HUAWEI

4G Wireless Broadband Industry WHITE PAPER

An Abstract for ITU Telecom World 2017

Terminology

Term	Description
CPE	Customer Premise Equipment
ARPU	average revenue per user
CA	carrier aggregation
D-MIMO	Distributed Multiple Input/Multiple Output
DSL	digital subscriber line
E2E	end to end
FTTx	Fiber to the x. Generic term for any broadband network architecture using optical fiber to provide all or part of the local loop used for last mile telecommunications.
FBB	Fixed Broadband, signifying wired connection
FDD	Frequency Division Duplex
GTI	Global TD-LTE Initiative
HBB	Home Broadband
LDC	Least Developed Country
MBB	Mobile Broadband
MIMO	Multiple Input/Multiple Output
MSO	Multi-service Operators
RRU	Remote Radio Unit
TDD	Time Division Duplex
WBB	Wireless Broadband
WTTx	Wireless to the x. For the purposes of this paper, the term WTTx can be used interchangeably with 4G (and beyond) WBB.
xDSL	Refers collectively to all types of digital subscriber lines, the two main categories being ADSL and SDSL

Executive Summary / Introduction

4G Wireless Broadband (4G WBB) is a good choice for governments and operators to construct national broadband and /or offer home broadband service alternatively with Fixed Broadband (FBB) due to its advanced technologies and mature eco-system.

The white paper highlights the following facts and some forecast according to reliable source:

- 4G WBB is a prior choice to minimize the “Digital Divide”, to connect the unconnected and improve the internet broadband penetration for its low cost; to speed up the existing broadband for better digital experience for its super high spectrum efficiency.
- 4G WBB may work effectively with MBB by utilizing the redundancy capacity of the network;
- Up to 400 million households are able to be connected, while more than 300 million households connection speed could be boosted by wireless broadband respectively; 4G WBB may play a key role in the progress;
- 4G WBB has mature eco-system with 150 operators, 50 million households and 1Gbps peak rate;
- Requirements of radio frequency bands are discussed. Practical actions and planning in spectrum management as well as related regulations are recommended in order to develop 4G WBB;
- Case studies globally: SoftBank in Japan; Dialog in Sri Lanka; Globe in Philippines.

Contents

1. Industry Background / Regional Market Status

1.1. Value Proposition of Wireless Broadband (WBB)

1.1.1. Challenge of the Digital Divide

In the home broadband (HBB) field, an obvious digital divide is being created due to the gap between the rich and poor. Considering the impact of gender, age, occupation, and other factors on internet penetration, promoting HBB for women, the elderly, children, and people not working has more social significance in narrowing the digital divide for the entire society.

Unfortunately, due to the limitations of country/region, policy, educational level, occupation, age, gender, and income, people have access to vastly different amounts of information transmission resources. This fundamentally affects the common development and progress of mankind.

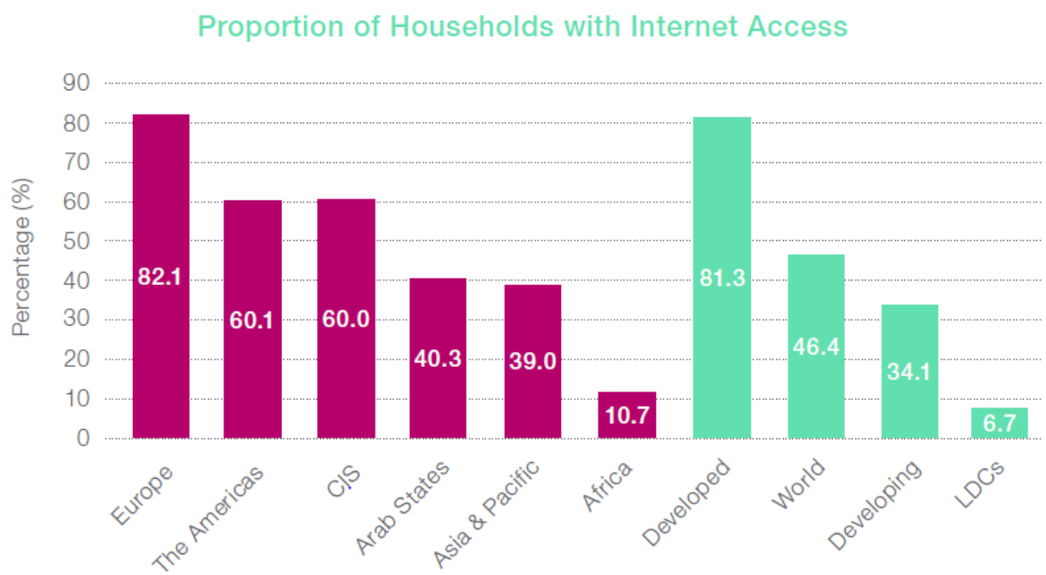


Figure 1: Proportion of Households with Internet Access

As figure 1 above shows, developing and underdeveloped countries have an HBB penetration rate of 40.8%, where approximately 800 million households have no HBB access. Developed countries possess an HBB penetration rate of 81.3%, where approximately 100 million households still have no broadband access.

