

Measuring digital development

Facts and figures

2021



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The base map for this infographic is based on the UNmap database of the United Nations Cartographic Section.

Foreword



An estimated 4.9 billion people are using the Internet in 2021, according to latest estimates in this 2021 edition of *Measuring Digital Development: Facts and figures*. That means that roughly 63 per cent of the world's population is now online – an increase of 17 per cent – with almost 800 million people estimated to have come online since 2019. Internet penetration increased more than 20 per cent on average in Africa, in Asia and the Pacific, and in the UN-designated Least Developed Countries (LDCs).

It is clear that ICTs and the Internet have been vital in helping maintain continuity in business activity, employment, education, provision of basic citizens' services, entertainment, and socializing. Digital platforms and services have enabled countless innovations that helped mitigate the health, social and economic costs of the tragedy, and build resilience against future crises.

With most of the 17 Global Goals thrust sharply off-track by the force of the emergency, the pandemic has highlighted – and exacerbated – the crippling cost of digital exclusion. Achieving universal meaningful connectivity has become a matter of the utmost urgency if we are to meet the SDGs by the end of the decade.

We cannot close the digital divide if we cannot measure it. And we cannot connect the unconnected if we do not know who they are, where they live, and why they remain offline – nor can we measure the success of our policies to bridge the gap.

Through a set of unique and timely statistics, ITU's *Facts and figures* sheds light on the multiple facets and evolving nature of the digital divide and takes stock of the progress towards closing it.

While the access divide is close to being bridged, with 95 per cent of the world's population now living within range of a mobile broadband network, important blind spots remain. Close to 30 per cent of Africa's rural population still lacks mobile broadband coverage.

And even though the vast majority of the world's people *could* access the Internet through mobile broadband, less than two thirds actually do. The statistics reveal a connectivity 'grand canyon' separating the digitally empowered from the digitally excluded, with 96 per cent of the 2.9 billion still offline living in the developing world.

Drilling down to country level also affords a more nuanced picture. Location plays a big part: our figures reveal that the share of Internet users in urban areas is twice as high as in rural areas. There is also a generational gap – 71 per cent of the world's population aged 15-24 is using the Internet, compared with 57 per cent of all other age groups. And gender remains a factor: globally, 62 per cent of men are using the Internet compared with 57 per cent of women. While that digital gender divide has been narrowing across all regions, women remain digitally marginalized in many of the world's poorest countries, where online access could potentially have its most powerful effect.

Closing the digital divide will mean much more than simply getting everybody online. As digital platforms and services become ever-more sophisticated, the digital divide is increasingly defined by people's ability to make *meaningful* use of connectivity. This ability in turn depends on myriad factors, one of which is, of course, affordability.

The Broadband Commission for Sustainable Development set a target for 2025 stipulating that entry-level broadband services should cost less than 2 per cent of monthly gross national income per capita. In almost half of the economies for which data could be obtained, that target has not yet been met.

Another important factor is digital skills, with a lack of skills preventing many from getting online at all, while compromising the ability of others to get the most out of devices and services. Poor digital literacy also exposes people to risks linked to the 'dark side' of connectivity: cyberattacks, scams, fake news, or harmful content.

With its hard evidence and global reach, ITU's *Facts and figures* serves as a powerful advocacy tool in efforts to put digital development at the top of the agenda of policymakers and the global development community.



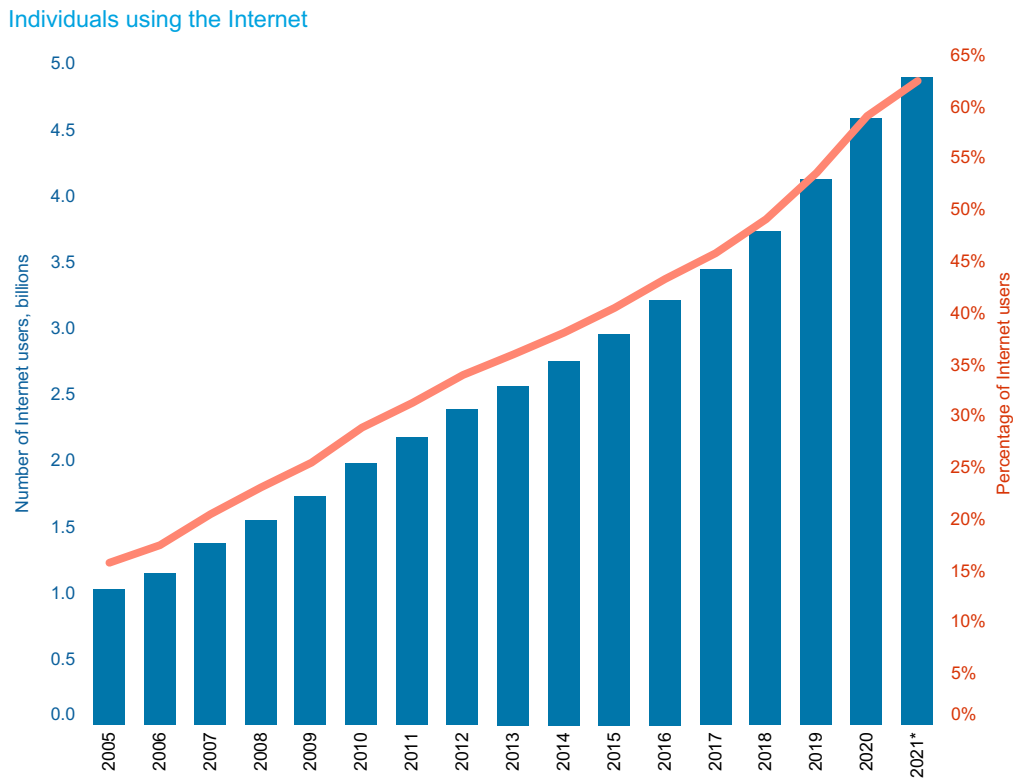
Doreen Bogdan-Martin

Director, ITU Telecommunication Development Bureau

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Internet uptake has accelerated during the pandemic



Source: ITU
* ITU estimate

The Internet has long been a source of countless opportunities for personal fulfilment, professional development and value creation. With the COVID-19 pandemic, it has become a vital necessity for working, learning, accessing basic services and keeping in touch.

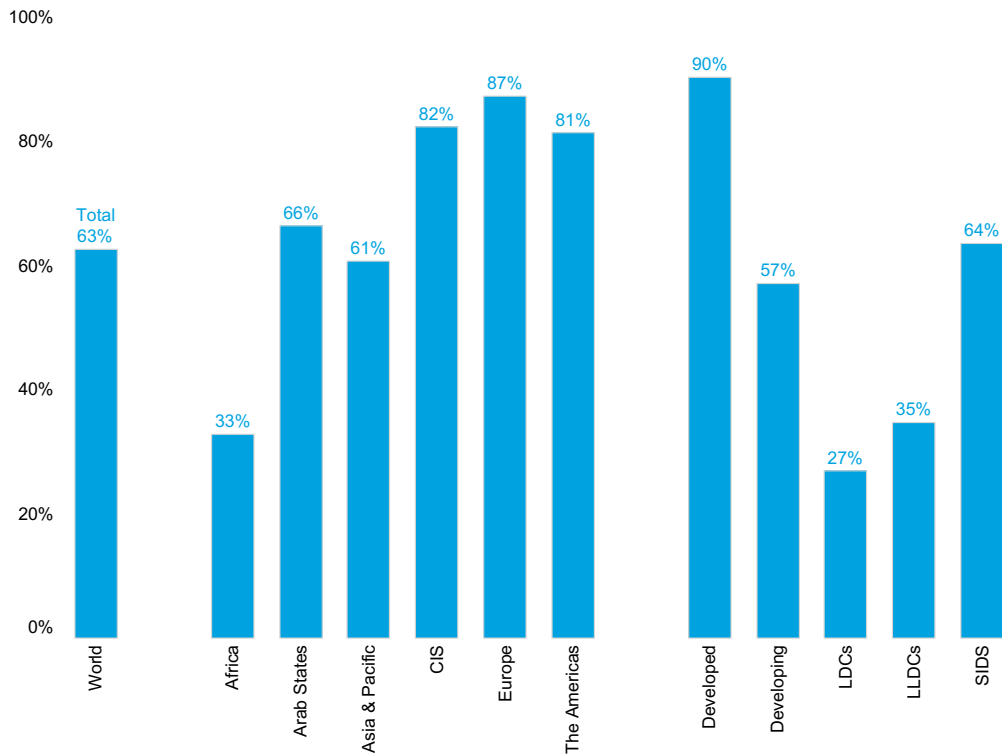
The latest ITU data show that uptake of the Internet has accelerated during the pandemic. In 2019, 4.1 billion people (or 54 per cent of the world’s population) were using the Internet. Since then the number of users has surged by 800 million to reach 4.9 billion people in 2021, or 63 per cent of the population.¹

Nonetheless, this means that some 2.9 billion people remain offline, 96 per cent of whom live in developing countries. Those who remain unconnected face multiple barriers, including a lack of access: some 390 million people are not even covered by a mobile broadband signal (see below).

