



Measuring the Information Society



2012

EXECUTIVE SUMMARY



I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

Measuring the Information Society

2012

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SUMMARY**



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Foreword

It is my pleasure to present to you the 2012 edition of *Measuring the Information Society*. Now in its fourth year, this annual report draws on innovative and authoritative benchmarking tools developed by ITU to monitor information-society developments worldwide as well as to provide valuable information for use in formulating evidence-based policies and in effective peer learning.

The report presents the *ICT Development Index (IDI)*, which ranks countries' performance with regard to ICT infrastructure and uptake, and the *ICT Price Basket (IPB)*, a unique metric that tracks and compares the cost and affordability of ICT services. This edition also features new data series and analyses concerning revenue and investment in the ICT sector, and proposes a new methodology using non-conventional data, to measure the world's telecommunication capacity.



The past year has seen continued and almost universal growth in ICT uptake. Much of this enhanced connectivity is due to the rapid uptake – a 40 per cent rise in 2011 – of mobile-broadband subscriptions, to the point where there are now twice as many mobile-broadband as fixed-broadband subscriptions. The surge in numbers of mobile-broadband subscriptions in developing countries has brought the Internet to a multitude of new users. The report nevertheless notes that the prices for ICT services remain very high in many low-income countries. For mobile broadband to replicate the mobile-cellular miracle, 3G network coverage has to be extended, and prices have to go down further.

Indeed, the disparities in ICT development between countries remain substantial, with IDI values that are on average twice as high in developed compared to developing countries.

I trust that the data and analysis contained in this report will be of great value to the ITU membership and others working towards building an inclusive global information society. I am pleased to note that, overall, considerable strides have been made since the launch of the 2011 edition.

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ITU also appreciates the cooperation of countries that have provided data included in the ICT Development Index and ICT Price Basket.

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Chapter 1. Introduction

Information and communication technologies (ICTs) continue to penetrate countries in all regions of the world, as more and more people are getting connected. The past year has seen persistent growth in ICT uptake worldwide, with an increase in all key indicators except the number of fixed-telephone lines, which has been in decline since 2005 (Chart 1). Indeed, more and more countries are reaching a critical mass in terms of ICT access and use, which accelerates ICT diffusion and further boosts demand, driven by the spread of mobile Internet.

Around 6 billion mobile-cellular subscriptions by the end of 2011

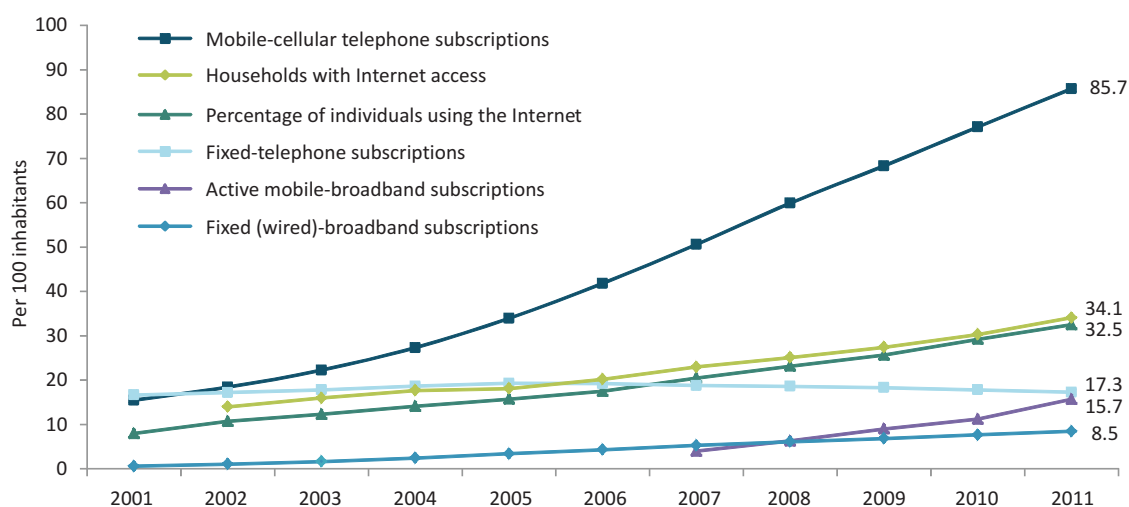
Between 2010 and 2011, mobile-cellular subscriptions registered continuous double-digit growth in developing-

country markets, but an overall slowdown in comparison with previous years. The number of mobile-cellular subscriptions increased by more than 600 million, almost all of them in the developing world, to a total of around 6 billion, or 86 per 100 inhabitants, globally (Chart 2). China alone is home to 1 billion subscriptions, and India is expected to hit the 1 billion mark in 2012. Mobile-cellular penetration increased by 11 per cent worldwide, compared to 13 per cent the previous year. Overall, the increasing number of service providers has led to sometimes fierce competition in the sector and driven down consumer prices significantly, which has been a key factor in the spread of mobile-cellular services.

Almost twice as many mobile-broadband as fixed-broadband subscriptions

Uptake of both fixed (wired)-broadband and mobile-broadband services has continued to grow worldwide. By end

Chart 1: Global ICT developments, 2001-2011



Source: ITU World Telecommunication/ICT Indicators database.

2011, the number of fixed (wired)-broadband subscriptions had climbed to almost 600 million, corresponding to a global penetration rate of 8.5 per cent (Chart 3). This compares with around 530 million, and 7.7 per cent penetration, a year earlier. At the same time, the number of active mobile-broadband subscriptions grew by 40 per cent between 2010 and 2011, to almost 1.1 billion by end 2011. This represents a penetration rate of 16 per 100 inhabitants globally, as against 12.6 a year earlier (Chart 4). Today, there are almost twice as many mobile-broadband as fixed-broadband subscriptions. Europe continues to be the leading region when it comes to broadband uptake, followed by the Americas (Chart 5).

Mobile-broadband penetration is expected to continue growing at double-digit rates over the next few years, reflecting the spread of mobile Internet services

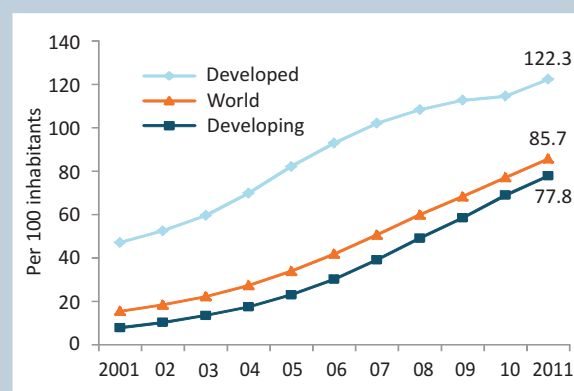
Mobile broadband continues to be the ICT service displaying the sharpest growth rates. Between 2010 and 2011, growth continued at a high rate of 40 per cent globally, 23 per cent in the developed world and 78 per cent in developing countries. Contrary to mobile-cellular penetration, no saturation point has yet been reached for mobile-broadband penetration, and growth is expected to continue at double-digit rates over the next few years. The emergence of mobile Internet services (both prepaid and postpaid) has played a key role in the surge in numbers of mobile-broadband subscriptions in developing countries, bringing Internet to a large number of users who have limited access to fixed-broadband services.

The high growth in smartphones and (affordable) tablets in big emerging markets (such as the BRICS countries) will have a significant impact on the number of mobile-broadband subscriptions and Internet users and, coupled with the increase in mobile video applications, will reinforce the shift from mobile voice to mobile data traffic. As a result, significant upgrades of networks, higher speeds and more spectrum will be required, all warranting sustained investment flows in the sector.

High-end users require advanced fixed-broadband infrastructure

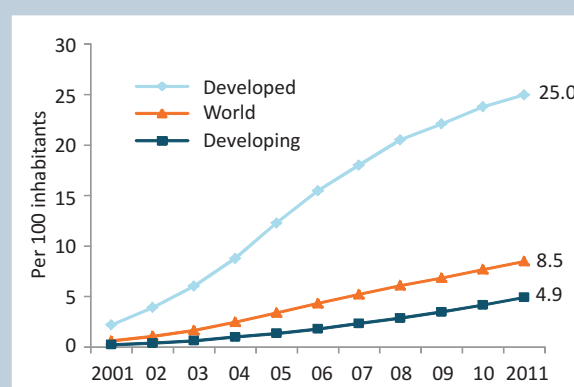
Fixed-broadband penetration, on the other hand, is growing more slowly, by 10 per cent worldwide, 5 per cent in developed countries and 18 per cent in developing

Chart 2: Mobile-cellular subscriptions, 2001-2011, world and by level of development



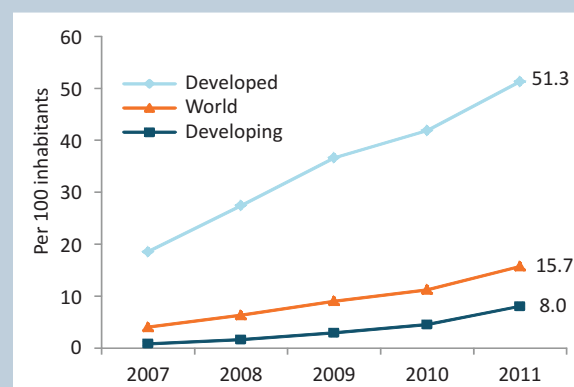
Source: ITU World Telecommunication /ICT Indicators database.

Chart 3: Fixed (wired)-broadband subscriptions, 2001-2011, world and by level of development

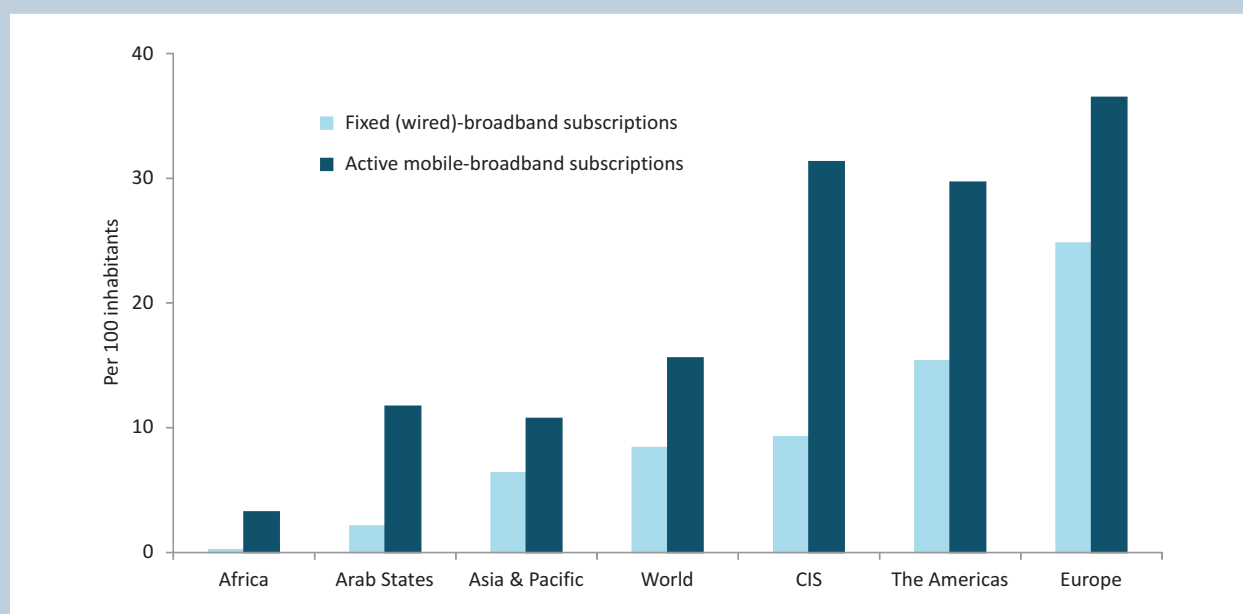


Source: ITU World Telecommunication /ICT Indicators database.

Chart 4: Active mobile-broadband subscriptions, 2007-2011, world and by level of development



Source: ITU World Telecommunication /ICT Indicators database.

Chart 5: Fixed (wired)- and active mobile-broadband subscriptions per 100 inhabitants, by region, 2011

Source: ITU World Telecommunication/ICT Indicators database.

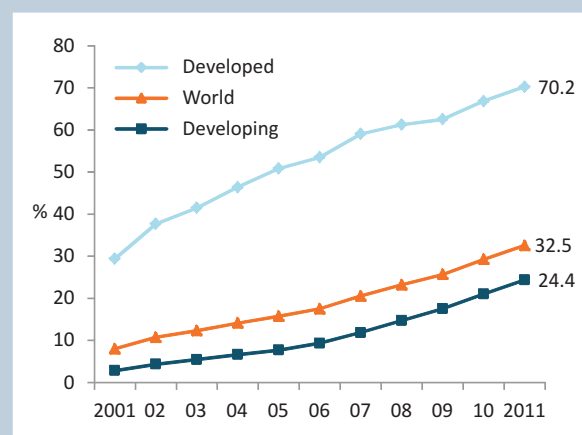
countries over the past year. There are no signs of saturation yet, and fixed-broadband penetration is expected to continue progressing over the next few years.

In comparison with mobile-network infrastructure, fixed-broadband infrastructure requires much larger investments. Particularly in the last mile, broadband access is improved by extending fibre connections all the way to the home or the business. These new fixed-broadband networks provide higher speed, capacity and quality of service than mobile-broadband networks and therefore correspond better to the needs of high-end users, such as organizations or businesses, who will require advanced fixed-broadband infrastructure in order to take full advantage of broadband.