1.1.2. New Digital Divide

The concept of digital divide is not limited to people's lack of internet access. Households with broadband access still face challenges in the new digital divide. With social development and technological progress, more and more content is delivered through broadband. As a result, the strength and speed of people's broadband become critical. The following figures illustrate vast differences in broadband access between different countries, different areas in a country, and different people due to inequalities between countries and regions.

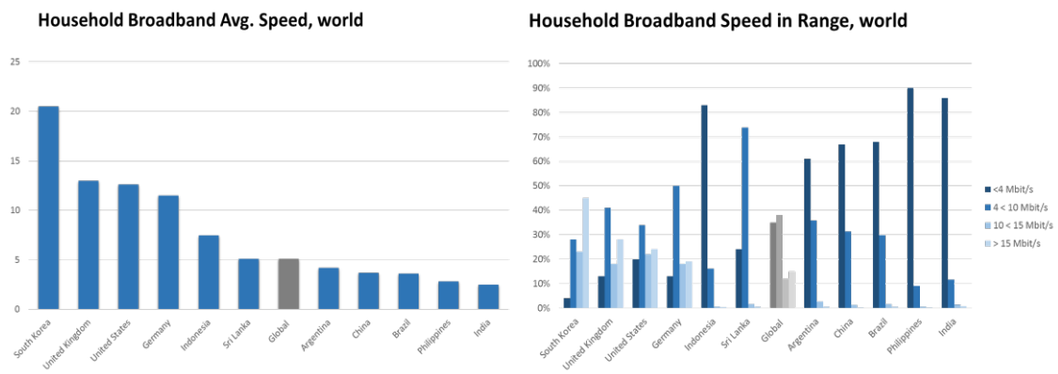


Figure 2: Household Broadband Speed

1.1.3. WBB Helps Bridge the Digital Divide

There are 4.2 billion people worldwide not yet connected to the internet. A key concern is how to give them affordable and effective access to the internet. This is particularly challenging considering basic broadband services cannot meet the requirements of the 3 billion people already connected to the internet. Broadband penetration unquestionably promotes the economic development of a country or region. So how do we quickly implement broadband acceleration? More and more countries have developed national internet and broadband development plans to do just that. We believe that WBB with its unique value can help them address these challenges.

1.1.4. 4G WBB Definition and Evolution

4G WBB mainly serves households and small and medium-sized enterprises whose major service demands are broadband internet access and video. For the purposes of this paper, 4G WBB can be defined as a wireless broadband access solution based on LTE and evolution technologies with performance comparable to wired broadband access.

1.2. Comparing FBB & MBB

Mobile broadband (MBB) has gone through a golden decade, when the mobile subscription has increased by tens to hundreds fold worldwide, mainly driven by fast technology innovation and a very strong ecosystem.

Unlike the rapid growth and wide penetration of mobile connections globally, fixed broadband (FBB) is progressing very slowly, and the gap between them continues to widen. According to the data from the ITU, FBB development has stagnated behind MBB in the past years, and the overall penetration rate of MBB has long surpassed FBB and continues to lead ahead.

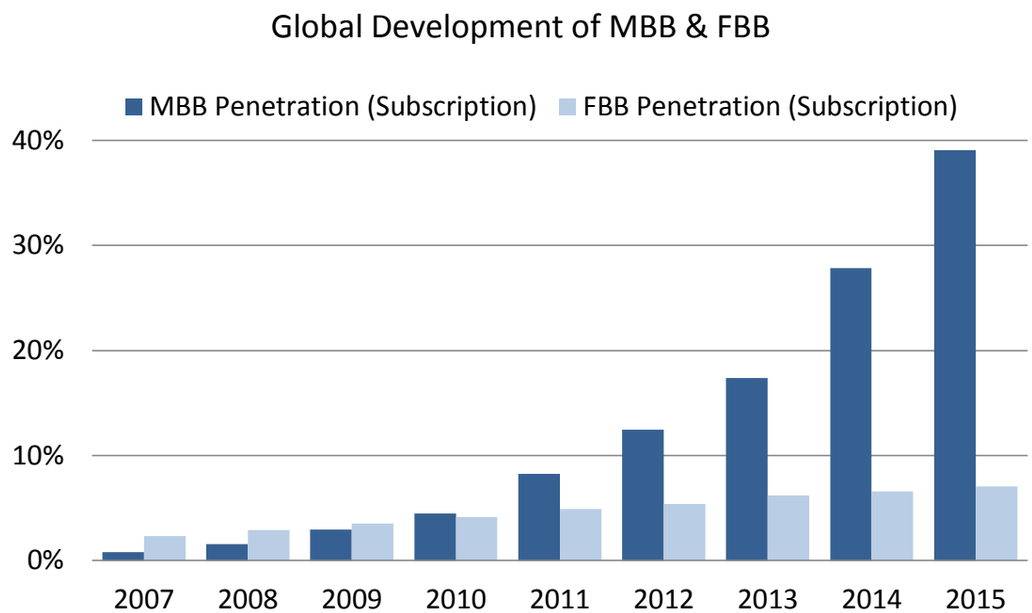


Figure 3: Global Development of MBB & FBB[1]

