ICT AND TELECOMMUNICATIONS IN LEAST DEVELOPED COUNTRIES
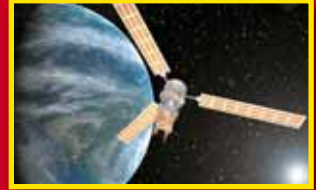
Mid-Term Review for the Decade 2001-2010

ICT Service / Applications

Strategies & Policies

Universal Access

Smart Skills

New & Low Cost Technologies

Emergency Telecommunications

International Telecommunication Union

ICT and Telecommunications in the Least Developed Countries

**Mid-Term Review for the Decade
2001-2010**

International Telecommunication Union

Foreword

We have made huge strides towards the implementation of all the seven Commitments of the Brussels Programme of Action of the Least Developed Countries that was adopted by the Third United Nations Conference for the Least Developed Countries for the decade 2001-2010. The work undertaken falls into the following areas:

a) **Development of rural telecommunications**: The digital divide in most countries is between urban areas and remote rural communities. Most of the urban areas are well served in terms of telephone and Internet access while most of the remote areas have no or very limited access. The focus has been to try and reduce the digital gap between urban and rural areas with the goal of achieving or increasing the pace towards universal access. Increased rural access has tended to stimulate rural industries, improve education delivery through community telecentres, and stem population migration to cities.

b) **Development of infrastructure and introduction of new technologies and services**: The idea has been to identify low-cost, affordable and appropriate technologies for the LDCs. Wireless technologies have proved popular because these are easy to deploy and affordable for the populations in the LDCs. As a result, e-applications and services have been deployed such as e-trade, e-health, e-education, etc.

c) **Sector Restructuring**: A friendly regulatory and legal framework is catalytic to both domestic and foreign investment into the ICT sector. A lot of assistance has been provided to LDCs to help them establish and strengthen their regulatory authorities. Effective regulation helps countries in generating more revenue especially through licensing. Revenue generation can also be directed towards universal access initiatives through the collection of universal service funds.

d) **Human resources development/management**: Assistance was given to train and retrain experts in LDCs. Direct training as well as capacity building under south-south arrangements proved to be very effective for the countries.

e) **Emergency Telecommunications**: Assistance in disaster risk reduction was given to LDCs, Small Island Developing States and some Land-Locked Developing States. This assistance was basically in early warning systems, in disaster preparedness, disaster relief and response, and rehabilitation/reconstruction.

In implementing our activities as outlined on ITU's list of deliverables submitted to the Third United Nations Conference for the LDCs, we encountered a number of obstacles that left us with increased enthusiasm to pursue the goal of Universal Access. Some of the strategies that will help us attain this goal include:

- Need to develop a stable, predictable, and transparent policy, legal and regulatory framework as this is a prerequisite for any sustainable approach to improving access to information and communications services (e.g. focusing on the market efficiency and access gaps).

- Need to use low-cost terrestrial wireless and satellite communications systems to provide access for the rural and isolated areas in LDCs, Land Locked Developing Countries and especially Small Island Developing States.

- Establishment of national, regional and international interconnectivity and interoperability of telecommunications networks

- Establishment of a clear set of standards and criteria by which to monitor and evaluate any national information and communication initiative project

- Improving the availability and reliability of electricity supply to maintain reliable communications networks by using low-cost integrated solar power and battery recharge systems.

- Ensuring a coordinated development, deployment and retention of the required human resources to facilitate the telecommunication infrastructure deployment rollout and utilization.

- Increase coordination among the various actors in the sector so as not to waste resources. Coordination should begin at government level. An inter-ministerial committee on ICT can go a long way in achieving this goal.

ITU is much encouraged by signs of an upturn everywhere. I encourage all the least developed countries, development partners, and the rest of the international community to help bridge the gap between the technological haves and the have-nots. Stock-taking for the period 2001-2005 has demonstrated that the road to the Information Society for the LDCs is no longer a rocky one. It is my fervent hope that the next five years leading to the Fourth United Nations Conference for the least developed countries will witness rapid growth in the telecommunication/information and communication technology sector. We will certainly be part of this process!

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Director

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Acknowledgement

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1   Overview of the global state of telecommunications

There is sustained growth in the telecommunications sector, as well as rapid progress in policy and technology development. Three factors contributing to this growth are privatization, opening of markets to competition and the establishment of telecommunication regulatory authorities at both regional and national levels.

Mobile and fixed telephony

Globally, mobile telephony has continued to grow, surpassing fixed telephony. Between 2000 and 2001, mobile telephony growth rates rose rapidly to catch up with fixed-line growth rates. Since 2002, there are more mobile subscribers than fixed line subscribers around the world, with mobile teledensity rates outstripping fixed teledensity in every region of the world. ITU statistics show that from just 740,035 million subscribers in 2000, the number of mobile cellular subscribers exceeded 1.8 billion subscribers, or 28 per cent of the world's population, by the end of 2004. This is an annual average growth rate of 45 per cent, compared to a global average of just 5.1 per cent for fixed telephone line subscribers. In terms of users, one in three people around the world today have a mobile phone. In contrast, there were 1.2 billion fixed telephone lines, i.e., a penetration rate of 19 per cent[1]. Fixed line growth has been slow, and in several countries the number of fixed lines is actually falling. Typically, the countries with an already high fixed line penetration are the ones showing low growth rates, whilst low penetration regions like Asia and Africa show above average growth rates.

Regionally, Asia has overtaken Europe as the region with the largest share of mobile subscribers in the world. Interestingly, more than 70 per cent of mobile subscribers are found in Asia and Europe combined. By the end of 2004, the majority of countries in the world (166) had more mobile than fixed line users[2]. The main reasons for the strong mobile growth have been rapid network deployment, prepaid services and a highly competitive environment. The mobile sector is marked by more competition than any other sector. The rapid rise of mobile phones as the premier choice for voice communications is also attributed to the drop in prices for mobile services, subsidized handsets in some countries and the popularity of short message services (SMS).

Third Generation (3G) Deployment

The phenomenal growth rates in mobile telephony in least developed countries is being used as evidence that the gap that separates developed and developing countries is being reduced, since 58 per cent of mobile subscribers are based in the developing world. As developing nations catch up in the area of mobile telephony, developed nations are charging ahead into other areas, such as broadband. This, in a way, is creating a new form of a divide, as most developing countries, especially LDCs, continue to compete in the "catch-up" race. Third Generation (3G) mobile technology, with its wide range of innovative applications for users and new revenue sources for operators, has not made the massive uptake strides that were expected of it. Ninety-three per cent of 3G subscribers are in Asia-Pacific and the Americas regions, with only a small fraction being in Oceania and Africa.

The majority of least developed countries have not yet deployed 3G services, as most of them are still in the process of rolling out second-generation networks. Even Europe, which took a leading position with second-generation mobile network availability and subscriptions, has not as yet taken to 3G in the same way. Operators in the developing world are exercising caution in their investment into 3G networks. By the end of 2004, the 3G rankings were as follows: United States (49.5 million), Korea (27.5 million) and Japan (24.7 million). These three countries alone represent 75 per cent of the world's 3G rollout.

Internet

Internet has continued to make major inroads into general usage, both as a communications platform and a knowledge infrastructure. By the end of 2004, there were an estimated 840 million internet users in the world, which is a penetration rate of 13.2 per cent of the total world population. The highest penetration rates are in Europe and the Americas, where almost one third of the population is online. The lowest penetration rates are in Africa where, on average, only 2.6 per cent of an estimated 850 million population is online, as shown in Figure 1.1.

Figure 1.1: Internet penetration by region in 2004
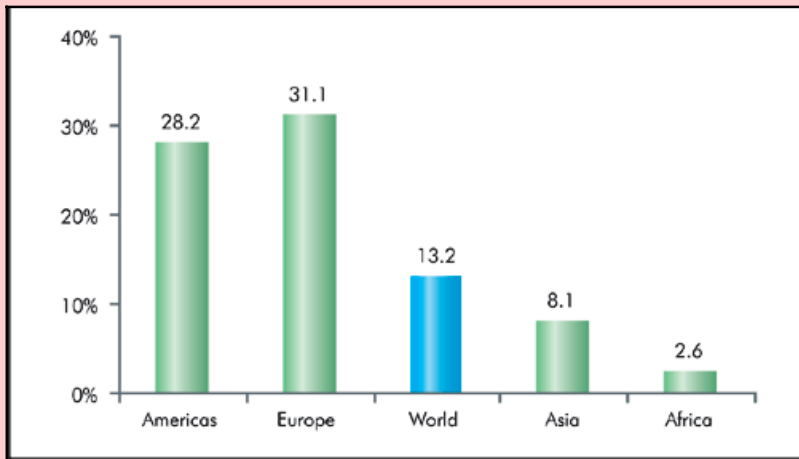
Source: World Telecommunication Development Report 2006.

Broadband

Broadband markets are growing fast, with 158.9 million broadband subscribers worldwide by the end of 2004.[3] Broadband services are now available in 145 economies, including developing countries in central Asia and Latin America. In terms of subscribers, Asia is still leading in the world, with 41.1 per cent of the worldwide total, followed by the Americas with 30.7 per cent and Europe with 27 per cent. Oceania and Africa account for only 1.1 and 0.2 per cent, respectively, as shown in Figure 1.2 below.

Although broadband is spreading in many developing countries, it must be noted that broadband access in these markets is often priced way in excess of the world average, worsened by extremely expensive access through leased lines. Some providers in these countries engage in premium pricing of sought-after advanced services or passing off Integrated Services Digital Network (ISDN) as broadband. The most expensive pricing packages found in this analysis are in the LDCs where, for instance, Myanmar charges USD 1 247 per 100 kbits/s and Uganda charges USD 1 125. In mid-2005, six out of the top ten most expensive countries for broadband access worldwide were in Africa. This is an important issue, since the cost of access to ICTs in LDCs is a critical factor in determining access and usage. Highly priced ICT tend to weaken these countries' potential to spur economic growth.

Figure 1.2: Distribution of broadband subscribers by region in 2004

158.9 million broadband subscribers, 2004

Source: ITU
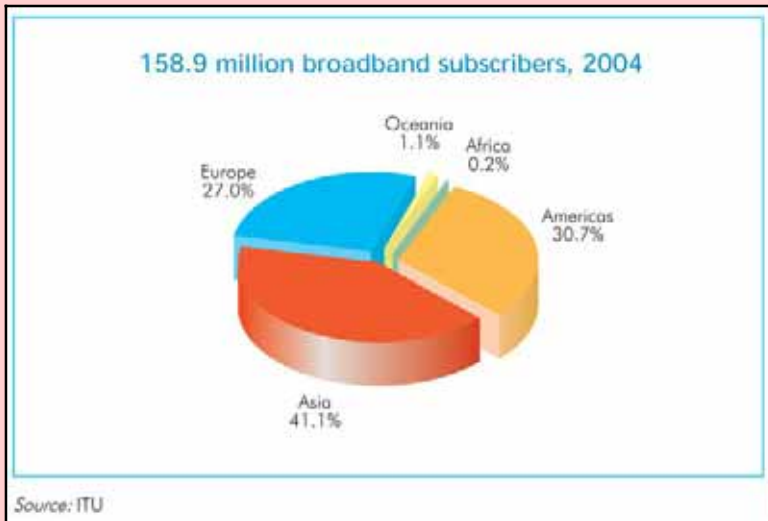
Voice over Internet Protocol (VoIP)

International VoIP increased by 35 per cent from 2003 to 2004, as shown in Figure 1.3.

Figure 1.3: Growth of international traffic

Source: ITU World Telecommunication Indicators Database and TeleGeography *Global Traffic Statistics 2006 report*. Telegeography Research is now part of PriMetrica, Inc. (see www.primetrica.com)
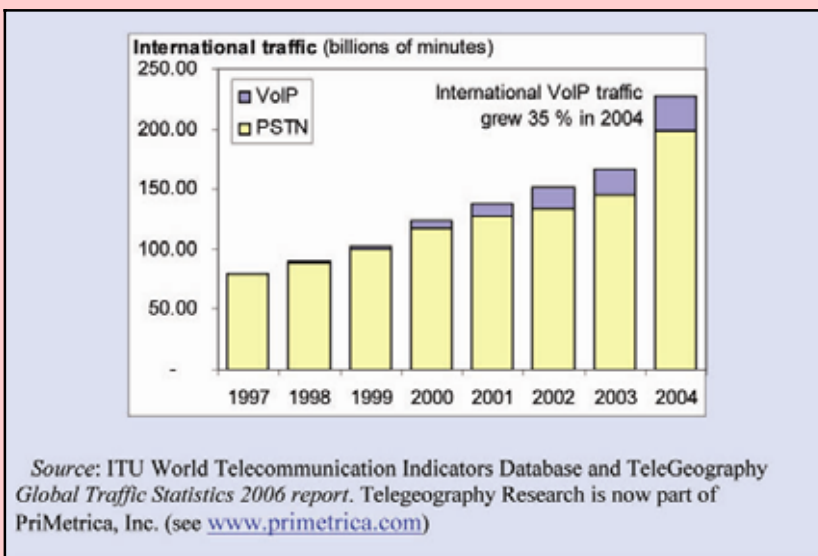
Many operators around the globe are using VoIP to carry part of their international traffic. Regulators' reactions to VoIP have been varied. Some have tried to ban it; some have ignored it by leaving it unlicensed, while others have licensed it. In several countries, users are allowed to make IP calls while, at the same time, no operator is allowed to provide the service. There are also some countries where providers in the markets are allowed to provide VoIP, but nobody is allowed to use it. The good news is "there is a movement towards a new stance that recognizes that IP-based networks will soon become the main bearers of voice traffic".[4]

SPAM

The world continues to be hampered by the spectre of spam. According to some analysts, spam accounted for around 70 per cent of all e-mail traffic by mid-2005. Apart from the sheer volume of spam traffic, it often carries viruses and worms, and threatens the stability and security of networks.

2 Trends in telecommunications in the least developed countries

Introduction

The current state of telecommunications in the least developed countries shows that progress is being made towards bridging the digital divide. Since 2001, the number of people using information and communication technologies has tended to rise exponentially. A number of reasons accounted for this positive development, as shall be discussed in later pages. By the end of 2001, out of 49[5] LDCs, 36 had teledensities[6] above one (1). In terms of main lines, four countries had more than five (5) lines per 100 inhabitants. By 2002, 12 countries had teledensities above five (5). At the end of 2003, 15 LDCs had teledensities above five (5), while 31 countries had above two (2) telephone lines per 100 inhabitants and seven remained with teledensities below one (1). In 2004, 21 LDCs achieved the targets for telecommunications set by the Brussels Programme of Action[7] to achieve an average teledensity of five (5) main lines[8] (ML) per 100 inhabitants. Data regarding effecting teledensity[9] in 21 LDCs in 2004 is shown in Figure 2.1 and Table 2.1.

Figure 2.1: Effective teledensity in 21 LDCs in 2004
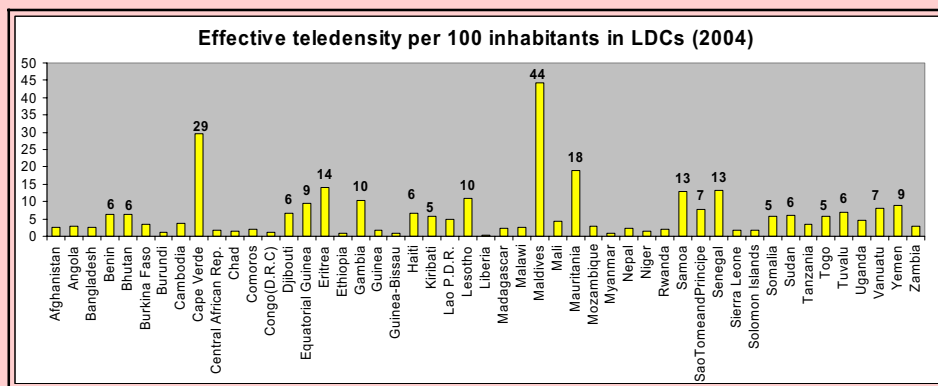
Source: ITU World Telecommunication Indicators Database.

Table 2.1: LDCs with five or more telephone lines per 100 inhabitants in 2004

Total telephone subscribers per 100 inhabitants

Country	2001	2002	2003	2004
Benin	2.80	4.14	4.31	6.33
Bhutan	2.60	2.84	4.52	6.34
Cape Verde	21.62	25.11	27.26	29.49
Djibouti	2.01	3.83	4.97	6.70
Equatorial Guinea	4.66	8.08	9.41	9.41
Eritrea	0.82	0.90	0.93	14.03
Gambia	6.98	10.42	10.40	10.42
Haiti	2.07	3.25	5.80	6.57
Kiribati	4.67	5.68	5.68	5.68
Lesotho	3.63	5.79	6.28	10.90
Maldives	16.76	25.11	33.65	44.13
Mauritania	5.18	10.39	14.14	18.84
Samoa	6.81	8.03	13.05	13.05
Sao Tome and Principe	3.63	5.44	7.76	7.76
Senegal	5.50	7.72	9.76	13.21
Somalia	1.22	1.37	2.50	5.83
Sudan	1.73	2.63	4.40	6.02
Togo	3.02	4.54	5.61	5.61
Tuvalu	6.84	6.84	–	–
Vanuatu	3.61	5.69	6.90	7.96
Yemen	3.05	4.89	6.87	9.02

Figure 2.2 shows that teledensity has almost doubled in the majority of the least developed countries since 2000. It is clear that some countries, although they had a low teledensity of less than four telephone lines per 100 inhabitants in 2004, have not only doubled their teledensities but that these have boosted their telephone lines by as much as 15 times since 2000.

Countries like Afghanistan, with a teledensity of 0.13 in 2000, experienced a 20 per cent growth by end of 2004, which translates to a 20-fold growth. The same levels of growth were experienced in Dem. Rep. of the Congo (which recorded a 22-fold increase), in Eritrea (16-fold) and Mauritania (14-fold) increase.

Figure 2.2: Growth of teledensity in LDCs from 2000 to 2004

Teledensity per 100 inhabitants in 2000 and 2004

Source: ITU World Telecommunication Indicators Database.
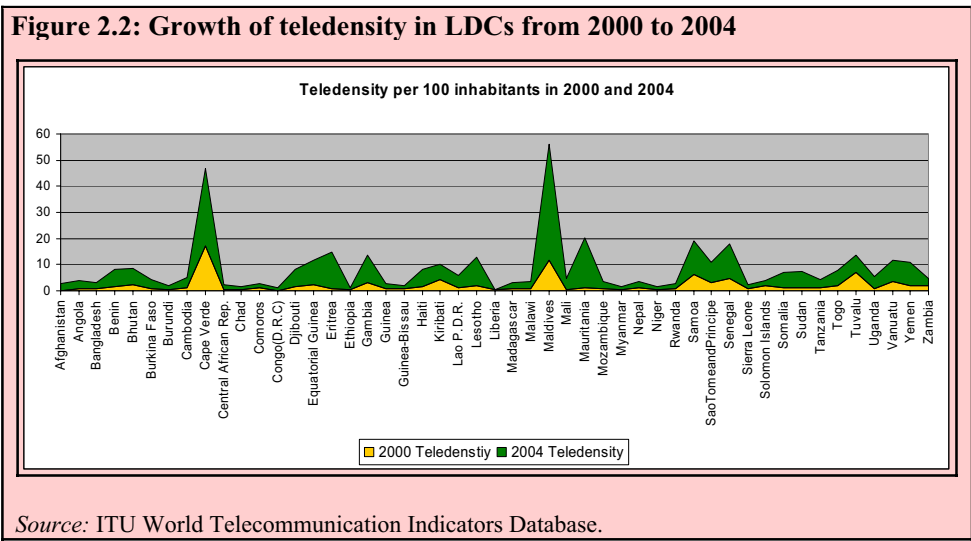
Maldives, Cape Verde and Samoa, which are both SIDS and LDCs, have shown a remarkable positive development in telecommunications. This can be attributed to the liberalization of their telecommunication sector, which has attracted foreign investment that led to the upgrading of facilities and the expansion of the network. All three islands depend heavily on tourism, which accounts for a significantly increased demand for telecommunication services. In 2004, Maldives and Cape Verde led all the other LDCs, with teledensities of 44 and 29, respectively, as shown in Figure 2.1. These countries took advantage of the dramatic technological breakthroughs over the last decade, such as the development of the internet and satellite communications.

Steady fixed-line networks

Even though some LDCs have made remarkable progress in increasing their teledensities, the overall average growth of fixed lines in the LDCs over the period 2000-2004 is quite steady: almost two lines per 100 inhabitants per year, as shown in Figure 2.3. This trend is in line with the overall growth of fixed lines worldwide, as noted in the 2006 World Telecommunication Development Report.[10]. One of the reasons for this sluggish growth of fixed lines is the growth of the mobile market, especially in rural areas, where people go straight to mobile phones, rather than wait for a fixed line connection that may take years to be established.

Figure 2.3: Sluggish growth of fixed lines, 2000-2004

Fixed lines growth average per 100 inhabitants in LDCs (2000-2004)
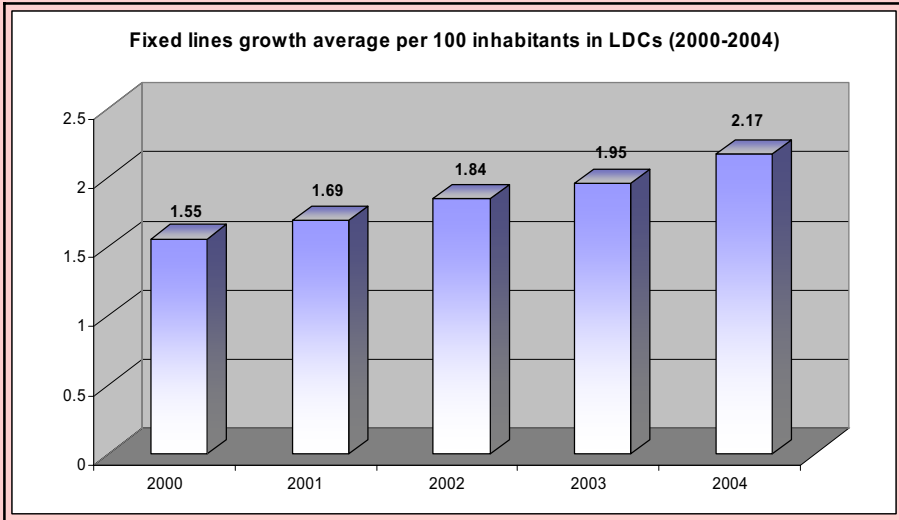
Source: ITU World Telecommunication Indicators Database.
Note: The minimal increase in 2004 might in part be a result of limited data. Data for 2003 has been used for the following countries: Angola, Burundi, Cambodia, Comoros, Dem. Rep. of the Congo, Equatorial Guinea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Kiribati, Liberia, Mozambique, Samoa, Sao Tome and Principe, Sierra Leone, Solomon Islands, Tanzania, Togo, Tuvalu and Zambia.

The boom of mobile phones

Between 2000 and 2003, the average growth rate of the mobile sector in LDCs was 72 per cent, accounting for the highest and fastest growth of all sectors, as shown in Figure 2.4. People who were first telephone owners in LDCs simply subscribed straight to cellular phones for the following reasons:

- Availability: Easy connectivity and deployment of infrastructure, even in rural communities.

- Frustration at the long wait for a fixed-line connection which, in some countries, took up to two years to be established.

- Introduction of prepaid cards, which allowed users that might not have qualified for a monthly subscription to control their own call spending. For operators, this helped reduce the risk of late or non-payments.

- Gradual reduction of mobile phone call charges, due to increased competition.

Internet, fixed, mobile, computers, television: Together for better access

The mobile sector has shown a significant growth of 72 per cent from 2000 to 2003, compared to internet users (16%) and fixed lines (9%). The internet, a communication platform riding on network access technologies such as fixed lines and mobile cellular, has gained widespread recognition as a driving force in the social and economic development of countries. In 2004, internet penetration caught up with fixed line penetration in LDCs, which shows the gradual importance that internet access and its applications, such as e-education, e-health, e-business, e-agriculture, e-government, etc., have gained for people living in both urban and rural areas, as shown in Figure 2.4. Nevertheless, internet users in LDCs are still very few: only an estimated 5.5 million of the LDC population are online, representing 0.75 per cent of the LDC population (720 million) in 2004, against 840 million world internet users, constituting 13.2 per cent of the total population.

Figure 2.4: Increased growth of mobile telephone subscribers
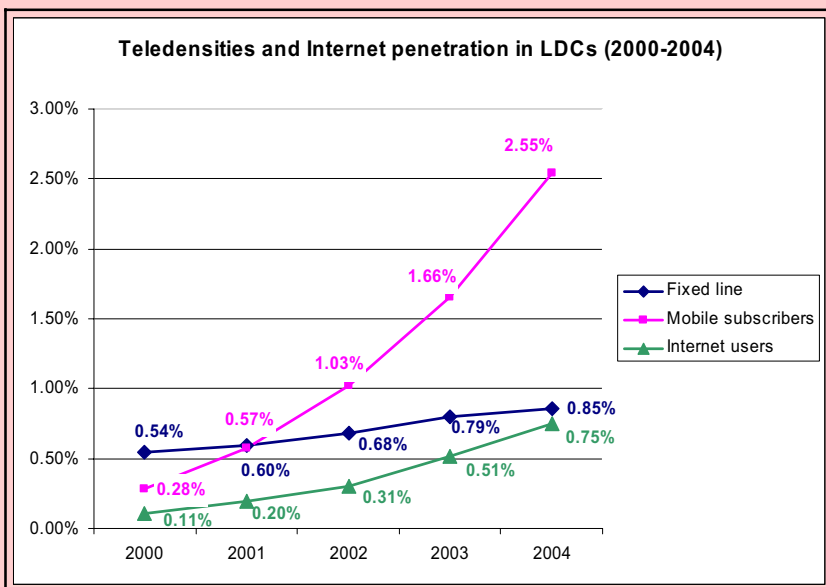
Source: ITU World Telecommunication Indicators Database.
Note: For the series of internet users, we have used data for 2003 for Liberia and Dem. Rep. of the Congo since there is no data for 2004.