By end 2011, 2.3 billion people (i.e. one in three) were using the Internet

On the back of the increase in broadband services worldwide, the number of people using the Internet grew by 11 per cent over the past year (Chart 6). By end 2011, more than one-third of the population worldwide was online, i.e. 2.3 billion people. Internet user growth was higher in developing (16 per cent) than developed (5 per cent) countries. This reflects the large differences in Internet

penetration rates, which by end 2011 stood at 70 per cent in developed countries compared with 24 per cent in developing countries. The developing countries' share of the world's total number of Internet users has increased, from 44 per cent in 2006 to 62 per cent in 2011. Today, Internet users in China account for 23 per cent of the world's total

Chart 6: Percentage of individuals using the Internet, 2001-2011, world and by level of development

Source: ITU World Telecommunication /ICT Indicators database.

Internet users and 37 per cent of the developing countries' Internet users.

More and more people have access to the Internet from home. Between 2010 and 2011, the proportion of households with Internet access grew by 14 per cent. By end 2011, out of 1.8 billion households worldwide, one-third or 600 million had Internet access.

In developing countries, broadband subscriptions are often at speeds below 2 Mbit/s

At the same time, while in most developed countries it is difficult to imagine day-to-day life without Internet, two-thirds of the world's population, and more than three-quarters of the population in developing countries, are not yet online, and of those that are, many do not have access to high-speed, high-quality Internet services.

While in many high-income, developed economies the majority of fixed (wired)-broadband subscriptions deliver very high speeds (of above 10 Mbit/s), many subscriptions in developing countries are limited to speeds below 2 Mbit/s. This effectively restricts the type and quality of applications and services that users can access over the Internet. It is also important to note that while mobile-broadband technology helps to increase coverage and offer mobility, the mobile networks and services currently in place usually only allow limited data access, at lower speeds, which often makes mobile-broadband subscriptions unsuitable for intensive users, such as businesses and institutions. High-speed, reliable broadband access is particularly important for the delivery of vital public services, such as those related to education, health and government. The potential and benefit of mobile-broadband services is therefore constrained when mobile broadband is used to replace, rather than complement, fixed (wired)-broadband access.

The Broadband Commission endorsed four ambitious but achievable targets for 2015

The need to bridge the digital divide and make broadband Internet access universal has been recognized within key international development goals, such as the Millennium Development Goals (MDGs) and the targets of the World Summit on the Information Society (WSIS). In addition, at its

fourth meeting in October 2011 in Geneva, the Broadband Commission for Digital Development endorsed a set of four new "ambitious but achievable" targets that countries around the world should strive to meet in order to ensure their populations participate fully in tomorrow's emerging knowledge societies. The targets cover broadband policy, affordability and uptake:

Target 1: Making broadband policy universal. By 2015, all countries should have a national broadband plan or strategy or include broadband in their universal access/service (UAS) definitions.

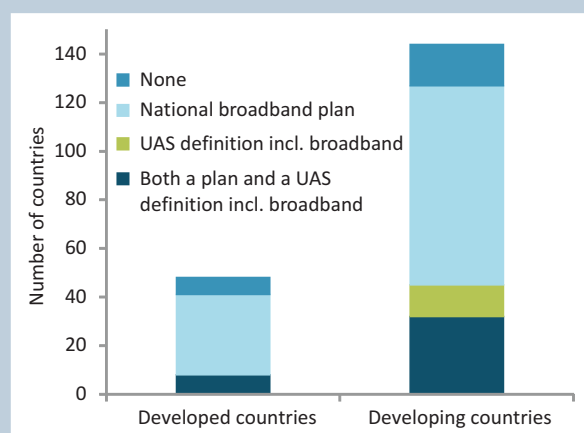
As at 2011, out of a total of 144 developing countries, 127 had established a national broadband plan, included broadband in their UAS definitions, or both (Chart 7). Given that more and more countries are elaborating national broadband plans that recognize the importance of broadband as a core national infrastructure, the target of 100 per cent by 2015 could be achieved.

Target 2: Making broadband affordable. By 2015, entry-level broadband services should be made affordable in developing countries through adequate regulation and market forces (e.g. be priced at less than 5 per cent of average monthly GNI per capita).

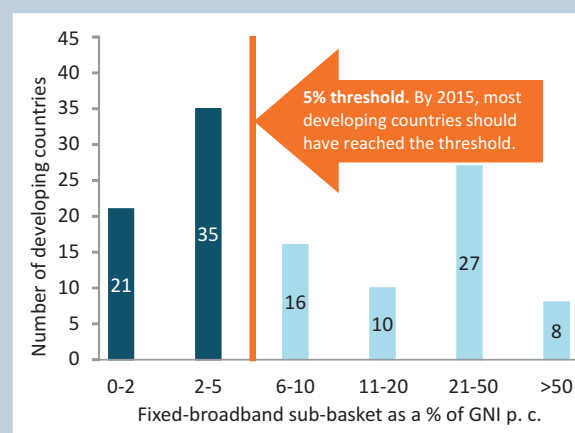
Broadband prices are falling worldwide, in particular in developing countries, but are still too high, thus making broadband unaffordable for many people. In 2011, the price of fixed-broadband services in developing countries corresponded to 40.3 per cent of GNI per capita on average. A total of 56 developing countries had achieved the 5 per cent target (Chart 8). By comparison, in the large majority of developed countries, broadband prices correspond to less than 5 per cent of GNI per capita.

Target 3: Connecting homes to broadband. By 2015, 40 per cent of households in developing countries should have Internet access.

Having access to broadband Internet at home is the most inclusive way of bringing people into the information society. In developed countries, more than 70 per cent of households had Internet by end 2011, as compared with 20 per cent in developing countries (up from 17 per cent

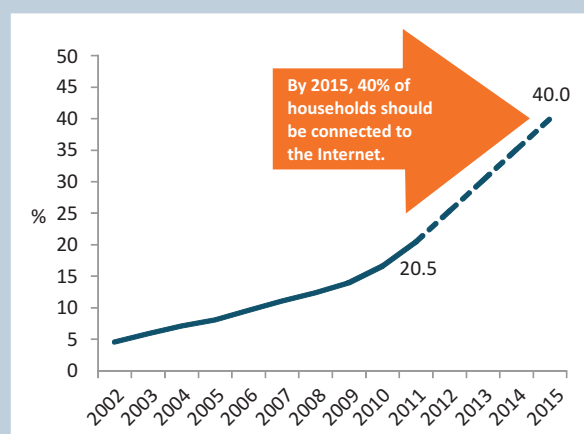
Chart 7: National policy instruments in place to promote broadband, 2011

Source: ITU, Regulatory Knowledge Centre.

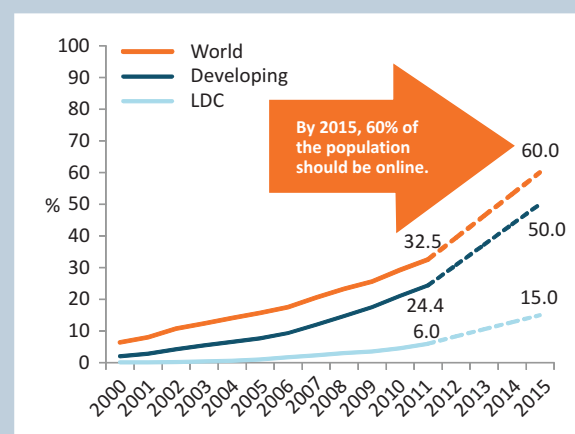
Chart 8: Fixed-broadband prices in developing countries, % of GNI per capita, 2011

Source: ITU.

Note: For further details on the methodology of the ICT Price Basket, see Chapter 3 of the full report.

Chart 9: Percentage of households with Internet access, developing countries

Source: ITU.

Chart 10: Percentage of individuals using the Internet

Source: ITU.

a year previously). This number has to double to reach the target of 40 per cent by 2015 (Chart 9).

Target 4: Getting people online. By 2015, Internet user penetration should reach 60 per cent worldwide, 50 per cent in developing countries and 15 per cent in LDCs.

At end 2011, Internet user penetration rates stood at 33 per cent globally, 24 per cent in developing countries and

6 per cent in least developed countries (LDCs) (Chart 10). Growth has to accelerate substantially if the target is to be met, especially in LDCs. In view of the steep increase in mobile-broadband subscriptions, however, the target may be achievable if services and devices are offered at affordable rates; if new applications are developed that are geared to less educated or marginalized population groups; and if important barriers related to skills, literacy, content and languages are addressed.

Chapter 2. The ICT Development Index (IDI)

The ICT Development Index (IDI) is a composite index combining 11 indicators into one benchmark value (presented on a scale from 0 to 10). The objectives of the IDI are to monitor progress in ICT developments in both developed and developing countries and to measure the evolution of the global digital divide. The IDI is divided into three sub-indices: the access sub-index, the use sub-index and the skills sub-index, each capturing different aspects and components of the ICT development process. This report presents IDI results for 2011 in comparison with 2010, for 155 countries.

The Republic of Korea ranks first in the IDI 2011, followed by mostly European countries

The Republic of Korea tops the IDI 2011, followed by Sweden, for the second consecutive year. The other top ten countries (in order) are Denmark, Iceland, Finland, the Netherlands, Luxembourg, Japan, the United Kingdom and Switzerland (Table 1). Remarkably, the top five countries have not changed position between 2010 and 2011, and are thus maintaining the highest ICT levels in the world. Between 2010 and 2011, almost all 155 countries included in the index improved their IDI values, which testifies to the continuous growth of ICT uptake worldwide. On average, the IDI increased by 0.21 points (Table 2). Growth was stronger in the use sub-index in comparison with the access sub-index (Chart 11). This reflects the fact that, overall, countries have already reached a higher level of performance on the access sub-index, whereas the use sub-index is at a much lower level, and many countries are still expanding in terms of ICT usage. There are huge differences among countries, with IDI 2011 values ranging from 8.56 (highest value) to 0.88 (lowest value). The range has increased slightly between 2010 and 2011, indicating a widening of the gap between the country at the top and the country at the bottom of the index.

IDI values are twice as high in developed countries, but the most dynamic performers are primarily from developing countries

All countries in the top 30 of the IDI are high-income

countries, underlining the strong link between income and IDI levels. There are large differences between developed and developing countries, with IDI values on average twice as high in the former compared with the latter. The gap is at its widest in the use sub-index, which is more than three times higher in developed than in developing countries (Chart 11). Furthermore, the developing-countries group has become more heterogeneous: the IDI range (or the difference between the highest and the lowest country scores) and coefficient of variation among developing countries increased, suggesting that the differences in ICT levels within that group widened. The opposite is true for the developed countries, which have become more homogenous in terms of ICT development (Table 2).

At the same time, the highest growth rates in IDI values are found in developing countries, not only on the IDI overall, but also on both the access and use sub-indices. The use sub-index, in particular, grew by 20 per cent from 2010 to 2011 in the developing world, as against 10 per cent in developed countries.

This is partly attributable to the lower starting values in developing countries, but it also reflects the rapid uptake of ICT services such as mobile Internet. Indeed, the most dynamic performers (i.e. those with above-average changes in IDI value or ranking between 2010 and 2011) are primarily from the developing world, and include countries from all regions (Table 3).

Priority should be given to the “least connected countries” when it comes to ICT-for-development

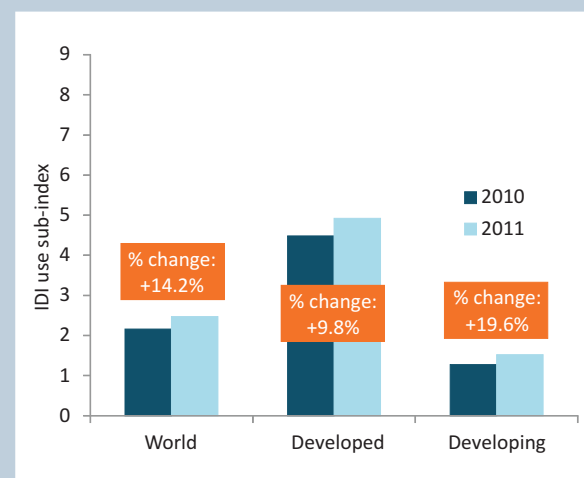
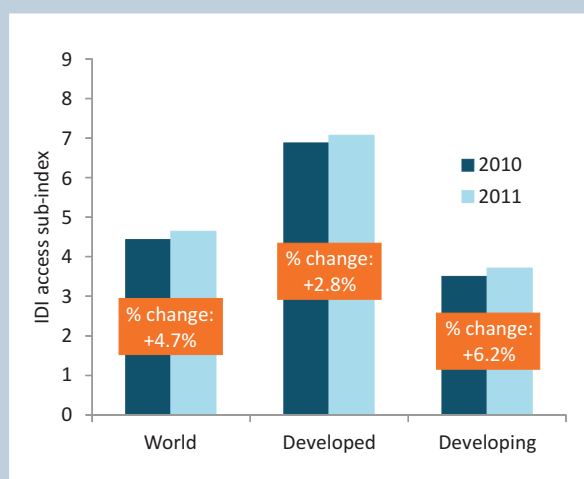
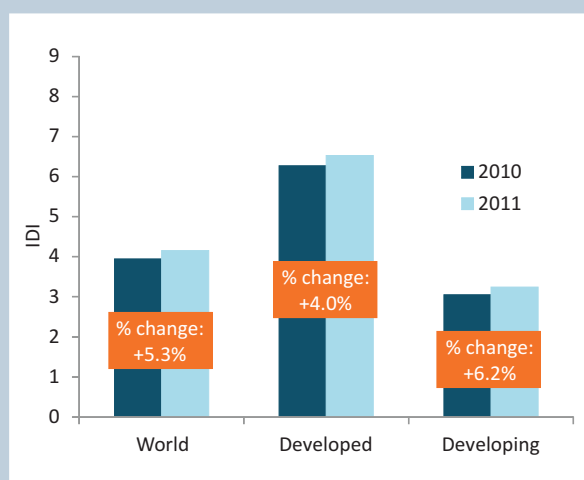
In addition to comparing IDI results between developed and developing countries, a more accurate analysis of the evolution of the digital divide can be obtained by grouping countries on the basis of their IDI levels (high, upper, medium and low) and comparing changes over time. Between 2010 and 2011, the IDI range decreased for the high, upper and medium IDI groups, whereas it increased for the low IDI group. The latter is also the group where the least progress in terms of ICT development was made. The low group, which comprises the lowest quartile (or lowest ranked 39 countries) of the 155 countries included in the 2011 IDI, can be termed the world’s “least connected countries” (LCCs) (Table 4). Countries in this group lack the infrastructure and

