

# ICT AND TELECOMMUNICATIONS IN LEAST DEVELOPED COUNTRIES 2001-2005

## 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<sup>1</sup>. 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<sup>2</sup>. The main reasons for the strong mobile growth have been rapid network deployment, prepaid services and a highly competitive environment. The mobile

---

<sup>1</sup> ITU, *Trends in Telecommunication Reform 2006, Regulating in the Broadband World*. 2006 p.3

<sup>2</sup> ITU, *2006 World Telecommunication Development Report/ICT Development Report*:2006 p.5

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**

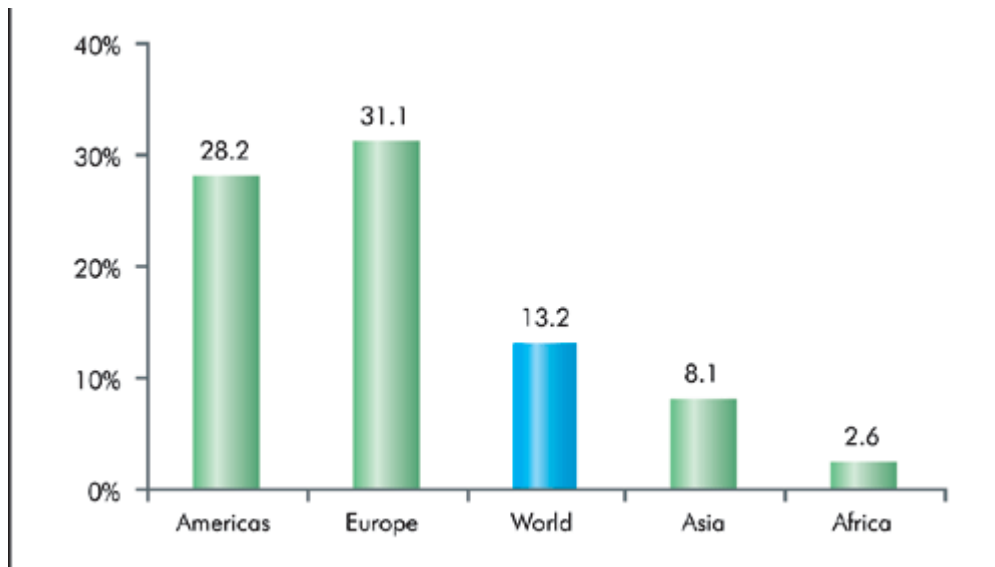
The phenomenal growth rates in mobile telephony in least developed countries is being used as evidence that the gap that separates developed and developing countries is being reduced since 58 per cent of mobile subscribers are based in the developing world. As developing nations catch up in the area 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 percent 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 3 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 being in Africa where, on average, only 2.6 percent of an estimated 850 million population in Africa is online as shown in figure 1.1 below.

**Figure 1.1: Internet penetration by region, 2004.**



**Source:** World Telecommunication Development Report 2006.

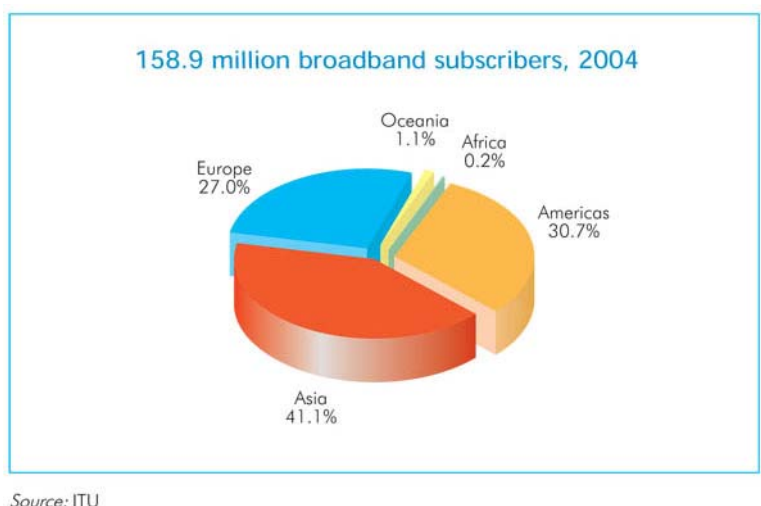
## **Broadband**

Broadband markets are growing fast with 158.9 million broadband subscribers worldwide by the end of 2004.<sup>3</sup> 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.

---

<sup>3</sup> ITU, Internet Report 2005: The Internet of Things, 2005.

**Figure 1.2: Distribution of broadband subscribers by region in 2004**

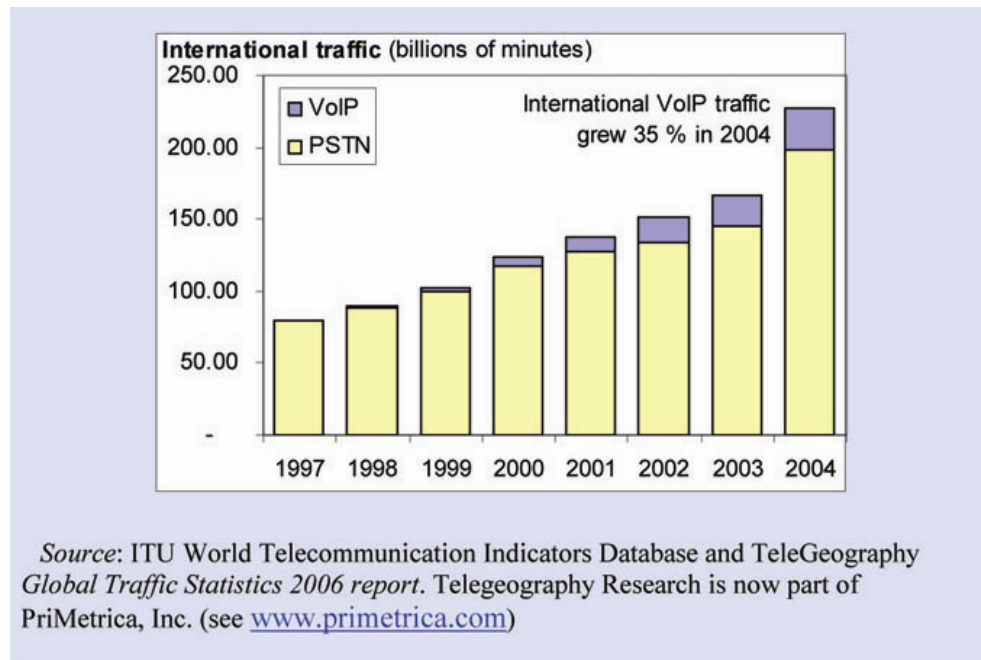


Although broadband is spreading in many developing countries, it must be noted that broadband access in these markets is often priced way in excess of the world average, worsened by extremely expensive access through leased lines. Some providers in these countries engage in premium pricing of sought-after advanced services or passing off ISDN services as broadband. The most expensive pricing packages found in this analysis are in the LDCs where for instance Myanmar charges USD 1247 per 100kbits/s and Uganda charges USD 1125. 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.

## 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**



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".<sup>4</sup>

## SPAM

The world continues to be hampered by the specter 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.

