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Connecting humanity action blueprint

Advancing sustainable, affordable and innovative solutions

September 2025

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Foreword

When the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) were adopted in 2015, just over half of the world's population was using the Internet.

The other half remained offline.

Five years later, a landmark study assessed the investment needed to bring affordable broadband to everyone, everywhere, by 2030.

Developed by the International Telecommunication Union (ITU) with the support of the Kingdom of Saudi Arabia, *Connecting Humanity* offered the first comprehensive global estimate of what it would cost to close the digital divide.

Since then, the digital landscape has undergone dramatic shifts, including a global pandemic and the emergence of transformative technologies like artificial intelligence.

But the digital divide persists.

More people are connected than ever before, and yet one-third of humanity – 2.6 billion people – remain offline.

Infrastructure is still a challenge, particularly in remote and rural areas of the world.

And gaps in affordability, skills and policy are raising pressing questions about how to make connectivity not only accessible, but truly meaningful.

What kind of infrastructure is needed to bridge the last-mile?

Which regulatory frameworks are needed in what context?

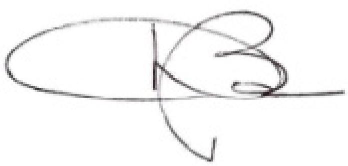
How do we ensure people have the skills to benefit from connectivity?

The *Connecting Humanity Action Blueprint* provides a fresh assessment of where we stand in 2025 – the year ITU turns 160 – and what it will take to move forward.

Most importantly, it underscores the need for sustained partnerships – because no single actor can bridge the digital divide alone.

Connecting everyone in a meaningful way requires collaborative action from governments, industry, development finance institutions, the technical community and civil society.

On the road to 2030, I hope that this Blueprint can guide us in ensuring everyone, everywhere, benefits from the opportunities of an increasingly digital world.



Doreen Bogdan-Martin
Secretary-General
International Telecommunication Union

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Abbreviations and acronyms

Acronyms	Definitions
AI	Artificial Intelligence
APNIC	Asia Pacific Network Information Centre
APC	Association for Progressive Communications
BDT	ITU Telecommunication Development Bureau
BEAD	Broadband Equity, Access and Deployment programme
BSNL	Bharat Sanchar Nigam Limited
CapEx	Capital Expenditure
CIS	Commonwealth of Independent States
CAI	Community Anchor Institution
CSR	Corporate Social Responsibility
CST	Communications, Space and Technology Commission
DC	Data Centre
DFI	Development Finance Institution
DIII	Digital Infrastructure Investment Initiative
ESG	Environmental, Social and Governance
FBA	Fiber Broadband Association
FCC	Federal Communications Commission
FCF	Free Cash Flow
FDI	Foreign Direct Investment
FWA	Fixed Wireless Access
GB	Gigabyte
GDP	Gross Domestic Product
GEO	Geostationary Earth Orbit
G20	Group of Twenty
GNI	Gross National Income
GSMA	GSM Association
GW	Gigawatt

(continued)

Acronyms	Definitions
HETA	Healthcare Electrification and Telecommunications Global Development Alliance
HIC	High Income Country
HP	Hewlett-Packard
ICT	Information and Communication Technology
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
ISP	Internet Service Provider
ISOC	Internet Society
IXP	Internet Exchange Point
Kb/s	Kilobit per second
km	Kilometre
KPI	Key Performance Indicator
LDC	Least Developed Country
LEO	Low Earth Orbit
LIC	Low Income Country
LLDC	Landlocked Developing Country
LMIC	Lower-Middle Income Country
LTE	Long-Term Evolution
Mb/s	Megabit per second
MCMC	Malaysian Communications and Multimedia Commission
MCIT	Ministry of Communications and Information Technology
MEO	Medium Earth Orbit
MHz	Megahertz
MNO	Mobile Network Operator
MSP	Multistakeholder Partnership
MWs	Megawatts
NGSO	Non-Geostationary Satellite Orbit
OECD	Organization for Economic Cooperation and Development
OpEx	Operational Expenditure
PPP	Public-Private Partnership

(continued)

Acronyms	Definitions
SDG	Sustainable Development Goal
SIM	Subscriber Identity Module
SIDS	Small Island Developing State(s)
SMS	Short Message Service
STEM	Science, Technology, Engineering & Mathematics
UAS	Universal Access and Service
UMIC	Upper-Middle Income Countries
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	United States Dollar
VAT	Value-Added Tax
W	Watt
WHO	World Health Organization
4G	Fourth Generation

Introduction and overview

In 2020, under the direction of the G20 during the presidency of the Kingdom of Saudi Arabia, the International Telecommunication Union (ITU) published the *Connecting Humanity by 2030* report,[1] establishing the goal of achieving universal, affordable broadband connectivity for all of humanity by the end of this decade. At that time, approximately three billion people remained unconnected to the Internet.

For countries, rapid and reliable Internet connectivity can spur innovation, open up new sectors of economic activity, upgrade the digital capabilities of the workforce, and empower citizens to access new knowledge, skills and tools. For individuals, Internet connectivity is increasingly indispensable for accessing basic government services such as healthcare and education, participating in the economy, socializing with friends and family and engaging with entertainment.

Many different stakeholders are working to close the digital divide. Under both the Brazil (2024) and South Africa (2025) G20 presidencies, the concept of achieving universal, meaningful connectivity has continued to advance and be seen as a global priority. Innovative business models are being pursued that enable commercially sustainable deployment of connectivity infrastructure and services in unserved communities at lower prices. Advancements in technology enable users living in even the most remote areas to access reliable mobile and fixed broadband services. Governments have adopted new policy and regulatory approaches in the digital sector that are designed to foster expansion in broadband availability, subscription and use. Stakeholders (including the ITU) are focusing on measuring Information and Communication Technology (ICT) and digital skills with the aim of closing the digital skills gap. These developments make universal, meaningful connectivity more achievable than ever before.

Despite this innovation and effort, global progress towards universal, meaningful connectivity has been slow and remains off-target to meet the 2030 goal of achieving affordable broadband connectivity for all. Since the publication of the first Connecting Humanity report in 2020, an additional 400 million people are now online, shrinking the connectivity gap to 2.6 billion in 2024. This is praiseworthy but insufficient, particularly as more and more countries continue to emphasize the importance of digital transformation to achieve broader economic, health and educational goals. Indeed, progress in closing the digital divide now seems to be slowing after a temporary boost driven by the COVID-19 pandemic. Moreover, innovative new technologies like multi-gigabit fibre, 5G and artificial intelligence (AI) are being deployed extensively in more advanced markets, further widening gaps between the digital "haves" and "have-nots."

Achieving and sustaining universal, meaningful Internet connectivity will require a collaborative, multipronged effort across stakeholders and designing systemic interventions that not only achieve progress in the short term, but ensure new divides are not created in the long-term. It will involve an ongoing cycle of setting goals, identifying and working to address gaps, and then measuring progress to identify successes and new regions, barriers, or projects to prioritize.

1 https://www.itu.int/hub/publication/d-gen-invest-con-2020/

This report is divided into two parts. Part I establishes the scope of the problem that stakeholders are working to address by:

1. Identifying the current targets for achieving universal, meaningful connectivity and describing the current conditions relative to these targets.
2. Outlining the key gaps – infrastructure, affordability, digital skills, and policy and regulation – and estimating the costs to close them.

Part II focuses on supporting stakeholder efforts to overcome barriers and close gaps by:

1. Providing recommendations on how to establish successful and sustainable multistakeholder and public-private partnerships.
2. Presenting case studies to identify strategies that countries and international organizations have used to make meaningful progress towards achieving universal, meaningful Internet connectivity that can be tailored to other countries' specific needs or replicated in local contexts.
3. Providing examples of creative and inspirational "Digital Inclusion Transformative Projects" that can be launched through multistakeholder partnerships and make significant progress in achieving global or regional connectivity.
4. Identifying mechanisms for monitoring and assessment to track global progress towards universal, meaningful connectivity that can be used at the global, national or sub-national level.

Closing the digital divide is challenging, but targeted and sustained intervention from all stakeholders can achieve universal, meaningful Internet connectivity. This report aims to support these efforts.

Part I: Overview of the Global Digital Divide

Part I of this report provides a detailed analysis of goals, gaps and costs for closing the global digital divide. It includes an assessment of the current state relative to goals (as they are established in the ITU's aspirational targets)[2] and estimates the costs to achieve universal, meaningful connectivity.

A. Assessing the Current State

Before attempting to quantify the cost of closing the digital divide, it is essential to understand the current state of Internet connectivity and access around the globe. Which barriers to connectivity are people experiencing? How do they vary across different countries or regions? This report assesses the state of broadband availability and adoption, as well as the different barriers to universal, meaningful connectivity – in terms of affordability of service and devices, acquisition of digital skills and gender parity.

As global policy-makers work to close the digital divide, it is essential that as many countries as possible regularly collect highly-granular data on broadband availability and adoption. All countries are encouraged to fully respond to data collection efforts by the ITU and other trusted international organizations. More complete data helps governments, the private sector, civil society and other stakeholders better understand where and how to effectively target policy interventions and investment towards universal, meaningful Internet connectivity.

To support stakeholders in understanding the gaps between the current state and achieving universal, meaningful Internet connectivity, the ITU, in partnership with the Office of the UN Secretary-General's Envoy on Technology, established aspirational targets for 2030. These include universality, technology and affordability targets for achieving universal, meaningful digital connectivity.

1. Aspirational Targets

Closing the digital divide requires effectively addressing the full range of barriers that hinder digital access and use across the population. These barriers can be divided into two categories:

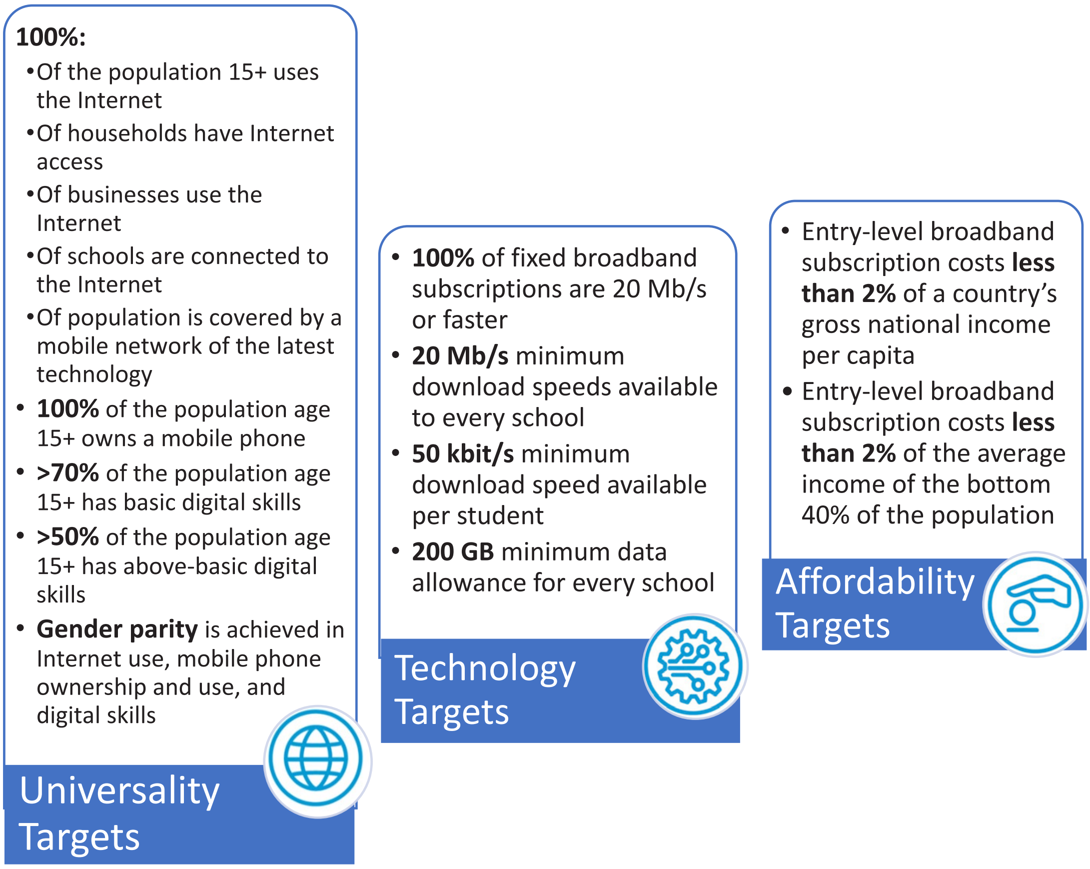
- **Availability barriers** – Whether or not someone lives in an area where broadband infrastructure and services are available to them at specified viable speeds, encompassing supply-side factors; and

[2] As part of the implementation of the UN Secretary-General's Roadmap for Digital Cooperation, the ITU, the Office of the UN Secretary-General's Envoy on Technology and their partners, have established a set of Aspirational Targets for 2030 to help prioritize interventions, monitor progress, evaluate policy effectiveness, and galvanize efforts around achieving universal and meaningful connectivity by the end of the decade.

- **Adoption barriers** – The factors that encompass demand and prevent people from subscribing to fixed and mobile broadband services and using digital services when they are available to them. These can include affordability of service, device access and affordability, lack of digital and online safety skills, and a lack of understanding of the benefits of Internet access.

The ITU's updated aspirational targets for 2030, shown in the Figure below, address both availability and adoption barriers to achieve universal, meaningful digital connectivity.

Figure 1: ITU's updated aspirational targets



Source: ITU[3]

Progress towards achieving these targets has been relatively slow, particularly in least developed countries (LDCs), where projects are hampered by a lack of available financing for backbone deployment, as well as last-mile, fixed and mobile broadband networks; underdeveloped capital markets and currency challenges; a workforce that lacks sufficient technical expertise in deploying and maintaining broadband networks; and unreliable complementary infrastructure (*e.g.*, power grid, road system, etc.). In LDCs, the economics of broadband service, particularly in areas of lower population density, also remain challenging because of the relatively low incomes of the population. This has resulted in slower progress towards achieving some of the aspirational targets, particularly in countries and regions where the digital divide is the largest. It will be critical that policy-makers continue to evolve their connectivity programmes to keep

3 International Telecommunication Union. "Aspirational targets for 2030." April 2022. Available at: https://www.itu.int/itu-d/meetings/statistics/umc2030/.

them up-to-date. The aspirational targets reflect the present baseline needs of most consumers and, if met, will bring about a significantly more equitable global broadband ecosystem.