Two main factors lead to the slow progress of FBB. One is the shift of data traffic from PC to handsets, which is mainly due to the surging prosperity and prevailing popularity of smartphones. The other factor, which is critical from a technical perspective, is the roll out of conventional FBB networks, like FTTx and xDSL. These technologies face tough challenges mostly due to the high cost of civil works, when it comes to large scale deployment.

1.3. Regional Market Status

When it comes to FBB itself, another critical issue remains to be solved, and that is the remarkably uneven development of FBB not only at a global level, but also between urban and rural areas. This is another significant difference between FBB and MBB deployment.

According to Ovum Knowledge Centre, the 2016 world average broadband household penetration rate has reached to 42.66%, but the distribution of connected users is unevenly distributed from one place to another, leaving a large population and households still unable to access the internet and benefit from the digital prosperity and economy benefits.

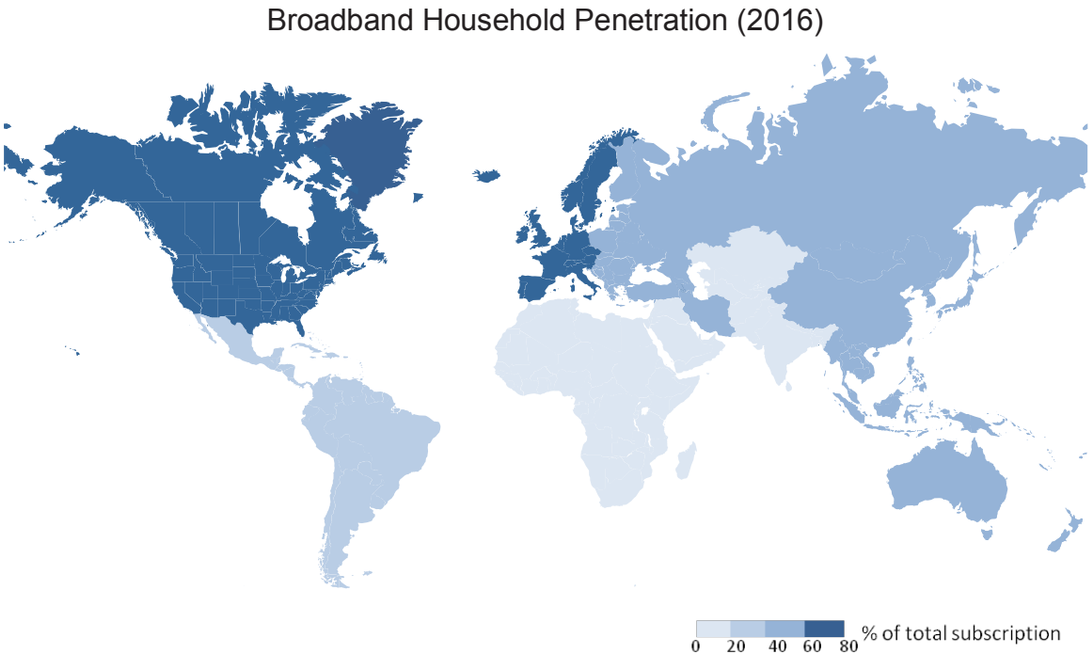


Figure 4: Broadband Household Penetration[2]

Africa and South Asia are the main two regions where the majority of households and businesses are not connected. Using South Asia as an example, this region holds a population of more than 1.8 billion. However, the penetration rate of FBB in most of the countries is even less than 10 percent, much lower than world average. Low economic development and private ownership of land are prohibiting broadband service from reaching more people.

This represents a huge market potential to the telecommunication industry. The key lies in an alternative solution that provides people affordable connections with an experience matching incumbent technologies. WBB is poised to provide that solution. In addition, the difficulties in rolling out fixed lines should be dealt with properly.

2. Key Trends

2.1. WBB advantages compared with FBB

Compared with FBB, WBB will be the preferred connectivity solution. There are obvious benefits to wireless connectivity: rapid deployment, fast speed, quick return on investment and low cost to deploy compared to FBB. When it comes to South Asia, it's notable that WBB has already played a significant role for data connection. This delivers a promising future for WBB in the markets, especially in emerging economies.