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

## 2. Trends in Telecommunications in 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 end of 2001, out of 49<sup>5</sup> LDCs, 36 had teledensities<sup>6</sup> above one (1). In terms of main lines, 4 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 out of 100 inhabitants and 7 remained with teledensities below one (1). In 2004, 21 LDCs achieved the targets for telecommunications set by the Brussels Programme of Action<sup>7</sup> to achieve an average teledensity of five (5) main lines<sup>8</sup> (ML) per 100 inhabitants as shown in figure 2.1. and table 2.1).

---

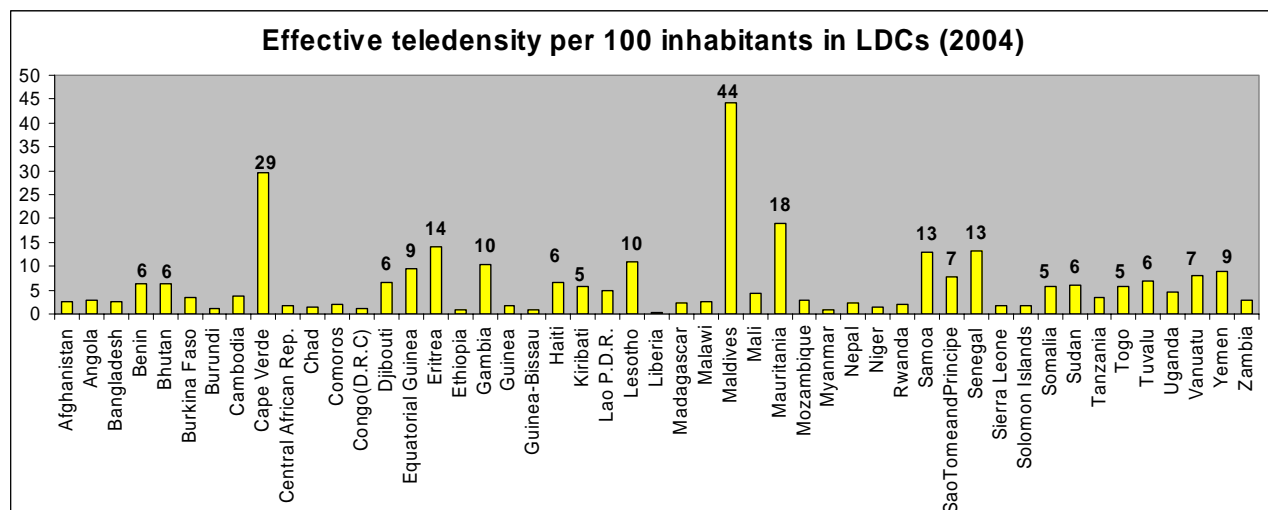
<sup>5</sup> This report's analysis is limited to only 49 of the 50 countries defined by the United Nations as LDCs. Timor Leste was left out as it is not an ITU Member State.

<sup>6</sup> Teledensity refers to both fixed and mobile lines per 100 inhabitants.

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

<sup>8</sup> Main lines refer to both fixed and mobile lines per 100 inhabitants.

**Figure 2.1: Effective teledensity<sup>9</sup> in 21 LDCs in 2004.**



**Source:** ITU World Telecommunication Indicators Database

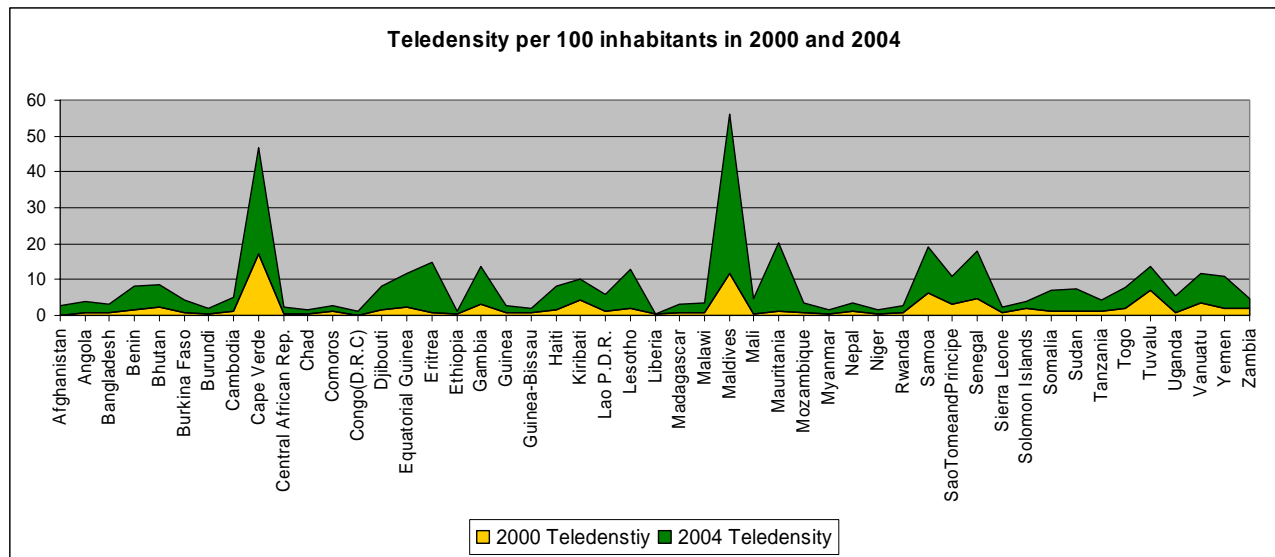
**Table 2.1: LDCs with 5 or more telephone lines per 100 inhabitants in 2004.**

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

<sup>9</sup> Effective teledensity reports fixed-line teledensity or mobile density—whichever is higher—in a particular country.

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 4 telephone lines per 100 inhabitants in 2004, have not only doubled their teledensities since 2000, but that these have boosted their telephone lines by as much as 15 times.