New technologies and the potential for emerging divides

Internet connectivity and digital services are rapidly evolving. New technologies are being developed and deployed that have the potential to cause paradigm shifts in the way that people work, access information and use Internet-based services.

- AI and Machine Learning applications have the potential to impact almost every aspect of life, from how people use Internet search platforms to how they access healthcare and education and perform job functions.
- Quantum Computing has the potential to completely revolutionize large-scale data processing, improve the quality of economic and financial models, allow for real-time traffic optimization, improve the training for AI learning models, and has extensive scientific applications that could facilitate previously impossible discoveries.

Both of these technologies can offer enormous benefits to populations where they become available if the countries, residents, businesses and connectivity infrastructure are able to support their widespread deployment and harness those benefits. High income countries (HICs) are significantly better positioned to adopt AI and make full use of the promise of the technology. In fact, AI is already being widely used and deployed in high-income countries around the world, but is not being used as extensively, even by many businesses, in low-income countries. In fact, many countries lack sufficient connectivity infrastructure to support AI proliferation, even if there is demand from the population. This makes it even more essential to close global connectivity gaps quickly, and to close them in a way that plans for the widespread adoption of these innovative technologies (which will require the deployment of more robust technologies like fibre). Transformative applications of connectivity are being deployed that will benefit countries, businesses, individuals and communities in comparison to those not taking advantage of them and fueling further innovation. Countries without the connectivity infrastructure to support these applications risk falling further behind and missing out on the benefits of these applications, creating wider economic, social, health and financial gaps between high- and low-income countries.

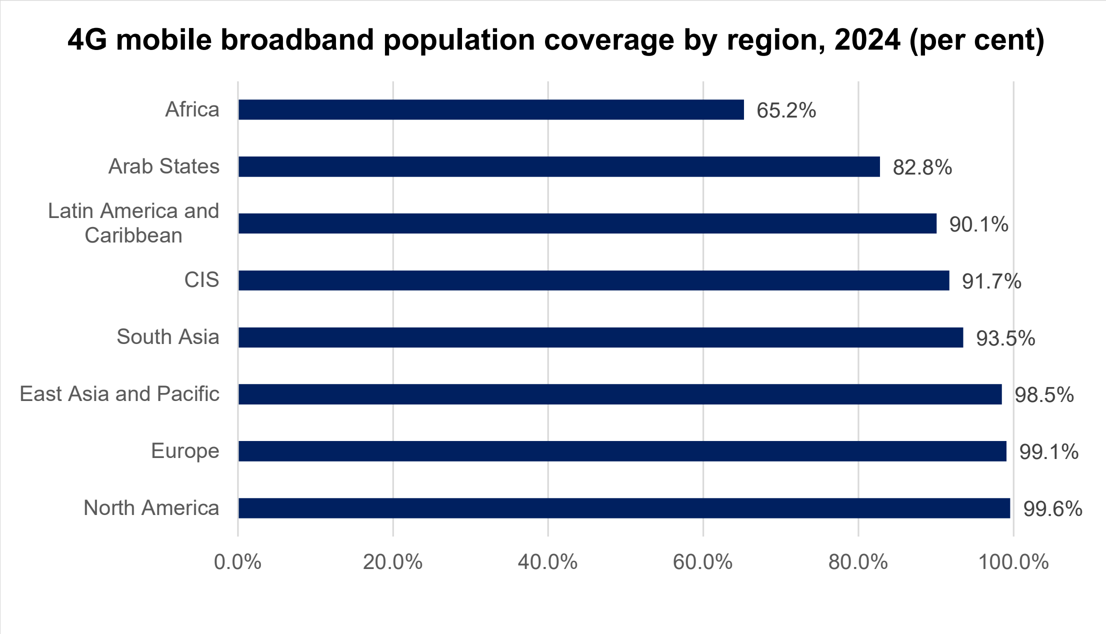
The aspirational targets identify the components that make up the digital divide and reflect the target state when universal, meaningful Internet connectivity is achieved. The next section describes the current state of broadband availability and adoption, relative to the aspirational targets for: broadband availability, broadband adoption and use, device ownership, broadband affordability, digital skills and gender parity.

2. Availability

a) Broadband Infrastructure Availability

The state of broadband availability varies significantly, depending on location and whether mobile or fixed broadband connectivity is examined. Considering mobile broadband, global coverage is becoming more ubiquitous. Overall, 91.7 per cent of the world's population lives in areas covered by a Long-Term Evolution (LTE) Fourth Generation (4G) network. The total global population lacking 4G coverage is approximately 680 million.[4] The Figure below shows the population under 4G network coverage (which is capable of delivering the 20 Mb/s speed aspirational target listed above) at the end of 2024.[5]

Figure 2: 4G mobile broadband population coverage



Source: ITU based on data from GSM Association (GSMA)[6]

The proportion of the population living under coverage of a 4G network varies significantly depending on the level of economic development. Additionally, regions with large rural populations (such as sub-Saharan Africa, for example) face larger 4G coverage and capacity gaps. The average marginal cost of deploying telecommunication networks rises as population density declines. Deploying 4G networks requires significant capital expenditure (CapEx), as well as ongoing network maintenance and operational expenditure (OpEx). The limited number of potential customers in rural areas can make it difficult for providers to recoup costs and be profitable. This is particularly true in regions with lower average incomes, where potential customers are unlikely to produce high monthly recurring revenues.

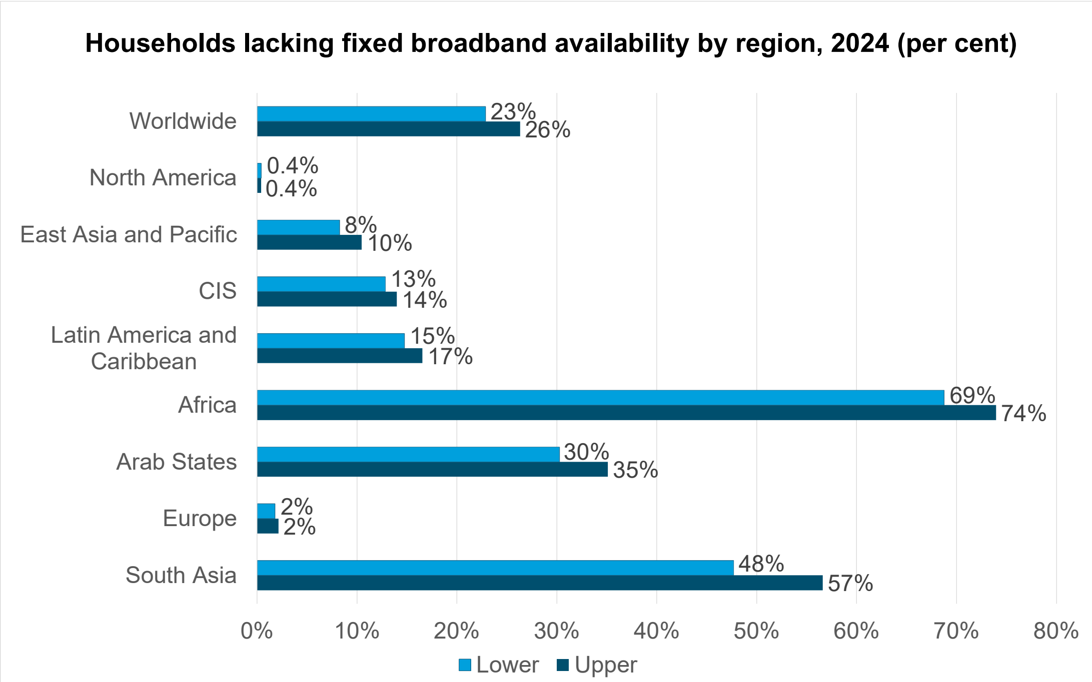
4 Calculated using 2024 estimate. United Nations Department of Economic and Social Affairs Population Division. "World Population Prospects 2024." 2024. Available at: https://population.un.org/wpp/. Accessed April 7, 2025.

5 For purposes of this report, the Southeast Asian countries are included in the East Asia and Pacific region. For a full list of countries by region, see the Appendix.

6 GSMA. "State of Mobile Broadband Connectivity." 2024. Available at: https://www.gsma.com/r/somic/. Accessed April 7, 2025.

The fixed broadband availability gap is much larger. According to the estimate developed for this report, approximately 74-77 per cent of households worldwide have access to fixed broadband networks capable of delivering speeds of at least 20 Mb/s.[7] The total global population lacking access to fixed broadband networks is between 498 million and 574 million households, or between 2.3 and 2.6 billion people worldwide. This estimate reflects the fixed wired technology coverage gap[8] in urban areas and the 4G fixed wireless gap in rural areas, reflecting the different types of technologies used to deploy fixed broadband service in areas with different population densities. The Figure below shows the fixed broadband availability gap overall and by region, as a percentage of the population. In terms of fixed broadband, Africa, South Asia and the Arab States face the largest availability gaps.

Figure 3: Percentage of households lacking fixed broadband availability



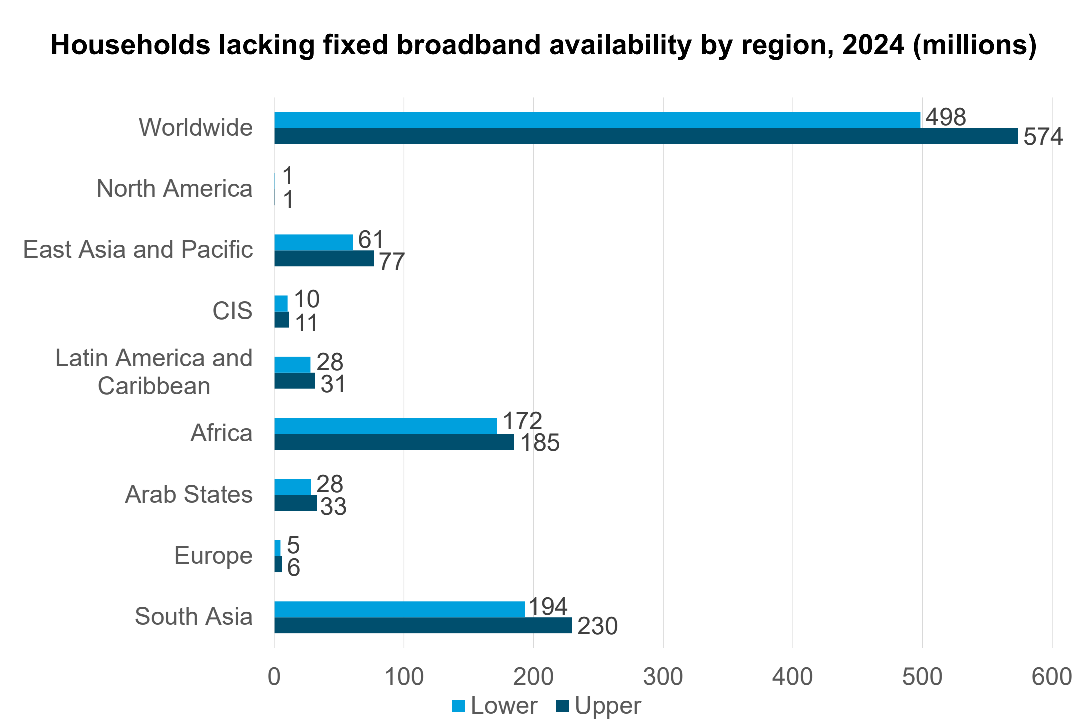
Source: ITU, leveraging population data from WorldPop, geospatial data on fibre node locations from the ITU, and 2024 ITU data on fixed broadband subscriptions

The regional breakdown shifts slightly when considering the total number of households to be connected in each region. The Figure below shows the breakdown of the fixed broadband availability gap in terms of the number of households per region that are unserved. While Africa faces the largest gap in terms of percentage of the population, South Asia faces the largest gap in terms of the total number of households that remain out of reach of fixed broadband service. East Asia and Pacific, which faces a much smaller gap in terms of the percentage of the population, faces the third largest connectivity gap in terms of number of households (more than double the number of unconnected households in the Arab States).

[7] Fixed broadband availability is more difficult to measure, given that many countries do not report fixed broadband infrastructure availability or speed data. Using internal ITU data on fibre availability, combined with 4G network availability data in rural areas and data on fixed broadband subscription rates, the report leverages a model to estimate the current fixed broadband availability gap. To account for the lack of precision, the model includes a range to describe the availability of fixed broadband service.

[8] The fixed wired technology coverage gap in urban areas is measured by assessing the current availability of fibre, cable, and V-DSL—all technologies capable of delivering 20 Mb/s speeds.

Figure 4: Number of households lacking fixed broadband availability



Source: ITU, leveraging population data from WorldPop, geospatial data on fibre node locations from the ITU, and 2024 ITU data on fixed broadband subscriptions

The global fixed broadband gap is significantly larger than the global mobile broadband gap and varies significantly by region.

3. Adoption

Global fixed and mobile broadband adoption rates also vary significantly, both by technology and by region. As is the case with broadband availability, mobile broadband subscription rates are much higher than fixed broadband subscription rates, overall and in low income countries (LICs) and lower-middle income countries (LMICs).[9] Overall, 37 per cent of the world's population lives under coverage but does not have a mobile broadband subscription.[10] The Figure below shows the subscription rate for mobile broadband by region.[11]

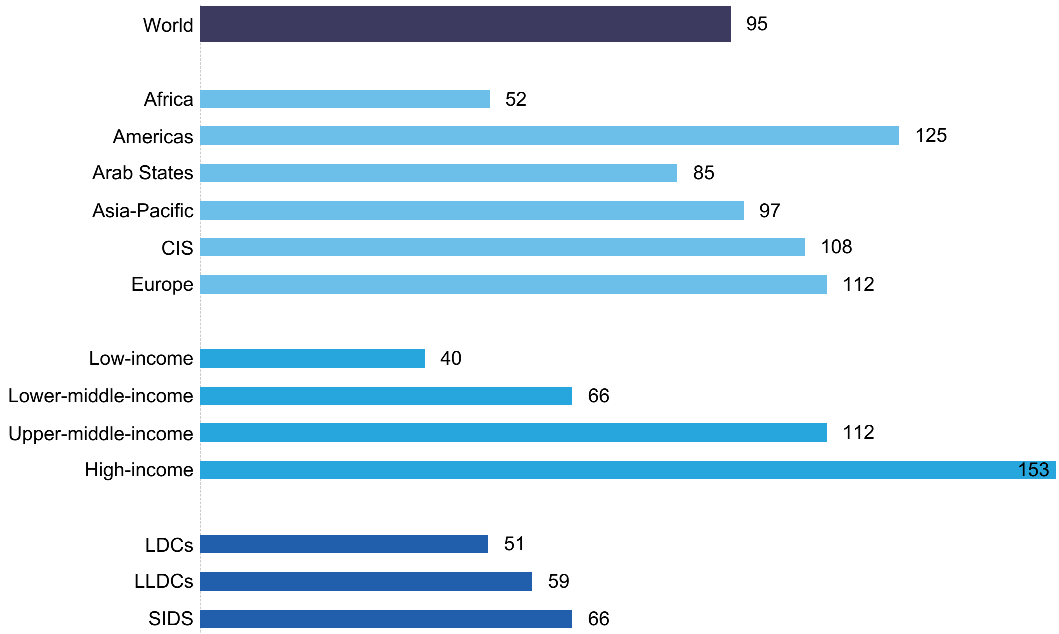
9 It is important to note that the prevalence of multiple SIM cards and subscriptions, particularly in high-income countries, where it may be common for single individuals to hold multiple mobile broadband subscriptions (*e.g.*, a personal hotspot, a personal smartphone, a smartphone for business), can inflate global averages and obscure divides.