In 2020, the first year of the pandemic, the number of Internet users grew by 10.2 per cent, the largest increase in a decade, driven by developing countries where Internet use went up 13.3 per cent. In 2021, growth has returned to a more modest 5.8 per cent, in line with pre-crisis rates.

¹ See “Methodology” below for information about how estimates were produced.

Percentage of individuals using the Internet, 2021*

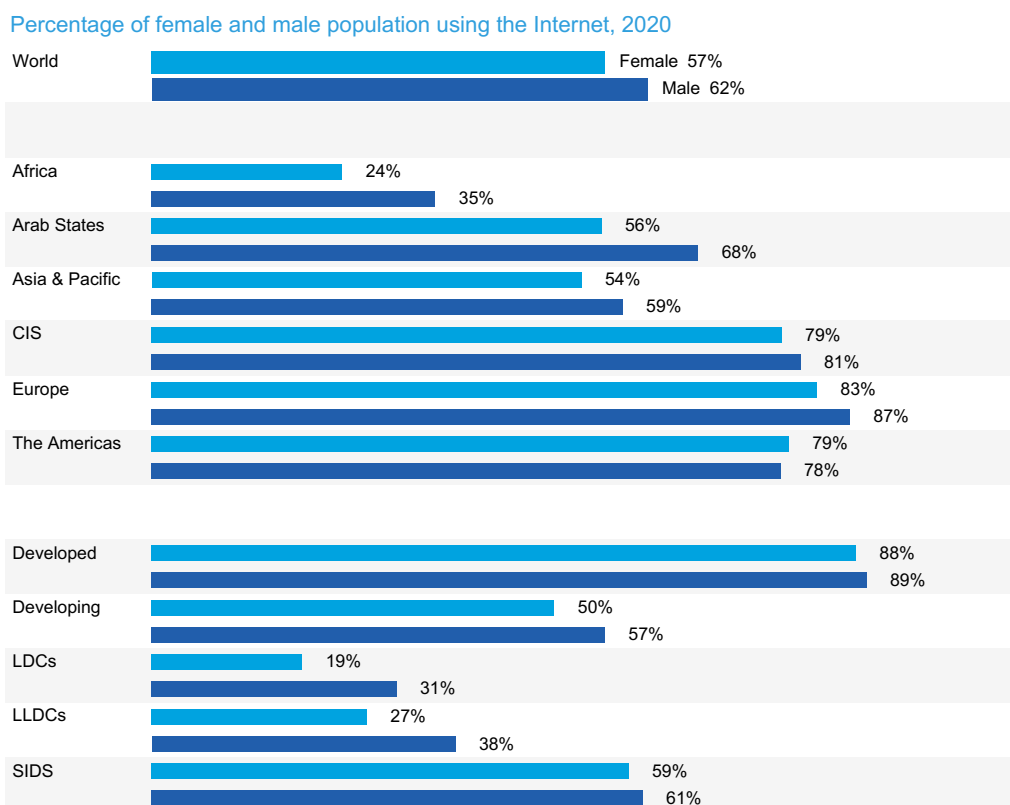


Source: ITU
* ITU Estimate

Between 2019 and 2021, Internet use in Africa and the Asia-Pacific region jumped by 23 per cent and 24 per cent, respectively. Over the same period, the number of Internet users in the least developed countries (LDCs) increased by 20 per cent and now accounts for 27 per cent of the population. Growth has been necessarily much weaker in developed economies, given that Internet use is already almost universal, at more than 90 per cent.

This growth differential has contributed to a modest narrowing of the divide between the world's most and least-connected countries: for example, the divide between developed economies and the LDCs went from 66 percentage points in 2017 to 63 percentage points in 2021.

Internet use moving closer to gender parity



Source: ITU

Globally, in 2020, 62 per cent of all men were using the Internet, compared with 57 per cent of all women.

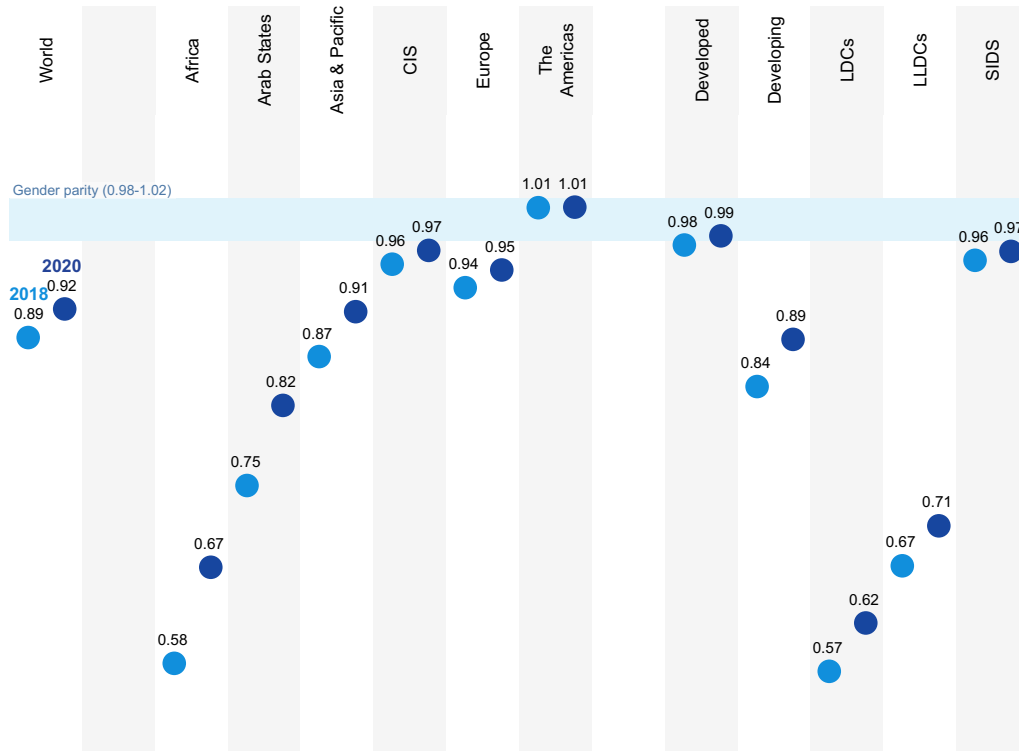
Gender parity is deemed achieved when the gender parity score, defined as the female percentage divided by the male percentage, stands between 0.98 and 1.02.

In all regions, the gender Internet divide has been narrowing in recent years (see figure on next page). Thus, the global gender parity score has improved from 0.89 in 2018 to 0.92 in 2020.

Parity has been achieved in developed countries as a whole and in the Americas, and almost achieved (parity score between 0.95 and 0.98) in the Commonwealth of Independent States (CIS) region, the small island developing states (SIDS) and Europe.

The divide remains wide in the LDCs, where only 19 per cent of women are using the Internet (12 percentage points lower than men), the landlocked developing countries (LLDCs) (27 per cent of women versus 38 per cent of men), Africa (24 per cent versus 35 per cent) and the Arab States (56 per cent versus 68 per cent).

The Internet user gender parity score, 2018 and 2020

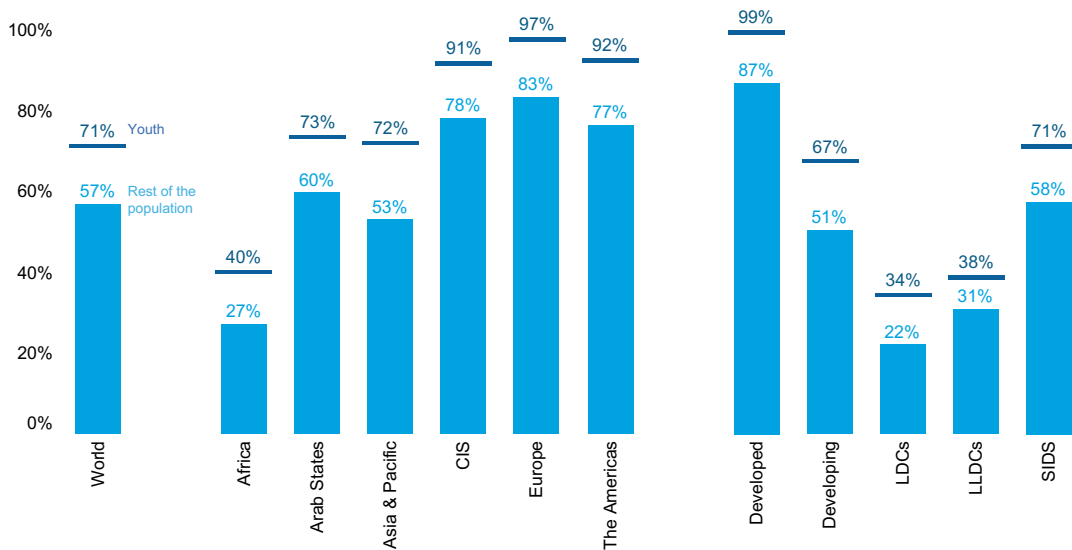


Source: ITU

Note: The gender parity score is calculated as the proportion of women who use the Internet divided by the proportion of men. A value smaller than one indicates that men are more likely to use the Internet than women, while a value greater than one indicates the opposite. Values between 0.98 and 1.02 reflect gender parity.