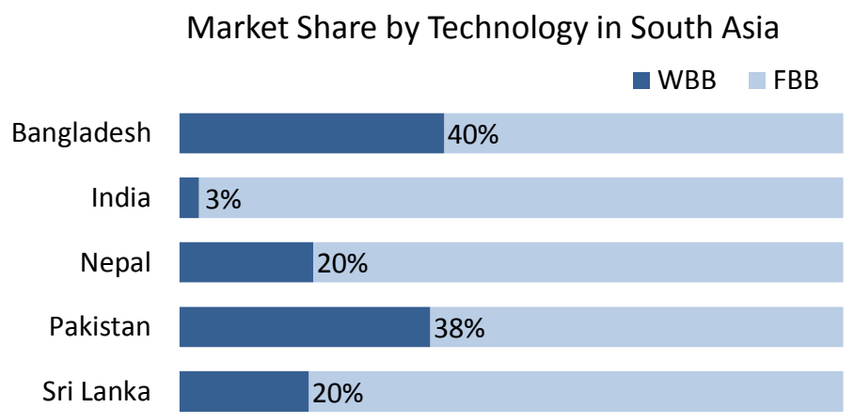


Figure 5: Market Share by Technology in South Asia[3]

2.2. 4G WBB advantages compared with other WBB technology

WBB is a group of several wireless technologies, serving the same purpose, including HSPA, WiMAX, LTE and others. Compared with other wireless broadband technologies, LTE has some advantages. First, LTE offers continuous experience enhancements. Increases in the efficient use of spectrum will continue to be achieved with lower-cost products. These innovations include more efficient coding, modulation, MIMO, interference cancellation, and spectrum harvesting using frequency aggregation. Second, LTE industry support is more mature and sustaining. LTE has been proved to be the most successful wireless standard in history.

2.3. 4G WBB enables fiber-like experience

All network users will continue to need high-speed throughput. Emerging multimedia venues, including social applications, virtual reality and e-commerce, require more bandwidth than ever before. High-quality video content and virtual reality will only accelerate this trend, with the bandwidth usage of 720P, 1080P and 4K video averaging 2, 5 and 25 Mbps respectively. For 4G

WBB, with a series of innovative solutions including massive MIMO, massive CA, high-order QAM, can provide xGbps peak rate, users can enjoy fiber-like broadband experience.

2.4. 4G WBB Continuous Evolution

In order to help operators further expand the boundaries of WBB and unlock the latent growth potential of the market, vendors are targeting advancements to help evolve these opportunities. Some vendor targets medium bands (typically 2.3GHz, 2.6GHz, and 3.5GHz) with its high power 8T8R radio units helping to extend single site coverage and increase cell throughput. New Technology e.g. Massive MIMO aims to increase spectral efficiency and downlink capacity by 5 times more.

Furthermore some leading operators start to explore the use of 5G technology for fixed wireless access. Fixed wireless access is positioned to be one of the first scenarios for 5G with several operators beginning trials including Verizon, AT&T, Telus and T-Mobile in mmWaves with wide spectrum bandwidth.

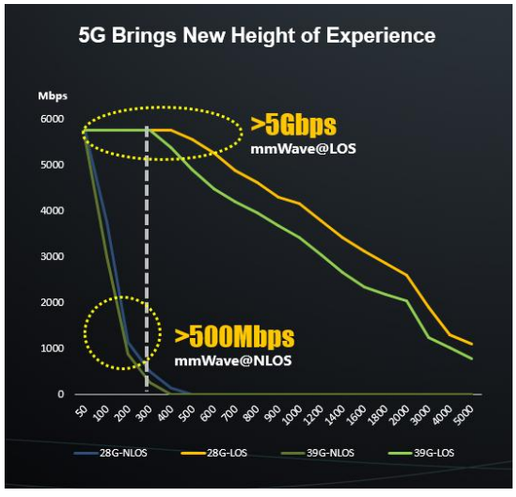


Figure 6: 5G Experience

2.5. 4G WBB Key Features & Advantages

2.5.1. Higher Rate: Comparable to Optical Fibres

4G technologies and their evolution provide continuous and significant increase in the WBB users' peak rate experience, from 150 Mbit/s at the initial stage, to 600 Mbit/s, and to the current 1 Gbit/s. User experience of WBB has gone beyond that provided by copper wire transmission and is currently comparable to that provided by optical fibre.

2.5.2. Improved Coverage

High-frequency coverage is significantly extended thanks to MIMO technology like 4x4 MIMO, Massive MIMO and high gain CPEs (even higher gain with outdoor types). Using 2.3 GHz, 2.6 GHz, and 3.5 GHz frequency bands, WBB (with CPE) can provide similar coverage like MBB (with mobile phone) in 2.1 GHz and even 1.8 GHz frequency bands.

2.5.3. Lower Costs: Reduced Time to Market

In comparing WBB with FBB, we see in many countries operators must apply for licenses to perform necessary civil engineering tasks, such as digging trenches and installing poles. Civil engineering is time-consuming, laborious, and expensive work. However, WBB, offering wireless network advantages, can overcome these obstacles and help operators and users save time and money.