10 GSMA. "State of Mobile Broadband Connectivity." 2024. Available at: https://www.gsma.com/r/somic/. Accessed April 7, 2025.

11 The available data does not distinguish subscriptions between 3G, 4G, and 5G. While valuable, 3G connections are not sufficient to deem these individuals served with broadband. Subscription rates to mobile broadband service capable of 20 Mb/s speeds are likely lower than what is reported.

Figure 5: Mobile broadband subscription rates

Active mobile-broadband subscriptions per 100 inhabitants, by region, 2024



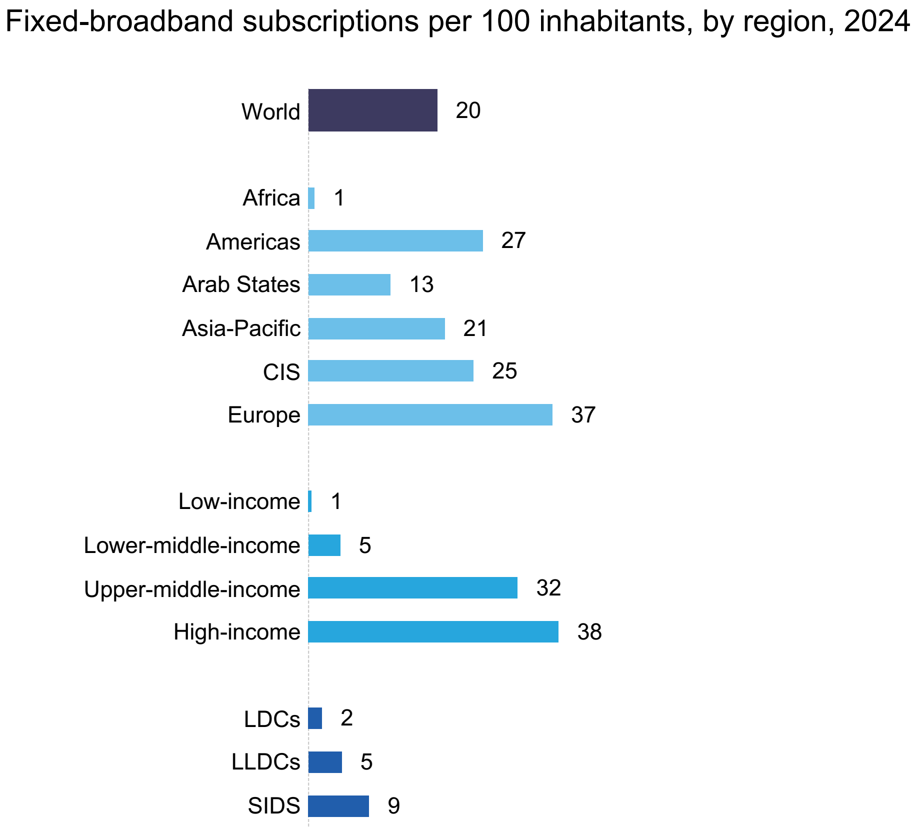
Source: ITU Facts and Figures 2024[12]

Differences in subscription rates by region also tie back to income and level of development, as well as perceptions of relevance. Low-income countries and LDCs have the lowest mobile broadband subscription rates, and Africa, the region with the lowest average income and largest number of LDCs, has the lowest levels of subscription by region. Additionally, subscription rates in some areas may be lower because people may not see a use for broadband Internet in their daily life. This is particularly the case in low-income, rural, remote and previously unconnected areas, where people may have lived their whole lives without accessing the Internet. People with limited budgets have to decide how best to allocate limited resources and may view broadband service as less critical than other expenses.

The Figure below shows the subscription rate for fixed broadband by region.

[12] International Telecommunication Union. "Facts and Figures 2024." November 2024. Available at: https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/. Accessed April 7, 2025.

Figure 6: Fixed broadband subscription rates



Source: ITU Facts and Figures 2024[13]

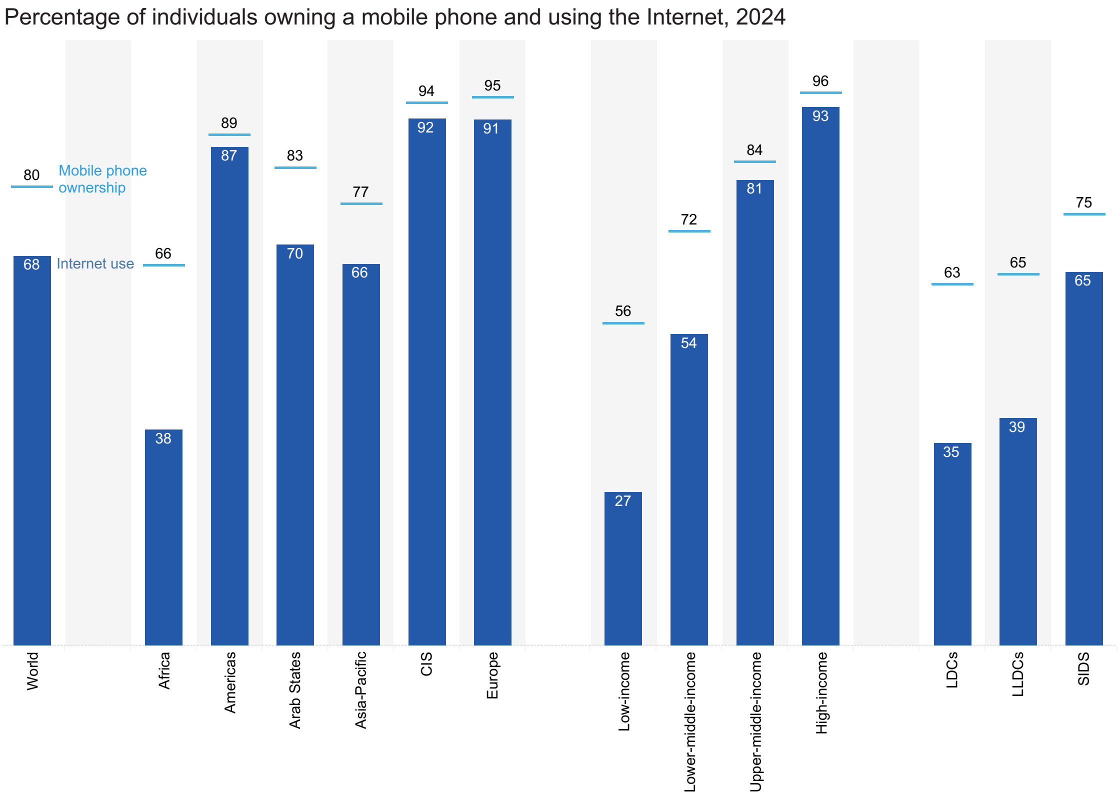
The same factors that explain regional differences in mobile subscription rates – income, level of development and perception of relevance – also explain regional differences in fixed broadband subscription. Several factors explain the differences within regions of subscription rates for mobile versus fixed broadband, namely: the fact that fixed broadband service is purchased at a household level, while mobile broadband subscriptions are purchased at the individual level; the lack of fixed broadband infrastructure, particularly in lower-income and rural areas; and the perception that mobile broadband is sufficient for individuals' usage needs. In addition, mobile broadband subscriptions can be used both at home and on the go. Fixed broadband subscriptions are location-dependent and may prove cost prohibitive for individuals who cannot afford the larger and often unlimited data packages. While some innovation is happening among providers and households to share costs across multiple users and reduce the cost of fixed broadband subscriptions, some consumers with limited budgets may still consider mobile broadband to be largely adequate for their needs.

[13] *Ibid.*

Device Access

A good general proxy for measuring access to devices is mobile phone ownership.[14] The majority of the world's population over the age of 10 owns a mobile phone – a significantly higher percentage than those who say they use the Internet regularly. The Figure below shows mobile phone ownership compared to Internet use by region.

Figure 7: Percentage of individuals (10+) owning a mobile phone and using the Internet by region



Source: ITU Facts and Figures 2024[15]

There is variability by region, both in terms of the overall mobile phone ownership rate and of the delta between mobile phone ownership and Internet use. Regional variability in phone ownership is largely a product of demographic differences and income. Low-income individuals who cannot afford a mobile phone will simply live without one or share access to a phone (*e.g.*, within a family or household). Different communities may differ in their perception of the relevance of broadband among the population, which could further explain these differences. If people have lived without a mobile phone for a significant portion of their life, they may feel that the cost of a mobile phone, and in particular a smartphone, exceed the benefits. This may be true of low-income, rural and previously unserved areas, and for older populations.

14 This does not distinguish between smartphone and non-smartphone ownership. Additionally, not all smartphones are able to reliably provide high-quality service at the desired speeds. Particularly in LDCs, some individuals in possession of smartphones may be using antiquated or recycled models which cannot connect to 4G networks. Therefore, the percentage of people who own smartphones capable of delivering 20 Mb/s speeds is likely lower than overall mobile phone ownership.

15 International Telecommunication Union. "Facts and Figures 2024." November 2024. Available at: https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/. Accessed April 7, 2025.

Of all mobile phones worldwide, the majority (54 per cent) are smartphones.[16] However, as with mobile phone ownership, there is significant variability by region in terms of the ownership of smartphones versus non-smartphone mobile phones. Differences between levels of mobile phone ownership and Internet use indicate that, in areas where that gap is larger, more non-smartphones are being used. The Americas, the Commonwealth of Independent States (CIS) and Europe each have a very small gap between mobile phone ownership and Internet use, possibly suggesting that most phones are likely to be smartphones. The significant delta between mobile phone ownership and Internet use in Africa, as well as in low-income countries and LDCs in general, indicates a much lower rate of smartphone ownership among the population. This is also explained by income, as standard mobile feature-phones cost significantly less than smartphones. Taken together, this indicates that a significant barrier to mobile phone (and in particular smartphone) ownership might be the affordability of devices, alongside other factors such as ease of use, need, perceived relevance, user literacy rates, and lack of digital skills to meaningfully use devices.

4. Affordability

With the exception of a brief period of increased broadband costs during the pandemic, likely due to unprecedented demand for service, as well as inflation and supply chain challenges, overall, the cost of both fixed and mobile broadband service has been trending down worldwide since 2018.[17] Affordability indexes the cost of services relative to average income of consumers. From this analysis, despite declines in prices, affordability gaps still persist.

Affordability varies significantly by technology. Mobile data packages of 10 Gigabytes (GB), which would provide sufficient data to meet the needs of the average Internet user, remain unaffordable to nearly 40 per cent of the population worldwide. The largest affordability gap is in Africa, where less than four per cent of the population can afford a 10 GB mobile data package. Fixed broadband, by contrast, is affordable for most consumers worldwide, and in most regions, in part due to the fact that fixed connection costs are shared with all members of a household.[18] The Figure below shows monthly mobile and fixed broadband subscription costs by region relative to the ITU and Broadband Commission affordability target of two per cent of average national income.[19]

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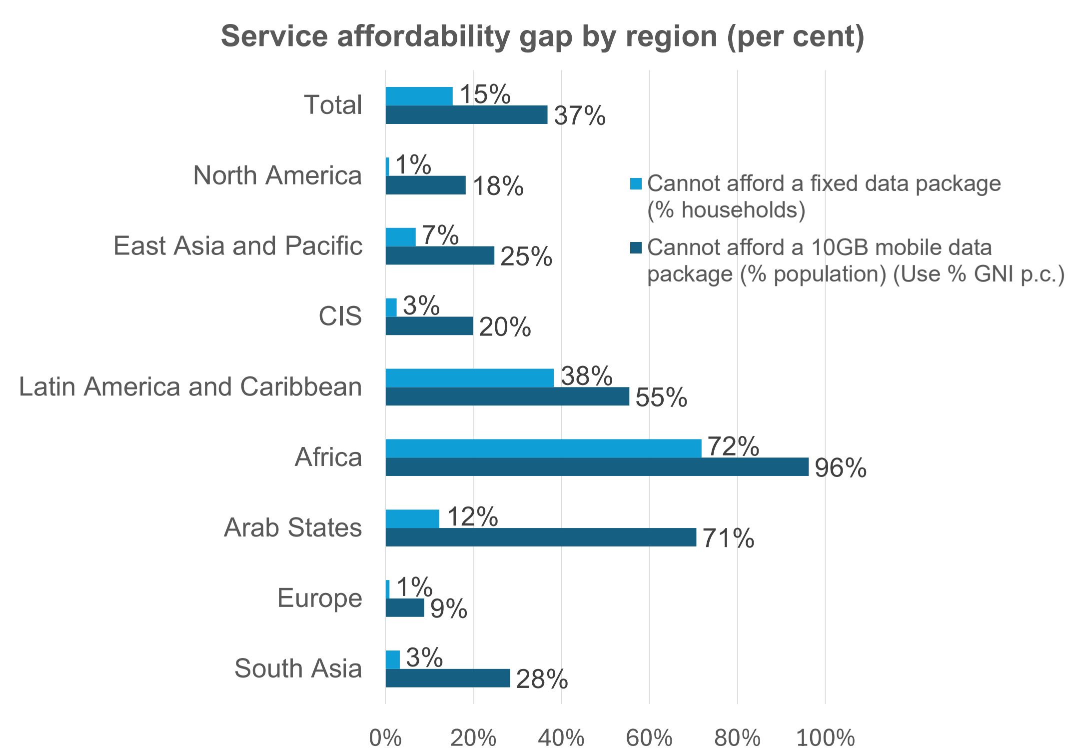
16 GSMA. "Smartphone owners are now the global majority, New GSMA report reveals." October 2023. Available at: https://www.gsma.com/newsroom/press-release/smartphone-owners-are-now-the-global-majority-new-gsma-report-reveals/. Accessed April 7, 2025.