Young people more connected than the rest of the population

Percentage of individuals using the Internet, 2020



Note: youth means 15-24 year old individuals using the Internet as a percentage of the total population aged 15 to 24 years. Rest of the population means individuals below 15 years old or over 24 years old as a percentage of the respective population.

Source: ITU

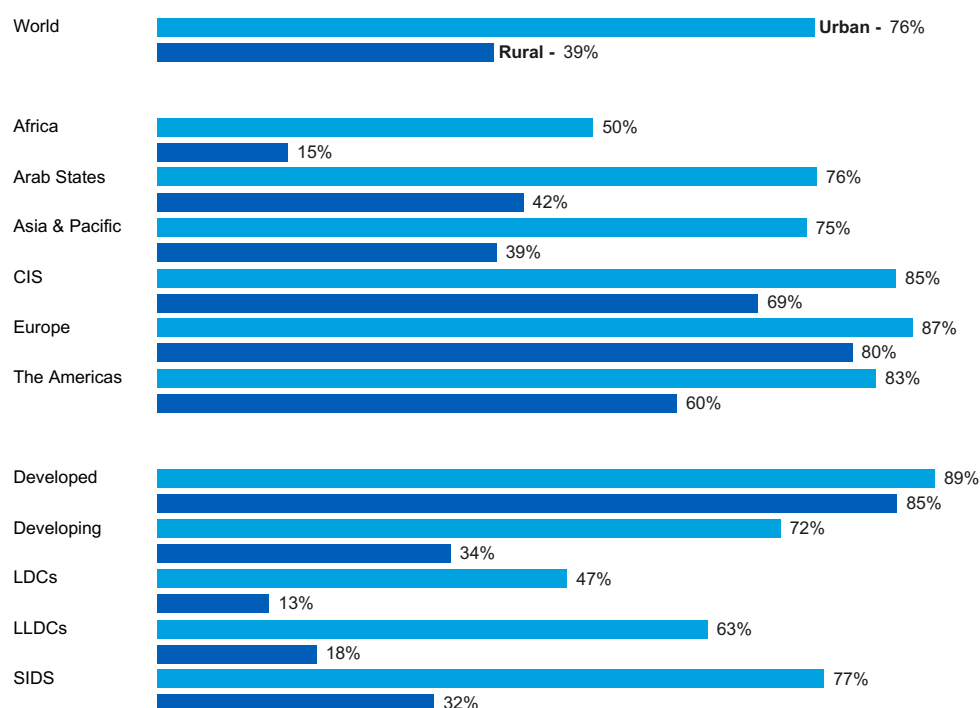
In 2020, 71 per cent of the world’s youth (aged between 15 and 24 years) were using the Internet, compared with 57 per cent of the other age groups. On the global scale, young people were thus 1.24 times more likely to connect than the rest of the population.

In developed countries, where 90 per cent of the population is already online, the ratio was small (1.14). In developing countries the difference stood at 1.32, and in the LDCs it reached 1.53, as 34 per cent of young people were connected compared with only 22 per cent for the rest of the population. For Africa the ratio was 1.47, and for the Asia and the Pacific region it was 1.35.

The greater uptake among young people bodes well for connectivity in areas where the demographic profile is skewed towards youth, such as the LDCs, where half of the population is less than 20 years old. It means that the workforce will become more connected and technology-savvy as the young generation joins its ranks. This in turn could improve the development prospects of these regions.

Share of Internet users in urban areas twice as high as in rural areas

Percentage of individuals using the Internet by location, 2020



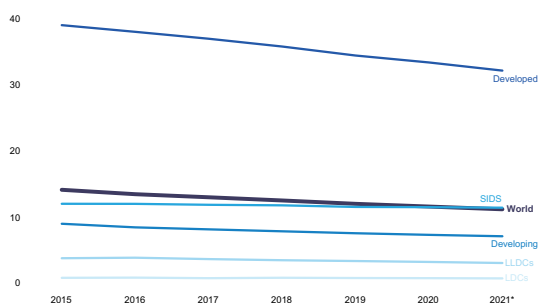
Source: ITU

Globally, people in urban areas are twice more likely to use the Internet than those in rural areas. In Africa the gap is greater: one-half of urban dwellers are online, compared with just 15 per cent of the rural population. And in the LDCs, urban dwellers are almost four times as likely to use the Internet as are people living in rural areas (47 per cent versus 13).

Where connectivity is close to universal, the urban-rural gap has almost disappeared, unsurprisingly. Thus in the developed economies the connectivity rate in urban areas (89 per cent) is only four percentage points higher than in rural areas.

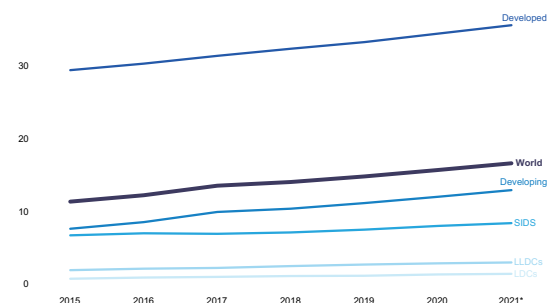
Broadband subscriptions pick up in 2021

Fixed-telephone subscriptions per 100 inhabitants, by development status



Source: ITU
* ITU estimate

Fixed-broadband subscriptions per 100 inhabitants, by development status

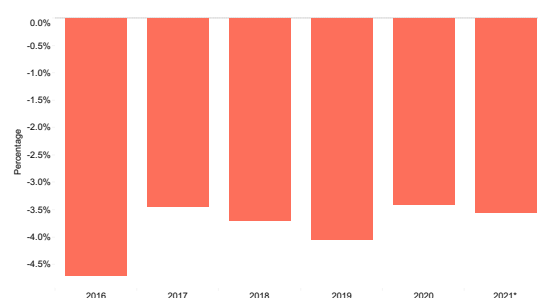


Source: ITU
* ITU estimate

Fixed telephony continues its steady decline, with 11 subscriptions per 100 inhabitants globally, down from a peak of 19 per 100 in 2006.

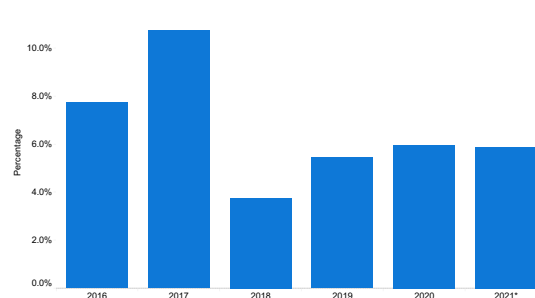
The decline is seen in all regions except the Arab States, where fixed telephone line subscriptions have been growing again since 2015.

Global year-on-year growth in the number of fixed-telephone subscriptions per 100 inhabitants, %



Source: ITU
* ITU estimate

Global year-on-year growth in the number of fixed-broadband subscriptions per 100 inhabitants, %



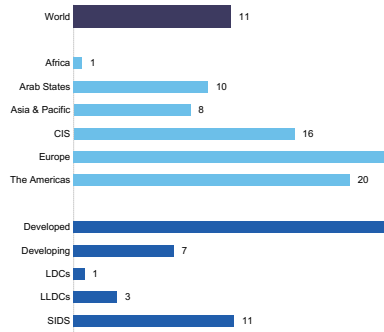
Source: ITU
* ITU estimate

Fixed broadband subscriptions continue to grow steadily, attaining 17 subscriptions per 100 inhabitants on a global average in 2021. In the LDCs, despite double-digit growth, fixed broadband remains the privilege of a few, with only 1.4 subscriptions per 100 inhabitants.

At the global level, the number of fixed broadband subscriptions has been higher than that of fixed telephony since 2017.