Using 4G technologies such as multiple-antenna technology, WBB improves spectral efficiency, greatly reducing cost per bit and increasing coverage and performance.

2.5.4. Flexible Deployment: Available in Both Urban and Rural Areas

WBB networks can be quickly and flexibly deployed. They can be deployed in mainstream urban and suburban areas and also in special scenarios, such as deserts of the Middle East, the islands in the Philippines, rural areas in China, mountainous areas in Canada, and famous historic and cultural sites where cable routing is inconvenient or even not allowed.

2.5.5. Comprehensive Services: Same as Wired Networks

Using WBB services, family members can share wireless connections while watching internet videos. In addition to video services, WBB networks provide VoIP easily as well. The data, video, and voice triple play of traditional wired broadband is also available on WBB networks.

In the near future, WBB CPEs will support smart home services. Video surveillance and intelligent home management will likely become the first batch of applications. This strategy will help expand the blue ocean markets of vertical industries.

3. Market Potential

According to OVUM Total Fixed Broadband Subscription[3], there are 883 million household with broadband access out of approximately 2070 million families in 2016. That is nearly 1200 million families that do not have broadband access.

The precise market potential is affected by many factors such as the culture, the economic development in different countries, the distribution/allocation of the users, the construction cost for cabling and base station rental, the telecom budget of user and the strategy that the local operators may take, etc. For the purpose of this analysis, the telecom budget measure approach is used to estimate the potential wireless broadband access market.

Assuming 3% of household income will be used for telecom service (especially families with low income) using a world household income distribution chart leads to the following conclusions. Model-based calculations and research studies on typical-country markets indicate that about 320 to 410 million household users can afford WBB in intensely competitive markets around the world. Fixed broadband users are excluded from the calculation.

4. Key Use Cases for 4G WBB

4G WBB can be used to connect the unconnected home and home broadband upgrade.

1st Connect the unconnected home with low cost.

In suburban and rural areas, 4G WBB use high power RRU to improve the coverage, multi-antenna technology and soft-split to enlarge the coverage and capacity can reduce the single bit cost by 74%, with end to end coordination.

In urban and hot zone areas, Massive MIMO can satisfy the vertical coverage requirement with 3D (Three Dimension) beam forming. Massive MIMO can provide five times capacity compare with 8T8R and reduce the single bit cost by 80%.

2nd Home broadband upgrade

Massive MIMO technology will be a key 5G technology. Today's implementations can enable reliable communication in crowded places like railway stations and shopping centres, where communication speeds tend to slow. Massive MIMO uses a large number of antennas and beamforming to allocate a private width of radio waves to each user to improve their user experience. It can achieve an average cell throughput of 400Mbps and peak throughput of 650Mbps, 10 times faster than baseline LTE under busy network conditions.

Massive MIMO deployed in WBB implementations pushes the user peak data rate reach up to 1Gbps and maximizes the spectral efficiency.

5. Ecosystem Development and Opportunities

5.1. Network and Application

The network architecture of WBB is not different than that of MBB, only with handsets replaced by CPE. What this brings to mobile operators, is to enable the infrastructure sharing with MBB services without additional cost.

According to a Boston Consulting Group Study[4], fixed wireless is the most cost effective solution for densities between 10 and 1000 inhabitants per km^2 with a committed DL/UL speed of 10/1Mbps.

5.1.1. WBB Business Opportunities

4G WBB is growing very fast by taking the advantage of LTE development and ecosystem. On Network side, there are several solutions in the market, for example, WTTx (Huawei), FastMile (Nokia) and other solutions. All the solutions deliver the following features:

- Greater Capacity delivery
- Support a wide range of desired services
- Advanced terminal technology

Commercial Operators & Users

Many favourable factors will ease operators' transformation. Opening up new markets outside the mobile service scope will help operators maintain healthy businesses as their MBB incomes approach maturity. WBB deployment is an important approach in the overall operator transformation/diversification. In developed markets, the ARPU of HBB services is roughly 2 times of mobile services. In underdeveloped regions, the lower penetration rate of HBB opens up new blue ocean markets, and the ARPU of HBB service is about 3-5 times of mobile service. Marketing for WBB is roughly equivalent to developing new services. WBB can share the existing MBB network resources, promising low network and reconstruction costs. The extremely low expense on network deployment makes the ROI quite attractive.

Accordingly, an increasing number of traditional mobile operators have launched WBB service, like China Mobile, Globe Philippines, Orange España, T-Mobile Netherlands, Optus Australia, and SoftBank Japan. All have begun WBB service provisioning on their 4G networks.

At the same time, and not to be left behind, cable operators, who have plenty of video and media resources, want to speed up service deployment and expansion, thus efficiently seizing

more market shares. This demand can be satisfied by adopting WBB, which features quick deployment.

Many fixed network operators like SkyTV Brazil and Internux Indonesia have transformed into multi-service operators (MSO) to grab this chance to extend the marketing reach of their vast content resources.

