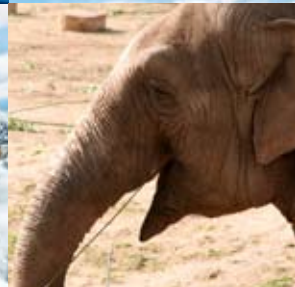


STIMULATING UNIVERSAL ACCESS TO BROADBAND

in Afghanistan, Bangladesh, Bhutan, Maldives and Nepal



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Bhutan, Maldives and Nepal*

November 2010



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FOREWORD



I am pleased to present this report of the Afghanistan, Bangladesh, Bhutan, Maldives, and Nepal (ABBMN) Ministerial Forum, Digital Inclusion: Connecting Responsibly. The ABBMN Forum took place on 3-5 August 2010 in the Maldives, with the active participation of governments, industry and other interested stakeholders.

ABBMN countries have seen unprecedented ICT growth in recent years, mainly driven by mobile cellular development, including an increase of more than 10 percentage points in mobile penetration in Afghanistan, Bhutan and Nepal between 2008 and 2009; and the record mobile cellular penetration reached by the Maldives in 2009 (148 mobile subscriptions per 100 inhabitants).

Despite this progress, broadband penetration levels in ABBMN countries remain low when compared to the rest of the world. In 2009, fixed broadband penetration was less than 0.5 per cent in Afghanistan, Bangladesh, Nepal and Bhutan whereas Maldives recorded a rate of 5.8 per cent. The situation of mobile broadband uptake was marginally better, with negligible rates in Afghanistan, Bangladesh and Nepal and 1.7 per cent in Bhutan. However, the Maldives showed how broadband rates can be boosted quickly through mobile networks with its impressive 33 per cent penetration.

This report reviews the overall context of broadband development in ABBMN countries, as well as analysing some priority policy and regulatory issues for broadband deployment. The report provides concrete recommendations for policy makers and regulators.

I hope that the findings and recommendations of the report will help ABBMN countries in their efforts to stimulate broadband investment and development and in turn, achieve the WSIS targets and the UN Millennium Development Goals.

Sami Al Basheer Al Morshid
Director
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1 EXECUTIVE SUMMARY

In 2010, the Telecommunication Development Bureau (BDT) of the International Telecommunication Union (ITU) carried out an assessment of the broadband situation in five least developed countries in South Asia: Afghanistan, Bangladesh, Bhutan, Maldives and Nepal (known collectively as ABBMN). The objective was to review the deployment status of broadband, identify areas of improvement and recommend ways of stimulating broadband access. This assessment was carried out as an input to the ITU Ministerial Forum held from 3 to 5 August 2010 in Maldives, which resulted in a Ministerial Declaration setting out, among other things, priority areas for stimulating broadband access in the five ABBMN countries.

The report examines the close link between economic development and broadband growth, which works in both directions. In ABBMN countries, Afghanistan, Bangladesh and Nepal have significantly lower Gross National Income (GNI) per capita¹ compared to Bhutan and especially Maldives, which translates into lower broadband development. Moreover, the turbulent situation in Afghanistan adversely affects human development in the country (i.e. not only economic development, but also education and life expectancy), which partially explains the reasons for substantially lower ICT development levels in the country.

Geographic and demographic factors are also main determinants affecting broadband development. A combination of high population density and high percentage of urban population, and a small land mass with few geographical obstructions to broadband rollout, makes Maldives the ABBMN country with the most favourable conditions for the deployment of new broadband networks. In contrast, Afghanistan and Nepal have geographically unfavourable conditions, and they also have low percentages of urban population and low population density. These are some of the main factors behind the relatively low broadband penetration levels of most of the ABBMN countries which can be found not only in the Asia-Pacific region but also elsewhere in the world.

This report analyses seven specific issues relating to National Regulatory Authorities (NRAs): fixed network infrastructure, personal computer penetration, broadband prices, national broadband plan and funding, authorization/licensing and competition. It also provides generic as well as specific recommendations to stimulate broadband access in ABBMN countries.

¹ See: <http://data.worldbank.org/indicator/NY.GNP.PCAP.CD>



MINISTERIAL DECLARATION

We, the Ministers responsible for Telecommunication in the ABBMN countries, have assembled in Malé, Republic of Maldives, from the 3rd to 5th of August 2010, to discuss and declare our commitments towards “**Digital Inclusion: Connecting Responsibly**”.

We believe, Digital Inclusion will help to advance specific initiatives in ABBMN countries to meet the 2015 Millennium Development Goals and the targets of World Summit on the Information Society (WSIS), where the latter mentions about making available the benefits of new technologies, especially Information and Communication Technologies to all.

We recognize, the governments, certainly, have to play major roles in formulating and implementing relevant policies and regulations in a timely manner, and to act as primary facilitators to assure reasonable returns for the investments made by the ICT industry, and to encourage it to be proactive in their business expansions and practices.

We are determined, to work collaboratively to achieve the most effective and efficient use of our regional resources and to share our experiences and expertise in reaping the full benefits of Digital Inclusion in the region. This is expected to be achieved through various commitments initiatives and projects.

We resolve, to work collectively with all stakeholders within a reasonable period to review and to implement, as appropriate, the following objectives that are considered crucial for successful Digital Inclusion in ABBMN countries:

- A. Stimulate Broadband Access
- B. Ensure Cyber Security
- C. Minimize Climate Change and Build Emergency Communications Capacity

A. Stimulate Broadband Access

Wider access to broadband services is the pre-requisite for reaping the maximum benefit of Digital Inclusion. To stimulate broadband access, we will:

- i. Establish National Broadband Policies and enabling regulatory environment to stimulate investment of infrastructures including the establishment of Internet Exchange especially in those countries where such exchanges are still absent.
- ii. Establish or strengthen National Advanced ICT training capabilities in each ABBMN country to educate citizens on the benefits of broadband technologies and applications to develop appropriate skills to harness the full potential of broadband.
- iii. Encourage service providers to expand broadband access using full potential of wireless broadband to deliver innovative solutions in rural and remote areas while encouraging establishment of Broadband Community Centres, capable of offering online applications including

e-Governance, e-Learning, e-Health, e-Publications using local contents with engagement of local communities.

- iv. Facilitate to resolve the high bandwidth costs of international connectivity among the neighboring countries to enable affordable access and use of broadband services especially for the landlocked countries.

B. Ensure Cybersecurity

The success of Digital Inclusion requires prospective users of broadband who are confident that their information and identities are secured and protected. In order to realize this, we will:

- i. Establish or strengthen, as appropriate, the National Cyber Security Strategy taking into account national critical information infrastructure in each of the ABBMN countries and a national CIRT, in cooperation with ITU, as a mechanism for coordinated exchange of information and faster response in case of incidences.
- ii. Exchange knowledge and expertise among ABBMN countries to build necessary skills related to cyber security and establish and strengthen national and regional collaborative efforts in combating cybercrimes protecting intellectual property rights, digital identities, personal data and privacy of individuals online.
- iii. Provide special measures for the protection of children in cyberspace, such that their education and creativity through the use of ICT, including access to the Internet, will not be discouraged or prevented.

C. Minimize Climate Change and Build Emergency Communications Capacity

The Digital Inclusion initiatives have to accord importance to building and strengthening emergency communications capacity and to promote and protect the fragile environment from the possible effects of Climate Change. In this regard, we will:

- i. Establish a National Emergency Telecommunications Team in each of the ABBMN countries with an aim to intensify efforts to ratify the Tampere Convention and to develop National Emergency Telecommunications Plan (NETP) with necessary assistance from ITU and its partners.
- ii. Make available all necessary resources for disaster preparedness and response including frequencies for use in emergency situations.
- iii. Encourage ITU proposal and effort on establishing the Asia-Pacific Multi-partnerships Regional Platform for Disaster/Emergency Communications which aims at communications needs in all phases of disaster management and especially in emergency response for humanitarian assistance in general and rescue operations in particular.
- iv. Encourage the governments and private sector to harness the full potential of the ICTs in tackling global challenges related to improving energy efficiency and Climate Change by promoting “Green” and environment friendly technologies.

We are convinced, Digital Inclusion will truly benefit people in socio-economic development by increasing opportunities to interact, learn, co-operate and collaborate in their professional, social and academic activities.

We are confident, the above objectives can only be realized through the concerted efforts to be undertaken by ABBMN countries. This requires well-coordinated efforts through exchange of learning lessons, use of experts and resources as far as practically possible.

We invite regional and international community, the donor organizations, other UN agencies and all others who are interested in playing proactive roles for mitigating effects of Digital Divide by contributing towards the efforts for Digital Inclusion.

We task, the ITU, BDT to pursue regional collaboration for the successful implementation of our initiatives towards realizing Digital Inclusion in the ABBMN countries. We will continue our dedicated efforts to provide necessary support and assistance to the ITU, BDT.

We acknowledge, with sincere gratitude, the initiatives and support of the organizer of this Forum, the International Telecommunication Union (ITU), and the kind hospitality of the host, the Government of the Republic of Maldives, and the interest and support of the Forum Secretariat and all partners.

2 METHODOLOGY

Chapter 3 of this report was written after a revision of recent literature on international broadband developments from sources such as ITU, the Organisation for Economic Co-operation and Development (OECD), the United Nations Development Programme (UNDP), and the World Bank. It also includes information from diverse National Regulatory Authorities (NRAs). Data used are sourced from ITU, the World Bank, UNDP and the United Nations Statistics Division (UNSD).

The assessment of the current situation of broadband development in ABBMN countries was undertaken based on a questionnaire prepared specifically for this study, in order to collect the necessary information required for Chapter 4. The questionnaire was designed in collaboration with the ITU Regulatory and Market Environment Division (see Annex 1 for more details).

The overall process developed as follows:

1. **Design of the questionnaire:** taking as reference the *ITU Telecommunication Regulatory Survey*, the questionnaire was designed to cover the gaps in the regulatory and statistical information regarding broadband development in ABBMN countries.
2. **Sending the questionnaire** to national experts designated by ITU as focal points.
3. **Collation of responses**, as well as any additional information provided (e.g. recent acts, guidelines, deployment plans, etc., related to the broadband issues covered in the questionnaire).
4. **Analysis of the data provided**, including the identification of incomplete answers requiring further information and/or clarification. The latter was carried out through interaction with focal points who, in those instances where it was necessary, acted as efficient liaison with the relevant national expert(s) in respect of each raised issue. Examples of this interaction include information about the application of a set of infrastructure-sharing guidelines, details on the composition of an appellate tribunal, minutiae about the scope of a fund for rural development and refined information about the competitive situation in a given broadband market, among others.

Finally, a questionnaire on interconnection and related issues was sent to ABBMN countries in order to collect additional data. The responses to this questionnaire are enclosed in Annex 2.

3 OVERVIEW

3.1 SOCIO-ECONOMIC, GEOGRAPHIC AND DEMOGRAPHIC PARAMETERS

ITU has highlighted that broadband-based applications have the greatest impact on people, society and businesses.² Many of the most effective applications and services that can foster development are only available through high-speed always-on Internet connections. For instance, those related to e-commerce, e-government, social interactive sites, content-intensive sites, e-learning or e-health. As many studies have shown, deployment of broadband has widespread positive implications, such as:

- In contrast to narrow-band users, broadband users spend significantly more time on-line (some studies point to over 50 times), visit more sites and access content-intensive sites more often.³
- Evidence in developed countries shows that broadband can promote growth by cutting costs. From 1996 to 2001, enterprises implementing Internet Business Solutions (IBS) saved an estimated USD 155.2 billion in the United States, and EUR 9 billion in France, Germany and the United Kingdom. In the same period, US firms increased their revenues by an estimated USD 443.9 billion by implementing IBS, whilst British, German and French revenues increased by some EUR 86.4 billion.⁴
- Broadband provides access to global markets, and enables global real-time competition both by allowing national firms to compete at an international level and by allowing outsourcing and localization of international firms (see for example the importance of broadband for the business process outsourcing (BPO) industry in India).⁵
- In rural areas, broadband deployment reduces information asymmetry and enables the environment for a new range of economic opportunities for communities. This is also the case in developing countries, where several documented experiences have shown that access to broadband had a positive impact on rural incomes, such as the e-Choupal Program in India.⁶
- More generally, broadband improves the performance of information and communication technologies (ICTs), a general purpose technology⁷ that has an overall impact on the economy. Recent research (Qiang, 2009)⁸ has found that a 10 per cent growth in broadband penetration in developing countries corresponds to a growth in GDP of 1.38 percentage points – more than in

² See, for example, ITU (2006, 2008, 2009a, 2009b).

³ See, for example, Rapport et al. (2002), and Whisler and Saksena (2003).

⁴ See Varian et al. (2002).

⁵ Between 1999 and 2004, the software and business process outsourcing delivered through the Internet sectors in India passed from 284 000 professionals employed to 813 500 (Kumar and Joseph, 2005). According to the Government of India, the revenues of this sector accounted for an estimated 5.5 per cent of India's GDP in 2007-08 (see <http://business.gov.in/outsourcing/outsourcing.php>). This booming of software exports and the outsourcing sector in India would not have been possible without an underlying broadband infrastructure, as broadband is necessary for such tasks as electronic delivery of software, remote product updating or technical assistance for customized software.

⁶ See www.echoupal.com/ for more information.

⁷ In this sense, broadband is commonly compared to other historical general purpose technologies (GPTs) such as the railway and electricity. See for example Federal Communications Commission – FCC (2010), Kelly (2009) or OECD (2008).

⁸ The study took a sample of 120 countries, the majority of which were developing countries, and studied their GDP growth and broadband penetration between 1980 and 2006.

high-income countries (1.21 percentage points) and more than other telecommunications services (Internet, mobile telephony, fixed telephony). This result is in line with prior evidence from countries with broadband-intensive economies, such as Korea (Kelly, 2009).⁹ Similar studies carried out by Booz and Company (Booz Allen & Co, 2009) point to a similar relation between broadband penetration and labour productivity.

Box 3.1: Telemedicine in Nepal

Nepal is a mountainous country with about 24 million inhabitants. About 80 per cent of the land area is mountainous, including the Himalayan range that has numerous mountain peaks higher than 7 000 m. Most of the inhabitants of Nepal live in mountain villages accessible only by foot. Since there are no roads and industries in the mountain villages, there are very few facilities that provide health services to the rural population.

e-Health Nepal is an initiative undertaken by a non-governmental organization (NGO) supported by ITU to assist in setting up clinics in rural villages and connecting them to the main hospitals in the region, initially setting up telemedicine centres in 12 villages and three supporting hospitals. The goal is to connect as many rural villages as possible to the hospitals in main cities and to provide health services electronically.



The pilot project for rural telemedicine when completed will connect Pokra, Kathmandu Model Hospital, Dolkha and Hetaunda to demonstrate the benefits to villagers and in turn the whole country. Microwave links in ISM 5.8 GHz have already been established to connect the four sites. ITU provided high-quality video conferencing equipment and connectivity solutions to support the e-Health Nepal project, so that remote online examination of patients can be carried out by a specialist doctor in Kathmandu. A live demonstration of video conferencing was shown in Kathmandu Model Hospital, where the doctors from Dolkha hospital discussed the case of a patient with the experts in Kathmandu Model Hospital.

Source: ITU Regional Office for Asia and the Pacific.

All these findings highlight the importance of broadband for socio-economic development and the strong link between broadband and economic growth. However, the causality between broadband and wealth can also be seen from a reverse perspective, that is, rising wealth can spur broadband penetration, both by promoting network deployment and by making it more affordable, due to the increase in income.

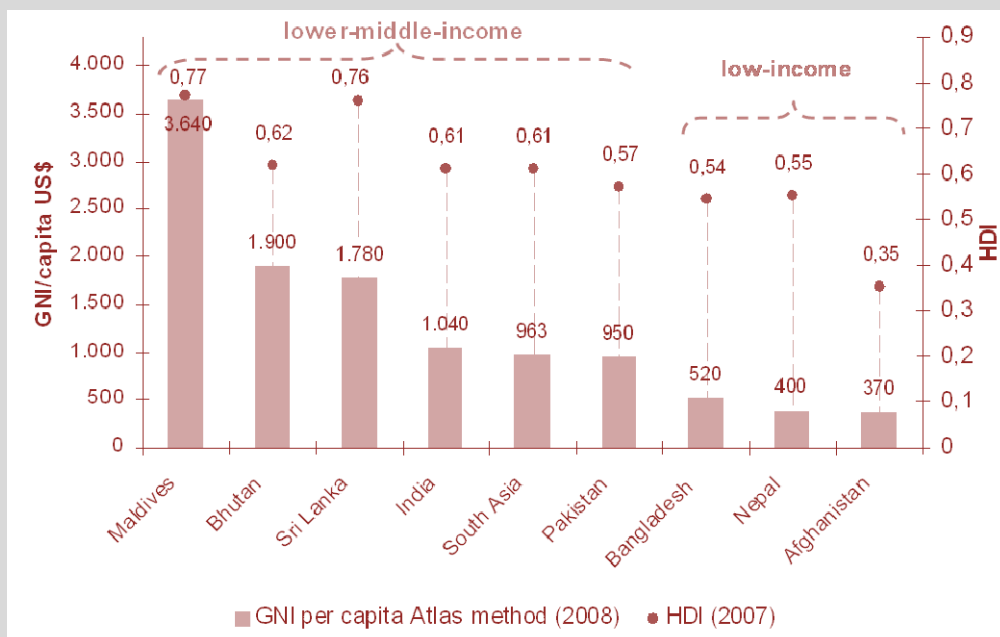
⁹ "The contribution of telecommunication services (including broadband) to GDP more than doubled, from 2.05 per cent to 4.99 per cent, between 1995 and 2005, the decade of broadband's expansion in the Korean economy."

Although economic factors are not always the main determinant,¹⁰ it can be assumed that there is a strong two-way link between broadband development and economic growth (Kelly, 2009). Therefore, an analysis of broadband in ABBMN countries should take into account the socio-economic situation of these countries, in order to choose the correct benchmarks and set realistic targets.

Chart 3.1 shows the GNI per capita (a proxy indicator for average income) and the Human Development Index (HDI) value (a measure of general development in a country, i.e. not just the economic development) of South Asian countries.

In terms of HDI classification, all South Asian countries except Afghanistan are classified as medium human development countries. Differences in HDI are indeed smaller than those in income: Maldives (the South Asian country with the highest HDI) has an HDI 39 per cent higher than that of Nepal, while it has a GNI per capita which is more than eight times as much as that of Nepal (i.e. 808 per cent). The same conclusion applies to Bhutan and Bangladesh. Afghanistan is the only ABBMN country that clearly lags behind in terms of human development (more than in terms of income). This is most probably caused by the turbulent situation that the country has been facing in the last years, which has had a negative impact on the indicators relating to education and life expectancy (in the HDI 2007, Afghanistan had the second lowest life expectancy index of all countries in the world, after that of Zimbabwe).

Chart 3.1: GNI per capita and HDI in South Asian countries



Source: World Bank's World Development Indicators for GNI per capita (Atlas Method),¹¹ and UNDP Indicators (2009) for the Human Development Index (HDI).

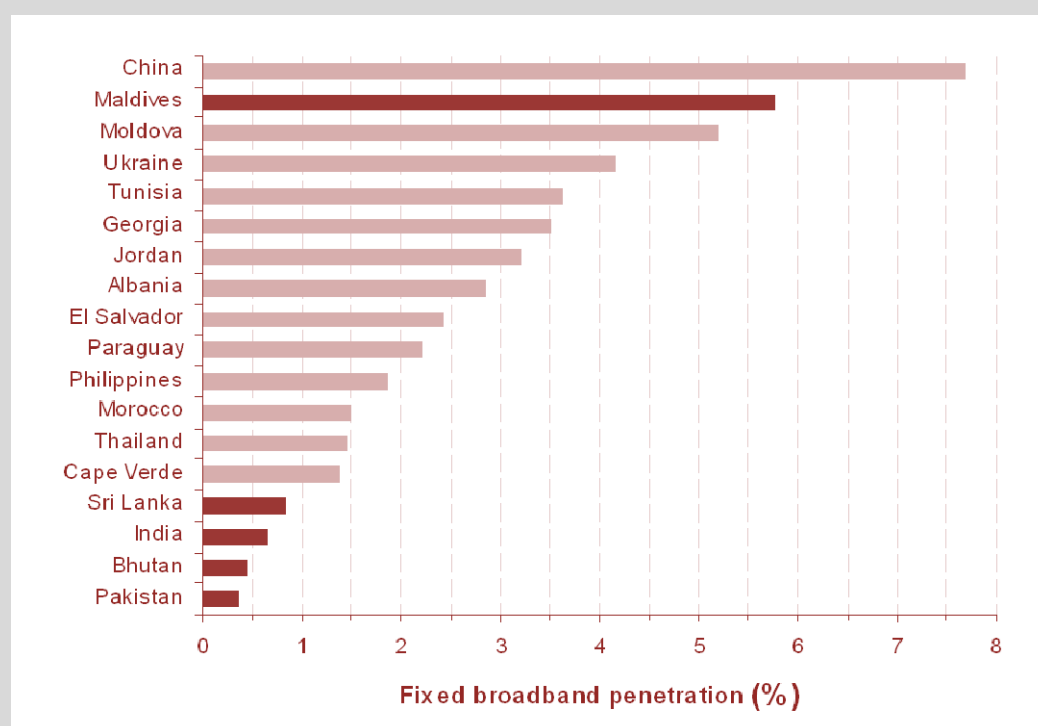
¹⁰ See, for examples in Asia and the Pacific, ITU (2009b), Chart 2.4, which shows that some countries such as China, Maldives or Viet Nam have higher fixed broadband penetration than other countries with higher GNI per capita.

¹¹ The World Bank Atlas method is used for the Bank's official estimates of the size of economies in terms of GNI converted to current USD. GNI takes into account all production in the domestic economy (GDP) plus the net flows of factor income (such as rents, profits, and labour income) from abroad. The Atlas method smoothes exchange rate fluctuations by using a three-year moving average, price-adjusted conversion factor. See: <http://data.worldbank.org/indicator/NY.GNP.PCAP.CD>

According to the income groups of the World Bank, Bangladesh, Nepal and Afghanistan are classified as low-income countries. Under this category fall most countries in Sub-Saharan Africa, but also Asian countries such as Myanmar, Lao PDR, Cambodia and Viet Nam. Among all low-income countries, in 2009 only Viet Nam had a fixed broadband penetration above 1 per cent (3.01 per cent). In terms of mobile broadband penetration, although it is increasing in low-income countries, in 2009 only Cambodia, Kenya, Mauritania and Nigeria had an uptake above 2 per cent. It can be thus concluded that low-income countries are at the very early stages of broadband deployment and uptake (both fixed and mobile). This is also the situation in Bangladesh, Nepal and Afghanistan, as it is further analyzed in Chapter 4.

Bhutan and Maldives are classified as lower-middle-income countries by the World Bank, because they have a GNI per capita (Atlas method) between USD 976 and USD 3 855. This is also the case of other South Asian countries, such as Sri Lanka, India and Pakistan. Chart 3.2 shows the fixed broadband¹² penetration of lower-middle-income countries (only those with an uptake above 1 per cent, plus South Asian economies). In 2009, Maldives had the second highest number of fixed broadband subscriptions per 100 inhabitants, only surpassed by China. On the other hand, Bhutan had a penetration below 0.5 per cent, low even when compared to several other lower-middle-income countries.

Chart 3.2: Fixed broadband penetration of selected lower-middle-income countries, 2009



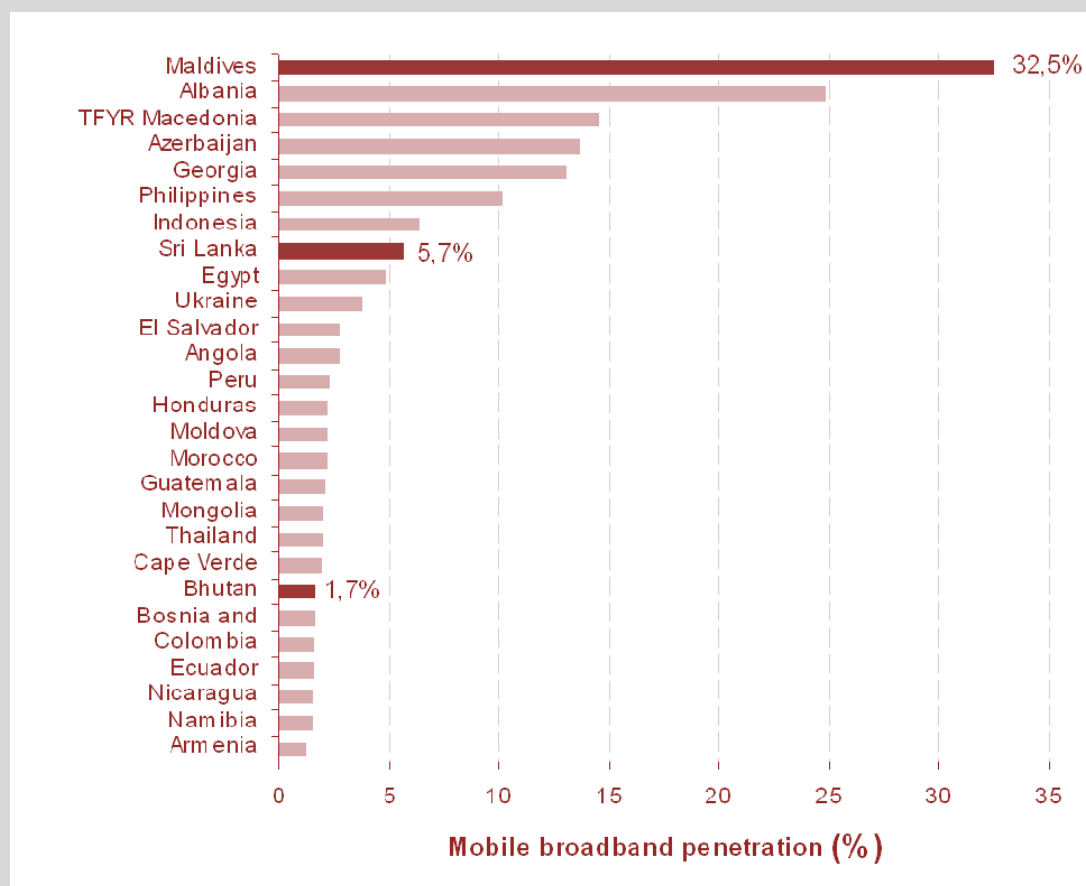
Source: ITU.