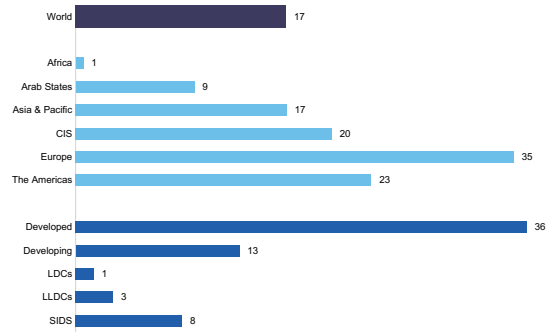
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Fixed-telephone subscriptions per 100 inhabitants, by region, 2021*



Source: ITU
* ITU estimate

Fixed-broadband subscriptions per 100 inhabitants, by region, 2021*

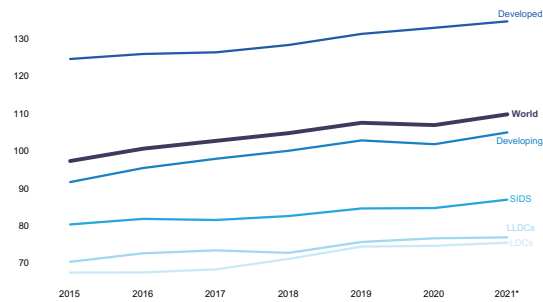


Source: ITU
* ITU estimate

Following a small decline in 2020, the penetration of mobile cellular subscriptions worldwide rose again in 2021, reaching a record 110 subscriptions per 100 inhabitants. Mobile subscriptions with broadband capability (3G or better) followed the same trend, reaching 83 subscriptions per 100 people.

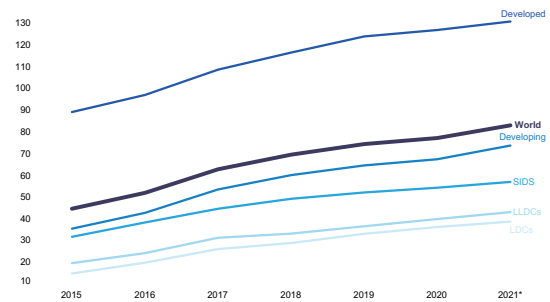
This increase was driven by developing countries in the Asia and the Pacific and Americas regions. By contrast, in Africa mobile cellular subscriptions declined in 2021, after increasing in 2020.

Mobile-cellular telephone subscriptions per 100 inhabitants, by development status



Source: ITU
* ITU estimate

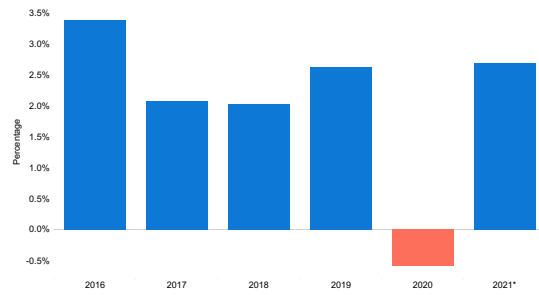
Active mobile-broadband subscriptions per 100 inhabitants, by development status



Source: ITU
* ITU estimate

Measuring digital development

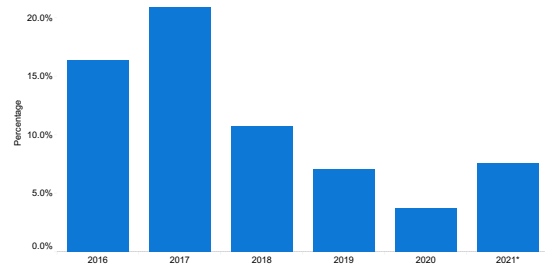
Global year-on-year growth in the number of mobile-cellular subscriptions per 100 inhabitants, %



Source: ITU

* ITU estimate

Global year-on-year growth in the number of active mobile-broadband subscriptions per 100 inhabitants, %



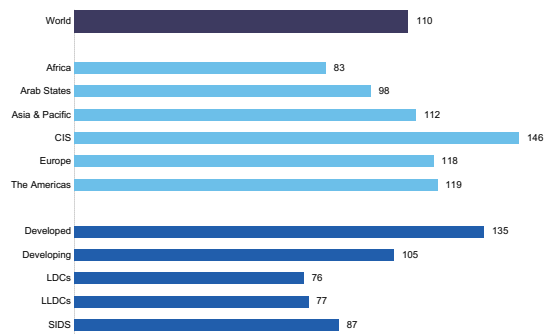
Source: ITU

* ITU estimate

After a slowdown in the growth of mobile broadband subscriptions in 2020, it picked up pace again in 2021, reaching 83 per 100 inhabitants worldwide.

The strongest growth was recorded in the Asia-Pacific region, at 10.5 per cent, followed by the CIS region (7.0 per cent) and Africa (6.7 per cent), which was the region with the highest growth during the previous three years.

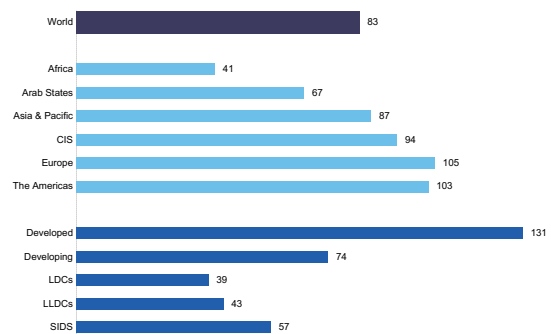
Mobile-cellular telephone subscriptions per 100 inhabitants, by region, 2021*



Source: ITU

* ITU estimate

Active mobile-broadband subscriptions per 100 inhabitants, by region, 2021*

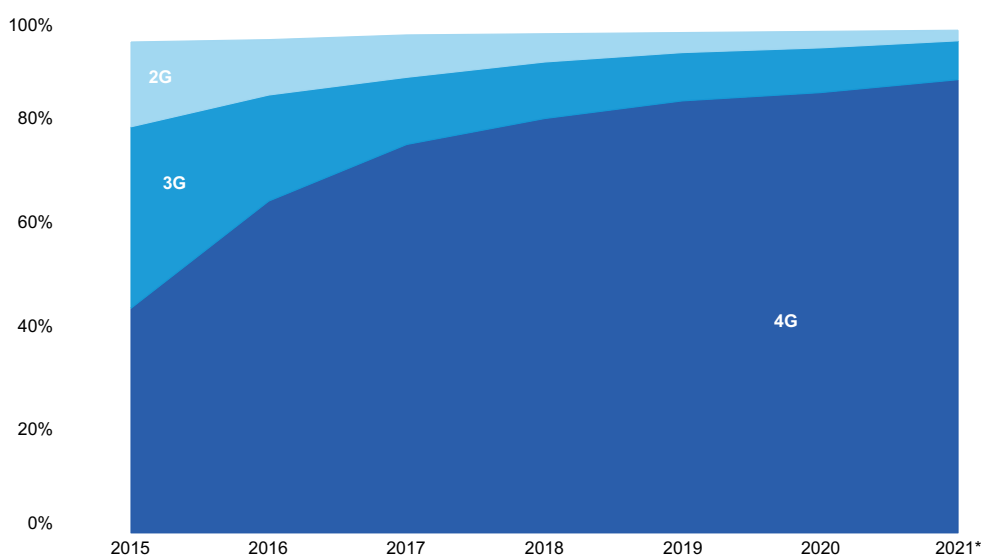


Source: ITU

* ITU estimate

Most of the world population is covered by a mobile-broadband signal, but blind spots remain

Population coverage by type of mobile network, 2015-2021*



Note: The values for 2G and 3G networks show the incremental percentage of population that is not covered by a more advanced technology network (e.g. 95% of the world population is covered by a 3G network, that is 7% + 88%).

Source: ITU
* ITU estimate

In most developing countries, mobile broadband (3G or above) is the main way—and often the only way—to connect to the Internet. It is a necessary condition, but not a sufficient one, as potential users face several other barriers to connectivity.

