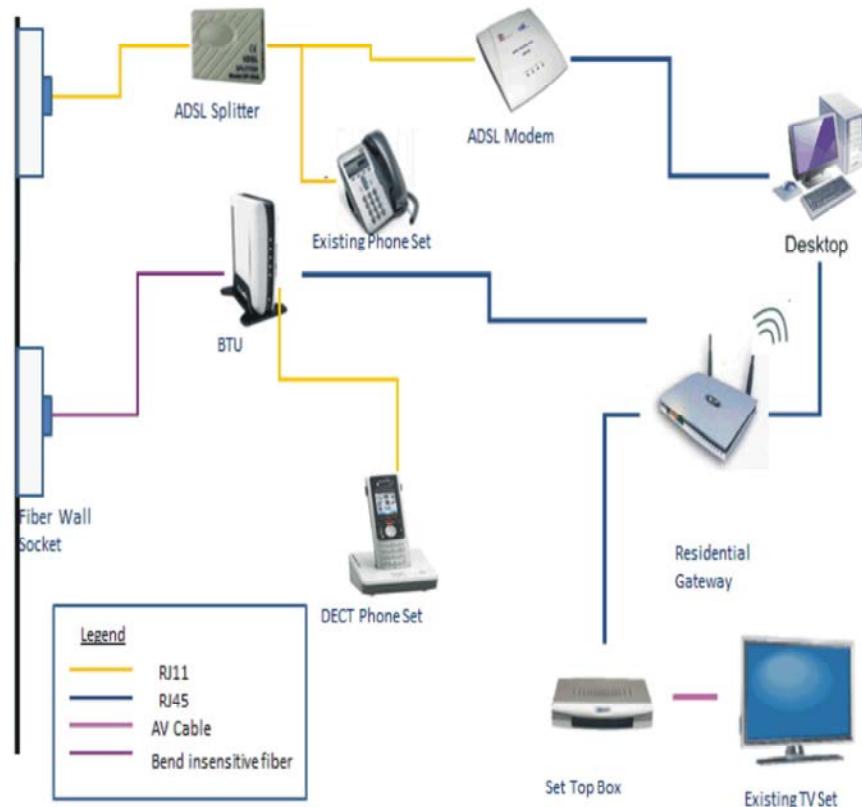


Fig. 2: Components Installation for HSBB

The HSBB service installation is subject to the service coverage availability, technical and civil testing requirements. Normally, installation time for fiber in landed properties will take between 5 to 8 hours while for the high rise buildings, utilizing the Very High Speed Digital Subscriber Line (VDSL2) technology will take between 2 to 3 hours. The basic installation network diagrams for landed and high rise buildings are depicted in the diagrams below:

For landed building, it will utilize a fully fiberized network or FTTH technology. Starting from network provider exchange up to fiber distribution cabinet (FDC) and fiber distribution point (FDP), the network is served via fiber cable and fiber system. From the FDP,

the drop fiber cable is rolled up to the Fiber termination box (FTB) at the customer's premise. From the FTB, the indoor fiber cable is used to connect the FTB to the internal fiber wall socket (FWS). And finally from this FWS, a bend insensitive patch cord is used to link the network from the FWS to the BTU-ONU that act as a modem for HSBB service. From BTU-ONU, the telephone cable RJ11 cable is used to link to the phone set while the RJ45 cable is used to connect the modem to the Residential Gateway (RG) that acts as a router. From this RG, we will use the Ethernet cable RJ45 cable to connect to the personal computers (PC) and to connect to the Set Top Box (STB) to enjoy videos on demand via TV set.