¹² According to ITU's definition: Fixed broadband Internet subscriptions refer to users of the Internet subscribing to paid high-speed access to the public Internet (a TCP/IP connection). High speed access is defined as being at least 256 kbit/s, in one or both directions. Fixed broadband Internet includes cable modem, DSL, fibre and other fixed broadband technology (such as satellite broadband Internet, Ethernet LANs, fixed-wireless access, Wireless Local Area Network, WiMAX etc.). Subscriptions with access to data communications (including the Internet) via mobile cellular networks are excluded.

Chart 3.3 shows mobile broadband¹³ uptake in lower-middle-income countries with a penetration above 1 per cent. Maldives stands out as being the lower-middle-income country with the highest mobile broadband availability (32.5 per cent). Despite recent progress (from 0.4 to 1.7 per cent in the last year), Bhutan had a mobile broadband penetration well below that of other countries with similar income levels, which is explained by the late commercial launch of 3G services in the country (May 2008).¹⁴

Mobile and fixed broadband figures need to be interpreted with caution, because they are not directly comparable. The ITU mobile broadband indicator measures “availability”, not actual usage, and counts mobile subscriptions, which are usually not shared. The fixed broadband indicator measures high-speed Internet subscriptions, which are usually shared by several users, and imply a monthly payment, which makes proof of use unnecessary (i.e. if broadband subscribers pay a recurrent monthly subscription, it is deemed that they will use the service).

Chart 3.3: Mobile broadband penetration of selected lower-middle-income countries, 2009



Source: ITU.

¹³ According to ITU’s definition, mobile broadband subscriptions refer to subscriptions to mobile cellular networks with access to data communications (e.g. the Internet) at broadband speeds (here defined as greater than or equal to 256 kbit/s in one or both directions) such as WCDMA, HSDPA, CDMA2000 1xEV-DO, CDMA 2000 1xEV-DV etc., irrespective of the device used to access the Internet (handheld computer, laptop or mobile cellular telephone, etc.).

¹⁴ See www.druknet.bt/gprsedge-3g/

The current state of mobile and fixed broadband deployment in ABBMN countries is further analyzed in Chapter 4. However, before going into the details of the specific broadband indicators and the regulatory framework, the different demographic and geographic features of ABBMN countries should be highlighted, and how they can affect broadband deployment and uptake.

Indeed, the challenges vary greatly when promoting access to broadband technologies in the rugged mountains and hills of Nepal; the densely-populated lowlands of the Ganges delta, in Bangladesh; the 26 small atolls of Maldives; the isolated forestland of Bhutan; and in the highlands and plains of Afghanistan, the largest ABBMN country. These particular geographic features will be taken into account in Chapter 4, when proposing some policy recommendations for broadband stimulus.

Closely linked with the geographic features of a country, there are a series of demographic indicators that may help to better assess the challenges of broadband deployment and uptake.¹⁵ For instance, it is easier to connect densely-populated urban zones with wired broadband technologies/networks (e.g. copper twisted pair (xDSL), cable or fibre) than to connect sparsely-populated remote zones. Wireless broadband technologies (satellite, WiMAX or 3G) and now IMT Advanced, may be considered relatively appropriate to provide a more cost-efficient coverage in rural areas and thus help reduce the digital divide, although the trade-off between cost, coverage, and capacity remains a complicated issue in most cases.¹⁶ This does not mean that a dispersed population is an insurmountable obstacle, as it has been proved by the two larger OECD countries, Canada and the United States, which have an extensive broadband footprint.¹⁷ However, it is a factor that may significantly affect broadband penetration rates in countries where there is not yet an extensive infrastructure in place, especially considering the cost of deployment of wired local loops.¹⁸

Chart 3.4 shows a representation of South Asian countries in two axes, according to the population density (x-axis) and the percentage of urban population (y-axis). Different bubble sizes correspond to the percentage of population in the main urban agglomeration (i.e. the bigger the bubble, the higher the percentage of population in the main city).

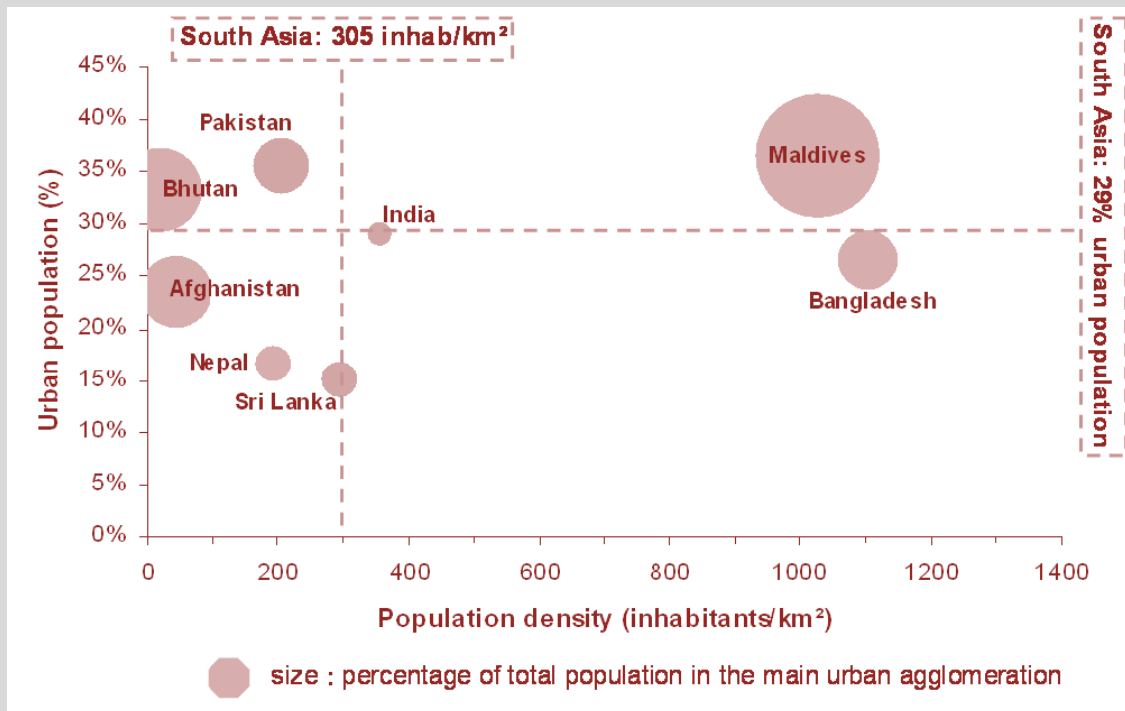
¹⁵ See, for example, OECD (2008, 2009); Ford et al. (2007).

¹⁶ Rural broadband connectivity remains an issue even in developed countries, as proved by the recent policy initiatives undertaken in this field, such as those carried out in the United States – USD 7.2 billion allocated in the American Recovery and Reinvestment Act of 2009 to promote broadband in underserved areas, especially in rural areas – or in the European Union – EUR 1 billion earmarked in the European Economic Recovery Plan (December 2008) to promote broadband in rural areas.

¹⁷ See (OECD, 2008) for a comparison with other OECD countries, and analysis of broadband correlation with landmass and population dispersion.

¹⁸ In Spain, a recent feasibility study on fibre deployment commissioned by CMT (the Spanish telecommunications regulator) concluded that public intervention would be needed in rural areas in order to make available the benefits of NGN in those areas. The study showed that in some rural zones there would not be enough incentives for private operators to invest in the deployment of a new fibre network, and that this could affect some 1.5 million people in the country. See ISDF (2009) for more information.

Chart 3.4: Demographic indicators of South Asian countries, 2007



Source: UNdata (UNSD).

The country that has the most favourable demography for the deployment of new broadband networks is Maldives. Compared to other South Asian countries, it has both a high population density and a high percentage of urban population. Moreover, 36 per cent of inhabitants in the country live in the main urban agglomeration (Male). That means that by providing broadband coverage to the people in the main urban centre, Maldives would have 36 per cent of the population covered, much more than Bhutan (16 per cent), Afghanistan (12 per cent), Bangladesh (8 per cent) or Nepal (3 per cent). These parameters together with the low population in Maldives (some 300 000 inhabitants in 2007), can be seen as positive factors for rapid broadband penetration growth,¹⁹ as it has indeed been the case in recent years.²⁰

Bangladesh is the ABBMN country with the highest population density (1 102 inhabitants per square kilometre, according to 2007 UN data), but it has a lower percentage of urban population (27 per cent) than Maldives (37 per cent) and Bhutan (33 per cent). Population density figures need to be treated with caution, as they may be misleading. For example, Iceland has a very low population density (2.9 inhabitants per square kilometre in 2007), but 50 per cent of the population live in 1.4 per cent of the land mass, which equates to a population density of 103 inhabitants per square kilometre for this half of the population. In the absence of better indicators to measure demographic dispersion, the percentage of urban population is

¹⁹ Despite positive demographic factors for the first stages of broadband penetration growth, it is to be noted that Maldives has a very particular geography, which makes universal access to broadband a very challenging task (i.e. to achieve affordable broadband coverage in all inhabited islands, most of them small and some very remote).

²⁰ Maldives increased fixed broadband penetration from 700 subscriptions in 2004 (0.25 per cent of the population) to 17 780 in 2009 (5.78 per cent of the population), which equates to a compound annual growth rate (CAGR) of 91 per cent.

the only proxy available for all ABBMN countries. Thus, this indicator may be in some cases more relevant to measure the ease of deployment of new broadband networks than population density.

Bhutan has a percentage of urban population above that of South Asia, and the main city concentrates a fair amount of the population of the country, which can both be interpreted as positive factors for broadband penetration growth. However, the low population density (17.2 inhab./km²) may indicate that a relevant part of the population is scattered in rural areas, which would make a thorough coverage of the country with broadband networks more difficult to achieve.

Afghanistan and Nepal are the two ABBMN countries with the lowest percentage of urban population (24 per cent and 17 per cent, respectively). In the case of Afghanistan, the high percentage of rural population adds to the fact that it is the largest ABBMN country, which suggests that a complete broadband coverage of the population would imply the deployment of extensive rural (wired or wireless) networks. Nepal has a rather complex population distribution for the deployment of new broadband networks, primarily because it has the lowest percentage of urban population of ABBMN countries, and also the lowest percentage of the population living in the main urban agglomeration (Katmandu).

Table 3.1 shows the results of some projections on broadband penetration in ABBMN countries making some simple assumptions.²¹ Two values are estimated: the fixed broadband penetration that would be reached (i) if each household in the main urban agglomeration had a fixed broadband subscription; and (ii) if each household in all urban agglomerations had a fixed broadband subscription. In both estimates only household subscriptions are taken into account, due to lack of complete data on the number of businesses in ABBMN countries. Thus the theoretical results need to be taken as lower than the real fixed broadband penetration level that would be achieved by connecting the main urban agglomeration, and all urban population, respectively.

The results show that all ABBMN countries except Maldives would achieve a higher fixed broadband penetration than they currently have, by connecting only the households in their main urban agglomeration.

Bhutan would increase by seven times its actual fixed broadband penetration by connecting only the households in Thimphu. That penetration would be doubled (up to 6.7 per cent) if fixed broadband connections were extended to all urban households.

Table 3.1: Theoretical broadband penetration in ABBMN countries depending on demographic factors			
	Current fixed broadband penetration	Theoretical fixed broadband penetration if	
Economy	2009 (%)	each household in the main urban agglomeration had a broadband subscription (2007)	each urban household had a broadband subscription (2007)
Maldives	5.78	5.45%	5.50%
Bhutan	0.44	3.22%	6.66%
Bangladesh	0.03	1.61%	5.03%
Nepal	0.26	0.53%	2.77%
Afghanistan	0.00	1.57%	3.07%

Source: ITU for household size and fixed broadband penetration, UNSD for population data.

²¹ It is assumed that the household size is homogenous within each country.

Despite its high population density, Bangladesh would achieve only a 1.6 per cent fixed broadband penetration by connecting the households in Dhaka. Afghanistan, which is a much more sparsely populated country (42 inhab./km² compared to 1'102 inhab./km² in Bangladesh), would achieve a similar fixed broadband penetration by connecting only the households in Kabul. However, if fixed broadband connections were extended to all urban households in the country, the penetration reached in Bangladesh would be greater than in Afghanistan (5 per cent, compared to 3 per cent).

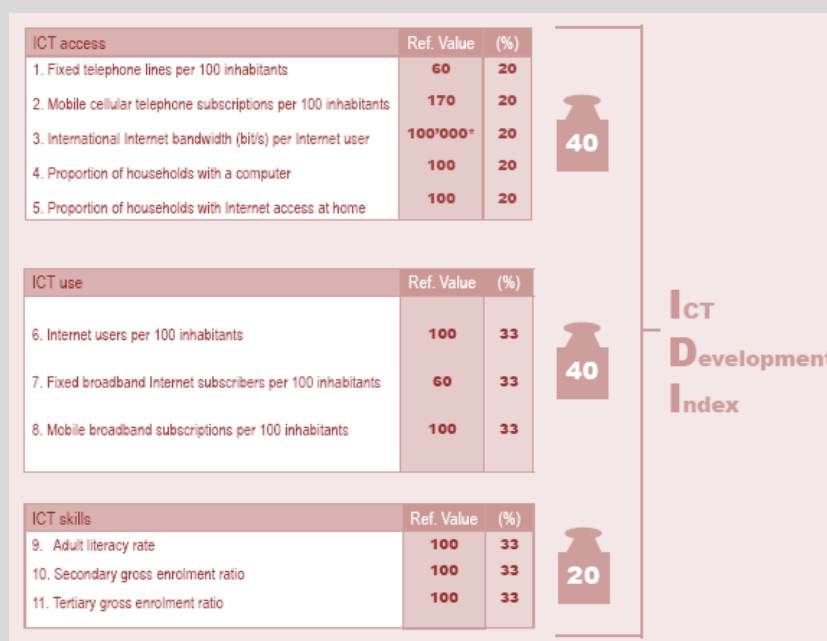
Nepal would achieve the lowest fixed broadband penetration of ABBMN countries by connecting only the households in Kathmandu, or all its urban households, due to the geographical dispersion of the population in the country, and the big share of rural population.

In conclusion, Table 3.1 shows how even restricting fixed broadband deployment to those areas that are more accessible, significant progress could be made in the current fixed broadband penetration of all ABBMN countries except Maldives. On the other hand, the challenge in Maldives is to extend fixed broadband to rural areas, including connecting the widely dispersed islands, rather than assuring its availability in urban areas.

3.2 ICT DEVELOPMENT

In February 2010, ITU presented the second edition of the ICT Development Index (IDI).²² The IDI is a useful tool to benchmark and assess ICT developments, and to monitor the digital divide. The IDI is a composite index made up of 11 different indicators, grouped into three sub-indices (Figure 3.1). The sub-indices measure ICT infrastructure and access (access sub-index), ICT use and intensity of use (use sub-index), and the capacity to use ICTs effectively (skills sub-index).

Figure 3.1: ICT Development Index – Weighting of indicators



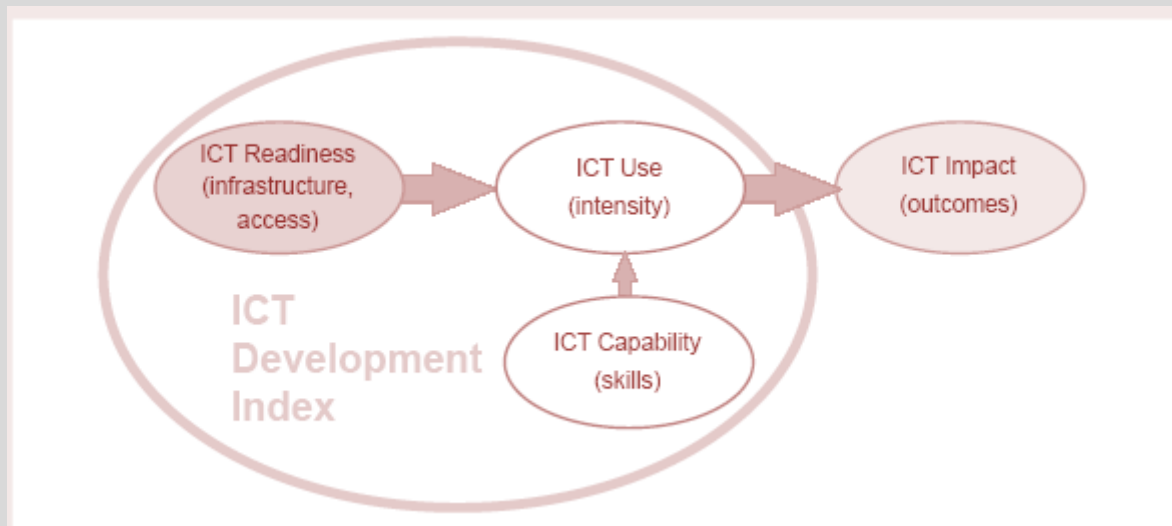
* This corresponds to a log value of 5, which was used in the normalization step.

Source: ITU (2010b).

²² See ITU (2010b) for the latest edition of the IDI. See ITU (2009a), Chapter 3 and Annex 1, for more information on the background and methodology of the IDI. See ITU (2009b), Chapter 3, for an analysis of the 2007 IDI in Asian economies, including ABBMN countries (except Afghanistan, due to lack of data).

The IDI is based on a conceptual framework that describes the ICT development process, and a country's transformation to becoming an information society, using a three-stage model. The first stage (ICT readiness) reflects the level of networked infrastructure. The second stage (ICT intensity) reflects the level of use of ICTs in the society, which is enabled by ICT skills. Lastly, the third level (ICT impact) reflects the impact of an efficient and effective ICT use. The IDI measures the first two stages in the evolution towards an information society (see Figure 3.2).

Figure 3.2: Three stages in the evolution towards an information society



Source: ITU.

This model is also valid to describe the stages of broadband development. Indeed, a country with highly skilled ICT users and advanced applications can not obtain any benefits from broadband if it does not have an infrastructure that provides access to a significant part of the population. Thus, the first stage of broadband development would also be infrastructure development and access. Once there is a high level of access, the second stage would be focused on broadband use. To foster usage of available broadband networks, it would be necessary to have affordable prices, and useful applications (e.g. e-government or e-banking applications, sites with content in the national language(s), etc.). Another key enabling factor for broadband use would be e-literacy skills, without which the population would not know how to use the available broadband services. Lastly, both broadband access and broadband use would be necessary to achieve the third stage: broadband impact (e.g. improved business efficiency and productivity, new opportunities for rural communities, individual access to richer information both for personal and professional use, etc.).

The IDI and the different sub-index values for ABBMN countries are shown in Table 3.2. All ABBMN countries had an IDI value below the world average in 2008 and in 2007, which shows that they lag behind in terms of ICT development. This can be partly explained by the fact that ABBMN countries have significantly lower incomes when compared to the world (USD 8 579 GNI per capita in the world in 2008, while Maldives, the ABBMN country with the highest GNI per capita, had USD 3 630 in the same year). As it has been analyzed in several ITU publications (ITU, 2009a, 2009b, 2009c, 2009d, 2009e, 2009f, 2010a, 2010b), there is a strong link between income and ICT development. That is, countries with low GNI per capita (income) tend to have low IDI values (ICT development), and vice versa.

Table 3.2: ICT Development Index (IDI), and IDI sub-indices, 2008 and 2007, ABBMN countries

Economy	IDI value		Access sub-index		Use sub-index		Skills sub-index	
	2008	2007	2008	2007	2008	2007	2008	2007
WORLD*	3.58	3.32	4.07	3.76	1.70	1.39	6.37	6.30
DEVELOPING*	2.70	2.49	3.06	2.79	0.91	0.71	5.53	5.47
SOUTH ASIA*	1.96	1.80	2.34	2.08	0.33	0.24	4.45	4.35
Maldives	3.54	3.11	4.61	4.00	1.15	0.76	6.16	6.02
Bhutan	1.62	1.48	1.90	1.74	0.25	0.20	3.82	3.54
Bangladesh	1.41	1.34	1.78	1.59	0.01	0.01	3.48	3.48
Nepal	1.34	1.27	1.37	1.31	0.06	0.05	3.83	3.61
Afghanistan	NA	NA	NA	NA	NA	NA	NA	NA

* Simple averages.
Source: ITU (2010b).

Maldives is the only ABBMN country with an IDI value above the average of developing countries. It stands out for having a high access sub-index value (higher than the world average), but the country has a rather low use sub-index value when compared to that of the world (i.e. low broadband and Internet uptake).

Chart 3.5 shows the relationship between IDI and GNI per capita in South Asia. The relation is indeed quite strong in the region (overall R square value of 0.69, or 0.89 excluding Bhutan from the computation).²³ Bhutan has a lower IDI value as would be expected for its level of income (it is clearly below the trendline in Chart 3.5). This suggests that the country has ample room for stronger ICT-led developments, if relevant policies are enforced.

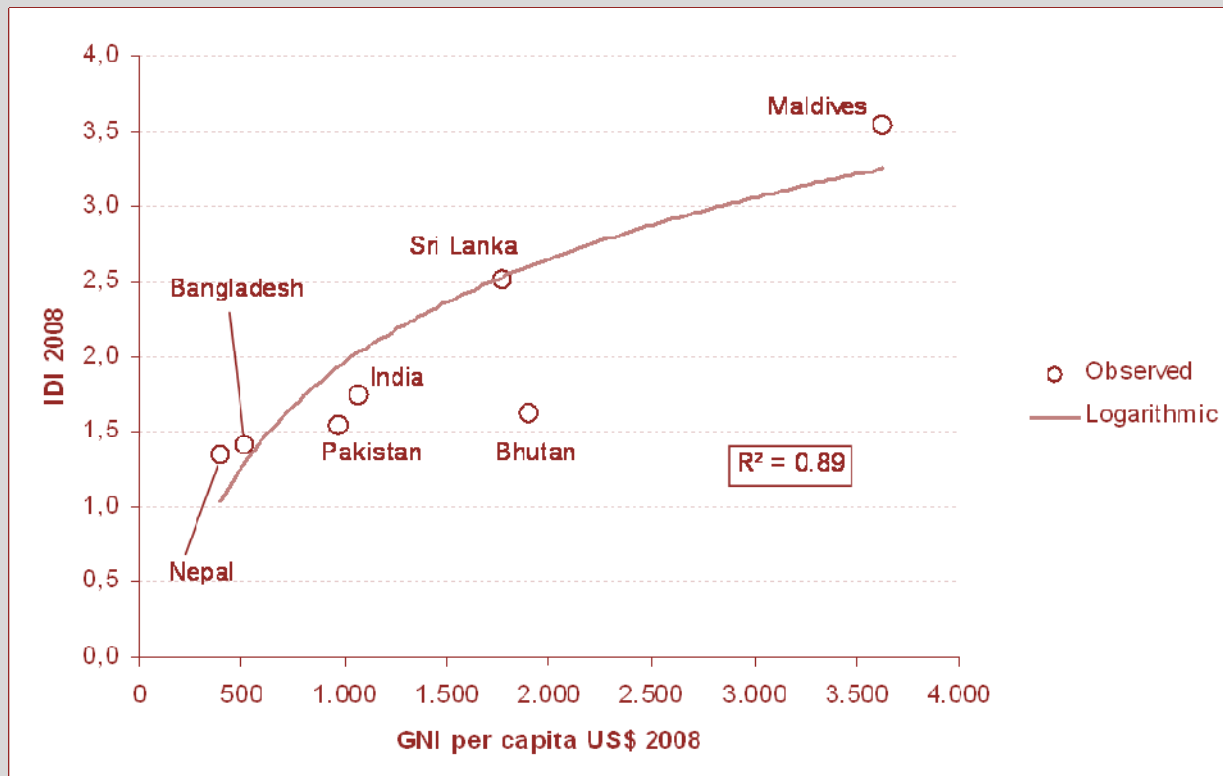
Bangladesh and Nepal have the lowest IDI values in ABBMN countries, although as it can be seen in Chart 3.5, their IDI values correspond to their level of income. Bangladesh has a low use sub-index value (in 2008 the second lowest in the world, after that of Myanmar). This stresses the importance of fostering broadband access and Internet use in the country, in order to advance both in terms of ICT uptake and economic development.

Nepal has a very low access sub-index value, which has experienced little growth between 2007 and 2008.²⁴ This finding suggests that the country should focus on creating an enabling environment for the development of basic ICT infrastructure.

²³ The R square value of a logarithmic regression provides a measure of how well the trendline approximates the real data points. It varies from 0 to 1, being 1 the value obtained by a perfect fit of the data points. In the case of a regression between IDI and GNI per capita, the higher the R square value, the stronger the link between IDI and GNI per capita, as expressed by a logarithmic curve. The R square value found for South Asia is 0.69, or 0.89 if Bhutan is excluded from the computation. This latter value is in line with the R square values found in the regressions between GNI per capita (in USD) and IDI in Asia and the Pacific (0.93, 2007), Europe (0.88, 2007), and the Americas (0.85, 2007). Moreover, the relation is stronger in South Asia than in other regions such as the Arab States (0.75, 2007), Africa (0.69, 2007), and the CIS (0.66, 2007).

²⁴ Nepal's use sub-index grew 4.5 per cent from 2007 to 2008, compared to 9.2 per cent in Bhutan, 11.9 per cent in Bangladesh, and 15.3 per cent in Maldives.