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



**Source:** ITU World Telecommunication Indicators Database

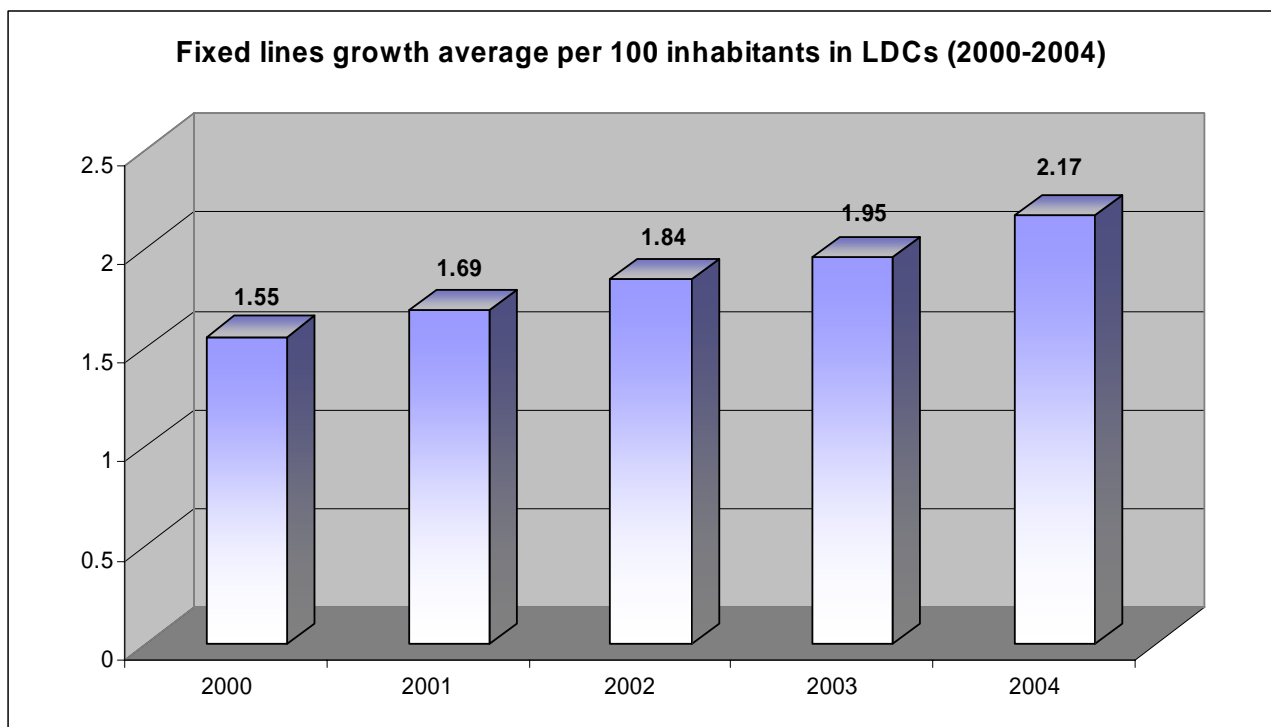
Countries like Afghanistan with 0.13 teledensity in 2000 experienced a 20 per cent growth by end of 2004, which translates to a 20-fold growth. The same levels of growth were experienced in Congo (D.R.C) that experienced a 22 times increase , Eritrea witnessing a 16 times rise while Mauritania enjoyed a 14 times increase.

Maldives, Cape Verde and Samoa, which are all Small Island Developing States and also LDCs, have shown a remarkable positive development in telecommunications. This can be attributed to the liberalization of their telecommunications sector, which has attracted foreign investment that has led to upgrading of facilities and network expansion. All 3 Islands depend heavily on tourism that has tended to increase the demand for telecommunication services. In 2004, Maldives and Cape Verde led all the other LDCs with teledensities of 44 and 29 respectively as already 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 lines networks

Even though some LDCs have made remarkable progress in increasing their teledensities, the overall growth average of fixed lines in the LDCs over the period 2000-2004 is quite steady, increasing by almost 2 lines per 100 inhabitants per year as shown in figure 2.3. This trend is in line with the overall situation of the growth of fixed lines worldwide, as noted in the World Telecommunication Development Report 2006.<sup>10</sup> 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 come.

**Figure 2.3: Sluggish growth of Fixed Lines: 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, Congo (D.R.C.), Equatorial Guinea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Kiribati, Liberia, Mozambique, Samoa, Sao Tome & Principe, Sierra Leone, Solomon Islands, Tanzania, Togo, Tuvalu, and Zambia.

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

### **The Boom of mobile phones**

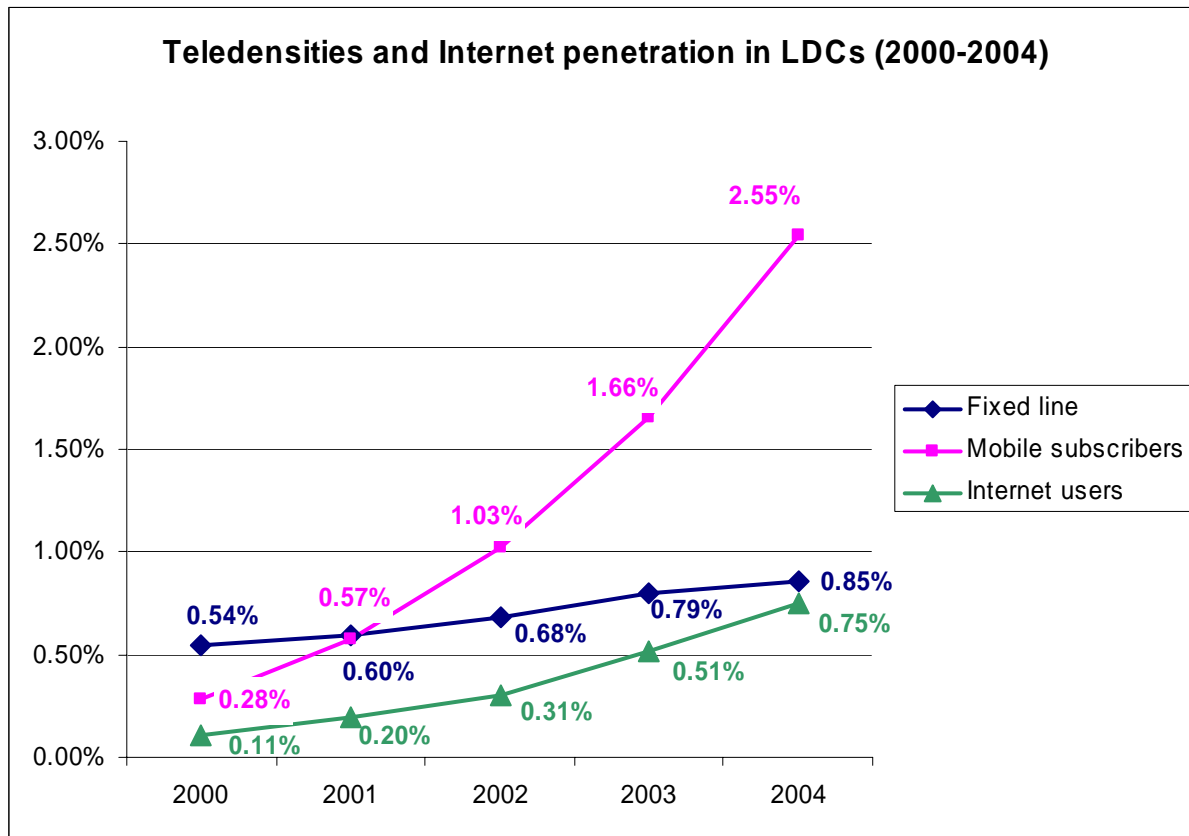
Between 2000 and 2003, the average growth rate of the mobile sector in LDCs was 72%, accounting for the highest and fastest growth of all sectors as shown in figure 2.4. People who were first telephone owners in LDCs simply subscribed straight to cellular phones for the following reasons:

- Availability: Easy connectivity and deployment of infrastructure even in rural communities
- Frustration of waiting for a fixed line connection, which in some countries took up to two years.
- 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 risks of late or non-payments, and
- Gradual reductions of mobile phone call charges due to increased competition.

