Global Connectivity Report 2022

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Executive summary

In the 30 years since the creation of the ITU Telecommunication Development Sector in 1992, the number of Internet users surged from a few million to almost five billion. This trend has enabled a digital transformation that has been, and is, transforming our societies and our economies. Yet the potential of the Internet for social and economic good remains largely untapped: one-third of humanity (2.9 billion people) remains offline and many users only enjoy basic connectivity. *Universal and meaningful connectivity* – defined as the possibility of a safe, satisfying, enriching, productive, and affordable online experience for everyone – has become the new imperative for the 2020-2030 Decade of Action to deliver on the Sustainable Development Goals (SDGs).

The *Global Connectivity Report 2022* takes stock of the progress in digital connectivity over the past three decades. It provides a detailed assessment of the current state of connectivity and how close the world is to achieving universal and meaningful connectivity, using a unique analytical framework. It goes on to showcase solutions and good practices to accelerate progress. The second part of the report consists of seven thematic deep dives on infrastructure, affordability, financing, the pandemic, regulation, youth, and data.

Chapter 1: Universal and meaningful connectivity: The new imperative

In 1984, the Independent Commission for World-Wide Telecommunications Development convened by ITU published *The Missing Link* – a seminal report that for the first time identified the social and economic benefits of telecommunications and promoted connectivity as a right and a priority for all countries. The report noted that it was "not right" that only a minority of the world benefits from "remarkable new technologies".

Since the publication of that report, there has been tremendous progress in connecting the world. The Internet – a remarkable technology that did not exist in 1984 – is now woven into the entire fabric of our daily lives. And the minority has become the majority: two-thirds of humanity use the Internet. Yet despite this progress, "the link is still missing": one-third of the world's population remains offline and many among the online population are not meaningfully connected. The "missing link" has morphed into multiple digital divides, across and within countries, between men and women, between youth and

older persons, between cities and rural areas, between those who enjoy a fibre connection and those who struggle on a spotty 3G connection.

Linking everyone is no longer enough. Universal and meaningful connectivity, the possibility for everyone to enjoy a safe, satisfying, enriching, productive, and affordable online experience, has become the new imperative for the 2020-2030 decade

Depriving vast swaths of humanity from the possibilities offered by the Internet is unacceptable and costly, as it stunts economic development and deepens inequalities. The COVID-19 pandemic has led to a sharp uptake in usage of the Internet. For those privileged enough to be connected, the Internet allowed a measure of continuity. However, for others, the pandemic exacerbated the cost of digital exclusion.

Connectivity has a profound and far-ranging impact. The catalytic and enabling role of connectivity for sustainable development is recognized in the Sustainable Development Goals. The Internet offers significant economic benefits and the potential to enhance welfare for individuals throughout their lives. It enables new forms of communication, entertainment, expression,

and collaboration. It enables access to services where traditional services are lacking, access to an enormous amount of knowledge, learning resources, and job opportunities. The benefits of connectivity are considerable for everyone, including marginalized and vulnerable groups, who are often the least connected.

In this Decade of Action, three challenges have emerged:

- Closing the coverage gap: Even though 95 per cent of the world population is now within range of a mobile broadband network, at least 390 million people have no possibility to connect to the Internet.

- Closing the usage gap: One in three individuals who could go online choose not to, mainly due to prohibitive costs, lack of access to a device, and/or lack of awareness, skills, or purpose.

- Achieving universal and meaningful connectivity: This means upgrading connectivity from basic to meaningful for all.

As the use of the Internet increases, so too does the exposure to the downsides of connectivity such as privacy infringements, cybercrime, harmful content, and the outsized power of large companies. Addressing these issues is part of the journey to universal and meaningful connectivity. Finally, digital connectivity alone cannot solve any of the global challenges the world is facing. It is only one of many enablers of sustainable development. "Analogue complements", including governance, security, health, education, transport infrastructure, and entrepreneurship are needed.

Chapter 2: The journey to universal and meaningful connectivity

Chapter 2 relies on the framework for universal and meaningful connectivity and the associated targets for 2030, developed by ITU and the Office of the Secretary-General's Envoy on Technology, to analyse the current state of digital connectivity globally and progress towards reaching the targets by 2030. The framework considers usage by various stakeholders (universal dimension of connectivity) and the five enablers of connectivity (meaningful dimension of connectivity): infrastructure, device, affordability, skills, and safety and security.