Table 1: ICT Development Index (IDI), 2010 and 2011

Economy	Rank 2011	IDI 2011	Rank 2010	IDI 2010
Korea (Rep.)	1	8.56	1	8.45
Sweden	2	8.34	2	8.21
Denmark	3	8.29	3	8.01
Iceland	4	8.17	4	7.96
Finland	5	8.04	5	7.89
Netherlands	6	7.82	7	7.60
Luxembourg	7	7.76	6	7.64
Japan	8	7.76	8	7.57
United Kingdom	9	7.75	14	7.35
Switzerland	10	7.68	9	7.48
Hong Kong, China	11	7.68	12	7.39
Singapore	12	7.66	10	7.47
Norway	13	7.52	11	7.39
Macao, China	14	7.51	13	7.38
United States	15	7.48	16	7.11
Germany	16	7.39	15	7.18
New Zealand	17	7.34	18	7.03
France	18	7.30	17	7.08
Austria	19	7.10	22	6.74
Ireland	20	7.09	19	6.99
Australia	21	7.05	21	6.75
Canada	22	7.04	20	6.87
Belgium	23	6.89	23	6.60
Estonia	24	6.81	26	6.36
Slovenia	25	6.70	24	6.54
Malta	26	6.69	28	6.30
Israel	27	6.62	25	6.41
Spain	28	6.62	27	6.31
Italy	29	6.28	29	6.13
Qatar	30	6.24	31	5.94
Poland	31	6.19	30	6.09
Czech Republic	32	6.17	33	5.89
Greece	33	6.14	35	5.88
Barbados	34	6.07	32	5.91
Lithuania	35	6.06	34	5.88
Latvia	36	6.06	37	5.80
Portugal	37	6.05	36	5.86
Russian Federation	38	6.00	40	5.61
Slovakia	39	5.86	39	5.63
Bahrain	40	5.85	45	5.19
Hungary	41	5.77	42	5.53
Croatia	42	5.75	41	5.54
Antigua & Barbuda	43	5.74	44	5.35
Cyprus	44	5.73	38	5.64
United Arab Emirates	45	5.64	43	5.41
Belarus	46	5.57	46	5.08
Saudi Arabia	47	5.43	53	4.81
Serbia	48	5.40	47	5.04
Kazakhstan	49	5.27	56	4.65
Uruguay	50	5.24	49	4.89
Bulgaria	51	5.20	51	4.87
Romania	52	5.13	50	4.89
Oman	53	5.10	54	4.75
TFYR Macedonia	54	5.05	48	4.90
Chile	55	5.01	58	4.63
Argentina	56	5.00	55	4.72
Brunei Darussalam	57	4.95	52	4.85
Malaysia	58	4.82	57	4.63
St. Vincent and the G.	59	4.74	59	4.58
Brazil	60	4.72	67	4.17
Trinidad & Tobago	61	4.57	60	4.42
Moldova	62	4.55	62	4.24
Bosnia and Herzegovina	63	4.53	64	4.21
Saint Lucia	64	4.49	61	4.36
Lebanon	65	4.48	68	4.11
Panama	66	4.41	63	4.21
Ukraine	67	4.40	65	4.20
Azerbaijan	68	4.39	73	3.83
Turkey	69	4.38	66	4.17
Seychelles	70	4.37	69	4.00
Costa Rica	71	4.37	71	3.94
Maldives	72	4.30	72	3.92
Georgia	73	4.20	75	3.75
Mauritius	74	4.18	70	3.95
Jordan	75	3.95	77	3.61
Colombia	76	3.93	76	3.73
Venezuela	77	3.92	74	3.78
China	78	3.88	79	3.58

Economy	Rank 2011	IDI 2011	Rank 2010	IDI 2010
Mexico	79	3.79	78	3.60
Albania	80	3.78	80	3.48
Viet Nam	81	3.68	86	3.41
Ecuador	82	3.68	85	3.41
Egypt	83	3.66	81	3.44
Mongolia	84	3.63	87	3.36
Tunisia	85	3.58	83	3.42
Peru	86	3.57	82	3.43
Iran (I.R.)	87	3.53	88	3.35
Fiji	88	3.50	93	3.08
Jamaica	89	3.49	84	3.42
Morocco	90	3.46	92	3.19
South Africa	91	3.42	90	3.20
Thailand	92	3.41	89	3.29
Dominican Rep.	93	3.34	91	3.19
Philippines	94	3.19	94	3.04
Indonesia	95	3.19	97	3.01
Syria	96	3.15	96	3.01
Paraguay	97	3.14	99	2.94
Bolivia	98	3.13	100	2.93
Guyana	99	3.12	95	3.02
Tonga	100	3.12	98	2.94
Cape Verde	101	3.08	101	2.90
Uzbekistan	102	3.05	104	2.77
El Salvador	103	2.99	102	2.89
Algeria	104	2.98	103	2.86
Sri Lanka	105	2.88	105	2.74
Cuba	106	2.77	107	2.66
Honduras	107	2.72	106	2.71
Botswana	108	2.67	108	2.50
Namibia	109	2.51	112	2.27
Turkmenistan	110	2.49	109	2.44
Gabon	111	2.47	110	2.40
Tuvalu	112	2.46	113	2.23
Nicaragua	113	2.44	111	2.31
Kenya	114	2.32	114	2.07
Zimbabwe	115	2.24	118	1.89
Swaziland	116	2.24	115	2.06
Ghana	117	2.23	121	1.81
Bhutan	118	2.13	117	1.92
India	119	2.10	116	1.98
Lao P.D.R.	120	1.99	120	1.84
Cambodia	121	1.96	119	1.88
Nigeria	122	1.93	124	1.75
Solomon Islands	123	1.85	127	1.67
Senegal	124	1.85	122	1.76
Gambia	125	1.84	123	1.75
Yemen	126	1.76	126	1.70
Pakistan	127	1.75	125	1.71
Djibouti	128	1.74	128	1.65
Côte d'Ivoire	129	1.69	131	1.62
Comoros	130	1.68	130	1.64
Myanmar	131	1.67	129	1.65
Uganda	132	1.67	136	1.53
Rwanda	133	1.66	140	1.50
Togo	134	1.65	132	1.59
Zambia	135	1.65	137	1.53
Mauritania	136	1.64	138	1.53
Nepal	137	1.63	134	1.55
Cameroon	138	1.60	135	1.54
Tanzania	139	1.60	139	1.52
Congo (Rep. of the)	140	1.60	133	1.55
Benin	141	1.55	141	1.49
Papua New Guinea	142	1.44	144	1.36
Madagascar	143	1.44	142	1.41
Malawi	144	1.42	143	1.37
Mali	145	1.38	147	1.24
Congo (Dem. Rep.)	146	1.30	149	1.18
Mozambique	147	1.28	145	1.26
Guinea	148	1.28	146	1.25
Liberia	149	1.26	148	1.20
Ethiopia	150	1.15	150	1.09
Burkina Faso	151	1.14	152	1.06
Eritrea	152	1.09	151	1.08
Central African Rep.	153	0.97	153	0.96
Chad	154	0.94	155	0.85
Niger	155	0.88	154	0.88

Source: ITU.

Chart 11: IDI by level of development

Source: ITU.

Note: Simple averages.

skills needed to increase ICT penetration and usage. Thus, keen attention should be paid to this group of countries by policy-makers at both the national and international levels.

Developing countries are improving ICT access, which will eventually lead to higher ICT usage and impact

In terms of the IDI sub-indices, Hong Kong (China) ranks first in the IDI access sub-index, for the second consecutive year, followed by mainly European countries (Table 5, left). The most dynamic countries in terms of the access sub-index are (almost) all developing countries, generally ranked low in the IDI, and include some African and Arab LDCs. Whereas top IDI performers already have a highly developed ICT infrastructure, many developing countries are still enhancing ICT access. Of all the indicators used to compile the access sub-index, mobile-cellular penetration is growing the most strongly. Between 2010 and 2011, the number of mobile-cellular subscriptions continued to rise at double-digit rates in almost 60 (mostly developing) countries included in the IDI. International Internet bandwidth per Internet user continued to increase in most countries. There is quite a divide in terms of ICT household penetration between high-income countries, on the one hand, and lower- and middle-income countries, on the other. While the percentage of households with a computer and with Internet access is growing steadily, fixed-telephone penetration is stagnating in most countries.

The IDI use sub-index shows the most dynamic growth of all the sub-indices included in the IDI

The three countries topping the use sub-index – the Republic of Korea, Sweden and Denmark – are the same as for the overall IDI. Further top performers come from Europe and the Asia and the Pacific region (Table 5, right), and all have also reached very high scores on the overall IDI. This confirms that for societies to attain a high level of ICT usage, they need a high degree of ICT readiness and infrastructure (measured by the access sub-index) and ICT capabilities (measured by the skills sub-index). While the use sub-index contains the lowest values of all the sub-indices, it has been the most dynamic for the period 2010-2011, with mobile broadband displaying the highest growth rates

Table 2: IDI changes by level of development, 2010-2011

	IDI 2010					IDI 2011					Change in average value 2010-2011
	Average value*	Standard deviation	CV	Min.-Max.	Range	Average value*	Standard deviation	CV	Min.-Max.	Range	
World	3.94	2.08	52.60	0.85-8.45	7.60	4.15	2.13	51.31	0.88-8.56	7.68	0.21
Developed	6.27	1.17	18.69	3.48-8.21	4.73	6.52	1.15	17.59	3.78-8.34	4.56	0.25
Developing	3.05	1.60	52.35	0.85-8.45	7.60	3.24	2.12	65.54	0.88-8.56	7.68	0.19

Source: ITU.

Note: *Simple averages. CV = Coefficient of Variation.

Table 3: Most dynamic countries (top ten) – changes between IDI 2010 and 2011

Change in IDI ranking			Change in IDI value (absolute)			Change in IDI value (%)		
IDI rank 2011	Country	IDI rank change	IDI rank 2011	Country	IDI value change	IDI rank 2011	Country	IDI % change
49	Kazakhstan	7	40	Bahrain	0.66	117	Ghana	23
60	Brazil	7	47	Saudi Arabia	0.62	115	Zimbabwe	19
133	Rwanda	7	49	Kazakhstan	0.61	68	Azerbaijan	15
47	Saudi Arabia	6	68	Azerbaijan	0.57	88	Fiji	14
40	Bahrain	5	60	Brazil	0.54	49	Kazakhstan	13
68	Azerbaijan	5	46	Belarus	0.54	60	Brazil	13
88	Fiji	5	24	Estonia	0.49	47	Saudi Arabia	13
9	United Kingdom	5	73	Georgia	0.45	40	Bahrain	13
81	Viet Nam	5	71	Costa Rica	0.45	114	Kenya	12
117	Ghana	4	117	Ghana	0.43	73	Georgia	12

Source: ITU.