### **Internet, Fixed, Mobile, Computers, Television: Together for better access**

The mobile sector has shown significant growth of 72% from 2000 to 2003, compared to 16% for Internet users' growth, and 9% growth of fixed lines. 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 continue to be low with only an estimated 5.5 million of the LDC population being online, representing 0.75% of the LDC population (720 million) in 2004, against 840 million world Internet users, constituting 13.2 percent 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 Congo (D.R.C.) since there is no data for 2004.

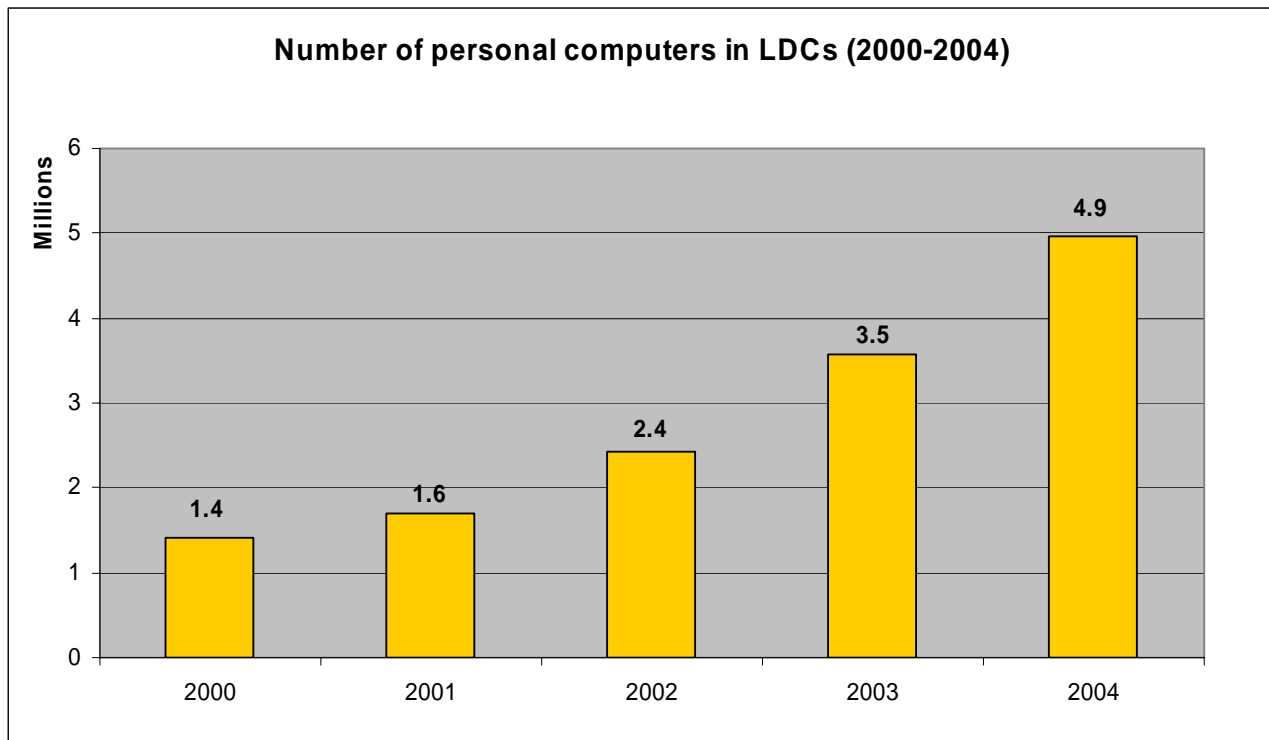
Generally, there is increased access to computers. This increased growth of personal computers is influenced by the popularity of Internet usage. In 2004, almost 5 million people were using computers<sup>11</sup> in the LDCs with a population at that time of 720 million, accounting for a penetration rate of 0.7%. Looking back over the previous 3 years, in 2003 there were 3.5 million computer users when LDCs had a population of 700 million, accounting for a penetration rate of 0.5%.

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

<sup>11</sup> 2004 Data for personal computers is not available for Afghanistan, Congo (D.R.C), Guinea-Bissau, Haiti, Lesotho, Liberia, Rwanda, Sao Tome and Principe, Sierra Leone and Tuvalu.

personal computers in 2004 were Bangladesh with an estimated 1'650'000, Sudan with 606'000 and Myanmar with 325'000.

**Figure 2.5: Staggering growth rates of personal computers**

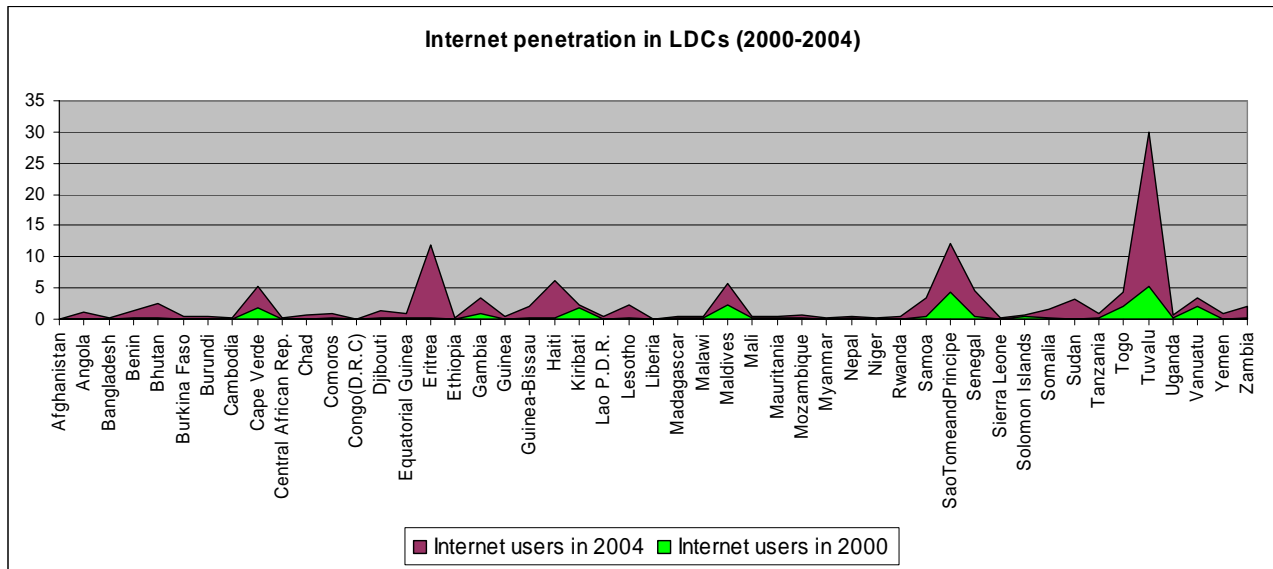


**Source:** ITU World Telecommunication Indicators Database

**Note** Data for 2003 has been used for Angola and Samoa. The following countries have not been included due to lack of data: Afghanistan, Congo (D.R.C.), 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 4 Internet users per 100 inhabitants (355%), Maldives with 5 (458%), Sao Tome & Principe with 8 (794%), Togo with 4 (360%), Tuvalu with 16 (1,553%) and Vanuatu with 3 (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: Congo (D.R.C.), 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**



**Source:** ITU World Telecommunication Indicators Database  
**Note:** 2003 data has been used for Congo (D.R.C) and Liberia.