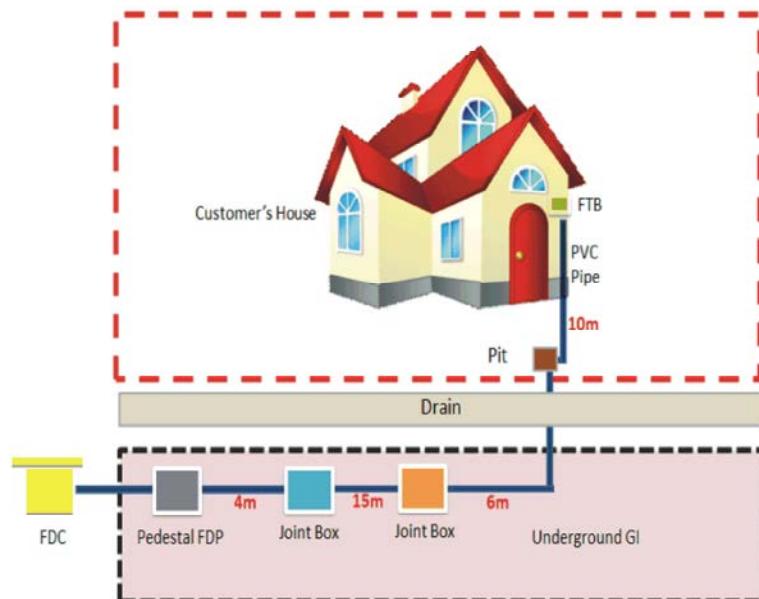


Fig. 3: Landed Property HSBB Installation

RESIDENTIAL BUILDING WITH SDF ROOM & CABLE RISER (SCENARIO 1)

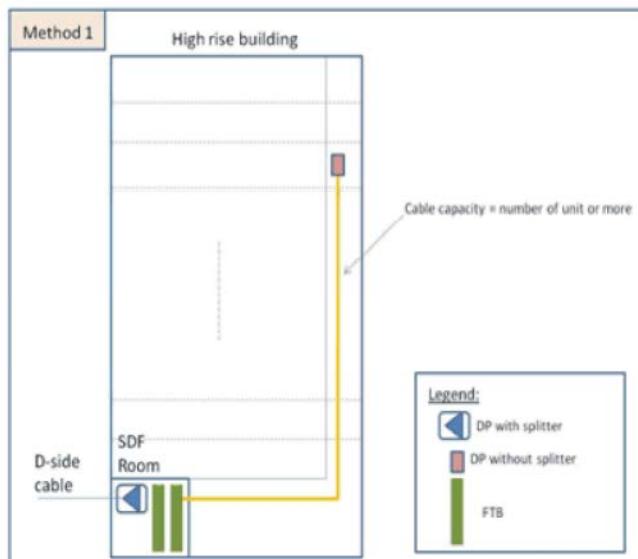


Fig. 4: High Rise HSBB Installation

For high rise, the fiber network will end up at the subscriber distribution frame (SDF) that is usually located at the first floor of the building. Starting from network provider exchange up to the SDF, it will use a fully fiberized system and equipment. There will be an interface for fiber-copper in the SDF that can convert the service

from fiber technology to copper technology. From SDF up to customer's wall socket, it will fully use the existing copper network. A BTU-VDSL that acts as a modem will be connected directly to the splitter that connected to the wall socket using the telephone cable RJ 11. From this VDSL modem, it will be connected to the phone set using

Table 2: The Factors That Affect the Service Usage

Factor	Explanation
Location Of Websites	Access to some international websites could be slow due to traffic volume
Web Server Capacity	Some web servers restrict capacity to handle huge traffic demand or may even restrict download speed to ensure fair access to all.
Network Congestion	Temporary congestion due to unavoidable network maintenance/outages
Multiple Users or applications	Running multiple applications at the same time such as peer-to-peer Bit tolerant, can degrade access speed. Multiple users sharing the connection at the same time can also degrade the speed.
PC Operating Systems	Some configurations of the PC operating systems can compromise the Internet access performance.
WiFi (Wireless) connectivity	Compared to wired connectivity, wireless connectivity can slow internet access.

the RJ 11 cable and it will be connected to personal computers and RG using the RJ45 cable. From RG, it will use the Ethernet cable RJ45 cable to connect to the personal computers (PC) and to connect to the Set Top Box (STB) to enjoy videos on demand via TV set similarly to the set up in FTTH network.

The internet access speed is depending on various factors such as the location of websites surfed by the users, the web server capacity, network congestion, multiple users or applications, PC operating systems and the Wireless connectivity [4].