Table 4: Least connected countries (LCCs), 2011

Country	IDI 2011	Country	IDI 2011	Country	IDI 2011	Country	IDI 2011
Ghana	2.23	Pakistan	1.75	Nepal	1.63	Mozambique	1.28
Bhutan	2.13	Djibouti	1.74	Cameroon	1.60	Guinea	1.28
India	2.10	Côte d'Ivoire	1.69	Tanzania	1.60	Liberia	1.26
Lao P.D.R.	1.99	Comoros	1.68	Congo	1.60	Ethiopia	1.15
Cambodia	1.96	Myanmar	1.67	Benin	1.55	Burkina Faso	1.14
Nigeria	1.93	Uganda	1.67	Papua New Guinea	1.44	Eritrea	1.09
Solomon Islands	1.85	Rwanda	1.66	Madagascar	1.44	Central African Rep.	0.97
Senegal	1.85	Togo	1.65	Malawi	1.42	Chad	0.94
Gambia	1.84	Zambia	1.65	Mali	1.38	Niger	0.88
Yemen	1.76	Mauritania	1.64	Congo (Dem. Rep.)	1.30		

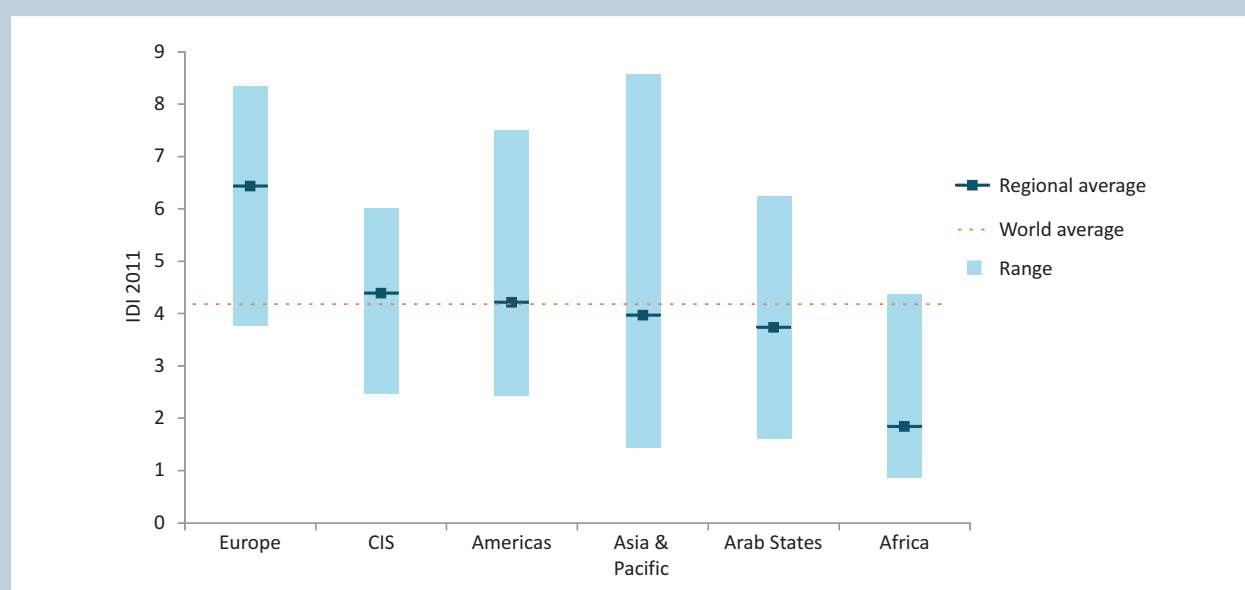
Source: ITU.

Table 5: Top ten economies in the IDI access sub-index (left) and IDI use sub-index (right), 2010 and 2011

Economy	Rank 2011	Access 2011	Rank 2010	Access 2010
Hong Kong, China	1	9.21	1	9.09
Switzerland	2	8.89	4	8.69
Luxembourg	3	8.87	3	8.75
Iceland	4	8.81	2	8.83
Germany	5	8.66	5	8.51
Sweden	6	8.50	6	8.51
United Kingdom	7	8.47	7	8.33
Singapore	8	8.38	12	8.12
Denmark	9	8.37	8	8.29
Netherlands	10	8.34	9	8.24

Economy	Rank 2011	Access 2011	Rank 2010	Access 2010
Korea (Rep.)	1	8.17	1	8.04
Sweden	2	7.84	2	7.53
Denmark	3	7.79	4	7.17
Finland	4	7.51	3	7.33
Japan	5	7.29	5	7.03
Singapore	6	7.24	6	7.02
Luxembourg	7	7.07	7	6.90
Iceland	8	7.07	8	6.53
Netherlands	9	6.86	10	6.40
Macao, China	10	6.63	9	6.46

Source: ITU.

Chart 12: IDI ranges and averages, by region, 2011

Source: ITU.

Note: Simple averages.

among the three indicators included in the sub-index. There are, however, several countries that have not (yet) launched 3G services commercially and have thus seen their use sub-index rank fall.

Fixed (wired)-broadband penetration remains behind mobile-broadband penetration globally. In 50 of the

countries included in the IDI (especially low-income, developing countries), fixed (wired)-broadband penetration is below 1 per cent. The percentage of the population using the Internet increased significantly in a number of countries, especially from the developing world, and has reached top levels in a number of European and other developed countries.

Table 6: The top five economies in each region and their ranking in the global IDI, 2011

Regional IDI rank	Europe	Global IDI rank	Asia & Pacific	Global IDI rank	Americas	Global IDI rank	Arab States	Global IDI rank	CIS	Global IDI rank	Africa	Global IDI rank
1	Sweden	2	Korea (Rep.)	1	United States	15	Qatar	30	Russian Fed.	38	Seychelles	70
2	Denmark	3	Japan	8	Canada	22	Bahrain	40	Belarus	46	Mauritius	74
3	Iceland	4	Hong Kong, China	11	Barbados	34	UAE	45	Kazakhstan	49	South Africa	91
4	Finland	5	Singapore	12	Antigua & Barbuda	43	Saudi Arabia	47	Moldova	62	Cape Verde	101
5	Netherlands	6	Macao, China	14	Uruguay	50	Oman	53	Ukraine	67	Botswana	108

Source: ITU.

Europe is the only region where the digital divide is narrowing

An analysis of the IDI for each of the six regions highlights differences in ICT development globally and regionally. European countries generally rank very high in the IDI, with a regional average of 6.49 (Chart 12). Furthermore, Europe is the only region that has become more homogenous in terms of ICT development and where the regional divide is narrowing. The CIS region has the second highest regional IDI, at 4.43, and comprises countries with relatively similar levels of ICT development; generally good progress has been made in terms of ICT development in the region from 2010 to 2011. The Americas region features an above-average IDI of 4.26. While the United States and Canada stand apart with very high IDI levels, the remaining countries are relatively homogenous in terms of ICT development. Asia and the Pacific has a relatively low regional average IDI of 4.02, which remains below the global average of 4.15. This region is very heterogeneous in terms of (ICT) development, including top performers as well as least connected countries. The Arab States region has the second lowest regional IDI value, at 3.77, but several high-income countries from the region stand out with relatively high IDI values. African countries are invariably found in the low ranks of the IDI, and the regional average is very low at 1.88. The progress made has mostly been in countries at the top of the regional ranking, making Africa

the exception: in other regions both the top- and bottom-ranked countries improved their performance.

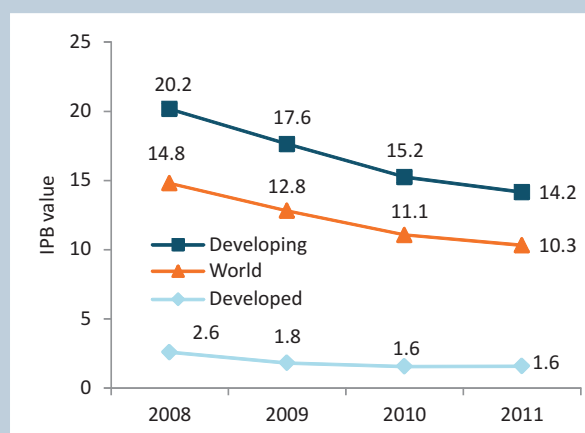
A comparison of the global and regional rankings of the top five countries in each region illustrates the global divide in ICT development, as well as regional imbalances (Table 6).

Chapter 3. The ICT Price Basket (IPB)

The price of ICT services has a significant impact on the demand for and spread of ICTs. To monitor the affordability of ICT services in countries, across regions and over time, ITU has developed the ICT Price Basket (IPB), a unique global benchmarking tool that provides insightful information on the cost and affordability of fixed-telephone, mobile-cellular and fixed-broadband services. The 2011 IPB ranks a total of 161 economies according to the affordability of ICT services.

The price of ICT services has dropped by 30 per cent and become more affordable in both developed and developing countries between 2008 and 2011

A global trend analysis comparing prices over the four-year period from 2008 to 2011 highlights that ICT services have

Chart 13: ICT Price Basket values, world and by level of development, 2008-2011

Source: ITU.

become more affordable in both developed and developing countries. Over this period, the global IPB value decreased from 14.8 to 10.3. In developing countries it dropped by 30 per cent, from 20.2 in 2008 to 14.2 by 2011 (Chart 13). All three sub-baskets that make up the IPB showed similar trends over the period 2008-2011, with a steeper drop in prices between 2008 and 2009 followed by a more moderate price decrease (indicating stabilization) in the most recent years. Fixed-telephone prices in particular have changed only moderately over the last two years, and are stabilizing. Macao (China), Norway and Singapore top the 2011 IPB with the most affordable ICT services worldwide (Table 7).

Prices nevertheless remain too high in many low-income developing economies, and particularly in the world's least developed countries (LDCs)

ICT services tend to be relatively affordable in countries with higher gross national income (GNI) per capita levels, while the bottom 15 in the 2011 IPB rankings are all LDCs (with the exception of Zimbabwe). At the same time, prices are now falling faster in developing countries. Less than one-third of the countries ranked in the top 50 of the 2011 IPB have shown any change in their IPB value from the previous year, and in most cases the changes are minor. The most significant IPB value changes took place in countries where prices are still relatively high. The more dynamic changes observed at the lower end of the IPB ranking compared to

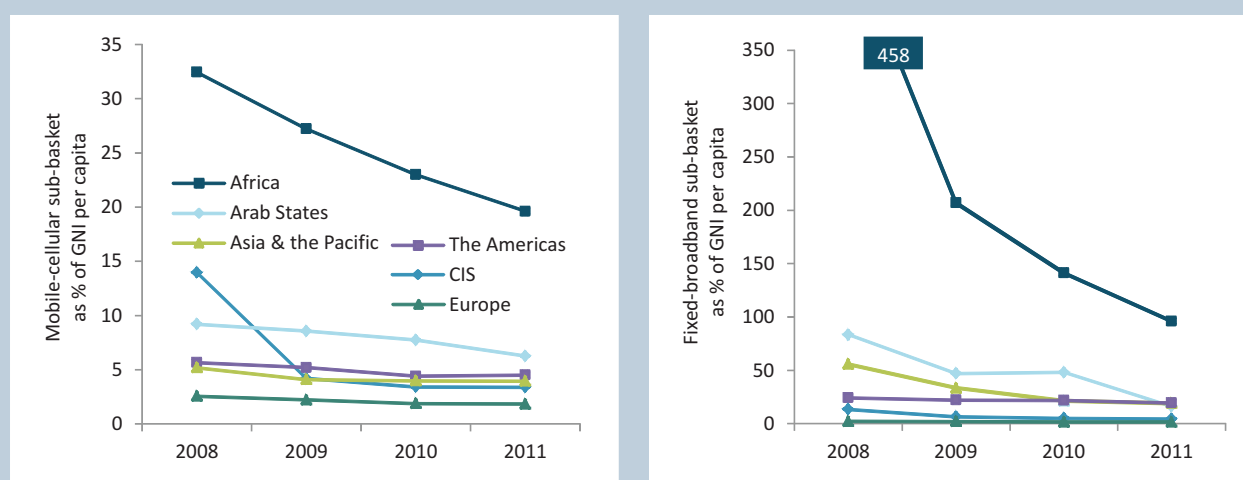
those at the top suggest that countries with ICT prices that are already relatively low have less scope for further reducing prices, whereas more can be done in countries where prices remain relatively high.

Although the price of ICT services fell in all regions of the world between 2008 and 2011, major differences in affordability persist

Prices remain high in Africa, in particular, with a 2011 IPB value of 31.4, as compared with 8.8, 8.0 and 5.5 in Asia and the Pacific, the Arab States and the Americas, respectively. In the CIS and Europe, the IPB value came down to 2.9 and 1.5, respectively, in 2011, making them the regions with the most affordable ICT services in the world. While ICT services have become more affordable across all regions in every year since 2008, the largest decrease occurred between 2008 and 2009, when all regions showed double-digit price drops. More recently, between 2010 and 2011, prices in all regions have declined at a much slower pace (Chart 14).

Mobile-cellular prices in developing countries continue to fall at double-digit rates

Mobile-cellular prices have decreased substantially over the last few years. While between 2008 and 2009 it was developed countries that recorded the greatest drop in mobile-cellular prices there has been little or no movement between 2010 and 2011. This reflects the fact that by 2011 a high degree of liberalization and competition in developed economies has stabilized prices at a relatively low level. Prices in developing countries, meanwhile, continue to fall at double digit-rates. In 2008, Europe, the Americas and Asia and the Pacific already enjoyed relatively affordable mobile-cellular prices, and further reduced their mobile-cellular sub-basket values to 1.8, 4.5 and 3.9 per cent of GNI per capita, respectively, by 2011. In the CIS, the mobile-cellular sub-basket came down from 13.9 per cent of GNI per capita in 2008 to below 5 by 2011. The Arab States have witnessed a steady decrease in the price of mobile-cellular services, too, although prices remained above 5 per cent of GNI per capita in 2011. Prices in Africa fell steeply, with the mobile-cellular sub-basket decreasing from 32.4 per cent of GNI per capita in 2008 to 19.6 in 2011. Even though the top ten countries with the most affordable mobile-cellular sub-baskets are all high-income economies, mobile cellular is the sub-basket

Chart 14: IPB mobile-cellular (left) and fixed-broadband (right) sub-baskets by region, 2008-2011

Source: ITU.

Note: Simple averages.

for which the difference in affordability between developed and developing countries is the least pronounced.

By 2011, almost half of all developing countries included in the IPB had achieved a fixed-broadband sub-basket value of less than 5 per cent of GNI p.c., a target set by the Broadband Commission for Digital Development

Fixed-broadband prices witnessed the steepest fall (of about 75 per cent) between 2008 and 2011. Fixed broadband is the sub-basket for which the difference in affordability between developed and developing countries is the most pronounced. However, developing countries benefited from a particularly strong decrease in prices (of close to 50 per cent) between 2008 and 2009, and prices continued to fall by over 30 per cent annually between 2009 and 2011. In developed countries, on the other hand, the fixed-broadband sub-basket actually increased from 2010 to 2011, albeit only slightly. This is because, in most developed countries, the price of entry-level fixed-broadband services has reached relatively low levels and in many cases operators increase speeds and/or data volume caps instead of further reducing prices.