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

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 solution, but limited 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.

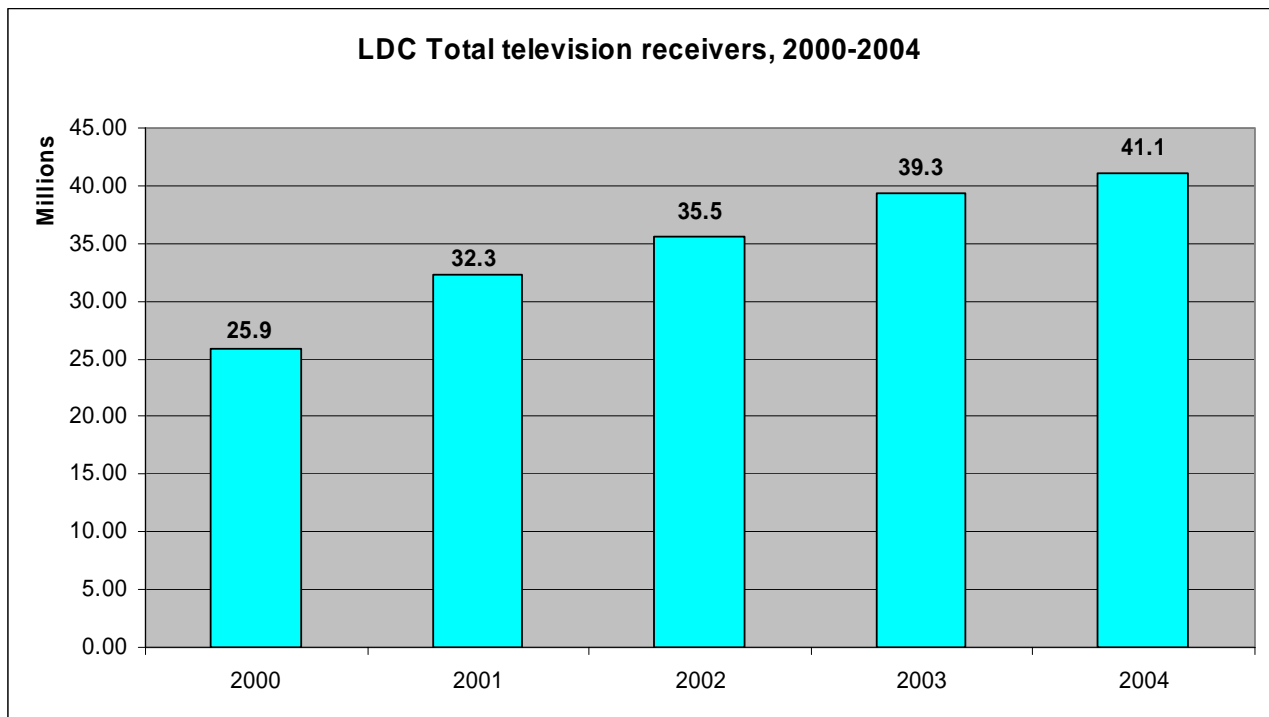
Digital subscriber lines (DSL), cable modems, and Wireless Local Area Network (LAN) are other broadband platforms which again have little coverage in the LDCs. Wireless Fidelity (Wi-Fi), which has been used to offer public broadband access in so called “hotspots” remains a challenge in LDCs. WiMAX, which offers high-speed connectivity over a range of up to 50 kms, 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 where the number of sets stood at 42 million as shown in figure 2.7. The penetration rate in 2004 was 5.72%. This growth shows that there is a general tendency in poor countries to own TVs 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.

**Figure 2.7: Sustained increase of TV receivers in the LDCs.**



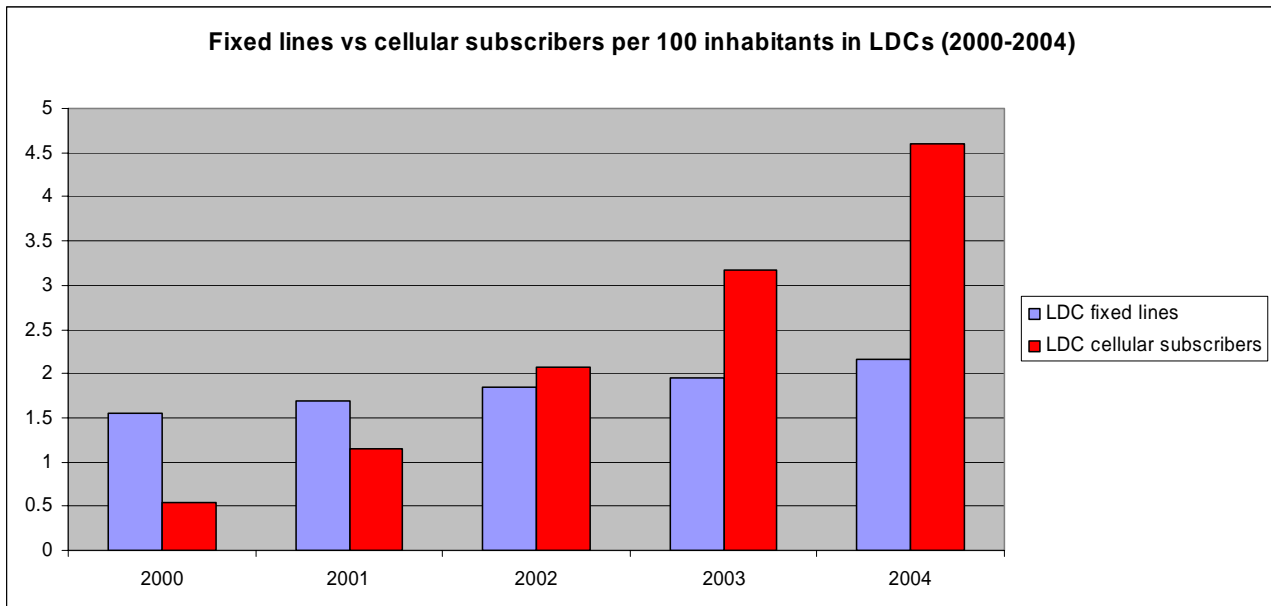
**Source:** ITU World Telecommunication Indicators Database

**Note:** The small increase in 2004 could partly be due to limited data that was available.

## Summing Up

As has been demonstrated, over the past 4 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 compared to the stagnation of fixed lines as an average in the LDCs.