Chart 3.5: IDI and GNI per capita, South Asia, 2008



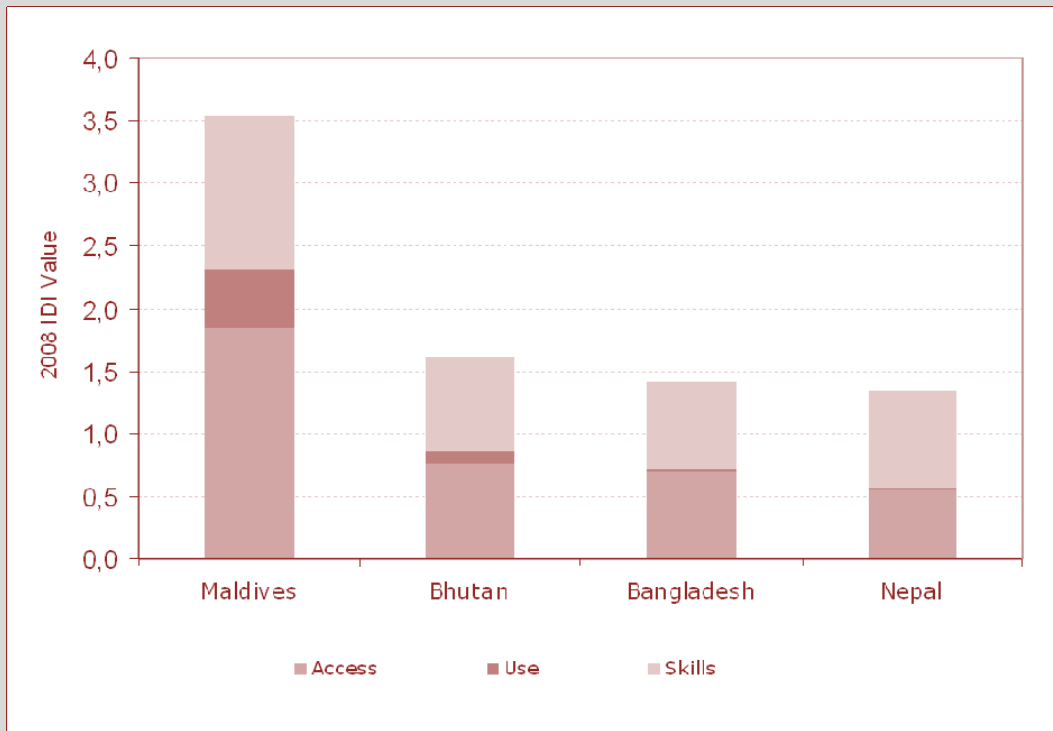
Note: R square of 0.89 if Bhutan is excluded from the computation, 0.69 if it is included.

Source: ITU (2010b) and World Bank (GNI per capita data).

In 2008, all ABBMN countries had an access sub-index well above the use sub-index (see Chart 3.6). Moreover, IDI growth between 2007 and 2008 was mainly due to improvements in the access sub-index, while moderate increases were achieved in the skills and use sub-indices (except for Maldives, which experienced a significant increase in the use sub-index).

These dynamics are explained by the sequential three-stage model on which the index is based (Figure 3.2): countries advance towards becoming information societies by developing first ICT infrastructure and access, then ICT use and intensity of use, and finally achieving ICT impact, which is enabled by ICT capabilities or skills. ABBMN countries are in the first stage of ICT development, so the focus would need to be put on ICT infrastructure and access developments.

Chart 3.6: IDI value of ABBMN countries by sub-index, 2008



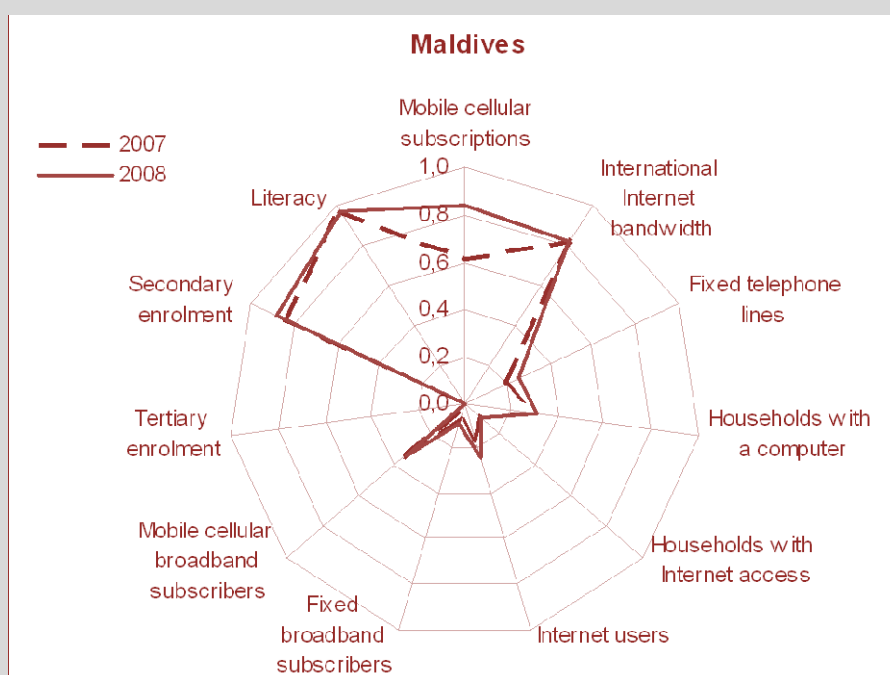
Note: The access and use sub-index have each a weight of 40 per cent, while the skills sub-index has the remaining 20 per cent weight of the IDI (see Figure 3.1).

Source: ITU.

The following section takes a closer look at the IDI performance of ABBMN countries, and highlights key developments and future challenges:

- Maldives** (Chart 3.7) had the highest IDI value of all ABBMN countries in 2008 (3.54 in 2008, ranked 68th out of 159 countries in the global IDI ranking), and the country also experienced the highest IDI gain among ABBMN countries between 2007 and 2008 (0.43 points or 13.7 per cent growth). Maldives increased mobile cellular penetration from 104 per cent in 2007 to 143 per cent in 2008, reaching the tenth highest mobile cellular penetration in the world. It is the only South Asian country with a mobile cellular penetration above 100 per cent. Although much lower, fixed telephone penetration also increased in the same period (from 11 to 15 per cent), which is a significant growth, taking into account that fixed telephone penetration is stagnating or even decreasing worldwide. Nevertheless, the country's fixed telephone penetration is still far from the reference value (60 per cent, see Figure 3.1). In 2008, 30 per cent of households in Maldives had a computer, and some 10 per cent had an Internet access at home. Regarding use sub-index indicators, Internet usage increased from 17 per cent in 2007 to 24 per cent in 2008, which is still a relatively low value.²⁵ Fixed broadband penetration increased from 3.5 to 5.3 per cent between 2007 and 2008. Concerning the skills sub-index, Maldives has a very low tertiary enrolment ratio (0.2 per cent, the lowest of all 159 countries included in the IDI).

Chart 3.7: Spider chart, Maldives, 2008 and 2007*

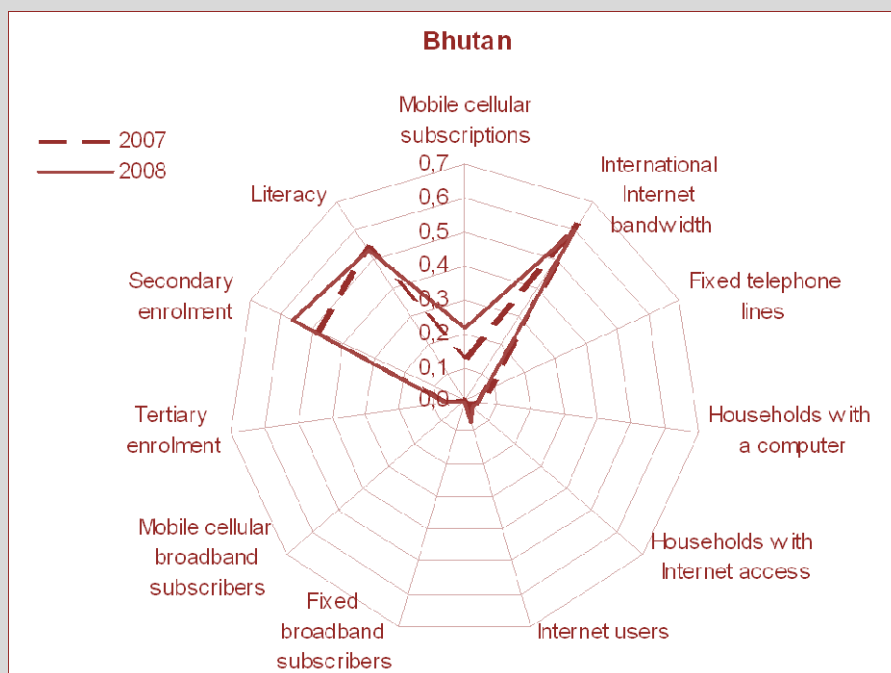


* This chart shows normalized changes in the indicators that are included in the IDI.
 Source: ITU (2010b).

²⁵ In 2008, Internet usage in Maldives (24 per cent) was at a similar level as in 2002 in the Czech Republic (24 per cent), Jamaica (23 per cent) or Latvia (22 per cent). In 2008, the world's top countries in terms of Internet uptake had achieved penetration above 80 per cent. This was the case of Finland, Iceland, Luxembourg, the Netherlands, Norway and Sweden (ITU, 2010b).

- Bhutan** (Chart 3.8) increased 0.14 points (9.7 per cent) its IDI value between 2007 and 2008. The country improved mobile cellular penetration from 22 to 37 per cent, and secondary enrolment ratio from 48 to 56 per cent. On the other hand, fixed telephone penetration decreased slightly to 4 per cent in 2008, which is a low value that affects not only fixed telephony uptake, but also fixed broadband deployment through xDSL technologies (the most commonly used technologies for fixed broadband access).²⁶ By the same year, only 4.2 per cent of households had a computer, and 2.8 per cent had Internet access. The three use sub-index indicators were very low: in 2008, there were 6.6 Internet users per 100 inhabitants, 0.3 fixed broadband subscriptions per 100 inhabitants, and 0.4 mobile broadband subscriptions per 100 inhabitants.

Chart 3.8: Spider chart, Bhutan, 2008 and 2007*

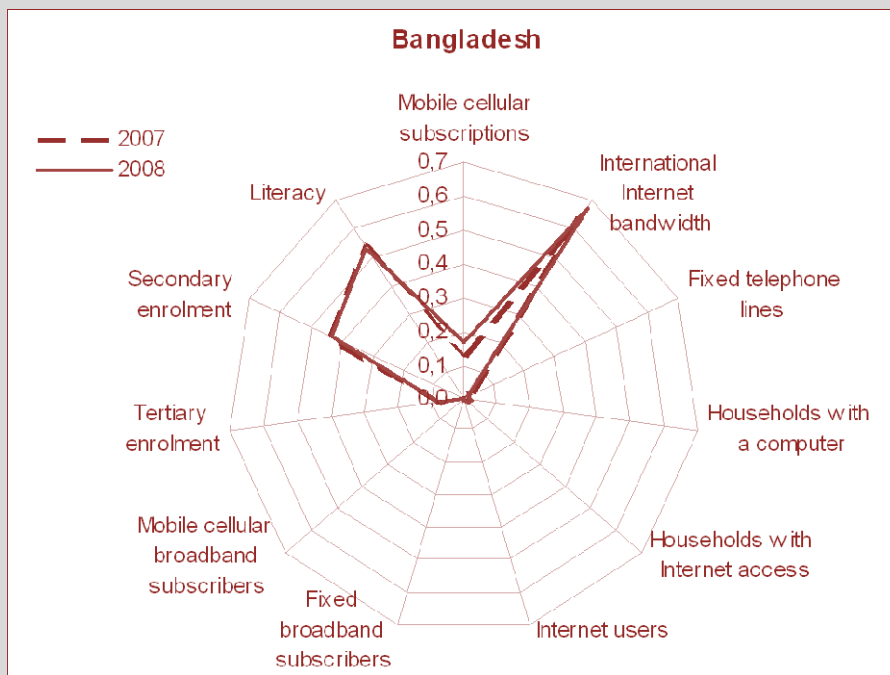


* This chart shows normalized changes in the indicators that are included in the IDI.
 Source: ITU (2010b).

²⁶ According to ITU (2010b), today 65 per cent of the world's fixed broadband connections use xDSL technologies.

- Bangladesh** (Chart 3.9) slightly increased access indicators between 2007 and 2008, while the use and skills sub-index stagnated. Mobile cellular penetration advanced from 22 to 28 per cent, and international Internet bandwidth per Internet user from 1 284 to 2 273 bps per user (estimation). However, by 2008 the country had a very low fixed telephone penetration (0.8 per cent), only comparable to that of some sub-Saharan countries in Africa. The percentages of households with a computer (2.2 per cent in 2008) and with Internet access (1.9 per cent in 2008) were also low. In 2008, Internet usage in Bangladesh stood at 0.3 per cent, the second lowest in the world, after that of Myanmar, and there were only three fixed broadband subscriptions per 10 000 inhabitants in the country. Mobile broadband was not available in the country (no 3G licences have been awarded yet).

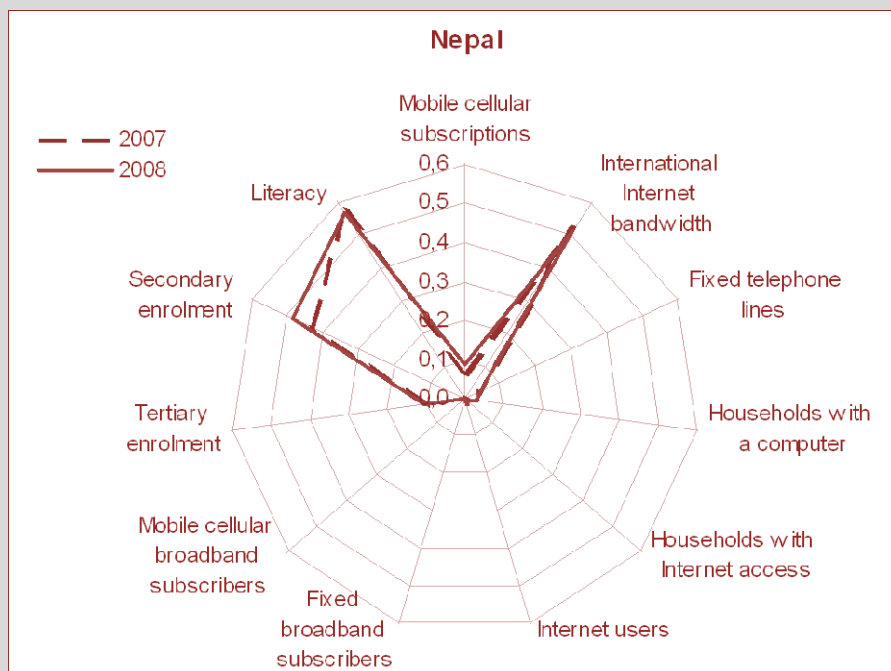
Chart 3.9: Spider chart, Bangladesh, 2008 and 2007*



* This chart show normalized changes in the indicators that are included in the IDI.
 Source: ITU (2010b).

- Nepal** (Chart 3.10) experienced little IDI growth between 2007 and 2008. The slight progress was due to improvements in secondary enrolment ratio (from 43 to 48 per cent), and in mobile cellular penetration (from 11.6 to 14.6 per cent). However, mobile cellular penetration was in 2008 the lowest of all South Asian countries.²⁷ Furthermore, Nepal has very low international connectivity per Internet user: only some estimated 350 bps per user in 2008. Taking into account that Nepal has few Internet users (499 000 users or 1.7 penetration in 2008), the lack of international Internet bandwidth may become a major barrier for Internet uptake in the future (i.e. as the number of Internet users increases). Despite that Nepal launched 3G services in 2007,²⁸ the uptake of mobile broadband was by the end of 2008 negligible (less than 0.1 per cent penetration). By the same time, there were only three fixed broadband subscriptions per 10 000 inhabitants, and the proportion of households with a PC and Internet access were as low as 3.2 per cent and 1 per cent respectively.

Chart 3.10: Spider chart, Nepal, 2008 and 2007*



* This chart shows normalized changes in the indicators that are included in the IDI.

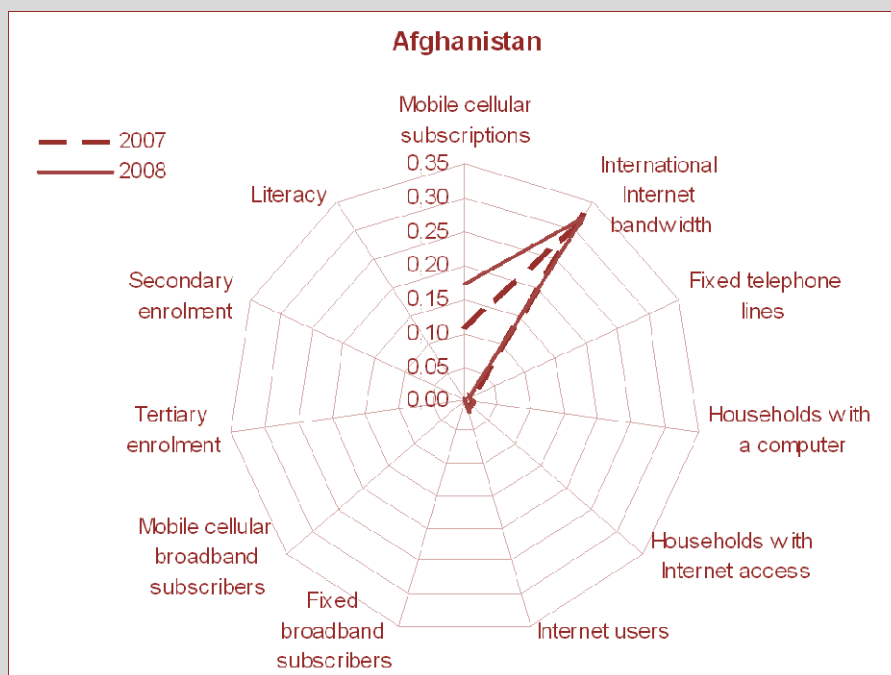
Source: ITU (2010b).

²⁷ In 2008, Nepal had 14.6 mobile subscriptions per 100 inhabitants, compared to 27.9 in Bangladesh, and 29.4 in India, the following South Asian countries with lowest mobile cellular penetration.

²⁸ NDCL (2007).

- Due to lack of data, Afghanistan’s IDI value can not be computed. However, a partial analysis of the situation in the country can be carried out with the available indicators (Chart 3.11). The country achieved remarkable progress in mobile cellular penetration: from 18 per cent in 2007 to 29 per cent in 2008. However, international bandwidth per Internet user was the lowest in all ABBMN countries, with only 42 bps per user in 2008. As it has been flagged in the case of Nepal, low international connectivity may become a major barrier for future Internet uptake, moreover taking into account the low Internet penetration in Afghanistan (1.8 users per 100 inhabitants in 2008). In 2008, Afghanistan had the lowest fixed telephone penetration in all ABBMN countries (only 0.37 main lines per 100 inhabitants), the lowest percentage of households with a PC (1.5 per cent), and negligible fixed and mobile broadband penetration.

Chart 3.11: Spider chart, Afghanistan, 2008 and 2007*



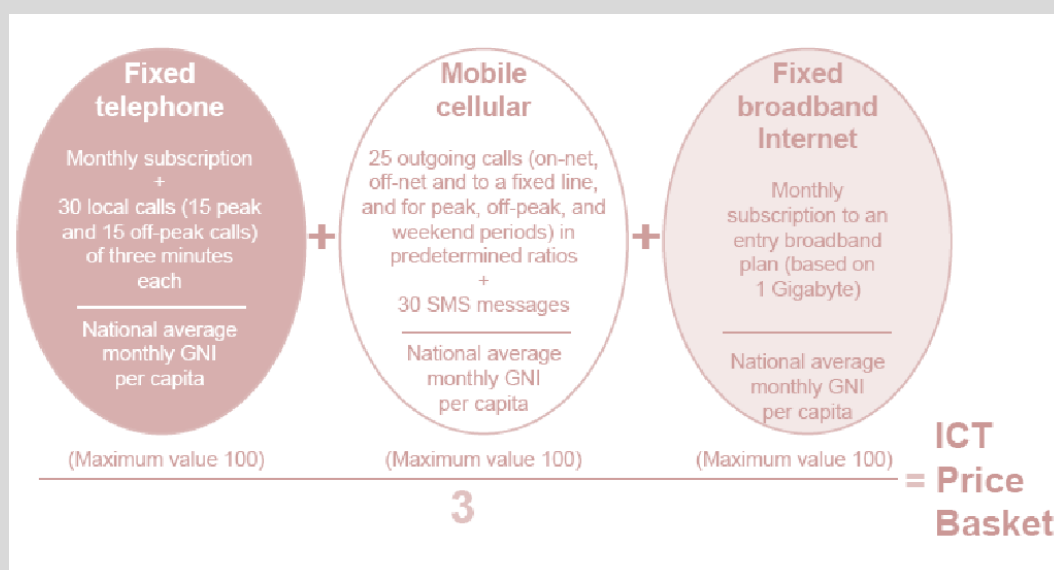
* This chart shows normalized changes in the indicators that are included in the IDI.
Source: ITU (2010b).

3.3 AFFORDABILITY OF ICT SERVICES

In February 2010, ITU presented the second edition of the ICT Price Basket.²⁹ Its objective is to monitor the price of ICT services, which influences or even determines whether or not people will subscribe to certain services and use ICTs.

The ITU ICT Price Basket is made up of three sub-baskets, which measure the prices of fixed telephony, mobile cellular and fixed broadband Internet services. Each sub-basket is presented in USD, in PPP\$³⁰ and as a percentage of monthly GNI per capita. The three sub-baskets are combined into a single ICT Price Basket value, based on which countries are ranked (Figure 3.3). For the ranking, prices of each sub-basket are expressed as a percentage of GNI per capita, thus pointing to the relative cost (or affordability) of ICT services within a country. The lower the ICT Price Basket value, the cheaper the combined relative cost of ICT services. This section analyses the ICT Price Basket in ABBMN countries. Afghanistan is excluded from the comparison, due to lack of data on ICT prices.

Figure 3.3: ICT Price Basket methodology



- Note:
- 1) In countries where no mobile prepaid offers are available, the monthly fixed cost (minus the free minutes included, if applicable) of a postpaid subscription is added to the basket.
 - 2) For monthly fixed broadband Internet plans that limit the amount of data transferred by including caps below 1 Gigabyte, the cost for additional bytes is added.
 - 3) Twenty-five outgoing calls are equivalent to a total of 37.1 minutes. For more details on the OECD/Teligen methodology, see OECD (2002).

Source: ITU (2010b).

²⁹ See ITU (2010b) for the latest edition of the ICT Price Basket. See ITU (2009a), Annex 2, for more information on the methodology of the ICT Price Basket. See ITU (2009b), Chapter 3, for an analysis of the 2008 ICT Price Basket in Asian economies, including ABBMN countries (except Afghanistan, due to lack of data).

³⁰ Current international dollars (PPP\$) are calculated using Purchasing Power Parity (PPP) conversion factors instead of regular exchange rates. The use of PPP exchange factors helps screening price and exchange rate distortions, thus providing a measure of the cost of a given service taking into account the purchasing power equivalences between countries. PPP data used in the ICT Price Basket were provided by the World Bank. For more information on PPP methodology and data, see <http://go.worldbank.org/UI22NH9MEO> and World Bank (2008a).

Table 3.3 presents the results of the ICT Price Basket in ABBMN countries. Between 2008 and 2009, the combined cost of the three ICT services included in the ICT Price Basket decreased an average 27.8 per cent in South Asian countries, which is a higher reduction of prices than the average of the world for the same period (14.8 per cent decrease). In 2008, Maldives was the only ABBMN country that had an ICT Price Basket below the average of the world (i.e. cheaper ICT prices). In 2009, Bhutan also achieved an ICT Price Basket below the world average, due to a drastic reduction in fixed broadband prices. Nepal ICT prices also decreased significantly (especially mobile cellular and fixed broadband ones), although they were still above the world average (i.e. more expensive). Bangladesh was the only South Asian country where ICT prices did not significantly decrease between 2008 and 2009.

Table 3.3: ICT Price Basket and sub-baskets, 2009 and 2008, ABBMN countries

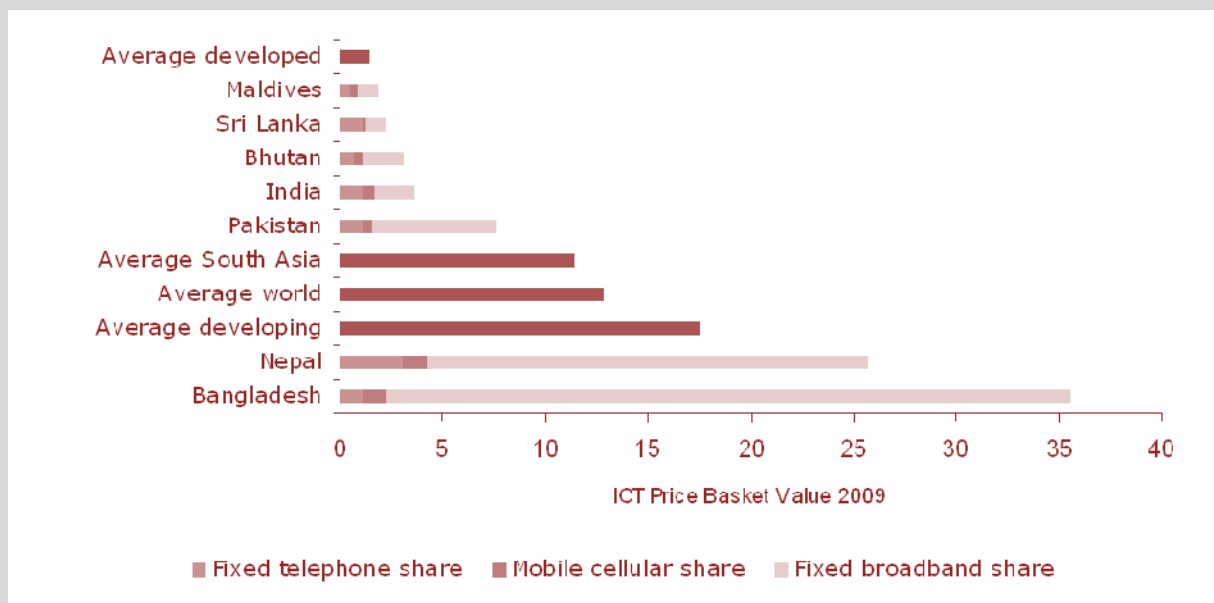
Economy	ICT Price Basket		Fixed telephone sub-basket as a % of GNI per capita		Mobile cellular sub-basket as a % of GNI per capita		Fixed broadband sub-basket as a % of GNI per capita		GNI per capita, USD, 2008 (or latest available year)
	2009	2008	2009	2008	2009	2008	2009	2008	
DEVELOPED	1.5	1.9	1.2	1.4	1.2	1.6	2.0	2.8	34.038
SOUTH ASIA	11.4	15.8	3.7	4.7	1.8	3.4	31.0	44.6	963
WORLD	12.8	15.0	5.9	7.4	5.7	7.5	122.0	210.8	8.654
Maldives	1.9	2.1	1.4	1.5	1.1	1.3	3.1	3.5	3.640
Bhutan	3.2	15.2	1.9	2.4	1.3	2.1	6.3	41.1	1.900
Bangladesh	35.6	35.6	3.6	3.4	3.1	3.4	116.3	137.7	520
Nepal	25.7	34.3	8.9	12.1	3.7	10.3	64.6	80.4	400
Afghanistan	NA	NA	NA	NA	NA	NA	NA	NA	370

Note: The ICT Price Basket and sub-basket values of developed economies, the world and South Asia are computed as simple averages. Sub-basket values are presented uncapped.