Africa's fixed-broadband sub-basket has become much more affordable over this period, going from 458.1 per

cent of GNI per capita in 2008 to 95.9 in 2011. In the Arab States, too, the fixed-broadband sub-basket was slashed from 83.4 per cent of GNI per capita in 2008 to 15.9 in 2011. By 2011, both the Americas and Asia and the Pacific registered very similar fixed-broadband sub-baskets (at just over 19 per cent of GNI per capita), although Asia and the Pacific started off with much higher relative prices in 2008 (55.6 per cent of GNI per capita, as against 24.1 in the Americas). In the CIS, the fixed-broadband sub-basket has more than halved since 2008, and stood at below 5 per cent of GNI per capita in 2011. Fixed-broadband prices in Europe have been relatively affordable since 2008 and, by 2011, the fixed-broadband sub-basket value stood at just 1.5 per cent of GNI per capita.

Mobile-broadband services are more affordable in developed than in developing countries, but in developing countries mobile broadband is less expensive for low-volume subscribers than fixed broadband

In view of their growth rates and their potential for connecting more and more people to the Internet, the price and affordability of mobile-broadband services is becoming an important issue. In 2011, ITU conducted a pilot mobile-broadband price data collection exercise covering 127 countries, with the aim of understanding

Table 7: ICT Price Basket and sub-baskets, 2011 and 2010

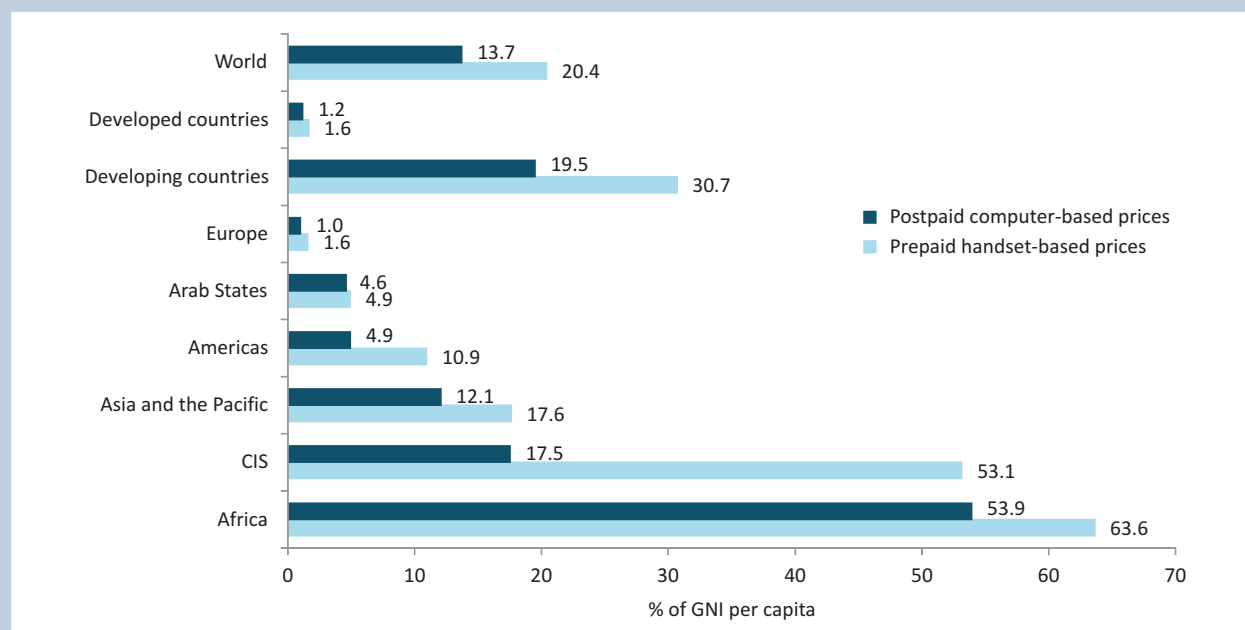
Rank	Economy	IPB		Fixed-telephone sub-basket as a % of GNI per capita		Mobile-cellular sub-basket as a % of GNI per capita		Fixed-broadband sub-basket as a % of GNI per capita		GNI per capita, USD, 2010 (or latest available year)
		2011	2010	2011	2010	2011	2010	2011	2010	
1	Macao, China	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	34'880
2	Norway	0.4	0.5	0.3	0.5	0.2	0.2	0.7	0.7	84'290
3	Singapore	0.4	0.4	0.2	0.2	0.2	0.2	0.8	0.8	40'070
4	Qatar	0.5	0.5	0.2	0.2	0.3	0.3	0.9	0.9	71'008
5	Luxembourg	0.5	0.5	0.4	0.4	0.4	0.4	0.6	0.6	77'160
6	United Arab Emirates	0.5	0.5	0.1	0.1	0.3	0.2	1.2	1.2	41'930
7	Denmark	0.5	0.5	0.6	0.6	0.2	0.2	0.9	0.9	59'050
8	Hong Kong, China	0.6	0.5	0.5	0.5	0.4	0.4	0.8	0.7	32'780
9	Sweden	0.6	0.6	0.6	0.6	0.3	0.3	0.8	0.8	50'110
10	United States	0.6	0.6	0.3	0.3	0.9	0.9	0.5	0.5	47'390
11	Switzerland	0.6	0.6	0.5	0.5	0.8	0.8	0.5	0.5	71'530
12	Finland	0.6	0.5	0.6	0.4	0.3	0.3	0.9	0.9	47'720
13	Austria	0.7	0.7	0.6	0.6	0.3	0.4	1.0	1.0	47'060
14	Cyprus	0.7	0.9	1.0	1.0	0.3	0.3	0.8	1.4	29'430
15	Bahrain	0.7	0.7	0.2	0.2	0.7	0.7	1.3	1.3	25'420
16	Iceland	0.8	0.7	0.7	0.6	0.7	0.6	1.0	0.9	32'710
17	Netherlands	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	49'050
18	Belgium	0.8	0.8	0.8	0.8	1.0	1.1	0.7	0.6	45'910
19	Israel	0.9	0.9	0.8	0.7	1.5	1.5	0.4	0.4	27'170
20	Germany	0.9	0.8	0.8	0.8	0.9	0.6	1.1	1.1	43'110
21	Ireland	0.9	0.9	0.8	0.8	1.1	1.1	1.0	1.0	41'000
22	Canada	0.9	0.8	0.8	0.6	1.2	1.1	0.8	0.7	43'270
23	Italy	0.9	0.9	0.9	0.9	1.1	1.0	0.9	0.9	35'150
24	United Kingdom	0.9	0.9	1.0	0.8	1.2	1.1	0.6	0.8	38'370
25	Japan	1.0	1.0	0.8	0.8	1.4	1.5	0.7	0.7	41'850
26	Brunei Darussalam	1.0	1.0	0.4	0.4	0.7	0.7	1.8	1.9	31'800
27	France	1.0	1.0	0.8	0.8	1.4	1.4	0.9	0.9	42'390
28	Malta	1.0	1.0	0.7	0.6	1.3	1.3	1.1	1.1	19'270
29	Australia	1.0	0.8	0.8	0.8	0.8	0.8	1.5	1.0	43'590
30	Oman	1.0	1.2	0.9	0.9	0.6	0.6	1.7	2.2	18'260
31	Russian Federation	1.1	1.0	0.8	0.8	1.1	1.1	1.2	1.2	9'900
32	Korea (Rep.)	1.1	1.1	0.4	0.4	1.3	1.4	1.6	1.6	19'890
33	Lithuania	1.2	1.2	1.4	1.4	1.0	1.0	1.1	1.1	11'390
34	Greece	1.2	1.2	1.1	1.1	1.6	1.7	0.9	0.8	26'940
35	Trinidad & Tobago	1.2	1.2	1.5	1.5	1.1	1.1	1.0	1.0	15'380
36	Latvia	1.2	1.2	1.0	1.0	1.3	1.3	1.3	1.3	11'620
37	Bahamas	1.2	1.3	0.9	0.9	1.0	1.0	1.7	2.0	20'610
38	Slovenia	1.3	1.2	0.9	0.9	1.2	1.0	1.7	1.7	23'860
39	Mauritius	1.3	1.5	0.8	0.8	1.0	1.1	2.0	2.5	7'750
40	Costa Rica	1.3	1.5	0.8	1.2	0.6	0.6	2.5	2.6	6'810
41	Saudi Arabia	1.3	1.3	1.0	0.7	1.0	1.1	2.0	2.0	16'190
42	Portugal	1.4	1.4	1.3	1.4	1.3	1.3	1.5	1.4	21'880
43	Spain	1.4	1.3	1.2	1.1	1.8	1.8	1.2	1.2	31'750
44	Maldives	1.4	1.4	0.8	0.8	1.4	1.4	1.9	1.9	5'750
45	Venezuela	1.4	1.3	0.2	0.2	2.5	2.3	1.6	1.5	11'590
46	Croatia	1.5	1.5	1.5	1.5	1.3	1.5	1.6	1.6	13'870
47	Estonia	1.6	1.5	1.0	1.0	1.9	1.9	1.7	1.7	14'460
48	New Zealand	1.7	1.6	1.4	1.4	2.0	2.0	1.7	1.5	28'770
49	Poland	1.7	1.7	2.0	2.0	1.2	1.5	1.9	1.7	12'440
50	Sri Lanka	1.8	1.8	1.8	1.8	0.6	1.0	2.9	2.7	2'240
51	Malaysia	1.8	1.8	0.8	0.8	1.4	1.4	3.2	3.2	7'760
52	Azerbaijan	1.8	1.7	0.6	0.6	2.0	1.7	2.8	2.8	5'330
53	Belarus	1.9	1.8	0.3	0.3	1.8	1.6	3.6	3.6	5'950
54	Slovakia	2.0	2.0	1.3	1.3	2.7	2.7	1.9	1.8	16'830
55	Uruguay	2.0	2.0	1.5	1.5	2.4	2.4	2.2	2.2	10'590
56	Czech Republic	2.0	1.9	1.8	1.8	2.2	1.9	2.1	2.1	17'890
57	Kazakhstan	2.0	1.6	0.4	0.4	1.9	2.3	3.8	2.1	7'590
58	Panama	2.1	2.2	2.2	2.1	1.6	1.7	2.5	2.9	6'970
59	St. Kitts and Nevis	2.2	2.2	1.3	1.2	1.5	1.6	3.7	3.7	11'740
60	Hungary	2.2	2.2	2.1	2.0	2.6	2.6	2.0	1.9	12'850
61	Romania	2.2	2.2	1.9	1.7	3.4	3.3	1.4	1.4	7'840
62	Ukraine	2.3	2.3	1.2	1.2	2.6	2.6	3.0	3.0	3'000
63	Mexico	2.4	2.4	2.6	2.6	2.3	2.3	2.5	2.3	8'890
64	Lebanon	2.5	3.0	1.6	1.4	3.4	4.1	2.4	3.4	8'880
65	Turkey	2.5	3.2	1.8	2.0	4.1	5.3	1.7	2.3	9'890
66	Tunisia	2.5	2.2	1.7	0.7	2.9	2.9	3.0	3.0	4'160
67	China	2.5	2.7	1.1	1.3	1.5	1.7	5.0	5.0	4'270
68	Montenegro	2.5	2.6	1.4	1.6	2.9	2.9	3.3	3.3	6'750
69	Serbia	2.6	2.1	1.4	1.1	2.1	1.8	4.2	3.3	5'630
70	Barbados	2.6	2.5	2.0	1.9	2.0	1.9	3.8	3.7	12'660
71	Chile	2.8	3.5	3.2	3.0	2.8	2.8	2.3	4.7	10'120
72	Seychelles	2.8	3.0	1.2	1.1	2.1	2.0	5.1	5.9	9'760
73	Bosnia and Herzegovina	2.8	3.2	2.5	2.3	4.0	3.9	2.0	3.4	4'770
74	Antigua & Barbuda	2.8	2.8	1.2	1.3	2.3	2.0	5.0	5.2	13'170
75	Egypt	2.9	3.0	1.6	1.6	3.3	3.5	4.0	4.0	2'420
76	Georgia	3.1	3.3	1.0	1.0	4.6	5.2	3.8	3.8	2'690
77	Argentina	3.2	2.8	0.6	0.6	5.7	4.3	3.4	3.6	8'620
78	Thailand	3.4	3.5	1.7	2.6	2.5	2.5	5.8	5.5	4'150
79	Algeria	3.4	3.1	1.7	1.7	3.7	3.7	4.8	4.0	4'450
80	Grenada	3.5	3.4	2.3	2.1	3.0	2.9	5.1	5.1	6'930
81	Botswana	3.5	3.7	3.0	3.3	2.3	2.6	5.2	5.2	6'790

Table 7: ICT Price Basket and sub-baskets, 2011 and 2010 (continued)