Generally, there is increased access to computers. This increased growth of personal computers is influenced by the popularity of internet usage. In 2004, almost five million people out of a population of 720 million were using computers[11] in the LDCs, accounting for a penetration rate of 0.7 per cent. Looking back over the previous three years: in 2003, when LDCs had a population of 700 million, there were 3.5 million computer users accounting for a penetration rate of 0.5 per cent.

In 2002, when the total LDC population was 685 million, 2.4 million people were using computers, accounting for a penetration rate of 0.3 per cent; and finally, in 2001, when LDCs had a population of 670 million, 168 million people used computers, accounting for a penetration rate of 0.2 per cent.

Although, internet and computer penetration in the LDCs remains significantly low, nevertheless, progress is being made as shown in Figure 2.5. The countries with the greatest number of personal computers in 2004 were Bangladesh (with an estimated 1 650 000), Sudan (606 000) and Myanmar (325 000).

Figure 2.5: Staggering growth rates of personal computers

Number of personal computers in LDCs (2000-2004)
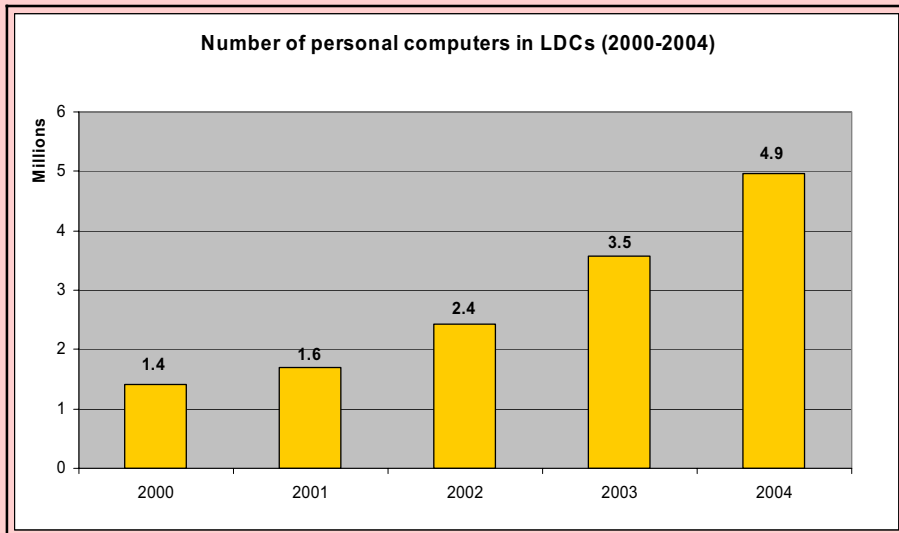
Source: ITU World Telecommunication Indicators Database.
Note: Data for 2003 has been used for Angola and Samoa. The following countries have not been included due to lack of data: Afghanistan, Dem. Rep. of the Congo, Guinea-Bissau, Haiti, Lesotho, Liberia, Rwanda, Sao Tome and Principe, Sierra Leone and Tuvalu.

In terms of internet penetration, Sao Tome and Principe and Tuvalu have achieved 10 internet users per 100 inhabitants attaining 12 and 30 users per 100 inhabitants respectively in 2004. Some LDCs have had a considerable average growth for the period 2000 – 2004, such as Cape Verde, with an average of four internet users per 100 inhabitants (355%); Maldives, with five (458%), Sao Tome and Principe, with eight (794%); Togo, with four (360%), Tuvalu with 16 (1,553%) and Vanuatu with three (308%). In terms of effective annual growth (percentage change), the high performing countries in the area of internet vary every year. High scorers in 2000 were: Rwanda, Somalia and Sudan. In 2001, Dem. Rep. of the Congo, Lesotho and Yemen led the group. In 2002, Afghanistan, Sudan and Tanzania scored high, while in 2003 Eritrea, Haiti and Myanmar made the most progress. This variation is shown in Figure 2.6.

Figure 2.6: Growth of internet penetration in LDCs

Internet penetration in LDCs (2000-2004)
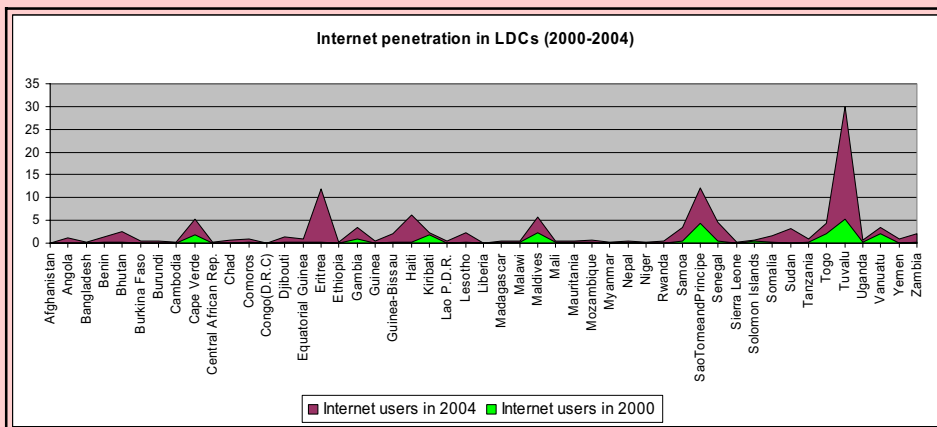
Source: ITU World Telecommunication Indicators Database.
Note: 2003 data has been used for Dem. Rep. of the Congo and Liberia.

The growth in internet penetration is due to the expansion of broadband. Broadband technologies, which bring high-speed access and increased capacity to a number of applications, such as music, images and video files, are in great demand in LDCs. Although the majority of LDCs have not yet launched high-speed internet services, the demand for access to internet at higher speeds is making more and more countries upgrade from dial-up internet connection to broadband. For instance, in 2004, Maldives had 57 per cent DSL subscribers as a percentage of total internet subscribers, Senegal had 40 per cent, Myanmar had 22 per cent, Lao P.D.R. had 11 per cent and Cape Verde had 5 per cent.

Broadband might be the gateway to universal access for rural areas and to narrowing the gap between urban and rural areas. The challenge is to attract investment, especially in rural areas, with low return on investment. Fixed wireless access, which provides high-speed internet access to users in a fixed location, is also a cost-effective, but limited, solution because such networks are too expensive or simply not available in LDCs. A shortage of fixed lines in LDCs would suggest that mobile phones are extensively used to access the internet, but 3G networks are not yet widely developed in LDCs. It follows, therefore, that other affordable technologies will be needed to provide high speeds.

Digital subscriber lines (DSL), cable modems, and Wireless Local Area Network (LAN) are other broadband platforms which again have little coverage in the LDCs. Wireless fidelity (Wi-Fi), which has been used to offer public broadband access in so called "hotspots", remains a challenge in LDCs. WiMAX, which offers high-speed connectivity over a range of up to 50 km, could be an efficient solution to fill infrastructure gaps in rural and underserved areas.

Television

The sustained increase of TV receivers in LDCs shows the willingness of people to gain access to information and communication technologies. In 2000, the LDCs accounted for about 26 million sets, almost doubling the number in 2004 to 42 million, as shown in Figure 2.7. The penetration rate in 2004 was 5.72 per cent. This growth shows that there is a general tendency in poor countries to own TV sets, as ownership is linked to social status. Technological convergence is expected to effectively contribute to universal access, as the same medium, such as TV broadcasting, could be used for interactive communications and mobile phones for entertainment.

Summing Up

As has been demonstrated, over the past four years, the mobile sector in the LDCs has grown considerably against fixed lines. Cellular subscribers per 100 inhabitants have surpassed those of fixed lines since 2002, and more than doubled in 2004. In 2000, there were 2 people with fixed lines, compared to 1 with mobile phones per 100 inhabitants, while in 2002, the number of people owning fixed lines and mobile phones were almost equal. By 2004, there were 5 people with cellular phones, compared to 2 with fixed lines. Figures 2.8 and 2.9 clearly show the fast growth of the mobile sector as compared to the stagnation of fixed lines as an average in the LDCs.

Figure 2.7: Sustained increase of TV receivers in the LDCs

LDC Total television receivers, 2000-2004
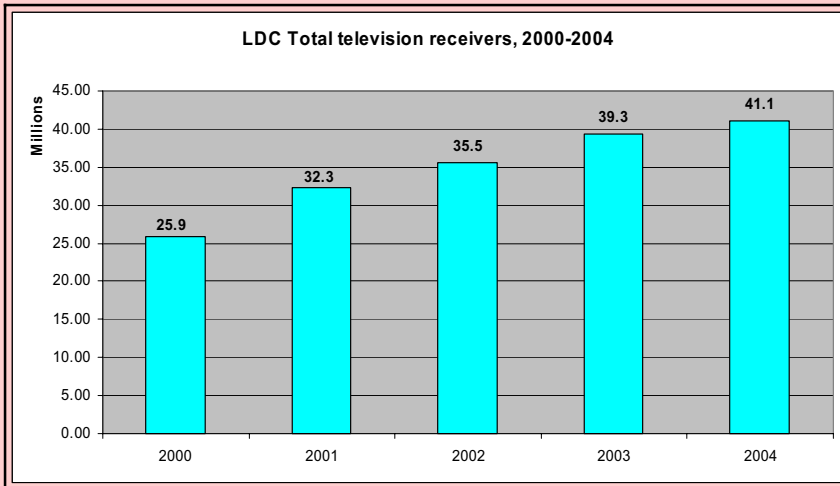
Source: ITU World Telecommunication Indicators Database.
Note: The small increase in 2004 could partly be due to limited data that was available.

Figure 2.8: Mobile increases, fixed lines stagnate

Fixed lines vs cellular subscribers per 100 inhabitants in LDCs (2000-2004)
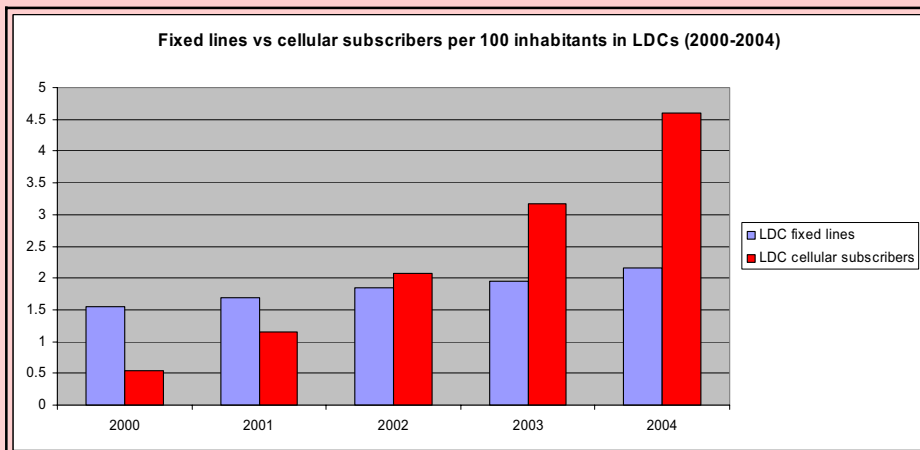
Source: ITU World Telecommunication Indicators Database.
Note: For the following LDCs we have used data for 2003 in the absence of 2004 data: Angola, Burundi, Cambodia, Comoros, Dem. Rep. of the Congo, Equatorial Guinea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Kiribati, Liberia, Mozambique, Samoa, Sao Tome and Principe, Solomon Islands, Tanzania, Togo, Tuvalu, and Zambia.

Figure 2.9: Mobile phones surpassed fixed lines in the LDCs in 2004

Fixed lines vs mobile phones per 100 inhabitants in the LDCs (2004)
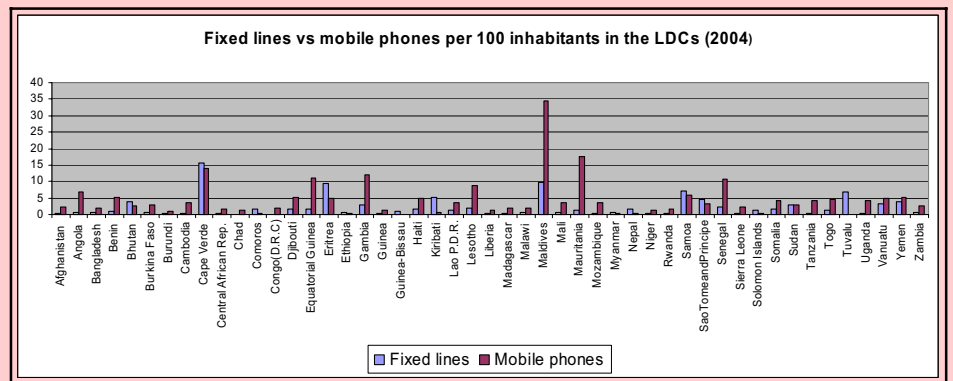
Source: ITU World Telecommunication Indicators Database.

Some LDCs have significantly shifted from wired to wireless networks. For instance, in 2004, Dem. Rep. of the Congo had 0.02 main lines per 100 inhabitants, compared to 3.52 cellular subscribers per 100 inhabitants, making for 95 per cent more mobile subscribers than fixed lines. Afghanistan had 0.02 main lines per 100 inhabitants, compared to 2.41 cellular subscribers. In Cambodia, the corresponding figures are 0.26 and 3.52, while in Mauritania these are 1.31 and 17.53, and in Uganda, 0.27 fixed lines compared to 4.36 cellular subscribers. Most LDC households now have a mobile phone or two, but no fixed line. On average, in 2004 there were three people out of 100 with cellular phones in the LDCs, compared to one out of 100 with fixed lines.

The least developed countries that have recorded the highest growth in the number of cellular subscribers per 100 inhabitants over the 2000-2004 period were: Cape Verde (9.35), Equatorial Guinea (5.84), Gambia (6.35), Maldives (16.46), Mauritania (8.87), and Senegal (5.92). However, Comoros (0.10), Ethiopia (0.11), Guinea-Bissau (0.04), Myanmar (0.09), Nepal (0.21), Niger (0.40), and Solomon Islands (0.27) had the lowest growth in terms of teledensity, as shown in Figure 2.10.

Figure 2.10: Mobile density growth in LDCs

Effective mobile density average growth over 2000 - 2004
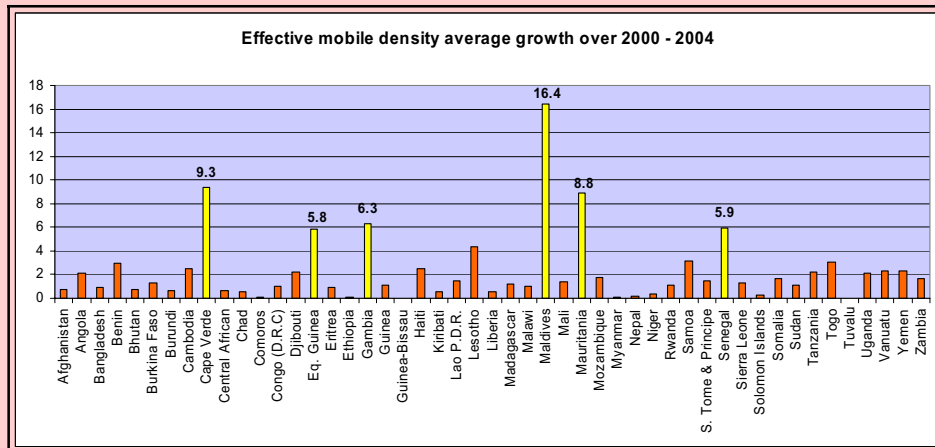
Source: ITU World Telecommunication Indicators Database.

The introduction of prepaid services has been one of the main contributing factors for the explosive expansion of the mobile sector in LDCs, where more than half of the population lives on less than one dollar a day. Prepaid cards allow subscribers more control over their mobile telephone expenditure, releasing operators from performing time-consuming credit checks that are essential under the subscription option. Wireless mobile telephony has also been instrumental in reducing the gap between urban and rural areas, as it provides access to areas underserved by main telephone lines. In many least developed countries, mobile prepaid services are the only means of communication for the majority of the households. In the Africa Region, the opening of this service has been a success story, making up almost 90 per cent of the entire market. In addition, many of the African LDC mobile subscribers[12] use the prepaid service, rather than monthly subscriptions. For instance, in 2004, Chad, Eritrea and Niger had 100 per cent prepaid mobile subscribers, as percentage of total subscribers. Others range from 94 per cent to 98 per cent rate such as Benin, Burkina Faso, Cape Verde, Dem. Rep. of the Congo, Madagascar, Malawi, Mali, Rwanda and Senegal, as shown in Figure 2.11.

Another factor for the expansion of prepaid services is the use of SMS (short message service). Mobile subscribers use prepaid services because these are cheaper than voice calls. The SMS market in LDCs has improved the economic conditions of the people, as it is an important way to access information in places where people don't have access to the internet. For example, in Uganda, FoodNet, a non-governmental organization, collects data on better prices for

farmers, which are stored on a database. Farmers then send an SMS to obtain prices from the database. This service of providing information on commodity prices by operators through SMS is widely used in rural areas of many developing countries.

Figure 2.11: Prepaid mobile subscribers as per cent of total subscribers in 2004

Country	Percent
Afghanistan	100%
Chad	100%
Djibouti	100%
Eritrea	100%
Haiti	100%
Somalia	100%
Niger	100%
Burkina Faso	98%
Senegal	98%
Benin	98%
Congo (D.R.C.)	97%
Mali	97%
Rwanda	96%
Malawi	95%
Madagascar	94%
Bhutan	94%
Cape Verde	94%
Yemen	90%
Vanuatu	86%
Maldives	86%
Lesotho	85%
Lao P.D.R.	81%
Uganda	80%
Bangladesh	80%
Ethiopia	73%
Samoa	70%
Mauritania	66%
Tanzania	62%
Cambodia	58%
Mozambique	58%
Nepal	46%
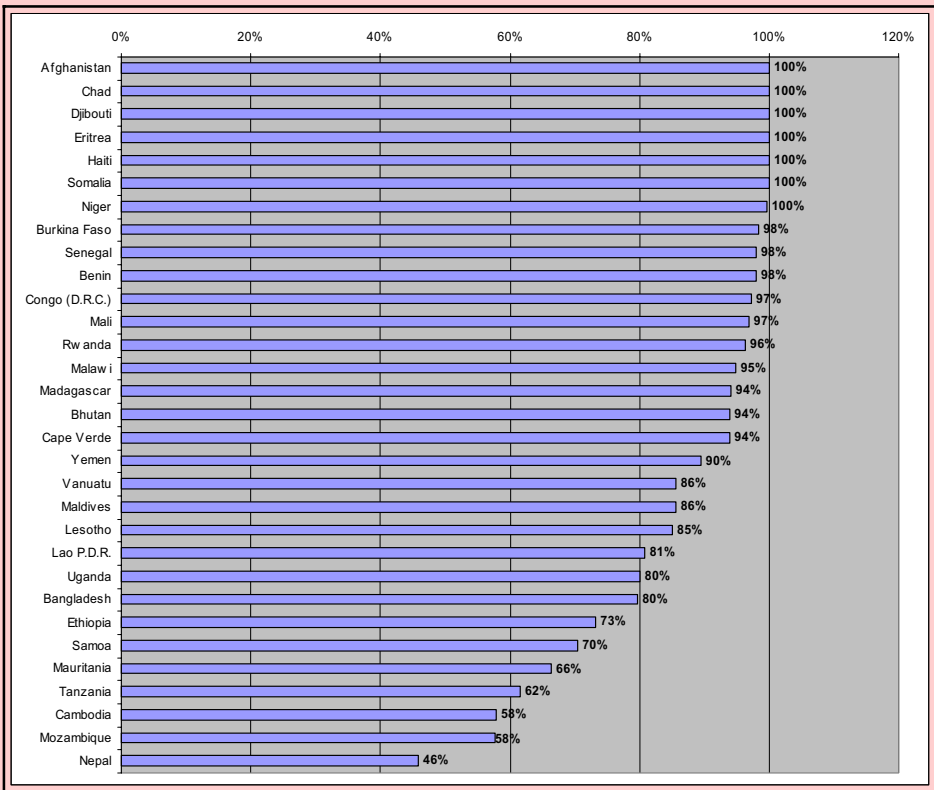
Source: ITU World Telecommunication Indicators Database.
Note: No data available for Angola, Burundi, Central African Rep., Comoros, Equatorial Guinea, Gambia, Guinea, Guinea-Bissau, Kiribati, Liberia, Myanmar, Sao Tome and Principe, Sierra Leone, Solomon Islands, Sudan, Togo, Tuvalu and Zambia.

Third-generation networks, which allow high speed data-transmission through mobile phones, is still very low in the LDCs. Operators are reluctant to offer these services in the world's poorest countries as they see low revenues out of these services. Also, the majority of LDC mobile subscribers could find 3G handsets to be relatively expensive. Thus, there is an insignificant portion of 3G subscribers, as compared to the total number of mobile subscribers.

LDCs vs World: LDC fixed and mobile growth is not doing badly!

LDCs have had a higher annual growth of total telephone (fix and mobile) subscribers from 2000 to 2003 when compared to global telephone growth. In 2000, LDCs had an annual growth of 35 per cent, compared to 17 per cent for the rest of the world. In 2001, LDCs accounted for 38 per cent, against 12 per cent. The growth gap in 2001 was the biggest between these two. In 2002, the gap began to shrink with 29 per cent annual growth for LDCs, against 14 per cent for the world. In 2003, LDCs accounted for 26 per cent, compared to 12 per cent. Overall, during 2000-2003 the LDCs had an average growth of 32 per cent, against 14 per cent for the world, as clearly shown under Figure 2.12.

Figure 2.12: Total telephone subscriber growth in the LDCs and in the world
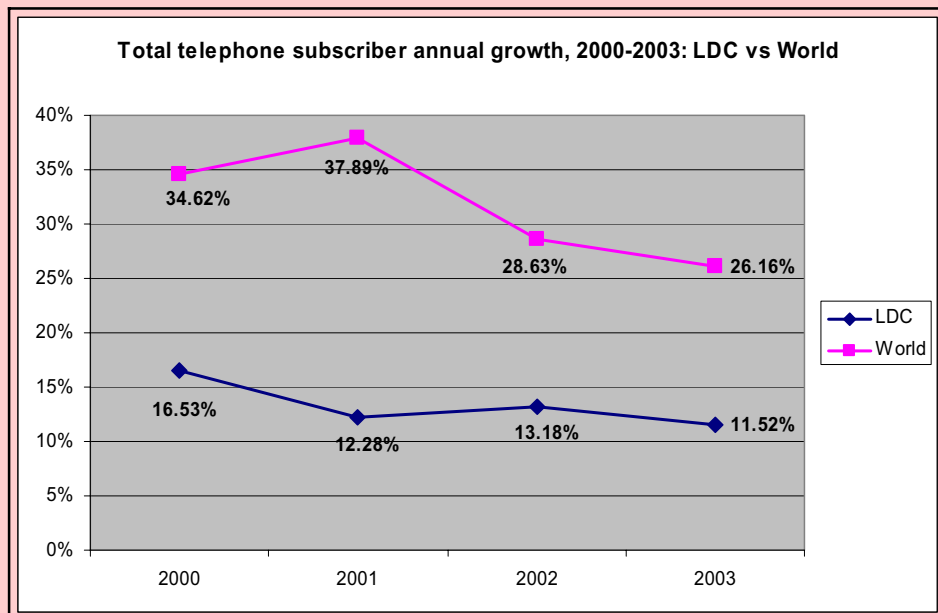
Source: ITU World Telecommunication Indicators Database.

3   Challenges (Investment, policy and regulation)

Some of the challenges that LDCs face in their bid to develop their ICT are in the areas of ICT policy, regulation and investment promotion. How successfully a country deals with these three issues has a bearing on its likelihood to achieve universal access.

The current success in the deployment of mobile cellular services in least developed countries and the rest of the developing world can be traced to a number of factors, such as innovative pricing strategies (namely, prepaid subscriptions), lower deployment costs for mobile networks and competition in the provision of mobile services (87 per cent of LDCs authorize competition in the provision of mobile services, relying on effective policy and regulation). This success could be emulated by putting the same regulatory sweeteners in place for large-scale broadband and internet deployment. Since mobile is clearly the prevailing technology for telecommunication access in developing and rural regions, successful broadband deployment will most likely be achieved through broadband wireless access (BWA) technologies, for example 3G, WiMAX and Wi-Fi. Broadband technologies can be deployed incrementally, as demand develops, rather than via expensive network wide upgrades. This means a varied range of players, private and public, small and large, could become ICT providers, thus harnessing the power of broadband to provide access in both rural and urban areas.

To date, experience world over has shown that the rapid and coherent diffusion of ICTs in a country is closely linked to the level of government direction and support. The government, through its ICT policies and regulation, must present a vision and solid strategies leading to the creation of an enabling environment, favorable to the establishment of a ubiquitous infrastructure and ICT services.