Source: ITU (2010b), the World Bank for the GNI per capita of the World and South Asia.

Chart 3.12 shows the contribution of each sub-basket to the overall cost of the ICT Price Basket in ABBMN countries. In all ABBMN countries, fixed broadband is the most expensive sub-basket. Indeed, as in most regions, high fixed broadband prices are the main reason for high ICT Price Basket values, such as those of Bangladesh and Nepal. Moreover, Bangladesh and Nepal have the lowest fixed broadband penetration of all ABBMN countries, which stresses the importance of affordable prices for broadband uptake.

Chart 3.12: ICT Price Basket by sub-basket, ABBMN countries, 2009



Source: ITU (2010b).

Maldives is the South Asian country with the lowest ICT Price Basket value. The country achieved in 2009 the same level of ICT prices as developed countries had, on average, in 2008. Indeed, the country had fixed telephone and mobile cellular prices in line (or even lower) than the average of developed countries. Only fixed broadband prices were significantly higher than the average of developed countries. The fact that Maldives has lower relative ICT prices than the rest of South Asian countries can be partly explained by Maldives' income per capita, which is higher than that of other countries in the region. Thus, ICT prices in Maldives are more affordable; that is, they correspond to a smaller share of the income per capita. However, as it has been mentioned, Maldives' ICT Price Basket value is comparable to that of several developed countries, which have much higher income (they are classified either as upper-middle or high-income countries in the World Bank income groups, while Maldives is a lower-middle income country). This puts into perspective and highlights the merit of Maldives' low ICT Price Basket value.

Between 2008 and 2009, **Bhutan** achieved the biggest decrease in the ICT Price Basket (12.1 points or 79 per cent) of all South Asian countries, and the fourth biggest reduction among the 161 countries included in the global ICT Price Basket. The country improved especially fixed broadband prices (from 41.1 to 6.3 per cent of the monthly GNI per capita), but mobile cellular prices also decreased significantly (from 2.1 to 1.3 per cent).

Nepal reduced fixed broadband prices from 80.4 to 64.6 per cent of its monthly GNI per capita between 2008 and 2009. Despite the reduction, the country still needs to focus on improving fixed broadband affordability, because 64.6 per cent is too high a share of income to deem fixed broadband services within the reach of a majority of the population. In Section 3.2, the shortage of international connectivity has already been flagged as a potential barrier for Internet, and therefore broadband uptake.³¹ The subject is further explored in Section 4.4. Regarding Nepal's ICT Price Basket, it is worth noting the decrease in mobile

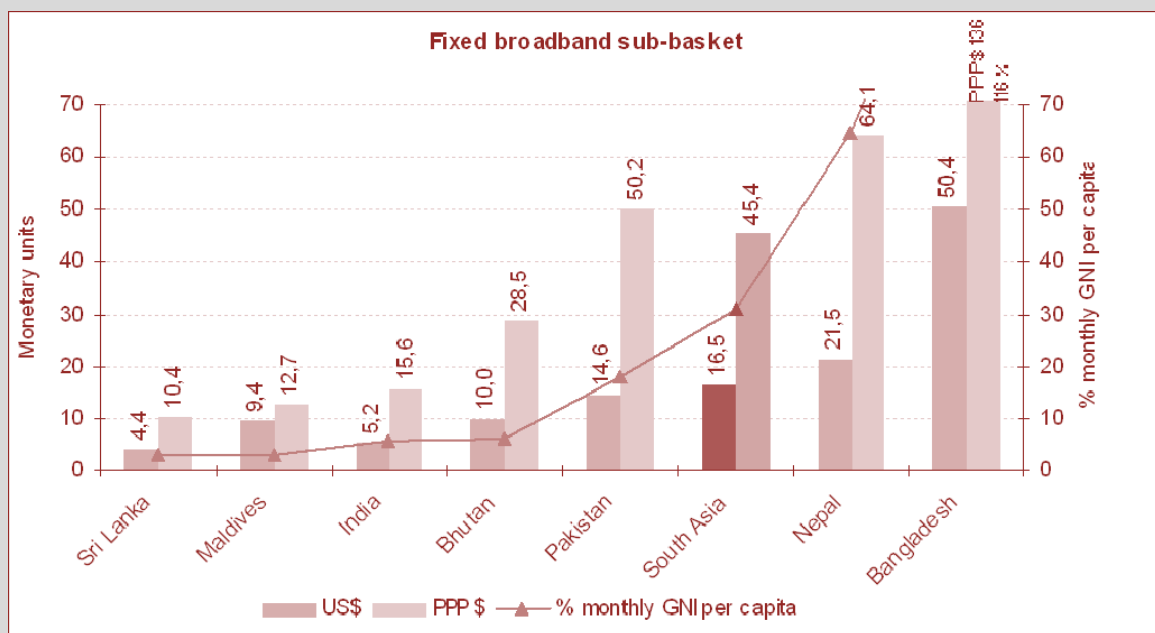
³¹ See ITU (2009c) for an analysis of the shortage of international Internet bandwidth in several sub-Saharan countries, and its effects on fixed broadband prices.

cellular prices: from 10.3 to 3.7 per cent between 2008 and 2009. On the other hand, the fixed-telephone sub-basket corresponded to 8.9 per cent of the monthly GNI per capita, the highest relative price of all South Asian countries.

Bangladesh was the South Asian country with the smallest ICT Price Basket decrease between 2008 and 2009, and it was also one of the developing countries that experienced the smallest reduction of prices worldwide. The fixed broadband sub-basket was the only one that underwent a significant decrease of prices, although it did not affect the overall ICT Price Basket value, because the sub-basket was still above 100 per cent of the monthly GNI per capita in 2009. Indeed, fixed broadband prices in Bangladesh correspond to more than the average monthly income of a Bangladeshi, which makes it unaffordable, except for a small minority of the population. This explains to a great extent why Bangladesh had in 2008 such a low fixed broadband penetration (only 3 subscriptions per 10 000 inhabitants), and highlights the importance of policy initiatives to improve fixed broadband affordability in order to improve broadband uptake. The subject is further explored in Section 4.4.

Chart 3.13 shows the fixed broadband sub-basket in South Asian countries, both in PPP\$ and USD. Maldives had the cheapest fixed broadband prices in ABBMN countries, although Bhutan had similar prices in terms of USD. However, when considering PPP factors, fixed broadband prices in Bhutan were more than twice as much as those in Maldives.³²

Chart 3.13: Fixed broadband sub-basket in South Asia, 2009



Source: ITU (2010b).

³² Intuitively, if country A and country B have the same price in USD for a fixed broadband connection, but in country A prices of other products are in general cheaper (in USD), then, by applying PPP exchange rates, the fixed broadband connection in country A will be more expensive. That is because, compared to country B, in country A the same amount of USD (exchanged into national currency at market exchange rates) can buy more products or services. Therefore, the fixed broadband connection in country A is more expensive in terms of what could be bought with that amount in each country.

In 2009, fixed broadband prices in USD in Nepal were at a similar level as those in the United States (USD 19.95), but they were much more expensive in PPP terms (PPP\$ 64.1 in Nepal compared to PPP\$ 19.95 in the United States), and of course much higher when taking into consideration the GNI per capita in both countries (i.e. the differences in income, which are estimated using GNI per capita as a proxy). Indeed, in Nepal a fixed broadband subscription corresponded to an estimated 64.6 per cent of the monthly GNI per capita, while in the United States it represented only an estimated 0.5 per cent.

In Bangladesh, fixed broadband prices in USD were more expensive than in the majority of high-income countries in the world. For instance, in 2009 a monthly fixed broadband subscription cost USD 42.03 in Luxembourg, and USD 50.40 in Bangladesh. However, the monthly GNI per capita in Luxembourg was USD 7 074, while in Bangladesh it was only USD 43.3. This makes fixed broadband prices relatively cheap in Luxembourg, and very expensive in Bangladesh, thus affecting broadband uptake in the country.

Box 3.2: Technological Options for Connectivity: Maldives

ITU carried out a connectivity study in Maldives where the challenge is to provide inter-island connectivity to affordable backbone infrastructure, as well as to design a techno-economical model for providing broadband services to nearly 200 inhabited islands. Basic voice services have already been provided to all the islands by the incumbent Dhiraagu and the new entrant Wataniya. Another important contributor to network infrastructure and last-mile connectivity is cable TV services, which are provided using MMDS technology, from one island to another, including VSAT as well as microwave links. This project was undertaken by ITU to make the assessment of the existing infrastructure (both telecom as well as cable TV networks) for their suitability to carry multimedia services, including IPTV services, to promote the utilization of Internet among the youth and other sectors of the communities. As a result of this study, a project for providing broadband connectivity solutions to the island communities has been designed and proposed by the ITU.

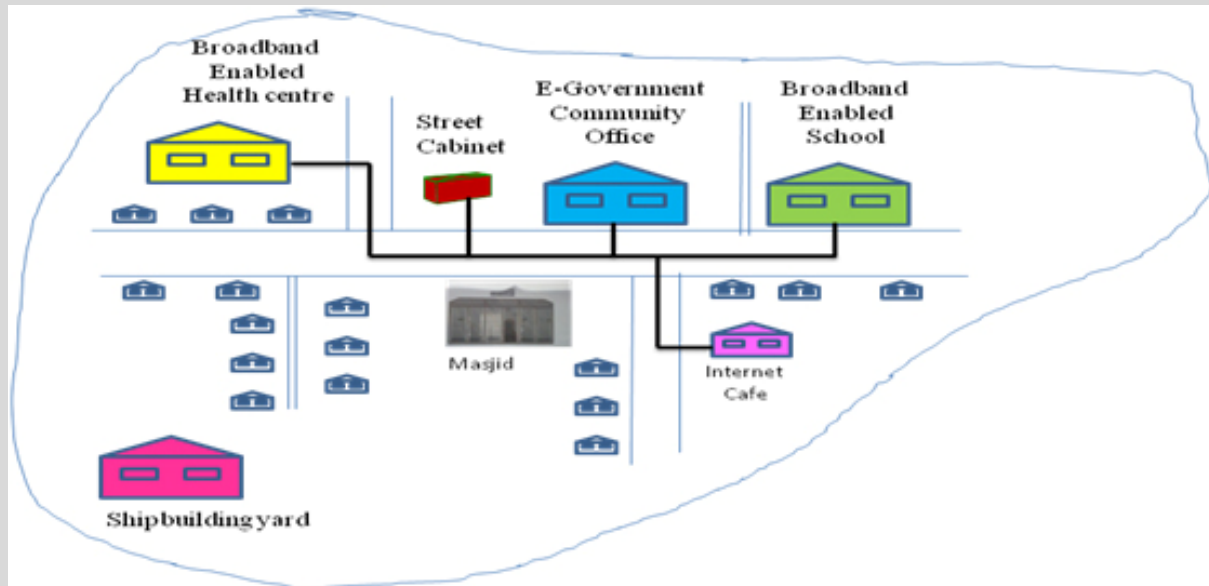


Figure: A generalized configuration for fixed-wire expansion to provide broadband access.

A pilot project for a small island community with the main emphasis on provision of broadband services to the island residents for promoting universal access in a common place accessible by all community residents was also proposed. This model would give access to e-government, e-health and e-education applications, with minimum expenditure. A pilot site was proposed to observe information and communications technology (ICT) progress and service availability on Gulhi Island, which has a population of about 800 inhabitants.

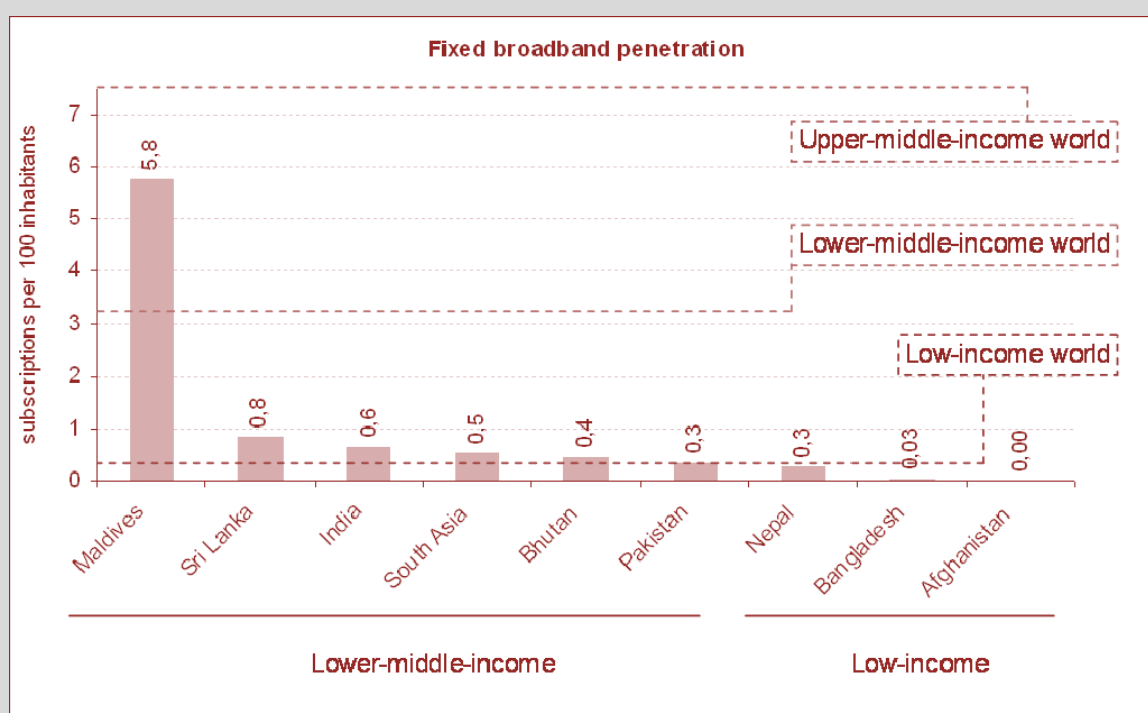
Source: ITU Regional Office for Asia and the Pacific.

4 CURRENT STATUS OF BROADBAND³³ DEVELOPMENT

Chart 4.1 compares fixed broadband penetration in ABBMN countries with other South Asian economies in different income groups. As analyzed in Chapter 3, only Maldives has achieved a fixed broadband penetration above that of lower-middle-income countries (3.2 per cent). Bhutan lies below that threshold, with barely 0.4 fixed broadband subscriptions per 100 inhabitants.

In Afghanistan and Bangladesh fixed broadband penetration is nearly zero, a low value even when compared to that of low-income countries worldwide (0.3 per cent). Nepal has made some improvement in the last year, reaching 0.26 per cent fixed broadband penetration by the end of 2009.

Chart 4.1: Fixed broadband penetration in South Asian countries, 2009



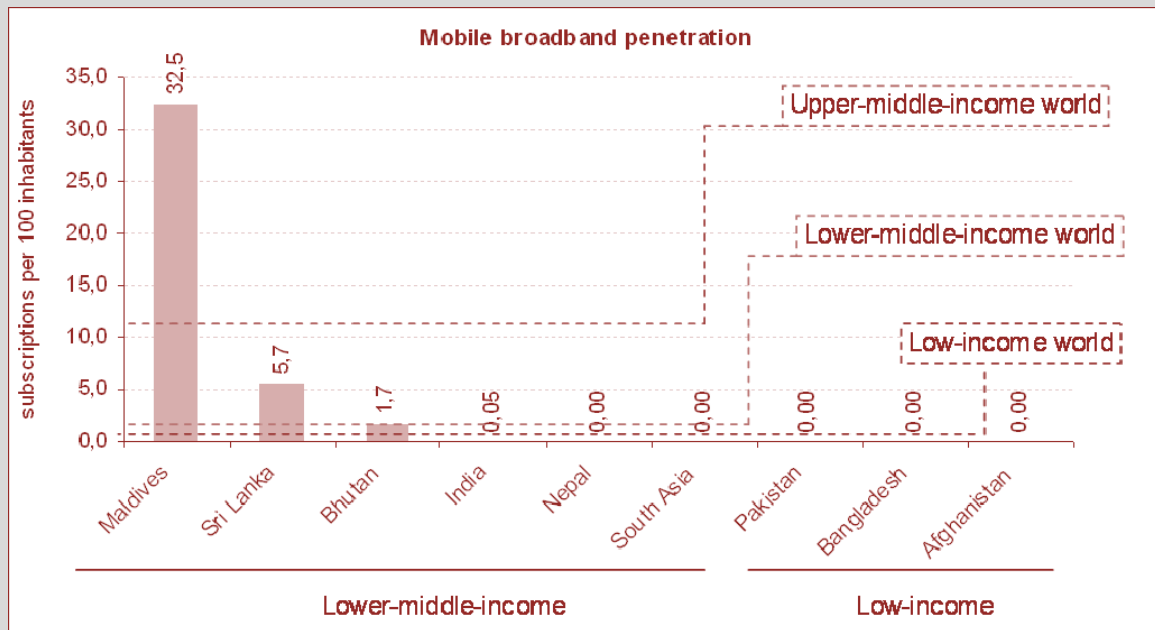
Source: ITU, income groups taken from the World Bank.

In terms of mobile broadband penetration, the situation is similar to that of fixed broadband uptake for low-income ABBMN countries (Chart 4.2). In Nepal, although 3G services were launched in 2007, the penetration is still negligible.³⁴ Bangladesh and Afghanistan have no mobile broadband services commercially available in the country. On the other hand, Maldives and Bhutan have a mobile broadband penetration above that of lower-middle-income countries (1.4 per cent). As it has been previously highlighted, Maldives has a mobile broadband penetration even higher than countries with higher income levels (32.5 per cent compared to an average 11.3 per cent in upper-middle-income countries worldwide).

³³ Internet broadband access is defined by ITU as that allowing access to the Internet at speeds equal or above 256 kbit/s, in one or both directions.

³⁴ 2 000 IMT-2000 subscriptions or 0.01 per cent penetration in March 2010. Source: ITU ABBMN questionnaire (June 2010).

Chart 4.2: Mobile broadband penetration in South Asian countries, 2009



Source: ITU, income groups taken from the World Bank.

The following sections take a closer look at specific issues concerning broadband development in ABBMN countries, both in terms of current infrastructure, policy initiatives and regulation, and draw attention on the challenges that remain ahead.

4.1 NATIONAL REGULATORY AUTHORITIES

NRAs play a key role in setting the regulatory framework that applies to broadband markets, and in providing legal certainty to investment. The importance of independent regulatory authorities to stimulate investors' confidence has been stressed in several international fora, including WSIS (see UNDP, 2004). Moreover, ITU has advocated the importance of establishing transparent, neutral and effective regulatory authorities, and it has highlighted the trend of creating such regulatory authorities for the ICT sector (from 12 separate regulatory authorities in 1990 to 153 at the end of 2009, see ITU, 2007, 2009g).

In the case of broadband stimulus, the existence of independent, transparent, predictable and efficient regulation is crucial to attract private investment. Thus regulators play a major role in broadband stimulus, if the right enabling environment is to be created to concretize the necessary investment for the deployment of broadband networks, which today still are not fully in place.

All ABBMN countries have established their own regulatory authorities, which means that the first milestone has been achieved.

The next stage is to have the legal provisions that ensure that these regulators:³⁵

- Are **Independent** from the policy-maker, so that there is a separation between the government that determines ICT policies and the regulator that impartially oversees their enforcement.
- Are **transparent and predictable** in their decisions, in order to strengthen its legitimacy.
- Create **legal certainty** with their decisions.

Table 4.1 shows the characteristics of ABBMN regulators, together with those of other selected regulators worldwide. In general, the right regulatory structure in ABBMN countries is in place. However, based on the analysis of the responses to the questionnaire sent by ITU, the specific areas for regulatory strengthening are further discussed in the following section.

Public consultations are a basic tool to involve stakeholders in the decision-making process, and also to foster transparency by means of providing a clearly established procedure for all interested parties to submit their contributions in equal terms.³⁶ It is therefore important that prior to taking any decision that has a relevant impact on a telecommunication market (in the case of this report, the fixed or mobile broadband markets) the opportunity is given to stakeholders to present their opinions in an appropriate time frame and in a transparent manner. Thus the comments of all relevant stakeholders need to be taken into account, and the results of the public consultation made publicly available on the regulator's website. In the case of Maldives, Nepal and Afghanistan, this is not always mandatory.

An important function of regulatory authorities (if not the main one in several countries in terms of files/inquiries treated in day-to-day work) is to resolve disputes between stakeholders. In order to do so effectively, **dispute-resolution mechanisms** need to be clearly defined, especially concerning the competence of enforcing binding decisions to operators. This is important, for example, in the case of fixed or mobile broadband infrastructure sharing, where disputes are likely to arise (especially against the dominant operator), and require a rapid solution to avoid discouraging alternative operators. In ABBMN countries, Maldives has not defined clear mechanisms for its regulatory authority, and Bhutan only alternative dispute-resolution mechanisms.

Finally, **legal certainty** is one of the main concerns of investors. In the case of fixed and mobile broadband networks, it is crucial because the deployment of new networks requires long-term commitment – they are capital intensive and entail long-term amortization of assets – and therefore it is important that there is legal certainty about the regulation that will be applied to them. The right to appeal to a judicial body should be ensured in order to guarantee that the regulatory authorities' decisions do not contravene the rule of law. However, it would strengthen the regulators' legitimacy if their decisions were considered as the last administrative instance, only to be challenged by the courts (including, in some cases, administrative appeals tribunals). This is indeed the case in most developed countries. In ABBMN countries, only in Bangladesh and Nepal do the regulatory authority's decisions stand as the last administrative instance, where they are only liable to be overturned by the judiciary. In the remaining ABBMN countries, this legal certainty in the regulator's decisions may not be assured.

³⁵ See Module 2 of the ICT Regulation Toolkit for more details on the role, rationale, and requirements of ICT regulators: www.ictregulationtoolkit.org/en/Section.3105.html

³⁶ This has been widely acknowledged, and included in the rules that guide several regulators. For example, in the European Framework Directive (2002/21/EC), which sets the common regulatory framework for electronic communications networks and services in the European Union, Article 6 is devoted to consultation and transparency mechanisms. The text states: "*Member States shall ensure that where national regulatory authorities intend to take measures in accordance with this Directive or the Specific Directives which have a significant impact on the relevant market, they give interested parties the opportunity to comment on the draft measure within a reasonable period.*"

Table 4.1: Characteristics of regulatory authorities in ABBMN countries and other selected economies.

	Year created	Is it autonomous in its decision-making?	Are public consultations mandatory before adopting regulations?	Can the regulator impose sanctions?	Are there clear dispute-resolution mechanisms?	Who has the ultimate authority to overturn a decision of the regulator?
Nepal Telecommunications Authority	1997	Yes	Only in some issues requiring input	Yes	Yes	The judiciary
Bhutan InfoComm & Media Authority	2000	Yes (after 2006)	Yes, before adopting rules	Yes	Only alternative dispute resolution	The Appellate Tribunal
Bangladesh Telecommunication Regulatory Commission	2001	Yes	Yes	Yes	Yes	The judiciary
Communications Authority of Maldives	2003	Yes	No	Yes	No	The President
Telecommunication Regulatory Board (Afghanistan)	2003	Yes	Just in certain cases	Yes	Yes	The sector Ministry
United States (FCC)	1934	Yes	Yes	Yes	Yes	The judiciary
Sweden (NPTA)	1992	Yes	Yes	Yes	Binding decisions	The judiciary
Korea (Rep.) (KCC)	1997	Yes	NA	Yes	Courts/ litigation	The judiciary
United Kingdom (Ofcom)	2002	Yes	Yes	Yes	Yes	The judiciary
Australia (ACMA)	2005	Yes	Yes	Yes	Yes	The judiciary, Administrative Appeals Tribunal

Source: ITU Telecommunication Regulatory Survey.

4.2 FIXED NETWORK INFRASTRUCTURE

Historically, the Public Switched Telephone Network (PSTN)³⁷ has played the role of being the main telecommunications network, providing fixed telephony services through a copper-based network. These fixed telephony services have been in many cases included in universal service obligations. Thus the PSTN has benefited in many countries from universal service regulation, and used universal service funds to expand the network. This is especially relevant in the case of the access network (local loop), which is the most difficult part to replicate in wired telecommunications networks.

³⁷ The PSTN was designed and deployed to provide Plain Old Telephone Services (POTS) using a circuit-switched architecture. Today, the PSTN has evolved to a mostly digital network (except the local loop), allowing for digital services.

Today fixed telephone networks have significantly changed, from the original all copper-based analogue networks to IP-convergent networks, mostly digital, and with core fibre-optic technology. Convergence to all-IP networks and the development of xDSL technologies have allowed fixed telephone networks to provide cost-efficient Internet access. As a result, xDSL has become the most common technology for fixed broadband Internet access: by the end of 2009, 65 per cent of total fixed broadband subscriptions worldwide used xDSL technologies, according to ITU (2010b).

In those areas where there is a fixed telephone network in place, it may be the most straightforward means to provide fixed broadband Internet access by using xDSL technologies. This entails in most instances only moderate investment (DSLAMs, backhaul capacity, DSL modems, etc.), and does not require the deployment of a completely new infrastructure.

Likewise, those areas with cable access networks (offering CATV and/or fixed telephony) can also benefit from the infrastructure in place to provide broadband Internet access. This is possible by upgrading cable networks to support DOCSIS, which requires also a moderate investment when compared to that of deploying new infrastructure.