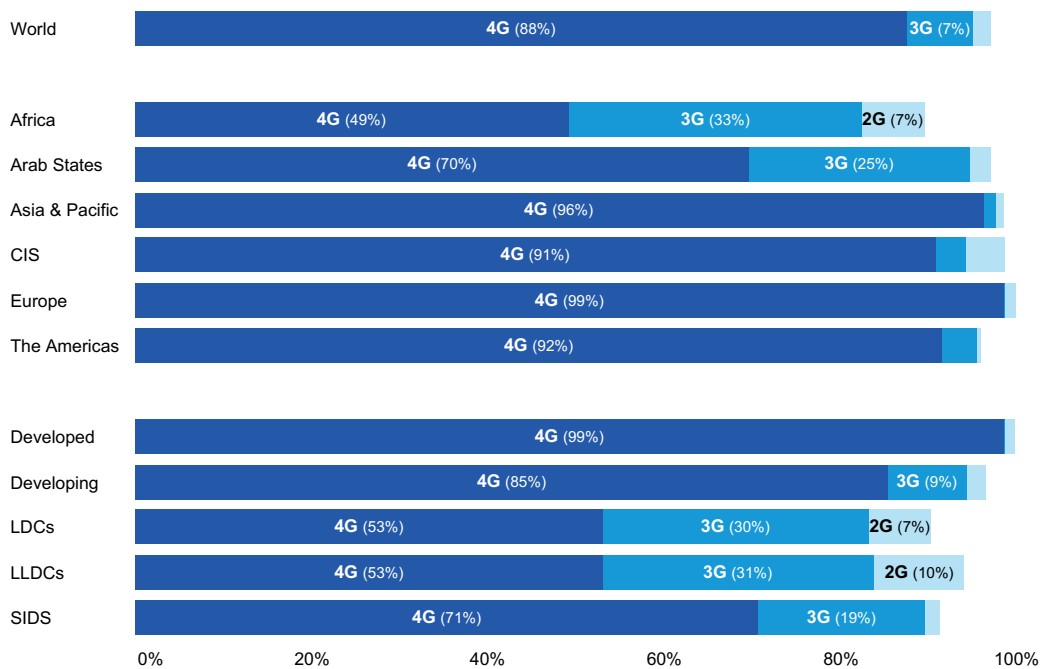
Ninety-five per cent of the world population now has access to a mobile broadband network. Between 2015 and 2021, 4G network coverage doubled to reach 88 per cent of the world's population.

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In four of the six regions, mobile broadband coverage (3G or above) is available to 90 per cent of the population, and the CIS region is very close to that mark (89 per cent). The coverage gap remains significant in Africa, where, despite a 21 per cent increase in 4G coverage since 2020, 18 per cent of the population remains without any access to a mobile broadband network.

Almost as many (17 per cent) lack such access in LDCs and LLDCs, thereby falling short of target 9.c of Sustainable Development Goal 9: to “significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020.”

Population coverage by type of mobile network, 2021*



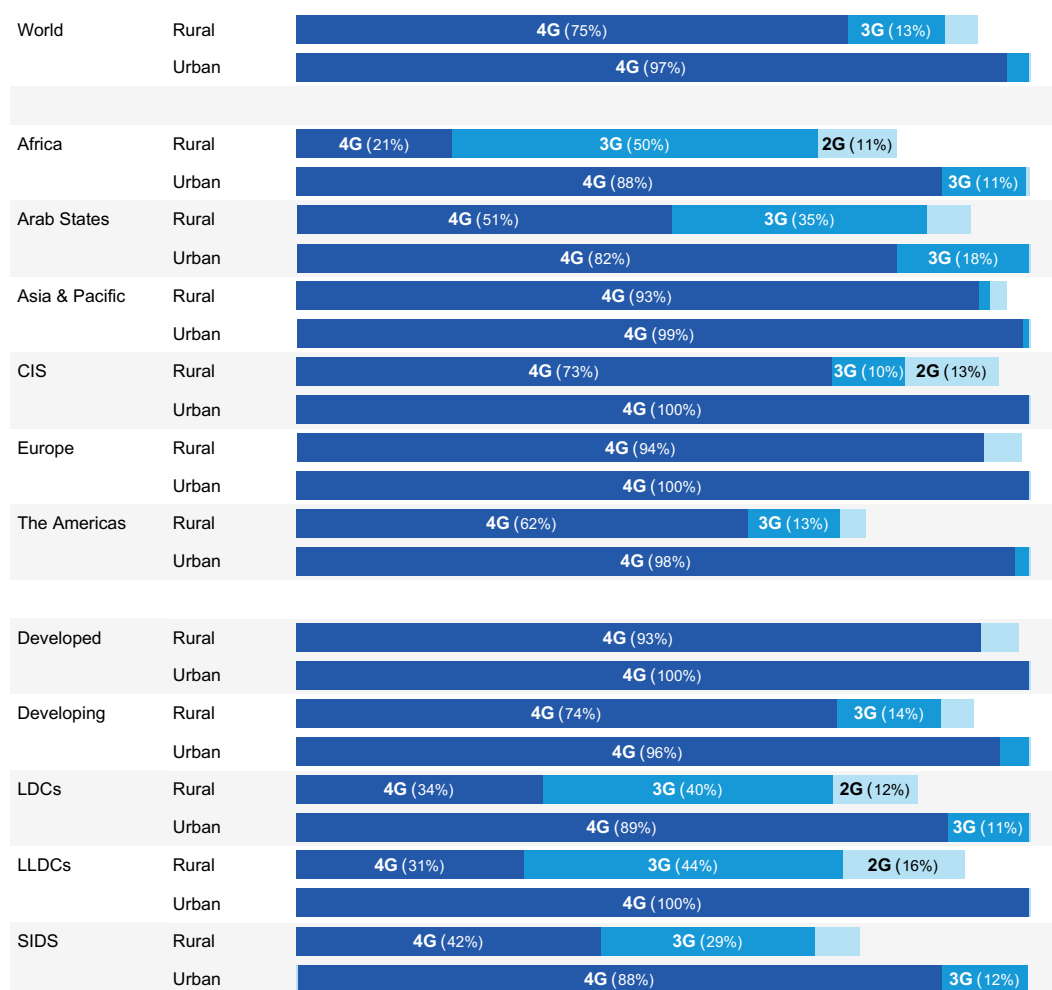
Note: The values for 2G and 3G networks show the incremental percentage of population that is not covered by a more advanced technology network (e.g. 95% of the world population is covered by a 3G network, that is 7% + 88%).

Source: ITU
* ITU estimate

While virtually all urban areas in the world are covered by a mobile broadband network, many gaps persist in rural areas.

In Africa, 18 per cent of the rural population has no mobile network coverage at all, and another 11 per cent has only 2G coverage. This means that almost 30 per cent of the rural population cannot access the Internet. The coverage gap is almost as significant in the Americas, where 22 per cent of the rural population is not covered at all and another 4 per cent is covered only by 2G.

Population coverage by type of mobile network and area, 2021*

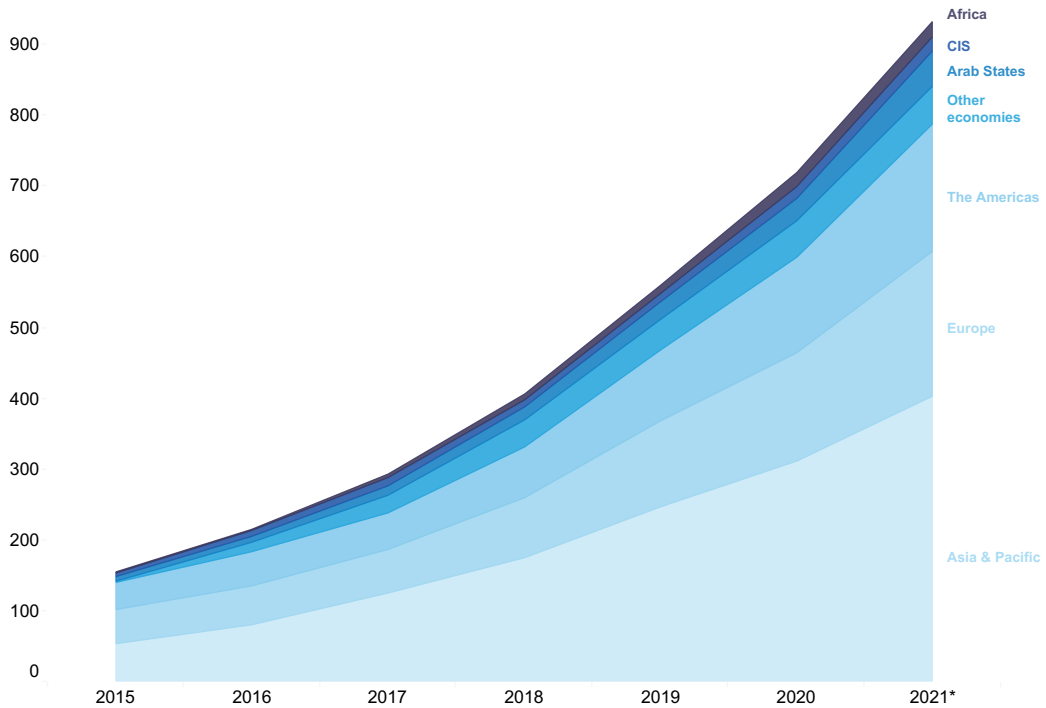


Note: The values for 2G and 3G networks show the incremental percentage of population that is not covered by a more advanced technology network (e.g. 95% of the world population is covered by a 3G network, that is 7% + 88%).