There is need for an autonomous regulatory authority with a clear vision of what needs to be achieved to stimulate – and not stifle – growth of the sector. Right policies and an enabling environment generally stimulate competition which, in turn, creates a market for investors. Investment and funding for ICT infrastructure development is and has always been the Achilles heel of LDCs. For this reason, appropriate policy and regulation could be a magnet for financial flows into the sector.

What is becoming obvious is that the route that has been used by developed countries to establish their information highways do not befit LDCs. As already mentioned, the phenomenal growth of the mobile sector worldwide seems to indicate that many new users are going 'straight to mobile'. In LDCs, the much higher mobile growth rates show that the mobile phone has become the number one voice communication technology, rather than main lines. Inferring from this

trend, the indication is that the age of the ubiquitous wire-line network may never arrive in many LDCs. Dominant access networks are likely to continue to be mobile and wireless. With the rapid technological advances being made in infrastructure, particularly wireless networking standards in the Wi-Fi and WiMAX families, deployment costs are likely to go down as market demand continue to favor mobile, rather than fixed line, networks.

Over the past five years, the introduction of competition into the provision of second-generation mobile telephony in developing countries has been one of the main contributory factors towards increasing teledensity in these countries. Figure 3.1 illustrates the sectors where competition has been authorized as compared to those still under the monopolistic control of the incumbent Public Telecommunication Operators (PTOs). Competition in international services, particularly the international gateway and leased lines, has been vital in providing low-cost internet access. Competition is authorized in basic services, as well as leased lines, in just over 40 per cent of LDCs. Overall, competition is authorized in above 80 per cent of countries for services such as cellular, internet access and VSAT.

With regards to fixed lines, there are a few countries that allow private ownership of main fixed-line operators. In 2004, they were 22, which accounts for 44 per cent of the total LDCs. The countries that permitted private ownership of main fixed-line operators were Cape Verde, Central African Republic, Equatorial Guinea, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao P.D.R., Lesotho, Madagascar, Maldives, Mauritania, Mozambique, Niger, Rwanda, Sao Tome and Principe, Senegal, Solomon Islands, Somalia, Sudan, Uganda and Vanuatu.

According to the old business model for telecommunication provision, public voice services provided the largest source of revenue for established telephone operators which were, mostly, state monopolies. In this model, when an international telephone call passed from one country to another, the operator in the country that originated the call had to make a compensatory payment to the operator in the destination country. These payments were made when traffic in one direction was greater than the traffic in the return direction. The level of payment was based on bilaterally negotiated "accounting rates" [13]. The established structure of telephone service pricing in most countries depended heavily on higher prices for long-distance calls, especially international calls. Revenue generated from international incoming calls was a good telecommunications revenue stream for the old state monopolies. ITU estimates that, between 1993 and 1998, net flows of settlement payments from developed counties to developing ones amounted to some USD 40 billion.

Figure 3.1: Level of competition in selected services and networks in the LDCs, 2004
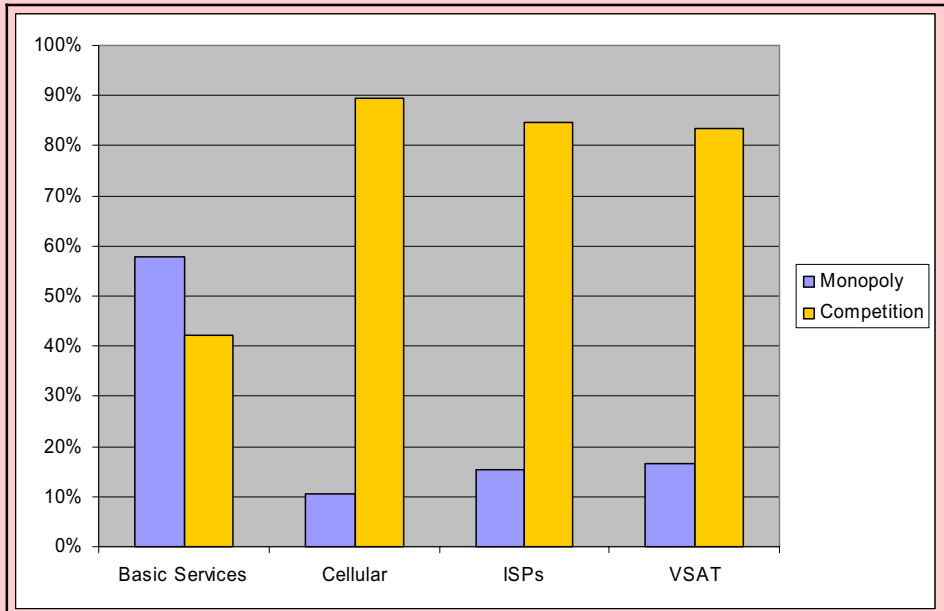
Source: ITU World Telecommunication Regulatory Database.
Note: Data is not available for the following countries: Angola, Benin, Central African Rep., Chad, Comoros, Djibouti, Equatorial Guinea, Guinea, Kiribati, Lao P.D.R., Liberia, Maldives, Rwanda, Sao Tome and Principe, Solomon Islands, Somalia, Tuvalu, Uganda and Vanuatu.

VoIP is basically eating into this market and the revenues that the voice calls used to generate. The increasing volume of traffic that now goes through the internet and leased lines, for instance, does so outside the accounting rate system. It is estimated that more than half of all international traffic now takes place outside the accounting rate system. This loss of revenue has significant implications for LDCs that are losing revenue in the packet switching-based model. It is a challenge for traditional telephone operators to now establish new business models and pricing for their services.

Any major technological improvement that dramatically changes the status quo by reducing unit costs and expanding service capabilities offers the potential of enormous benefits in terms of network and market expansion, cost and price reductions, and new service development. It also brings the threat of significant losses to those benefiting from the traditional ways of doing things, and a requirement that the existing structure of policies and regulations be adapted and modified to meet the new challenges and opportunities. VoIP, the new wireless

technologies and the rate at which they are converging are posing these challenges to policy-makers and regulators on one side, and telephone operators and service providers on the other. Countries have to put faith in effective, transparent and predictable regulatory regimes. Separate regulatory agencies[14] lay the ground for a favorable investment climate and promote market opportunities.

Figure 3.2: Growth of Regulatory agencies in LDCs from 1990 to 2005

Regulatory agencies, LDCs (cumulative)
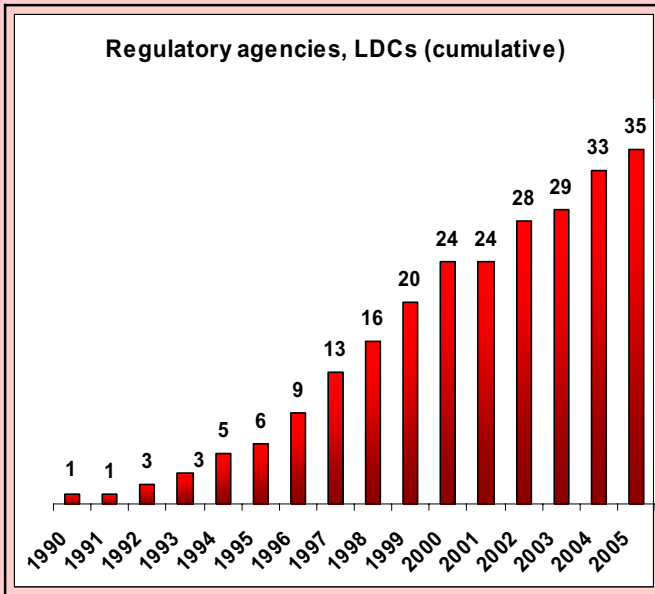
Source: ITU World Telecommunication Regulatory Database.

The number of regulatory authorities is expected to continue to rise, with new regulatory authorities on the verge of being established in Liberia and Samoa. In fact, this wave of telecoms reform sweeping across the world could almost be called a revolution. New technology, privatization and competition are the vehicles being used to drive these changes. It must be remembered that most LDCs started their telecoms reform process much later than the developed countries, and have not yet fully completed the transition to an effective structure of liberalized market participation and independent regulation. The current thrust will certainly lead to more private participation, supported by autonomous regulatory agencies.

Summing up

The rapid rate of change in ICT technologies, markets and services being stimulated by IP convergence is creating two sets of problems for policy-makers and regulators. Many established policies and regulations have become obsolete and now provide inefficient and increasingly untenable restrictions and barriers to the development and dissemination of the benefits of IP convergence. VoIP is one area where this has become evident. Policy-makers and regulators must therefore forge a transition path away from the old regulations that may have served a useful purpose in the past, but are today barriers to progress.

The second equally challenging task is how to develop the appropriate policy and regulatory framework that will facilitate the realization of the full benefits of IP convergence in network and service development and the achievement of public interest goals. In many LDCs, policy changes are required. These changes should seek to provide regulators with powers, flexibility and tools to implement a transition path to a new framework of regulation that facilitates new network development opportunities that is fuelled by increased investor financial flows into the sector.

4 Implementing the Brussels Programme of Action (BPoA)

4. 1 Background

In May 2001, the UN General Assembly convened the Third United Nations Conference for the Least Developed Countries aimed at drawing up a comprehensive result-oriented, poverty reduction strategy, tailored to the special needs of the LDCs. The conference ended with the adoption of the Brussels Declaration and Programme of Action for the Least Developed Countries for the decade 2001-2010. The seven commitments [15] approved by the delegates provided the blueprint for actions by least developed countries and development partners aimed at eradicating poverty and improving the quality of life of people in LDCs through sustained economic growth leading to sustainable development. These commitments are:

- Commitment 1: Fostering a people-centred policy framework.
- Commitment 2: Good governance at national and international levels.
- Commitment 3: Building human and institutional capacities.
- Commitment 4: Building productive capacities to make globalization work for LDCs.
- Commitment 5: Enhancing the role of trade in development.
- Commitment 6: Reducing vulnerability and protecting the environment.
- Commitment 7: Mobilizing financial resources.

ICTs are no doubt a catalyst in the successful implementation of the Brussels Programme of Action and an essential enabler in achieving all these commitments. The creation of an enabling environment for the development of ICT infrastructure, applications and services is crucial to attract foreign investment into this sector. E-government services, which depend on ICTs, can help governments increase transparency and the effectiveness of government institutions. ICT also increases the ability of people and institutions to deliver services such as e-health and e-education, especially in rural areas. ICT development and deployment, can also promote trade, business and employment, thus raising productivity levels in LDCs. Market access is facilitated through ICTs, thus promoting export diversification. These technologies are also useful in detecting, predicting and responding to disasters. Last but not least, ICTs can enhance partnerships and strengthen the collaboration of partners through virtual conferences and other ICT mediums of communication.

4.2 Looking back at pledges made by the International Telecommunication Union at the Third United Nations Conference

At the time of the Third United Nations Conference in Brussels, ITU presented a set of deliverables to the 6,500 participants from 193 governments, parliaments, UN specialized agencies and civil society. These deliverables were based on ITU's programmes, projects and activities aimed at providing LDCs with assistance in the development and deployment of ICTs and telecommunications. The following is a summary of the deliverables presented at the Conference:

a) Provide comprehensive ICT assistance to LDCs

In line with its commitment to establish a dedicated programme for the least developed countries, ITU put in place a Special Programme for the LDCs at its third World Telecommunications Development Conference (WTDC)[16] that was held in Istanbul, Turkey, in 2002. This programme also had ambitious targets:

- To achieve a countrywide average mainline density of 5 ML per 100 inhabitants by the year 2010.
- To achieve a rural ML density of above 2 ML per 10,000 inhabitants in 2010.
- To achieve an average density of 10 internet users per 100 inhabitants in 2010.

The programme was given five priority areas to focus on: These are summarized below:

- Development of infrastructure and introduction of new technologies: To build infrastructure and introduce modern and appropriate technologies and associated services/applications, such as internet, wireless access (fixed and mobile), and mobile services, among others.
- Sector restructuring: To create a conducive environment through the reforming of the telecommunication sector in order to increase investment and growth, bring about market liberalization and competition to reduce costs, and increase private sector participation through the establishment of independent regulatory authorities.
- Rural telecommunication development: Seeks to extend access and use of telecommunication services and ICTs in rural areas, to ultimately achieve universal access. It also stimulates rural industries at grassroots level and entrepreneurial activities to foster economic growth and improve human capacity and social services in rural areas.

■ Human resources development/management: To invest in human capital by providing training for personnel in the operation and management of modern telecommunication networks.

■ Financing and partnerships: This area looks at tariffs and costs of interconnection rules and rates. It promotes partnerships to co-finance existing and new projects, through the mobilization of resources and increased the captation of local and foreign investment.

b) Assistance to countries in special need

Special assistance is also to be extended to countries emerging from war, civil strife and natural disasters, having suffered considerable damage to their telecommunications networks. ITU shall provide "seed money" from the proceeds of ITU TELECOM exhibitions ("TELECOM Surplus Fund") and use them to attract more resources from other partners. These resources shall finance network rehabilitation and telecom infrastructure projects.

A building destroyed by war
Source: ITU/Melissa Arditto.

Currently, there are 12 countries under this category: Afghanistan, Burundi, Democratic Republic of the Congo, Eritrea, Ethiopia, Guinea, Guinea-Bissau, Liberia, Rwanda, Sierra Leone, Somalia and Timor-Leste.

Market in Honiara, Solomon Islands. E-commerce could change how business is traditionally done
Source: ITU/Cosmas Zavazava.

c) Electronic commerce and other e-strategies

This ITU initiative seeks to assist developing countries, especially the least developed, to participate in the digital era. Assistance is given in e-commerce, e-government, e-health, and e-education. This assistance includes policy formulation, legal drafting, and the development of public key infrastructure. The following summarizes the activities carried out:

■ Infrastructure development: Assistance to build an adequate infra-structure for the provision of secure electronic payments, secure transactions and trust services.

■ Capacity building and technology transfer: Provision of training and workshops to enhance the skills of the personnel through transfer of technology, so they can run and operate the services themselves.

■ E-policies: Assist and advise decision-makers to adopt policies and create a favorable environment for the deployment of e-technologies.

d)   Assistance in achieving universal access

The aim from the beginning has been to make digital opportunities accessible to the majority of the people in LDCs. ITU is engaged in various projects aimed at bridging the digital divide not only between developed and developing countries, but also between urban and rural areas. This way, universal access and the use of ICTs and their valuable applications are increasingly becoming a reality.

The implementation of Multipurpose Community Telecentres[17] (MCTs) is one of the main activities undertaken to provide ICT-based services and applications in rural and remote areas, with a view to developing sustainable models. MCT projects now exist in many LDCs, for instance, Benin, Bhutan, Mali, Mozambique, Tanzania and Uganda, and recently also in Samoa and the Solomon Islands.

In implementing these MCTs, attention and resources were also directed at developing human capacity, with a view to ensuring self-sustainability.

Samoan women learning how to use computers at the MCT.
Source: Government of Samoa.

In addition, policy guidelines on universal access and rural telecommunications in developing countries were also developed. Several of them focused on best practices in terms of implementing and evaluating these projects.

> ## Summing up
>
> In preparation for the Third United Nations Conference on the LDCs, ITU drew up a list of deliverables. These included the commitment to mainstream the Brussels Programme of Action in all ITU activities, to provide special assistance to countries affected by war, civil strife and natural disasters, to assist countries in the elaboration of strategies to harness ICT applications and services, and to help countries achieve universal access.

4.3   Reporting on ITU's 2001-2005 Activities in Support of BPoA

In keeping with its commitments made at the United Nations Conference on Least Developed Countries in 2001, ITU has been providing assistance to LDCs in the spirit and letter of the "deliverables list" presented at the Conference. Hence, a creative assistance delivery mechanism was put in place in 2002 to provide concentrated assistance to an average of 12 LDCs for a period of two years, starting with the countries in most of assistance, in order to produce tangible and lasting results. The two-year period allows for closer and sustained follow-up of actions taken, including evaluation, and a mustering of partnerships through partnership round tables and other initiatives aimed at mobilizing resources. Table 4.1 shows the countries that have benefited from this assistance since 2001.

Table 4.1: Beneficiaries of ITU's concentrated assistance, 2001-2005

Year	Beneficiary countries of concentrated assistance	
2001	▪ Eritrea ▪ Guinea-Bissau ▪ Mozambique	▪ Nepal ▪ Niger ▪ Yemen
2002	▪ Bhutan ▪ Central African Republic ▪ Djibouti ▪ Haiti	▪ Kiribati ▪ Malawi ▪ Mali ▪ Zambia
2003	▪ Bhutan ▪ Bangladesh ▪ Burkina Faso ▪ Central African Republic ▪ Dem. Rep. of the Congo ▪ Djibouti	▪ Lao P.D.R. ▪ Malawi ▪ Mali ▪ Somalia ▪ Uganda ▪ Zambia
2004	▪ Afghanistan ▪ Angola ▪ Bangladesh ▪ Burkina Faso ▪ Dem. Rep. of the Congo ▪ Guinea	▪ Lao P.D.R. ▪ Mauritania ▪ Myanmar ▪ Rwanda ▪ Somalia ▪ Uganda
2005	▪ Afghanistan ▪ Angola ▪ Burundi ▪ Chad ▪ Guinea ▪ Madagascar	▪ Mauritania ▪ Myanmar ▪ Rwanda ▪ Samoa ▪ Solomon Islands ▪ Sudan

Another ITU means of aid delivery has been the ad hoc assistance given to countries not covered by the concentrated assistance mechanism. This assistance has been provided through five other programmes dealing with:

- Regulatory reform
- Technologies and telecommunication network development
- E-strategies and e-services/applications
- Economics and finance, including cost and tariffs
- Human capacity building

Last but not least, the ITU TELECOM Surplus Fund is another source of funding that has been used to develop ICTs in LDCs. As already stated, these are funds generated by any surplus income over expenditure derived from ITU TELECOM exhibitions and used as extra budgetary income for telecommunication development projects, primarily in the least developed countries. This funding was successfully used to attract funding from other partners in co-financing arrangements.

Analysis of ITU Assistance vis-à-vis the Brussels Programme of Action Commitments

A stocktaking exercise has been carried out based on an assessment of ITU's work against the seven Commitments drawn up in the Brussels Programme of Action.

Commitment 1: Fostering a people-centred policy framework

Effective policy making is an important element in the general development of the ICT sector. Assistance has generally been sought by LDCs in an attempt to strengthen weak institutions. Capacity building has been prioritized by ITU, especially for government staff and for personnel in regulatory agencies and fits in with ITU's work related to sector reform and restructuring through regulation. Specifically, assistance has been provided in drafting telecommunication/ICT laws, establishing national regulatory agencies and regional regulatory associations for the purpose of harmonizing regional regulations and solving other regulatory challenges with the aim to create an enabling environment that could pave the way for increased investment into this sector. Figure 4.1 shows ITU's contribution towards the implementation of Commitment 1 from 2001 to 2005.

Commitment 2: Good governance at national and international levels

This is an important area that increases the effectiveness of government institutions through e-government, sector reform and training projects. Focused assistance was provided to countries emerging out of war situations, such as Somalia, that had spent more than 13 years without a government.

Under the Countries in Special Need initiative, ITU helped a group of LDCs to reconstruct their telecommunication networks in preparation for the provision of e-applications and services, thus paving the way for durable peace-building and sustainable development. The work under this commitment contributed to "good governance through transparent, accountable, and efficient institutions and practices within the Government"[18]. Figure 4.2 shows ITU's contribution towards the implementation of Commitment 2 from 2001 to 2005.

Figure 4.1: Implementation of Commitment 1 by ITU, 2001-2005

Fostering a People-Centred Policy Framework, 2001-2005
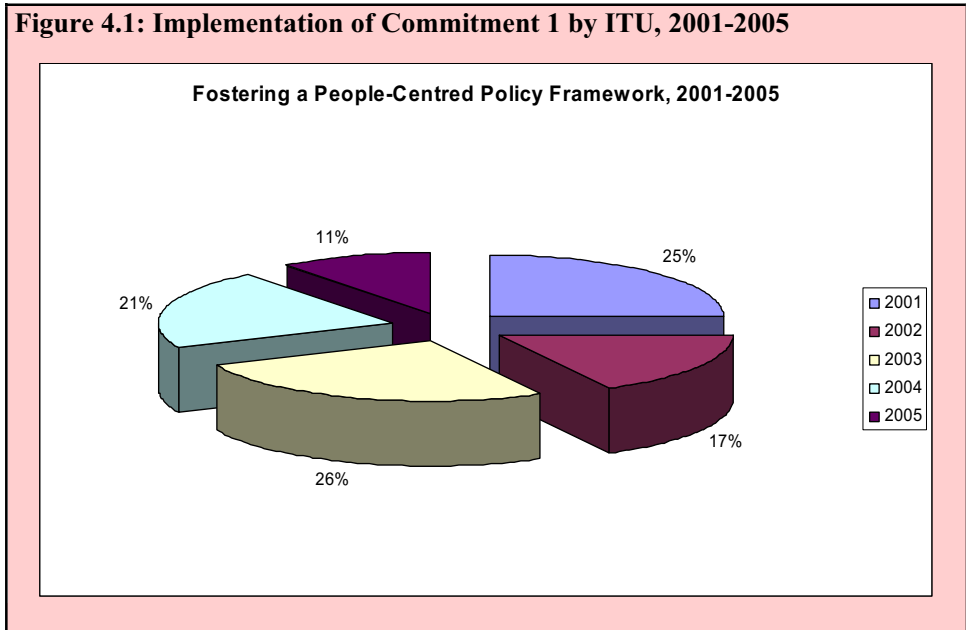
Commitment 3: Building human and institutional capacities

This Commitment is concerned with efforts to develop human capacities in LDCs, covering all facets of human life. E-services were implemented in support of the need to develop "longer-term policies and strategies … in health, education, employment and rural development"[19] to facilitate universal access, especially in rural areas, to basic social services.

Developing people's skills is an important priority area for ITU. ITU delivered human capacity-building assistance in telecommunication policy, regulation, corporate management, and advanced telecommunication technology. An e-learning project in Mali called "Internet for schools for Mali" was implemented in collaboration with Swisscom to provide internet connection to students in schools in Mali. ITU also assisted youths in the region of Thies, Senegal, and women in Cameroon, Tanzania and Uganda, with internet access. Projects and initiatives to foster the delivery of telemedicine solutions were implemented in Bhutan, Ethiopia, Guinea, Haiti, Mauritania, Mozambique, Myanmar, Rwanda, Senegal, Sudan and Uganda. For example, 10 hospitals in Ethiopia were networked to a hub at the Tikur Anbesa Hospital in Addis Ababa, enabling health professionals to get training through the use of ICTs. In Senegal, a telemedicine link was established to provide remotely located experts with the transmission of medical images and patient data records for medical consultation. Figure 4.3 shows ITU's contribution towards the implementation of Commitment 3 from 2001 to 2005.

Figure 4.2: Implementation of Commitment 2 by ITU, 2001-2005

Good governance at national and International Levels 2002-2004

6% 5%

89%

- 2002
- 2003
- 2004
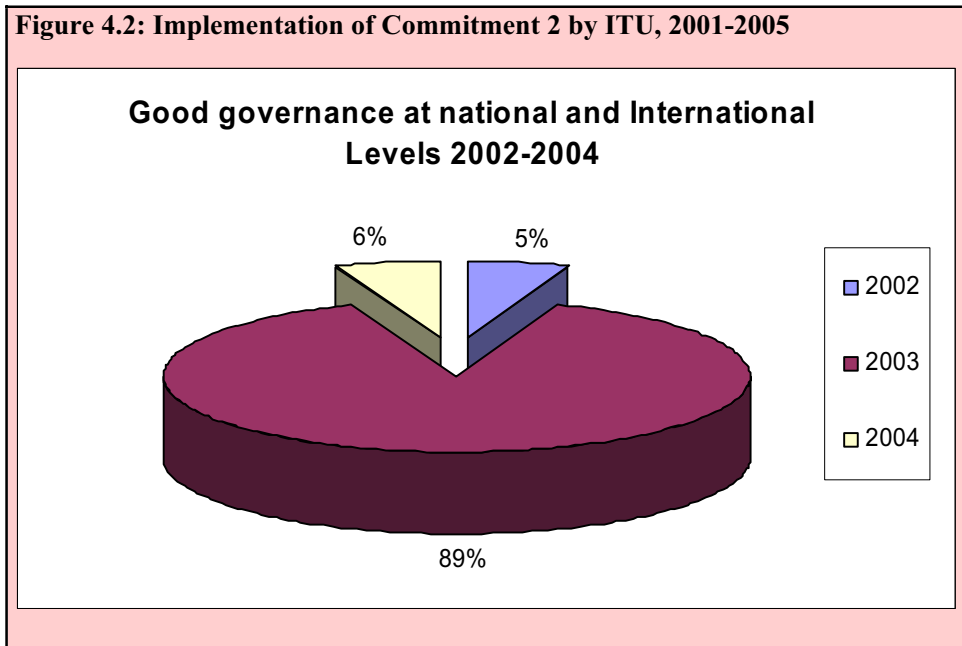
Commitment 4: Building Productive Capacities to make Globalization work for LDCS

This commitment relates to increasing information and communication networks, including telecommunications and postal services, and improving access to such services in both rural and urban areas. The ultimate objective is to improve productive capacity, diversification, export capability and competitiveness. It is an attempt to "help LDCs to integrate beneficially into the world economy, reversing their marginalization in global trade, finance, investment and technology flow".[20]

The resources and efforts put by ITU and countries into ICT development go a long way towards making globalization work for LDCs. This manifests itself in infrastructure development, especially for those in remote and rural areas who could not traditionally participate in economic activities. Small and medium business enterprises, with limited resources to allocate for marketing and communication with international companies, can now use the web to advertise and market their products in almost real-time. Using ICT has also raised productivity levels in LDCs. Information on market conditions has become more readily available, thus assisting small businesses to make more informed decisions on investment, who to sell to and when to buy or sell. Figure 4.4 shows ITU's contribution towards the implementation of Commitment 4 from 2001 to 2005.