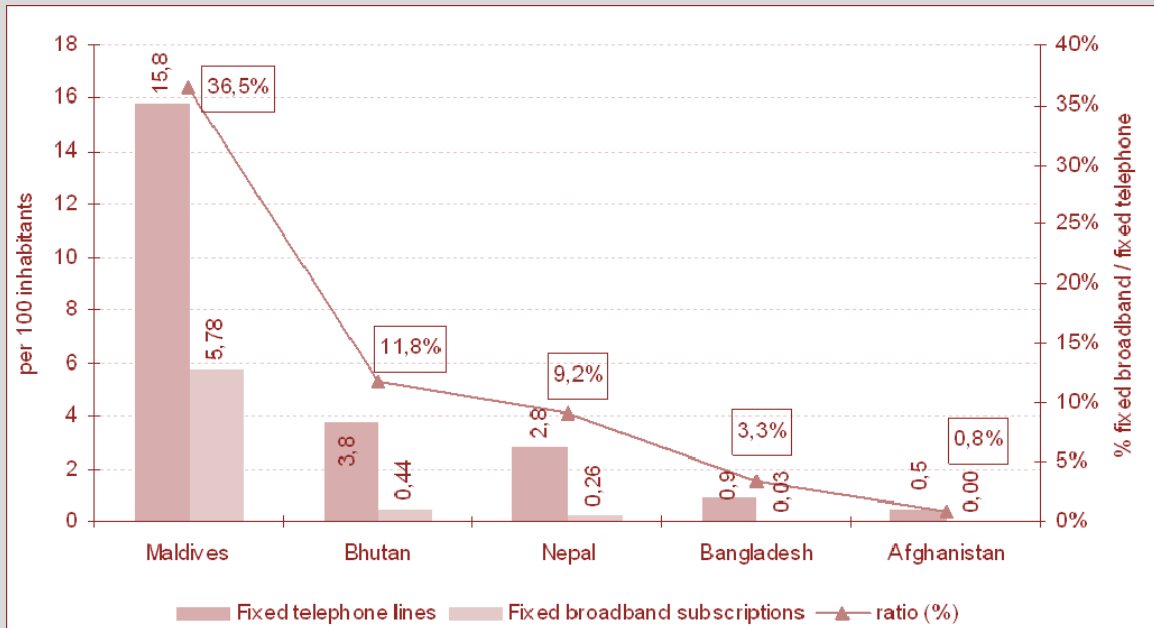
Although the driver of cable network development has been historically CATV, the potential impact of upgrading CATV networks to provide fixed broadband access is not analyzed in this report due to lack of data about CATV subscriptions. Thus, the analysis is limited to the potential benefits of upgrading fixed telephone networks (which include both cable and xDSL-based connections) to provide fixed broadband access.

Chart 4.3 compares fixed telephone penetration and fixed broadband penetration in ABBMN countries. The chart also displays the percentage of fixed broadband subscriptions to fixed telephone lines. This percentage gives a rough estimate of the actual use of fixed telephone networks to provide fixed broadband Internet access. Data show that Maldives is the only ABBMN country where a significant share of fixed telephone access is used to provide fixed broadband (33.8 per cent). In the remaining ABBMN countries, there is still ample room for broadband deployment through xDSL access technologies and/or cable. For instance, in Bhutan 3.8 per cent of the population have a subscription to a fixed telephone line, but only 0.4 per cent have a fixed broadband connection using that same telephone access line.

There are some details that need to be taken into account when assessing the viability of upgrading the current fixed telephone infrastructure to provide xDSL and/or cable broadband Internet access. For example, from a technical point of view, the length of the local loops may limit the speed of xDSL Internet access. From an economic point of view, demand will be crucial to build a strong business case. Demand will be to a large extent affected by the affordability of the service (see Section 4.4), as well as by the population covered by each exchange. Other factors may be also relevant, such as the e-literacy skills of the target population, the availability of PCs (see Section 4.3), and the local content available. There are several initiatives that can be taken to promote the improvement of these factors, such as the use of universal service funds to subsidize the demand for broadband Internet access, the launch of e-literacy programmes to provide the necessary skills to fully benefit from a broadband Internet connection, or the support to the creation of local content.

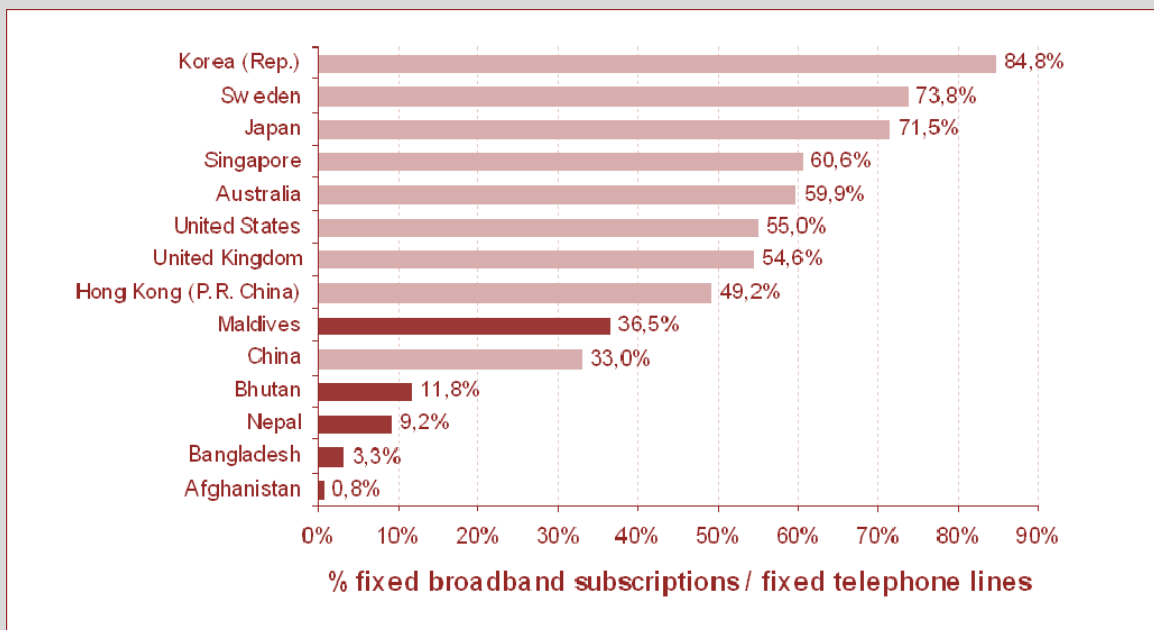
Chart 4.4 shows the ratio of fixed broadband subscriptions to fixed telephone lines in selected economies. It highlights that advanced economies in terms of fixed broadband penetration have a high proportion of fixed broadband subscriptions to fixed telephone lines. This roughly means that these economies are using to a large extent fixed telephone networks to provide also fixed broadband access. Nepal, Bangladesh, Afghanistan and Bhutan are in the lower end of Chart 4.4, which suggests that these countries could greatly improve fixed broadband penetration by providing data services at broadband speeds through their fixed telephone networks already in place. This would require conditioning the existing networks where necessary.

Chart 4.3: Fixed telephone and fixed broadband penetration in ABBMN countries, 2009



Source: ITU.

Chart 4.4: Percentage of fixed broadband subscriptions to total fixed telephone lines in selected countries, 2009



Source: ITU.

4.3 PERSONAL COMPUTER PENETRATION

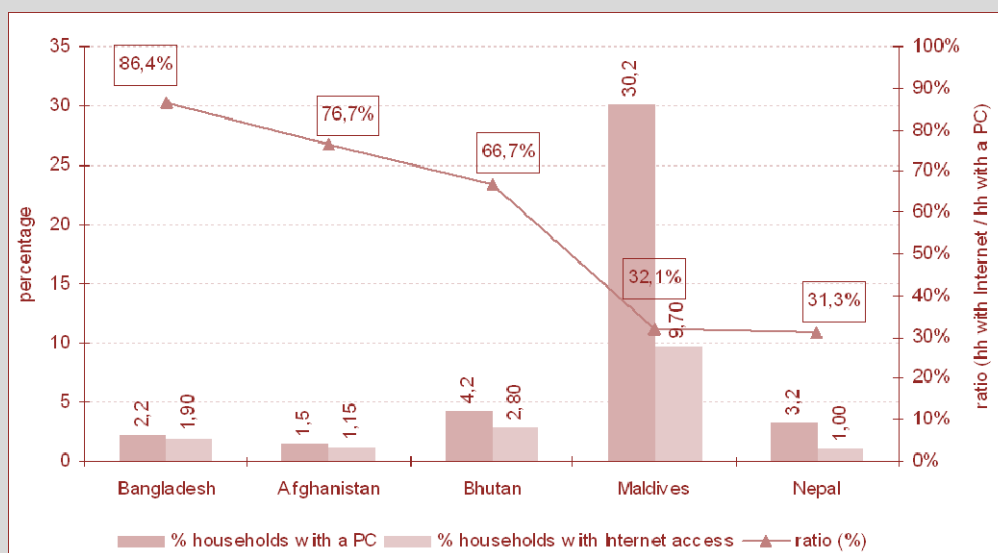
Fixed and mobile broadband connections can only be of use to those who own or have access to a terminal device, such as a personal computer (PC) or a smartphone, etc. The benefits of personal use of ICT devices have been acknowledged in the WSIS Plan of Action,³⁸ and concretized in WSIS Target 10, which include the objective of “achieving 50 per cent personal ownership of ICT devices” by 2015.

In the case of mobile broadband, 3G technologies make broadband available to any subscriber who owns an enabled cell phone. However, the user experience of broadband may vary considerably depending on the device.³⁹ Moreover, some particular mobile broadband connections (e.g. using datacards and dongles) require a computer. Additionally, some mobile phones can be used to supply broadband connectivity to computers through tethering.

Fixed broadband penetration and personal computer penetration are highly correlated. This relationship works in both directions: personal computers are a prerequisite to use a fixed broadband connection, and Internet access has become one of the main uses of personal computers. Furthermore, high personal computer penetration may be a relevant factor in assessing whether there is a solid business case for fixed broadband roll-out in a given area.

Chart 4.5 shows the ratio of households with Internet access to households with a personal computer in ABBMN countries. In 2008, Bangladesh, Afghanistan, and Bhutan had a high ratio, which means that most households that had a personal computer had also an Internet connection. Taking into account that the percentage of households with a PC was nevertheless low in these three countries, this suggests that the lack of personal computers may be a major barrier for further Internet adoption, and therefore for broadband uptake.

Chart 4.5: Ratio of households with Internet access to households with a PC in ABBMN countries, 2008



Source: ITU.

³⁸ The complete WSIS Plan of Action is available at: www.itu.int/wsis/docs/geneva/official/poa.html

³⁹ For example, smartphones are devices more oriented to the use of data services than regular cell phones, and thus provide a user experience closer to that of fixed broadband connections used with a personal computer.

On the other hand, in Maldives and Nepal most households that had a computer did not have an Internet connection in 2008. Thus, a lack of computers may not be the main obstacle for further broadband uptake in these countries, but rather other factors such as insufficient infrastructure, high fixed broadband prices, lack of local content, etc., may play a role. This is especially true in the case of Maldives, while Nepal would still need to improve computer penetration (only 3.2 per cent of households had a PC in 2008) in order to advance in terms of fixed broadband uptake. Indeed, in all ABBMN countries except Maldives the percentage of households with a PC was below 5 per cent, which is a very low value when compared to developed countries worldwide.⁴⁰

There are several initiatives that can be taken in order to improve personal computer penetration, such as subsidies to vulnerable groups for the purchase of computers or incentives to the distribution of low-cost devices (see Box 4.1).

Additionally to those actions aiming at achieving a higher computer penetration, community usage of computers can also be enhanced by fostering Public Internet Access Centres (PIACs) and other types of community access to computers. This has been specifically acknowledged in the WSIS Plan of Action; and in WSIS Target 1 (“Connect villages and establish community access points”) and WSIS Target 4 (“Connect all public libraries, archives, museums, cultural centres and post offices”). However, PIACs will only contribute to higher fixed broadband usage if they are equipped with fixed broadband Internet connections, which is not always the case.

Box 4.1: Deployments of the OLPC project in Afghanistan and Nepal

Several international initiatives have addressed the problem of lack of computers in developing countries.⁴¹ One of the most ambitious projects is the One Laptop Per Child (OLPC), which aims at providing to the children of the developing world a low-cost, low-power, connected laptop designed for children of ages 6 to 12. One of the principles of the initiative is child ownership of the computer, so that its use is not restricted to the school premises.

OLPC Nepal has distributed some 2 500 laptops in two phases:

- First phase: from April 2008 to March 2009, targeting two rural schools in Lalitpur district, and a total of 135 students and 22 teachers.
- Second phase: from April 2009 to March 2010, extending the project to some five additional districts, and distributing some additional 2 000 computers to 26 schools. This phase also included the training of 125 teachers (grades 2, 3 and 6).

As of 2010, OLPC Nepal is planning to deploy some additional 2 000 laptops to 12 more schools and cover grades 2, 3, 4 and 6 in all the schools.

OLPC Afghanistan has also taken the OLPC project to Afghanistan. In the first phase, 500 laptops were distributed in Jalalabad, and afterwards the project was extended to Kabul, with the aim of distributing a total of 2 000 additional laptops. The project is a public-private partnership with the United States Agency for International Development (USAID), Roshan, a mobile operator in Afghanistan, and Paiwastoon, a local information technology company.

In Bhutan, ITU has partnered with OLPC and the United Nations Children's Fund (UNICEF) to provide 269 laptops to connect 24 schools in rural and remote areas in the country (see Box 4.2).

Source: ITU,⁴² OLPC, OLPC Afghanistan,⁴³ and OLPC Nepal.⁴⁴

⁴⁰ For example, in 2008 some 75 per cent of Australian households had a PC, 75 per cent in Hong Kong (P.R. China), 86 per cent in Japan, and 81 per cent in the Republic of Korea.

⁴¹ In addition to the OLPC's XO, other relevant low-cost computing devices include Intel's Classmate, ASUS's Eee, Encore's Mobilis, and the Israeli-designed ITP-C. For more information, see Module 2 of ITU's "Connect a School, Connect a Community Toolkit", available at: www.itu.int/ITU-D/sis/Connect_a_school/Modules/Mod2.pdf

⁴² See ITU press release for more details: www.itu.int/newsroom/press_releases/2009/41.html

There is little data available on PIACs in ABBMN countries, which constraints the analysis and the conclusions that can be taken from it. Bangladesh and Nepal most probably have today a significantly higher percentage of population with access to a PIAC (20 per cent and 16 per cent respectively in 2004) than Afghanistan (5 per cent in 2006) and Bhutan (2 per cent in 2004).

Box 4.2: Connecting schools with broadband in Bhutan

One of the major barriers to meeting the Millennium Development Goals targets of 2015 has been the lack of affordable ICT devices. To help address this challenge, ITU joined with various partners such as OLPC and the 50X15 Foundation in a global initiative to provide low-cost laptops for school children in least developed/low-income countries such as Bhutan.

In October 2009, ITU–OLPC–UNICEF–MoIC–MoE–15X50 Learning Labs provided 269 OLPC laptops to some 20 schools, including 24 regular laptops. The training programme benefited about 300 students and teachers, with teachers invited for training together with the students. OLPC is providing 200 XO laptops to connect 24 schools in rural and remote areas of Bhutan. ITU and the 50x15 Foundation provided some additional 44 laptops under the ITU-AMD Learning Labs project, as well as training support for the 20 schools. UNICEF provided 25 XO Laptops and ITU facilitated training for eight school teachers identified by UNICEF. On completion, 50 XO laptops will be provided to the school where the training is taking place, and the remaining ones will be distributed to the other schools. Each of the head teachers of the 20 schools received a conventional laptop for monitoring learning progress and comparing knowledge gained through shared and individual usage.



A school teacher at Kuschichen Middle Secondary School, Kabisa, Bhutan, set up a computer lab with about 50 students in a model computer class room – each and every student equipped with OLPC laptop connected with 512 Kbps broadband Internet access. The school mainstreamed the ICT in the regular curriculum. An ITU senior advisor interviewed several students who were able to show their skills using Internet, writing sentences such as “I love my country”, play games, record videos by themselves and perform several other functions effortlessly! They were very excited and are making good use of the laptops for ICT skills development. Several students created e-mails and are connected to the information highway. Currently, ITU is supporting advanced training for the school teacher from Kabisa at the OLPC office in Hong Kong (P.R. of China)

It was also concluded that the highest impact in learning was achieved when there are a minimum number of OLPC (50) deployed, as done in the case of the pilot school. Where there were only a few OLPCs (4-5) provided for demonstration, the impact was much more limited.

Source: ITU Regional Office for Asia and the Pacific.

⁴³ See www.olpc.af/ for more details on the deployment of the OLPC project in Afghanistan.

⁴⁴ See www.olenepal.org/ for more information on the deployment of the OLPC project in Nepal.

There is no PIAC data available for Maldives. These figures suggest that in Bangladesh and Nepal efforts should be made to provide broadband connectivity to the PIACs already in place. In Afghanistan and Bhutan, the focus should be put in extending the reach of PIACs, and in equipping the new ones directly with broadband connections.

In Bhutan, the Government of Bhutan, the Government of India, ITU and the Universal Postal Union have collaborated in a project to extend e-services through post offices. The project targeted 32 post offices that had a reasonable ICT infrastructure, plus six post offices at remote locations, for which VSAT equipment was deployed in order to provide connectivity. The project was signed in 2002, and by the end of 2008 the targeted 32 post offices were computerized and five out of six remote post offices had their VSAT equipment functioning.⁴⁵

4.4 BROADBAND PRICES

ITU has highlighted the importance for policy-makers to address the issue of ICT prices, and to consider the so-called “power of price” as a relevant factor for ICT uptake (ITU, 2009a). No matter how effective policy initiatives to extend broadband networks are, they will not result in higher broadband uptake if prices are not affordable.

Since 2008, ITU has been collecting fixed broadband Internet prices. Mobile broadband prices have not yet been collected.⁴⁶ As it has been analyzed in Chapter 3 (see Chart 3.12), in Nepal the price of a fixed broadband subscription corresponds to 64 per cent of the average monthly income of a Nepali. In Bangladesh, it represents more than 100 per cent of the average monthly income per capita in the country. These findings are in line with the fact that these countries have the lowest levels of fixed broadband penetration in South Asia, together with Afghanistan (no price data available for the country).

Table 4.2 summarizes the comparative situation of fixed broadband prices in ABBMN countries (except Afghanistan, due to lack of data), and benchmarks them against selected developed countries.

As highlighted in the table, nominal fixed broadband prices (USD) in Bangladesh are uncommonly high. In Nepal they are also expensive: a fixed broadband connection costs more than twice as much as in Bhutan and Maldives, and the same as in the United States.

Table 4.2 also includes a comparison between fixed telephony prices and fixed broadband prices (both services are deployed based on the same network, although requiring different active devices, resources, etc.). Fixed broadband prices are much higher than fixed telephony prices in Bangladesh and Nepal, while they are much more balanced in all other countries included in the table. Inequalities in prices are indeed related to inequalities in penetration of the two services. In those countries where prices of both services are similar, penetration rates of fixed broadband and fixed telephony tend to be also similar. In Bangladesh and Nepal, much higher fixed broadband prices than fixed telephony prices are linked with much lower fixed broadband penetration than fixed telephone penetration.

⁴⁵ See the document “E-Services through Post Offices in Bhutan” for more details on the initiative. Available at: www.itu.int/ITU-D/tech/RuralTelecom/Rural_Publications/Bhutan-Report.pdf

⁴⁶ Mobile broadband prices are more difficult to collect than fixed broadband prices. This is due to two main factors: the difficulty of finding a common methodological approach, and the resources required to undertake the data collection. Indeed, mobile broadband tariffs are more heterogeneous than fixed broadband ones, and are in several cases bundled with other services, which makes comparisons across countries more complicated. The OECD is currently discussing the creation of a mobile broadband basket, which will be one of the first international attempts of its kind.

Table 4.2: Comparison of recurring monthly fixed broadband prices in ABBMN countries and other selected economies.

	Price USD 2009	Price % income 2009	Δ 2009/2008	Price broadband/ fixed telephone 2009	Penetration fixed telephone/ fixed broadband 2009
Bangladesh	50.4	116%	-7%	32 times higher	31 times higher
Bhutan	10.0	6.3%	-84%	3 times higher	8.5 times higher
Maldives	9.4	3%	0%	2 times higher	3 times higher
Nepal	21.5	64%	-6%	7 times higher	11 times higher
Australia	26.0	0.8%	-5%	Equal	1.5 times higher
Korea Rep.	25.3	1.4%	25%	5 times higher	
Sweden	35.5	0.8%	10%		1.5 times higher
United States	20.0	0.5%	33%	1.5 times higher	2 times higher

Source: ITU (2010b).

The comparison between prices and penetration has of course some limitations. Fixed broadband and fixed telephone penetration are the cumulative result of various years of infrastructure development, pricing policies and other factors. On the other hand, fixed telephony and fixed broadband prices as collected by ITU represent only one tariff (the most general one from the operator with the highest market share), which may not be available in the whole geography of the country, and can greatly vary from year to year.

Moreover, a big change of tariffs within two consecutive years will have only a soft impact in the penetration rates of those two years, and will need a longer period to be fully transposed (provided that the change of prices is maintained). This may explain the case of Bhutan, which experienced an 84 per cent reduction in fixed broadband prices between 2008 and 2009. This steep decrease has probably not yet had its full impact in fixed broadband penetration. However, if prices are kept this low, it is to be expected an increase in fixed broadband penetration in the future, and probably a rebalance of the “fixed telephone / fixed broadband” ratio to less than 8.5.

High fixed broadband prices are usually the result of several factors, such as:

- **Type of technology:** in Bangladesh, the 2009 fixed broadband prices collected by ITU correspond to a VSAT connection, because ADSL services were not available in the country until later in 2009. VSAT services tend to be more expensive than ADSL services, due to the cost of the underlying infrastructure. This explains the high costs of fixed broadband in Bangladesh compared to other ABBMN countries, which all provide it using ADSL technology. This situation has already changed with the launch of commercial ADSL services in Bangladesh, which has reduced considerably the prices of fixed broadband.⁴⁷ In Afghanistan, although no information on prices was collected, broadband through xDSL technologies is not offered. End users have only access to broadband through VSAT, WiMAX, and Wi-Fi technologies, being **VSAT** the dominant one for broadband access.⁴⁸ This suggests that fixed broadband prices in Afghanistan are also relatively high due to the type of technology used.

⁴⁷ Currently (June 2010), BTCL offers an ADSL subscription that costs between USD 8-15, and which is available in Dhaka, Chittagong, Comilla, Khulna and Bogra.

⁴⁸ ITU ABBMN questionnaire (June 2010).

- **High prices of international Internet bandwidth:** high international connectivity prices may be due to (i) shortage of international bandwidth; (ii) an inefficient structure in the internal market; (iii) a combination of both. In Chapter 3, shortage of international connectivity has been flagged as a relevant problem in Afghanistan and Nepal. In Bangladesh, state monopoly still exists in the backhaul segment between the Cable Landing Station (CLS) and the international gateways. Moreover, international carriers are not allowed to set by commercial negotiation international bandwidth prices; they must set prices equal to those of the government-owned entity. As a result, although there is no shortage of international connectivity in Bangladesh, prices are higher than they could be in a competitive environment.⁴⁹ Furthermore, in Bangladesh demand for international bandwidth is limited, which makes the traded volume small, and therefore prices relatively high. In Afghanistan, a similar problem could happen if national demand for international bandwidth were not aggregated (once new international fibre connections are in place).
- **High domestic connectivity prices:** lack of national and regional interconnection points may divert domestic IP traffic to international gateways, increasing significantly costs. A strong national policy to foster peering agreements between national and regional ISPs would solve this problem, and at the same time provide an incentive for the development of locally hosted content and services. Bangladesh has already included this objective in its National Broadband Policy,⁵⁰ and other ABBMN countries could benefit from such an approach (especially Maldives, the only one without a national IXP).⁵¹
- **Absence of a solid business case:** there are high infrastructure and operational costs in areas outside major cities. This may be also the case in populated areas, where low demand may render the investment risk high, because the amortization of active/passive assets may need a minimum demand to justify the investment. Even in the case of deployments requiring relatively low investment, such as the upgrade of the fixed telephone network to offer xDSL services, active equipment at the telephone exchange (e.g. DSLAMs) requires a minimum density of subscriptions in the area covered by the exchange in order to be economically viable.
- **Lack of competition:** as it is further analyzed in Section 4.7, competition fosters efficiency, which has a direct impact on the quality and the prices enjoyed by end users. Lack of competition in certain stages of the fixed broadband provision chain, such as the stages regarding international and domestic Internet bandwidth provision, may be an important cause of high prices. An additional bottleneck for competition in the fixed broadband market is in most cases the access to the local loop, which is the most difficult part to replicate of a fixed broadband network. Lack of competition may also be the consequence of lack of infrastructure competition (e.g. cable networks competing against copper-pair operators) or weak competitive pressures from related markets (e.g. a highly competitive mobile broadband market).
- **Other factors** such as licensing procedures and costs (see Section 4.6), high costs of access to capital (due to the risk associated with the project, but also to regulatory uncertainty, country risk, etc.), etc.

⁴⁹ Source: Shamsuzzoha (2010). *Country Report on Broadband: Bangladesh*.

⁵⁰ The National Broadband Policy (2009) of Bangladesh addresses the issue of saving international Internet bandwidth by encouraging the setting of new National Internet Exchanges (NIXs) to provide peering facilities beyond those already available in the country (Bangladesh Internet Exchange, Bangladesh National Internet Exchange, and Bangladesh Society of Internet Exchange). Moreover, all ISPs will be required to connect to NIXs.

⁵¹ Maldives is currently finalizing the interconnection of the two main networks operating in the country. Due to the specific market structure of Maldives, this interconnection may play the role that IXPs have played in other ABBMN countries.

Box 4.3: Establishment of an Internet Exchange in Afghanistan

The role of Internet Exchanges for stimulating the uptake of broadband by reducing the cost of peering and saving on the cost of expensive international bandwidth while improving the local content is well established. In order to set up a neutral Internet Exchange, ITU carried out a field survey in Kabul in 2009 to study the Afghanistan Internet status and the possibility to set up an Internet Exchange. The Afghanistan Ministry of Communication, in its published development plan for 2005-2009, also mentioned the plan to establish local Internet Exchanges in Afghanistan, but its implementation could not be undertaken.