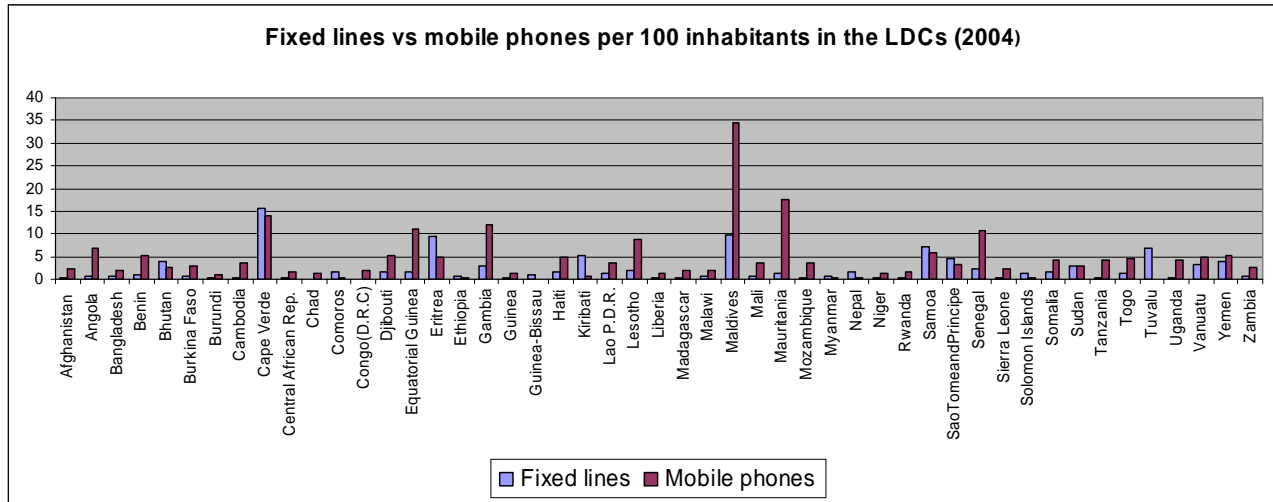
**Figure 2.8: Mobile increases, fixed lines stagnate**



**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, Congo (D.R.C), Equatorial Guinea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Kiribati, Liberia, Mozambique, Samoa, Sao Tome & Principe, Solomon Islands, Tanzania, Togo, Tuvalu, and Zambia.

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

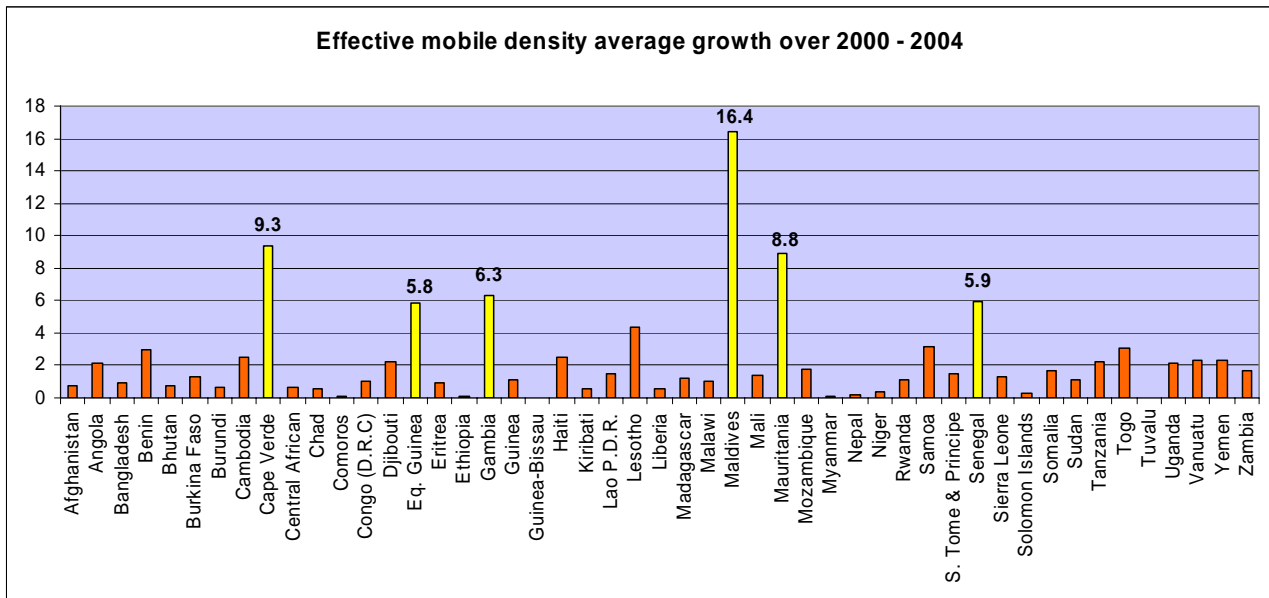


**Source:** ITU World Telecommunication Indicators Database

Some LDCs have significantly shifted from wired to wireless networks. For instance in 2004, Congo (D.R.C.) had 0.02 main lines per 100 inhabitants compared to 3.52 cellular subscribers per 100 inhabitants, making for 95% 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 1.31 and 17.53, and 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 3 people out of 100 with cellular phones in the LDCs, compared to 1 out of 100 with fixed lines.

The least developed countries that have had the highest growth in cellular subscribers per 100 inhabitants over the period 2000-2004 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 teledensities as shown in figure 2.10.