Figure 4.3: Implementation of Commitment 3 by ITU, 2001-2005

Building Human and Institutional capacities 2001-2005

11%   1%   7%   3%

78%

- 2001
- 2002
- 2003
- 2004
- 2005

Figure 4.4: Implementation of Commitment 4 by ITU, 2001-2005

Building Productive capacities to make Globalization work for LDCs 2001-2005

3%   8%   19%

31%

39%

- 2001
- 2002
- 2003
- 2004
- 2005

Commitment 5: Enhancing the role of trade in development

Access to global networks, new information technologies and advanced services have become the driving forces of integration into the world trading economy. Trade is critical for LDCs as a means to generate revenues for financing growth and development and realizing the goals and targets of the Brussels Programme of Action.

E-commerce projects for developing and least developed countries were implemented in Burkina Faso and Senegal, while in Mauritania, Myanmar and Samoa, MCT projects designed to support e-agriculture, which enables rural farmers to access information about the market price of their products, facilitates the establishment of direct relationships with buyers and the collection and distribution of agriculture information to the rural population, were implemented. Access to information has improved farming and marketing methods for products. Additionally, projects using advanced security and trust technology based on Public Key Infrastructure (PKI) were implemented in Bhutan, Burkina Faso, Cambodia, Senegal and Zambia. Figure 4.5 shows ITU's contribution towards the implementation of Commitment 5 from 2001 to 2005.

Commitment 6: Reducing vulnerability and protecting the environment

Recognizing that the weakest economies are often the most vulnerable to disasters, ITU developed several projects aimed at strengthening disaster mitigation policies and mechanisms, early-warning systems, preparedness and relief efforts. ITU has also been assisting LDCs in "establishing public-private sector partnerships to address environmental challenges"[21] and building capacity, so that they are able to respond adequately to existing and new environmental challenges. In 2006, ITU's World Telecommunication Development Conference adopted a key Study Question to be discussed over the next four years. The focus will be on the role of space technology in disaster detection and prediction that includes earth exploration. This will also provide reliable information on environmental patterns to assist authorities in their attempts to find ways of protecting the environment. Figure 4.6 shows ITU's contribution towards the implementation of Commitment 6 from 2001 to 2005.

Figure 4.5: Implementation of Commitment 5 by ITU, 2001-2005

Enhancing the role of Trade in Development 2001-2005

1%   8%   2% 4%

☐	2001
■	2002
☐	2003
☐	2004
■	2005

85%

Figure 4.6: Implementation of Commitment 6 by ITU, 2003-2005

Reducing Vulnerability and Protecting the Environment, 2003-2005

14%

16%

☐	2003
■	2004
☐	2005

70%
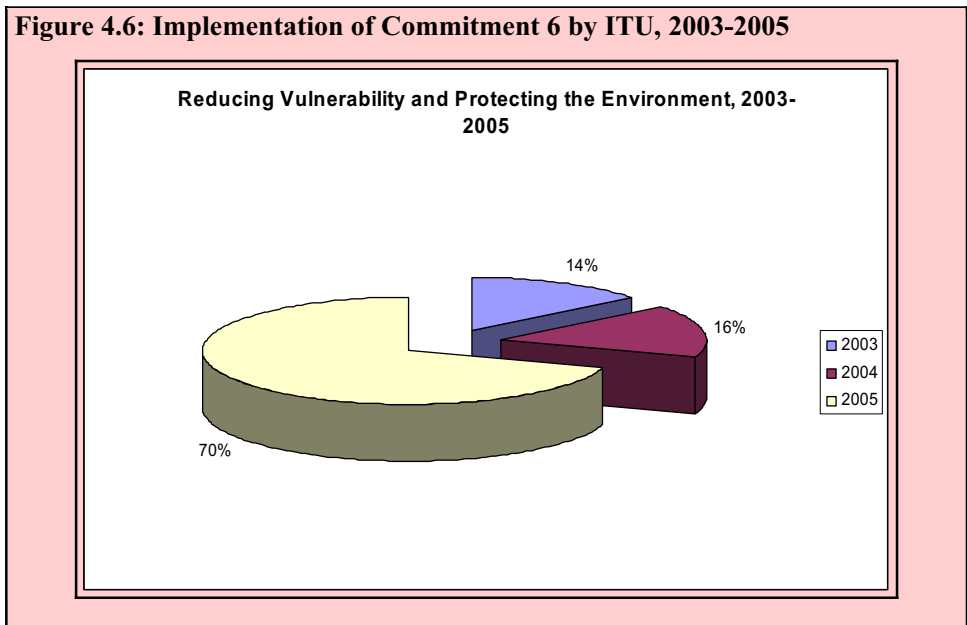
Commitment 7: Mobilizing financial resources

ITU has been very active in mobilizing resources for the benefit of LDCs, particularly building private-public partnerships. Various strategies were used, including the holding of roundtables in order to bring development partners together to discuss the funding of development projects. For example, in 2001 roundtables were held for Eritrea, Guinea-Bissau, Mozambique, and Nepal to promote their ICT and telecommunication projects to development partners. In 2003, a partnership roundtable was held in Arusha, Tanzania, for the benefit of the Central African Republic, Malawi, Mali and Zambia. Another partnership roundtable took place in Coventry, UK, for Bhutan and Kiribati. Haiti and Djibouti also benefited from partnership roundtables held in Mexico City and Beirut, respectively. In the same spirit, ITU organized the first Global ICT Forum for the Least Developed Countries in Mauritius (July 2004). Representatives from almost all the LDCs attended the Forum with fellowships provided by ITU. A detailed account of these partnership forums is given in section 4.3.7.

Figure 4.7 shows ITU's contribution towards the implementation of Commitment 7 from 2001 to 2005.

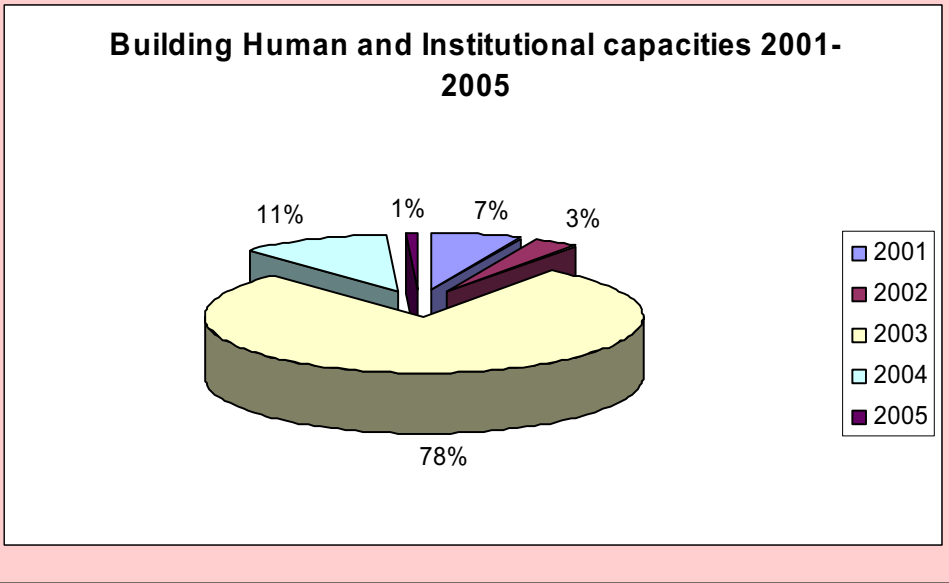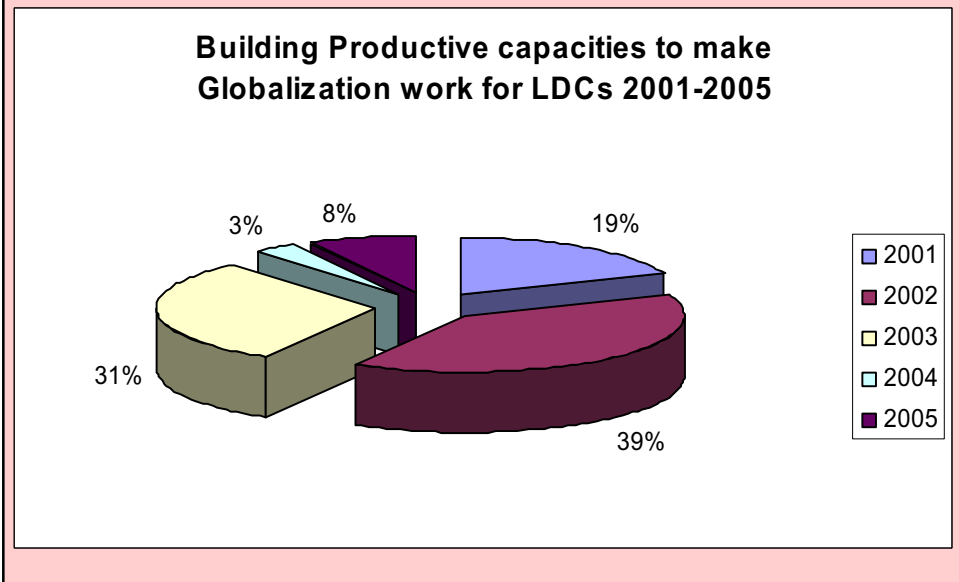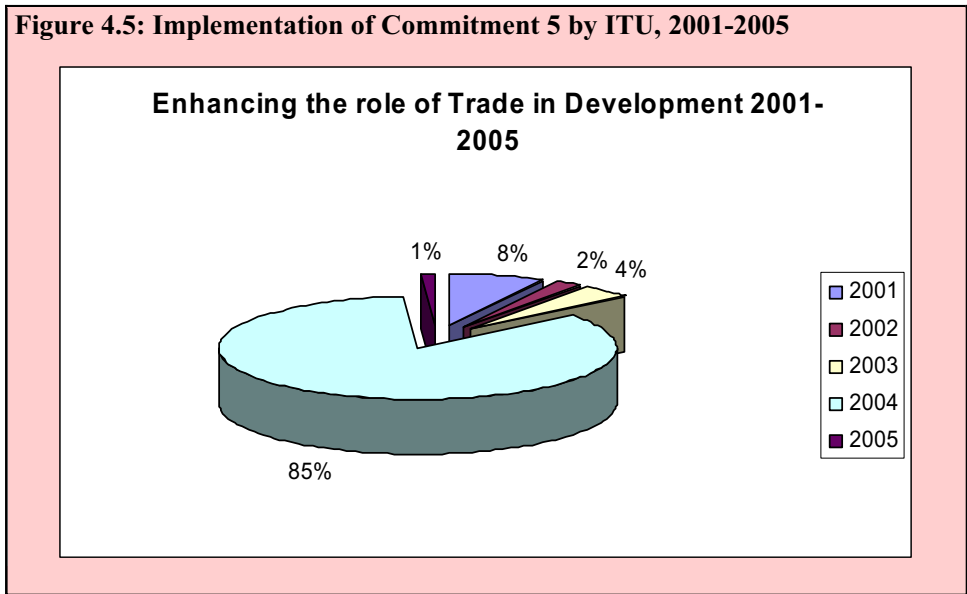**Figure 4.7: Implementation of Commitment 7 by ITU, 2001-2005**

Mobilizing Financial Resources, 2001-2005

2001	
2002	
2003	
2004	
2005	

26%, 19%, 12%, 18%, 25%
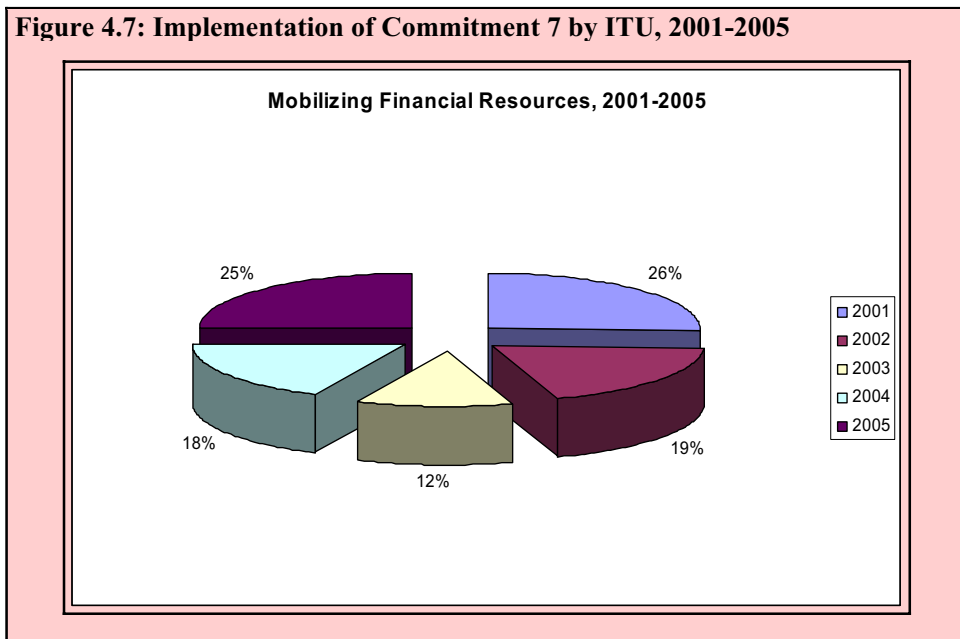
Table 4.2 has been prepared in accordance with the priority areas on the basis of which ITU's assistance to LDCs was delivered:

Table 4.2: Synergies between the Brussels Programme of Action Commitments and ITU's Priority Areas

BPOA Commitments	Year	Nature of key assistance provided to countries
1. Fostering a people-centred policy framework	**2001**	Development of a universal service/access policy for Mozambique.
		Sector restructuring for Eritrea.
		Study of the telecommunication policy and regulation of Guinea-Bissau.
		Assistance in numbering plan for Uganda.
		Cost and tariff policy workshops in Gambia, Guinea-Bissau and Sierra Leone.
		Training in frequency spectrum and management for Chad, Dem. Rep. Of Congo, Djibouti, Equatorial Guinea, Liberia and Somalia.
	2002	Assistance in sector reform for Central African Republic and Djibouti.
		Assistance in frequency management for Malawi (FM frequency band).
		Assistance in the strengthening of the regulatory body of Haiti.
		Support to Société des Télécommunications du Mali (SOTELMA), the telecommunication operator in Mali, in the implementation of a strategy for its privatization.
		Emergency support to Afghanistan in spectrum management.
		National sector policy and drafting of regulatory framework project for LDCs in the Pacific Islands.
	2003	Assistance to enhance the frequency management and radio monitoring system of Burkina Faso, Guinea and Yemen.

ICT and telecommunications in LDCs

BPOA Commitments	Year	Nature of key assistance provided to countries
	2003	Support in the implementation of sector reform for Central African Republic, Dem. Rep. Congo and Equatorial Guinea.
		Assistance in strengthening the spectrum management unit of Malawi, Mali and Zambia.
		ICT regulatory harmonization for the Economic Community of West African States (ECOWAS) countries.
	2004	Assistance in restructuring the telecommuni-cation sector in Angola and Mauritania.
		Assistance in sector reform of the Ministry of Post, Telephone and Telecommunications of the Dem. Rep. of Congo.
		Assistance in developing frequency management plans and radio monitoring, and in the creation of a National Directorate for Communication and Information in Guinea.
		Assistance in establishing a frequency monitoring station service to the Ministry of Communication of Afghanistan.
		Assistance in establishing point(s) of intercon-nection for hybrid networks for Bangladesh.
		Assistance in the establishment of a regulatory authority for Lao P.D.R. and Myanmar.
	2005	Assistance in sector restructuring for Angola, Madagascar, Mauritania, Rwanda, and Sudan.
		Subregional meeting on sector restructuring for Myanmar and Lao P.D.R.
		Assistance to the regulatory authority of Cape Verde, to the Société Centrafricaine de Télécommunications of Central African Republic, and to the Eritrea Telecom-munications Services Corporation (Eritel).
		Holding of the Global Symposium for Regulators for regulators from the developed, developing and least developed countries.[22]

BPOA Commitments	Year	Nature of key assistance provided to countries
2. Good governance at national and international levels	**2001**	Rebuilding of the rural telecommunication infrastructure in Burundi and Rwanda.
		Assistance in the strengthening of the policy and regulatory environment in the telecommunications sector to Burundi, Democratic Republic of Congo, Liberia, Rwanda, Sierra Leone and Somalia.
	2002	Ongoing assistance in the strengthening of the policy and regulatory environment in the telecommunications sector for Burundi, Democratic Republic of Congo, Liberia, Rwanda, Sierra Leone and Somalia.
	2003	Implementation of IP-based platforms for the governments of Burkina Faso and Mauritania.
	2004	Assistance in the establishment of sector governance in telecommunications for Timor-Leste.
	2005	Assistance in sector restructuring for Angola, Madagascar, Mauritania, Rwanda and Sudan.
		Subregional meeting for sector restructuring Lao P.D.R. and Myanmar.
		Assistance provided to the regulatory authority of Cape Verde, to Société Centrafricaine de Télécommunications of Central African Republic, and to the Eritrea Telecommunications Services Corporation (Eritel).
		Organization of a Global Symposium for Regulators.
3. Building human and institutional capacities	**2001**	Establishment of a Telecommunication and ICT Training Institute in Eritrea.
		Training in the use of a network planning tool (PLANITU) for the national telecommunication operator in Chad, Société des Télécommunications du Tchad (SOTEL).
		Support for the reorganization of the training centre of the telecommunication operator in Mali (SOTELMA).

ICT and telecommunications in LDCs

BPOA Commitments	Year	Nature of key assistance provided to countries
	2002	Assistance through training management for the Société Centrafricaine de Télécommunications (SOCATEL) from Burkina Faso.
		Establishment of telemedicine links for Senegal.
		Telemedicine pilot project in Guinea.
		Assistance in the elaboration of distance learning and dissemination of information on tropical disease for Tanzania and Uganda.
		Workshop and training in human resources development/management for Bhutan, Djibouti, Malawi and Zambia.
	2003	Establishment of internet training centres in Afghanistan, Angola, Burkina Faso, Cape Verde, Ethiopia, Maldives, Mozambique, and Uganda.
		Establishment of an ICT Training Centre for Returnees in Liberia.
		Assistance in strengthening skills and capacities of Somali Telecom operators.
		Establishment of internet for schools in Mali.
		Support in the rehabilitation of the information and communication training institute in Kabul, Afghanistan.
		Assistance in the establishment of a telemedicine link in Mozambique.
	2004	Assistance in human resources development/management for Mauritania, Myanmar and Somalia.
		Internet training centres were established in Bhutan, Cape Verde, Liberia, Malawi, Rwanda, Tanzania and Yemen.
		Telemedicine project in Mauritania.
	2005	Internet training centres were established in partnership with the European Commission in Ethiopia, Gambia, Rwanda, Uganda and Zambia.

BPOA Commitments	Year	Nature of key assistance provided to countries
	2005	ITU-CISCO internet training centres were established in Angola, Bangladesh, Bhutan, Lao P.D.R., Mali, Mauritania and Samoa.
		Assistance was given to Ethiopia for the development of a TTS software adapted to the Ethiopian local language, Amharic, in support of the Adaptive Technology Centre for the Blind (ATCB).
4. Building productive capacities to make globalization work for LDCs	**2001**	Guidance in the preparation of tender documents for cellular networks and implementation of the network in Bhutan.
		Assistance in the establishment of a pilot hybrid PSTN/IP network in Nepal.
		IP network assistance in Mauritania.
		Establishment of MCTs in Burkina Faso, Cape Verde, Mali and Senegal.
	2002	MCTs were implemented in Haiti, Madagascar, Mali, Myanmar and Niger.
		Establishment of a telekiosk for e-post services in Bhutan.
		Financial assistance for the purchase and installation of equipment for the Lomé Regional Telecommunication Maintenance Centre (CMTL SA).
		Assistance in developing a broadcasting system for Bhutan and Ethiopia.
	2003	MCTs were established in Haiti, Malawi, Niger, Sudan, Tanzania and Uganda.
		Conduction of a study for a submarine optical fiber network for Maldives and Myanmar.
		Assistance in telekiosks for e-post services for Afghanistan, Bhutan and Myanmar.
	2004	Assistance in the expansion of MCT projects for Guinea, Haiti, Myanmar and Uganda.
	2004	Development of Bhutan's rural ICT infrastructure.

BPOA Commitments	Year	Nature of key assistance provided to countries
	2005	VSAT network implemented in Bhutan.
		Assistance in establishing MCTs in Samoa and Solomon Islands.
		Wireless IP projects in Uganda and Yemen.
5. Enhancing the role of trade in development	**2001**	Assistance in the upgrade of ICT networks with advanced security and trust technology in Burkina Faso, Cape Verde, Mali and Senegal.
	2002	Assistance in establishing an e-commerce legal framework for Burkina Faso.
		Assistance in an e-commerce project for Cape Verde.
		Assistance on e-commerce training in the development and management of a public key infrastructure for Cambodia.
	2003	Assistance to African LDCs in issues related to the General Agreement on Trades in Services (GATS).
	2004	E-commerce projects established in Burkina Faso and Senegal.
		E-agriculture projects were implemented in Mauritania, Myanmar and Samoa.
		E-security projects and trust technology based on PKI for Bhutan, Burkina Faso, Cambodia, Senegal and Zambia.
		Assistance in developing a legal framework for e-commerce in Tanzania.
	2005	Conduction of a study on the economic integration of the Communauté Économique et Monétaire de l'Afrique Centrale (CEMAC) countries for Central African Republic, Chad, Congo and Guinea.
6. Reducing vulnerability and protecting the environment	**2002**	Publishing of the first edition of the Disaster Communications Handbook.
		Launch of a project on emergency communications funded by ITU and Inmarsat that deploys satellite terminals in countries when disasters strike.

BPOA Commitments	Year	Nature of key assistance provided to countries
	2003	Establishment of an "Environment Information Circulation and Monitoring System on the Internet Programme for Africa" (SISEI) for Gambia, Ghana, Guinea, Kenya, Mali, Mauritania, Morocco, Niger, and Uganda.
	2004	Publication of the Handbook on Emergency Telecommunications[23].
	2005	Deployment of satellite terminals to tsunami-hit countries and Pakistan, following the Kashmir earthquake.
		Assessment, rehabilitation and reconstruction of telecommunication infrastructure in Bangladesh, Indonesia, Maldives and Sri Lanka.
7. Mobilizing financial resources	2001	Partnership roundtables for Eritrea, Guinea-Bissau, Mozambique and Nepal.
	2002	Fellowships given to LDCs to attend events and workshops, and participate in training courses.
	2003	Partnership roundtables for Bhutan, Central African Republic, Djibouti, Haiti, Kiribati, Malawi, Mali and Zambia.
	2004	First Global ICT Forum for Least Developed Countries[24].
	2005	Fellowships for LDCs to attend events such as ITU Private Sector events providing forums for partnership building.

4.3.1   Detailed analysis of ITU's activities in support of Commitment 1: Fostering a people-centred policy framework

2001

Under the sector restructuring priority area, Mozambique received concentrated assistance in developing a universal service policy plan, while concentrated assistance was also given to Eritrea's government in sector restructuring and training. Guinea-Bissau received concentrated assistance in carrying out a study on telecommunications policy and regulation and on spectrum management and radio monitoring. Several workshops were organized for most of the African LDCs on cost and tariff policies, to enable them to calculate fair charges for tele-

communication services. Gambia, Guinea-Bissau and Sierra Leone benefited from these workshops. Assistance in frequency management aimed at strengthening the spectrum management systems of the Democratic Republic of Congo was provided throughout the year.

Ad hoc assistance was provided to Chad, Djibouti, Equatorial Guinea, Liberia and Somalia in training staff on frequency spectrum management, while Uganda received assistance in developing numbering plans.

2002

Concentrated assistance was provided to Central African Republic in the implementation of sector reform. Malawi also received assistance in frequency management, particularly within the FM frequency band. Haiti received assistance in the strengthening of its regulatory body and Djibouti received concentrated assistance in sector restructuring and in finance and tariffs. SOTELMA, the telecommunication operator in Mali, received support in the implementation of a strategy for its privatization.

A joint ITU TELECOM Surplus Fund/UNDP project provided support to the Government of Afghanistan in restoring their Ministry of Communications when the war ended and establishing an operational structure capable of dealing with the telecommunication governance issues during the immediate term and beyond. In addition, ITU also assisted the country in developing critical elements of their sector policy, drafting a telecommunications bill, and working out a regulatory structure and streamlining its operations. In the same vein, ITU also elaborated a National Radio-Frequency Plan, National Radio Regulations, Guides for Spectrum Monitoring and Station Inspection, and implemented a computerized spectrum management system. A related coverage map for the medium wave, frequency modulation and TV broadcasting is shown in Figure 4.8.