If we wish to use the HomePlug/BPL for your HyppTV or internet or use Wireless Repeater to expand wireless signal from router, the service usage may be affected by various factors such as interference from other electrical equipment in the vicinity, actual copper line quality and coverage distance. The explanation of these factors can be classified in the table below:

The Hsbb Deals and Offers: Telekom Malaysia believed that the basic HSBB packages will eventually allow Malaysians to experience high speed Internet of up to 100 times faster than the usual rate while businesses will be able to have maximum speeds of up to 1,000 Mbps (1Gbps). Basically, a HSBB is expected to offer product that support Voice, Video and Data. The voice come through incorporating new technology into telephone network, that VoIP (*Voice over IP*) is used instead of conventional PSTN system. VoIP lowers telephony cost. *Video application used IPTV over PON*, this supports TV broadcast and also Video on Demand at SDTV and also HDTV quality. Lastly *Data* is expected transfer is configured to reach minimum of 100Mbps and 1Gbps of High Speed Broadband.

The Development Phase of the High Speed Broadband Technology in Malaysia: The Malaysian government has aimed to reach a 50% broadband penetration rate by 2010. Under the National Broadband Plan (NBI), the government has invested and successfully implemented

several initiatives and broadband projects such as the implementation of Mobile Number Portability (MNP), WiMax MyIX, as well as continuance of bridging the Digital Divide efforts through development of Universal Service Provision (USP) technologies. [5] And now the concern and focus is in transforming from purely a device for voice communication to data mobility and image transmission as well as the digital TV Set Top Box. All of these technologies are embrace in a HSBB technology.

High-speed broadband or HSBB is part of Malaysia's National Broadband Implementation strategy and the government aims for the country to achieve 50% broadband penetration by 2010. This involves several strategies in terms of both supply and demands. [5] HSBB has been initially deployed via fiber in the inner Klang Valley, Iskandar Malaysia and key industrial zones throughout the country. It is expected that 1.3 million premises will have the ability to access HSBB coverage by end 2012.

According to the Malaysian Communications and Multimedia Commission (SKMM), Malaysia's broadband penetration was 17.5% of households at the end of the third quarter of 2008. That meant that there was still a large market to grow for many service providers. Also, the increased focus on high tech and knowledge based industries meant that broadband was going to become an essential utility. Not only was broadband a must in areas like high tech parks, it was also necessary in homes. Workers were beginning to work more from their homes. [5] On the supply side of the broadband market, the Malaysian Government has defined two categories of broadband:

The first is HSBB in selected geographic areas with speeds ranging from 10 Mbps up to 100 Mbps for residential customers using fiber to the curb – namely, roadside cabinets - with the final part of the connection provided via a wire pair into the premises and up to 1 GBPS using fiber directly into premises for businesses and high economic impact areas.

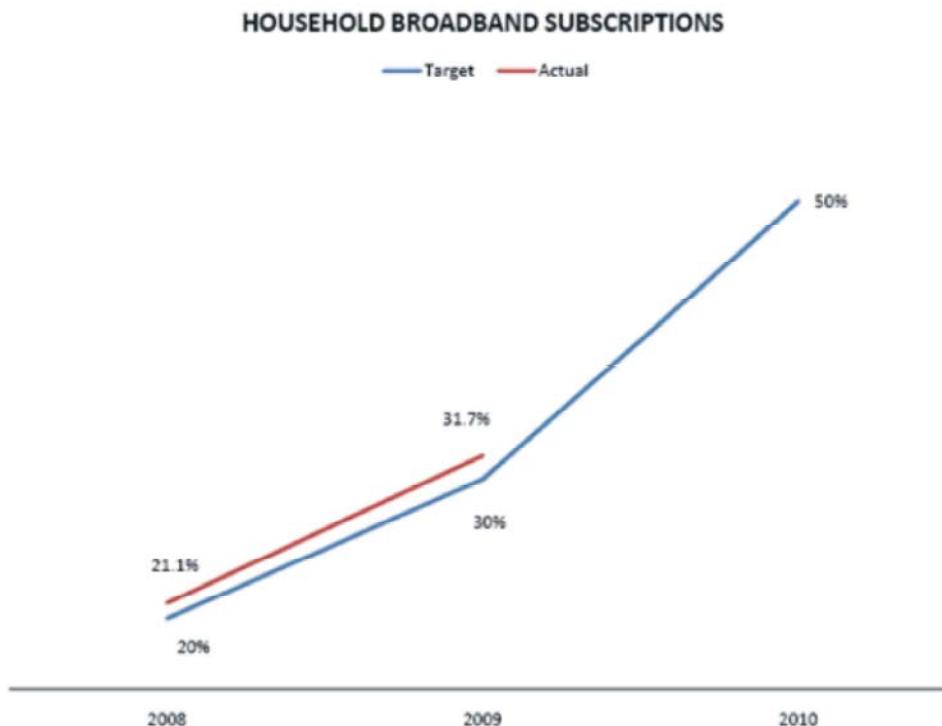


Fig. 5: The Household Broadband Subscription as of 2010

The second is Broadband to the General Population (BBGP) with speeds generally from 256 Kbps to 2 Mbps and all the way up to below 10 Mbps.