The assessment reveals that the world is still far from universal and meaningful connectivity. Infrastructure needs to be rolled out or improved to bridge the coverage gap. There are still significant differences between and within countries in network availability and quality. Fixed broadband is a costly investment and is not available or is unaffordable for many. Mobile broadband offers greater flexibility and is less expensive, and most rely on this technology to go online. But in many rural areas of developing countries, only 3G is available, when meaningful connectivity requires 4G.

The coverage gap, currently at 5 per cent, is dwarfed by the usage gap: 32 per cent of people who are within range of a mobile broadband network and could therefore connect, remain offline. Data compiled by ITU make it possible to classify the offline population based on who they are and where they live. These data reveal five divides:

- Income divide: The level of Internet use in low-income countries (22 per cent) remains far below that of high-income countries, which are close to universal usage (91 per cent).

- Urban-rural divide: The share of Internet users is twice as high in urban areas as in rural areas.

- Gender divide: Globally, 62 per cent of men are using the Internet, compared with 57 per cent of women.

- Generation divide: In all regions, young people aged between 15 and 24 are more avid Internet users (71 per cent of them are online) than the rest of the population (57 per cent).

- Education divide: In nearly all countries where data are available, rates of Internet use are higher for those with more education, far higher in many cases.

Understanding why people and households do not use the Internet is critical for designing effective, targeted interventions. The main reasons cited by people for not using the Internet are the lack of affordability, of awareness about the Internet, of need, as well as the inability to use the Internet.

Globally, connectivity became more expensive in 2021 due to the global economic downturn triggered by the COVID-19 pandemic. After years of steady decline, the share of income spent on telecommunication and Internet services increased in 2021. The global median price of an entry-level broadband plan in the majority of countries amounts to more than 2 per cent of the gross national income per capita, which is the affordability threshold set by the Broadband Commission for Sustainable Development.

People should not be forced to use the Internet. However, evidence suggests that introducing people to the Internet usually entices them to stay online. Based on activities people reported, use of the Internet leads to an improved social life, with the use of social networks, making Internet calls and streaming video the most common activities.

Beyond awareness about the merits of the Internet, making meaningful use of it requires specific skills. In the countries where data are available, they suggest that many people, sometimes the majority, do not have such skills.

Chapter 3: Accelerating progress towards universal and meaningful connectivity

This chapter explores options to accelerate progress towards universal and meaningful connectivity. Expanding broadband networks is needed to eliminate the remaining blind spots and improve the quality of connectivity. Measures include reducing constraints on foreign direct investment to attract capital for upgrading and expanding digital infrastructure; ensuring sound ICT sector regulation to help build competitive markets and enhance predictability; promoting infrastructure

sharing to reduce costs; ensuring the supply of adequate, inexpensive spectrum to help reduce coverage gaps; and ensuring sufficient capacity and a shift to new generations of mobile broadband. Solutions to ensure an adequate energy provision to power ICT infrastructure include policy incentives, reducing duties and taxes on green power equipment and allowing independent power producers. Recalibrating universal service funds (USFs) can help deployment of infrastructure in unserved areas to reduce gaps among vulnerable groups such as women and girls, persons with disabilities and older persons.

Overcoming digital illiteracy is critical in bridging the usage gap. Effective and large-scale programmes are needed to address the challenge, including providing digital literacy as part of the school curriculum. Funding school connectivity remains a challenge, however. In many low- and middle-income countries where equipping schools with electricity is already a struggle, Internet access and digital skills are often after-thoughts. The cost of devices and Internet service is a significant barrier that stops many people from using the Internet. Countries have limited options, but eliminating import duties and reducing taxes on services will make them more affordable. Governments should encourage operators to offer a variety of plans that cater to different income levels and circumstances. Other measures to improve affordability include the provision of unlimited broadband access to community centres and schools; maintaining the temporary COVID-19 concessions that were put in place by operators in many countries; subsidizing data use for the poorest; and applying zero ratings for critical services such as e-government, education and health sites.

Meaningful connectivity implies safety of use. Threats include a breach of data privacy, misinformation and harmful content, and overuse of digital technology. It is important to know how to mitigate risks to preserve trust in the use of the Internet. Countries need to enact better data protection laws to safeguard privacy, social media companies need to moderate content to detect false and inciteful content, and media literacy must be part of any digital skills training.