Source: ITU
* ITU estimate

International bandwidth continues to grow strongly

International bandwidth by region, Tbit/s**

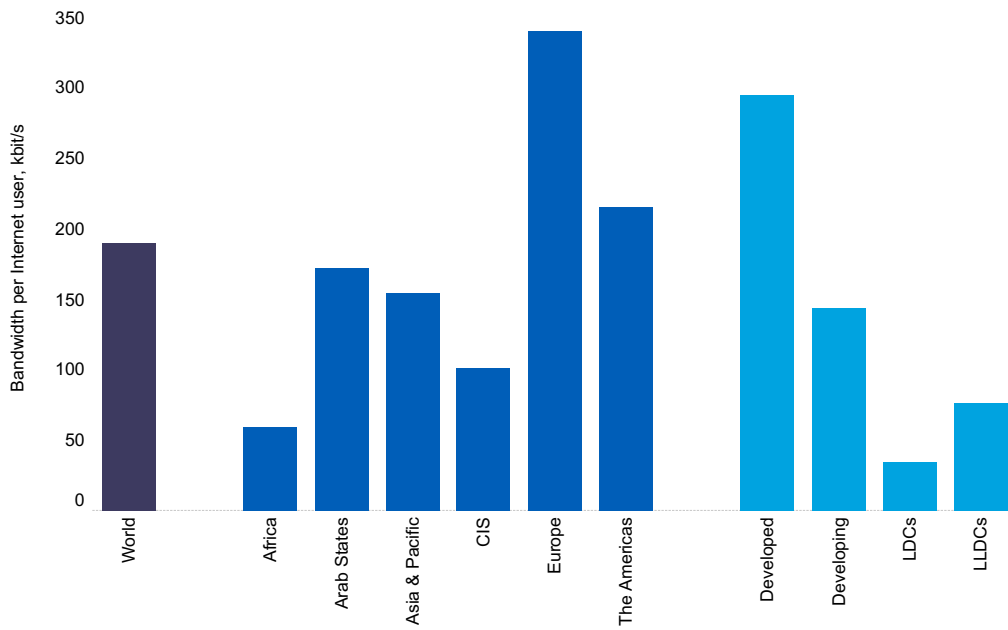


Source: ITU
 * ITU estimate
 ** 1 Terabit = 1'000'000 Megabit.

International bandwidth usage in 2021 reached a worldwide total of 932 Tbit/s, up from 719 Tbit/s in 2020. This is a 30 per cent increase, and it follows a similar increase to that of the previous year.

The highest regional total for international bandwidth use is in the Asia-Pacific region at over 400 Tbit/s, twice as high as in Europe (204 Tbit/s) or the Americas (180 Tbit/s).

International bandwidth per Internet user, kbit/s, 2021*



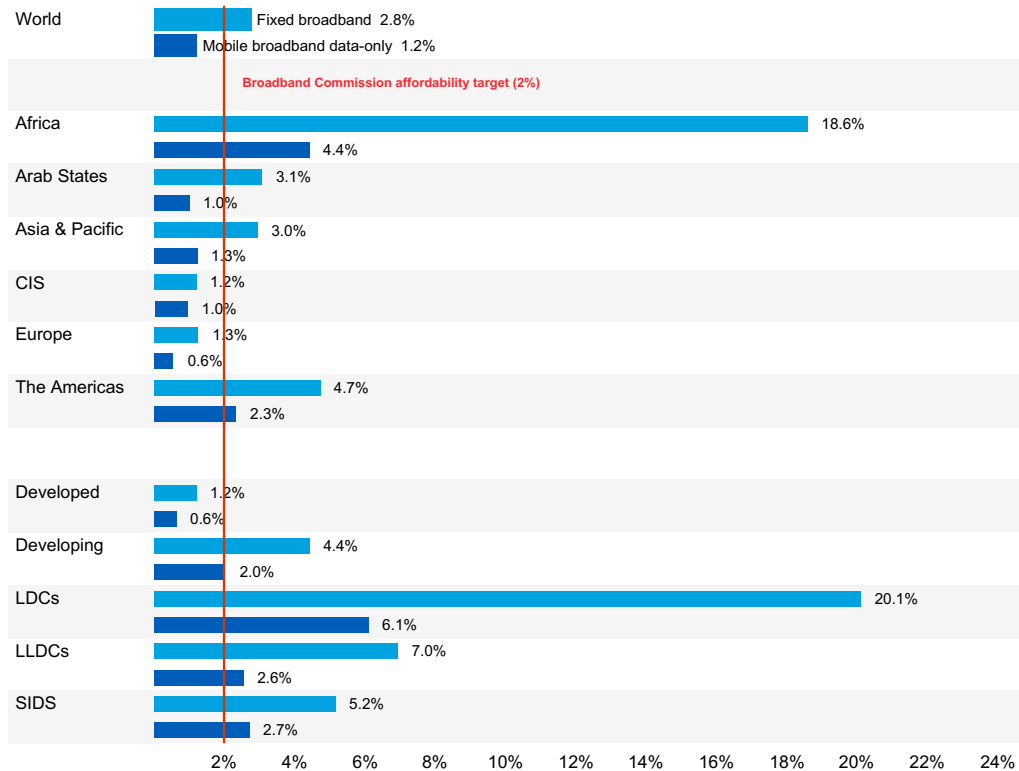
Source: ITU
* ITU estimate

On a per-user basis, it is Europe that leads, at 340 kbit/s per Internet user, followed by the Americas at 214 kbit/s and the Arab States at 174 kbit/s (the first time the per-user figure in the Arab States is higher than in the Asia-Pacific region).

International bandwidth usage in the LDCs translates to just 34 kbit/s per Internet user, a sharp contrast to developing and developed countries (144 kbit/s and 296 kbit/s, respectively).

Despite a steady decline, the cost of connecting remains high in developing countries

Fixed-broadband and mobile-data basket prices as a % of GNI p.c., 2020



Source: ITU

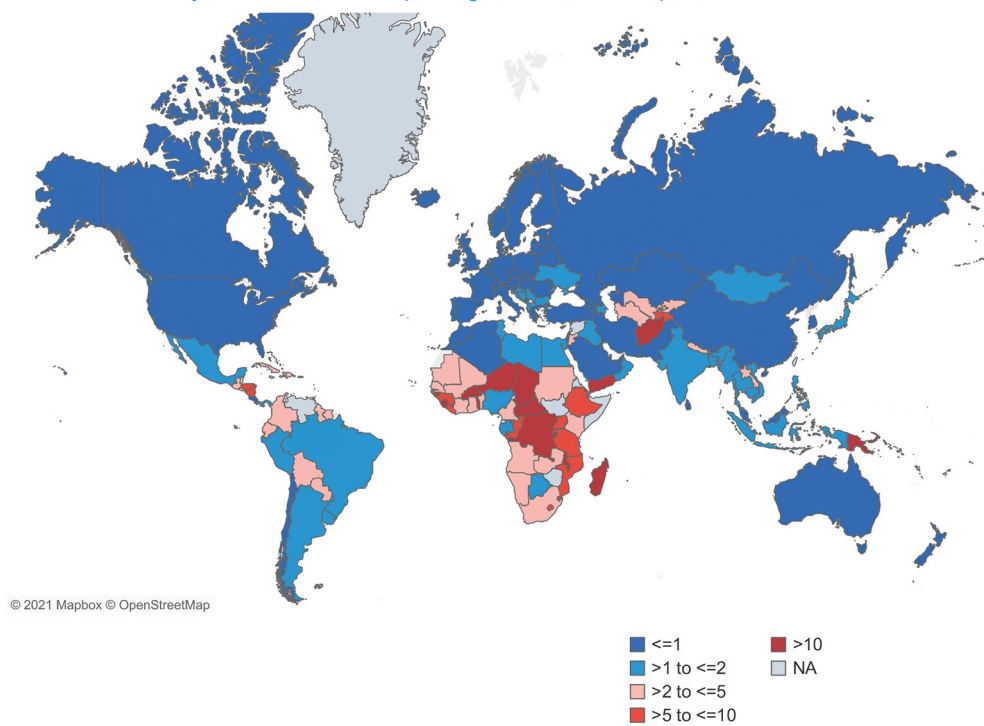
The United Nations [Broadband Commission for Sustainable Development](#) aims to make broadband prices affordable in developing countries by 2025, affordability being defined as the availability of broadband access at a price of less than two per cent of the monthly gross national income (GNI) per capita.

With only four years left to reach that target, prices remain prohibitive in many parts of the world. For mobile broadband, just under one-half of the economies for which ITU collected data in 2020 are still short of the target (84 out of 195), and for fixed broadband, it is more than one-half (56 per cent).