Statistics show that the number of global WBB operators is nearing 150, serving more than 50 million users worldwide.

Figure 7: WBB Global Application

5.2. **Devices**

According to the April 2017 GSA report[5], there are more than 75 device makers for 4G wireless broadband, providing over 1100 types of CPE.

Highlighting the commitment and variety of different WBB products, many device makers are contributing CPE products to the WBB market to meet different customer needs, from indoor to outdoor, from the LTE Cat4 low-end CPE to the LTE Cat12 high-end CPE, supporting a variety of segmented markets in 4G based Wireless broadband.

The outdoor CPE is mainly used in suburban and low population density, sparsely populated areas. Currently it is widely deployed in the Philippines Smart, Peru Movil, Oman Nawras and Etisalat ET operators.

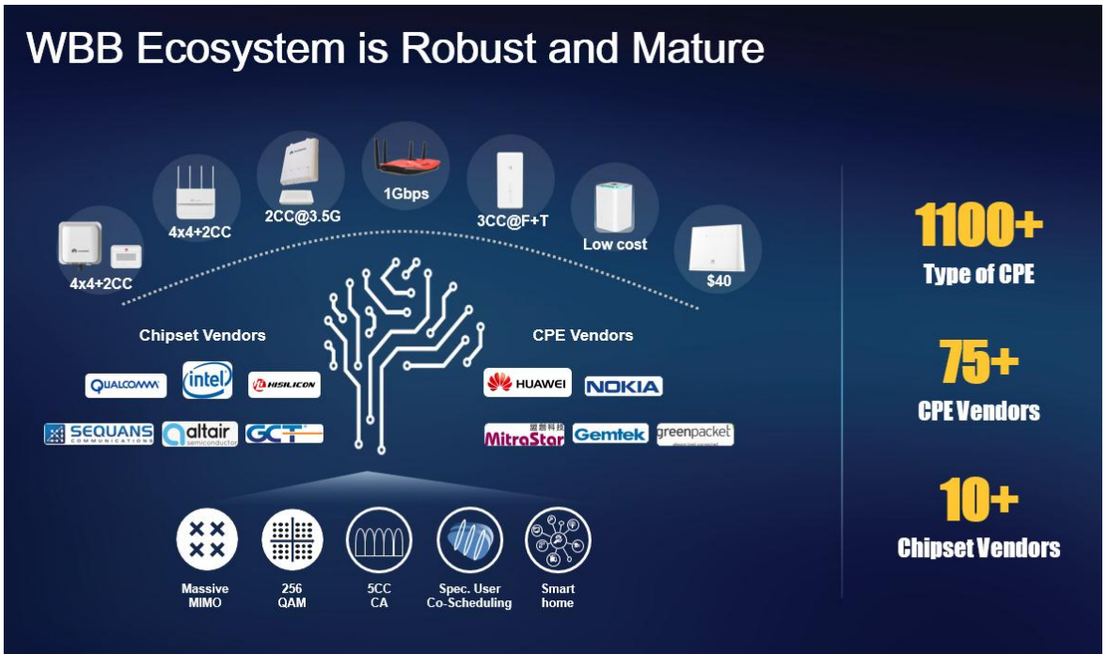
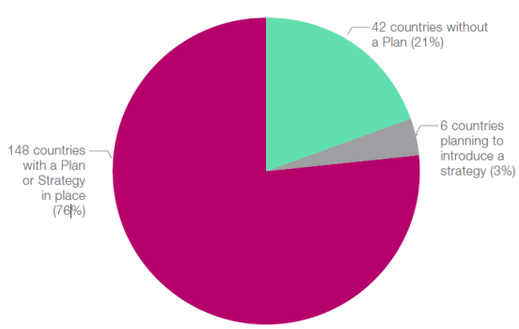


Figure 8: WBB Ecosystem

At present, 4G chips provided by the major vendors in the industry, including Qualcomm, Intel, Hisilicon, GCT, and Sequans, fully support various WBB services and all major WBB frequency bands (1.8GHz, 2.3 GHz, 2.6 GHz, and 3.5 GHz).

6. Regulatory Impacts



6.1. WBB, an Important Ingredient of National Broadband Policy

3G technologies were the basis of WBB solutions, but 3G WBB provides an access quality that is lower than FBB. The adoption of 4G LTE technologies reinvigorates WBB. 4G WBB inherits advantages from

traditional WBB solutions, such as rapid and flexible deployment and low costs, but goes beyond to provide FBB-class access bandwidths and quality. This allows 4G WBB to become a new leading player in the household broadband market. Nowadays, recognizing the value of spectrum, an increasing number of countries have formulated their national Internet and broadband development plans. With its unique advantages, 4G WBB can be integrated and co-exist with FBB to become an important ingredient of national broadband.