To achieve universal connectivity, disadvantaged groups such as women and girls, persons with disabilities, older persons, those with low incomes and people living in remote areas, require special attention. Greater collaboration is needed across governments, agencies, advocacy organizations and digital companies to accelerate the acquisition of digital skills. To reduce the gender gap, non-governmental organizations should be supported in providing mentoring and digital skills training for women and girls. Technology companies, too, can play a role, not only by supporting skills initiatives but also by setting their own gender equity targets. Digital products and services should be customized to the needs of women in terms of design, safety and security. Training of older persons is necessary if they are to access online public services. Measures to reduce the digital disability gap include raising awareness, enacting laws that require online public services to be accessible to persons with disabilities, adapting products by adhering to international design guidelines, and supporting entrepreneurs in the

development of contextually relevant digital assistive technologies. Since data are often lacking, there is a need to ensure that the scope of ICT surveys addresses disadvantaged groups as well.

Among the challenges posed by increased digital connectivity, e-waste continues to grow, and what happens to over four-fifths of e-waste is unknown. As a minimum, the recycling process should be made easier for consumers. Connectivity will help reduce carbon emissions across the economy, for example video conferencing for work and education will reduce travel while the greater use of sensors will generate energy efficiencies across many sectors. Furthermore, there is considerable untapped renewable potential from solar, wind, hydro and geothermal sources in many low- and middle-income countries. As major energy users, ICT companies can provide the scale of investment to make renewable energy economically feasible. Governments can help enormously by creating climate friendly energy strategies and liberalizing markets, particularly by welcoming independent renewable power producers.

Chapter 4: The critical role of middle-mile connectivity

Middle-mile infrastructure is essential for connectivity. It is composed of Internet exchange points (IXPs), data centres and cloud computing and is a critical link between international connectivity (first mile) and the infrastructure that connects users (last mile). IXPs enable Internet service providers (ISPs) and content providers to exchange their data traffic, which offers substantial advantages, including reduced cost, increased reliability through redundancy, improved quality, and reduction in time needed to retrieve data.

Data centres play a fundamental role in the digital economy by providing space for data storage of domestic content and processing of large datasets. Despite their crucial role, few data centres are found in low- and middle-income economies due to a range of elements including lack of demand, low income, natural disasters, political instability, energy supply, and ease of doing business.

Cloud computing offers computing power, on-demand infrastructure, competitive cost, maintenance, and advanced big data technologies. While it is attractive to store data on the cloud, cost, latency, and national security remain important considerations for countries.

For a country to improve its middle-mile connectivity, investment is crucial. The building blocks of an attractive data ecosystem include liberalization of the telecommunication market; putting in place data protection laws to help attract investment on data centres and cloud computing; addressing energy supply by allowing independent renewable power producers and suppliers to enter the market; and collaboration between governments, IXPs, ISPs, data centre operators, and investors.

Chapter 5: Meaningful connectivity for all: The affordability factor

Millions of people remain offline, or are not meaningfully connected, because of the high cost of the device and/or subscription. The global picture of affordability is one of many stark contrasts. Connecting to the Internet remains prohibitively expensive for many in low- and lower-middle-income economies while it is relatively cheap in richer countries. There are also less-visible divides within countries due to income inequalities. Even in countries where the average earner can afford an entry-level broadband service, poorer segments of the population often cannot. The "value-for-money" is also uneven across countries. Not only are entry-level fixed broadband connections out of reach in lower-income economies, but connection speeds are also far lower there than in high-income economies.

The past decade has seen significant improvements in affordability of broadband access, especially mobile broadband, but the majority of low- and middle-income economies fall short of the global affordability target. The economic crisis triggered by the COVID-19 pandemic has set back progress.

Affordability and connectivity go hand in hand. The critical challenge for policies with a digital development focus is to release countries trapped in a vicious cycle of unaffordable broadband prices that perpetuate low subscription rates. These are countries where factors such as physical geographic conditions, uneven population distribution or low levels of disposable income deter investments, where market size does not drive down prices, while unaffordable prices deter new subscribers.

Evidence suggests that affordability and the maturity of the regulatory environment go hand in hand. Countries showing the highest readiness levels in collaborative digital regulation and with tailored competition policy have the most affordable broadband service prices. This offers scope for countries to increase affordability as they improve their regulatory policy environment. Governments wishing to reduce the cost of broadband access can resort to a variety of measures, from conditioning regulatory approval on the provision of low-cost services, to negotiating public-private partnerships balancing investment incentives for network deployment with price capping. Governments may also consider reducing taxes or subsidizing access to free or low-priced devices, as well as free connection in public administration facilities such as libraries, hospitals, or schools or at other public hot spots. Measures to ensure affordable access to universal meaningful connectivity will ideally form part of more comprehensive broadband strategies.