Some of the LDCs in the Pacific Islands benefited from projects designed to help them develop their national sector policy and regulatory framework. Beneficiary countries included Kiribati, Samoa, Solomon Islands, Tonga and Tuvalu. The projects were at national and subregional levels, i.e., expertise was provided for the development of a national sector policy and a regulatory framework for each participating country, as well as policy harmonization at the subregional level (including the development of competences in the area of telecommunication policy, regulation and legislation). Fourteen Pacific Island countries participated in the subregional project. The project was co-funded by Asia-Pacific Telecommunity, Government of Australia, ITU, Pacific Islands Forum Secretariat, Pacific Islands Telecommunications Association, United Nations Development Programme.

Figure 4.8: Coverage area of a station with directional antenna, Kabul, Afghanistan

Example of coverage area presentation
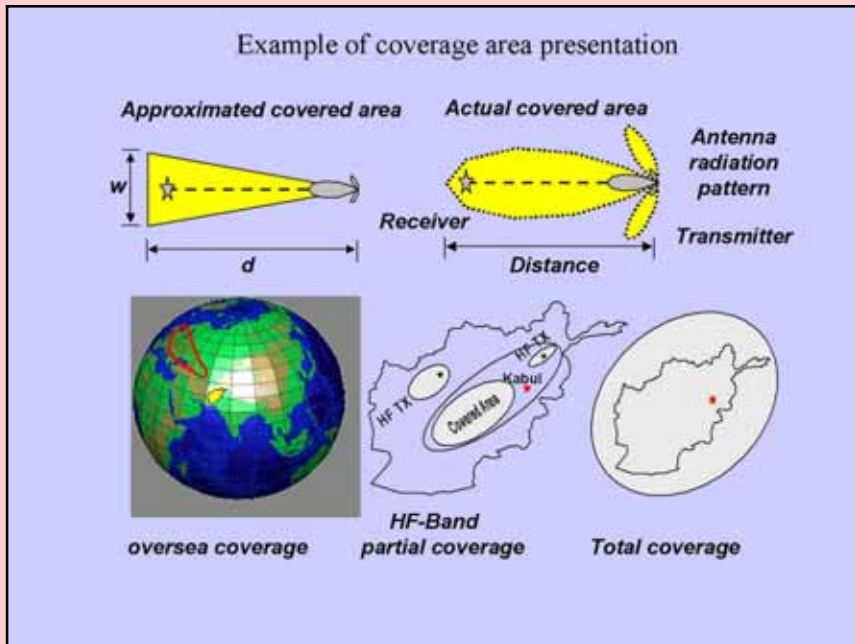
Source: ITU.

Ad hoc assistance, mainly in policy and regulation, was provided for a number of initiatives to benefit Somalia. Expertise was also provided on financial aspects and tariffs for Yemen's Public Telecommunication Corporation (PTC), and numbering plans for the Maldives.

One of the most notable annual events held was the Global Symposium for Regulators, organized by ITU to help world regulators exchange views on how to achieve successful policy reforms and put in place appropriate regulatory mechanisms to attract investment into the sector, and ultimately allow for its integration into the global economy.

2003

Burkina Faso received concentrated assistance to enhance its frequency management and radio monitoring systems, while the Central African Republic, the Dem. Rep. Congo and Equatorial Guinea received support in the implementation of sector reforms, namely updating old and elaborating new legislative and regulatory texts, particularly in frequency management, universal access, tariffs, ICT and interconnection.

The Malawi Communications Regulatory Authority (MACRA) received assistance in strengthening the spectrum management unit, while Mali and Zambia received assistance in enhancing their frequency management and radio-monitoring units. ITU carried out a needs assessment for the Communication Authority of Zambia (CAZ), covering technical and human resource needs.

Kiribati received management support and training in the area of costing and price-setting in relation to the development of a long-range strategic business plan for the state-owned company.

A subregional telecommunication meeting for Cambodia and Lao P.D.R. was organized to discuss common interests and telecommunication development issues within these two countries. ITU assisted by providing guidance and recommendations, as well as, concentrated assistance in sector restructuring and interoperability of the various networks in Lao P.D.R.

West African regulators approve a framework for a common ICT market in September 2005.
Source: ITU.

ECOWAS countries (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo) received assistance for a project on ICT market harmonization to create an integrated ICT market policy. This project, co-financed by ITU and the European Commission, also sought to build human and institutional capacity in the field of ICT through a range of targeted training, education and knowledge sharing. Regulatory guidelines addressing interconnection, licensing, numbering, spectrum management, universal access, ICT policy and legislation for the project were formally approved in 2005.

Ad hoc assistance was provided to Gambia for the review of that country's Telecommunication Act and to Eritrea, Guinea and Yemen in frequency management and regulatory issues. Expertise was provided to Yemen in telecommunication regulation affairs.

2004

Angola received concentrated assistance in restructuring its telecommunication sector, especially in moving from a monopolistic regime to a competitive environment. In this regard, a new strategy was adopted to adapt and transform Angola Telecom to the new changing environment. The transformation of Angola Telecom divisions into strategic business units was funded by ITU, through its TELECOM Surplus project. Other recipients of concentrated assistance were the Dem. Rep. of Congo, which carried out a sector reform of its Ministry of Post, Telephone and Telecommunications, and Guinea, where assistance was provided in the form of frequency management planning, radio monitoring and the creation of a National Directorate of Communication and Information.

Rwanda, a special needs country, also received assistance in sector restructuring, frequency management, costing and tariffs, while Mauritania received assistance in sector restructuring, including regulation and planning.

Concentrated assistance in spectrum monitoring station services was provided to the Ministry of Communication of Afghanistan for the establishment of intelligent monitoring and control systems in Kabul. The services provided were:

- Guidance to contractors during the design and restoration of the monitoring station's building, damaged by war;
- Preparation of the antenna configuration for the VHF and UHF monitoring system;
- Test and delivery of equipment;
- Commissioning and installation of equipment at site;
- Training the Spectrum Management Unit staff on radio spectrum monitoring techniques.

Bangladesh received concentrated assistance to create an enabling policy and a legal, regulatory and operational environment through the planning and establishing of interconnection hybrid networks (National Internet Exchange in Bangladesh) point(s), with support from UNDP and private operators (see Figure 4.9).

Support was provided in establishing a regulatory authority for Myanmar. Lao P.D.R.'s Ministry of Communication, Transport, Post and Construction received assistance to set up a regulatory authority and train staff. ITU additionally developed licensing regulation and universal service access for the country.

Figure 4.9: Schematic diagram of internet exchange at Dhaka, Bangladesh

Internet Exchange Router

EBGP Session   EBGP Session   EBGP Session   EBGP Session

Layer 2 Switch

NMS Server

Router ISP A   Router ISPB   Router ISP C   Router ISP D

Private Peering

Link ISP A Network   Link ISP B Network   Link ISP C Network   Link ISP D Network
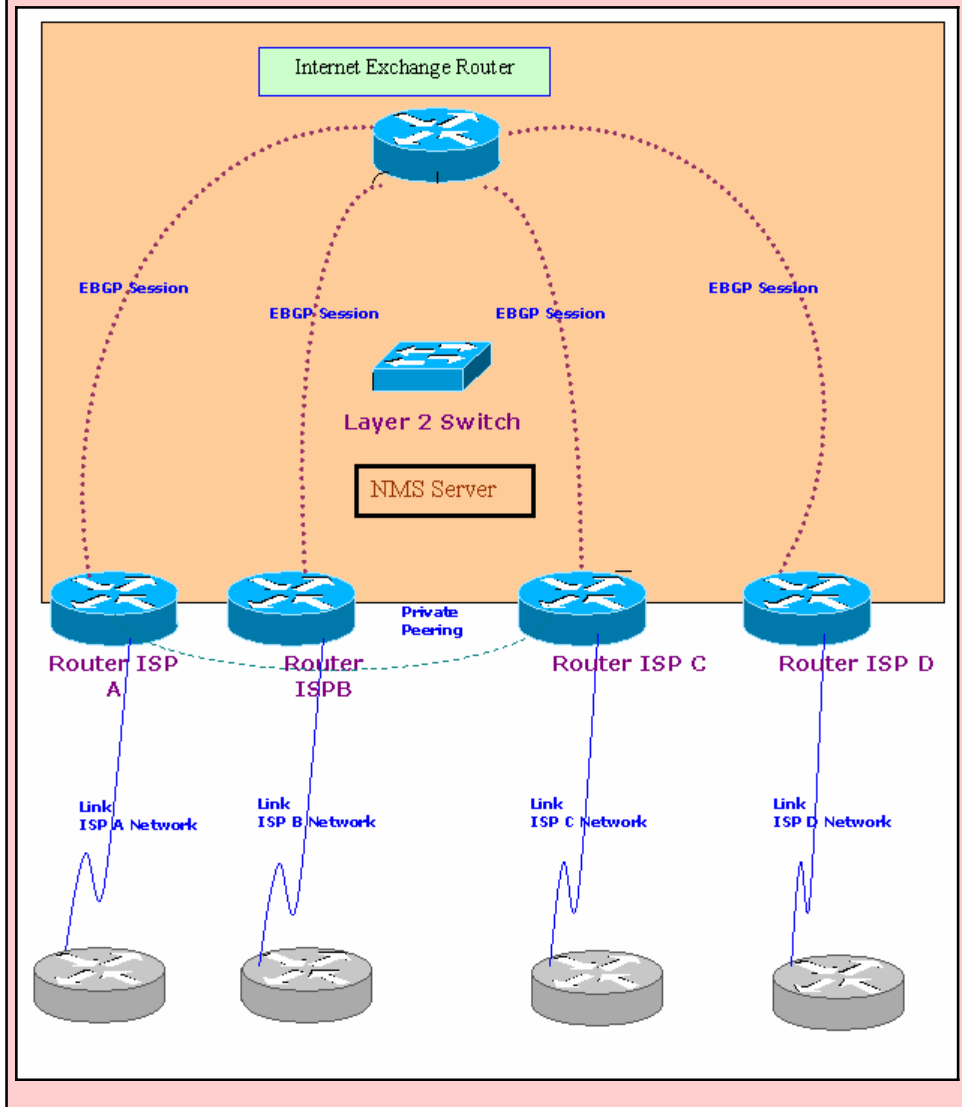
Ad hoc assistance was provided to Cape Verde for the preparation of a national policy document, to Central Africa for the subregional maintenance centre project on telecoms, and to Yemen on tariffs and policies.

The fifth annual ITU Global Symposium for Regulators (GSR 04), themed "Low-cost broadband and internet access essential to information society", identified the best practices needed to facilitate access, so that the social and economic benefits of the information society could be extended to all the world's citizens. The participants expressed a shared goal to create national regulatory frameworks that are flexible and pro-competition between multiple private sector service providers who may want to utilize a variety of technology platforms and delivery options. Fellowships were given to LDCs to enable delegates to attend the event in Geneva, during the first phase of the World Summit on the Information Society.

2005

Angola continued to receive assistance in sector restructuring. The Société des telecommunications (SOTEL) of Chad received assistance in strengthening their regulator's capacity for privatization. Madagascar, Mauritania, Rwanda and Sudan received concentrated assistance in sector restructuring.

Afghanistan continued to benefit from the establishment of an intelligent monitoring and control systems project in Kabul.

Lao P.D.R. and Myanmar benefited from the subregional meeting for sector restructuring organized by the Regulatory Reform Unit.

Ad hoc assistance was provided to the regulatory authority of Cape Verde, to the Société Centrafricaine de Télécommunications of Central African Republic, and to the Eritrea Telecommunications Services Corporation (Eritel).

ITU organized the sixth annual Global Symposium for Regulators (GSR 05), during the second phase of the World Summit on the Information Society (WSIS) in Tunisia, from 14 to 15 November 2005. It brought together regulators, policy-makers and service providers from 110 countries to develop a new regulatory framework to promote broadband deployment and access in developing countries. Fellowships were given to LDC administrations to enable their participation.

Global Symposium for Regulators, 14-15 November 2005, Yasmine Hammamet, Tunisia
Source: ITU.

4.3.2 Detailed presentation of ITU's activities in support of Commitment 2: Good governance at national and international levels

2002

Within this framework, ITU implemented projects in rebuilding the rural telecommunication infrastructure of Burundi and Rwanda, that had been destroyed by war. The projects, financed by ITU TELECOM Surplus Fund with ONATEL and RWANDATEL as partners, involved the installation of telecommunication equipment in rural areas and ICT training of personnel on the operation and maintenance of telecom networks. These projects were meant to improve nation-wide access to telecommunications services in both urban and rural areas. As of today, these services have already positively impacted the development of other sectors such as education, health, e-commerce, agriculture and business.

Burundi, Democratic Republic of Congo, Liberia, Rwanda, Sierra Leone and Somalia received assistance to strengthen the policy and regulatory environment in the telecommunications sector and to improve rural access to services by encouraging investment in those areas. Specifically, support was provided in the

development of a modern regulatory framework regarding telecommunication services and broadcasting. Additional technical assistance included the training of staff, overseas training, and consultancies meant to reinforce the regulatory agencies. This project was co-financed by the Federal Communications Commission (FCC), the ITU TELECOM Surplus Fund and the United States Agency for International Development (USAID).

2003

VoIP for e-government convergence is a reality now in Mauritania
Source: ITU.

IP-based platforms are being implemented on the government optical fibre network in Ouagadougou, Burkina Faso and in Mauritania, to develop government services and applications by covering the national territory. As a result of these projects, participating countries will benefit from more secure, accessible, transparent and efficient government operations and services. All ministries and all major cities in Burkina Faso will be connected by 2007 using an optical fibre-based platform. In Mauritania, the target is to install 6 000 internet-connected PCs in government offices (ministries and other administrative offices) by 2006, as part of the implementation of the National ICT Strategies project developed with ITU's assistance.

2004

Assistance was provided to Timor-Leste, a country in Special Need, for the establishment of sector governance in telecommunications.

4.3.3 Detailed presentation of ITU's activities in support of Commitment 3: Building human and institutional capacities

2001

In this area, Eritrea was assisted in developing a business plan for the establishment of a Telecommunication and ICT Training Institute. The goal was to equip telecommunication staff with smart skills for the reform of the telecommunication sector in the country, after the Eritrean-Ethiopian war finished in 2000. Personnel in the national telecommunication operator in Chad (SOTEL)

also received training on the use of the network planning tool (PLANITU) used in finding minimum-cost solutions. Mali received support in the reorganization of the training centre for the telecommunication operator in Mali, SOTELMA.

2002

Société Centrafricaine de Télécommunications (SOCATEL), from Burkina Faso, received concentrated assistance to train telecoms managers, while ONATEL personnel, in the Office National des Télécommunications, benefited from expert assistance in the form of training in GSM networks.

In order to strengthen the frequency management function of MACRA, staff in the Malawi Communications Regulatory Authority received training in spectrum planning and management.

Zambia received concentrated assistance by way of on-the-job training and fellowships were granted to enable the communication authority staff to receive training abroad. Kiribati also received concentrated assistance in various forms, including technical advice to the Board of Directors of the Telecommunication Services Kiribati Limited.

A workshop and training courses in human resources development/management were held in Bhutan and Djibouti.

With regards to telemedicine projects, an ITU TELECOM Surplus Fund pilot project was established to link the University Hospital of Dakar-Fann in Senegal with the Regional Hospital in Dioubel. Thanks to ITU, the Government of Senegal and SONATEL, the transmission of medical images, as well as patient data records and other medical information, is now available. This project makes possible distance-consultation and the exchange of medical information, as shown in Figure 4.10.

Guinea also received assistance on a telemedicine pilot project connecting a hospital in Conakry, Guinea's capital, to two other hospitals based in rural areas. This project was funded by ITU through its ITU TELECOM Surplus Funds.

Figure 4.10: Telemedicine project configuration in Senegal

Finally, Ethiopia, Tanzania and Uganda received assistance in the elaboration of distance learning and dissemination of information on tropical diseases. In Ethiopia, 10 hospitals were networked to a hub at the Tikur Anbesa Hospital of Addis Ababa, enabling health professionals to get training through the use of ICTs as shown in Figure 4.11.

Figure 4.11: Location of the hospitals linked in Ethiopia

2003

Launch of the first gender-focused ITU/CISCO Internet Training Centre at the Dept. of Women and Gender Studies of the Makerere University, Kampala, Uganda, 2003
Source: ITU.

The partnership between Cisco and ITU has enhanced human capacity building in government and public administration, in the field of IP networking. The project targeted least developed countries and assisted non-profit training and educational institutions in establishing the Cisco Certified Networking Associates of the Cisco Networking Academy Program. Through a

train-the-trainer approach, ITU has provided affordable and relevant training, using both face-to-face workshops and e-learning methods. LDCs that benefited from this initiative in 2003 are: Afghanistan, Angola, Burkina Faso, Cape Verde, Ethiopia, Maldives, Mozambique and Uganda.

Djibouti received concentrated assistance in human resources development/management, including the application of GSM 400, VSAT, AMRC-CDMA 450 system and IMT-2000 in rural telecommunications.

Somalia also received concentrated assistance in a project aimed at strengthening the skills and capacities of existing staff – technical, administrative and managerial – and developing infrastructure and capacities to undertake further training on a continuing basis to better meet the needs of Somali Telecom operators. This project proposed to develop a training facility, design training materials and conduct training programs in order to enhance existing skills and produce a wider pool of skilled manpower to cope with the demands of all Somali operators.

Bangladesh benefited from concentrated assistance to impart know-how on the technical, financial, economic and other considerations regarding the application of next-generation networks.

Bhutan received capacity building for new technologies and management. The tailor-made training for some 20 staff of Bhutan Telecom focused on "the management and operation of better telecoms technologies and management in a changing environment".

Internet for Schools
Source: Swisscom.

"Internet for Schools in Mali" is another successful project that connect to the internet the Timbuktu High School, located in the trans-Saharan desert, 1 000 kilometres from the capital. Students are acquiring ICT skills that will bring socio-economic benefits to their communities and to their future professional lives. This partnership project between ITU, Mali, and Swisscom is part of ITU's overall scheme to develop a large number of projects and connect as many schools as possible across the world to the internet. In Senegal, a similar project on e-learning was also established.

Afghanistan was supported in the rehabilitation of the information and communication training institute in Kabul.

Mozambique received assistance in the extension of telemedicine facilities from Beira (central region) and Maputo (capital) through ISDN links. Two central hospitals, one in Maputo and one in Beira, were connected by a telemedicine link using the existing telecommunication infrastructure. The establishment of a link between the two sites was for clinical and educational purposes. Doctors are now able to discuss cases that require high-level interpretation. The transmitted images are used to obtain a second or third opinion and, last but not least, the images sent in advance are used to assess whether hospitalization is required before the transfer of the patients to Maputo, as shown in Figure 4.12.

Figure 4.12: Telemedicine project configuration in Mozambique
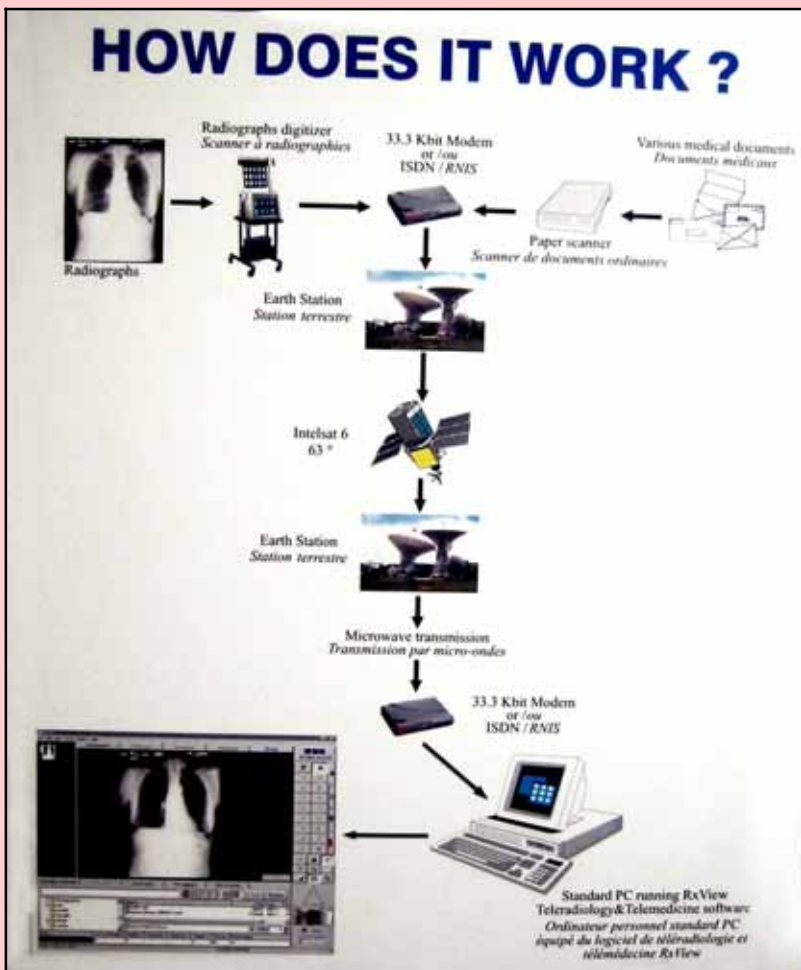
2004

ICT Training in a multipurpose community telecentre established by ITU in Bhutan
Source: ITU.

The ITU Capacity-Building Programme, supported by the European Commission, established Internet Training Centres (ITCs) in Bhutan that provided two streams of internet and ICT training programmes to end-users and advanced users. The centres provided training courses in "How to design and set up an e-secure web-based service" and an "Introductory computer, software and digital technology".

The Internet Training Centres established in partnership with Cisco were extended to the following LDCs in 2004: Cape Verde, Liberia, Malawi, Rwanda, Tanzania and Yemen.

Mauritania also received concentrated assistance in human resources development/management, including human resource development planning, management and training in new technologies.

Concentrated assistance was given to Somalia in human resource development/management. This assistance included the development of rural telecommunications and infrastructure, the introduction of new technologies and services, sector restructuring, HRM/D, and financing.

Direct assistance was given to Myanmar under the ITU Human Capacity-Building Programme in human resource development/management and regulation.

The Government of Mauritania received assistance in establishing a telemedicine unit that helps in extending access to high-quality health care to remote areas, improving medical training capabilities for future specialists and increasing capacities for medical data communication between networked practitioners. This project was funded by the ITU TELECOM Surplus Fund.

ITU-CISCO Internet Training Centre (ITC) at the National University of Samoa (NUS), Lepapaigalagala Campus, Western Samoa. Cabling exercises during instructor training for women
Source: ITU.

2005

More Internet Training Centers in partnership with the European Com-mission were established in LDCs during 2005, such as in Ethopia, Gambia, Rwanda, Uganda and Zambia.

The ITU-CISCO Internet Training Centers expand-ed in 2005 into Angola, Bangladesh, Buthan, Lao P.D.R., Mali, Mauritania and Samoa.

Ad hoc assistance was given for the development of TTS software for the Ethiopian local language, Amharic, in supporting the Adaptive Technology Centre for the Blind (ATCB), based in Addis Ababa, Ethiopia. This project is a joint initiative of ITU and the United Nations Educational, Scientific and Cultural Organization (UNESCO), which trained blind students, government employees and others to use computers equipped with adaptive devices such as voice synthesizers, magnifying hardware and software, as well as Braille embossers, scanners and printers. The objective of this project is to enable the visually-impaired population in Ethiopia at large to use IT in reading documents written in the local language.

Blind graduates from the Adoptive Technology Centre for the Blind (ATCB) in Addis Ababa, Ethiopia
Source: ATCB.

Sudan received concentrated assistance in human resources development/ management, while Nepal received ad hoc assistance in capacity building for the Nepal Telecommunication Authority.

A young Liberian returnee learning ICT skills for new job opportunities
Source: UNHCR.

An ICT training centre was established in Monrovia, Liberia, to assist returning refugees in acquiring ICT skills in order to improve their chances of finding a job. The project was jointly sponsored by Africa Development, Assistance (ADA Liberia), ITU, Opportunity Industrialization Centre (LOIC), United Nations Development Programme (UNDP) and United Nations High Commissioner for Refugees (UNHCR). Apart from providing ICT training, the centre will also support any on-going peace initiatives and development issues. The project outputs are highly visible in that young people, both men and women, are being given core computer and entrepreneurial skills (business management, project management, etc.) to enable them to develop small- and medium-sized enterprises, either within the knowledge industry or in other businesses. The centre trains about 60 students every two months. It offers training free of charge to returnees, but charges a nominal fee for other community members wishing to receive training in ICT. In order to generate revenue, the centre serves as an internet café after student training sessions and charges users for such services. Services provided include e-mail, internet access, word processing, photocopying, and basic desktop publishing. The modest fees charged are to make the venture financially sustainable. It also supports various social and economic community initiatives such as peer counseling, micro-finance, etc. It is hoped that this model will be replicated in other parts of Liberia and other countries emerging out of war situations in Africa.

ITU helped to launch a project linking schools on Tanzanian islands to the internet. Together with the Tanzania Commission for Science and Technology (COSTECH), the Ministry of Education and Vocational Training in Zanzibar, a Dar es Salaam-based private company, Satcom Networks Africa Ltd, and the Microsoft office in Nairobi, ITU brought together resources for the Wete School Net and Community Access Project.

Utaani Secondary School and the Benjamin William Mkapa teacher-training facility now have access to modern ICTs. Each school has equipment that includes computers, associated peripherals and software, printers, photocopying machines, digital cameras, television and video sets.

The new equipment and access points will help teachers and students at the two schools to achieve computer literacy. These facilities will be used free of charge during school hours. The local community in the town of Wete will be served as well.