China is a prime example. In 2013, the State Council of China released the "Broadband China" Strategy and implementation plan. In 2014, the Ministry of Industry and Information Technology of China released a notice promoting mobile WBB in rural areas, facilitating the national broadband strategy, and creating a new blue ocean of mobile Internet. In this notice, a three-step goal of urban-rural broadband development was proposed to clarify the significance of WBB in promoting broadband services in rural areas. In large areas with a population density smaller than 200 households per square kilometer, the cost of deploying wired broadband networks ranges from USD $500 to USD $800 per wire or even higher, and the payback period is 10 years. Maintaining those wired networks is also costly. Under such conditions, operators would suffer a loss, making it hard to sustain this development. WBB networks, on the other hand, are much more cost-effective than optical fiber networks, and they provide a better service experience than xDSL. Since 2015, WBB networks have grown rapidly in rural areas in Jilin, Sichuan, Yunnan, Anhui provinces, and other parts in Midwest China. This demonstrates the unique benefits brought by WBB as an important ingredient of national broadband.

WBB has proven itself an essential component in national broadband in developed countries as well as developing countries. Governments in Australia, Germany, and Norway endorse WBB and hope to provide universal broadband services and improve broadband experience using WBB networks. To fulfil this goal, they have created preferential policies or concrete measures to promote WBB development. In Germany, the government demands that operators provide universal broadband services in rural areas using the 800 MHz frequency band. The Australian government has set up the NBN Company to implement its national broadband plan. The Norwegian government provides ultra-broad spectrum at preferential prices to operators who build cost-effective and high-quality WBB networks.

Industry Consensus on Spectrum Allocation Facilitates WBB Development

Spectrum is the basis of all wireless solutions. To expand spectrum is to foster and expand the development space of wireless solutions in the future. The more regulators learn about user needs and the growth of emerging industries in the broadband era, the better can they properly

and rapidly allocate spectrum to create a multi-win ecosystem for governments, communities, operators, and users.

The popularity of Internet broadband has elevated it to a basic need for modern life, much like electricity and highways. As spectrum is becoming limited and precious and core spectrums have already been used for a variety of other key services, it is difficult to allocate and acquire dedicated spectrum for WBB. What spectrum can be used for WBB and what are the market demands of such spectrum?

Potential WBB Frequency Bands

Technically, all 4G frequency bands can be used for WBB, but carriers are deploying WBB using two methods. The first is sharing medium- and low-frequency MBB carriers like 1.8GHz, and the second is deploying dedicated WBB carries on medium- and high-frequency bands like 2.3GHz, 2.6GHz and 3.5GHz. Operators can choose from these methods, and each has their advantages and disadvantages.

Deploying dedicated WBB carriers on medium- and high-frequency bands is quite popular for operators. Most countries in Asia Pacific, including India, Saudi Arabia, Indonesia, and The Philippines, choose frequency bands higher than 2 GHz, mainly 2.3 GHz (band 40) or 2.6 GHz (band 41), while countries in Europe, Africa, and Latin America often choose 3.5 GHz (band 42 or band 43). The low coverage performance of these high-frequency bands can be made up for by using multi-antenna technology on base stations and high-gain antennas on UEs.

The biggest advantage of deploying dedicated WBB carriers on medium- and high-frequency bands is the abundant spectrum resources. With these spectrum resources, it is convenient for operators to provide optical fiber-class broadband performance better than that of DSL networks. WBB networks with wide spectrum bandwidth no longer need to share resources with MBB networks, making it easier for operators to ensure WBB service quality. Therefore, many operators with high WBB requirements choose to deploy dedicated WBB carriers and select frequency bands for such carriers based on service types. In general, provision of video, HD video, and other services requiring large bandwidths is the trend of broadband service development, and WBB demands larger bandwidths.

Allocation of Continuous Large-Granularity Spectrums

While WBB has heavy bandwidth demands, it can provide optical fiber-class performance and is expected to provide a variety of services similar to that of wired broadband. In contrast to using a single carrier, two or more continuous carriers can lower the single-bit (or single-user)

cost for operators. Given this, an industry consensus has been reached on allocating WBB spectrums. Continuous large-granularity spectrums should be allocated at the same time, with 10 MHz and 20 MHz as minimum, basic allocation units for LTE FDD and LTE TDD, respectively. This can lower network deployment costs of operators and usage costs of end users, attracting more end users, provided that the spectrum price remains unchanged.

Spectrum and Technology Neutrality Facilitates WBB Development

If WBB operators cannot smoothly expand their service scope from wireless HBB services to other services by following certain procedures, they may hold back investment in spectrum, networks, and user development. This will have a negative impact on the broadband ecosystem and even the entire telecom industry.

A technology and spectrum neutral policy or conditional spectrum application must be implemented. Technology neutrality refers to operators' free choices of technologies to deploy certain spectrum obtained by applying and paying for such spectrum. As for conditional spectrum application, for example, WBB operators can apply and pay for licenses to operate fixed or MBB networks. In this way, operators can make long-term plans and increase network investment, creating a triple-win condition for governments, enterprises, and users.