Rank	Economy	IPB		Fixed-telephone sub-basket as a % of GNI per capita		Mobile-cellular sub-basket as a % of GNI per capita		Fixed-broadband sub-basket as a % of GNI per capita		GNI per capita, USD, 2010 (or latest available year)
		2011	2010	2011	2010	2011	2010	2011	2010	
82	Dominica	3.6	4.4	1.9	1.9	3.1	3.0	5.9	8.5	6'760
83	Bulgaria	3.7	3.8	2.2	2.4	6.3	6.3	2.6	2.6	6'270
84	Saint Lucia	3.8	3.8	2.1	2.1	3.9	4.1	5.4	5.4	6'560
85	India	3.8	3.9	2.7	2.7	3.2	3.5	5.5	5.5	1'330
86	Bhutan	3.8	3.9	2.2	2.2	2.3	2.9	7.0	6.7	1'870
87	Colombia	3.8	4.6	1.5	1.3	4.8	4.8	5.2	7.7	5'510
88	TFYR Macedonia	3.8	4.2	3.1	3.1	5.0	6.1	3.4	3.4	4'570
89	Dominican Rep.	3.8	4.1	3.0	3.7	4.0	4.0	4.5	4.5	5'030
90	St. Vincent and the Grenadines	3.9	3.9	2.1	2.1	3.2	3.2	6.4	6.4	6'300
91	Jordan	3.9	4.6	2.6	2.6	2.9	2.9	6.2	8.3	4'340
92	Suriname	4.0	4.0	0.5	0.5	2.9	2.9	8.5	8.5	5'920
93	Brazil	4.1	4.7	2.9	2.9	7.3	7.3	2.2	4.0	9'390
94	El Salvador	4.2	5.3	2.4	2.5	4.7	4.5	5.6	8.8	3'380
95	Armenia	4.3	5.7	1.6	1.6	3.3	3.3	7.9	12.1	3'200
96	Albania	4.6	4.3	2.3	1.9	7.8	7.8	3.5	3.3	3'960
97	Jamaica	4.6	4.4	3.2	2.9	3.2	3.0	7.3	7.3	4'800
98	South Africa	4.8	5.0	4.6	4.9	4.4	4.6	5.4	5.4	6'090
99	Ecuador	4.8	4.8	2.2	2.2	5.3	5.3	7.0	7.0	3'850
100	Morocco	5.1	9.3	0.9	9.0	9.4	13.9	4.9	4.9	2'850
101	Guyana	5.1	8.3	1.3	1.3	3.5	3.9	10.4	19.6	2'870
102	Fiji	5.2	4.9	2.8	2.6	6.5	6.2	6.2	6.1	3'630
103	Paraguay	5.3	5.1	3.0	3.0	4.3	3.8	8.5	8.4	2'710
104	Indonesia	5.5	5.5	2.2	2.4	3.9	3.8	10.4	10.4	2'500
105	Moldova	5.9	5.9	1.3	1.3	8.4	8.4	8.1	8.1	1'810
106	Viet Nam	6.0	6.4	2.3	2.5	4.9	5.8	10.8	10.8	1'160
107	Guatemala	6.1	6.7	2.4	2.4	3.9	3.4	12.0	14.2	2'740
108	Cape Verde	6.3	8.7	3.1	3.1	11.6	11.6	4.3	11.6	3'270
109	Syria	6.4	6.2	0.5	0.5	9.3	8.7	9.4	9.4	2'750
110	Bangladesh	6.5	6.8	2.6	2.3	2.7	4.0	14.3	14.3	700
111	Peru	7.2	8.5	3.1	3.6	11.0	11.0	7.6	10.8	4'700
112	Pakistan	8.2	8.0	4.7	4.3	3.8	3.4	16.2	16.2	1'050
113	Philippines	9.0	9.2	8.4	8.9	5.9	5.9	12.9	12.9	2'060
114	Honduras	9.0	9.1	4.1	4.1	10.9	9.1	12.2	14.1	1'870
115	Angola	9.4	17.2	5.3	5.0	6.3	5.9	16.5	40.6	3'940
116	Tonga	9.7	8.7	2.3	2.3	4.0	4.0	22.8	19.8	3'280
117	Micronesia	10.1	8.6	4.4	4.1	4.0	4.0	22.0	17.6	2'730
118	Belize	10.5	15.8	6.2	6.2	9.8	9.8	15.6	31.5	3'810
119	Yemen	10.8	10.3	1.1	1.2	12.6	11.0	18.7	18.7	1'070
120	Samoa	12.1	12.0	4.8	4.8	7.1	7.1	24.3	24.3	3'000
121	Sudan	12.9	N/A	5.7	N/A	5.7	N/A	27.4	N/A	1'270
122	Namibia	13.2	13.4	3.8	4.0	4.3	4.5	31.6	31.6	4'500
123	Bolivia	13.4	15.5	15.7	15.7	7.5	7.5	16.9	23.2	1'810
124	Ghana	14.3	14.6	5.4	5.4	6.9	7.5	30.8	30.8	1'230
125	Nicaragua	14.9	20.4	5.6	5.6	18.1	18.3	21.1	37.2	1'110
126	Djibouti	19.8	25.5	7.6	7.8	12.3	12.3	39.5	56.4	1'270
127	Mauritania	21.7	22.5	20.9	20.9	16.8	19.1	27.4	27.4	1'030
128	Senegal	22.0	22.0	11.3	11.3	15.1	15.1	39.7	39.7	1'090
129	Timor-Leste	23.9	24.1	9.3	10.0	9.0	8.7	53.5	53.5	2'220
130	Cambodia	24.3	32.0	12.6	11.7	12.1	12.4	48.0	72.0	750
131	Côte d'Ivoire	27.1	26.1	20.3	20.3	19.7	16.7	41.5	41.5	1'160
132	Nepal	27.2	26.6	9.3	8.5	8.7	7.8	63.4	63.4	440
133	Kenya	28.6	32.3	21.5	21.5	6.8	17.8	57.4	57.6	790
134	Uganda	29.9	32.3	25.7	25.9	25.1	32.0	39.0	39.0	500
135	Nigeria	31.1	28.0	16.4	14.2	16.1	15.7	60.7	54.0	1'180
136	Zambia	32.0	37.0	8.4	27.0	22.4	18.9	65.0	65.0	1'070
137	Cameroon	32.2	39.9	18.2	18.2	19.1	19.9	59.1	81.5	1'180
138	Ethiopia	33.8	38.5	3.4	3.0	13.0	12.6	85.0	906.0	390
139	Lesotho	33.9	33.9	15.0	15.0	25.4	27.9	61.2	58.8	1'040
140	Uzbekistan	34.7	34.6	0.8	1.0	3.2	2.8	187.5	187.5	1'280
141	Iraq	35.5	N/A	0.2	N/A	6.4	N/A	108.3	N/A	2'340
142	Cuba	36.0	35.8	0.1	0.1	7.8	7.3	379.0	379.0	5'550
143	Vanuatu	36.0	35.7	18.6	18.6	11.6	10.6	77.7	77.7	2'640
144	Lao P.D.R.	37.4	37.3	5.2	4.6	7.0	7.2	111.0	159.6	1'050
145	Swaziland	37.8	38.0	2.3	2.3	11.1	11.7	399.1	399.1	2'630
146	Tajikistan	38.0	37.8	1.4	1.3	12.7	12.2	543.7	543.7	800
147	Benin	38.3	38.3	13.9	13.9	23.9	23.9	77.1	77.1	780
148	Kiribati	39.4	39.5	6.9	6.9	11.2	11.7	228.7	228.7	2'010
149	Tanzania	39.7	44.4	25.5	25.5	22.9	37.1	70.8	70.8	530
150	S. Tomé & Príncipe	40.3	40.3	8.3	8.3	12.7	12.7	221.3	285.4	1'200
151	Gambia	41.8	N/A	9.3	N/A	16.0	N/A	747.4	N/A	450
152	Comoros	45.9	51.6	16.0	16.0	21.6	38.8	128.3	620.0	750
153	Mali	46.6	50.3	15.7	17.0	29.3	33.9	94.6	100.2	600
154	Rwanda	51.6	55.0	20.8	28.3	34.0	36.7	257.8	377.4	520
155	Eritrea	51.8	N/A	12.7	N/A	42.8	N/A	720.0	N/A	340
156	Burkina Faso	51.8	58.4	30.3	28.0	25.2	47.3	113.5	180.1	550
157	Zimbabwe	52.8	59.0	26.3	23.6	53.7	53.4	78.3	1059.0	460
158	Mozambique	57.8	60.0	31.4	33.7	41.9	46.2	135.5	135.5	440
159	Togo	60.5	61.5	33.5	33.5	48.0	51.2	405.5	405.5	490
160	Niger	64.0	73.9	37.9	37.9	54.0	83.7	193.4	193.4	370
161	Madagascar	64.6	64.6	50.9	50.9	43.1	43.1	106.9	253.0	430

Source: ITU. GNI per capita and PPP\$ values are based on World Bank data.

Note: N/A – Not available.

Chart 15: Mobile-broadband prices as a percentage of GNI per capita, 2011, by region and by level of development

Source: ITU.

Note: Simple averages. Kuwait is not included, as GNI per capita was not available. Averages do only include those 116 countries for which both prepaid handset-based and postpaid computer-based prices were available.

the methodological constraints and difficulties involved and of gaining insights into the affordability of mobile-broadband services.

While mobile-broadband prices correspond on average to less than 2 per cent of GNI per capita in the developed countries, they correspond to more than 30 per cent of GNI per capita in developing countries. Mobile-broadband prices are most affordable in Europe, whereas Africa is the continent with the highest, and the widest range of, mobile-broadband prices (Chart 15). Prepaid handset-based mobile-broadband access is more expensive on average than postpaid computer-based mobile-broadband subscriptions, and data allowances tend to be higher for the latter. Whereas in developed countries prices for mobile broadband are similar to fixed-broadband prices, in developing countries mobile broadband is more affordable than fixed broadband. For mobile broadband to replicate the mobile-cellular miracle and bring more people online (especially in lower-income developing countries), 3G network coverage has to be extended and prices have to go down.

Chapter 4. Revenue and investment in telecommunications

As ICTs become more available and affordable, there is growing evidence of their economic and social impact. The ICT sector has in itself become a major contributor to economic development. In 2010, global exports of ICT goods accounted for 12 per cent of world merchandise trade, and as much as 20 per cent in developing countries. As regards ICT services, revenues from the telecommunication sector reached USD 1.5 trillion in 2010, corresponding to 2.4 per cent of the world's gross domestic product (GDP). In the same year, capital expenditure in telecommunications amounted to more than USD 241 billion, or an estimated 2 per cent of the world's total gross fixed capital formation (GFCF). In addition, several studies point to the contribution of ICT use to productivity growth in the overall economy.

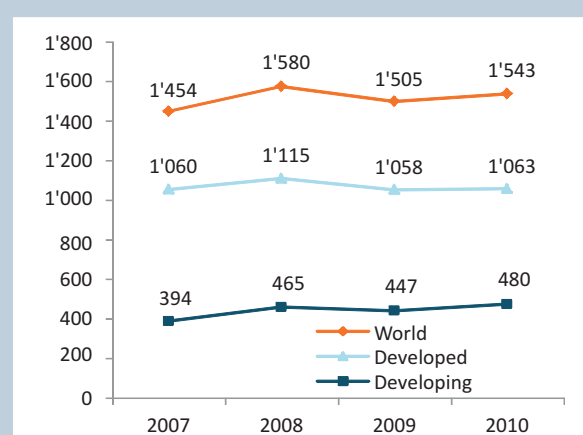
Developing countries are key growth markets for telecommunication revenues

The role and contribution of developing economies in terms of both generating revenue and securing investment in telecommunications is increasingly important, as they have been less affected by and recovered more quickly from the 2008 global economic downturn.

In 2010, nine of the top 20 telecommunication markets in terms of revenue were developing countries (Chart 16), including several of the large emerging economies such as Brazil, China, India and the Russian Federation, and smaller but wealthy economies such as Saudi Arabia.

The USD 1.5 trillion revenue from telecommunication services in 2010 was slightly higher than the USD 1.4 trillion recorded in 2007 (Chart 17). Developing economies accounted for 35 per cent of world telecommunication revenues in 2010, and more importantly they constituted a significant source of

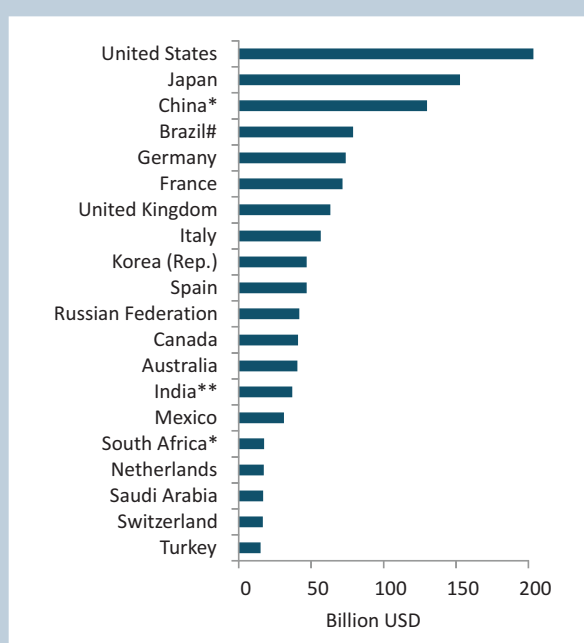
Chart 17: Total telecommunication revenues, 2007-2010, world and by level of development



Source: ITU.

Note: 'World' includes 55 countries accounting for 92 per cent of world GDP. 'Developed' includes 28 developed countries accounting for 98 per cent of total GDP in the developed world. 'Developing' includes 27 developing countries accounting for 79 per cent of total GDP in the developing world.

Chart 16: Top 20 largest telecommunication markets in terms of revenue from telecommunication services, 2010



Source: ITU.