4.3.4 Detailed presentation of ITU's activities in support of Commitment 4: Building productive capacities to make globalization work for LDCs

2001

Assistance was mainly provided in the area of improving the investment environment. Efforts were also directed at identifying low cost, affordable technologies for the LDCs.

For instance, Bhutan was given guidance in the preparation of tender documents for its cellular networks that resulted in their implementation. In Nepal, a pilot hybrid PSTN/IP network was set up to enable migration from PSTN to IP, while Mauritania was also a beneficiary of IP network assistance.

MCT[25] pilot projects were implemented in various countries – such as Burkina Faso, Cape Verde, Mali and Senegal – in an effort to promote universal access. In Burkina Faso, broadcasting transmitters were rehabilitated and upgraded to assist in network expansion.

2002

MCT pilot projects were implemented in various countries in an effort to promote universal access. These centres were designed to run along commercial lines with generated funds being injected back into the project. They provide internet access, access to libraries and databases, as well as government/services and information. Benefits from this initiative include: easy access to education materials through e-education, access to medical information and services and the dissemination of business-related information that has tended to stimulate the rapid growth of local businesses and enabled farmers to easily access market data (e.g. prices of products, government online information). The facilities have gone a long way towards the training of the local population in ICTs and preparing unemployed persons for the new job challenges and opportunities coming with the new information age. Examples of countries where MCTs were implemented

in 2002 are Haiti, Madagascar, Mali, Myanmar and Niger, where a network of telecentres for women was established. The MCT project for Haiti was suspended when civil strife raised its ugly head. However, all the required equipment had already been procured and delivered.

Bumthang Post Office Bhutan, which is capable of transmitting e-mails that are delivered as post mail
Source: ITU.

Related to this initiative, ITU and the Universal Postal Union (UPU) initiated a project for the provision of e-post facility in Bhutan. This project allows e-mail messages that are sent to the post office to be delivered as local mail. The project benefited from a South-South transfer of expertise, know-how and technology from India.

Togo received financial assistance to purchase and install equipment for the Lomé Regional Telecommunication Maintenance Centre (CMTL SA) in laboratories and workshops. Expertise was also provided to Djibouti and Haiti that included the drafting and commissioning of project documents related to the introduction of new technologies in the ICT sector.

Bhutan and Ethiopia received assistance in developing their broadcasting systems, to be partly used to disseminate timely information that could make globalization work for these countries.

2003

Assistance was given to Mali in the implementation of a VSAT[26] network.

MCTs were established in Haiti, Malawi, Niger, Sudan, Tanzania and Uganda.

Along the northwestern border of Tanzania, a network of three MCTs was set up for refugees at:

- Ngara town, the district headquarters, which hosts the local administration, as well as aid agencies,
- K9, a camp that houses seven relief organizations working with the refugees and a secondary school for girls,
- Lukole, site of two refugee camps: Lukole A and Lukole B.

Refugees, including women, have been trained to run the centres themselves
Source: UNHCR.

The community has an estimated population of 135,000 refugees – mostly from Burundi – whose health, education, information and communication needs have been addressed by the project. The majority of them were from Burundi. MCTs also catered for the needs of the local community, educational institutions, schools, international aid agencies and non-governmental organizations involved in relief work in the area.

This project has had a tremendous impact on the local community. The MCT in Ngara town is on the way to becoming a rural ISP, in the sense that it provides internet access to the local hospital, schools and the district administration, through Wi-Fi links. The catchment area consisting of the refugee community, the local community, schools in particular, the local organizations and the staff members of international aid agencies, all have access to affordable ICT-based information and communication services. The ICT access has enabled them to:

- Stimulate the development and growth of local businesses,
- Access peacekeeping and conflict-resolution information through Worldspace radio programming,
- Develop ICT and community centre management skills among the local population,
- Access education facilities and medical information.

This project is a joint effort of ITU, the Tanzania Commission for Science and Technology (COSTECH), World Space Corporation, UNESCO, UNHCR and Volunteers in Technical Assistance (VITA).

Burundi and Eritrea were beneficiaries of ad hoc technical assistance in rural telecoms engineering and external plant management.

A feasibility study was carried out for a submarine optical fibre network to link the Maldives and Myanmar to existing or planned submarine optical fibre networks.

In an effort to develop rural telecommunications, Afghanistan, Bhutan and Myanmar had assistance in telekiosks for e-post services.

2004

Cape Verde and Mali had assistance in GSM network expansion. Cape Verde prepared tender documents to issue a Second GSM License. Madagascar also had assistance in a call for bids for network expansion.

Guinea, Haiti, Myanmar and Uganda saw the expansion of their MCT projects and connectivity was established in remote areas of Bhutan.

Benin was selected, along with four other African countries, to pilot the concept of telecentres as a means to provide affordable communications to rural and remote areas, and to develop specific applications in response to the basic needs of rural populations (education, health, small and medium enterprises, agriculture, etc.).

2005

A VSAT network was implemented in Bhutan, whilst the Solomon Islands and Sudan were assisted in infrastructure development and introduction of new technologies.

Rural populations in Solomon Islands plug into the information society
Source: ITU/Cosmas Zavazava.

In Samoa and Solomon Islands, ITU worked with local experts in designing and implementing 20 MCTs (ten for each country) intended to serve as access points for the population to voice communication, ICT services and applications for communities, businesses and schools. In Samoa, women have created their own local committees to manage nine of the MCTs, and a youth group runs the tenth. A train-the-trainers programme has being provided. A local expert conducts training in the Samoan language. Training materials have been translated into Samoan, and this has proved very useful for the women. When the trainer is away, they teach themselves using translated manuals. ITU works with SIDS to implement rural connectivity projects that match specific country's needs. In the case of Samoa, rural connectivity is a priority in its national strategic plan for ICT. The government believes that ICT cannot be developed at the national level if development continues to concentrate on the business district alone.

ITU provided assistance to LDCs to formulate policies and implement measures to foster an enabling environment to facilitate the deployment of modern ICT networks. The idea has been to identify low-cost, affordable, robust and appropriate technologies for LDCs. Wireless technology has proved popular because it is easy to deploy and affordable to the populations of LDCs.

For instance, two wireless IP projects in Uganda and Yemen have been implemented to pilot the use of wireless IP technology to facilitate access in remote and rural areas to basic communication and the internet and to support a variety of specific applications (telemedicine, tele-education, etc).

4.3.5 Detailed presentation of ITU's activities in support of Commitment 5: Enhancing the role of trade in development

2001

Telecentre established in Sta. Catarina, Cape Verde
Source: ITU/M. Minges.

In Burkina Faso, Cape Verde, Mali and Senegal, the already established ICT networks were upgraded with advanced security and trust technology and e-business platforms capable of meeting the needs of enterprises worldwide were established. Assistance and expertise in the design, development and implementation of secure e-commerce solutions were provided to these countries, in addition to training courses and seminars to increase awareness on the potential of ICTs in enhancing business and trade.

2002

At Brussels, ITU presented as one of its deliverables an e-commerce initiative whose purpose was to enhance trade in LDCs.

To this end, Burkina Faso received assistance in establishing a legal frame-work to promote e-commerce. Cape Verde benefited from the establishment of MCTs and an e-commerce project, while Cambodia received e-commerce training in the development and management of a public key infrastructure.

Seminars were organized for specific regions such as the e-business seminar for the Arab region that was held in Cairo (December 2002). It was intended for high-level representatives from Arab administrations, private sector experts in e-business, and representatives from regional and international organizations. Some of the topics addressed included:

- Infrastructure and applications for e-business,
- Building an e-business environment (policies and legal issues),
- Sustainable e-business strategies (turning on-line services into profitable business models),
- Securing your e-business environment (trust and security in e-business transactions),
- Security implications from the perspective of new privacy laws.

2003

Ongoing assistance was provided for African LDCs to restructure their telecommunication sector, including issues related to the General Agreement on Trades in Services (GATS), a World Trade Organization (WTO) treaty.[27]

Mauritania was given assistance in the establishment of e-commerce legislation. ITU assisted with the drafting of the legislation and the establishment of an internet-access community centre for women.

2004

Within the framework of ITU's e-strategy programme, many projects were implemented to build e-transaction infrastructures and Internet Protocol (IP)-based services and applications such as e-commerce and e-agriculture. Cybersecurity is critical in the use and development of ICTs. With the exponential growth in the use of cyberspace for commercial activities, the fight against cybercrime has become a very topical issue. Lack of adequate security is a handicap when using ICTs for applications that rely on the protection and confidentiality of sensitive data. Unless these security and trust issues are addressed, the benefits of the information society to governments, businesses and citizens cannot be fully realized. For this reason, ITU has been assisting countries to address these issues.

E-commerce projects for developing and least developed countries have been implemented in Burkina Faso and Senegal. Operational projects enabling women's associations to reap the benefits of ICTs in enhancing trade and establishing business relationships have been implemented.

In Mauritania, Myanmar and Samoa, e-agriculture projects which enable rural farmers to access information about the market price of their products facilitate the establishment of direct relationships with buyers and the collection and distribution of agriculture information to the rural population. Access to information has improved farming and marketing methods for their products.

Projects using advanced security and trust technology based on PKI, including digital certificates and digital signature techniques, have been carried out in Bhutan, Burkina Faso, Cambodia, Senegal and Zambia.

To develop their information and telecommunications infrastructure, Uganda and Yemen implemented wireless IP networks. Tanzania put in place the legal framework for e-commerce development, while Bhutan established its e-applications strategy.

2005

ITU makes concerted efforts to forge international partnerships to bring the benefits of ICTs to unconnected LDCs. In 2005, the Central African Republic, Chad, Congo and Guinea and benefited from a feasibility study of interconnection of CEMAC[28] countries. There was also another study to include two war-torn countries, Angola and the Democratic Republic of Congo, in the Southern African Development Community (SADC)[29] Region ICT infrastructure. Such ICT infrastructure networks will boost regional trade and alleviate poverty.

4.3.6   Detailed   presentation   of   ITU's   activities   in   support   of Commitment 6: Reducing   vulnerability   and   protecting   the environment

2002

"The LDCs are acutely vulnerable to a variety of natural shocks, including natural disasters".[30] ITU established a dedicated programme on emergency telecommunications to provide fast and reliable telecommunications services when disaster strikes.

Under this framework, ITU published the first edition of the Handbook on Disaster Communications, as adopted by ITU-D Study Group 2 Question 16/2. This publication provides guidance for those involved in humanitarian assistance using telecommunications to mitigate the effects of disasters. The first part is intended to provide a background framework for policy-makers who have re-

Handbook on Disaster Communications
Source: ITU.

sponsibilities in the area of disaster communications planning and for those who have an operational role. The Handbook material was developed by ITU.

Partnership agreement with Inmarsat
Source: ITU/Cosmas Zavazava.

A technical cooperative agreement was signed between Inmarsat and ITU paving the way for the co-financing of activities aimed at providing practical solutions to disaster relief. In the arrangement, Inmarsat contributed funds, matched by ITU, that were used in the procurement of Inmarsat Global Area Network (GAN) satellite terminals with the capability of supporting mobile ISDN and mobile packet data services. This equipment has been successfully used in disaster situations in the framework of implementing Resolution 34 and Resolution 36 on telecommunications in the service of humanitarian assistance, that were adopted by ITU's third World Telecommunication Development Conference in 2002 and ITU's Plenipotentiary Conference of 2002, respectively.

2003

ITU is collaborating with the United Nations Institute for Training and Research (UNITAR) on an "Environment Information Circulation and Monitoring System on the Internet Programme for Africa (Système d'information et de suivi de l'environnement sur internet – SISEI)". It is a capacity-building programme to assist countries, subregions and organizations to validate, circulate and harness relevant environmental information. It is an attempt to meet the information needs of the environmental component of the New Partnership for Africa's Development (NEPAD)[31]. About 10 country projects were supported over a period of three years (2003-2005) by the ITU TELECOM

This project will allow African countries to more effectively collect, manage, share and make use of environmental data to preserve its environmental resources and address challenges like droughts
Source: CICR / L. de Toledo.

Surplus Fund. Other partners who collaborated in this Programme were the Observatory for Sahel and Sahara (OSS) and the United Nations Environment Programme (UNEP). The programme will assist African countries to achieve a rapid and effective appropriation of modern ICTs to secure the management of national environmental data for environmental protection and sustainable development.

2004

In 2004, ITU prepared a publication called Handbook on Emergency Telecommunications, which is a manual being used by many actors involved in disaster relief work.

2005

On 8 January 2005, the Tampere Convention on Emergency Telecommunications came into force. This was an ITU-initiated treaty, whose ratification enables the trans-border use of telecommunication equipment by humanitarian organizations. Prior to the treaty, regulatory barriers that made it extremely difficult to import and rapidly deploy telecommunications equipment for emergencies often impeded

Handbook on Emergency Telecommunications. *Source:* ITU.

humanitarian efforts. ITU and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) were the driving forces in drafting this treaty.

OCHA convenes the Working Group on Emergency Telecommunications (WGET), of which ITU is a member. The Working Group is tasked with seeking ways to facilitate the use of telecommunications in the service of humanitarian assistance and to increase the effectiveness of its participants in relation to regulatory, operational and technical aspects of telecommunications for disaster relief. WGET not only encourages measures applying the relevant ITU resolutions and recommendations relative to telecommunications for disaster relief, but is also an active facilitator of the promotion and implementation of the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations.

In this respect, in 2005, ITU provided Sri Lanka with satellite terminals at the time of the South-East Asia earthquake and consequent tsunami. ITU also provided training for technicians in Thailand in the use of the satellites. Pakistan received similar satellite terminals, following the East Asia earthquake in October 2005. The equipment was used for telemedicine and voice communications purposes.

ITU provided funding and expert services to the earthquake and tsunami-hit countries. The experts carried out assessments of the status of the telecommunications infrastructure in the affected areas, prepared telecommunication infrastructure rehabilitation plans, and helped develop national plans for emergency communications as part of the tsunami early-warning system for the Indian Ocean. Additionally, in the event of other natural disasters or major telecommunication network failures, ITU assisted governments in preparing the technical specifications needed for infrastructure procurement, while helping to prepare the documentation required to source funding for telecoms infrastructure rehabilitation projects.

4.3.7 Detailed presentation of ITU's activities in support of Commitment 7: Mobilizing financial resources.

2001

In 2001, ITU organized a partnership round table in Johannesburg, South Africa, for Eritrea, Guinea-Bissau, Mozambique and Nepal to promote their ICT and telecommunications projects to the private sector, development banks and intergovernmental organizations. The aim was to establish private-public co-financing of infrastructure, so as to bring increased investment into the telecommunication sector of these countries. An array of projects were presented on rural telecommunication development through the use of privately operated pay phones for the public, capacity building to increase the efficiency and productivity of telecommunication professionals and the development of new technologies and infrastructure to establish direct links to different African countries aimed at attaining low charges, among other benefits.

During 2001, ITU provided fellowships to professional staff from LDCs to finance their participation in events, workshops, and training courses, as shown in Figure 4.13.

2002

As in other years, ITU provided fellowships to LDCs to attend events, workshops, and to participate in training courses, as shown in Figure 4.14.

Figure 4.13: Fellowship expenditure by region in LDCs, 2001

3%
11%
17%
69%

Africa ■ Americas ▫ Arab ▫ Asia & Pacific
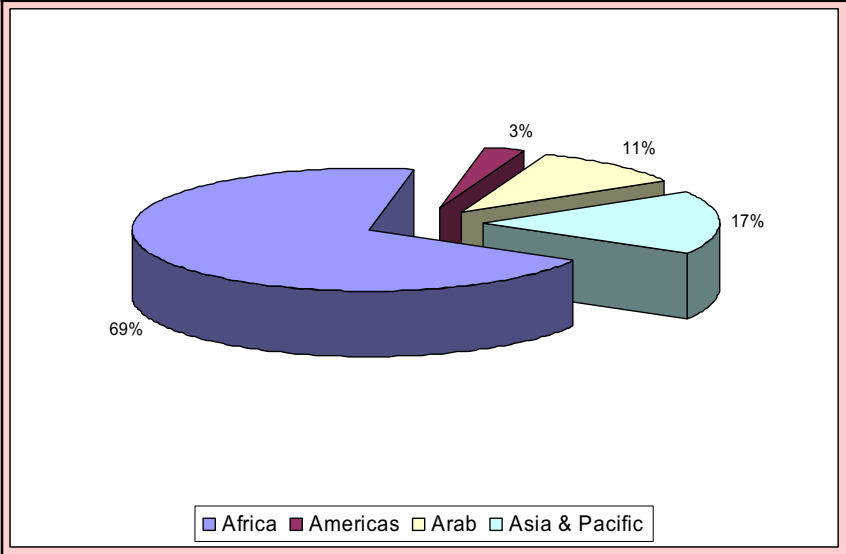
Figure 4.14: Fellowship expenditure by region in LDCs, 2002

26%
55%
16%
3%

Africa ■ Americas ▫ Arab ▫ Asia & Pacific
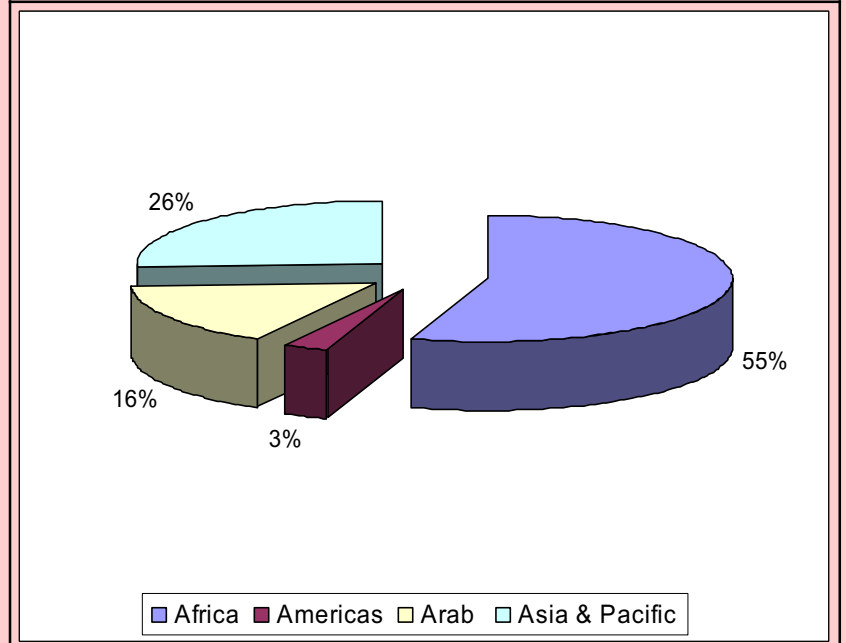
2003

ITU provided seed money to act as a catalyst in the implementation of projects in LDCs. In so doing, ITU organized partnership round tables for LDCs to promote their ICT and telecommunications projects to development partners. In 2003, a partnership round table for Central African Republic, Malawi, Mali and Zambia took place in Arusha, Tanzania in order to promote projects in those countries to development partners. Also in Coventry, UK, another partnership round table took place for Bhutan and Kiribati. Haiti benefited from a partnership round table that was held in New Mexico. Due to Haiti's instability at the time, the initiative did not bear results. Djibouti also benefited from a partnership round table held in Beirut, Lebanon, in 2003.

Figure 4.15 shows the expenditure of fellowships in 2003.

Figure 4.15: Fellowship expenditure by Region in LDCs in 2003
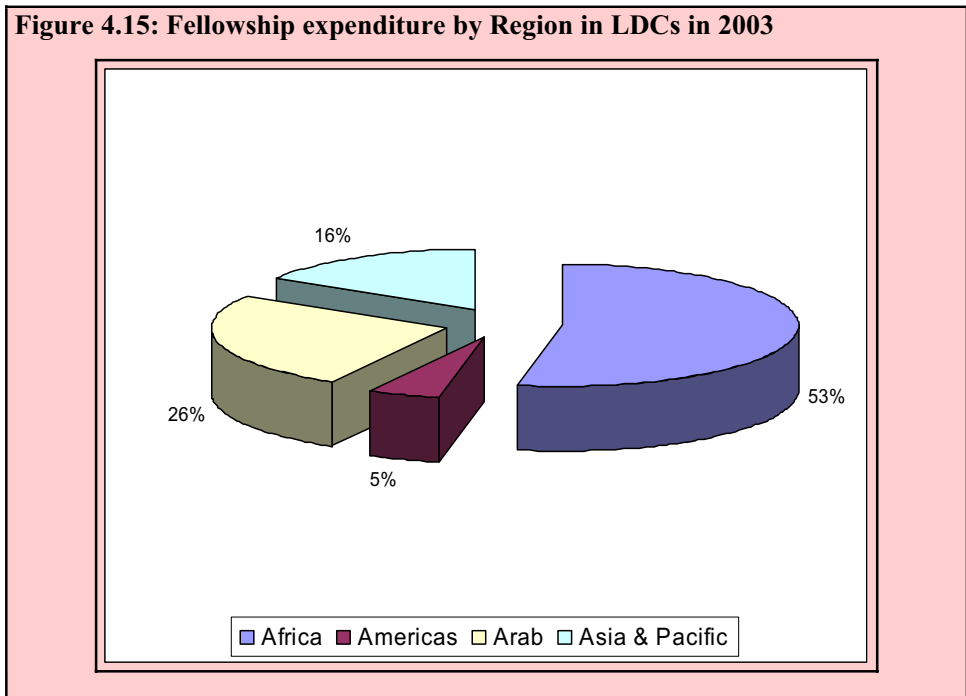
2004

ITU and the Commonwealth Business Council organized the first Global ICT Forum for the Least Developed Countries, which was held in Mauritius in July 2004. The meeting attracted 150 participants, including 20 Ministers from LDCs, business leaders, civil society and donor agencies, to consider ways to help LDCs

join the information society. The Forum enabled LDCs to present ICT projects to development partners. Ninety per cent of the projects that were negotiated during the Forum have either been implemented or are ongoing, thanks to co-financing arrangements involving ITU, the private sector, development banks, and the countries themselves. Some of the projects executed by ITU are:

■ Assistance provided to Bhutan in establishing a "train-the-trainers" programme under the ITCI-DC[32]. Assistance was provided to the Royal Institute of Management for Training in April 2005.

■ Global e-learning project: As a result of the meeting, the ITU/ I-linx/Inmarsat global e-learning project merged with NEPAD's e-schools initiative to provide rural schools in developing African countries with suitable IT equipment and connection to the internet. The first NEPAD e-school for the Inmarsat consortium was launched in 2005 in Mali.

At the Mauritius meeting, Samoa and the Solomon Islands requested ITU to assist in developing rural telecommunications to bring the benefits of the information society to these unconnected SIDS. ITU has established 10 MCTs in each of these countries, designed to serve as access points to provide internet connectivity, e-applications and services in rural areas.

Figure 4.16 shows the expenditure of fellowships in 2004.

Figure 4.16: Fellowship expenditure by region in LDCs in 2004
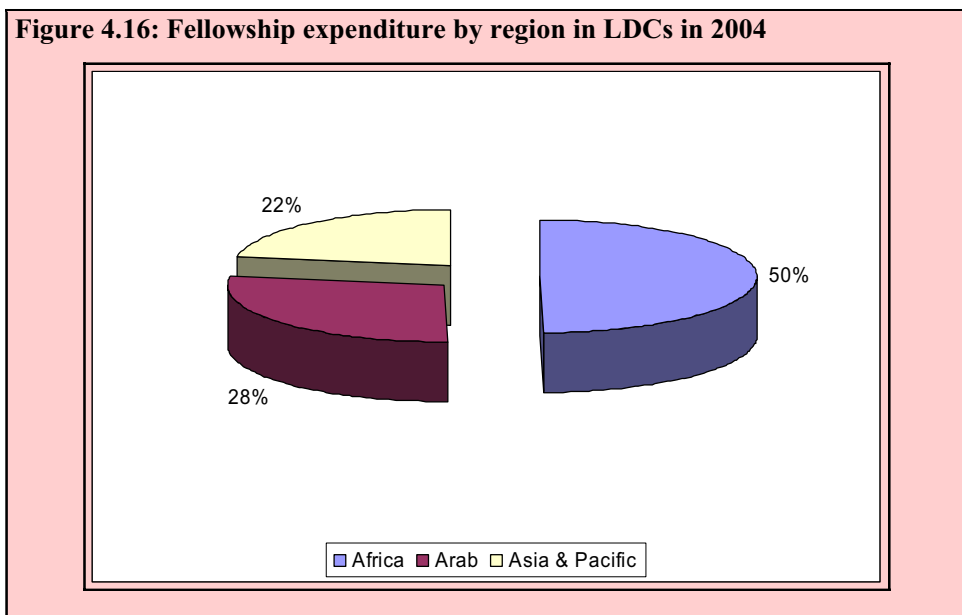
2005

Under the Special Programme for LDCs, Sudan received assistance in financing and partnerships. The LDC programme undertook a series of resource mobilization initiatives for LDCs that included bilateral and multilateral initiatives. See Figure 4.17 for fellowships granted during 2005.