17 Broadband Commission for Sustainable Development. "The State of Broadband 2024." June 2024. Available: https://www.broadbandcommission.org/publication/state-of-broadband-2024/. Accessed April 7, 2025.

18 In order to develop a globally consistent estimate, it was important to use the data that is most recent and most widely available in number of countries reporting. This data is only available for entry-level service, which is defined as a fixed service achieving greater than or equal to 256 Kb/s made available by the largest operator in the country. This falls far short of the aspirational target of 20 Mb/s speeds. If data was available for affordability levels for a 20 Mb/s level of fixed service, the cost to close the affordability gap would likely be substantially higher.

19 The report focuses on affordability of service for the overall population. However, there are aspirational targets also related to the affordability of service for the bottom 40 per cent of earners. Additional analysis of the current state of affordability for the bottom 40 per cent of earners is available in the Appendix.

Figure 8: Broadband service affordability gap



Source: ITU, leveraging ITU data on broadband service package affordability[20] [21]

Progress improving mobile and fixed broadband service affordability to meet the two per cent target is mixed. On the mobile side, operators are moving quickly to close this gap – 11 more countries achieved this target for mobile broadband in 2023 than did in 2022, a jump of almost 10 per cent in the number of countries.[22] Reductions in fixed broadband prices (in terms of new countries meeting the two per cent target) are happening at a slower rate than reductions in mobile broadband service costs.[23]

5. Digital Skills

Digital skills are vital to enable people to access the Internet safely and securely, and to make the most of online opportunities and knowledge. Digital skills are likely to prove ever more important in the future, as more day-to-day activities shift online, from transferring money and remittances to filling out tax returns and insurance claims and submitting job applications. However, it is difficult to quantify the current state of digital skills in many countries, due to severe limitations in the data available. Only 90 countries have submitted some digital skills data to the ITU, and only 40 countries have submitted comparable data on which this report can base an analysis.

[20] International Telecommunication Union DataHub. "Affordability Data – Broadband Service Packages" 2024. Available at: https://datahub.itu.int/data/?Affordability=ICT+prices. Accessed April 7, 2025.

[21] North America and Europe both appear to face significant affordability barriers for 10 GB mobile service plans. However, this is explained at least in part by the fact that North American and European mobile operators generally do not offer per GB mobile data packages. Consumers in these regions generally pay a monthly subscription fee for unlimited data.

[22] *Ibid.*

[23] Broadband Commission for Sustainable Development. "The State of Broadband 2024: Leveraging AI for Universal Connectivity (Part 1)." June 2024. Available at: https://www.broadbandcommission.org/publication/state-of-broadband-2024/. Accessed April 7, 2025.

The ITU and external research have identified trends in digital skill levels that can help to explain variability between regions and countries. This research indicates that education-levels and country income correlate with digital skills – lower education levels and lower incomes correspond with lower levels of digital skills, and vice versa.[24] [25] Countries and regions with higher incomes also see higher digital skill levels, though reported digital skills data indicates that the percentage of the population that has basic digital skills is substantially lower than the overall population using the Internet – meaning that many people may be using the Internet without having the skills to use it safely or to leverage a diverse range of online applications.[26]

6. Gender Parity

Gender parity in access to broadband is essential, as the Internet offers a gateway to social engagement and economic opportunities. Without sufficient policy attention, Internet access might become yet another means by which the interests, opportunities and skills of men and boys can be promoted and enhanced, while discriminating against women and girls and holding them back from accessing opportunities and fulfilling their educational or economic potential.

Overall, gender parity in Internet use is an area in which certain regions have performed better than others. While some regions have achieved gender parity in Internet use (with one region, the Americas, actually reporting slightly higher rates of Internet use by women than men), others continue to face significant gender gaps. Discouragingly, the global gap in broadband use between men and women has actually widened by three per cent between 2019 – 2024.[27] While differences in Internet use by gender are not as large in Europe and CIS, or in upper-middle income countries (UMICs) and HICs, there are significant differences in Africa and South Asia, as well as in LICs and LMICs. The Figure below shows a comparison between rates of men versus women using the Internet in 2024, by region. One important caveat is that a regional analysis can obscure significant differences between countries within the same region. For example, South Asia's significant gender gap in terms of Internet use is masked by better gender parity in other parts of the Asia-Pacific region.

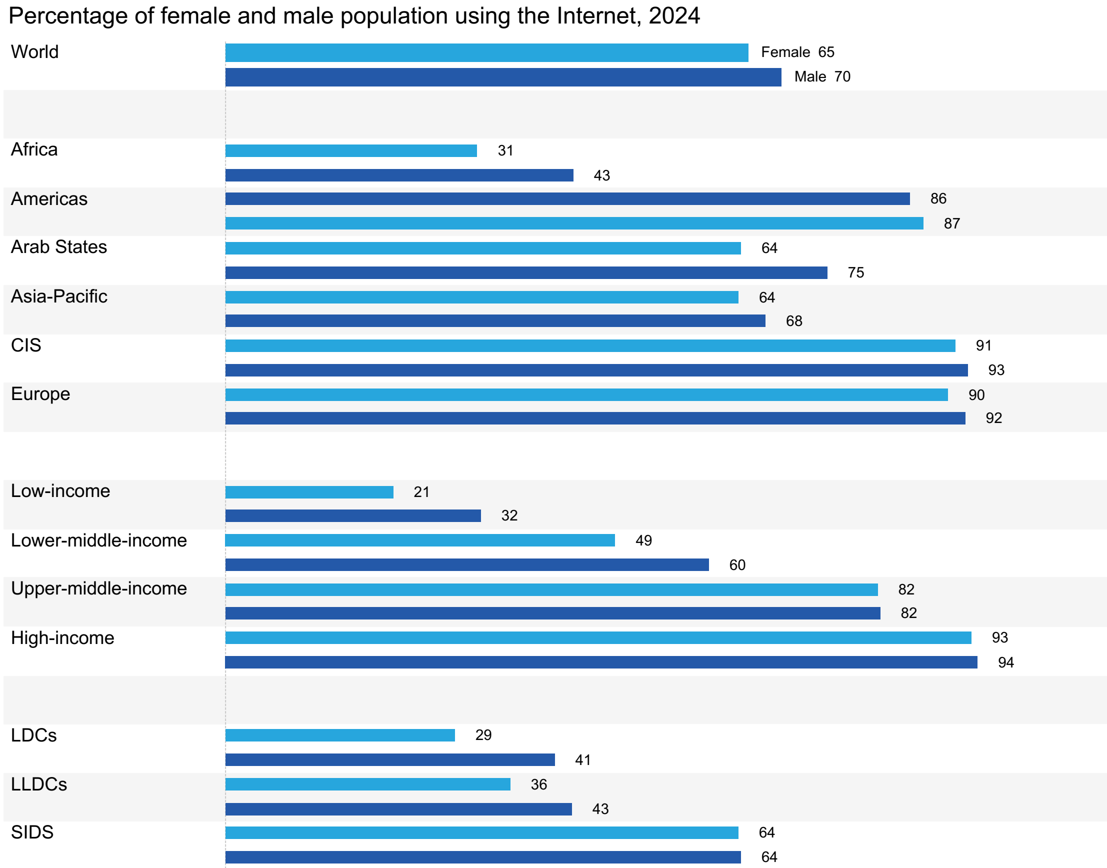
[24] Marija Antonijević et al. "Is There a Relationship Between Country Development and Citizens' Level of Digital Skills?" 2023. Available at: https://www.ceeol.com/search/article-detail?id=1246848. Accessed April 7, 2025.

[25] Eurostat. "Digital skills in 2023: impact of education and age." February 2024. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240222-1. Accessed April 7, 2025.

[26] International Telecommunication Union. "The ITU digital SDG indicators." 2023. Available at: https://www.itu.int/en/ITU-D/Statistics/Pages/SDGs-ITU-digital-indicators.aspx#:~:text=Based%20on%20this%20limited%20dataset,prevalent%20(median%20of%2051). Accessed April 7, 2025.

[27] *Ibid.*

Figure 9: Percentage of population using the Internet by region and gender



Source: ITU Facts and Figures 2024[28]

Variations in gender parity by region are the result of several factors. First is existing Internet use. Gender parity is often weakest in the countries with the lowest levels of Internet use for the overall population.[29] This observation suggests that expanded Internet access in these countries will increase Internet use by both men and women, but that in those countries, more men and boys are venturing online sooner and earlier than most women and girls, who are generally coming online later. Cultural attitudes and gender norms, which vary substantially by country, can also contribute to this divide. Indeed, some studies have shown that, in certain countries, there is significant variability in Internet use and digital skills between men and women from the same household, indicating that men (fathers or brothers) are prioritized in terms of Internet access and use, relative to women and girls.[30]

B. Estimated Costs to Achieve Aspirational Targets

Having assessed the current state of connectivity and the outstanding gaps, this section estimates the size of the investments required to meet the 2030 aspirational targets – moving the world toward universal, meaningful Internet connectivity.

[28] International Telecommunication Union. "Facts and Figures 2024." November 2024. Available at: https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/. Accessed April 7, 2025.

[29] *Ibid.*

[30] United Nations Children's Fund. "Bridging the Gender Digital Divide: Challenges and an Urgent Call for Action for Equitable Digital Skills Development." 2023. Available at: https://data.unicef.org/resources/ictgenderdivide/. Accessed April 7, 2025.

The original Connecting Humanity report estimated the overall cost for closing the global digital divide at USD $428 billion, inclusive of: an infrastructure investment gap cost of USD $382 billion; a policy and regulatory gap cost of USD $6 billion; and a digital skills and training gap cost of USD $40 billion. This cost estimate was developed early in the COVID-19 pandemic, before its economic effects were fully understood and before inflation and supply chain issues had taken hold. It also does not reflect the updated target speed threshold of 20 Mb/s for meaningful connectivity, versus the 10 Mb/s target used in the original report.

Additionally, new technologies, such as terrestrial fixed wireless and satellite broadband, have advanced. These technologies enable Internet service providers (ISPs) to cost-effectively extend connectivity services to different types of locations and over greater geographic areas. Consideration of new technologies enables this new report to reflect the costs of reaching 100 per cent of households and individuals with broadband service, even those in the most rural and remote areas. Moreover, evolving use cases for broadband are necessitating higher transmission speeds and levels of capacity than were accounted for in the previous report (*e.g.*, digital financial services, digital authentication, medical imagery, interactive news feeds or trading platforms). These additional components are increasingly important to establish universal, meaningful connectivity and are also critical to the growth of advanced services like AI.

Additional components of the digital divide should also be reflected in the cost to close the gap, particularly the costs of: expanding data centre capacity; increasing the number of Internet exchange points (IXPs); reaching all users (including in the most remote regions) with broadband service; and ensuring that broadband service is affordable to average, as well as lower-income, residents (the service affordability gap).[31]

The estimate included in this report builds on the previous work of ITU by:

- **Providing an updated and more granular estimate of the cost to close the digital divide** by using updated costs that reflect how conditions have changed since 2020, and by leveraging sub-national geospatial data on infrastructure availability to provide more accurate estimates of the cost to connect specific locations.
- **Providing a more comprehensive estimate of the cost to close the digital divide**, including: deploying all critical types of network infrastructure; closing the global digital skills gap; closing the global affordability gap for mobile broadband service, fixed broadband service and smartphones; and modernizing policy and regulatory regimes to ensure that governments are setting their broadband sectors up for long-term success.

1. Methodology

As noted above, this report builds on the 2020 Connecting Humanity report authored under the Kingdom of Saudi Arabia's G20 presidency. The original report broke down the overall cost to close the global digital divide into three main categories: ensuring that broadband infrastructure is ubiquitously available (inclusive of last-mile and backbone infrastructure); ensuring that countries' policy and regulatory regimes can effectively support their broadband sectors; and ensuring that populations have the skills needed to meaningfully use their Internet connection.

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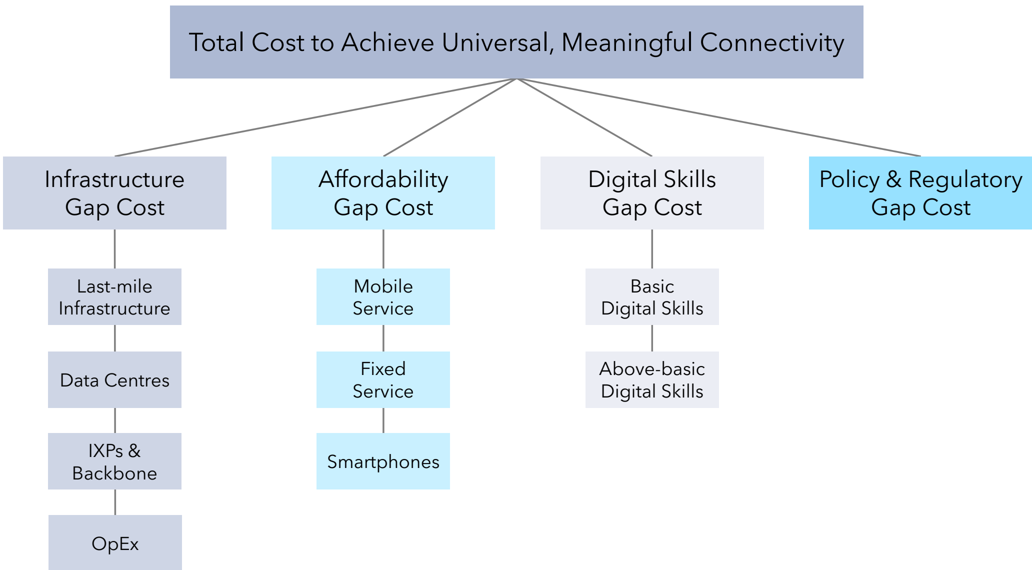
31 Since then, the ITU has continued to support research further refining the world's understanding of the digital divide and of the investments required to close it. In 2024, the ITU launched the Digital Infrastructure Investment Initiative (DIII) in collaboration with Brazil's G20 presidency and the development finance community to catalyze investments in digital infrastructure. As part of this effort, the initiative estimated the investment gap specifically for digital infrastructure (*i.e.*, closing the broadband availability gap), and identified creative innovative financing mechanisms that organizations could implement to close it.