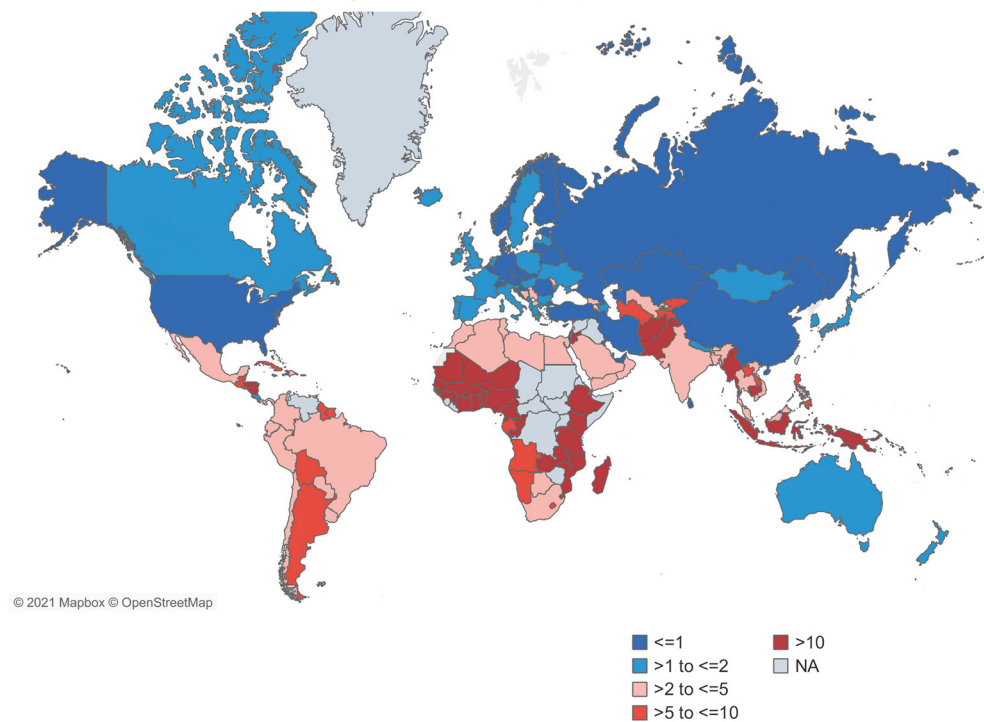
In the LDCs, while the median price for entry-level broadband has been declining, it remains beyond the means of the average consumer in all but 4 of the 43 LDCs for which data could be obtained. For fixed broadband, among the 33 LDCs for which data are available, only one has met the two per cent target.

For more information, refer to the ITU publication *Measuring digital development: ICT price trends 2020*.

Cost of a data-only mobile broadband package, as a % of GNI p.c., 2020



Cost of a fixed broadband package, as a % of GNI p.c., 2020

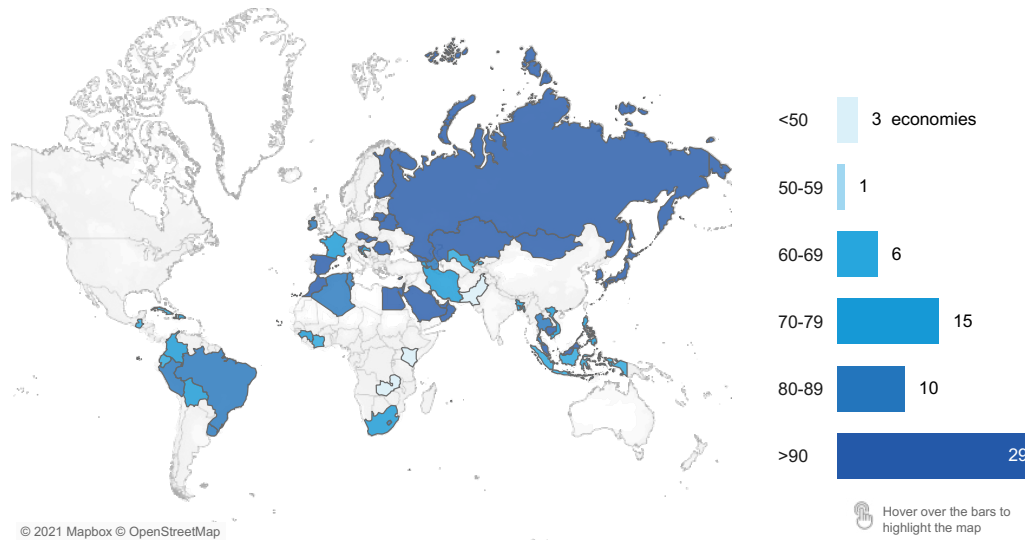


Source: ITU

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Mobile phones are becoming ubiquitous

Percentage of individuals owning a mobile phone, latest year in 2018-2020



© 2021 Mapbox © OpenStreetMap

Source: ITU

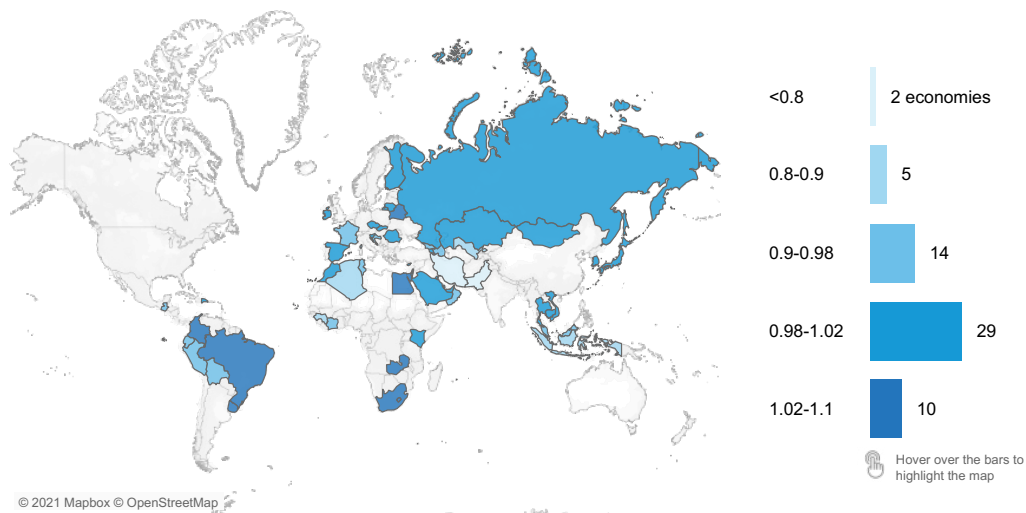
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In almost half of the countries for which data are available for the 2018-2020 time-frame, more than 90 per cent of the population own a mobile phone.

For another 10 countries, that figure lay between 80 and 90 per cent.

In only 3 countries was the share below one-half of the population, the lowest at 45 per cent.

Gender parity score for mobile phone ownership, latest year in 2018-2020



Source: ITU

Notes: The gender parity score is calculated as the proportion of women who own a mobile phone divided by the proportion of men who own a mobile phone. A value smaller than 1 indicates a larger proportion among men than among women. A value greater than 1 indicates the opposite. Values between 0.98 and 1.02 reflect gender parity.

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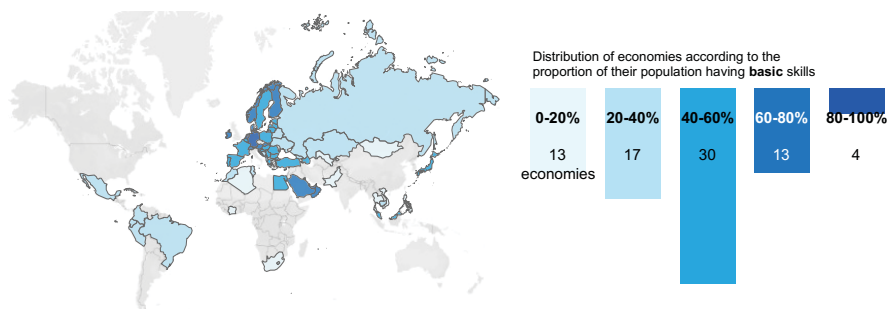
Ownership of mobile phones has been shown to be an important tool to empower women, and it appears that the world is moving to greater gender equality in this regard.

In one-half of the 60 countries for which data are available for the 2018-2020 time-frame, gender parity in mobile phone ownership has been achieved, and in ten more countries, more women than men own a mobile phone.

Nevertheless, in 21 countries, women lag behind men in mobile phone ownership, in some cases by a large margin.