With this initiative, ITU designed and developed a schematic plan of Internet Exchange and provided the necessary equipment to establish the exchange. Membership policy, organizational set up and procedure of accessing Afghanistan Internet Exchanges (AIX) were prepared in consultation with the Ministry, Internet service providers and relevant stakeholders. For operation and maintenance, a specific training course was designed and a field visit to the Indonesian Open Internet Exchange was organized by ITU. AIX has now been established in Kabul and several ISPs are joining the AIX.



Source: ITU Regional Office for Asia and the Pacific.

In addition to recurring monthly charges, up-front costs may represent a strong cost barrier. For example, today an ADSL modem in Bangladesh costs between USD 36-50,⁵² while the average monthly income of a Bangladeshi is USD 43. This means that in order to start using a fixed broadband Internet connection a person must pay on average a whole monthly salary, plus the monthly charge for the subscription.

In conclusion, there are two complementary approaches to deal with the problem of high broadband costs. On the one hand, there is the supply-side approach, which focuses on improving such shortcomings as shortage/high international bandwidth prices, the transfer of national traffic to international gateways, and lack of competition in the fixed broadband market. On the other hand, there is the demand-side approach, which comprises policy initiatives such as promoting broadband use in small and medium (SMEs) and vulnerable groups, and considers tax incentives or subsidies for some devices necessary for broadband connections (e.g. customer premises equipment).

An additional solution, addressing both demand and supply-side shortcomings, would be the inclusion of broadband in universal service obligations (see Section 4.5).

4.5 NATIONAL BROADBAND PLAN AND FUNDING

Universal service funds have been used in the context of ICTs to ensure that all citizens – regardless of geographic location, socio-economic factors and disability – have access to a minimum set of

⁵² Source: Bangladesh Telecommunications Company Limited, www.btcl.gov.bd/

telecommunication services. Traditionally, universal service obligations have been limited to fixed telephony services, including in some cases dial-up (narrowband) Internet.

In several cases, universal service funds have been used to extend fixed telephone networks, which are the basis for fixed broadband provision through xDSL technologies. This means that, indirectly, the use of universal funds in the past may have benefited the roll-out of necessary infrastructure for the provision of fixed broadband services today. With the increasing importance of broadband for economic development, the question arises on whether universal service funds should be used to directly promote broadband services.

An international example of this shift in universal service policies is the United State's National Broadband Plan, which proposes to create a Connect American Fund (CAF). This fund would receive (in ten years) all resources that relate to voice services (high-cost component) from the existing Universal Service Fund, and use them to support the provision of affordable broadband and voice with at least 4 Mbps *actual* download speeds (see FCC, 2010).

In the European Union, the revision of the Universal Service Directive (2002/22/EC)⁵³ by the approval of the Citizens' Rights Directive (2009/136/EC)⁵⁴ in December 2009 has reviewed the scope of the universal service, which was before limited to the provision of narrowband Internet services. The amended Universal Service Directive opens the door to the inclusion of broadband connections within the universal service (see recital 5 of the Citizens' Rights Directive). Discussion at national and European level is currently ongoing on the application of these changes in each EU country.

Table 4.3 shows the summary of universal service obligations and related initiatives to promote broadband uptake in ABBMN countries. Nepal is the only ABBMN country where broadband is included in the universal service obligations (only rural areas). In Bangladesh, the creation of a universal service fund to support the achievement of the targets set in the National Broadband Policy is foreseen as a short-term objective, to be achieved by the end of 2010.

There are other financing mechanisms that can be used to promote universal access to broadband. For instance, in Afghanistan, the resources of the Telecommunications Development Fund (TDF) are used to promote rural development (ATRA, 2008). This may include broadband development, although only Internet access is specifically mentioned. In Nepal, telecoms equipment imported for rural services is exempt of nominal custom charges. As for special tariffs for broadband subscribers, Maldives is the only ABBMN country that has implemented such policies, in the context of educational purposes.

National broadband plans are an important tool to align all national efforts towards the accomplishment of specific broadband development targets. They may include references to the usage of universal service funds for the achievement of national broadband targets, in those cases where broadband strategies are also linked to universal service policies.

With the acknowledgement by the international community of the importance of broadband as a driver of economic growth, many countries have developed in the last years their own national broadband plan. Well-known examples include the United States' National Broadband Plan (see FCC, 2010), the German *Breitbandstrategie* (see BMWi, 2009), and other wider plans including broadband targets, such as the French *France Numérique 2012* (see *Secrétaire d'Etat chargée de la prospective et du développement de l'économie numérique*, 2008) and the British Digital Britain (DCMS and BIS, 2009).

⁵³ Directive 2002/22/EC of the European Parliament and of the Council, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0051:0077:EN:PDF>

⁵⁴ Directive 2009/136/EC of the European Parliament and of the Council, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0011:0036:En:PDF>

Table 4.3: Universal service and other policy initiatives to promote broadband in ABBMN countries.

	Is there a national broadband plan?	Universal service includes broadband?	Are there other financing mechanisms for broadband?	Are there social tariffs for broadband subscribers?
Afghanistan	Being developed	No	TDF Fund	No
Bangladesh	Yes ⁵⁵	No, but foreseen in the National Broadband Policy	No	No
Bhutan	Yes ⁵⁶	No	No	No
Maldives	No	No	No	Yes, for educational purposes
Nepal	Currently a draft under consultation	Yes, in rural areas USO imposed on the incumbent fixed line operator, and financed through US Fund and interconnection charges	Tax exemption for telecoms equipment imported for rural services	No

Source: ITU ABBMN questionnaire (June 2010).

Among ABBMN countries, Bangladesh⁵⁷ and Bhutan have approved their national broadband plans. Nepal has currently under consultation its own broadband plan, while Afghanistan and Nepal are in the process of developing it. Maldives is the only ABBMN country with neither a broadband plan, nor in the process of developing it.

There is not a single solution on the best policy instrument to promote universal access to broadband. Universal service obligations, other financing mechanisms, and different public broadband plans may prove more or less effective depending on the national circumstances. These include very diverse factors, such as demography and geography, competitive situation in the broadband market, access to financing sources, and/or policy goals. There are, however, some general considerations to be taken into account when assessing the suitability of the different options:

- **The importance of aligning all policies related to broadband** development towards achieving a clear, measurable, and scheduled common set of targets. If correctly designed, a **national broadband plan** may be a good means of achieving this objective.
- If universal service policies are extended to broadband, **it must be undertaken a careful assessment about the effects these policies may have on competition**. For example, in Nepal universal service obligations related to broadband development in rural areas are imposed to the fixed-line incumbent, which finances them partially with its interconnection charges. High interconnection charges have an impact on alternative operators that need to interconnect to the network of the fixed-line operator, and in consequence indirectly affect competition in those areas with more than one operator. Thus the burden of universal service policies is partially passed to alternative operators. This is not *per se* negative, but an impact analysis needs to be carried out, in

⁵⁵ National Broadband Policy, 2009.

⁵⁶ National Broadband Network Master Plan for Bhutan, 2008.

⁵⁷ See also the initiative on Digital Bangladesh that has been announced by the Honorable Prime Minister of Bangladesh. More information available at: www.digitalbangladesh.com.bd/#

order to avoid that the extension of broadband to rural areas weakens competition in competitive areas.

- In order to maximize the benefits drawn from the use of public funds for broadband development, **a gradual approach should be considered**. In those areas where there are enough incentives for operators to compete, intervention should be limited to regulatory measures to ensure a level-playing field for all stakeholders. In underserved and rural areas, where stronger public intervention will be required, it should be sought to enforce those public policies that better promote both broadband development and competition (see, for an example, Box 4.2). This needs to be considered also in any broadband network development using public funds: open access or other forms of infrastructure sharing are the best way to favour both efficient infrastructure use and end-user benefit.
- **Universal service obligations need to be financed in a transparent and efficient way**. A good option to do so may be through the creation of a universal service fund.⁵⁸ Irrespective of the mechanism implemented for the management of universal service funds, it is of critical importance that funds are used only and entirely for the provision of the telecommunication services included in the USO. A good way of ensuring it is to separate these funds from the public budget – as it is the case, for example, of the TDF in Afghanistan –, and to collect them only after assessing the real cost of the USO.

Box 4.4: Broadband services or broadband connectivity to be included in the universal service?

The provision of fixed broadband by an operator can be decoupled in two elements, both of them necessary for the enjoyment of the service: the connection to the Internet at a fixed location, and the provision of Internet services to the end user through this connection.

Following this approach, broadband can be included in the universal service in two different ways:

- (a) By comprising both the connection (i.e. roll-out of the network to rural/underserved areas), and the provision of the Internet service. In this case, the same operator that extends the network offers the retail services, and thus it is the sole beneficiary of the universal service funds.
- (b) By including only the connection. In this instance, the operator that extends the network would not necessarily be the one offering the retail services. Different competing operators could offer these services by accessing the network (e.g. local loop unbundling, bitstream access, reselling) of the beneficiary of the universal service funds.

In case (b), in order to ensure that the newly offered broadband services are affordable, universal service funds could be used to promote social tariffs below market prices. These subsidies would allow end users to choose the most beneficial broadband service provider.

Option (a) has been the way fixed telephony services have been historically financed through their inclusion in the universal service. Option (b) is an innovative option currently discussed at a European level, which could be more advantageous for the extension of broadband through the universal service, because it could promote some degree of competition in its provision.

⁵⁸ Prior to taking the decision of creating a universal service fund, it should be assessed whether the total amount to be managed by the fund and the costs related to its administration justify its creation, instead of some other more direct mechanism. For instance, if the amount of funds to be transferred is moderate, and there are few stakeholders involved in the transactions, a system of direct transfer could be more appropriate.

- Universal service funds should not be used to benefit one single operator by subsidizing the extension of its network and/or the provision of risk-free services (i.e. publicly subsidized), while damaging the competitive situation of alternative operators. Although this may render some short-term benefits for selected (usually national) undertakings, it is neither the best way to obtain the highest end-user benefit from the use of public funds, nor the way to promote long-term efficiency of national telecommunications firms.

4.6 AUTHORIZATION/LICENSING

Authorization of ICT services has long evolved from the early days where telecommunication services were provided by a branch of the public administration, with its mandate defined by a law or a policy document. With the wave of privatization of national telecommunication services, accompanied by the liberalization of telecommunication services, and the entrance of private players in the market, individual licences were issued to set down the conditions of telecommunications operators.

Currently, the trend in many developed countries is to grant only one general authorization (technologically neutral) for the provision of any telecommunication service, or even to require only a notification prior to start operating. These light-touch authorization regimes are considered better suited to respond to the current situation of electronic communication markets, which have a very dynamic nature, are experiencing an increase in competition due to the entry of new players, and have undergone a deregulation movement.⁵⁹

A good international example of general authorization of electronic communications and networks is the EU Authorisation Directive (2002/20/EC).⁶⁰ Under this directive, European Union Member States agreed in 2002 to adopt a general authorization regime, where *“The undertaking concerned may be required to submit a notification but may not be required to obtain an explicit decision or any other administrative act by the national regulatory authority before exercising the rights stemming from the authorisation. Upon notification, when required, an undertaking may begin activity”*. This general authorization regime does not exclude that Member States may grant individual rights of use for radio frequencies and numbers (both scarce resources, which are subject to general interest policies). Administrative charges imposed on undertakings for both general authorizations and individual rights of use shall cover only the administrative costs incurred.⁶¹

Table 4.4 presents the comparison of the different licences available in ABBMN countries for the provision of broadband services. No ABBMN country has a licensing regime based on notification, and only Nepal has implemented general licences. Individual licences, which prevail in most ABBMN countries, may make the licensing negotiation burdensome and allow for different type of contract agreements depending on the operator. On the other hand, countries without a clear legal framework have attracted investment by providing regulatory certainty through the use of detailed individual authorizations.⁶²

⁵⁹ See Module 3 of the ICT Regulation Toolkit for more details on the different authorization and licensing regimes and their evolution: www.ictregulationtoolkit.org/en/Section.507.html

⁶⁰ Directive 2002/20/EC of the European Parliament and of the Council, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0021:0032:EN:PDF>

⁶¹ The limitation of the administrative costs of individual rights of use for radio frequencies does not constrain the choice of a given selection criteria for granting a limited number of spectrum rights of use (e.g. assigning frequencies to the highest bidder).

⁶² Examples of the use of individual licences to attract investment in transitional and developing economies include Hungary, Jordan, Morocco and Uganda. See www.ictregulationtoolkit.org/en/Section.1196.html for more information.

Table 4.4: Comparison of licences enabling the provision of broadband services in ABBMN countries.

	Type of licence	Is it technologically neutral?	Licences granted		Type of services allowed by the licence?	Licence fees		Time to grant the licence	Licence duration
			Total	Limit		One time	Annual		
Afghanistan									
ISP licence	Individual	Yes	30	None	Internet service	USD 20 000 (national) USD 5'000 (provincial)	USD 12 000 (national) USD 4'000 (provincial)	19 to 97 days	15 years
Bangladesh									
ISP licence	Individual	No	369	None	Internet service, leasing Internet bandwidth capacity, IP telephony	USD 2 860	USD 1 430	Max. 3 weeks	5 years
PSTN	Individual	No	9	None	Voice, Internet, leasing backhaul capacity	USD 1 74 million	USD 285 715		15 years
BWA	Individual	No	2	3	Broadband Internet, IP telephony	USD 31 million	USD 428 500		15 years
Bhutan									
Licence	Individual	Yes	5	None	All services	USD 200	USD 200	1 month	10 years
Maldives									
ISP licence	Individual	Yes	2	Yes	Internet services	None	5% ISPs revenues		10-15 years
Rural Internet retail licence	Individual	Yes	10	None	Internet services	USD 20	None	Few weeks	3 years
Nepal									
ISP licence	General	Yes	45	None	Internet services	USD 1.50 for rural service	USD 4 000 USD 1.50 per VDC for rural ISP	1 month	5 years

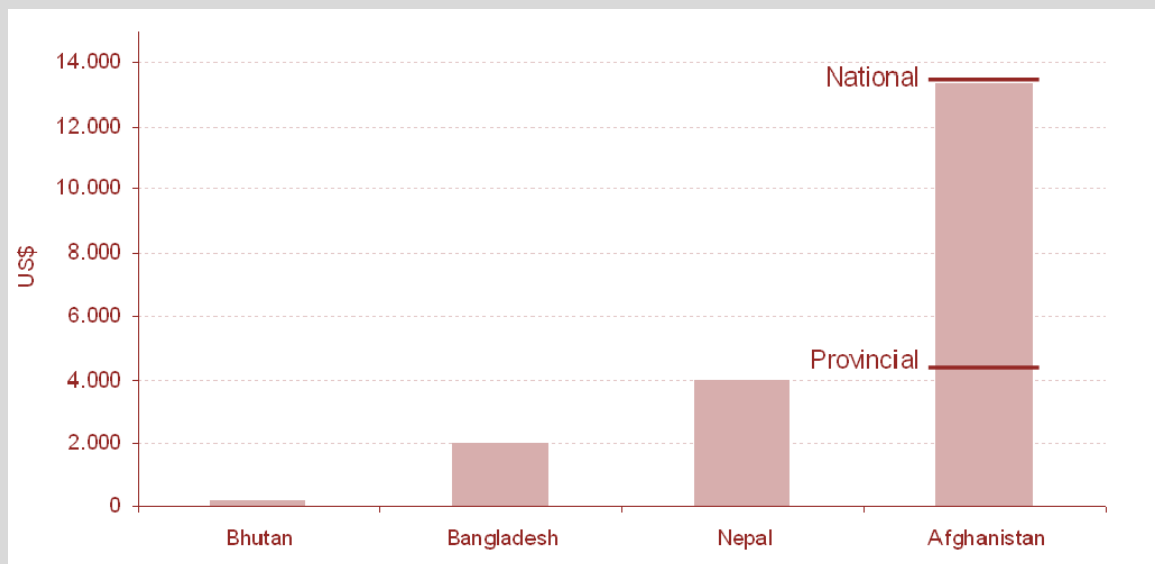
Source: ITU ABBMN questionnaire (June 2010).

All ABBMN countries except Bangladesh have technologically neutral licences. In the case of Bangladesh, the consequence is that quite different conditions apply to the provision of broadband services depending on the type of technology used. This may be partially justified in the case of the broadband wireless access (BWA) licence, because it relies on a scarce resource (spectrum), but it is in general not consistent with the current context of technological convergence.

Bhutan is the only ABBMN country with a unified licence (i.e. including all telecommunications services), which is a step forward towards simplifying the authorization process. Moreover, the country has the

lowest licence fees of all ABBMN countries, except for special ones addressed to rural ISPs. Chart 4.6 shows a comparison of the cost of an ISP licence in ABBMN countries. The total annual cost is computed as the sum of the annual fee plus the one-time fee divided by the licence duration. Licence fees in ABBMN countries vary from USD 200 in Bhutan to USD 13 333 for a national ISP licence in Afghanistan.

Chart 4.6: Annual cost of an ISP licence in ABBMN countries, 2010.



Source: ITU ABBMN questionnaire (June 2010).

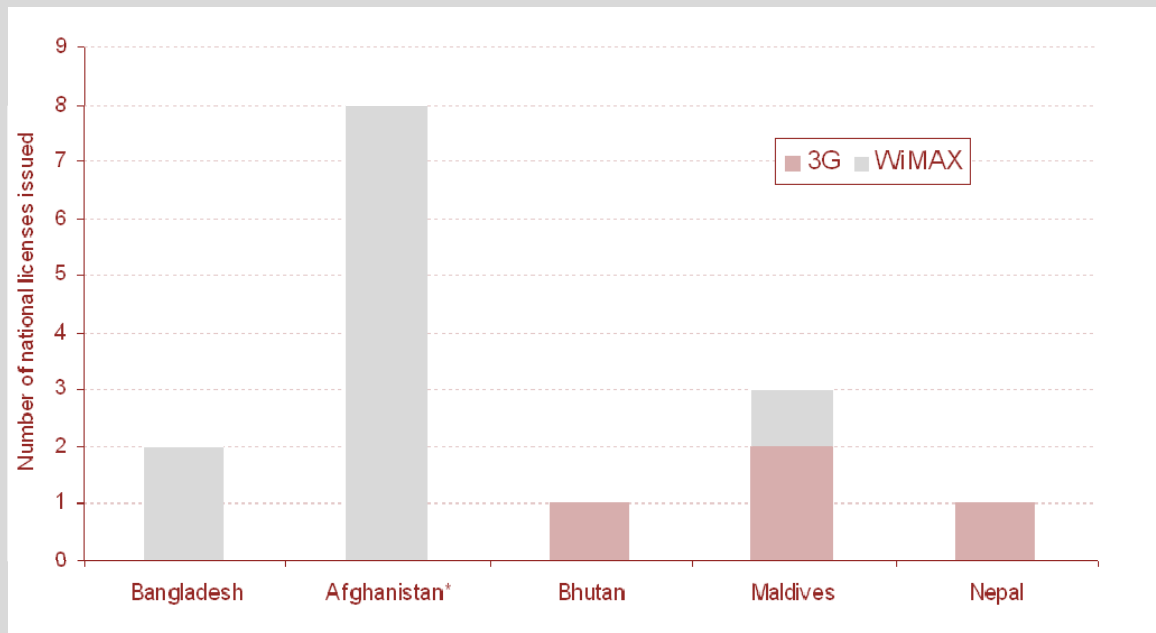
Moreover, in Bangladesh a PSTN licence costs as much as USD 285 715 per year, while a BWA licence costs USD 428 500 (without counting the one-time fee derived from the competitive selection procedure). These licence fees taken at face value seem quite high, but in order to determine whether they are reasonable or not, a broader study would need to be carried out comprising all the different fiscal obligations imposed on operators. For example, in several countries a tax applied to operators' revenues is levied to finance the administrative charges related to the regulation of the market. Therefore, very low authorization fees but high taxes on operators' revenues may be more burdensome than high authorization taxes but no tax on operators' revenues. This also applies to Maldives, whose licence fees (5 per cent ISPs revenues) seem also relatively high (e.g. the whole budget of the Spanish regulator is financed by a tax levied on operators' revenues, which is limited to a maximum of 2 per thousand).

It is worth mentioning the initiatives in Maldives and Nepal of having special licensing conditions for rural ISP. Indeed, favourable licensing conditions for rural ISP may incentivize the entrance of new ISP in rural areas. Such initiatives could be also extended to other ABBMN countries.

Concerning the time an undertaking may have to wait to be granted a licence, in the case of ISP licences, where no competitive selection is involved, the process should be short. In Afghanistan the time bracket seems to be too wide (from three weeks to more than three months), which opens the door to discretionary response times. The remaining ABBMN countries have reasonable time lapses.

In addition to expeditious authorization for the provision of broadband services, licensing of mobile broadband spectrum plays a crucial role in broadband development. Chart 4.7 shows the number of mobile broadband licences by type of technology (3G and WiMAX) issued in ABBMN countries.

Chart 4.7: Number of mobile broadband licences issued in ABBMN countries, June 2010.



* WiMAX licences granted on a temporary basis, while the bidding process is ongoing.

Source: ITU ABBMN questionnaire (June 2010).

Maldives is the only ABBMN country that has issued both 3G and WiMAX licences.⁶³ In Bhutan and Nepal only one 3G licence has been awarded, in both cases to the incumbent. In Maldives one 3G licence has been awarded to a fully private firm (Wataniya), while the other 3G licence and a WiMAX one have been granted to Dhiraagu, the historical national telecommunications carrier of Maldives. This highlights the limited involvement of private investment in IMT-2000 licensing processes in Bhutan, Maldives and Nepal. In contrast, Afghanistan and Bangladesh have awarded their WiMAX licences to fully private investors.

In the case of Afghanistan and Bangladesh, where 3G licences have not yet been awarded, it is important to keep in mind that operators will only have interest in rolling out the new 3G networks in those zones where it makes economic sense. Without some public support, there will probably be some rural/remote areas excluded from the roll-out. Indeed, rural areas have (i) higher roll-out costs, and (ii) in most developing countries, lower average revenue per user (ARPU), that is, people spend less money in telecommunication services. Both factors make the 3G business case more difficult in these areas, especially in developing countries, where ARPU is already low when compared to that of the developed world. Additionally, the demand for mobile data services, which should ultimately drive the 3G business case, is not as strong in developing countries as in developed ones. As a first step to deal with these issues, Afghanistan and Bangladesh could elaborate a study on the estimated costs of 3G roll-out, and benchmark them against different revenue scenarios. The results of such a study could set the reasonable expectations for 3G roll-out, and be a starting point for the discussion between policy-makers and operators on how to cooperate in order to bring 3G coverage to rural/remote areas.

In most cases, IMT-2000 licences in ABBMN countries impose some coverage obligations, although they do not refer specifically to rural/underserved areas. In the case of Bangladesh, obligations are also imposed on

⁶³ Afghanistan is currently in the bidding process of IMT-2000 spectrum, and in the bidding of permanent WiMAX licences.

the minimum number of subscriptions to be achieved by WiMAX licensees. Maldives is the only ABBMN country with neither geographic nor population coverage obligations attached to its mobile broadband licences.

All countries except Bhutan have carried out or are planning spectrum refarming to reassign new bands to wireless broadband services. This will open new opportunities for further competition in wireless broadband markets, in some cases entailing the release of premium bands for extended rural coverage (e.g. the 700 MHz band of the digital dividend will be freed in Bangladesh, and allocated⁶⁴ for LTE services).

Lastly, Maldives is the only country where no licence-free Wi-Fi bands have been allocated. Wi-Fi hotspots are a good complement to mobile broadband networks, because they can discharge part of their traffic to fixed networks with much bigger backhaul capacity.

4.7 COMPETITION

Competition is one of the main drivers of broadband uptake. A strong competitive environment will create incentives for different players to offer reduced prices and innovative services. The liberalization of telecommunication markets has provided evidence of the beneficial effects of stronger competition. The most flagrant example of the impact of competition in ICT uptake is the case of mobile cellular markets worldwide, which have witnessed in the last decade the highest penetration increase of any ICT service up to date. Indeed, the opening of national mobile cellular markets to new competing players has been one of the main factors to spur the reduction of prices of handsets and calls, as well as to incentivize the creation of innovative services.⁶⁵

ITU has highlighted the importance of strengthening competition in broadband markets in order to increase broadband penetration and bridge the broadband divide in Asia and the Pacific (ITU, 2010b, 2009b). In the case of ABBMN countries, the promotion of competition in both fixed and mobile broadband markets should be one of the main regulatory objectives. As it has been mentioned in Section 4.5, a gradual approach would focus first on creating an enabling environment for operators to offer broadband services in a competitive environment, and concentrate public funds in those rural/underserved areas where there are not enough incentives for undertakings to offer their services.

The following section analyzes competition in ABBMN broadband markets. Bhutan and Maldives are not included in the analysis due to lack of data.

Afghanistan

In Afghanistan, fixed broadband providers offer their services through VSAT, WiMAX, and Wi-Fi technologies. Due to the lack of separate data on narrowband and broadband subscriptions, the analysis is limited to the competitive situation of ISPs, regardless of whether they offer narrowband or broadband services.