Chapter 6: Financing universal and meaningful connectivity

Universal connectivity holds significant development opportunity but many areas, especially rural areas, remain unserved or underserved. However, current investment models for broadband connectivity are not commercially viable for uncovered areas due to the high cost of deployment and low demand. Policy and regulation can shrink the connectivity gap to some extent by removing obstacles to network deployment and by raising demand for broadband, but these are both inadequate and too slow in responding to the urgent need to close the gap. Both the base of contributors and the scope of investment to support deployment and adoption need to be broadened.

Several options are available to broaden the base of contributors:

- Identifying new contributors: New contributors can include digital companies, such as those with an e-commerce or other online focus, along with other companies deriving benefits from broadband, multilateral development banks, corporate social responsibility funds, and philanthropic donors. Contributions can come in a variety of forms, including investments and in-kind contributions such as digital skills training.

- Earmarking existing contributions: These contributions from ICT sector participants to support connectivity and adoption include mandatory contributions such as operator licence fees, spectrum licence fees, digital taxes, fees to access rights of way for infrastructure, and equipment import duties. Further contributions could include digital taxes and other regulatory levies.

- Reforming USFs: Reform can be achieved by setting clear objectives, implementing regulations, and providing a sound governance structure. Further changes in focus could include adding coverage obligations in spectrum licences and enabling direct operator investment rather than USF payments.

Several options are available to broaden the scope of investments:

- Operating expenditure: In addition to capital expenditure, contributing to operating expenditure can make a business plan more sustainable. These can include direct subsidies or incentives such as tax reductions and can include in-kind contributions.

- Risk protection: Governments and international institutions can offer guarantees and loss-guarantee schemes or insurance that limit risks beyond the investor's control, for example, political or currency risks.

- Demand-side support: Governments can ensure demand by becoming an "anchor tenant" with a future contract for connectivity in an underserved region. Indirect support for demand can be provided by subsidizing the cost of a device or data plans, increasing digital literacy, and developing locally relevant content.

Chapter 7: Policy and regulatory strategies that drive digital transformation

The need to redefine policy priorities, the roles of stakeholders, and to identify new tools has never been more pressing. Tensions, nevertheless, persist between established and emerging approaches to policy and regulation and new strategies will need to prove themselves.

Five strategies are at hand for policy-makers and regulators to navigate the digital transformation and connect the unconnected.

1. Build ambidextrous leadership: Policy leadership is built around embracing ambiguity and uncertainty with a growth mindset and out-of-the-box thinking, so when new challenges emerge, policy-makers and regulators can combine the 'tried-and-tested' with a new approach, and with equal ease.

2. Bridge silos and break through insularity: Silos are still common in national institutions and policy implementation. Adopting a whole-of-ecosystem approach to policy inception, design, prototyping and implementation is an issue in many countries – where these issues persist, they hinder digital market development, innovation and value-creation.

3. Develop a common language: Building a common language across stakeholder groups is essential to avoid policy implementation getting lost in translation. Leveraging stakeholder dialogue and data to guide decisions will co-create more diverse and resilient regulatory solutions.

4. Reframe and operationalize policy agendas: In the wake of recovery from COVID-19, governments have an opportunity to reframe their policy agendas and mainstream new priorities along with a broad development perspective. The circular economy, digital innovation, and gender empowerment have moved to the forefront of a new systemic approach where new legal instruments will redefine the focus for global action in the face of economic, technological, and climate disruption.

5. Skill up, and up again: In the "new normal", the speed of learning provides a competitive edge in business and technology. Problem-solving is impossible without building new skills and competences, formulating strategic thinking around new issues in digital markets and implementing novel regulatory approaches. A focus on emerging skills is key to building adequate institutional capacity and preparing for current and future challenges.

As digital markets grow and move towards everything-as-a-service, an agile and iterative, lean approach to policy and regulation has started to develop. The agency of regulators and policy-makers and their agility will be the keys to making the implementation of digital policies more impactful.