This updated 2025 report reflects those same categories and includes the additional category of estimating the cost to close the affordability gap for broadband service and devices. Lack of affordability of service and devices is an enormous barrier to Internet adoption and use, and universal, meaningful Internet connectivity will not be achieved without ensuring service and device affordability. This report also uses sub-national data where available to provide a more granular estimate of the broadband infrastructure gap and reflects updated costs of labour and materials (which have changed significantly since the publication of the original report).[32]

Two of these categories (infrastructure and affordability) can be further broken down into related but independent sub-categories. Ensuring ubiquitous broadband infrastructure requires deployment of last-mile infrastructure,[33] backbone infrastructure,[34] data centres and, where applicable, IXPs. The affordability gap has three main subcomponents: mobile broadband service affordability, fixed broadband service affordability and Internet-capable smartphone affordability. In addition to developing methodologies for costing the policy and regulatory and digital skills gaps (for both basic and above-basic skills), calculating the estimated cost to achieve universal, meaningful Internet connectivity required developing methodologies for estimating the costs of addressing each of these subcomponent gaps. The Figure below shows how each of these subcomponents contributes to the overall cost estimate.

Figure 10: Cost estimate components



Source: ITU

32 For additional information on the key differences between the 2020 and 2025 reports, please see the Appendix.

33 The last mile refers to the portion of the Internet access connection that terminates at the end user's location (for fixed) or device (or mobile). Source: United States Department of Commerce National Telecommunications and Information Administration. "Broadband Equity, Access, and Deployment (BEAD) Program: Alternative Broadband Technology Policy Notice." December 2024. Available at: https://www.ntia.gov/sites/default/files/publications/ntia_bead_alternative_broadband_technology_policy_notice.pdf. Accessed April 7, 2025.

34 The term "backbone infrastructure" means any broadband infrastructure that does not connect directly to an end-user location (including fibre, fixed wireless, and satellite links).

The Table below provides an overview of the methodology used in this report for calculating each of the components of these four categories. Additional information on the methodology is available in the Appendix.

Table 1: Connectivity investment gap cost methodology

	Gap	Summary of Cost Methodology
INFRASTRUCTURE	Last-mile	Uses geospatial data (1x1 kilometre (km) tiles) on population distribution, ITU data on fixed broadband subscriptions mapped to a fixed broadband availability estimate, ITU national data on 4G population coverage, and ITU and GSMA geospatial data mapping existing fixed and mobile broadband infrastructure, to estimate the cost of providing service to unserved locations in each 1x1 km tile. Varies the broadband technology used to provide service based on the tile's population density.
	Backbone	Estimates the cost to increase the amount of backbone fibre in LICs and LMICs to reach the amount of backbone fibre per household in UMICs. The estimate assumes an average cost of USD $37,500 per kilometre in 2021 (sourced from the ITU's Digital Infrastructure Investment Initiative, or DIII, report), and factors in an inflation cost of 10 per cent per year through 2025.
	Data Centre	Estimates the cost to increase data centre capacity (measured in Watts per household of energy usage) available in LICs and LMICs to reach the level of data centre capacity available in UMICs. The estimate assumes a data centre cost of $850/sq. ft. (source: Mary Zhang, Dgtl Infra) and an average of 150 Watts of energy consumed per sq. ft. in a data centre (source: DIII). Also ensures every country has at least one data centre.
	IXP	Estimates the cost of ensuring every country with a population over 100,000 and at least three network operators has one IXP, and for increasing the number of IXPs to match the number of cities (300,000+) in countries with an existing IXP. The estimate leverages IXP cost data from the Internet Society (ISOC), with a country's first IXP costing $60,000 and additional IXPs costing $75,000.

Table 1: Connectivity investment gap cost methodology (continued)

	Gap	Summary of Cost Methodology
NON-INFRASTRUCTURE	Policy and Regulatory	Estimates the cost of technical and regulatory assistance, regulatory capacity building and stakeholder engagement support for each country using World Bank short term consultant day rates. Amount of support varies based on a country's score on the ITU's ICT Regulatory Tracker (based on the Generations of Regulation Model) whether or not the country is very small in size (population less than 300,000) and whether or not it is a Small Island Developing State(s) (SIDS) country.
	Digital Skills	Estimates the cost of providing digital skills training to enough of each country's population to meet the aspirational targets. Baselines the percentage of the population that already has basic and above-basic digital skills using ITU Internet use and World Bank secondary educational attainment data. Cost of training is based on cost of trainer's time (source: International Labour Organization) multiplied by the number of hours of training (source: ITU internal experts) and factoring in a stipend for attendees equal to the average hourly wage of the bottom 50 per cent of earners in each country.
	Service Affordability	Uses World Bank data on income by country (income deciles), ITU data on broadband service plan costs by country (fixed and mobile) and the two per cent affordability threshold for service to estimate the cost to make monthly service affordable for each country's population at all income levels.
	Smartphone Affordability	Uses World Bank data on income by country (income deciles) and an affordability threshold of 20 per cent of one month's income to estimate the cost to make a USD $30 smartphone affordable for each country's population at all income levels.

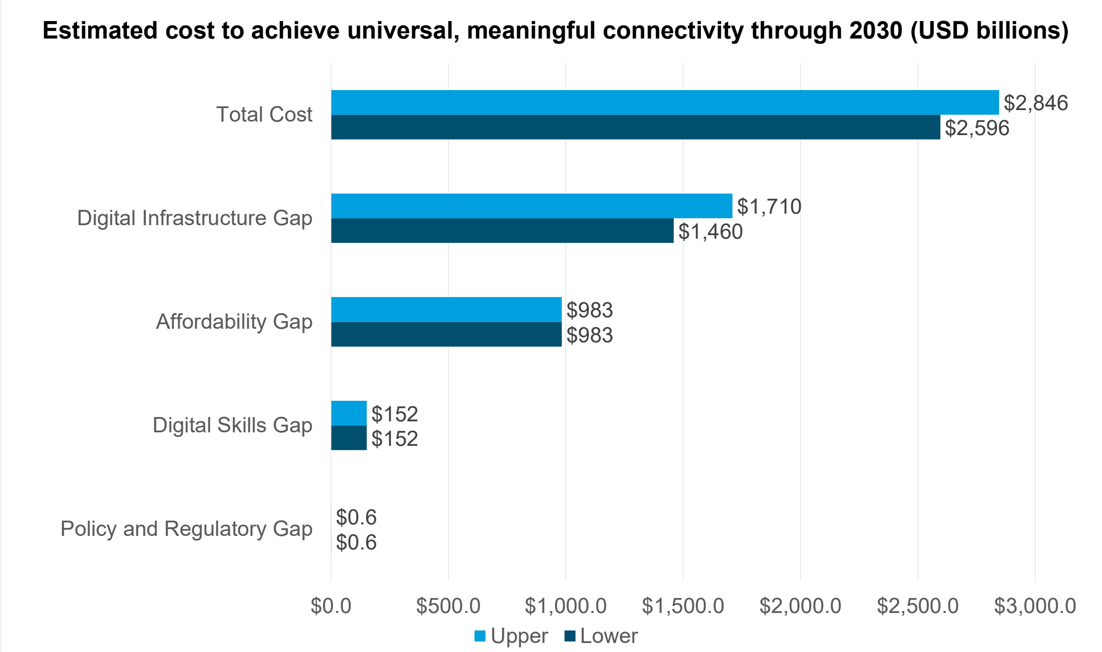
Methodology limitations

It is important to stress that estimates provided in this report are based on simplifying assumptions leveraging the best available data, which have limitations that impact accuracy. First, developing global estimates for each of these gaps requires harmonized approaches not specifically tailored to the unique context of each country. This means that estimates rely on assumptions which may prove correct, but which may not fully capture the reality of closing these gaps. Additionally, due to limitations in availability of data in many countries, several of the gaps estimated in this section necessitated the development of models and use of proxies to establish baselines. Using models and proxy data invariably leads to a less exact estimate than could be produced if more directly applicable data was available. The assumptions upon which each of the gap estimates relies are explored more fully in the Appendix, which provides an in-depth explanation of the methodology used to calculate each component of the gap. The estimates provided in the section below should not be taken to be exact but should be used as a planning and estimating tool to collect granular data and craft tailored interventions that address key remaining barriers to universal, meaningful connectivity.

2. Gap Cost

Inclusive of each of these elements, **the estimated cost to achieve universal, meaningful Internet connectivity through 2030 is USD $2.6 – $2.8 trillion at current prices**. The Figure below shows the breakdown of this overall cost into the different categories described above. For recurring costs, such as digital infrastructure OpEx and service affordability (both fixed and mobile), this analysis estimates five years of those recurring costs, which is the estimate through 2030 as the target year.

Figure 11: Estimated cost to achieve universal, meaningful connectivity through 2030



Source: ITU, based on methodology described in detail in the Appendix

The sub-sections below provide additional detail on each of the components of the overall connectivity gap cost. How these costs can be met and whether these costs can or should be borne by the public or private sector is not covered in this report and is a promising topic for further work.

When considering this estimate, it is important to remember that these are estimates to close the existing digital divide based on the currently established aspirational targets. The digital divide's closure is not permanent. As technologies and use cases evolve, new skills, higher speed connections and additional infrastructure needs will proliferate, necessitating updated definitions of universal, meaningful connectivity and additional initiatives to close newly emerging gaps. Therefore, it will be important for stakeholders to recognize not only these significant costs associated with closing the existing digital divide, but also that the closure of the digital divide requires sustained engagement, systemic interventions and a long-term commitment to universal, meaningful connectivity, even as the definition of that term evolves.

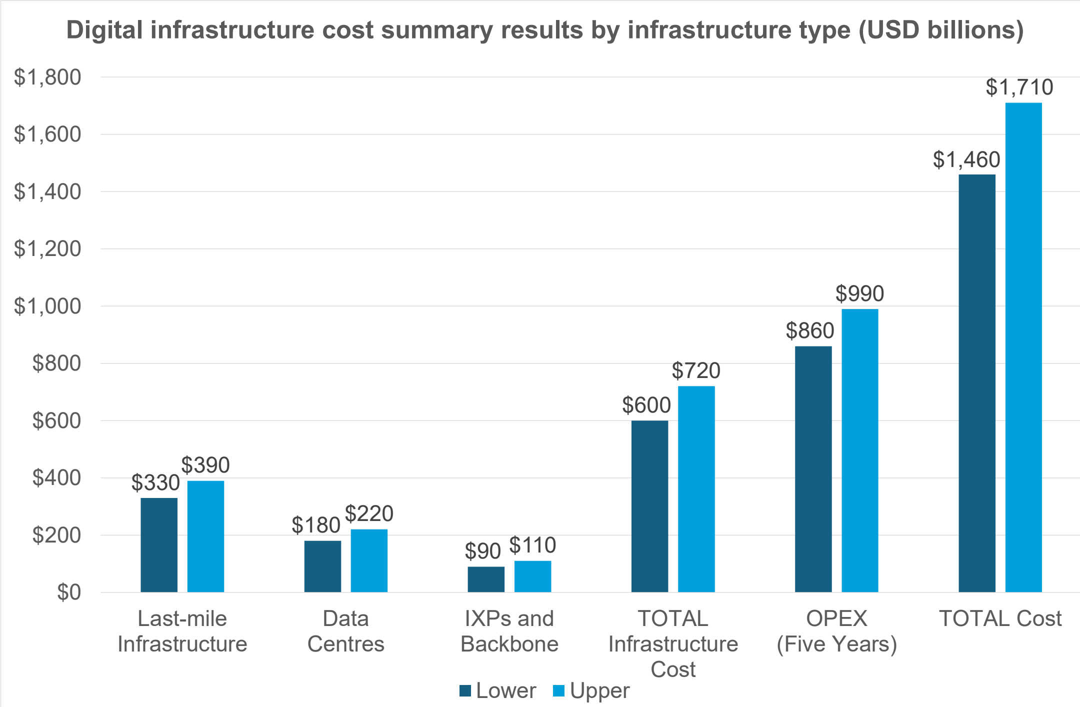
a) Digital Infrastructure Gap

The estimated cost to close the global digital infrastructure gap is approximately USD $1.5 – $1.7 trillion.

The largest single component of the overall connectivity gap cost is expanding digital infrastructure to reach every unserved individual and household. In total, inclusive of the deployment of last-mile and backbone broadband infrastructure, data centres, IXPs and the

OpEx for last-mile broadband,[35] **the estimated cost to close the global digital infrastructure gap is approximately USD $1.5 trillion to USD $1.7 trillion**. This represents the additional cost to cover between 2.3 and 2.6 billion people, and between 498 and 574 million households, with some variation in the size of unserved populations and in the mix of technologies used to provide service. The Figure below shows this overall cost broken down by infrastructure type.

Figure 12: Digital infrastructure gap cost



Source: ITU, based on methodology described in detail in the Appendix

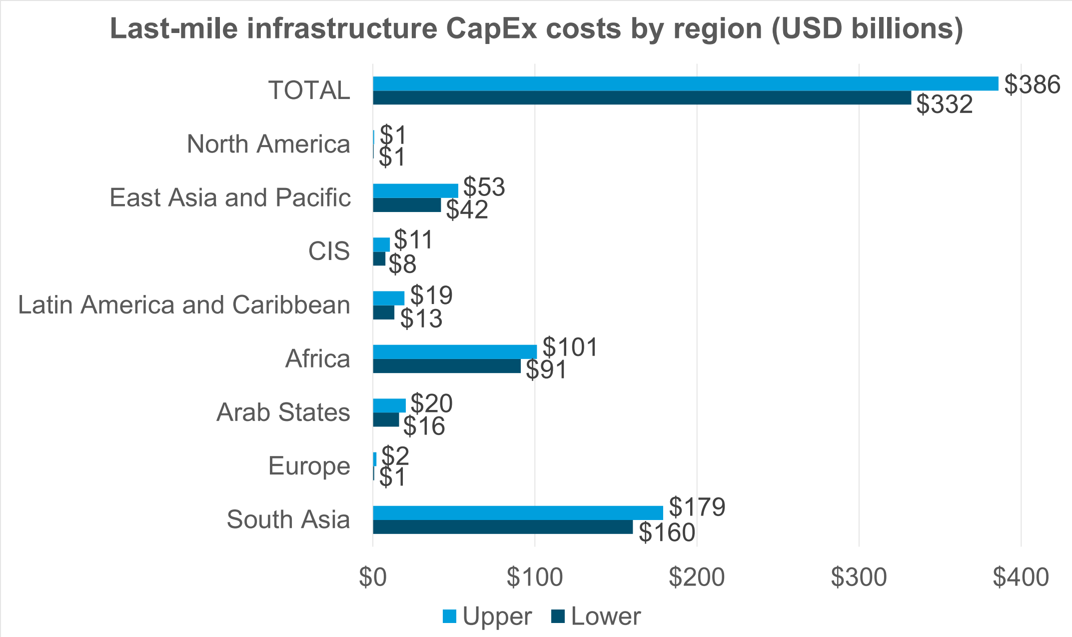
Regional Cost Breakdown

There is significant variation in these costs by region, by country and at the sub-national level, which can help connectivity stakeholders target attention and resources to the areas where interventions are most needed. The Figure below shows the breakdown of last-mile infrastructure CapEx costs by region.[36] As reflected in the Figure above, OpEx costs are substantially higher than the overall deployment costs, reflecting the significant reinvestment, management and maintenance that broadband networks require, on an ongoing basis. It is important to note once again that this report simply reflects costs and does not grapple with the question of how these costs will be funded. For example, OpEx costs may be offset by revenues from fixed and mobile broadband subscriptions.