**Figure 2.10: Mobile density growth in LDCs**

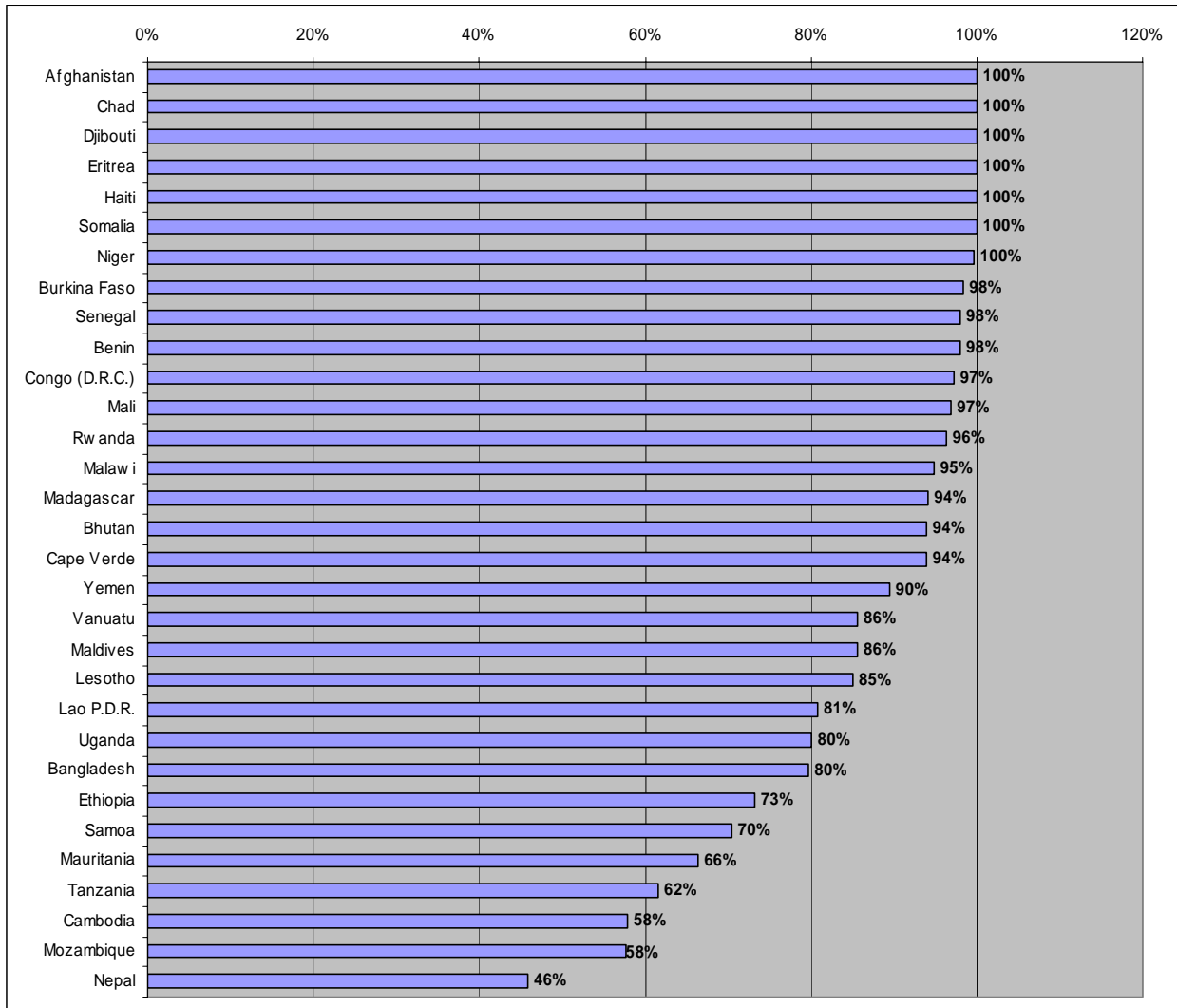


**Source:** ITU World Telecommunication Indicators Database

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 1 dollar a day. Prepaid cards allow subscribers more control of 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 pre-paid 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% of the entire market. In addition, many of the African LDC mobile subscribers<sup>12</sup> use prepaid service rather than monthly subscriptions. For instance, in 2004, Chad, Eritrea and Niger had 100% prepaid mobile subscribers as % of total subscribers. Others range from 94% to 98% rate such as Burkina Faso, Senegal, Benin, Congo (D.R.C.), Mali, Rwanda, Malawi, Madagascar and Cape Verde as shown in figure 2.11.

<sup>12</sup> 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.

**Figure 2.11: Prepaid mobile subscribers as % of total subscribers in 2004**



**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.

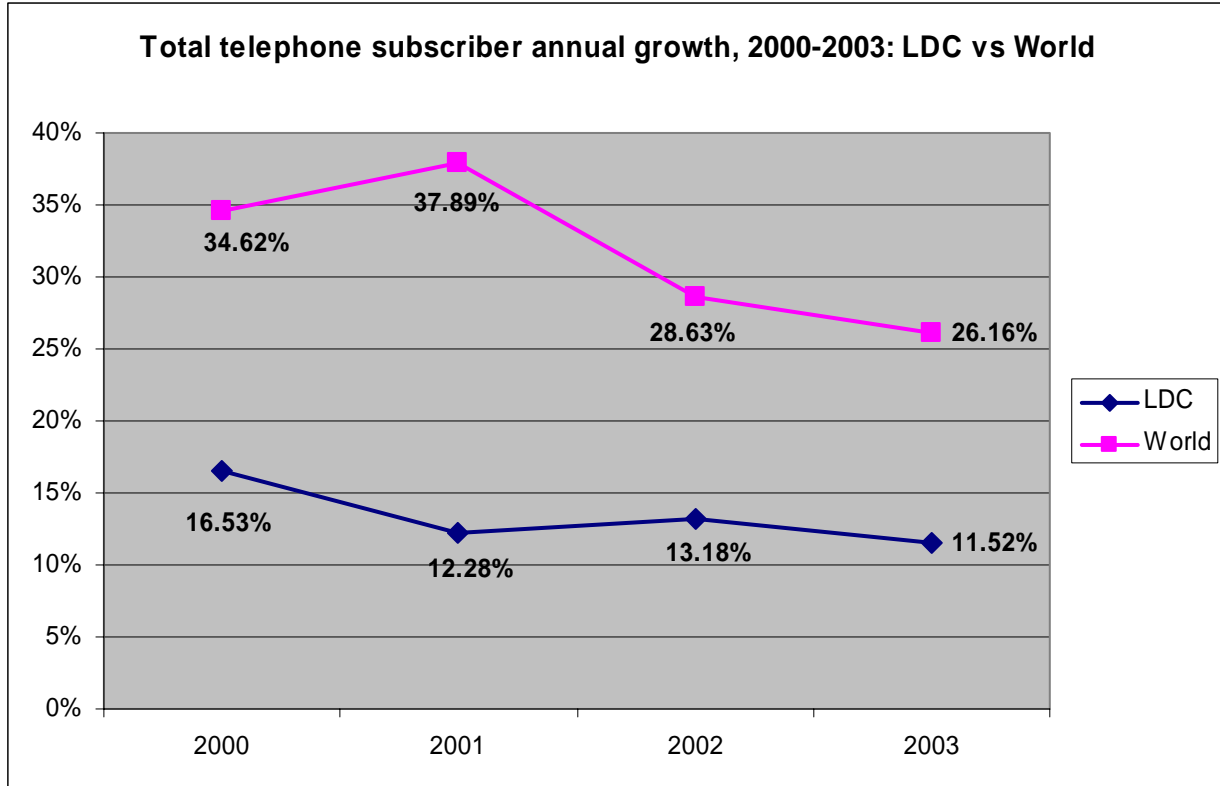
Another factor for the expansion of pre-paid services is the use of SMS (short message service). Mobile subscribers use pre-paid services because these are cheaper than voice calls. The SMS market in LDCs has improved the economic conditions of the people, as it is an important way to access information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

Third generation networks, which allow high speed transmissions of data services through mobiles, is still very low in the LDCs. Operators are reluctant to offer this services in the world's poorest 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 total mobile subscribers.

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

LDCs have had a higher annual growth of total telephones (fix and mobile) subscribers from 2000 to 2003 when compared to the World total telephone growth. In 2000, the LDCs had an annual growth of 35%, compared to 17% for the rest of the World. In 2001, LDCs accounted for 38%, against 12%. The growth gap in 2004 was the biggest between these two. In 2002, the gap began to shrink with 29% annual growth for LDCs, against 14% for the World. In 2003, LDCs accounted for 26%, compared to 12%. Overall, during 2000-2003 the LDCs had an average growth of 32%, against 14% 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 countries 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 WiFi. 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