Chart 4.8 shows the distribution of Internet subscriptions to VSAT, WiMAX, Wi-Fi, and dial-up services in Afghanistan. Although New Dunya Telecom has the biggest market share by far, it corresponds to 23 per cent of the total, which is less than the usual thresholds that signal a dominant position (e.g. according to European competition law, single dominance concerns arise in the case of undertakings with market shares

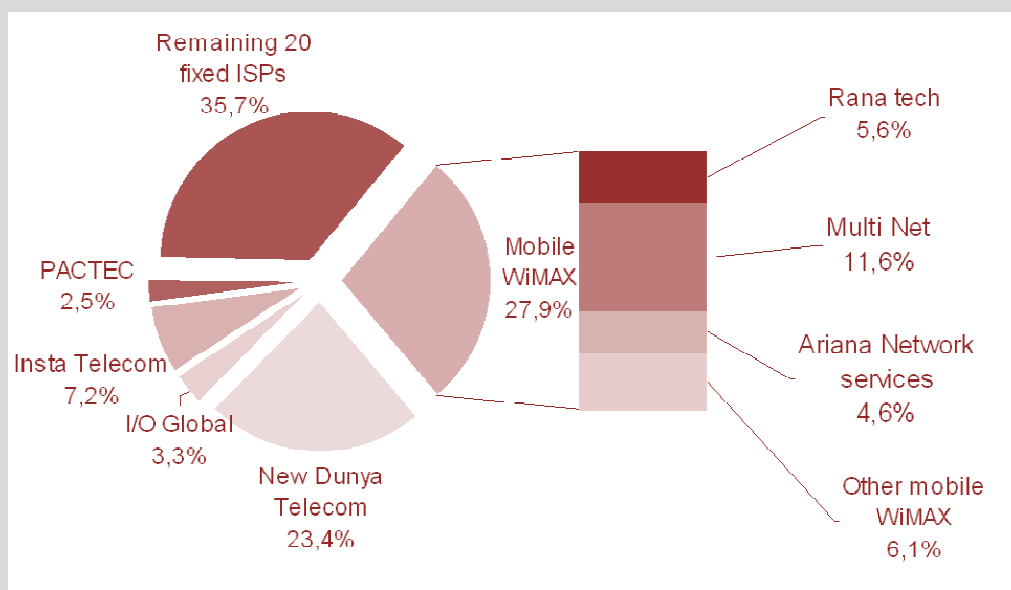
⁶⁴ Frequency allocation refers to the determination of a given use for a band or a block of frequencies. Frequency assignment refers to the granting of an authorization/licence to a given party to operate on a specific frequency channel under a given set of conditions. Each term refers thus to different tasks of spectrum management.

⁶⁵ There are several examples illustrating the impact on mobile cellular penetration of the entrance of new players in a mobile market. Recent examples include Viet Nam, Saudi Arabia, Gambia (ITU, 2009a: Boxes 4.5, 4.6, and 4.8), and Vanuatu, and Papua New Guinea (World Bank, 2008b: Chapter 2, section "Access costs (prices)").

above 40 per cent).⁶⁶ Moreover, the market is quite fragmented, as proven by the fact that it is approximately equally divided into three shares: the mobile broadband providers, the main four fixed broadband providers, and the remaining 20 fixed broadband providers.

In Afghanistan symmetric obligations exist concerning mobile infrastructure sharing, although they are not extended to fixed broadband infrastructure.

Chart 4.8: Market share of ISPs in Afghanistan, May 2010.



Source: ITU ABBMN questionnaire (June 2010).

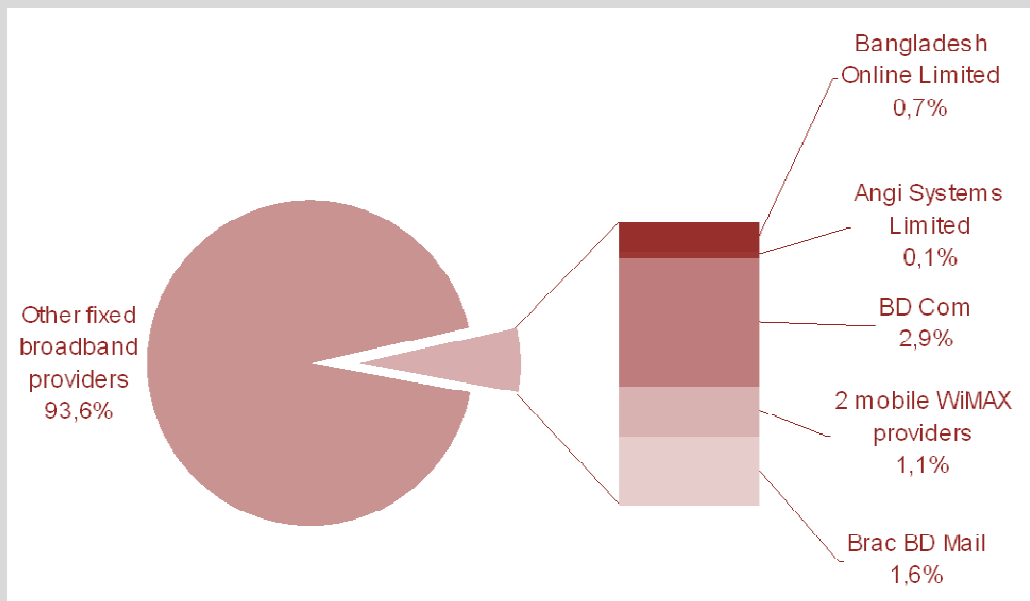
Bangladesh

The country has a unique broadband market. The incumbent (BTCL) has a little market share, due to its late entering into the broadband market (its xDSL services were commercially launched in 2009). The two mobile WiMAX licensees are yet in the early stages of their network deployment, which limits their coverage to some parts of Dhaka and Chittagong. Therefore the major part of the broadband market is atomized and divided into relatively small players, none of them with more than 3 per cent of the total market share (Chart 4.9).

⁶⁶ A dominant position may also occur with lower market shares, as a large market share is only one factor among several that may be determinant to establish a dominant position. Other factors include control of infrastructure not easily duplicated, privileged access to capital markets/financial resources, economies of scale and scope, vertical integration, product/service diversification (e.g. bundled products or services), etc. However, very large market shares – in excess of 50 per cent – are considered in themselves, save in exceptional circumstances, evidence of the existence of a dominant position. For more details, see the European Commission “Guidelines on market analysis and the assessment of significant market power for electronic communications networks and services” (2002/C165/03), available at:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2002:165:0006:0031:EN:PDF>

Chart 4.9: Market share of broadband providers in Bangladesh, May 2010.



Source: ITU ABBMN questionnaire (June 2010).

This singular competitive situation makes economies of scope and scale very limited in the country. Moreover, it is uncertain that any operator has reached the minimum efficient scale of operation (at least nationwide), which suggests that the consolidation of larger broadband operators could lead to a more efficient provision of broadband services.

Retail broadband tariffs are subject to the approval of the regulator in Bangladesh, while no obligations in wholesale broadband markets are enforced (neither access obligations, nor price controls). A more gradual approach would on the contrary be based on wholesale broadband regulation, and only apply retail regulation as a last resort. The rationale behind such an approach is that retail regulation, although it is the shortest way to produce the desired benefits to end users (e.g. lower prices), seldom promotes competition. On the other hand, effective wholesale regulation will create a level playing field for all operators, because it affects directly competition rules between them, and thus lead to more competition, and ultimately to lower prices and other benefits for end users. That is, effective wholesale regulation corrects competition and structural problems.

Concerning infrastructure sharing, the Regulatory Authority of Bangladesh (BTRC) has published a set of guidelines (BTRC, 2008), and the country has already had several successful examples of mobile infrastructure sharing.⁶⁷ The guidelines are, however, not limited to passive mobile infrastructure sharing, but include also optical fibre/wired access and backbone transmission networks. Moreover, they give BTRC the power to issue the last binding decision in the case of disputes between infrastructure providers and infrastructure seekers, which is a good mechanism to ensure expeditious solutions in the case of conflict.

⁶⁷ Robi + Grameenphone, Banglalink + Grameenphone, Banglalink + Qubee, Grameenphone + Qubee, Grameenphone + Banglalion, BTCL + Warid, Citycell + Warid, etc. Source: ITU ABBMN questionnaire (June 2010).

Box 4.5: Informed regulatory decision-making: a management information system (MIS) for BTRC, Bangladesh

The Bangladesh telecommunications sector is undergoing rapid growth. The number of users of mobile services, Internet services and other telecom services is rapidly increasing. As a regulator, BTRC needs to furnish various indicators and data that represent ICT growth, the expansion of telecommunications and ICT services, penetration, and the macro-level situation of the sectors. BTRC is also required to submit data to ITU for different types of indicators and data that need different formats and approaches to gather them. The data formats that are currently used are repetitive and not optimized, putting the burden on the operators. ITU provided technical assistance to set up a central “Database and MIS System” for BTRC where the required data and indicators will be automatically captured and processed so that informed regulatory decisions could be taken by the BTRC.



This assistance was provided in two stages: during 2009, for the first phase, ITU carried out an assessment of the data needs of BTRC, in consultation with stakeholders (including access providers, international gateway providers, Internet service providers as well as the Bangladesh Bureau of Statistics), and developed the optimized data formats. In the second phase, carried out in the first quarter of 2010, the recommendation and formats were prepared by developing a web-based interactive database system that is capable of accepting online data submission by the operators. BTRC will be able to generate the desired reports, make queries and take informed regulatory decisions. ITU also organized a training workshop on 22 May 2009 to share knowledge on ICT statistical indicators and the IDI. A suitable framework was recommended for ensuring accuracy and correctness of the data submitted by service providers and revenue assurance for payments receivable by BTRC. The MIS system is expected to help in gap analysis and will work as an effective tool for the empowerment of the regulator. Projection of key indicators will definitely encourage serious investment in the sector and enhance competition.

Source: ITU Regional Office for Asia and the Pacific.

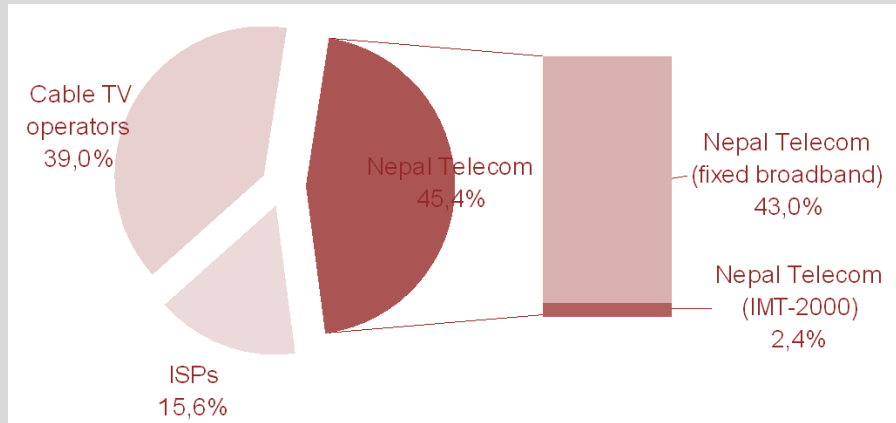
Nepal

The country has one broadband operator providing full national coverage: the incumbent Nepal Telecom (91.5 per cent public ownership). It faces competition from cable companies (fully private), which have a similar market share, and offer their services in the Katmandu valley and some selected big cities. The remaining share of the broadband market is taken by regional ISPs (fully private), different ones covering different regions (Chart 4.10)

This distribution of market shares reflects the typical situation in most broadband markets, where the fixed line incumbent, which owns the assets necessary for xDSL broadband provision, has a major part of the market. In the case of Nepal, this is balanced by a very significant number of subscriptions to cable modem broadband. This is even more beneficial for competition, because it creates a counterbalance to the incumbent, and does it based on an independent infrastructure. Niche regional players cover the remaining part of the market.

Further competition could come in the future from mobile broadband providers (to date, only one licence has been awarded to the incumbent), and maybe through local loop unbundling and bitstream access, as well as other forms of opening up the incumbent network to competition.

Chart 4.10: Market share of broadband providers in Nepal, May 2010.



Source: ITU ABBMN questionnaire (June 2010).

5 RECOMMENDATIONS

The deployment of broadband networks and the increase in the use of the services they provide, have a major impact on socio-economic development of nations. Moreover, broadband development leads towards advanced information societies, where citizens benefit from increased access to information and social development tools.

ABBMN countries have experienced in the last few years unprecedented ICT growth, based mainly on the development of mobile cellular telephony. For instance, Afghanistan, Bhutan and Nepal increased by more than 10 percentage points their mobile cellular penetration between 2008 and 2009. Maldives achieved a record mobile cellular penetration in 2009, with 148 mobile cellular subscriptions per 100 inhabitants.

Despite progress in specific ICT areas, broadband development remains very limited in all ABBMN countries except Maldives. In 2009, fixed broadband penetration was negligible in Afghanistan and Bangladesh. In Nepal it was barely 0.3 per cent, in Bhutan 0.4 per cent, and 5.8 per cent in Maldives. The situation of mobile broadband uptake was similar: not available or negligible in Afghanistan, Bangladesh and Nepal; and 1.7 per cent in Bhutan. Maldives was the only ABBMN country with a remarkably high uptake, with 33 mobile broadband subscriptions per 100 inhabitants.

The fact that ABBMN countries have some of the lowest broadband penetration levels worldwide is partly explained by socio-economic, geographic and demographic conditions. All of them are classified by the United Nations as least developed countries. In terms of income, Bhutan and Maldives have significantly higher income per capita than Afghanistan, Bangladesh and Nepal, which is partly reflected in their different levels of broadband development. Population density and especially the percentage of urban population are also determining factors for broadband development. Maldives has clearly more advantageous demographic conditions (high population density and high percentage of urban population, most of it concentrated in Male), while on the other hand Afghanistan and especially Nepal have relatively adverse conditions (e.g. high percentage of rural population).

Geography is also a major determinant for the deployment of new broadband networks, which may influence the type of technology, and ultimately the prices paid by end users. Indeed, the challenges to promote access to broadband technologies are not the same in the rugged mountains and the hills of Nepal as in the densely-populated lowlands of the Ganges delta, in Bangladesh. They are neither the same in the 26 small though geographically spread atolls of Maldives, nor in the isolated forestland of Bhutan, nor in highlands and plains of Afghanistan, the largest ABBMN country.

Despite some adverse socio-economic, geographic and demographic conditions (such as those that ABBMN countries may have), ITU analysis (ITU 2009a, 2010b) have shown that some countries have been able to overcome them and outperform, in terms of ICT development, other countries with more favourable conditions. A mixture of factors may lead to such achievements, being some of the most relevant ones: enabling regulatory measures, efficient public policy initiatives, and the involvement of the private sector.

Based on the analysis carried out in Chapter 4 taking into account seven priority areas of regulatory and policy action in ABBMN countries, following recommendations are proposed to stimulate broadband development:

1. National regulatory authorities

All ABBMN countries have an independent regulatory authority. However, in Bhutan and Maldives the regulator has not been given specific powers to issue binding decisions to solve disputes among operators. In the context of broadband, this is important to solve conflicts about infrastructure sharing, and in general about access to broadband inputs. Bhutan and Maldives should consider including that among the regulatory authority's tasks, either covering all kind of dispute resolutions or specifically infrastructure-sharing ones (see for an example §5.8 of Bangladesh's guidelines for infrastructure sharing: BTRC, 2008).

In order to provide further legal certainty to incentivize long-term investment in broadband networks, Afghanistan, Bhutan and Maldives should consider reviewing the process to overturn the regulator's decisions regarding broadband markets. To be aligned with the common practice in developed countries, the last decision should lie in a judiciary organ, not in a political one (this is especially advisable in the case of Bhutan and Maldives, where the main fixed broadband operator has a significant share of public ownership).

2. Fixed network infrastructure

ABBMN countries could significantly improve their fixed broadband penetration by using the fixed telephone infrastructure already in place to provide data services at broadband speeds. This is especially true for Afghanistan, Bangladesh, Bhutan and Nepal, because these countries make a low usage of their fixed telephone network to provide fixed broadband services.

Bangladesh, Bhutan and Nepal should consider reviewing the deployment plans of the main (public) fixed broadband operator, in order to include ambitious targets concerning the extension of xDSL services to more nodes of the fixed telephone network. In Afghanistan and Maldives, where the main fixed broadband operator is fully or partially privatized, tax rebates for the import of ICT equipment could be considered, among other incentives. These incentives should be technologically neutral and cover all fixed broadband technologies.

Additionally to supply-side initiatives, all ABBMN countries should consider measures to promote demand, such as those aimed at improving affordability, local content, e-literacy and e-government services for stimulating take up of broadband applications. Demand-side policies will be necessary in order to create the right incentives for a fixed broadband business case, especially in underserved areas and/or among vulnerable groups.

3. Personal computer penetration

Low personal computer penetration may be a major obstacle for further fixed broadband development in Afghanistan, Bangladesh and Bhutan. In Nepal, although there may be other bigger barriers for broadband uptake, there is also a need to improve personal computer penetration.

ABBMN countries should consider defining national programmes for the distribution of low-cost computing devices (LCCD) among students and other high-usage groups with no access to PCs. Plans should identify the priority groups for LCCD distribution and follow a scalable approach: starting with pilot projects and evolving to larger-scale deployments, with clearly defined time frames. LCCD programmes should be leveraged by public-private partnerships involving private funding. Additionally, international donors (such as NGOs, multi-lateral development agencies, or LCCD vendors) could contribute to the funding. Universal Service Funds could also be used for this purpose.

A complementary approach that ABBMN countries should consider would be that of fostering different types of (both public and private) community centres equipped with broadband Internet connections. ABBMN countries should focus on connecting schools and communities leveraging on initiatives such as ITU's "Connect a School, Connect a Community". The first step would be defining a well structured and realistic school connectivity plan, with medium-, short- and long-term objectives.

ABBMN countries should also consider additional forms of promotion of community access to broadband. An example of this is the initiative "Extend e-services through post offices in Bhutan". Similar projects could be considered in the remaining ABBMN countries, and in Bhutan a second phase of it could be envisaged, targeting the lower tier of the Bhutan Post structure (70 community mail offices).

4. Broadband prices

Afghanistan should consider the promotion of alternative technologies to VSAT for fixed broadband provision, in order to promote more cost-efficient technologies in those areas where it is economically feasible. This could involve speeding-up WiMAX licensing, and including coverage requirements in the licences. Additionally, an analysis of the current status of the fixed telephone network should identify those areas where xDSL technologies could be used to provide cost-efficient fixed broadband services. These initiatives should be complemented by measures to promote demand (e.g. among SMEs or vulnerable groups). The country should revise its needs of international connectivity, and set a plan for maintaining and upgrading the current international connections. Aggregation of domestic demand for international bandwidth should be sought in order to obtain lower international connectivity prices. Agreements with neighbouring countries could also help consolidate demand for international bandwidth, and could be a means of assuring access to international hubs at reasonable bandwidth prices.

In order to make low fixed broadband prices available to a larger part of the population, Bangladesh should consolidate the offer of xDSL services in the main cities, and extend it to other areas in the country. This could be done by reviewing the plans of the incumbent for upgrading the fixed telephone network to provide xDSL services, as well as by analyzing the possibility of opening-up the incumbent's network to other fixed broadband providers (e.g. by mandating access obligations to wholesale inputs). Additionally, the state monopoly in the backhaul segment of international connections should be revised, in order to eliminate artificial constraints to international Internet bandwidth prices. As in the case of Afghanistan, regional agreements with neighbouring countries could help consolidating demand, and thus lowering international bandwidth prices.

Bhutan could review the incumbent's xDSL deployment plan in order to extend the benefits of low fixed broadband prices to more areas in the country. This should be complemented by measures to promote demand among vulnerable groups, such as tax exemption for the purchase of ICT devices or subsidies to low-income groups for fixed broadband subscriptions. Additionally, a market analysis should be carried out to assess the possibility of opening up the incumbent's fixed broadband access network to competition, which could help reduce fixed broadband prices in areas with sufficient demand.

In order to overcome the shortage of international connectivity, which constrains fixed broadband prices, Nepal should develop a mid-term deployment plan of new international fibre connections. The incumbent's xDSL deployment plan should be reviewed in order to extend the availability of xDSL connections. Taking into account the special geography of the country, Nepal should study what areas of the country will have to be covered by alternative technologies, such as WiMAX and VSAT. In these areas, demand-side subsidies should be envisaged in order to compensate the higher cost of broadband provision.

Maldives should finalize the interconnection of the two main networks in the country, and monitor whether that rules out the need of an IXP. Unlike other ABBMN countries, the affordability of fixed broadband services in Maldives is comparable to that of developed countries. In order to ensure that this benefits a significant part of the population, it would be good to carry out a study of fixed broadband prices in the different regions within the country, to detect any unbalance (especially in rural and remote areas).

5. National broadband plan and funding

There is no one-size-fits-all policy approach to universal access to broadband. However, the development of a national broadband plan, such as the National Broadband Policy of Bangladesh, may help align national efforts towards achieving a common set of targets.

Maldives, which is the only ABBMN country that has not yet started developing a national broadband plan, should do so. Afghanistan and Nepal should continue their ongoing efforts to define their national broadband strategies. All ABBMN countries should have an operational national broadband plan in the short term (i.e. operative by 2012).

National broadband strategies should consider, *inter alia*, the following issues: the inclusion of broadband in the universal service and, if so, the definition of a transparent funding mechanism; alternative financing mechanisms for broadband, such as tax incentives and the use of rural development funds for broadband promotion in rural areas; public deployments of broadband infrastructure (e.g. shared backbone/backhaul networks, open access networks, public-private network deployments, etc.); general connectivity needs (both national, i.e. IXPs, and international); compliance with WSIS targets, if possible with broadband connections; and spectrum allocation and assignment for wireless broadband services.

A first step towards including broadband in universal service policies would be to revise the policy documents to include “broadband Internet provision” in the new funded projects, instead of just mandating “Internet provision”.

Bangladesh should continue developing the policy initiatives necessary to achieve the targets set in its National Broadband Policy, especially those related with short-term objectives (to be achieved by the end of 2010). These include the creation of a universal service fund, assuring the existence of at least one IXP in each divisional headquarter, and establishing broadband connections in all public libraries. Additionally, Bangladesh should consider carrying out comprehensive monitoring reports at the end of each implementation phase of the National Broadband Policy (end 2010, end 2012, and end 2015), which could provide practical feedback to the development of the targets set for the next phase, and at the end of the plan.

Bhutan should consider developing a policy document defining the implementation targets to be achieved concerning all the broadband recommendations and considerations analyzed in the Broadband Master Plan. This document would contain targets systematically ordered with their corresponding time frames, and quantifiable objectives. The document could also include concrete proposal for meeting the WSIS targets. Bhutan could also monitor the evolution of the forecasts set in the Master Plan (e.g. international traffic needs after introduction of ADSL), and the level of achievement of the targets set (roll-out of community information centres, fixed broadband network deployment in Gewogs, etc.).

6. Authorization/licensing

ABBMN countries should assess whether time has come to advance towards authorization regimes based on general authorization and unified licences, with individual licences awarded additionally for the use of limited resources, such as numbers and some frequency bands. A further step to be considered would be a regime based only on administrative notification.

Licence fees should be determined in order to reflect as much as possible only the administrative costs incurred and, in the case of frequency bands, its value and availability. Licence fees including unjustified costs are burdensome for operators and will deter the entry of new players in the market, which ultimately will have a negative impact on the choices (both in terms of price and quality) available to end users.

Reasonable maximum periods for decisions on granting authorizations should be clearly defined in laws or policy documents (e.g. three weeks).

Afghanistan, Bangladesh and Bhutan should consider adopting initiatives favouring rural ISPs by advantageous authorization conditions, such as those implemented in Maldives and Nepal.

Wireless broadband spectrum will play a crucial role in broadband development, especially in rural and sparsely populated areas, where wireless deployments are much more cost effective than wired ones.

Bhutan and Nepal should assign additional 3G licences in order to bring competition into the mobile broadband market. Moreover, they should consider allocating and assigning frequencies for WiMAX services. Bhutan should explore the possibility of refarming spectrum bands to allocate additional spectrum for wireless broadband services (e.g. the digital dividend, GSM-restricted bands or LMDS ones). Nepal

should continue its plans to reform the 2.3 GHz and 2.5 GHz frequency bands for wireless broadband purposes, such as WiMAX licensing.

Maldives – the only ABBMN country that has not yet defined licence-free bands for Wi-Fi – should consider allocating frequencies for that purpose. Allocation of licence-free Wi-Fi bands can complement the needs of mobile broadband networks by providing additional backhaul capacity.

Afghanistan should finalize the permanent assignment of WiMAX frequencies, and the bidding process for 3G licences. The country should as far as possible maintain in the final WiMAX licensing the variety of operators and the high level of private involvement of the temporary licensing. It would also be good to have such positive features in the assignment of the 3G licences.

Bangladesh should speed up the assignment of the 2.1 GHz band for 3G services, which are currently not available in the country. It would be good to involve private operators in the process, as the country has already done for the WiMAX licensing. Bangladesh should continue implementing the analogue-to-digital TV switchover in the 700 MHz band (i.e. clearing it, allocating and assigning frequencies), and carry on with the plans to assign at least part of the digital dividend to wireless broadband technologies (IMT Advanced envisaged).

Afghanistan and Bangladesh – the two ABBMN countries where no 3G licences have been awarded yet – could elaborate a study on the estimated costs of 3G roll-out, and benchmark them against different revenue scenarios. The results of such a study could set the reasonable expectations for 3G roll-out, and be a starting point for the discussion between policy-makers and operators on how to cooperate in order to bring 3G coverage to rural/remote areas.

All ABBMN countries should consider allowing secondary trading in the IMT-2000 bands (currently none of them allows it), which could lead to a more efficient use of the available spectrum based on market mechanisms. This measure is easier to implement in the early stages of wireless broadband licensing than later, because it may create unfair disadvantages between licences with and without secondary trading allowed.

Afghanistan, Bhutan, Nepal and Maldives should consider using a part of the digital dividend for wireless broadband purposes. Such an initiative should be seconded by a national analogue-to-digital switchover plan, with realistic time-frames for all its stages.

7. Competition

The strengthening of competition in broadband markets should be one of the main goals of regulatory authorities in ABBMN countries. A gradual approach should be favoured, targeting first structural problems that limit competition in broadband markets (i.e. access and pricing of wholesale inputs) and regulating retail markets only as a last resort, and second a complementary one to other lighter-touch solutions. This is not the case in the current regulation of ABBMN broadband markets: retail price controls are enforced in each country, while wholesale regulation is not imposed or is unclear in many of them.

ABBMN countries should periodically perform an economic analysis of their broadband markets using competition law principles in order to determine the competitive situation and identify bottlenecks. Such an analysis should at least study the following markets: broadband access (both physical and indirect access), backhaul capacity provision (mainly through leased lines, but also, for example, through dark fibre), and international connectivity. Regulatory obligations applied to wholesale and retail broadband markets should be based on the outcomes of these analysis. A reasonable periodicity for these analysis would be every two years.