35 An industry standard practice is to calculate OpEx costs for last-mile broadband, as the ongoing maintenance costs of other categories of infrastructure are passed on to ISPs in the cost of service. Therefore, the OpEx calculation reflects the ongoing expenses of maintaining last-mile broadband networks.

36 Because OpEx cost estimates are a function of CapEx costs, the regional breakdown of OpEx costs mirrors the breakdown for CapEx. Therefore, the report does not present an additional breakdown of OpEx costs by region.

Figure 13: Last-mile infrastructure CapEx costs



Source: ITU, based on methodology described in detail in the Appendix

The Figure shows that there is wide variability in the last-mile infrastructure gaps by region. North America and Europe, for example, already have built out nearly ubiquitous last-mile connectivity capable of 20 Mb/s speeds, while South Asia – with a large population lacking access to fibre infrastructure in urban and peri-urban areas and 4G infrastructure in rural areas – alone accounts for over half of the overall costs for last-mile CapEx. Africa and East Asia and Pacific also face significant costs. As the report notes in the current state section, levels of economic development correlate with the availability of broadband infrastructure, so it is not surprising that regions with a higher prevalence of LDCs are the ones facing the largest infrastructure gaps. Additionally, many LDCs also face challenges related to the expertise needed to successfully deploy broadband networks. Broadband networks require significant technical expertise related to network design and engineering (both hardware and software), as well as an in-depth understanding of principles related to signal propagation, network capacity and communications between different networks. This type of expertise is often in short supply in countries with low overall levels of development, and in particular countries that have low levels of coverage. The costs to close the backbone gap are also concentrated in the same regions, and in particular in LMICs.

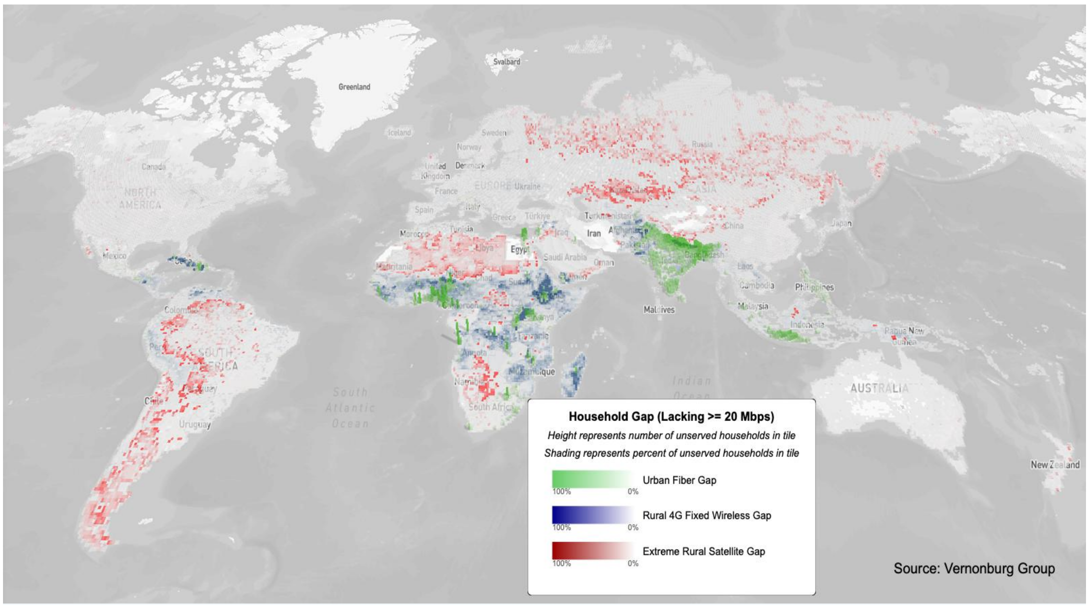
Within these regions, the estimate reflects the cost of using three different technologies to provide last-mile connectivity: fibre in urban and peri-urban areas, 4G fixed wireless in rural areas[37] **and satellite connectivity in the most remote locations**. While the fixed wireless gap could be filled by other technologies and providers – such as community networks and wireless Internet service providers (ISPs) – 4G fixed wireless coverage offers the best data to estimate the gap as well as provides a conservative cost estimate.

As shown in the Figure below, closing the global last-mile infrastructure gap will require significant additional deployments of each of these technologies, although fibre deployments

[37] Based on available coverage data, it is assumed that urban and peri-urban communities largely already have access to 4G service.

make up the vast majority of costs.[38] Topography, population density, urban development and technological mix help to explain differences in costs between regions. For example, the existing rates of connectivity in South Asia are much higher than in Africa, but South Asia faces significantly higher estimated costs to close the infrastructure gap than Africa. This difference can be explained by the population density in each region; the remaining coverage gap in South Asia, which has more densely populated areas, may be largely solved with fibre broadband networks. Africa has a predominantly rural population, meaning that most of the coverage gap may be solved through additional 4G or other wireless network deployment (which is less costly than fibre).

Figure 14: Map of last-mile infrastructure gap by technology used to provide service

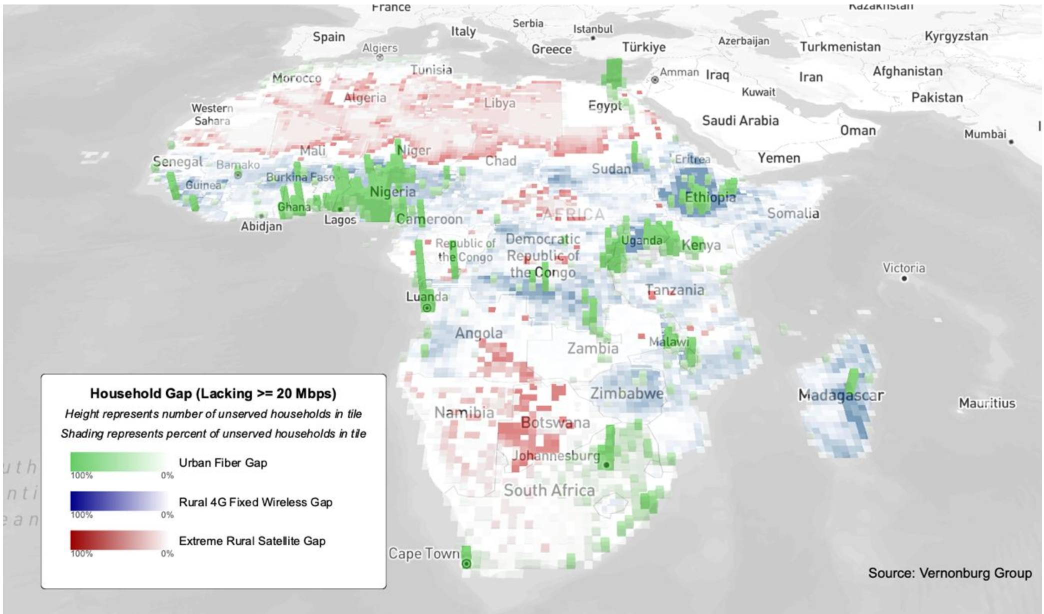


Source: Vernonburg Group for ITU, based on methodology described in detail in the Appendix

The scale of the needs for different technologies can be further illustrated when zooming in on specific areas of the map. The Figure below shows the gaps in coverage in Africa broken down by technology type. The areas requiring additional 4G and satellite broadband connectivity are more geographically expansive, but there are many more households currently without coverage that will require additional fibre deployment.

[38] Areas that are shaded grey in the Figure are already served with broadband service capable of delivering 20 Mb/s speeds, or, have no population. Areas that are white in the Figure have no available data.

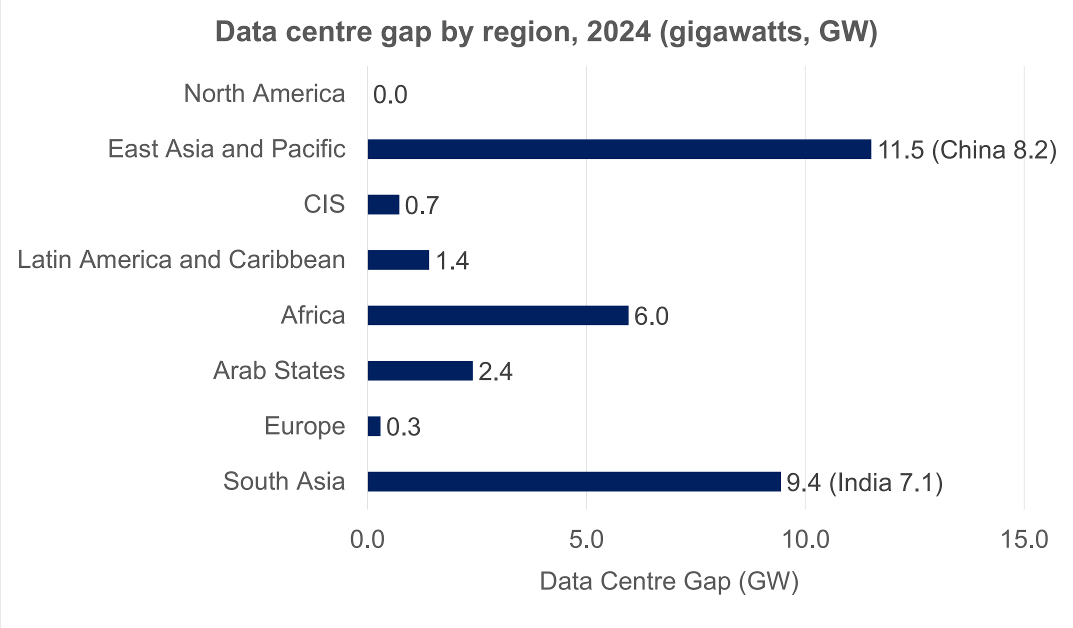
Figure 15: Map of last-mile infrastructure gap in Africa by technology used to provide service



Source: Vernonburg Group for ITU, based on methodology described in detail in the Appendix

The regional breakdown of the data centre gap, expressed in gigawatts (GW) of capacity available, is in fact slightly misleading, due to the specific needs of several large countries. Regions with the largest capacity gaps include East Asia and Pacific and South Asia, where there is significant variability between countries in these regions in terms of data centre capacity per household. Most countries in these regions are well-served with data centres and possess at least one. However, some countries are very poorly served with data centres – for example, in East Asia, the island of Hong Kong (China) has over a dozen data centres, while Laos and Mongolia each only have one. Regional analysis of data centre capacity needs is heavily influenced by China and India, which account for one-sixth of the global population each. Their additional data centre needs will prove enormous, as connectivity is extended to more unserved households. Excluding China's and India's needs, Africa, Latin America and the Caribbean, and the Arab States have the largest capacity gaps. The Figure below shows the estimated data centre capacity gap by region.

Figure 16: Global data centre gap



Source: ITU, based on methodology described in detail in the Appendix

The largest data centre gaps exist in areas with the lowest levels of development, as well as areas with particularly large populations. Notably, according to this analysis at the global level, North America has practically no data centre gap relative to other regions, at least for the near future, and in fact the region hosts data centres used to provide service for countries in other regions. However, given the exponential growth in data traffic observed over recent years, North America's relative profusion of data centres will only hold true over the near future, and the need for data centres is likely to increase.

Data centre key considerations

Data centres play a unique role in digital transformation. While data centres are not directly related to meeting the 2030 connectivity targets, they play an important role in digital transformation, storing and processing the content shared over the Internet, dramatically transforming the cost and accessibility of computing, and driving innovation. As a result, data centres are being deployed organically in many countries and regions. In addition to shared public cloud services, companies that consume large amounts of computing, especially those developing AI models, are building data centres for their own use. Companies offering public cloud services are building data centres around the world to be geographically close to their customers who may want data stored locally or nearby, as well as to improve quality of service. Governments in particular may want to store their national data within their country. As a result, there are almost 10,000 data centres in more than 164 countries with about one-third in the U.S., almost one-third in Europe and 12 per cent in Asia.[1]

Where data centres are constructed, and what types of data centres are deployed, is dependent on a number of factors. Large public cloud data centres can be as large as 50-100 megawatts (MWs), and companies training the largest AI models are building 200+ MW data centres. These data centres consume an enormous amount of resources, including electricity and water, and require the deployment of additional backbone infrastructure. For technical and economic reasons, it might make sense for larger data centres to be deployed on a regional basis, with a single data centre serving multiple countries. To address local storage needs, an emerging trend in small markets, including in remote areas, is to build modular and pre-fabricated data centres of 1MW-5MW for storing sensitive national data.