In Malaysia, this HSBB technology will be implemented mainly in industrial areas, cities, towns and the various development regions including cyber cities and cyber centers, technology parks and the Iskandar Development Region in the southern part of Peninsular Malaysia will feature HSBB. The Government's strategy to achieve this is through collaborative effort in a public-private partnership with the ministry and service provider such as TM. Under this initiative, TM will provide last mile access to homes and businesses through three main technologies namely, fiber-to-the-home (FTTH), Ethernet-to-the-home (ETTH) and Very High Speed Digital Subscriber Line (VDSL2). The Government's portion is mostly to make up for the lower net presence value (NPV) due to pushing supply into areas such as new housing estates and new industrial zones which are regarded as non-profitable by the other service providers to do so.

The increase in Internet access speeds can be directly linked to the types of services offered over the network. The provision of single play services that were primarily data-only services were responsible for moving dial-up users to ADSL which was mostly provided in Malaysia by TM through its Streamyx service. Most users basically

used the Internet for browsing static content (graphics and text) and email with a little bit of music and video streaming. Dual play came along and added voice with better quality of service (QoS) to existing data connections. This allowed cost effective voice over IP (VoIP) services along with other value-added services. Though these services were initially of poor quality, customers did not mind as they were provided at low prices. The networked world has now moved on to triple play which combines Internet access, voice communication (telephony) and entertainment services such as video streaming. Quadruple play adds seamless mobile access to the equation. The growing popularity of social networking applications and personalized services are adding even greater bandwidth demand.

The Impact of the Hsbb Technology Evolution to the Malaysian Society: As we gone through this paper, we can conclude that this HSBB technology is a very powerful technology that offers a triple play concept to allow Malaysians to experience a very high speed of internet access together with calls and to enjoy the Internet Protocol (IP) TV facility. However, the development phases of this HSBB technology and infrastructure in Malaysia is seemed to be focusing on the metropolitan and industrial areas including the core

Table 3: Swot Analysis: Hsbb Development

STRENGTHS (S)	WEAKNESSES (W)
<ul style="list-style-type: none"> •It offers several opportunities in several applications such as high speed internet for faster downloading •Enjoy a new TV experience through TV over broadband (IPTV) with access to TV channels over a private network in high definition format with high stability •Work from home and stay in touch with the office, clients and business associates •Improve on the educational facilities to access educational services such as jstudy on-line and participate in virtual classroom discussions •Have a richer, secure shopping and e-commerce experience •Play on-line games simultaneously with anyone in the world •Receive medical diagnosis and advice in the comfort of their homes or offices 	<ul style="list-style-type: none"> •Despite of having the largest established fixed telecommunication network, TM might need to replace some of its old network and it might require high investment in replacing this cable. Customers may not be able to enjoy the high speed broad band if these cables cannot provide throughput at the maximum level of capacity. •High demand and application from customers caused a long awaiting time will lead to customer dissatisfaction •Only selected area can enjoy the HSBB Broadband and IPTV due to networking problem
OPPORTUNITIES (O)	THREATS (T)
<ul style="list-style-type: none"> •The demand for notebook and desktop will increase from year to year and with the increase of demand for computer, there will be an increase in broadband users. •There are 12% gap between PC penetration rate and current Broad Band penetration rate and this can give TM the opportunities to market its HSBB products. •Government incentives 	<ul style="list-style-type: none"> •Customers readiness to invest in new product as HSBB price for HSBB product is higher compared to current broadband offerings •Future and potential competition from content providers such as Astro. With IPTV roll out, users can opt for IPTV or stay with Astro

business districts. This has come to our concern on what will happen to the society who is living out-circuit and staying in a remote and rural areas. Thus, we will study the impact of this HSBB development in Malaysia to the society as a whole as well as to promote for a special investment in HSBB to these people who have been left behind the technology.