Note: *Data from operators' annual reports – China: China Mobile, China Telecom and China Unicom; South Africa: Cell-C, MTN, Telkom and Vodacom. ** ITU estimate. # 2009 data.

growth during a period of sluggishness. While on average telecommunication revenues in developed economies stagnated, in developing economies they grew by 22 per cent between 2007 and 2010. By comparison, world telecommunication revenues grew by a mere 6 per cent. Revenue performance in 2009, the first year after the start of the economic crisis, is also telling: in the majority of developed countries telecommunication revenues declined, while in most developing countries (23 out of the 27 for which data were available) they continued to increase.

Telecommunication revenue growth in developing countries was largely driven by the expansion of service coverage, with a compound annual growth rate (CAGR) of above 10 per cent annually in, for example, Argentina, Colombia, Egypt, India, Kenya, Nigeria, Pakistan, Saudi Arabia and Venezuela.

In developed countries, subscriptions continue to grow but revenues are under pressure, with a few notable exceptions

In developed countries, telecommunication revenues are under pressure on account of a series of factors. These

markets are highly competitive, and many are close to saturation in the mobile services segment. Even though the number of subscriptions continued to grow, the economic crisis resulted in reduced telecommunication spending per subscription. In addition to tighter consumer budgets, operators were also faced with revenue pressure from new applications which cannibalize their traditional revenue streams. Notable exceptions were Canada, the Netherlands and Sweden, some of the most advanced countries in terms of next-generation network (NGN) development, where telecommunication revenue growth was sustained by data services and by savings on operating expenditure. This serves to highlight the importance of broadband for future growth in telecommunication revenues.

Mobile-cellular services are the prime source of revenue in developing economies, driven by growth in subscriptions, and mobile data holds promising growth potential

The mobile sector is the prime source of revenue in developing countries, representing 62 per cent of telecommunication revenues, a proportion that continued to increase over the last four years (Chart 18). Mobile revenues in developing countries

outgrew total telecommunication revenues, with a growth rate of 30 per cent (2007-2010), driving most of the 13 per cent growth in world mobile revenues. Rising subscription rates was the main explanatory factor behind exceptional mobile revenue growth rates of above 15 per cent annually (CAGR) observed for example in Egypt, Kazakhstan, Malaysia, Nigeria, Pakistan, Uzbekistan and Venezuela. In developed economies, mobile revenues represent on average 47 per cent of total telecommunication revenues. In these countries, mobile data was the most important driver of revenue growth in the mobile segment of telecommunications. Developing economies can also take advantage of mobile data as a growing revenue source by speeding up their transition to 3G and to more advanced networks, such as LTE.

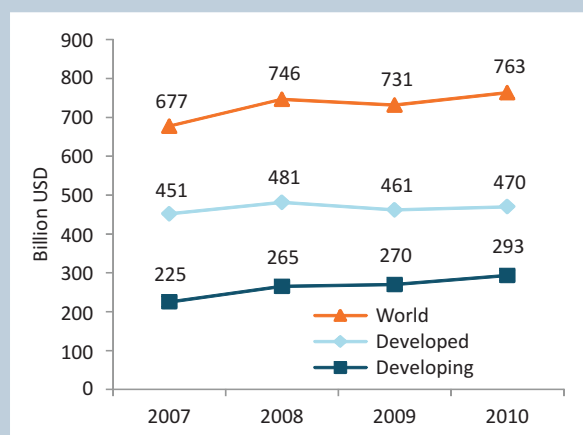
As mobile services expand to lower-income users, average revenue per subscription declines

Average revenue per mobile subscription generally declined between 2007 and 2010, mirroring the evolution of mobile-cellular service prices, and testifying to the fact that on average mobile-cellular subscriptions outgrew mobile revenues worldwide over the period analysed. Mobile revenues per subscription were higher in developed than in developing countries, with values of above USD 20 per month for the former and below USD 10 for the latter. This difference can also be explained by the fact that in many developing countries mobile-cellular services were extended to users with lower spending capacity, but representing a significant share of the population. Although developing countries still have room for revenue growth through the expansion of traditional mobile-cellular services, the uptake of mobile broadband could yield higher revenues and thus constitute an important incentive for operators to invest in more advanced telecommunication networks that support access to mobile-broadband services (Chart 19).

Renewed investment is essential to meet the requirements of advanced ICT services, notably broadband

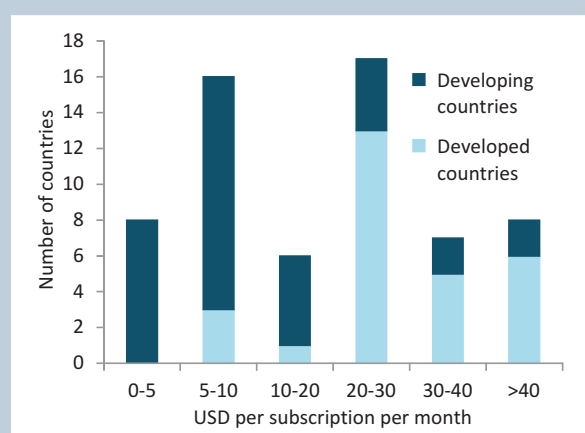
The progress seen in recent years in the uptake of ICTs would not have been possible without major investment in telecommunication networks. However, today more investment is needed both in order to improve existing

Chart 18: Revenues from mobile services, 2007-2010, world and by level of development



Source: ITU.

Note: 'World' includes 55 countries accounting for 90 per cent of world GDP. 'Developed' includes 27 developed countries accounting for 95 per cent of total GDP in the developed world. 'Developing' includes 28 developing countries accounting for 81 per cent of total GDP in the developing world.

Chart 19: Average mobile revenue per subscription, 2010, by level of development

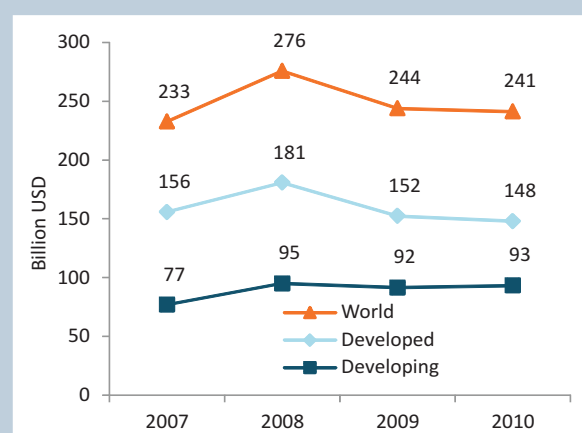
Source: ITU.

Note: Data for Brazil, Kenya and Viet Nam refer to 2009. Data for all other countries included refer to 2010.

services (e.g. upgrading to broadband) and so as to bring them to more people. Monitoring investment in telecommunications is thus key for policy-makers. Telecommunications is an infrastructure-intensive business, requiring large-scale and long-term capital outlays, with income earned on investment taking time to materialize and spreading over several years. In an increasingly competitive environment in which technology evolves very rapidly, renewed investment is essential to meet the requirements of advanced ICT services, such as bandwidth-hungry applications and convergent services, for both fixed-broadband and mobile-broadband services.

Since 2007 telecommunication investment has declined in developed countries and increased in developing countries

Data on capital expenditure (CAPEX) in telecommunications provides a measure of the investments in fixed assets needed to support the growth of telecommunications, regardless of the origin of capital – domestic or foreign, private or public. In 2010, global CAPEX reached USD 241 billion, as compared with USD 233 billion four years earlier (Chart 20). Between 2007 and 2010, CAPEX is shown to have increased only moderately, by 4 per cent, a growth rate slightly below that of global telecommunication revenues. While in developing countries CAPEX rose by

Chart 20: Total telecommunication investment, 2007-2010, world and by level of development

Source: ITU.

Note: Refers to data on capital expenditure (CAPEX). 'World' includes 46 countries accounting for 84 per cent of world GDP. 'Developed' includes 25 developed countries accounting for 88 per cent of total GDP in the developed world. 'Developing' includes 21 developing countries accounting for 75 per cent of total GDP in the developing world.

20 per cent, in developed countries it declined by 5 per cent over the period analysed. Total telecommunication revenues remained an important determinant of CAPEX, with revenue and CAPEX following similar trends over the period considered. The decline in CAPEX was particularly apparent in 2009, with a 16 per cent drop in the case of developed countries against only a 4 per cent fall for developing countries. In several developing economies, CAPEX continued to grow between 2007 and 2010.

Developing countries have higher telecommunication investment-to-revenue ratios

The ratio between CAPEX and revenue is below 20 per cent in most developed countries and above 20 per cent in the majority of developing countries. This suggests that while the most advanced countries in terms of ICT development require relatively low levels of investment relative to revenue generated by telecommunication services, in developing countries more significant relative investment is needed in order to fuel growth. Ghana, Egypt and India registered the highest investment-to-revenue ratio, which was accompanied by an increase in

mobile-cellular penetration of 20 to 30 per cent between 2009 and 2011.

The ratio of CAPEX to gross fixed capital formation (GFCF) compares investment in telecommunications with overall investment in the economy. Between 2007 and 2010, telecommunication CAPEX represented on average 3 per cent of GFCF, and a slightly higher 4 per cent in the developing countries. While in many developing economies both CAPEX and GFCF increased, investment in telecommunications grew faster than the general investment rate in several economies, such as Colombia, Costa Rica, Mexico, Turkey and Senegal. In the economies affected by the 2008 global economic downturn, overall investment declined, but the telecommunication sector was generally more resilient, partly as a result of targeted stimulus measures to support the telecommunication infrastructure.

Foreign direct investment in telecommunications has been an important source of financing, especially in developing countries

Data on foreign direct investment (FDI) in telecommunications shed light on the cross-border movement of finance capital for this sector and on the extent of business internationalization in telecommunications. Private foreign investment has played an important role in mobilizing financial resources from the international capital markets, beginning with the first wave of liberalization in the 1990s and including the more recent wave of greenfield investments (investments in new productive assets) which underpinned much of the mobile revolution. In low-income countries, telecommunications typically received a higher share of total private infrastructure investment commitments, which testifies to the relative success of these countries in attracting private investment in telecommunications, mostly in the form of greenfield investments.

After the economic crisis, foreign direct investment in telecommunications declined markedly, but developing countries were affected to a lesser extent

Recent trends in telecommunication FDI inflows indicate that FDI slumped in 2008 and 2009, and stabilized only in 2010, following the economic crisis and given the persistence of tight capital markets. FDI inflows to developing countries

were affected to a lesser extent, as confirmed by several high-value mergers and acquisitions in 2010 involving telecommunication operators based in developing countries. Foreign investors in telecommunications have targeted deals in developing countries, which enjoy better economic prospects and are recognized as important sources of revenue growth. Several transnational telecommunication operators pursued acquisitions in developing countries as a means of establishing presence in buoyant emerging markets, or in order to secure a higher share of revenues through consolidations in a context of declining prices and convergence to multiple-play.

Developed economies remain the leading source of financing for foreign direct investment in telecommunications, but developing countries are playing an increasing role

Developed economies remained the primary source of FDI in telecommunications between 2007 and 2010, led by the United Kingdom, Spain and the United States. Nonetheless, developing-country investors made an important contribution to south-south FDI flows, as in the case of the large consolidation deal concluded by America Movil (Mexico) on the Latin American continent and the landmark acquisition by Bharti Airtel (India) of Zain's (Kuwait) operations in 16 African countries, both concluded in 2010. Another metric closely monitored by investors is debt accumulation of transnational telecommunication operators, since debt is a common mode of financing for mergers and acquisitions. Especially in a context of tight capital markets, accumulated debt may constrain the ability of certain operators to contract additional loans for the purpose of financing infrastructure investments.

Chapter 5. Measuring communication capacity in bits and bytes

An alternative way of measuring the information society is by estimating the global capacity to transmit and receive data in bits and bytes, as a proxy for the capacity to communicate information. This approach provides new insights into the

development of telecommunications, complementing analyses based on the number of subscriptions to ICT services. For this purpose, two sets of estimates were computed. Subscribed communication capacity estimates the potential capacity and is determined by the number of subscriptions to selected telecommunication services, multiplied by the communicational performance (capacity) of the underlying technology, as measured by the average capacity in bits per second. Effective communication capacity estimates the amount of subscribed capacity actually used.