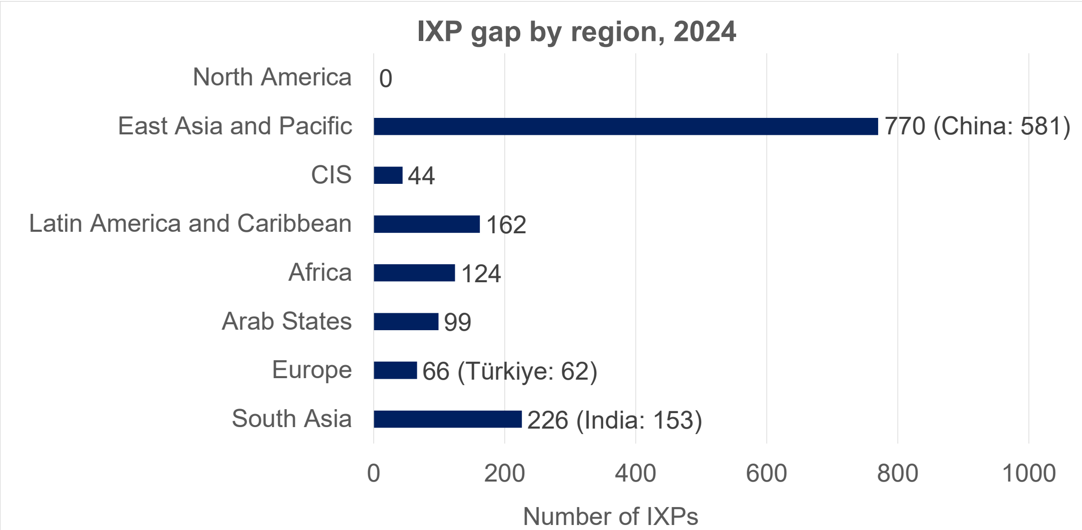
Based on these trends and considerations, the gap estimate provided factors in the cost of ensuring sufficient data centre capacity is available to every country, and of ensuring that every country with a population over 100,000 is equipped with a modular data centre, if there are no data centres in the country already. However, this is not intended to be prescriptive, and private sector and government stakeholders in each country should work collaboratively to determine in-country data centre needs, available regional capacity and whether the country has the infrastructure to support data centre development.

As noted above, there is significant private interest in investing in data centre capacity, and data centre needs are often addressed organically as markets evolve.

[1] Data Center Map. Available at: https://www.datacentermap.com. Accessed April 7, 2025.

The regional breakdown of the IXP gap is similarly nuanced, as evidenced in the Figure below. IXPs are physical locations where different broadband networks meet and exchange traffic. This reduces the costs of broadband networks and significantly improves the efficiency of those networks in routing local traffic. In the absence of IXPs, these networks would have to organize peer-to-peer sharing between networks individually and develop additional infrastructure to connect each network to the others or continue to rely on expensive transit services to route data through remote locations. Given that the purpose of IXPs is to reduce costs and improve efficiency, the IXP gap presents an opportunity for countries in these regions to reduce the costs of deploying and operating broadband networks, which can both reduce the cost of the overall infrastructure gap and reduce costs of service for consumers. Again, North America is well provided for and has no discernible need for additional IXPs, relative to the global situation. The analysis suggests Europe is adequately supplied at present, with Türkiye accounting for almost the entire IXP gap in the region.

Figure 17: IXP gap



Source: ITU, based on methodology described in detail in the Appendix

Considerations for the digital infrastructure gap analysis

- The cost of closing the global digital infrastructure gap is significant, particularly for last-mile connectivity. Fortunately, multiple technologies can be used to deliver universal, meaningful connectivity. Stakeholders seeking to deploy broadband networks and close the digital infrastructure gap should take a technology neutral approach that deploys fibre, 4G and satellite technologies based on where they can most cost-effectively provide high-speed service.
- Not all of the digital infrastructure gap costs represent an external financing gap that needs to be filled with private and/or public investment. A large portion of these costs can be recouped through network operators' revenues from operations. When planning for a large-scale digital infrastructure project, stakeholders should consider external funding needs over a project's life.
- Rather than adapting technologies designed for developed markets with extensive infrastructure and high average incomes, closing the infrastructure gap may require companies to develop products specifically designed to operate in challenging environments and regions that today lack access to digital and other forms of infrastructure (such as areas with limited access to the electrical grid).
- High upfront costs for infrastructure deployments, particularly fibre infrastructure, are a key inhibitor to its deployment, especially in LDCs and low-income countries. Stakeholders should continue to develop innovative technologies and business models that lower these costs and make it more appealing for funders to invest.
- The decision to construct a data centre in country is highly dependent on specific country conditions, including its stage of economic development, availability of infrastructure and political environment. Data centres are essential for enabling Internet applications, but not for achieving universal connectivity. Countries should collaborate with other stakeholders to understand their specific data centre needs, and stakeholders should largely focus their efforts on improving data centre capacity available to underserved regions (specifically Africa, South Asia, and East Asia and Pacific).
- IXPs are useful in markets with multiple competitors. The costs of IXPs (where applicable) are extremely low relative both to their benefits and to the other categories of infrastructure gaps.
- This analysis could be refined with better access to country-level data. Precise geographically granular data – collected on at least an annual basis – will help stakeholders better refine marketplace and policy interventions over time.

b) Digital Skills Gap

The estimated cost to close the global digital skills gap is USD $152 billion.

Overall, the report estimates that 1.2 billion people worldwide require training to achieve basic digital skills in order to use the Internet and meet the 70 per cent goal established in the ITU's aspirational targets. Another 311 million people require additional training to help at least half of all people develop above-basic digital skills and meet the 50 per cent goal established in ITU's aspirational targets. The total cost of this training is estimated at approximately USD $152 billion, which reflects the cost of providing in-person digital skills training, including direct costs

(costs of trainers) as well as a stipend for programme participants to account for indirect costs and lost wages.[39]

The largest component of these costs is the daily stipend for attendees. This is particularly important for low-income individuals and in low-income countries, where many people likely cannot forgo a week's wages to attend digital skills training. There may be ways to allow the population to acquire digital skills in other contexts; for example, educators can incorporate digital skills training into educational curricula, ensuring that all students who complete primary education meet the ITU's definition of having basic and above-basic digital skills.

While the cost estimate for digital skills represents a sizeable financing need for achieving universal, meaningful Internet connectivity, this gap can be significantly reduced by addressing the other gaps identified, in particular the digital infrastructure gap. People often can acquire digital skills through consistent use of the Internet at home, at work and/or at school. There will certainly still be a need for digital skills training to speed up the process by which new users can begin to benefit from connectivity, but informal opportunities for digital skills development abound (*e.g.*, through schools, community classes, peer networks and help from family and friends). More than any of the other barriers identified, this gap is one that individuals and communities can address on their own initiative.

However, self-led training also has the potential to deepen existing divides within individual communities. This is particularly true of the gender digital divide in areas where cultural norms have led to women having poorer access to broadband, weaker digital skills, and fewer educational and economic opportunities writ-large relative to men.[40] To close the digital skills gap effectively for all, it will be essential that governments monitor digital skills progress. In some contexts, stakeholders will need to deploy programmes specifically designed to promote digital skills among women and girls in order to achieve the aspirational targets. It is also vitally important that each country collects, benchmarks and monitors additional data on the digital skills of its population.

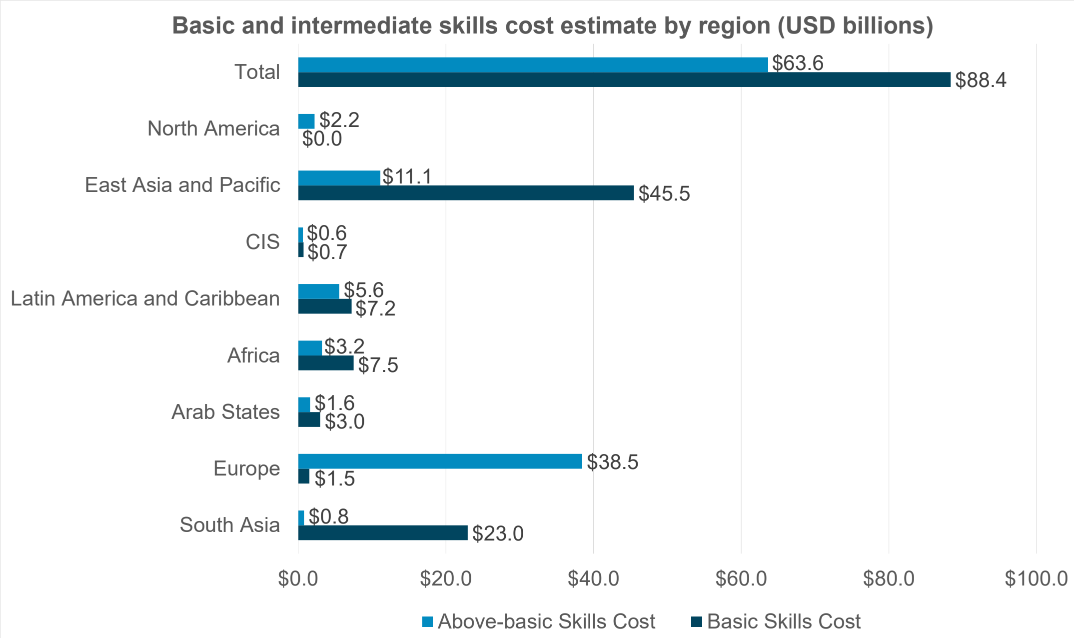
Regional Cost Breakdown

The Figure below shows the estimated digital skills gap costs by region in terms of number of people who need to be trained to meet the 70 per cent and 50 per cent targets. East Asia and Pacific, South Asia and Africa face the largest gaps in digital skills. These are also regions with lower incomes and lower educational attainments relative to other regions, both of which also correlate with lower levels of digital skills in a population. East Asia and Pacific and South Asia reflect a larger digital skills gap cost, due to their large populations (including China and India, respectively), while figures for Africa are relatively lower due to Africa's comparatively lower wages and stipend rates. By contrast, Europe has a relatively small above-basic digital skills gap – one-third of the size of Africa's gap in terms of number of individuals who need training – due to its overall lower population, but the high wages and stipend rates in Europe make closing the digital skills gap extremely expensive relative to other regions.

[39] Many individuals cannot afford to miss an earning opportunity to attend digital skills training. Therefore, a daily stipend for attendees for digital skills training was included to better reflect the costs of successful digital skills trainings that meet the needs of the targeted population. This stipend makes up the vast majority of digital skills training costs.

[40] EQUALS Global Partnership. "Why do we need a gender transformative approach to digital skills education?" 2024. Available at: https://www.equalsintech.org/publications. Accessed August 4, 2025.

Figure 18: Digital skills gap cost



Source: ITU, based on methodology described in detail in the Appendix

Considerations for the digital skills gap analysis

- The digital skills gap is significantly larger than the Internet adoption gap. Not all people who are regularly accessing the Internet have the digital skills to do so productively, safely and securely. This is particularly true for newer Internet users and users with low levels of educational attainment. Addressing the digital skills gap should include specific outreach and recruitment strategies targeting these groups.
- The gender divide is particularly stark with regard to digital skills. Stakeholders should develop interventions specifically designed to foster digital skills among women and girls, and countries should monitor progress towards closing the digital skills gap on a gender disaggregated basis.
- While this estimate provides a cost for formal trainings specifically focused on developing basic and above-basic digital skills, there are opportunities to reduce the need for formal training opportunities by collaborating with educational institutions and employers to integrate digital skills training into school curricula and professional development opportunities, thereby reducing costs.
- Like any other educational or training initiative, it is important that digital skills training reflects local cultural context. This includes both reflecting cultural sensitivities and education norms and tailoring the content included in the training to the specific applications most prevalent in the country. Digital skills gaps are highly individualized, so training should be tailored to the maximum possible extent.
- In higher income countries, many people acquire different types of digital skills through consistent use of the Internet, as opposed to formal training. Closing the broadband availability and affordability gaps might therefore also have an impact on the digital skills gap.

c) *Policy and Regulatory Gap*

The estimated cost to close the global policy and regulatory gap is approximately USD $0.6 billion.

The estimated cost to close the policy and regulatory gap is approximately USD $0.6 billion. While significant, costs for regulatory modernization are, on a per country basis, much lower, varying between USD $1.2 million – USD $8.4 million, depending on the country size and benchmarking in ITU's Regulatory Tracker (2023 data).[41] This report provides a cost estimate for technical assistance, capacity-building and stakeholder engagement to help countries reach the Generation 4 (G4) threshold in ITU’s ICT Regulatory Tracker. The methodology used assumes reaching G4 reflects sufficient regulatory maturity to support universal, meaningful connectivity in line with ITU’s aspirational targets. This report does not address the G5 Benchmark or digital transformation.

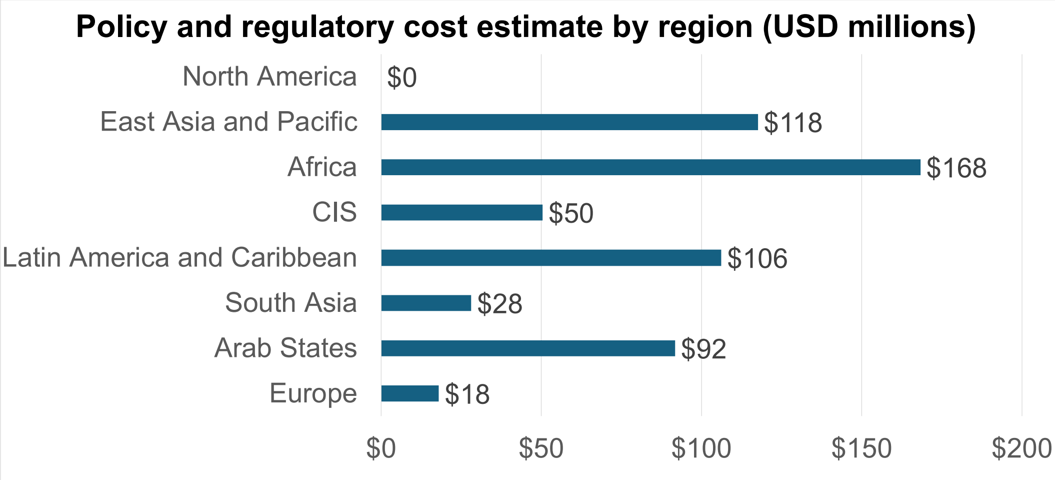
Closing the policy and regulatory gap will take more than funding and technical assistance. It also requires that national governments (including policy-makers and regulators) are motivated to undertake these efforts and prioritize achieving universal, meaningful Internet connectivity. Creating a predictable policy and regulatory environment is an essential input to closing the other gaps identified, and modernizing policy and regulatory regimes as quickly as possible can help catalyse activities to reduce the other three gaps. In some ways, however, this is actually one of the most complex gaps to address, with potentially conflicting interests and trade-offs involved. Just like network operators, regulators need to constantly reinvent themselves to keep up with technological changes. In some countries, regulators are perceived as limiting or hampering industry. Even in those countries where regulators and industry work together for the benefit of consumers, changing regulations and regulatory environments is arduous and time-consuming. Some types of regulatory change and modernization (including changes to market structure) require legislative amendments, as well as changes in mindset. Although the estimate of the monetary cost is relatively low at the global level, the procedural and cultural difficulties of implementing effective reforms of regulatory environments can be substantial.