Figure 4.17: Fellowship expenditure by region in LDCs in 2005
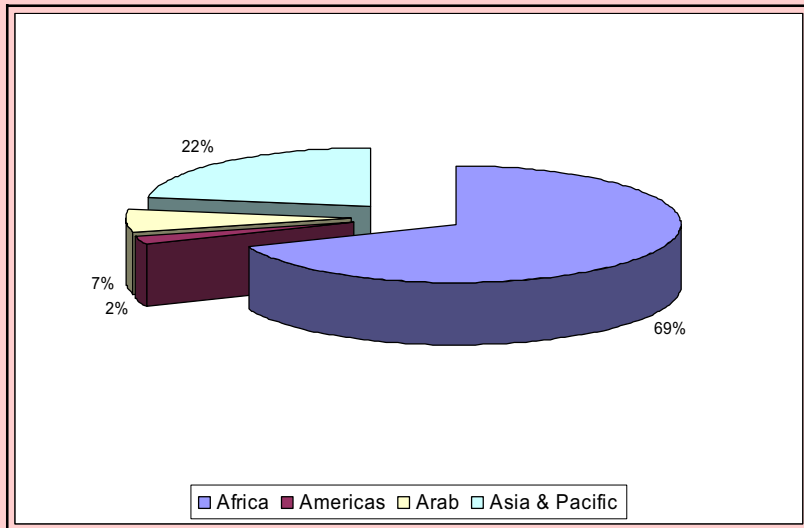
5   The World Summit on the Information Society

5.1   Drivers including the first phase of the World Summit on the Information Society

The first phase of the World Summit on the Information Society (10-12 December 2004) gathered more than 11,000 participants, including 44 Heads of State, Prime Ministers, Presidents and Vice-Presidents and 83 Ministers and Vice-Ministers from 175 countries. They came to Geneva to endorse a Declaration of Principles – a common vision of an information society's values – and a Plan of Action, which set forth a road map to build on that vision and to bring the benefits of ICTs to underserved economies.

In the final Declaration of Principles, three paragraphs made reference to the LDCs:

> *"We continue to pay special attention to the particular needs of people of developing countries, countries with economies in transition, **Least Developed Countries**, Small Island Developing States, Landlocked Developing Countries, Highly Indebted Poor Countries, countries and territories under occupation, countries recovering from conflict and countries and regions with special needs as well as to conditions that pose severe threats to development, such as natural disasters."*[33]

> *"Content creators, publishers, and producers, as well as teachers, trainers, archivists, librarians and learners, should play an active role in promoting the Information Society, particularly in the **Least Developed Countries**."*[34]

> *"We resolve to assist developing countries, **LDCs** and countries with economies in transition through the mobilization from all sources of financing, the provision of financial and technical assistance and by creating an environment conducive to technology transfer, consistent with the purposes of this Declaration and the Plan of Action."*[35]

In the WSIS Plan of Action, the following paragraphs were included in the document with regard to LDCs:

"Encourage the use of unused wireless capacity, including satellite, in developed countries and in particular in developing countries, to provide access in remote areas, especially in developing countries and countries with economies in transition, and to improve low-cost connectivity in developing countries. Special concern should be given to the **Least Developed Countries** *in their efforts in establishing telecommunication infrastructure."*[36]

"Design and implement regional and international cooperation activities to enhance the capacity, notably, of leaders and operational staff in developing countries and **LDCs**, *to apply ICTs effectively in the whole range of educational activities. This should include delivery of education outside the educational structure, such as the workplace and at home."*[37]

"Develop distance learning, training and other forms of education and training as part of capacity building programmes. Give special attention to developing countries and especially **LDCs** *in different levels of human resources development."*[38]

"Promote teleworking to allow citizens, particularly in the developing countries, **LDCs**, *and small economies, to live in their societies and work anywhere, and to increase employment opportunities for women, and for those with disabilities. In promoting teleworking, special attention should be given to strategies promoting job creation and the retention of the skilled working force."*[39]

"Establish monitoring systems, using ICTs, to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, **LDCs** *and small economies."*[40]

"Developed countries should make concrete efforts to fulfil their international commitments to financing development including the Monterrey Consensus, in which developed countries that have not done so are urged to make concrete efforts towards the target of 0.7 per cent of gross national product (GNP) as ODA to developing countries and 0.15 to 0.20 per cent of GNP of developed countries to **least developed countries**.*"*[41]

Heads of State at the first phase of WSIS. 9 December, 2003
Source: ITU / J.M. Ferré.

5.2   Preparations and the second phase of the World Summit on the Information Society

It was agreed that the focus of the preparatory process to the Tunis phase should be two-pronged: it was to provide solutions on how to implement and follow up the Geneva decisions (Declaration of Principles and Plan of Action) by stakeholders at national, regional and international levels, with particular attention to the challenges facing the **LDCs**, and it had to complete the unfinished business in Geneva on internet governance and financing. A consensus was also reached that the agreements reached during the Geneva phase were not to be re-opened.

Agreement was also reached on the Digital Solidarity Fund (DSF).[42] The DSF was to be fully utilized to fund the growth of ICT infrastructure and services and to complement existing mechanisms for funding the information society. The Fund is managed by a foundation with its headquarters in Geneva, which decides the criteria for contributions and on the use of the funds. Currently, 60 per cent of the resources of the Fund are earmarked for **LDCs**, 30 per cent for developing countries and 10 per cent for developed countries and countries with economies in transition.

The Tunis Summit

The second phase of WSIS took place from 16 to 18 November 2005 and attracted 19,400 participants, including 46 Heads of State and Government, Crown Princes and Vice-Presidents, and 197 Ministers/Vice-Ministers and Deputy Ministers.

The Tunis Phase took a stock of the first two years of implementation of the Plan of Action. Governments also sought agreement on issues such as effective financial strategies to promote the deployment of ICTs in the developing world and possible options for the governance of the internet.

The two outcome documents were the Tunis Commitment and the Tunis Agenda.

The Tunis Commitment had the political will to reiterate the unequivocal support for the Geneva Declaration of Principles and Plan of Action adopted at the first phase of the World Summit on the Information Society in Geneva, in December 2003. In paragraph 21, world leaders committed to pay "special attention to the particular needs of people of developing countries, countries with economies in transition, **Least Developed Countries**, Small Island Developing States, Landlocked Developing Countries, Highly Indebted Poor Countries, countries and territories under occupation, and countries recovering from conflict or natural disasters."[43]

The Tunis Agenda was the operational part for action. With regard to financial mechanisms, world leaders recognized that there are a number of areas in need of greater financial resources where current approaches to ICT for development financing have been insufficient to date.

> *"Coordinated assistance, as appropriate, for countries referred to in paragraph 16 of the Geneva Declaration of Principles* [44] *, particularly Least Developed Countries and Small Island Developing States, in order to improve effectiveness and to lower transaction costs associated with the delivery of international donor support."*[45]

On internet governance issues, world leaders acknowledged that the charges for international internet connectivity for developing countries and LDCs should be better balanced to enhance access.

They called for the development of strategies for increasing affordable global connectivity, thereby facilitating improved and equitable access for all by:

> *"Encouraging relevant parties to commercially negotiate reduced interconnection costs for Least Developed Countries (LDCs), taking into account the special constraints of LDCs."*[46]

Heads of State group photo at the second phase of the World Summit on the Information Society, November 16-18, 2005, Tunis.
Source: ITU/Jean-Marc Ferré.

6   Project highlights

Rural connectivity no longer a dream in Samoa

Samoan rural population are now enjoying the
benefits of ICTs
Source: Government of Samoa.

People in rural villages in Samoan islands of Upolu and Savaii, who had previously never seen a computer, are now using the internet to com-municate with their family members working in Apia, the capital city, or living overseas. Women have created their own local committees to manage nine of the MCTs, and a youth group runs the tenth. The centres are being used to transmit information for a national pro-gramme to promote healthy living. A train-the trainers programme is being provided. A local expert conducts training in the Samoan language. Training materials have been translated into Samoan, and this has proved very used for the women. When the trainer is away, they can teach themselves using translated manuals.

Ten MCTs in Samoa are now functioning as telephone and internet access points not only for personal communications, but also educational, business and community applications. The role of ITU in bridging the digital divide and improving rural connectivity is now a reality in Samoa.

Enhancing government services for Rwanda

Public phone in Kigali, Rwanda
Source: ITU/Cosmas Zavazava.

In partnership with the European Commission, ITU is also implementing Rwanda's e-government project. The first phase has provided internet access, visa and passport control facilities at the Kigali airport, and secured e-mail services to main government offices. Other planned applications include video-conferencing among public institutions, as well as online systems, available at post offices, for issuing such government documents as passports and work permits.

This project will give people, in both rural and urban areas, new access to administrative services. The project will help to ensure that the government is effective, accessible and accountable – and thus support Rwanda's goal of strengthening democratic institutions that were shattered by war.

Internet for Schools

Road sign to Timbuktu from Morocco
Source: ITU/Melissa Arditto.

ITU is helping to provide internet access to secondary schools in rural areas in Mali, together with the Mali government and private-sector partner, Swisscom. Located in the trans-Saharan desert, 1 000 km from the capital of Mali, the Timbuktu High School is now connected to the internet, and students receive a world of information. This is part of ITU's overall scheme to develop a large number of projects and connect as many schools as possible across the world to the internet in order to make the most of this educational technology.

Rebuilding of rural telecommunication infrastructure in Rwanda and Burundi

In these projects, ITU is helping to restore communication systems damaged by the war in 1994, in partnership with Onatel of Burundi and Rwandatel of Rwanda. The projects are now in their implementation stage, with most of the equipment having been procured and installed.

IP-based platform for e-government projects

In Burkina Faso, internet protocol (IP) applications are being implemented to render operations and services in government administration more secure and transparent. The General Delegation on ICT (DELGI) in Burkina Faso partners with ITU and UNDP in the implementation of this project.

ICT training for returning Liberians

Returnees learning the use of ICTs
Source: UNHCR.

On 19 April 2006, ITU and UNHCR launched an Information and Communication Technology Training Centre in Monrovia, Liberia, to help equip people with skills that make them more employable.

The project targets those who have returned to Liberia after years in refugee camps abroad, and offers them training in core computer and entrepreneurial skills. It is expected that 20 per cent of Liberian refugees go back to urban centres, most of them to the capital city, Monrovia.

The training centre is equipped with 20 computers, peripherals, a backup power supply, a projector, a photocopying machine, a television and video/DVD unit, and a video camera. The centre has the capacity to train about 60 students every

two months. It offers training free of charge to returnees, but charges a nominal fee for other community members wishing to receive training in ICT. The centre also provides related services, such as e-mail, internet access, word processing, photocopying, and basic desktop publishing. Modest fees will be charged for these services, so as to make the venture financially viable and sustainable. This collaboration between ITU and the UN refugee agency is an important effort towards extending ICT access and training to returnees.

Reconstruction of telecommunication infrastructure after the South East Asia earthquake and tsunami, and establishment of an early-warning system for the region

Aftermath of the South East Asia tsunami disaster of 26 December 2004
Source: ITU/Cosmas Zavazava.

After the devastating tsunami that followed the major earthquake off Indonesia in December 2004, ITU provided expert services to the disaster struck countries surrounding the Indian Ocean. After assessment of the situation in Maldives, a plan to rehabilitate telecommunication infrastructure was compiled, and training provided towards its implementation. ITU also sent GAN satellite terminals to Sri Lanka under the ITU-Inmarsat partnership in the aftermath of the tsunami, and an expert to Thailand to train government-designated technicians in the use of these terminals. In addition, to help establish and improve emergency communications, ITU cooperated with the national authorities concerned to help establish systems that will be part of a tsunami early-warning system for the region.

ITU responds to South Asia earthquake: Satellite terminals sent to disaster-hit zones

Aftermath of the Pakistan's earthquake
Source: Telecoms sans frontières.

Immediately following the massive earthquake that struck the Pakistan-India border area in October 2005, ITU sent 55 satellite terminals to help restore vital communication links. ITU paid for all the air-time arising from the use of these terminals. The GAN terminals are capable of providing voice, data and video services. Terminals were used to coordinate relief and rescue operations, and helped establish public call centres to provide essential information to families and friends searching for their loved ones. Pakistani officials, responsible for communications, were trained by ITU in basic operations, as well as in technical aspects of the satellite terminals. Training was also provided to medical teams helping injured people in remote areas. Diagnostic information on patients was transmitted via satellite to hospitals, for expert analysis and advice.

ITU helps Bhutan gain access to ICT in schools

Students from Samtagang Lower Secondary School receiving the computers
Source: Wangay Dorji/BICMA.

Bhutan's goal is to add ICT to the curricula of all schools by 2010. As part of this effort and with the support of ITU, a project was carried out in 2005 to distribute computers to schools and religious colleges across the country. The Korea Agency for Digital Opportunity and Promotion (KADO) provided 200 used computers for that purpose, and recipients were selected from among those institutions with a low (or zero) ratio of computers to students. ITU's support

involved liaising between the partners in the project, transporting the computers to Bhutan, and providing equipment for internet connection. The Bhutan Information, Communication and Media Authority (BICMA) was responsible for arranging internet connections, with the assistance of Bhutan TELECOM, as well as for organizing power supplies, installation and maintenance for the computers and appropriate training. In total, 13 secondary schools received computers under the project, some of which had never had such equipment before. In addition, 18 religious institutions nationwide were given computers. Although a private body, the Rigsum Institute of Information Technology, in the capital Thimphu, was also included in the project. This public-private partnership resulted in the establishment of a small cybercafé to provide free internet access at weekends for students of the institute and other schools.

7 Bottlenecks and constraints

a) The availability of affordable, adequate and reliable bandwidth on international links:

International internet bandwidth is the critical infrastructure that dictates the speed at which websites in other countries can be accessed. The high cost of international bandwidth is a major constraint, with developing countries often having to pay the full cost of a link to a developed country hub. More than 40 countries have less than 10 Mbit/s of international internet bandwidth, whereas in Belgium for instance, a 9 Mbit/s consumer ADSL package is available for just EUR 60 a month. Users in many LDCs are simply locked out of the full internet experience, since they lack sufficient bandwidth to adequately access the growing number of multimedia and graphics-rich sites. At present, the norm in LDCs for those privileged enough to afford to go online at all is slow and unreliable dial-up.

b) Infrastructure:

Telecommunications infrastructure is the backbone for the access and application of a wide range ICT services and applications. In LDCs, ICT infrastructure is often nonexistent; where it is already in place it is old, inadequate, poorly maintained and very unreliable due to institutional weaknesses and lack of resources.

Getting round these bottlenecks will require considerable physical and capital investment. Substantial funds will be required to help LDCs build and upgrade telecommunications networks and deploy ICTs.

c) Access to applications:

To successfully engage in e-commerce, e-health, and e-government, one requires secure internet servers. While developed nations can have more than 300 such servers per one million people, developing nations have fewer than two. Canada, for example, has more secure servers than all the developing countries combined.

d) Political instability:

A number of least developed counties have recently or are currently going through civil strife. These wars damage existing infrastructure and severely inhibit infrastructure development as no development work can be undertaken in unsafe circumstances.

e)   Local content:

Even where access to ICT is made, the creation and availability of locally relevant content that has been developed or adapted to local conditions and the language of local communities remain a challenge.

f)   Coordination:

There are different actors and developmental partners all trying to implement projects in LDCs using different technologies that end up not interoperating, resulting in waste. Resources continue to flow into ill-conceived pilot projects that end up with little impact on the development of the sector. Most of these projects never graduate into large-scale projects.

8   Conclusions and recommendations

1   Countries are coming together to share the costs of ICT infrastructure. A notable example is the East African Submarine System (EASSy) project (see www.eassy.org), an undersea fibre optic cable that will link the countries of East Africa to the rest of the world. This is the first optic fibre connectivity between Eastern Africa and the global optic fibre network. The following LDCs are involved in the project: Burundi, Congo, Djibouti, Eritrea, Ethiopia, Madagascar, Malawi, Mozambique, Rwanda, Somalia, Sudan and Uganda. The initial project cost is estimated at USD 280 million. A mixture of State and private investors is financing the project. On the country level as well, there is the need for cooperation of all kinds to bear the costs of ICT development.

On the same issue of bandwidth and connectivity, six Ugandan internet services providers (ISPs) have agreed to consolidate their purchase of bandwidth in an effort to cut down costs.

Initiatives and business associations like this will eventually bring the cost of internet access down for users. Lower cost and higher and more reliable bandwidth will be additional drivers to increase the usage of ICTs by LDCs.

2   Some large ICT manufacturers are designing products and applications specifically tailored to the LDC market. Microsoft is launching a low-cost Windows XP operating system with an African language interface pack. This new starter edition will feature a simplified user interface for easy navigation: large icons, animated demonstrations and a specially developed desktop help system. Initiatives such as this one also address the issue of local content.

3   Engaging national, subregional, bilateral and multilateral development actors with the aim of mobilizing resources and coordinating ICT development is the way to go.

4   The emergence and rapid deployment of wireless technology is going to speed up the race towards universal access in least developed countries. The future is looking bright, as increasing political will, motivation to succeed, improved stability and a general bias towards the creation of an information society is to be noted. There are big chances that the targets set by the Brussels Programme of Action at the Third United Nations Conference will be met by the majority of the countries before the Fourth United Nations Conference in 2010.

Statistical Annex

Table 1: Cellular mobile telephone subscribers per 100 inhabitants				
Country Name	**2001**	**2002**	**2003**	**2004**
Afghanistan	0.00	0.11	1.00	2.41
Angola	0.64	0.93	2.32	6.68
Bangladesh	0.40	0.81	1.01	2.03
Benin	1.90	3.22	3.36	5.33
Bhutan	0.00	0.00	1.09	2.45
Burkina Faso	0.65	0.94	1.85	2.97
Burundi	0.45	0.74	0.90	0.9
Cambodia	1.66	2.76	3.52	3.52
Cape Verde	7.12	9.53	11.63	13.94
Central African Rep.	0.29	0.32	0.97	1.53
Chad	0.29	0.43	0.80	1.39
Comoros	0.00	0.00	0.25	0.25
Dem. Rep. of the Congo	0.29	1.06	1.89	1.89
Djibouti	0.47	2.29	3.44	5.07
Equatorial Guinea	3.19	6.34	7.64	10.95
Eritrea	0.00	0.00	0.00	4.74
Ethiopia	0.04	0.07	0.14	0.25
Gambia	4.26	7.53	7.53	11.97
Guinea	0.73	1.18	1.44	1.44
Guinea-Bissau	0.00	0.00	0.10	0.1
Haiti	1.11	1.69	4.04	4.87
Kiribati	0.46	0.57	0.59	0.59
Lao P.D.R.	0.55	1.00	1.98	3.53
Lesotho	2.64	4.47	4.67	8.83
Liberia	0.06	0.06	1.40	1.4
Madagascar	0.95	1.02	1.74	1.87
Malawi	0.54	0.82	1.29	1.80
Maldives	6.86	14.91	23.18	34.53
Mali	0.44	0.50	2.25	3.60

Country Name	2001	2002	2003	2004
Mauritania	4.23	9.22	12.75	17.53
Mozambique	0.86	1.41	2.35	3.73
Myanmar	0.04	0.09	0.12	0.17
Nepal	0.08	0.09	0.35	0.47
Niger	0.02	0.14	0.62	1.19
Rwanda	0.82	1.01	1.56	1.64
Samoa	1.40	1.50	5.76	5.76
Sao Tome and Principe	0.00	1.31	3.17	3.17
Senegal	3.08	5.49	7.55	10.85
Sierra Leone	0.55	1.35	2.28	2.28
Solomon Islands	0.22	0.22	0.31	0.31
Somalia	0.87	1.01	1.67	4.17
Sudan	0.32	0.58	1.58	3.04
Tanzania	1.27	2.21	2.95	4.35
Togo	2.00	3.49	4.40	4.4
Tuvalu	0.00	0.00	0.00	–
Uganda	1.19	1.59	3.03	4.36
Vanuatu	0.18	2.42	3.76	4.84
Yemen	0.81	2.11	3.47	5.17
Zambia	1.15	1.28	2.15	2.75

Table 2: Internet users per 100 inhabitants

Country Name	2001	2002	2003	2004
Afghanistan	–	0.00	0.10	0.10
Angola	0.15	0.29	0.59	1.22
Bangladesh	0.14	0.15	0.18	0.22
Benin	0.38	0.74	1.00	1.38
Bhutan	0.74	1.45	2.04	2.56
Burkina Faso	0.16	0.21	0.39	0.40
Burundi	0.10	0.11	0.20	0.35
Cambodia	0.07	0.22	0.25	0.28
Cape Verde	2.71	3.55	4.36	5.30
Central African Rep.	0.08	0.13	0.14	0.23
Chad	0.05	0.19	0.37	0.68
Comoros	0.34	0.42	0.63	1.01
Dem. Rep. of the Congo	0.01	0.09	0.09	0.09
Djibouti	0.51	0.69	0.97	1.32
Equatorial Guinea	0.19	0.36	0.55	0.99
Eritrea	0.16	0.23	0.23	11.84
Ethiopia	0.04	0.07	0.11	0.16
Gambia	1.39	1.88	2.57	3.35
Guinea	0.20	0.46	0.52	0.53
Guinea-Bissau	0.33	1.12	1.48	1.99
Haiti	0.36	0.96	1.89	6.09
Kiribati	2.32	2.28	2.25	2.35
Lao P.D.R.	0.19	0.27	0.33	0.36
Lesotho	0.23	0.97	1.38	2.39
Liberia	0.03	0.03	0.03	0.03
Madagascar	0.23	0.35	0.43	0.50
Malawi	0.19	0.26	0.34	0.37
Maldives	3.63	5.34	5.93	5.79
Mali	0.19	0.24	0.32	0.45
Mauritania	0.27	0.37	0.44	0.47

Country Name	2001	2002	2003	2004
Mozambique	0.17	0.28	0.45	0.73
Myanmar	0.02	0.05	0.05	0.12
Nepal	0.26	0.34	0.42	0.48
Niger	0.11	0.13	0.15	0.19
Rwanda	0.25	0.31	0.37	0.45
Samoa	1.68	2.22	2.74	3.33
S. Tome and Principe	6.00	7.28	9.87	12.20
Senegal	1.02	1.04	2.17	4.66
Sierra Leone	0.14	0.16	0.18	0.19
Solomon Islands	0.46	0.50	0.52	0.61
Somalia	0.87	0.87	0.75	1.67
Sudan	0.47	0.91	2.81	3.30
Tanzania	0.18	0.23	0.71	0.88
Togo	3.16	4.10	4.20	4.41
Tuvalu	10.53	13.07	18.75	30.00
Uganda	0.25	0.40	0.49	0.75
Vanuatu	2.79	3.46	3.61	3.46
Yemen	0.09	0.51	0.60	0.87
Zambia	0.24	0.48	0.98	2.11

Table 3: Main telephone lines per 100 inhabitants

Country Name	2001	2002	2003	2004
Afghanistan	0.13	0.14	0.18	0.20
Angola	0.59	0.61	0.67	0.67
Bangladesh	0.43	0.46	0.55	0.61
Benin	0.90	0.92	0.95	1.00
Bhutan	2.60	2.84	3.43	3.88
Burkina Faso	0.50	0.52	0.53	0.61
Burundi	0.30	0.32	0.34	0.34
Cambodia	0.25	0.26	0.26	0.26
Cape Verde	14.49	15.58	15.63	15.56
Central African Rep.	0.24	0.23	0.23	0.26
Chad	0.14	0.15	0.15	0.15
Comoros	1.22	1.35	1.66	1.66
Dem. Rep. of the Congo	0.02	0.02	0.02	0.02
Djibouti	1.54	1.54	1.52	1.63
Equatorial Guinea	1.47	1.74	1.77	1.77
Eritrea	0.82	0.90	0.93	9.30
Ethiopia	0.43	0.53	0.63	0.63
Gambia	2.71	2.89	2.89	2.89
Guinea	0.34	0.34	0.34	0.34
Guinea-Bissau	0.81	0.89	0.82	0.82
Haiti	0.97	1.57	1.77	1.71
Kiribati	4.21	5.11	5.11	5.11
Lao P.D.R.	0.98	1.12	1.23	1.30
Lesotho	0.99	1.32	1.61	2.07
Liberia	0.22	0.21	0.21	0.21
Madagascar	0.38	0.37	0.36	0.33
Malawi	0.53	0.70	0.81	0.75
Maldives	9.90	10.20	10.48	9.60
Mali	0.49	0.53	0.56	0.68
Mauritania	0.95	1.18	1.39	1.31

Country Name	2001	2002	2003	2004
Mozambique	0.51	0.46	0.42	0.42
Myanmar	0.58	0.66	0.68	0.79
Nepal	1.31	1.41	1.57	1.69
Niger	0.20	0.19	0.19	0.19
Rwanda	0.27	0.31	0.30	0.27
Samoa	5.41	6.53	7.29	7.29
Sao Tome and Principe	3.63	4.13	4.59	4.59
Senegal	2.42	2.23	2.21	2.37
Sierra Leone	0.46	0.48	0.48	0.48
Solomon Islands	1.71	1.49	1.31	1.31
Somalia	0.36	0.36	0.83	1.67
Sudan	1.40	2.04	2.81	2.98
Tanzania	0.44	0.47	0.42	0.42
Togo	1.02	1.05	1.21	1.21
Tuvalu	6.84	6.84	6.84	6.84
Uganda	0.24	0.22	0.24	0.27
Vanuatu	3.43	3.27	3.15	3.11
Yemen	2.24	2.78	3.40	3.85
Zambia	0.81	0.81	0.79	0.79