Most ABBMN countries have already had successful cases of mobile infrastructure-sharing agreements. Bangladesh has gone a step further by elaborating a set of guidelines that clarify the process and extend it to fixed broadband infrastructure. Such an initiative could be extended to other ABBMN countries.

Bangladesh should consider favouring the concentration of broadband service providers and operators in the country, in order to overcome the atomization in the market and reach efficient scales of operation. This could be achieved, for instance, by encouraging the fusion of regional broadband providers into national groups, or by promoting cooperation agreements between operators.

Nepal (NTA) should analyze whether the high market share that Nepal Telecom holds in the Nepali broadband market indicates a dominant position of the undertaking. In the case that dominance is found, the regulator should impose obligations to Nepal Telecom in order to foster competition. Access to broadband wholesale inputs should be considered, and imposed as the only remedy if it proves sufficient. Retail price regulation should be imposed only as a last resort.

The competitive situation in the Afghani Internet market seems quite balanced in terms of market shares, but further analysis should be carried out to explore the structure of the broadband market.

Lack of data makes the analysis of broadband competition in Bhutan and Maldives not possible.

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ANNEX 1: QUESTIONNAIRE ON BROADBAND STIMULUS

Nº	Question	Possible answers
Authorization / licensing		
1.	Broadband authorization / licensing	
1.1.	Name of authorization / licence	
1.2.	Authorization type	<input type="checkbox"/> Individual licence <input type="checkbox"/> General authorization (class licence) <input type="checkbox"/> Licence exempt
1.3.	Is the number of authorizations limited?	Yes If yes, please specify the maximum number:
1.4.	Number of licences granted	
1.5.	Is the authorization / licence technologically neutral? (i.e. it applies to different technologies / networks that support broadband, such as xDSL, cable, VSAT, etc.)	Yes If no, please clarify to what technologies it applies:
1.6.	Type of services allowed by the authorization / licence	<input type="checkbox"/> Specific service. For which service? <input type="checkbox"/> Multi-service. For which services? <input type="checkbox"/> All services (Unified / Global licence) If necessary, please clarify:
1.7.	Is there a one-time authorization / licence fee (entry fee)? (if different conditions apply to rural ISPs, please add a note)	Yes If yes, please specify the amount in USD:
1.8.	Is there an annual authorization / licence fee? (if different conditions apply to rural ISPs, please add a note)	Yes If yes, please specify the amount in USD:
1.9.	Who approves the authorization / licence?	Ministry If other, please specify:
1.10.	Time to review an authorization / licence request (please provide the limit set by law or, if not defined, an estimate of the average time)	
1.11.	Licence duration (in years)	
1.12.	What are the procedures for licence renewal? Please explain:	
(If there is more than one type of licence for broadband services, please fill in the details of the other licences below. If not, please leave blank)		
1.13.	Name of authorization / licence	
1.14.	Authorization type	<input type="checkbox"/> Individual licence <input type="checkbox"/> General authorization (class licence) <input type="checkbox"/> Licence exempt
1.15.	Is the number of authorizations limited?	Yes If yes, please specify the maximum number:

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1.16.	Number of licences granted	
1.17.	Is the authorization / licence technologically neutral? (i.e. it applies to different technologies / networks that support broadband, such as xDSL, cable, VSAT, etc.)	Yes If no, please clarify to what technologies it applies:
1.18.	Type of services allowed by the authorization /licence	<input type="checkbox"/> Specific service. For which service? <input type="checkbox"/> Multi-service. For which services? <input type="checkbox"/> All services (Unified / Global licence) If necessary, please clarify:
1.19.	Is there a one-time authorization / licence fee (entry fee)? (if different conditions apply to rural ISPs, please add a note)	Yes If yes, please specify the amount in USD:
1.20.	Is there an annual authorization / licence fee? (if different conditions apply to rural ISPs, please add a note)	Yes If yes, please specify the amount in USD:
1.21.	Who approves the authorization / licence?	Ministry If other, please specify:
1.22.	Time to review an authorization / licence request (please provide the limit set by law or, if not defined, an estimate of the average time)	
1.23.	Licence duration (in years)	
1.24.	What are the procedures for licence renewal? Please explain:	
(If there is more than two types of licence for broadband services, please fill in the details of the other licence below. If not, please leave blank)		
1.25.	Name of authorization / licence	
1.26.	Authorization type	<input type="checkbox"/> Individual licence <input type="checkbox"/> General authorization (class licence) <input type="checkbox"/> Licence exempt
1.27.	Is the number of authorizations limited?	Yes If yes, please specify the maximum number:
1.28.	Number of licences granted	
1.29.	Is the authorization / licence technologically neutral? (i.e. it applies to different technologies / networks that support broadband, such as xDSL, cable, VSAT, etc.)	Yes If no, please clarify to what technologies it applies:
1.30.	Type of services allowed by the authorization /licence	<input type="checkbox"/> Specific service. For which service? <input type="checkbox"/> Multi-service. For which services? <input type="checkbox"/> All services (Unified / Global licence) If necessary, please clarify:
1.31.	Is there a one-time authorization / licence fee (entry fee)? (if different conditions apply to rural ISPs, please add a note)	Yes If yes, please specify the amount in USD:

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1.32.	Is there an annual authorization / licence fee? (if different conditions apply to rural ISPs, please add a note)	Yes If yes, please specify the amount in USD:
1.33.	Who approves the authorization / licence?	Ministry If other, please specify:
1.34.	Time to review an authorization / licence request (please provide the limit set by law or, if not defined, an estimate of the average time)	
1.35.	Licence duration (in years)	
1.36.	What are the procedures for licence renewal? Please explain:	

2.	Mobile broadband spectrum		
2.1.	Have operators been assigned spectrum for the provision of IMT-2000 (3G) services in your country?		Yes If Yes, please identify the frequency band(s):
	2.1.1.	Licence coverage	National If regional, please specify the different regions:
	2.1.2.	Are geographic and/or population coverage requirements included in the licences?	Yes If Yes, please specify:
2.2.	Have operators been assigned spectrum for the provision of WiMAX services in your country?		Yes If Yes, please identify the frequency band(s):
	2.2.1.	Licence coverage	National If regional, please specify the different regions:
	2.2.2.	Are geographic and/or population coverage requirements included in the licences?	Yes If Yes, please specify:
2.3.	Are there licence-free bands for Wi-Fi in your country?		Yes If No, please clarify how Wi-Fi licences are obtained:
2.4.	Does the provision of mobile broadband services require a telecommunication authorization (such as the ones listed in section 1) in addition to the spectrum authorization?		Yes If Yes, please specify the details of the additional authorization (please refer to questions in section 1 of the questionnaire):
2.5.	Is secondary trading allowed? (secondary trading: the trading of spectrum rights or licences between buyers and sellers directly without having it pass through the Regulatory Authority's hands)		Yes If Yes, is a change of spectrum use permitted on transfer: Yes

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2.6.	Is in-band migration allowed? (in-band migration: the right to use existing licenced spectrum for the provision of new services (e.g. 2G spectrum used for 3G))	Yes If Yes, has it taken place: Yes If Yes, please specify for which services/bands:
2.7.	Has there been (or is it planned for the near future) any spectrum refarming to reassign new bands to wireless broadband services? (e.g. the use of the digital dividend spectrum for wireless broadband services)	Yes If Yes, please specify (include time frames):

Regulatory obligations		
3.	Broadband regulation	
3.1.	Does the national regulatory authority (NRA) participate as observer or moderator in the discussions / fora of broadband operators?	Yes If Yes, please give some examples:
3.2.	Has the NRA imposed the obligation to accept reasonable access requests to wholesale broadband inputs of the dominant or incumbent operator? Or reasonable prices in wholesale and/or retail broadband markets? (in the latter case, the NRA would only intervene if there is evidences that prices charged by a dominant / incumbent operator are abusive)	Yes If Yes, please specify under what circumstances:
3.3.	Has the NRA imposed the obligation to accept access requests to wholesale broadband inputs of the dominant or incumbent operator through a Reference Offer? Or cost-oriented prices in wholesale and/or retail broadband markets?	Yes If Yes, please specify under what circumstances:
3.4.	Is unbundled access to the local loop required?	Yes If Yes, please specify to which operators: <input type="checkbox"/> Dominant or Significant Market Power (SMP) operator <input type="checkbox"/> Incumbent <input type="checkbox"/> All operators <input type="checkbox"/> Other, please specify: If Yes, please state what type of local loop unbundling is required: <input type="checkbox"/> Full unbundling (alternative operator gains access to the copper pair) <input type="checkbox"/> Partial unbundling (i.e. access to the high-frequencies of the local-loop for data transmission) <input type="checkbox"/> Bitstream access <input type="checkbox"/> Other, please specify:

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3.5.	Are broadband wholesale services subject to price controls?	<p>Yes</p> <p>If Yes, please specify to what operators are they imposed:</p> <p><input type="checkbox"/> Dominant or Significant Market Power (SMP) operator</p> <p><input type="checkbox"/> Incumbent</p> <p><input type="checkbox"/> All operators</p> <p><input type="checkbox"/> Other, please specify:</p> <p>If Yes, please state in what services:</p> <p><input type="checkbox"/> Full / partial local-loop unbundling</p> <p><input type="checkbox"/> Bitstream</p> <p><input type="checkbox"/> IP transit / peering</p> <p><input type="checkbox"/> Other, please specify:</p>
3.6.	Are broadband retail services subject to price controls?	<p>Yes</p> <p>If Yes, please specify to what operators are they imposed:</p> <p><input type="checkbox"/> Dominant or Significant Market Power (SMP) operator</p> <p><input type="checkbox"/> Incumbent</p> <p><input type="checkbox"/> All operators</p> <p><input type="checkbox"/> Other, please explain:</p> <p>If Yes, please state in what services/circumstances:</p>
3.7.	Is open access to fixed broadband networks mandated in cases other than local loop unbundling? (e.g. in several countries open access is mandated in those fixed broadband networks financed with public funds)	<p>Yes</p> <p>If Yes, please explain in what cases:</p>
3.8.	Are there any examples of open access broadband networks in your country? (open access network: a network that grants wholesale physical access to the network to different service providers)	<p>Yes</p> <p>If Yes, please give the most relevant examples:</p>
3.9.	Is mobile network infrastructure (towers, base stations, posts, etc.) sharing mandated?	<p>Yes</p> <p>If Yes, please clarify under what circumstances and whether it applies to all operators (symmetric obligation) or just to one (asymmetric, usually set to SMP/incumbent):</p>
3.10.	Have there been any mobile network infrastructure sharing agreements reached? (with or without the intervention of the NRA)	<p>Yes</p> <p>If Yes, please give some recent examples:</p>
3.11.	Is passive fixed network infrastructure (ducts, street cabinets, in building wiring, etc.) sharing mandated?	<p>Yes</p> <p>If Yes, please clarify under what circumstances and whether it applies to all operators (symmetric obligation) or just to one (asymmetric, usually set to SMP/incumbent):</p>
3.12.	Have there been any fixed network passive infrastructure sharing agreements reached? (with or without the intervention of the NRA)	<p>Yes</p> <p>If Yes, please give some recent examples:</p>
3.13.	Are there other regulatory measures (apart from the ones already mentioned) enforced on broadband operators or service providers?	<p>Yes</p> <p>If Yes, please specify:</p>

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4.	Universal Service Obligations		
4.1.	Does universal access/service in your country include broadband services?		Yes
	4.1.1.	Please specify what kind of broadband service is included? (wired/wireless, at certain speeds, with specific coverage e.g. in rural areas, etc.)	
	4.1.2.	Please indicate which operators are under the obligation to provide universal broadband access/service: (please check all that apply)	<input type="checkbox"/> All broadband operators <input type="checkbox"/> All network-facility broadband operators <input type="checkbox"/> Incumbent fixed-line operator <input type="checkbox"/> All 3G (IMT-2000) mobile operators <input type="checkbox"/> Dominant/SMP 3G (IMT-2000) mobile operators <input type="checkbox"/> All fixed broadband operators <input type="checkbox"/> Dominant/SMP fixed broadband operators <input type="checkbox"/> Satellite operators <input type="checkbox"/> ISPs <input type="checkbox"/> None; obligations are allocated on a competitive basis <input type="checkbox"/> Other, please explain:
	4.1.3.	Please indicate how the operator(s) finance their universal broadband access/service obligations:	<input type="checkbox"/> Cross-subsidy between own services (internal financing) <input type="checkbox"/> Direct subsidy from Government <input type="checkbox"/> Universal service funds <input type="checkbox"/> Access interconnection charges <input type="checkbox"/> Public-Private Partnerships (PPPs) <input type="checkbox"/> Other, please explain:
4.2.	Has your country established any other financing mechanisms (e.g., special rural access concessions, tax incentives, etc.) for the provision of universal broadband service/access?		Yes If Yes, please explain:
4.3.	Do you require any operators or service providers to offer "social tariffs" to eligible broadband subscribers?		Yes If Yes, please explain:
5.	National broadband plan		
5.1.	Has your country developed a specific national plan for broadband deployment and/or uptake?		Yes If Yes, could you provide a link to it: (If not available on the Internet, please provide a copy of it with the questionnaire?)

Sector structure

6.	Fixed broadband operators	Provide only detailed information on the main operators (up to 4); if less than 4 operators exist in the country please leave the rest blank, and fill-in question 6.6
6.1.	What is the maximum foreign participation or ownership permitted for fixed broadband operators (%):	

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6.2.	Operator name		
	6.2.1.	Type of operator	Public non-corporatized
	6.2.2.	Percentage of private ownership:	
	6.2.3.	Broadband technology:	<input type="checkbox"/> xDSL <input type="checkbox"/> Cable <input type="checkbox"/> VSAT <input type="checkbox"/> Fibre (FTTH / FTTB / FTTN) <input type="checkbox"/> Other, please specify:
	6.2.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	6.2.5.	Number of installed access: (i.e. number of active accesses (subscribers) + those accesses which could become operative in a short notice (2-4 days))	
	6.2.6.	Coverage	National If Regional or Local, please specify:
6.3.	Operator name		
	6.3.1.	Type of operator	Public non-corporatized
	6.3.2.	Percentage of private ownership:	
	6.3.3.	Broadband technology:	<input type="checkbox"/> xDSL <input type="checkbox"/> Cable <input type="checkbox"/> VSAT <input type="checkbox"/> Fibre (FTTH / FTTB / FTTN) <input type="checkbox"/> Other, please specify:
	6.3.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	6.3.5.	Number of installed access: (i.e. number of active accesses (subscribers) + those accesses which could become operative in a short notice (2-4 days))	
	6.3.6.	Coverage	National If Regional or Local, please specify:
6.4.	Operator name		
	6.4.1.	Type of operator	Public non-corporatized
	6.4.2.	Percentage of private ownership:	
	6.4.3.	Broadband technology:	<input type="checkbox"/> xDSL <input type="checkbox"/> Cable <input type="checkbox"/> VSAT <input type="checkbox"/> Fibre (FTTH / FTTB / FTTN) <input type="checkbox"/> Other, please specify:
	6.4.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	6.4.5.	Number of installed access: (i.e. number of active accesses	

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		(subscribers) + those accesses which could become operative in a short notice (2-4 days))	
	6.4.6.	Coverage	National If Regional or Local, please specify:
6.5.	Operator name		
	6.5.1.	Type of operator	Public non-corporatized
	6.5.2.	Percentage of private ownership:	
	6.5.3.	Broadband technology:	<input type="checkbox"/> xDSL <input type="checkbox"/> Cable <input type="checkbox"/> VSAT <input type="checkbox"/> Fibre (FTTH / FTTB / FTTN) <input type="checkbox"/> Other, please specify:
	6.5.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	6.5.5.	Number of installed access: (i.e. number of active accesses (subscribers) + those accesses which could become operative in a short notice (2-4 days))	
	6.5.6.	Coverage	National If Regional or Local, please specify:
6.6.	Remaining fixed broadband operators (totals)		
	6.6.1.	Number of subscribers:	
	6.6.2.	Number of installed access: (i.e. number of active accesses (subscribers) + those accesses which could become operative in a short notice (2-4 days))	
7.	IMT-2000 (3G) operators		Provide only detailed information on the main operators (up to 4), leave rest blank, and fill-in 7.6
7.1.	What is the maximum foreign participation or ownership permitted for IMT-2000 (3G) broadband operators (%):		
7.2.	Operator name		
	7.2.1.	Type of operator	Public non-corporatized
	7.2.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	7.2.3.	Percentage of private ownership:	
	7.2.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	7.2.5.	Population covered by IMT-2000 (3G) network:	

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7.3.	Operator name		
	7.3.1.	Type of operator	Public non-corporatized
	7.3.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	7.3.3.	Percentage of private ownership:	
	7.3.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	7.3.5.	Population covered by IMT-2000 (3G) network:	
7.4.	Operator name		
	7.4.1.	Type of operator	Public non-corporatized
	7.4.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	7.4.3.	Percentage of private ownership:	
	7.4.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	7.4.5.	Population covered by IMT-2000 (3G) network:	
7.5.	Operator name		
	7.5.1.	Type of operator	Public non-corporatized
	7.5.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	7.5.3.	Percentage of private ownership:	
	7.5.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	7.5.5.	Population covered by IMT-2000 (3G) network:	
7.6.	Remaining IMT-2000 (3G) operators		
	7.6.1.	Number of subscribers (as of certain date):	Subscribers: Date:
	7.6.2.	Population covered by IMT-2000 (3G) network:	
8.	WiMAX operators		Provide only detailed information on the main operators (up to 3), leave rest blank, and fill-in 8.5
8.1.	What is the maximum foreign participation or ownership permitted for WiMAX operators (%):		
8.2.	Operator name		

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	8.2.1.	Type of operator	Public non-corporatized
	8.2.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	8.2.3.	Percentage of private ownership:	
	8.2.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	8.2.5.	Population covered by WiMAX signal:	
8.3.	Operator name		
	8.3.1.	Type of operator	Public non-corporatized
	8.3.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	8.3.3.	Percentage of private ownership:	
	8.3.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	8.3.5.	Population covered by WiMAX signal:	
8.4.	Operator name		
	8.4.1.	Type of operator	Public non-corporatized
	8.4.2.	Licence coverage	National If Regional or Local, please specify the areas to which the licence is restricted:
	8.4.3.	Percentage of private ownership:	
	8.4.4.	Number of subscribers (as of certain date):	Subscribers: Date:
	8.4.5.	Population covered by WiMAX signal:	
8.5.	Remaining WiMAX operators		
	8.5.1.	Number of subscribers (as of certain date):	Subscribers: Date:
	8.5.2.	Population covered by WiMAX signal:	
9.	IXPs		
9.1.	Does your country have a national Internet Exchange Point (IXP) that allows Internet Service Providers (ISPs) to interconnect?		Yes
9.2.	Is your country part of a regional or subregional IXP?		Yes
	9.2.1.	If Yes, what is its name?	
	9.2.2.	If Yes, who are its other members?	

Cybersecurity

10.	Is there a specific entity responsible for cybersecurity matters?	Yes If Yes, could you provide a URL link to its website:
10.1.	Has your country adopted cybersecurity related legislation/regulation?	Yes
	10.1.1. If Yes, please indicate which area(s) it addresses:	<input type="checkbox"/> Cybercrime <input type="checkbox"/> Data protection <input type="checkbox"/> Online privacy <input type="checkbox"/> Online fraud <input type="checkbox"/> Online gambling & gaming <input type="checkbox"/> Child online protection <input type="checkbox"/> Critical information infrastructure protection <input type="checkbox"/> Network security <input type="checkbox"/> Other, please specify:
10.2.	Do you have a national focal point or agency with a specific responsibility for promoting safety on the Internet for children and young people?	Yes If Yes, could you provide a URL link to its website:
10.3.	Has your country developed specific legislation to counter Spam?	Yes If Yes, please provide the URL link(s) where related information can be found:

Emergency communication

11.	Has your country adopted emergency communication related legislation / regulation?	Yes If Yes, please provide the URL link(s) where related information can be found:
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Business use of broadband / Internet

12.	Proportion of businesses using computers	
12.1.	Proportion of businesses using the Internet	
12.2.	Proportion of businesses with a broadband access to the Internet:	
12.3.	Number of businesses in the country	

ANNEX 2: QUESTIONNAIRE ON INTERCONNECTION

Afghanistan

	Question	Answer	Remarks
1	Is there interconnection framework mandated by the regulator?	Yes	It is only for mobile and fixed telephony services.
2	Is it mandatory to publish reference interconnection offer?	Yes	Only for mobile and fixed telephony.
3	Is there specific time frame for seeking access to leased lines/ E1 circuits?	No	According to telecom law, only SMP operators' prices should be regulated.
4	Is the price of backhaul regulated?	No	According to telecom law, only SMP operators' prices should be regulated.
5	Price for 2Mbps leased circuit (USD)	For dedicated 1 Mbps the companies charge the customer USD 5000, and for one Mbps in shared case charges USD 1500.	
6	Access to international gateway is allowed to access seekers?	Yes	Only ISPs with licence have access to international gateway to access seekers.
7	VOIP termination rates mandated?	No	VoIP is not allowed.
8	Is VOIP interconnection with PSTN/PLMN permitted?	No	
9	Is the price for collocation mandated?	No	Only collocation is mandated.
10	Is price for 3G termination mandated? Is it different than 2G termination rates?	No	3G is not yet issued. It is under planning process , it will be great that if we directly shift our system to 3.5 G rather than 3 G.
11	Mandated termination rates by regulator	(USD)	
	a) Mobile	2.6 cents	
	b) Fixed	2.6 cents	
12	Price of 1MB data download using speeds higher than 256 kbps on mobile devices		Only GRPS is used in Afghanistan, 256 Kbps not available in mobility case.
13	Price for connection service (connecting to International portion of leased circuit)		
14	Price for 2Mbps DSL connection per month		No DSL services available.

Bangladesh

	Question	Answer	Remarks
1	Is there interconnection framework mandated by the regulator?	No	NIX Guidelines is under formulation. Many ISPs are voluntarily interconnected by the NIX, but it is not mandatory.
2	Is it mandatory to publish reference interconnection offer?	No	
3	Is there specific time frame for seeking access to leased lines/ E1 circuits?	No	But the concerned and eligible party may seek the intervention of the regulator for obtaining connection/access.
4	Is the price of backhaul regulated?	Yes	
5	Price for 2Mbps leased circuit (USD)	As per the directives issued by BTRC, The maximum price for 1 Mbps leased internet bandwidth is USD 258 (duplex). The IIG operators are offering the same rate.	
6	Access to international gateway is allowed to access seekers?	Not for all	Access to international gateway is allowed to access seekers?
7	VOIP termination rates mandated?	Yes (international)	VOIP termination rates mandated?
8	Is VOIP interconnection with PSTN/PLMN permitted?	Yes	Is VOIP interconnection with PSTN/PLMN permitted?
9	Is the price for collocation mandated?	No	Is the price for collocation mandated?
10	Is price for 3G termination mandated? Is it different than 2G termination rates?		Is price for 3G termination mandated? Is it different than 2G termination rates?
11	Mandated termination rates by regulator	(USD)	
	a) Mobile	0.31 cents	For inter operator calls, the call originating operator shall pay 0.18 BDT per minute to the terminating operator and 0.04 BDT per minute to the ICX operator providing the interconnection
	b) Fixed	0.31 cents	
12	Price of 1MB data download using speeds higher than 256 kbps on mobile devices		Only one mobile operator is offering 256 Kbps + speed (only for big-screen usage). The price mentioned here is for Maximum 1.5 GB usage per month. To go beyond this volume cap, BDT 0.003/KB shall be applied. Though in offer it is mentioned that the speed is up-to 512 kbps, but practically user experience is about 100-120 kbps on average.
13	Price for connection service (connecting to International portion of leased circuit)	360 USD Fast Ethernet Port; 572 USD Gigabit Ethernet Port.	Offer from the International Internet Gateway Operators (IIG)
14	Price for 2Mbps DSL connection per month	27 USD/ month	The Government owned incumbent is offering only a 2 Mbps package (from 08.00 PM to 08.00 AM) for BDT 5520 per 3 months. 1 Mbps connection price is 32 USD per month (unlimited).

Bhutan

	Question	Answer	Remarks
1	Is there interconnection framework mandated by the regulator?	Yes	
2	Is it mandatory to publish reference interconnection offer?		
3	Is there specific time frame for seeking access to leased lines/ E1 circuits?	Yes	30 days
4	Is the price of backhaul regulated?	Yes	
5	Price for 2Mbps leased circuit (USD)	USD 278 (5 Km)	
6	Access to international gateway is allowed to access seekers?	Yes	
7	VOIP termination rates mandated?	No	
8	Is VOIP interconnection with PSTN/PLMN permitted?	No	
9	Is the price for collocation mandated?	Yes	
10	Is price for 3G termination mandated? Is it different than 2G termination rates?	Yes	Same as 2G.
11	Mandated termination rates by regulator	USD	
	a) Mobile	3.3 cents fixed-mobile 2.2 cents mobile-mobile	
	b) Fixed	3.3 cents	
12	Price of 1MB data download using speeds higher than 256 kbps on mobile devices	USD 3.31	Rate per month
13	Price for connection service (connecting to International portion of leased circuit)		
14	Price for 2Mbps DSL connection per month	USD 8.86	

Nepal

	Question	Answer	Remarks
1	Is there interconnection framework mandated by the regulator?	Yes	Interconnection guidelines is available only for voice communication
2	Is it mandatory to publish reference interconnection offer?	Yes	
3	Is there specific time frame for seeking access to leased lines/ E1 circuits?	Yes	
4	Is the price of backhaul regulated?	No	
5	Price for 2Mbps leased circuit (USD)		
6	Access to international gateway is allowed to access seekers?	Yes	
7	VOIP termination rates mandated?	No	Only outgoing international calls require a licence for VOIP
8	Is VOIP interconnection with PSTN/PLMN permitted?	No	
9	Is the price for collocation mandated?	No	
10	Is price for 3G termination mandated? Is it different than 2G termination rates?	No	
11	Mandated termination rates by regulator		
	a) Mobile	–	Not mandated
	b) Fixed	–	
12	Price of 1MB data download using speeds higher than 256 kbps on mobile devices		Only volume-based tariff exists
13	Price for connection service (connecting to International portion of leased circuit)		No control. Varies with different NSP.
14	Price for 2Mbps DSL connection per month		USD 1400 for symmetric Internet access USD 150 for intranet access



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