Chapter 8: Connectivity and the pandemic: Building resilience for future crises

While the COVID-19 pandemic triggered fundamental disruptions to the economy and our way of life, it also accelerated the pace of digitalization and connectivity for many. However, the impact of the pandemic on the connectivity landscape has been uneven, due to the interplay of positive and negative factors on different time horizons.

In the immediate emergency phase, lockdown restrictions generated demand for connectivity and digital services, ranging from home delivery to government services. They also helped change people's preferences for digital solutions such as using electronic payments or teleworking. At the same time, demand was tempered in many countries where connectivity was conditioned on physical presence, for example, in-person purchases or renewals of pre-paid SIM-cards or devices.

In the short- and medium-term, operators boosted connectivity supply by increasing capacity limits and the availability of zero-rated content, while government policies helped speed up investments in network infrastructure or access to spectrum. However, the pandemic also took a toll on the financial capacity of governments and operators, created problems in the availability of a skilled labour force and the functioning of global supply chains, while the uncertain economic environment deterred and sometimes distorted investments.

The pandemic highlighted the indispensable role of connectivity and serves as a wake-up call for policy actions to better prepare for future shocks. Closing the digital divide, improving the quality of connectivity, and driving digital deepening are essential to improving resilience. Among other benefits, such actions will protect already disadvantaged children against the loss of learning experienced in the pandemic due to no or poor connectivity and avoid the shocks felt by many as remote interactions were forced on often poorly prepared governments, institutions and populations.

Chapter 9: The digital lives of children and young people

Globally, 71 per cent of young people aged between 15 and 24 use the Internet, far more than any other age group, and in every country for which data are available they are more connected than the rest of the population. At the same time, only 40 per cent of school-age children have access to the Internet at home, with stark disparities across and within countries. While young people in middle-income countries drive the digital transformation, accessibility and affordability remain key constraints in low-income countries.

Access does not determine the value that children and young people gain from the Internet. A second level of the digital divide emphasizes the role of digital skills in

mediating both the opportunities and risks of ICT use and digital engagement. Overall, young people have greater ICT skills than adults, and while there is gender parity for basic and intermediate skills, gender imbalances still exist for advanced skills such as programming.

Opportunities and risks tend to be correlated: more access and higher digital skill levels are associated with more exposure to online risks, making it challenging to increase the former without increasing the latter. Access and digital skills are key to ensure that children and young people enhance their prospects, however, stakeholders must collaborate effectively to protect them from online risks and harm.

As the digital environment becomes more complex, children and young people need to critically understand the digital world in which they are increasingly immersed. Many initiatives are underway to support and enhance digital learning and engagement. Online learning platforms can provide opportunities for children and young people to learn and develop new skills in many areas.

Improving evidence on access, use, skills and outcomes of children and young people will require international cooperation to ensure comparable definitions and measures and establish benchmarks enabling us to measure progress, examine problems and identify good practice.

Chapter 10: Measuring meaningful connectivity: The case for more and better statistics

Data are vital to universal and meaningful digital connectivity. While data volumes have grown

exponentially, for many countries reliable statistics on digital connectivity remain surprisingly scant.

To assess progress, data on the deployment and uptake of digital technologies are essential. ITU collects, analyses and disseminates statistics from administrative sources and household surveys conducted by national statistical offices. While much progress has been made in recent years, large data gaps remain, especially on indicators collected from household surveys. These gaps are symptomatic of wider data gaps elsewhere. Unequal development has disadvantaged lower-income countries, which lack the infrastructure, the financial resources, and the skills necessary to produce data and subsequently extract value from them.

Big data, driven by data harvested by technology companies, has attracted much attention and sparked interest in a range of subjects owing to the timeliness and volume of such data. Many organizations, including ITU, are leveraging the potential of big data, particularly from mobile networks and open-source data from social media, crowdsourcing platforms, and online search engines. ITU has devised methodologies for using big data to complement traditional ICT statistics and has carried out pilot projects in several countries. Progress to date is promising, with guidelines prepared on how mobile phone data can be used to measure the information society.

Closing the data gaps is crucial for closing the digital divides and achieving universal connectivity. More and better data are needed to understand and remove the barriers to meaningful connectivity, especially for the marginalized people who are still offline. Data cultures, funding and improving the collection, processing and use of data are integral to development.

For further information, visit https://www.itu.int/gcr2022

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International Telecommunication Union
Place des Nations, CH-1211 Geneva Switzerland