Effective communication capacity has increased more than the number of subscriptions over the past two decades

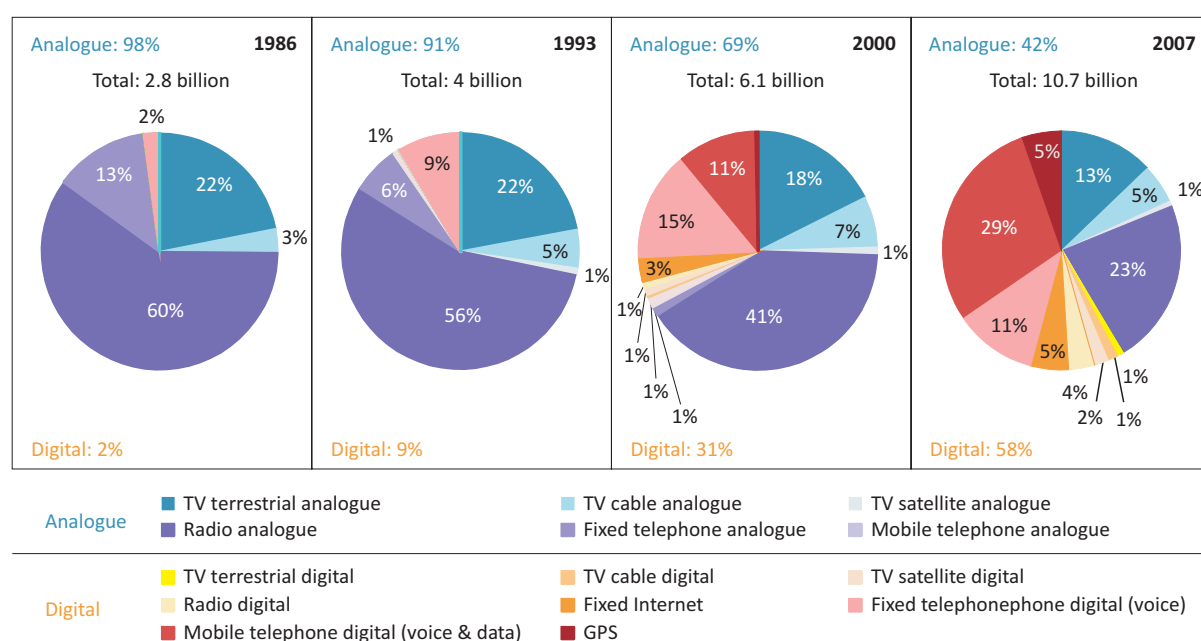
Comparing statistics on the number of ICT subscriptions (Chart 21) and on effective communication capacity (Chart 22) worldwide over the last two decades, for each of the ICT services considered, several interesting insights emerge. The total number of communication subscriptions taken together almost tripled, from 2.8 billion to 10.7 billion, while effective capacity grew by a factor of 4.5, from 432 exabytes

(EB) to almost 2 zettabytes (ZB). Differentiating between analogue and digital technologies, it emerges that, in terms of subscriptions, digital technologies started replacing analogue technologies as from 2000, and by 2007 the majority of subscriptions to communication services were based on digital technologies. However, a different pattern is observed in terms of effective communication capacity, with analogue technologies still dominating in 2007, as a consequence of the fact that terrestrial TV broadcasting consumes a large amount of capacity.

Mobile-cellular telephony is most widespread in terms of uptake, but TV broadcasting dominates global effective communication capacity

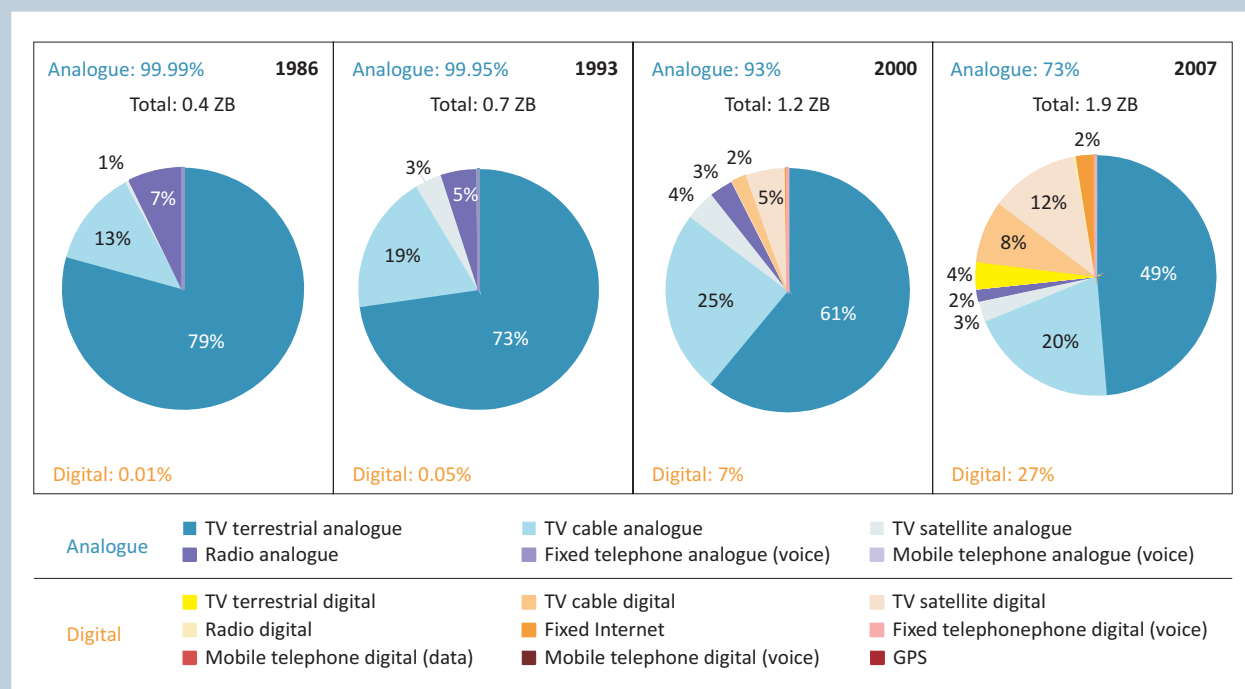
Looking at the different ICT services in terms of subscriptions, digital mobile telephony grew significantly over the past two decades, and by 2007 accounted for the largest share of the pie (29 per cent), while fixed Internet remained at a modest 5 per cent. Over the same time period, the share of radio declined markedly, and television stayed at around 25 per cent. In terms of effective communication capacity, on the other hand, television clearly dominated the global flow of

Chart 21: Global subscriptions to communication technology, 1986, 1993, 2000, 2007



Source: ITU.

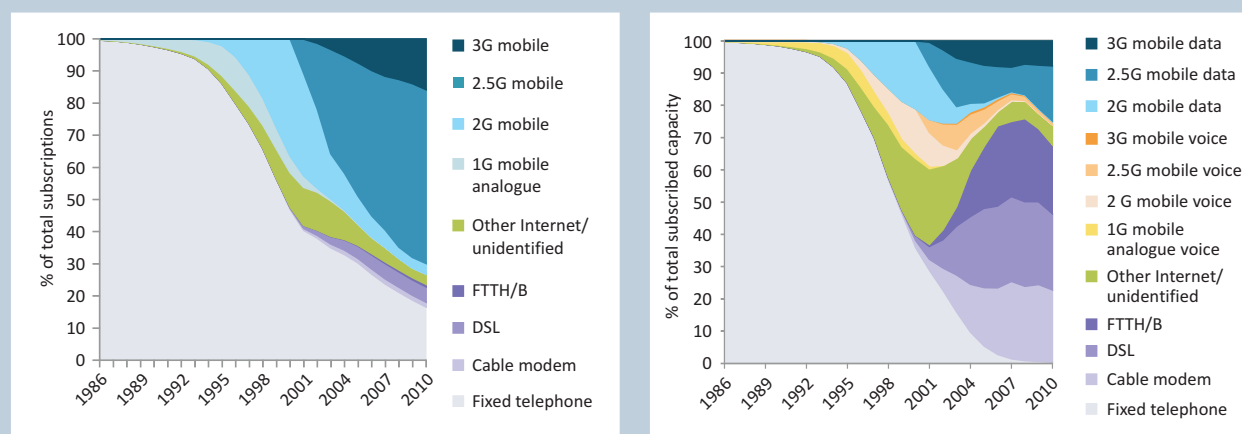
Chart 22: Global effective communication capacity, in optimally compressed zettabytes*, 1986, 1993, 2000, 2007



Source: ITU.

Note: *1 zettabyte (ZB) = 10^{21} bytes.

Chart 23: Global distribution of subscriptions (left), and subscribed capacity (right), for selected telecommunication technologies, 1986-2010



Source: ITU.

Note: Capacity is measured in optimally compressed kbit/s.

information effectively transmitted until 2007, with a share of between 93 and 96 per cent. Mobile voice and mobile data traffic represented less than 0.1 per cent of effective

communication capacity, and fixed Internet a little less than 3 per cent. The comparison illustrates that although the mobile-cellular telephone is the most widespread

communication device in terms of uptake, it represents a much smaller, albeit rapidly growing, proportion of global effective communication capacity.

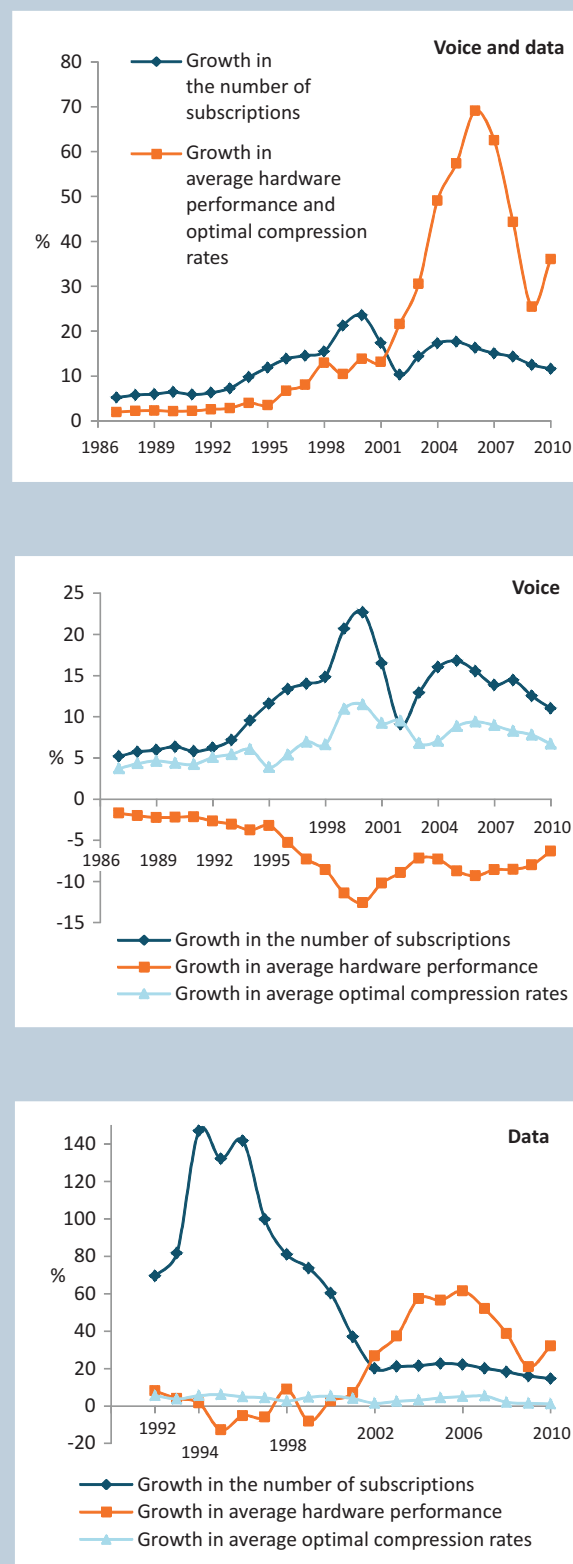
Telecommunication capacity has shifted from voice-based telephony to Internet data transmission

An analysis of statistics on subscribed capacity (Chart 23, right) reveals that while fixed telephony was dominant in 1986, its share started declining in 1994, to approximately one-third of global subscribed capacity in 2000-2001, the same as for fixed Internet and mobile telephony. Since then, data communications have taken over, with fixed Internet representing 80 per cent and mobile data 25 per cent of global capacity in telecommunications in 2010. Comparing this with data on subscriptions (Chart 23, left), it can be seen that in 2007 fixed telephony represented 25 per cent of global telecommunication subscriptions, but only 1 per cent of subscribed capacity. Mobile telephones accounted for two-thirds of subscriptions, but less than one-fifth of subscribed capacity. The share of fixed Internet was more than seven times larger in terms of capacity than in terms of subscriptions. These results underline that statistics on communication capacity are an important complement to statistics on number of subscriptions.

Growth of subscribed capacity in telecommunications has been driven by both technological changes and uptake

From a supply-side perspective, growth in the world's subscribed capacity can be driven by factors such as: more subscriptions (or uptake of services), improvements in hardware performance, and better compression algorithms (software performance). Using an analogy, the underlying logic can be likened to filling a certain number of tubes (infrastructure) of different sizes (hardware) with content of different levels of granularity (software compression). All of these elements contribute to determining the total "flow" through the tube. Until 2001, global capacity in telecommunications grew mainly as a result of expansion in subscriptions (Chart 24, upper). More recently, under the influence of the broadband revolution and the introduction of FTTH/B and 3G mobile telephony, the pattern changed and technological progress became the main driver.

Chart 24: Drivers of global subscribed telecommunication capacity, 1986-2010, annual growth rates



Source: ITU.

Distinguishing between voice and data (Chart 24, middle and lower), growth in global capacity to communicate voice was mostly pushed by subscriptions, while data communications were driven by technological change such as improved average hardware performance per subscription and superior compression algorithms.

The digital divide is larger when measured in terms of subscribed capacity than in terms of subscriptions

In terms of both magnitude and evolution, the digital divide measured in kbit/s per capita differs from the divide measured in number of subscriptions. While telecommunication subscriptions taken together are more evenly distributed relative to population, subscribed

telecommunication capacity is distributed along the lines of income inequality. The report shows that differences between developed and developing countries are greater when measured in terms of subscribed capacity than in terms of ICT services uptake (expressed by the number of subscriptions), and that over the last decade the gap in capacity has become wider than the gap in subscriptions. For example, by 2010, developed countries attained an estimated fixed-network subscribed capacity (including both voice and data) of 3 190 kbit/s per capita, as against only 260 kbit/s per capita for developing countries (or a divide of 12 to 1). By comparison, the fixed-line divide in terms of subscriptions appears to have stabilized at a ratio of 4.5 to 1. In this context, it is therefore important to consider policies that address the capacity dimension of the digital divide, for example in national broadband plans.

The full version of the report, as well as the executive summary in all six official languages of the ITU, are available at:

<http://www.itu.int/ict/publications/idi/index.html>