Firstly, there are a lot of positive sways that can be gained from this evolution of this HSBB. The development of this HSBB technology is a part of the National Development Plans towards achieving the status of Developed Country by the year 2020. Thus, the evolution of this HSBB technology will help to provide an acceptable level of service for current and future Internet services and applications and thus the HSBB becomes absolutely necessary.

Secondly, towards nourishing a new lifestyle by living in a smart and IP surrounding where everything is on our finger tips, the High Speed Broadband technology is seemed to have the potential to revolutionize the way we live and work, delivering real economic and social benefits.

From an educational point of view, the HSBB technology may provide a better infrastructure and facility for the students covering from the early education level up to higher learning level. This technology will offer the students the opportunity to enhance their knowledge and increase their information through the use of this new technology. The services provided through the IPTV facility may include the discovery channels, the educational programs and several other beneficial programs from all over the world.

Most of the businesses nowadays are already moving to subscribe for HSBB services in order to grow their business more effective. Starting from Small Medium Enterprise companies up to the conglomerate bodies are using the HSBB services such as online video conferencing, online business transactions, on net advertisements and other means as a part of making profit and grow their business today. Thus, we can conclude that the development of this HSBB technology in Malaysia may also contribute on the economic benefits.

IPTV over Passive Optical Network (PON) offers broadcast TV and also Video on Demand at SDTV and also HDTV quality. Thus, the society may enjoy some sorts of multimedia and entertainment upon subscription of this service. The demand for multimedia is the prime driver for high-speed broadband.

From the development of the Information and Communication Technology (ICT) sector in Malaysia, the HSBB investment may support the strength of the ICT development in Malaysia. The communications industry has moved to the stage where it focuses on broadband. There is a growing demand for faster Internet access that supports applications such as collaborative networking, video conferencing, tele-presence, IPTV, Video on Demand and VoIP. To meet this demand for bandwidth, a growing number of service providers have begun offering high bandwidth to subscribers in key regions worldwide.

In Malaysia, the development of this HSBB technology is launched under Public-private partnership with the state governments and the private sectors. While some in the industry and other commentators have criticized this partnership for providing an advantage to

one service provider over the others, the Government sees it as the only practical means to enable quick HSBB rollout, especially when Malaysia is far behind in broadband penetration compared to other countries. It needs to catch up fast. Efficient and speedier roll out is required. TM is the only service provider with an extensive network of fixed line infrastructures and ducts in place nationwide, so it's simpler, cheaper and faster for TM to do it.

On the contrary, for those who are not being exposed and do not have the opportunity to access to the HSBB technology will be left behind in certain situations. For instance, the students from the remote area will not be able to enjoy and experience this new technology as the development of this HSBB is focusing on the certain city area. The students will be left behind at one step while the students who are studying at the city and metropolitan areas will be more advanced in term of technological advancement. Thus, the government needs to review on the development plan of this HSBB technology so that the children development will be in equilibrium and fair to strive for the success of the nations.

In Malaysia, most of the people who are staying at the remote areas are among the Malays and other Bumiputras. Thus, in term of racial development, the imbalance development of this HSBB technology has missed most of the people especially those who are among the majorities in Malaysia. And since the development is under the smart partnership program with the state government, thus it involves political supports and constraints as Malaysia is a democratic country where not all the states are ruled by the government. This will contribute to a negative impact to the society who are living in the state that ruled by the oppositions.

Summary and Swot Analysis on Hsbb Tehnology: To conclude, the High Speed Broadband (HSBB) service ranging from the speeds of 10Mbps and above will eventually allow Malaysians to experience high speed internet of up to 100 times faster than the usual rate while business will be able to have maximum speeds of up to 1,000 Mbps (1Gbps). With the bandwidth provided by HSBB, a whole new lifestyle experience will open up for Malaysians in terms of providing greater opportunities and access to rich content like never before in entertainment, gaming, education, business, work, health, communications, services and much more (UniFi, 2010).

To study the strength, opportunities, threats and weaknesses of the HSBB development in Malaysia, we need to view these four aspects in a global view so that it will cover some of the main perspectives and views.

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