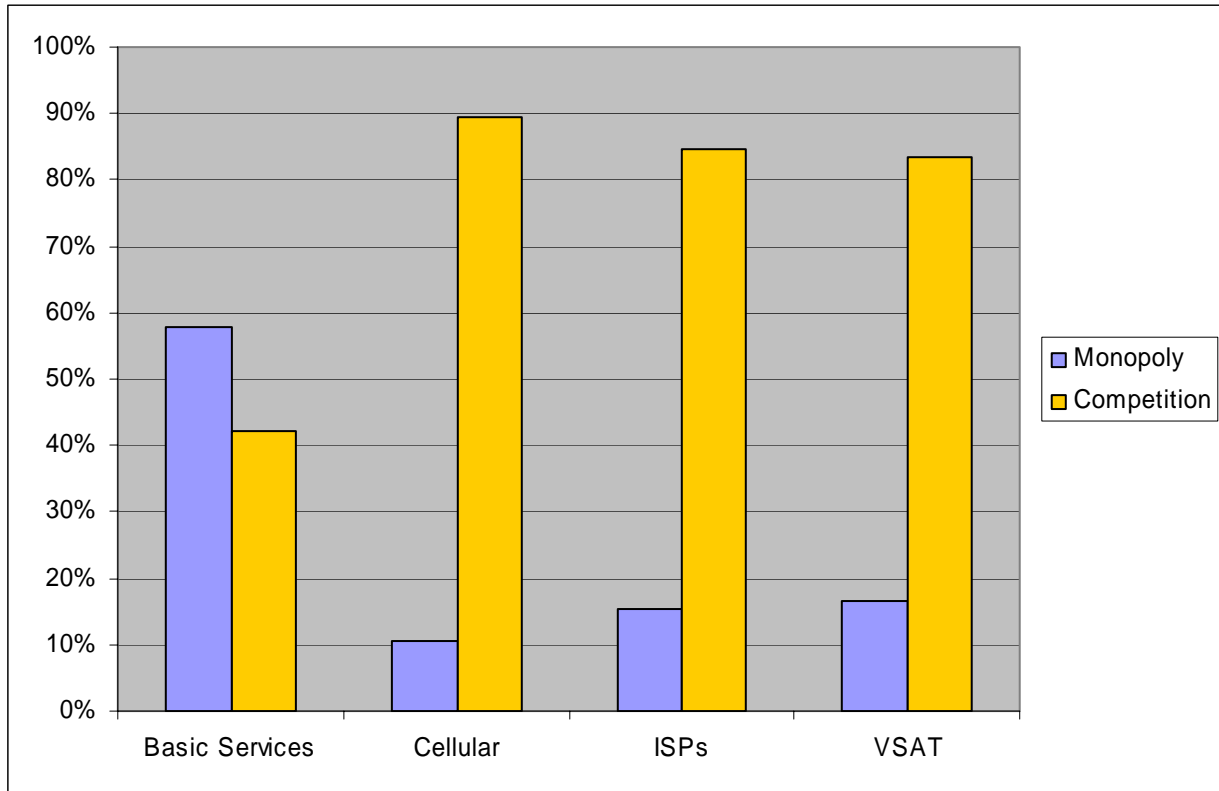
To date, experience world over has shown that the rapid and coherent diffusion of ICTs in a country is closely linked to the level of government direction and support. The government through its ICT policies and regulation must present a vision and solid strategies leading to the creation of an enabling 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 in 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 the developed countries to establish their information highways will not be the same as those to be used by LDCs. As already mentioned, the phenomenal growth of the mobile cellular sector worldwide is hinting 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 cellular telephony in developing countries has been one of the main contributory factors towards success in increasing teledensity in these countries. Figure 3.1 illustrates the sectors where competition has been authorized as compared to the provision of basic services, some of which are still under the monopolistic control of 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 percent of LDCs. Overall, competition is authorized in above 80 per cent of countries for services such as cellular, internet access and VSAT.

**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: Maldives, Sao Tomé & Príncipe, Rwanda, Chad, Equatorial Guinea, Kiribati, Solomon Islands, Tuvalu, Vanuatu, Comoros, Djibouti, Somalia, Benin, Central African Rep., Liberia, Uganda, Angola, Guinea, Laos, Comoros, and Djibouti.

With regards to fixed lines, there are a few countries that allow private ownership of main fixed-line operators. In 2004, there were 22 countries, which account for 44% 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 PDR, Lesotho, Madagascar, Maldives, Mauritania, Mozambique, Niger, Rwanda, Sao Tome & Principe, Senegal, Solomon Islands, Somalia, Sudan, Uganda and Vanuatu.

The old business model for telecommunications service provision was that public voice services provided the largest source of revenue for established telephone operators who mainly used to be 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 country that terminated the call. 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".<sup>13</sup> The established structure of telephone service pricing in most countries depended heavily on higher prices for calls of longer distances, especially international calls. Revenue generated from international incoming calls was a good telecommunications revenue stream for the old state monopolies. ITU estimates that, between 1993-98, net flows of settlement payments from developed countries to developing ones amounted to some US\$40 billion.

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

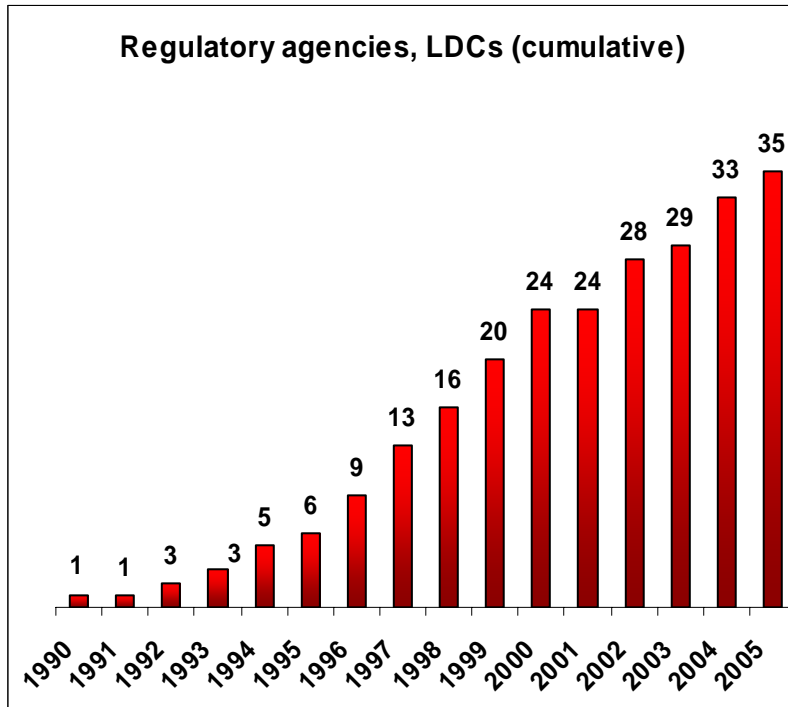
Any major technological improvement that dramatically changes the status quo by reducing unit costs and expanding service capabilities offers the potential of enormous benefits in terms of network and market expansion, cost and price reductions, and new service development. It also brings the threat 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<sup>14</sup> lay the ground for a favorable investment climate and promote market opportunities.

---

<sup>13</sup> The accounting rate regime is set out in the International Telecommunication Regulations (ITRs), an international treaty administered by the 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.

<sup>14</sup> Figure 3.2 illustrates the rapid increase of separate regulatory agencies in LDCs rising to 35 in 2005 from 1 in 1990 and 24 in 2001

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



**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 Samoa and Liberia. All the reason why 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 policymakers 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 services 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.

**For more information contact:**

Dr. Cosmas Zavazava

Head, Least Developed Countries, Small Islands Developing States and Emergency

Telecommunications

[cosmas.zavazava@itu.int](mailto:cosmas.zavazava@itu.int)