Table 4: Total telephone subscribers per 100 inhabitants

Country Name	2001	2002	2003	2004
Afghanistan	0.13	0.25	1.18	2.61
Angola	1.23	1.54	2.99	2.99
Bangladesh	0.83	1.26	1.56	2.63
Benin	2.80	4.14	4.31	6.33
Bhutan	2.60	2.84	4.52	6.34
Burkina Faso	1.15	1.46	2.39	3.58
Burundi	0.75	1.06	1.23	1.23
Cambodia	1.91	3.01	3.78	3.78
Cape Verde	21.62	25.11	27.26	29.49
Central African Rep.	0.53	0.55	1.20	1.79
Chad	0.43	0.58	0.96	1.54
Comoros	1.22	1.35	1.91	1.91
Dem. Rep. of the Congo	0.30	1.08	1.08	1.08
Djibouti	2.01	3.83	4.97	6.70
Equatorial Guinea	4.66	8.08	9.41	9.41
Eritrea	0.82	0.90	0.93	14.03
Ethiopia	0.48	0.60	0.77	0.77
Gambia	6.98	10.42	10.42	10.42
Guinea	1.07	1.52	1.78	1.78
Guinea-Bissau	0.81	0.89	0.92	0.92
Haiti	2.07	3.25	5.80	6.58
Kiribati	4.67	5.68	5.68	5.68
Lao P.D.R.	1.52	2.12	3.21	4.82
Lesotho	3.63	5.79	6.28	10.90
Liberia	0.28	0.28	0.28	0.28
Madagascar	1.33	1.40	2.10	2.19
Malawi	1.06	1.52	2.10	2.55
Maldives	16.76	25.11	33.65	44.13
Mali	0.93	1.03	2.82	4.28
Mauritania	5.18	10.39	14.14	18.84

Country Name	2001	2002	2003	2004
Mozambique	1.37	1.87	2.77	2.77
Myanmar	0.62	0.75	0.81	0.96
Nepal	1.39	1.51	1.92	2.16
Niger	0.22	0.33	0.81	1.39
Rwanda	1.09	1.32	1.86	1.91
Samoa	6.81	8.03	13.05	13.05
S. Tome and Principe	3.63	5.44	7.76	7.76
Senegal	5.50	7.72	9.76	13.21
Sierra Leone	1.01	1.84	1.84	1.84
Solomon Islands	1.93	1.71	1.62	1.62
Somalia	1.22	1.37	2.50	5.83
Sudan	1.73	2.63	4.40	6.02
Tanzania	1.71	2.68	3.37	3.37
Togo	3.02	4.54	5.61	5.61
Tuvalu	6.84	6.84	6.84	6.84
Uganda	1.43	1.81	3.27	4.63
Vanuatu	3.61	5.69	6.90	7.96
Yemen	3.05	4.89	6.87	9.02
Zambia	1.96	2.08	2.94	2.94

Table 5: Personal computers

Country Name	2001	2002	2003	2004
Afghanistan	–	–	–	–
Angola	17000	27000	27000	27000
Bangladesh	250000	450000	1050000	1650000
Benin	11000	15000	25825	30000
Bhutan	7000	10000	10000	11000
Burkina Faso	17000	19000	26000	28600
Burundi	4500	5000	13000	34000
Cambodia	20000	27000	32000	38000
Cape Verde	30000	35000	41000	48000
Central African Rep.	7000	8000	10000	11000
Chad	12000	13000	14000	15000
Comoros	4000	4200	4600	5000
Dem. Rep. of the Congo	–	–	–	–
Djibouti	7000	10000	14500	21000
Equatorial Guinea	2500	3500	5000	7000
Eritrea	7000	10000	12000	15000
Ethiopia	75000	100000	150000	225000
Gambia	17000	19000	21000	23000
Guinea	32000	42000	43000	44000
Guinea-Bissau	–	–	–	–
Haiti	–	–	–	–
Kiribati	900	1000	1000	1000
Lao P.D.R.	16000	18000	20000	22000
Lesotho	–	–	–	–
Liberia	–	–	–	–
Madagascar	40000	70000	80000	91000
Malawi	13000	14000	15800	19710
Maldives	15000	20000	27000	36000
Mali	14000	15000	25000	42000
Mauritania	27000	29000	35000	42000

Country Name	2001	2002	2003	2004
Mozambique	70000	82000	96000	112000
Myanmar	150000	250000	300000	325000
Nepal	80000	85000	100172	116199
Niger	6000	7000	8000	9000
Rwanda	–	–	–	–
Samoa	1100	1200	1200	1200
Sao Tome and Principe	–	–	–	–
Senegal	180000	200000	220000	242000
Sierra Leone	–	–	–	–
Solomon Islands	17000	18000	19000	20000
Somalia	–	15000	25000	50000
Sudan	115000	200000	348000	606000
Tanzania	120000	144000	200000	278000
Togo	120000	150000	160000	171000
Tuvalu	–	–	–	–
Uganda	70000	82000	102500	120500
Vanuatu	2600	3000	3000	3000
Yemen	37000	145000	200000	300000
Zambia	75000	80000	95000	113000

Table 6: Television receivers

Country Name	2001	2002	2003	2004
Afghanistan	320000	330000	340000	–
Angola	260000	280000	302000	–
Bangladesh	6600400	8189000	9860000	11531000
Benin	220000	38549	59546	81777
Bhutan	18000	20000	22000	25000
Burkina Faso	138000	144000	150000	156000
Burundi	200000	220000	250000	–
Cambodia	102100	105000	108000	–
Cape Verde	44000	46100	48000	–
Central African Rep.	18700	19800	21000	–
Chad	37000	40000	43000	–
Comoros	17000	18500	20000	21000
Dem. Rep. of the Congo	100000	120000	144000	–
Djibouti	50000	51000	52000	–
Equatorial Guinea	–	–	–	–
Eritrea	150000	200000	220000	250000
Ethiopia	370000	450000	547000	–
Gambia	20000	20000	20000	–
Guinea	126000	132000	138000	–
Guinea-Bissau	44000	50600	58000	–
Haiti	410000	450000	500000	–
Kiribati	3330	3500	3900	–
Lao P.D.R.	280000	300000	321000	–
Lesotho	70000	75000	80000	–
Liberia	–	–	–	–
Madagascar	250000	280000	314000	–
Malawi	59000	62000	65000	–
Maldives	32800	36800	41000	–
Mali	270000	290000	311000	–
Mauritania	104500	110000	120000	123000

Country Name	2001	2002	2003	2004
Mozambique	230000	300000	391000	–
Myanmar	364950	373000	373200	373300
Nepal	193000	219000	249000	–
Niger	108000	120000	133000	–
Rwanda	62000	64000	66000	–
Samoa	26000	26000	27000	–
Sao Tome and Principe	10500	14000	19000	–
Senegal	360000	400000	444000	–
Sierra Leone	65000	65250	66000	–
Solomon Islands	5000	5000	5000	–
Somalia	145000	150000	200000	–
Sudan	12265000	12571625	12886000	–
Tanzania	1500000	1500000	1500000	–
Togo	400000	600000	900000	–
Tuvalu	–	–	–	–
Uganda	339600	391000	450000	–
Vanuatu	2400	2600	2700	27000
Yemen	5310000	6000000	6780000	–
Zambia	600000	660000	726000	–

Source: ITU Databases.

Glossary

2G: *Second-generation mobile network or service*. Generic name for second-generation networks, for example GSM.

3G: *Third-generation mobile network or service* Generic name for third-generation networks or services under the IMT-2000 banner.

ATM: *Asynchronous transfer mode*. A transmission mode in which the information is organized into cells; it is asynchronous in the sense that the recurrence of cells from an individual user is not necessarily periodic.

ADSL: *Asymmetric digital subscriber line*. A technology that enables high-speed data services to be delivered over twisted pair copper cable, typically with a download speed in excess of 256 kbit/s, but with a lower upload speed. Corresponds to ITU Recommendation (standard) ITU-T G.992.1.

Bandwidth: The range of frequencies available to be occupied by signals. In analogue systems it is measured in terms of Hertz (Hz) and in digital systems in bits per second (bit/s). The higher the bandwidth, the greater the amount of information that can be transmitted in a given time. High bandwidth, channels are referred to as "broadband", which typically means 1.5-2.0 Mbit/s or higher.

Broadband: Although there exist various definitions of broadband that have assigned a minimum data rate to the term, it may be defined as transmission capacity with sufficient bandwidth to permit combined provision of voice, data, and video, with no lower limit. Effectively, broadband is implemented mainly through ADSL, cable modem or wireless LAN (WLAN) services.

Broadband Wireless Access (BWA): Encompasses either mobile or fixed access technologies that provide connections at speeds higher than the primary rate (for example, 2 Mbit/s).

Bit/s: Bits per second. Measurement of the transmission speed of units of data (bits) over a network. Also kbit/s: kilobits (1 000) per second; Mbit/s: megabits (1 000 000) per second and Gbit/s: gigabits (1 000 000 000) per second

Cable modem: A technology that allows high-speed interactive services, including internet access, to be delivered over a cable TV network.

Cellular: A mobile telephone service provided by a network of base stations, each of which covers one geographic cell within the total cellular system service area.

CEMAC: the Economic and Monetary Community of Central Africa (from its name in French, Communauté Économique et Monétaire de l'Afrique Centrale) is an organization of states of Central Africa established to promote economic integration among countries that share a common currency, the CFA franc. Its member states are Cameroon, the Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea and Gabon.

Competition: Refers to introducing competition among national service suppliers and/or foreign suppliers without any limitations. In the case of mobile cellular, the number of licensees is dependent on spectrum availability. Therefore, all countries allowing more

than one operator have been listed in this report as "competitive".

Connectivity: The capability to provide, to end users, connections to the internet or other communication networks.

Convergence: A term used to describe a variety of technological and market trends involving the blurring of previously distinct lines between market segments such as cable television, telephony and internet access, all of which can now be provided through a variety of different network platforms.

Coverage: Refers to the range of a mobile cellular network, measured in terms of *geographic* coverage (the percentage of the territorial area covered by mobile cellular) or *population* coverage (the percentage of the population within range of a mobile cellular network).

Digital: Representation of voice or other information using digits 0 and 1. The digits are transmitted as a series of pulses. Digital networks allow for higher capacity, greater functionality and improved quality.

Digital network: A telecommunication network in which information is converted into a series of distinct electronic pulses and then transmitted as a digital bitstream (see also *Analogue network*).

DSL: *Digital subscriber line*. DSL is a technology for bringing high-bandwidth information to homes and small businesses over ordinary copper telephone lines. ADSL is a variation of DSL.

E-commerce: *Electronic commerce*. Term used to describe transactions that take place online, where the buyer and seller are remote from each other.

Fixed line: A physical line connecting the subscriber to the telephone exchange. Typically, *fixed-line network* is used to refer to the *PSTN* (see below) to distinguish it from mobile networks.

Gateway: Any mechanism for providing access to another network. This function may or may not include protocol conversion.

GATS: General Agreement on Trade in Services.

Global System for Mobile communications (GSM): European-developed digital mobile cellular standard. For more information, see the GSM Association website at: www.gsmworld.com/index.html.

ICT: Information and communication technology.

IMT-2000: International Mobile Telecommunications-2000. Third-generation (3G) "family" of mobile cellular standards approved by ITU. For more information see the website at: www.itu.int/imt

IP: *Internet protocol*. The dominant network layer protocol used with the TCP/IP protocol suite.

IP telephony: *Internet protocol telephony*. IP telephony is used as a generic term for the conveyance of voice, fax and related services, partially or wholly over packet-based, IP-based networks. See also *VoIP* and *Voice over broadband*.

ISDN: Integrated services digital network. A digital switched network, supporting transmission of voice, data and images over conventional telephone lines.

ISP: *Internet service provider*. ISPs provide end-users access to the internet. Internet Access Providers (IAPs) may also provide access to other ISPs. ISPs may offer their own proprietary content and access to online services such as e-mail.

ITCI-DC: ITU launched an Internet Training Centres Initiative for Developing Countries (ITCI-DC) on World Telecommunication Day, 18 May 2001. This multimillion dollar project aimed at closing the gap in internet and "new economy" skills in developing countries. Under the initiative, by July 2003 ITU had established 50 training centres in existing non-profit institutions in developing countries to provide skills in internet protocol (IP) networking and services. It was expected that the centres will also function as incubators to help small and medium-sized enterprises to develop internet-related services.

Incumbent: The major network provider in a particular country, often a former State-owned monopoly.

Interconnection: The physical connection of separate telephone networks to allow users of those networks to communicate with each other. Interconnection ensures interoperability of services and increases end users choice of network operators and service providers.

Internet: Interconnected global networks that use the internet protocol (see IP).

Internet backbone: The high-speed, high-capacity lines or series of lines that form a major pathway and carry aggregated traffic within the Internet.

IT: Information technology.

ITU: *International Telecommunication Union*. The United Nations specialized agency for telecommunications. See www.itu.int.

LAN: Local area network.

Leased line: A point-to-point communication channel or circuit that is committed by the network operator to the exclusive use of an individual subscriber. Under national law, leased lines may or may not be permitted to interconnect with the public switched network.

Licensing: An administrative procedure for selecting operators and awarding franchises for the operation of particular telecommunication services, for instance, cellular radio.

Main telephone line: Telephone line connecting a subscriber to the telephone exchange equipment. This term is synonymous with the term *fixed line* used in this report.

Mobile: As used in this report, the term refers to mobile cellular systems and to mobile phones.

Multimedia: The presentation of more than one medium, typically images (moving and still), sound and text in an interactive environment. Multimedia requires a significant amount of data transfer and bandwidth, and it invariably requires computational facilities.

National Regulatory Authority: The regulatory agency or official at the central or federal government level that is charged with implementing and enforcing telecommunications rules and regulations.

Next-generation network (NGN): A broad term for a certain kind of emerging computer network archi-

tectures and technologies. It generally describes networks that natively encompass data and voice (PSTN) communications, as well as (optionally) additional media such as video.

Packet: Block or grouping of data that is treated as a single unit within a communications network.

Packet-based: Message-delivery technique in which packets are relayed through stations in a network.

Penetration: A measurement of access to telecommunications, normally calculated by dividing the number of subscribers to a particular service by the population and multiplying by 100. Also referred to as *teledensity* (for fixed-line networks) or mobile density (for cellular ones), or *total teledensity* (fixed and mobile combined).

PSTN: *Public switched telephone network*. The public telephone network that delivers fixed telephone service.

PTO: *Public telecommunication operator*. A provider of telecommunications infrastructure and services to the general public ("public" refers to the customer base). Also referred to as an operator, service provider, carrier or "telco".

SADC: the *Southern African Development Community* of which Angola, Democratic Republic of the Congo, Lesotho, Madagascar, Mozambique and Zambia are all members and also LDCs.

Short Message Service (SMS): A service available on digital mobile cellular networks and even landline telephones, typically enabling end users to send and receive messages with up to 160 characters.

Spam: Unsolicited commercial email, some of which may contain computer viruses or worms, fraudulent consumer scams or offensive content.

Spectrum: The radio-frequency spectrum of hertzian waves used as a transmission medium for cellular radio, radiopaging, satellite communication, over-the air broadcasting and other services.

Teledensity: Number of both main and mobile lines per 100 inhabitants. Effective teledensity reports fixed-line teledensity or mobile density – whichever is higher – in a particular geographical region. See *penetration*.

Total teledensity: Sum of the number of fixed lines and mobile phone subscribers per 100 inhabitants. See *penetration*.

Universal access: Refers to reasonable telecommunication access for all. Includes universal service for those that can afford individual telephone service and widespread provision of public telephones within a reasonable distance of others.

Voice over broadband: A method of making voice calls over a broadband connection. The calls can be either made via a computer or through traditional phones connected to voice over broadband equipment. See also *IP telephony* and *VoIP*.

VoIP: *Voice over IP*. A generic term used to describe the techniques used to carry voice traffic over IP (see also *IP telephony* and *Voice over broadband*).

VSAT: *Very Small Aperture Terminal*. A two-way satellite ground station with a dish antenna that is smaller than 3 metres, as compared to around 10 metres for other types of satellite dishes.

Wi-Fi: *Wireless fidelity*. A mark of interoperability among devices adhering to the 802.11b specification for wireless LANs from the Institute of Electrical and Electronics Engineers (IEEE). However, the term Wi-Fi is sometimes mistakenly used as a generic term for wireless LAN.

WiMAX: Fixed wireless standard IEEE 802.16 that allows for long-range wireless communication at 70 Mbit/s over 50 kilometres. It can be used as a backbone internet connection to rural areas.

Wireless: Generic term for mobile communication services which do not use fixed-line networks for direct access to the subscriber.

WLAN: *Wireless local area network*. Also known as *wireless LAN*. A wireless network whereby a user can connect to a local area network (LAN) through a wireless (radio) connection, as an alternative to a wired local area network. The most popular standard for wireless LANs is the IEEE 802.11 series.

WLL: *Wireless local loop*. Typically a phone network that relies on wireless technologies to provide the last kilometre connection between the telecommunication central office and the end-user.

Worm: A self-contained program (usually malicious) that can automatically propagate throughout a network. In addition to damage caused by the program on a user's machine, the programs can slow down network traffic as all infected machines scan simultaneously to find new hosts.

WSIS: *The United Nations World Summit on the Information Society*. The first phase of WSIS took place in Geneva (hosted by the Government of Switzerland) from 10 to 12 December 2003, and the second phase in Tunis (hosted by the Government of Tunisia), from 16 to 18 November 2005. For more information see: www.itu.int/wsis.

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Statistical Annex

Notes

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2   ITU, *2006 World Telecommunication ICT/Development Report*, 2006, p. 5.

3   ITU, *Internet Report 2005: The Internet of Things*, 2005.

4   ITU, *Trends in Telecommunication Reform: Licensing in an Era of Convergence*, 6th edition, 2004-2005, 2005.

5   This report's analysis is limited to only 49 of the 50 countries defined by the United Nations as LDCs. Timor-Leste was left out as it is not an ITU Member State.

6   Teledensity refers to both fixed and mobile lines per 100 inhabitants.

7   United Nations, *Programme of Action for the Least Developed Countries*, A/CONF.191/11, (United Nations, 2001), p. 23.
    See www.unctad.org/en/docs//aconf191d11.en.pdf

8   Main lines refer to both fixed and mobile lines per 100 inhabitants.

9   Effective teledensity reports fixed-line teledensity or mobile density – whichever is higher – in a particular country.

10 ITU, *World Telecommunication/ICT Development Report*, 2006, p. 3.

11 2004 data for personal computers are not available for Afghanistan, Dem. Rep. of the Congo, Guinea-Bissau, Haiti, Lesotho, Liberia, Rwanda, Sao Tome and Principe, Sierra Leone and Tuvalu.

12 No data available for Angola, Burundi, Central African Rep., Comoros, Equatorial Guinea, Gambia, Guinea, Guinea-Bissau, Kiribati, Liberia, Myanmar, Sao Tome and Principe, Sierra Leone, Solomon Islands, Sudan, Togo, Tuvalu, and Zambia.

13 The accounting rate regime is set out in the International Telecommunication Regulations (ITRs), an international treaty administered by ITU, which was last updated in 1988. There are ongoing discussions and reform of the accounting rate system to better reflect the new telecommunication environment.

14 Figure 3.2 illustrates the rapid increase of separate regulatory agencies in LDCs rising to 35 in 2005 from one in 1990 and 24 in 2001.

15 A detailed explanation of the commitments and how information and communication technologies can help to successfully implement the Brussels Programme of Action is given in Chapter 4.3.

16 The WTDC is held every four years to review the progress made in telecommunications/ICT in developing countries and to establish priorities and strategies for the development of information and communication technologies. The main objective

17 Access points in rural areas that offer ICT services and basic ICT facilities such as telephony, computer literacy, internet, faxes, and desktop publishing in order to provide e-services to the local communities.

18 United Nations, *Programme of Action for the Least Developed Countries*, A/CONF.191/11, (United Nations, 2001), p. 11. See under Commitment 2 at www.unctad.org/en/docs//aconf191d11.en.pdf

19 United Nations, *Programme of Action for the Least Developed Countries*, A/CONF.191/11, (United Nations, 2001), p. 14. See under Commitment 3 at www.unctad.org/en/docs//aconf191d11.en.pdf

20 United Nations, *Programme of Action for the Least Developed Countries*, A/CONF.191/11, (United Nations, 2001), p.24. See under Commitment 4 at www.unctad.org/en/docs//aconf191d11.en.pdf

21 United Nations, *Programme of Action for the Least Developed Countries*, A/CONF.191/11, (United Nations, 2001), p. 46. See under Commitment 6 at www.unctad.org/en/docs//aconf191d11.en.pdf

22 The Global Symposium for Regulators (GSR) is an annual event organized by ITU as the global venue for regulators from both developed and developing countries to exchange views and experiences on telecommunications. It serves as a platform for national policy makers to discuss regulatory issues and challenges with the regulatory officials of ITU Sector Members. Open dialogue between regulators and key ICT stakeholders – the private sector, investors and consumers – is fostered at these meetings. GSRs have given rise to many practical recommendations and enabled national regulatory authorities to work together in identifying best practice solutions to the regulatory challenges they face. For more information, see www.itu.int/ ITU-D/treg/Events/Seminars/2005/GSR05/index.html

23 For Handbook on Emergency Telecommunications see www.web/ITU-D/emergencytelecoms/publications.html

24 ITU and the Commonwealth Business Council jointly organized the First Global ICT Forum for Least Developed Countries in association with NEPAD's E-Africa Commission. It was held in Mauritius in July 2004 and enabled development partners to hold a series of bilateral and multilateral negotiations to devise practical strategies for deploying information and communication technology (ICT) to help integrate LDCs into the global economy. See the website www.itu.int/ITU-D/ldc/mauritius/

25 MCTs are community-run facilities that provide a range of ICTs for remote, rural regions. Such centres provide internet access, access to libraries and databases, as well as government/community information.

[26] VSAT stands for **Very Small Aperture Terminal,** which is a two-way satellite ground station with a small dish antenna that is commonly used for point of sale transactions and interactive distance-learning courses

[27] The General Agreement on Trade in Services (GATS) is a treaty of the World Trade Organization (WTO) that entered into force in January 1995 as a result of the Uruguay Round negotiations. The treaty was created to extend the multilateral trading system to services, in the same way the General Agreement on Tariffs and Trade (GATT) provides such a system for merchandise trade. All members of the WTO are signatories to the GATS. www.en.wikipedia.org/wiki/GATS accessed on 26.4 06 at 14.37.

[28] CEMAC: the Economic and Monetary Community of Central Africa (from its name in French, *Communauté Économique et Monétaire de l'Afrique Centrale*) is an organization of states of Central Africa established to promote economic integration among countries that share a common currency, the CFA franc. Its member states are Cameroon, the Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea and Gabon.

[29] SADC: the Southern African Development Community of which Angola, Democratic Republic of the Congo, Lesotho, Madagascar, Mozambique and Zambia are all members and also LDCs.

[30] United Nations, *Programme of Action for the Least Developed Countries*, A/CONF.191/11, (United Nations, 2001), p. 45. See under Commitment 6 at www.unctad.org/en/docs//aconf191d11.en.pdf

[31] New Partnership for Africa's Development is a vision and strategic framework for Africa's renewal. See www.nepad.org/2005/files/home.php

[32] ITU launched an Internet Training Centres Initiative for Developing Countries (ITCI-DC) on World Telecommunication Day, 18 May 2001. This multimillion dollar project aimed at closing the gap in internet and "new economy" skills in developing countries. Under the initiative, by July 2003 ITU had established 50 training centres in existing non-profit institutions in developing countries to provide skills in internet protocol (IP) networking and services. It was expected that the centres will also function as incubators to help small and medium-sized enterprises to develop internet-related services.

[33] Declaration of Principles A16, Document WSIS-03/GENEVA/DOC/4-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/dop.html

[34] Declaration of Principles B4:32, Document WSIS-03/GENEVA/DOC/4-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/dop.html

[35] Declaration of Principles B11:63, Document WSIS-03/GENEVA/DOC/4-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/dop.html

[36] Plan of Action C2:i, Document WSIS-03/GENEVA/DOC/5-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/poa.html

[37] Plan of Action C4:J, Document WSIS-03/GENEVA/DOC/5-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/poa.html

[38] Plan of Action C4:L, Document WSIS-03/GENEVA/DOC/5-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/poa.html

[39] Plan of Action C7:19(c), Document WSIS-03/GENEVA/DOC/5-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/poa.html

[40] Plan of Action C7:20(c), Document WSIS-03/GENEVA/DOC/5-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/poa.html

[41] Plan of Action D2:b, Document WSIS-03/GENEVA/DOC/5-E of 12 December 2003, see www.itu.int/wsis/docs/geneva/official/poa.html

[42] The DSF represents an innovative financial mechanism of a voluntary nature open to interested stakeholders, to be financed by voluntary contributions. Its aim is to transform the digital divide into digital opportunities by addressing specific and urgent needs at the local level and by seeking new voluntary sources of "solidarity" finance.

[43] Tunis Commitment, paragraph 21, Document: WSIS-05/TUNIS/DOC/7-E of 18 November 2005, see www.itu.int/wsis/docs2/tunis/off/7.html

[44] For reference, paragraph 16 of the Geneva Declaration of Principles reads as follows: "**We continue to pay** special attention to the particular needs of people of developing countries, countries with economies in transition, Least Developed Countries, Small Island Developing States, Landlocked Developing Countries, Highly Indebted Poor Countries, countries and territories under occupation, countries recovering from conflict and countries and regions with special needs as well as to conditions that pose severe threats to development, such as natural disasters."

[45] Tunis Agenda, 21e, Document: WSIS-05/TUNIS/DOC/6(Rev. 1)-E of 18 November 2005, see www.itu.int/wsis/docs2/tunis/off/6rev1.html

[46] Tunis Agenda, 50g, Document: WSIS-05/TUNIS/DOC/6(Rev. 1)-E of 18 November 2005, see www.itu.int/wsis/docs2/tunis/off/6rev1.html

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