Skills development remains crucial to connect the unconnected

Percentage of people with basic ICT skills, latest year available in 2018-2020



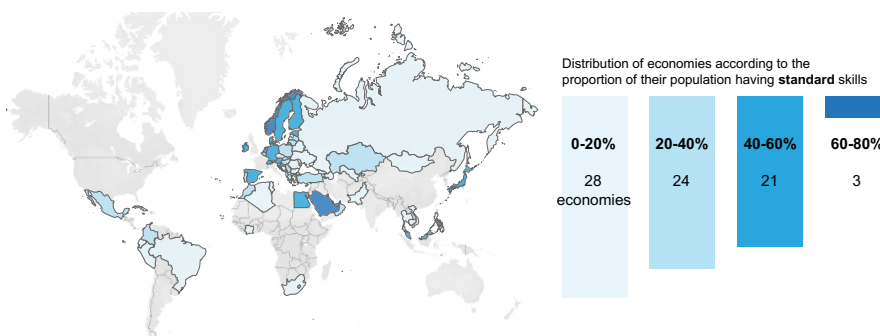
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Source: ITU

Notes: For each economy, the value for basic skills is the average value of the available recent data for following four computer-based activities: copying or moving a file or folder, using copy and paste tools to duplicate or move information within a document, sending e-mails with attached files, and transferring files between a computer and other devices.

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Percentage of people with standard ICT skills, latest year available in 2018-2020



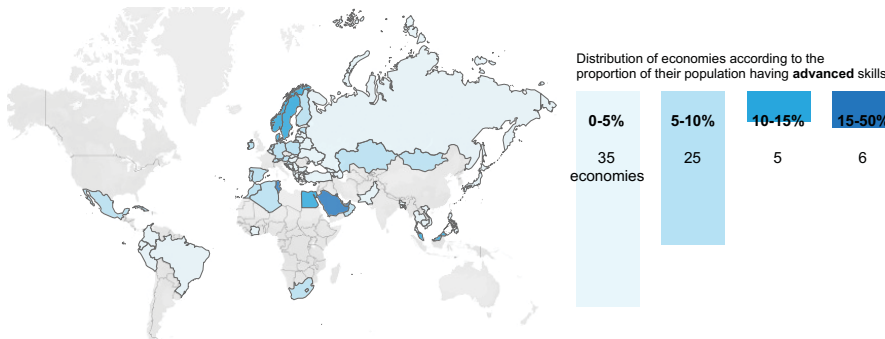
© 2021 Mapbox © OpenStreetMap

Source: ITU

Notes: For each economy, the value for standard skills is the average value of the available recent data for following four computer-based activities: using basic arithmetic formula in a spreadsheet; connecting and installing new devices; creating electronic presentations with presentation software; and finding, downloading, installing and configuring software.

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Percentage of people with advanced ICT skills, latest year available in 2018-2020



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Source: ITU

Note: For each economy, the value for advanced skills is the value for writing a computer program using a specialized programming language.

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Insufficient skills are often mentioned as an impediment to meaningful connectivity.

Because self-reporting of individuals' ICT skills may be subjective, ICT skills are measured based on whether an individual has recently performed certain activities that require different levels of skill.

In 40 per cent of the countries for which data are available, less than 40 per cent of individuals reported having carried out one of the activities that comprise basic skills, e.g. sending an e-mail with an attachment, in the previous three months.

In just 23 per cent of the countries did more than 60 per cent of individuals report one of the basic skills activities.

As for the standard skills components, such as creating an electronic slide presentation, in almost 70 per cent of the countries less than 40 per cent of individuals had used them in that time.

In only 3 of the 76 countries for which data are available did more than 60 per cent of individuals report performing some of those activities.

Finally, only 15 per cent of the countries had more than 10 per cent of individuals report that they had written a computer program using a specialized programming language in that time.

The available data show large differences in skill levels between age groups and between occupations, but relatively smaller differences between men and women, especially at younger ages.

Methodology

For this publication, regional and global aggregates up to 2020 were calculated using data supplied by Member States to ITU, supplemented by ITU estimates. Aggregates can differ from those produced for previous editions of *Facts and figures*, because of new or revised data submitted by Member States. All 2021 aggregates are estimates computed by ITU, based on the methodology described below.

Mobile population coverage (2G/3G/4G and above)

The percentage of the population covered by a mobile signal (2G/3G/4G and above) refers to the percentage of inhabitants who have such coverage, regardless of whether they use the service. The indicator thus measures the physical availability of mobile cellular services, not the actual level of use or subscriptions. It is differentiated by urban and rural areas.

The data for this indicator are generally provided in aggregate form (urban and rural). As with many indicators, ITU collects the data from telecommunication operators, telecommunication/ICT regulators and national ministries. This information is widely available for both developed and developing countries.

Since most countries provide data without differentiating between urban and rural coverage, it is necessary to perform disaggregation. It is known that mobile cellular coverage is virtually ubiquitous in urban areas. Furthermore, country data on the proportion of the population that lives in rural areas is published by the World Bank. Subtracting the urban population from the total population with mobile cellular coverage therefore gives the number of rural inhabitants who have such coverage in rural areas.

The percentage of the rural population covered by a mobile cellular signal (2G/3G/4G and above) is then obtained by dividing the number of such rural inhabitants by the total rural population and multiplying by 100.

Internet access and use estimates

Statistics on Internet use and household access to computers and the Internet can be derived from household surveys. However, relatively few countries administer such surveys, owing to their cost and the complexity of their implementation; accordingly, there are large data gaps.

In addition, the delay between the collection of household survey data and their publication can be as much as two years or more, limiting their usefulness for ICT statistics given the rapid pace of technological change.

These shortcomings make it necessary to rely on data modelling tools to estimate missing values and forecasting techniques to estimate current Internet use and access.

For 2021, forecasting was used to estimate the proportion of individuals using the Internet and the proportion of households with Internet access. Estimates were used to fill gaps in the data so as to produce regional and global aggregates (up to 2020) for Internet use—total, by gender, for young people (aged 15-24), and in urban and rural areas—and for households with Internet.

In addition to official ITU data collected from the membership, data was obtained from other sources, including Multiple Indicator Cluster Surveys, Demographic and Health Surveys, and

the surveys of Research ICT Africa and LIRNEAsia. Additional data on socio-demographic characteristics were obtained from the World Bank and the United Nations Population Division.

Based on the data points or estimates, multiple-country aggregate values were calculated based on a weighted average of the values for individual countries. Internet use aggregates were weighted by the population of each economy, while aggregates for the proportion of households with Internet access were weighted by the number of households.

Disaggregation of overall values was performed separately. For instance, where country data on the number of Internet users were only available in aggregate form (urban and rural), comparable economies for which disaggregated data are available were used to estimate that ratio for the country in question, filling the gap in real data. Existing data on the country's population size and urbanization were then used to produce separate estimates of the proportion of the population using the Internet in both urban and rural areas. Global and regional figures were calculated by weighting the figures for individual countries by the rural and urban population in each country.

A similar procedure was used to estimate Internet use separately for men and women, and for young people and the rest of the population.

Mobile cellular, mobile broadband and fixed broadband subscription estimates

June 2021 data on subscriptions were compiled from publicly available data from regulators and ministries, as well as subscription information published by each country's main operators. When the data from the main operator of the country was used, the operator-reported number of subscriptions was divided by its market share to obtain the total number of subscriptions in the country for a particular service. In the absence of annual reports, subscription data were estimated from industry analyses, authoritative news articles and operator press releases.

Data from these sources include the absolute number of subscriptions, market shares, penetration and growth rates, which were used to derive the country estimates using the same method as with operator data. In the case of countries for which data were not available either from the national administration or from annual and industry reports, subscriptions data were estimated using univariate time series analyses applied to the data from the last 10 years.

The univariate time series analyses were done by decomposing the time series of penetration data of a particular service to its trend and residual component so as to obtain the autoregressive integrated moving average (ARIMA) models. The resulting ARIMA models were used to make the 2021 point prediction for each country and service.

International bandwidth usage estimates

The basic assumption here is that international bandwidth usage is a function of demand for total bandwidth capacity in a country, which can be obtained by multiplying the number of Internet users by their average bandwidth use. Since very few countries publish monthly or quarterly statistics on international bandwidth usage and given the extraordinary nature of Internet activity in 2020 and 2021 due to the COVID-19 pandemic, estimates were performed using proxy indicators.

ITU statistics on fixed broadband subscriptions were combined with crowd-sourced statistics on average download speeds published by Ookla² for 180 economies. Smoothed speed change ratios from December 2020-January 2021 to June-July 2021 served as the basis for extrapolating growth rates for 2021. Estimates were validated against reports by submarine cable operators.

For economies with missing or unreliable fixed broadband download speed data, 2021 values were estimated with exponential smoothing relying on historical figures since 2016. It should be noted that, due to variations in the quality of speed statistics, the explanatory power of the model is stronger in countries where fixed broadband Internet is dominant, and in middle-income economies in general. Results are potentially sensitive to significant changes in broadband subscriptions during the year.

² Ookla URL: <https://www.speedtest.net/global-index/> (2020-2021 monthly editions; retrieved January to September 2021)

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