7. Operator Use Cases / Success Stories / Lessons Learned

7.1. Case 1：Softbank

Japan Softbank is a typical MBB (mobile broadband) operator, and its fixed network penetration rate is very low in Japan. In order to change the low market share of broadband and no fiber resources, Softbank starts to develop wireless broadband. Make full use of rich TDD spectrum, Softbank has proposed a strategic collaboration of WBB and MBB to quickly increase the broadband user base.

WBB in Japan has many scenarios and more market potential. For example, in some of the old and underdeveloped areas, there is no fiber resources, and the family needs to have low-cost wireless broadband solutions in order to connect the Internet, or some person especially student, often move from one apartment to another, and they cannot wait in applying the fixed line for 15 days which is usual in Japan. Besides, Japan has 2.9 million households with ADSL low rate, they has the urgent need for higher capacity to enhance the broadband experience.

Figure 9: Japan Potential WBB Market

WBB Application Scenario

Softbank precisely identifies the scenarios of WBB and makes an attractive tariff strategy, then WBB gets a rapid development through all these measures. Just in 2016, the wireless broadband subscribers has reached 500K users.

In order to provide much better experience, Softbank is now deploying Massive MIMO in hotspot or in-depth coverage regions, which can provide 5 times of capacity comparing to traditional base station. In addition, 3.5G spectrum is reserved as the capacity layer for the future needs form the market.

7.2. Case 2： Dialog in Sri Lanka

Sri Lanka, is an isolated island nation located in the Indian Ocean, with a population of approximately 20.64 million. Dialog, the largest mobile operator in Sri Lanka, has diligently been committed to providing cutting-edge telecommunications services to Sri Lankan enterprises and inhabitants, enriching lives through improved communication. The penetration rate of home broadband in Sri Lanka is approximately 12%, and home broadband is still unavailable for about 5 million households, indicating large market potential. Also there are 5 mobile operators in Sri Lanka, the MBB competition is fierce and it is hard for Dialog to get continuous revenue growth from mobile market. Meanwhile, the cost of deploying fixed broadband is high and time to market is too long. So Dialog capitalizes on advantages in networks, spectrum resources, and sites, and began to deploy WBB in 2013 to provide broadband service for households and SME. Now, the subscribers have increased to 300K households and is still growing. The YoY growth about Dailog's broadband market share is two digits. There are four success DNAs about Dialog:

1. Precision Marketing Strategy and Marketing Plan, including precise investment focus on target households and SME market, competitive & flexible package covers different income level, rich tariff packages enable Dialog to successfully expand its subscriber base and user can select package base on demand. Also Huawei's WTTx Map helped to achieve quick user acquisition : Home broadband coverage is available on the official website, the CPE capable of plug & play can be obtained immediately after a purchase order is complete, subscribers can enjoy 7 day free trial home broadband services, with no obligation, and full refund if not totally satisfied. Home-visit speed testing, if required, is also available. All these methods powers subscribers increase greatly.

2. Differentiated Services, Dialog is an integrate operator, possess DTV service, so the channel and content resource is rich. Bundling video and broadband service together can increase ARPU and low subscriber churn rate.

3. Best User Experience, Huawei provided a serial of innovative solution for Dialog, including Carrier Aggregation, 8T8R and Massive MIMO. And Dialog signed 4.5G (TDD+) MoU with Huawei in 2016, devoted to supply leading network experience for subscribers. Also Dialog and Huawei cooperatively launched the first 4.5G commercial network in South Asia.

7.3. **Case 3： Globe in Philippines**

The Philippines, consists of more than 7000 islands and covers an area of 300,000 km2 in Southeast Asia. Special geographic conditions and private land ownership present difficult tasks of deploying home broadband infrastructure. Globe believes that the home broadband market is an opportunity on which it cannot miss out. Up to 65% of the Philippines' population are 15 to 64 years old. This group of people is young, open-minded, and enjoy Internet surfing, online gaming, and online social activities. Strongly influenced by American culture, they are also keen on music and basketball. Based on the analysis of its potential market and user needs, Globe has rolled out the strategy of WBB to quickly increase the broadband user base. This commercial strategy, which customizes services and packages for target customer segments, has proved to be a success.

Since the commercial launch of WBB services in July 2013, Globe has quickly increased the home broadband user base due to its excellent operation especially in Luzon and Metro Manila, and attracted numerous users, successfully changing its unfavourable situation in the market. Globe's 2014 financial report shows that the WBB user base increased by 42%, generating a 22% increase in broadband revenue. In 2015, Globe's broadband user base dramatically increased by

58%, driving broadband revenue up by 37%. According to Globe's 2016 financial report, Globe has taken only one year to increase the total number of WBB users to more than 670,000, while it took four years to acquire such a large number of fixed network users. Meanwhile, Globe has earned considerable revenue and recouped home broadband investment in a short period of time, achieving a record high growth for a new telecommunication service.

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