Regional Breakdown

As seen in the Figure below, most of these costs are concentrated in Africa, East Asia and Pacific, Latin America and Caribbean, and the Arab States. Notably, this corresponds to the areas where there are the largest broadband infrastructure gaps (as shown earlier), and the greatest progress is needed on both broadband availability and adoption. One notable exception is South Asia, where there is still a relatively large, fixed broadband availability and adoption gap, but which requires less regulatory development according to the ITU’s ICT Regulatory Tracker.

[41] Additional detail on the methodology for calculating these costs is available in the Appendix.

Figure 19: Policy and regulatory gap cost



Source: ITU, based on the methodology described in detail in the Appendix and the ITU's ICT Regulatory Tracker[42]

Considerations for the policy and regulatory gap analysis

- While the estimated cost of closing the global policy and regulatory gap is much smaller than other gap categories identified, closing this gap is extremely important.
- Modernized policy and regulatory regimes create an enabling environment which supports efforts by network operators and other stakeholders to invest in closing broadband availability and adoption gaps and achieve universal, meaningful connectivity. A modernized policy and regulatory regime also helps to protect consumers (*e.g.*, by increasing competition, reducing network deployment costs, creating more choices and lowering prices for services and devices).
- By addressing policy and regulatory gaps, governments can accelerate achievement of broadband availability and adoption goals.

[42] The costs in North America are USD $0 because all countries in the region are rated G4 and above and, therefore, no costs have been allocated for policy/regulatory modernization.

d) *Affordability Gap*

The estimated cost to close the global affordability gap for both services and devices is approximately USD $983 billion.

The overall estimated cost to close the broadband affordability gap for both services and devices is approximately USD $983 billion.[43] This reflects the cost of ensuring that smartphones capable of delivering 20 Mb/s speeds are affordable to the entire global population. This estimate also reflects the cost of ensuring that monthly service plans for both fixed broadband (generally for households) and mobile broadband (generally per individual over 15) are affordable worldwide for five years.[44] Outside of infrastructure, the cost to close the affordability gap is the largest contributor to the overall cost to achieve universal, meaningful Internet connectivity.

Affordability of service is a complex concept, as it combines elements of the costs of services to consumers (in either nominal terms or adjusted for purchasing power parity), as well as average income (usually measured by average Gross National Income per capita) and perceived value of service. The cost of service to consumers is influenced by several upstream, market-level factors, including: levels of competition; access to spectrum, rights-of-way, towers and other resources; operator profit margins; and the cost of inputs, including labour and upstream bandwidth. Efforts to address affordability gaps can therefore include working to lower the prices for broadband service and smartphones, reducing or eliminating government-imposed taxes and fees on broadband service and smartphone purchases, and improving overall economic opportunities, training and workforce development (to increase incomes of potential subscribers).

As stakeholders work to address the affordability gaps over the long-term, additional strategies can be deployed to help users overcome affordability barriers. Pay-as-you-go models for both fixed and mobile broadband service (as well as devices) are or are becoming commonplace across emerging markets and allow customers to consume Internet connectivity and use devices on a progressive basis, depending on their usage. Additionally, the secondhand device market may be robust, particularly in places like Africa and South Asia, where refurbished or used devices are often available at lower costs.

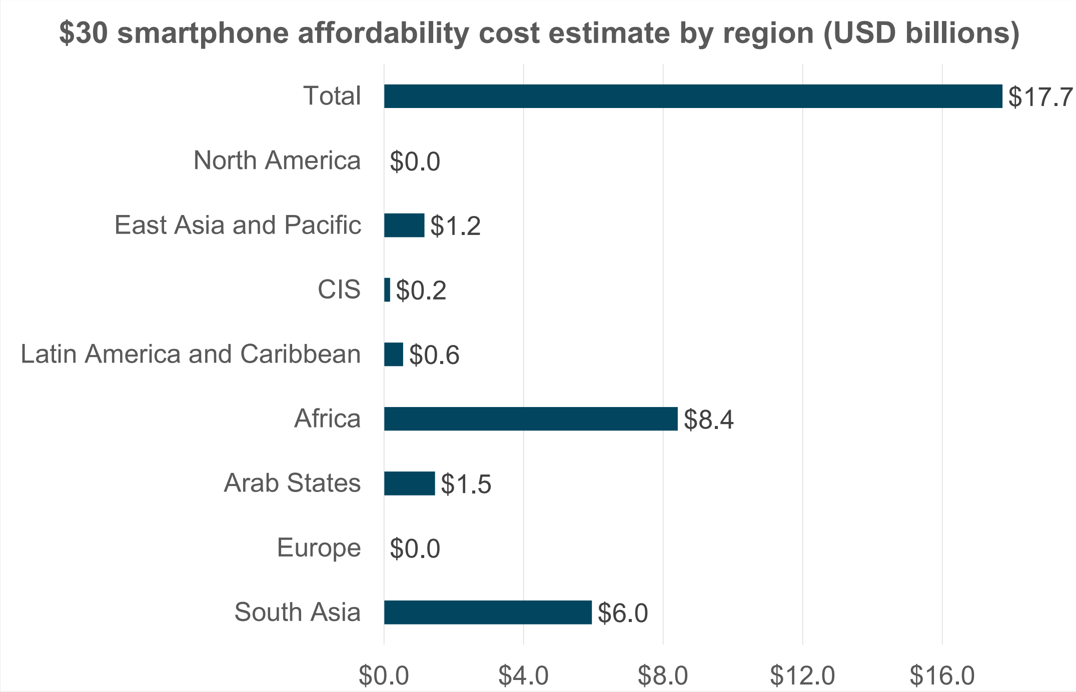
Regional Cost Breakdown

The Figure below shows the breakdown of the cost to close the smartphone affordability gap by region, based on the assumptions that consumers have access to 4G-capable smartphones costing as little as USD $30. The cost to close the smartphone affordability gap is estimated at approximately USD $18 billion, making it a relatively small component of the overall cost to close the affordability gap. Of this USD $18 billion, approximately half (USD $8.4 billion) relates to Africa and USD $6.0 billion relates to South Asia. Based on the cost threshold used in this report, Europe and North America are considered to have negligible smartphone affordability gaps in relative terms, at the global level.

43 Additional information on the thresholds for affordability of service and devices, as well as the methodology for costing the gap, is available in the Appendix.

44 For purposes of this analysis, it is assumed that individuals living in extremely rural areas will receive both mobile and fixed Internet connectivity from satellite providers and that these individuals will experience affordability gaps that are equivalent to gaps for fixed and mobile broadband in rural and urban areas.

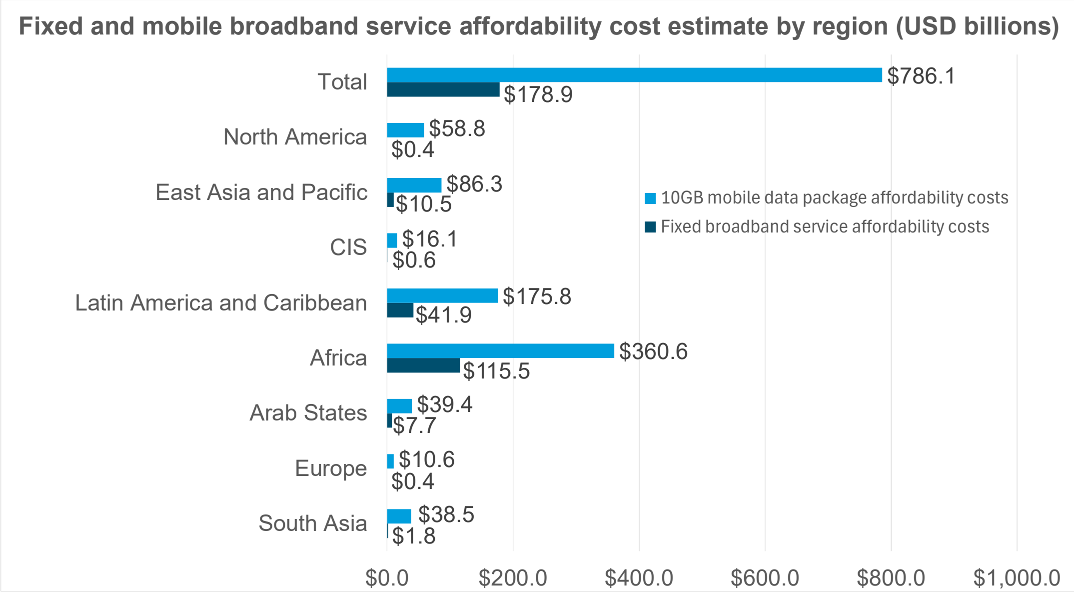
Figure 20: Smartphone affordability gap cost



Source: ITU, based on the methodology described in detail in the Appendix and income data from the World Bank

The Figure below shows the breakdown of the cost to close the fixed and mobile broadband service affordability gaps by region. For fixed broadband service, average household size also impacts this analysis. Africa and Latin America and Caribbean are the two regions with some significant gaps in fixed broadband service affordability – these regions also have the most significant gaps in mobile broadband service affordability. Africa accounts for nearly half the total mobile broadband service affordability gap (USD $361 billion). Latin America and Caribbean, East Asia and Pacific, North America and the Arab States also have moderate gaps in mobile broadband service affordability. CIS, South Asia and Europe have relatively limited gaps in mobile broadband service affordability.

Figure 21: Cost to close the broadband service affordability gap



Source: ITU, based on the methodology described in the Appendix and broadband pricing data from ITU

Considerations for the affordability gap analysis

- Affordability is one of many factors that impede broadband service and device purchases. The affordability of both services and devices remains a significant barrier to meaningful connectivity and consistent Internet use, particularly in lower-income communities.
- The overall percentage of people for whom mobile and fixed broadband service is affordable is lower than the percentage of people who are accessing the Internet.
- While this difference might indicate that consumers are willing to pay more for Internet connectivity than they can afford, this might also show that consumers are finding creative ways to access devices and services, even when they cannot afford them. These might include sharing a single smartphone among family members, participating in device rental programmes, leveraging available public Wi-Fi networks and purchasing daily use vouchers for Internet service for select days each month.
- Innovative financing approaches like micropayment schemes can improve the affordability of both services and devices and can complement other efforts to reduce device and service costs.
- A variety of factors influence the cost of services and devices, including the level of competition in a market, which can be facilitated by conducive legal and regulatory regimes, for example, with low barriers to market entry and spectrum, permitting and tax policies that minimize network deployment and service delivery delays and costs.
- This report estimates the cost to ensure broadband service is affordable for all consumers through the end of 2030. However, this estimate is based on current broadband service and smartphone prices. Further reductions in the cost of services and devices would help to reduce affordability gaps.
- Lack of affordability is not the only barrier to broadband adoption and device purchases. Even when Internet connectivity is free, there are still consumers that choose not to access to Internet, indicating that other barriers exists (such as digital skills, literacy and language gaps).

Part II: A Blueprint for Achieving Universal, Meaningful Connectivity

To address the challenges identified by the analysis in Part I, Part II collects best practices from past successes and spotlights the most promising innovations to accelerate progress towards universal, meaningful connectivity.

This section identifies actionable strategies for multistakeholder partnerships (public, public-private and civil society entities) to mobilize effective and resilient collaboration. Similarly, numerous countries have initiated projects that are making significant impact on the digital divide. A selection of those case studies is provided for countries and stakeholders to adapt to their own circumstances. Examples of creative and inspirational "Digital Inclusion Transformative Projects" that could accelerate progress in closing the digital divide are presented. Finally, potential mechanisms for monitoring and assessing progress towards universal, meaningful connectivity at the global, national or sub-national level are also presented.

C. Closing the Digital Divide Through Multistakeholder Partnerships

The digital divide is a complex and multifaceted problem that requires intervention by a wide range of stakeholders. Encouraging collaboration among them and positioning those collaborations for success are critical to closing the global digital divide. Additionally, Sustainable Development Goal (SDG) 17 ("Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development") recognizes multistakeholder partnerships (MSPs) as important vehicles for mobilizing and sharing knowledge, expertise, technologies and financial resources to support the achievement of the SDGs. Goal 17 seeks to encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships.[45] SDG target 17.17 specifically relates to multistakeholder collaboration.

While MSPs are critical for addressing the global digital divide and other societal needs, barriers have arisen to deploying these types of projects at the rate needed to address global infrastructure and social needs. For example, in 2020, Arthur D. Little suggested that, according to their research, public-private partnerships (PPPs) (which are a type of MSP) contributed to less than five per cent of public infrastructure investments, suggesting there is ample opportunity for additional collaboration between the public and private sectors in deploying infrastructure.[46] They found that adoption of these types of partnerships has been limited for several reasons: high complexity due to different partners, potentially from different countries; high costs due to the legal expertise and monitoring needed; the need for an enabling environment that can properly structure deals and monitor the work of the private parties and their remuneration; and the availability of bankable projects to attract private parties and justify the transfer of risk.

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[45] United Nations Department of Economic and Social Affairs (UNDESA). "Multi-stakeholder partnerships." Available at: https://sdgs.un.org/topics/multi-stakeholder-partnerships. Accessed April 7, 2025.

[46] Arthur D. Little. "Successful Public-Private Partnerships." October 2020. Available at: https://www.adlittle.com/sites/default/files/viewpoints/adl_public_private_partnerships_0.pdf . Accessed April 7, 2025.

This section:

1. Defines MSPs and highlights some **key advantages and disadvantages** of a partnership approach.
2. Provides **key insights and practical recommendations** gathered directly from individuals who have led and implemented MSPs on how they ensured long-term partnership success.
3. Provides a **roadmap** for establishing successful, sustainable partnerships.

1. Multistakeholder Partnerships Overview

a) Definitions

At their simplest, MSPs can be characterized as joint projects with several stakeholders from a range of backgrounds, with different expertise, resources, and opportunities, and sharing common goals and each participating in the accomplishment of a singular task or directive. The United Nations Department for Economic and Social Affairs (UNDESA) defines MSPs as "an ongoing collaborative relationship among organisations from different stakeholder types aligning their interests around a common vision, combining their complementary resources and competencies and sharing risk, to maximise value creation towards the SDGs."[47] This report considers MSPs specifically focused on addressing different aspects of the global digital divide, including collaboration among governments, civil society, international organizations and the private sector. Depending on the nature of the activities of the MSPs, many types of stakeholders can also prove important – *e.g.*, academia, research institutions, media partners (for awareness-raising and dissemination of information), philanthropic foundations, local authorities and policy-makers. MSPs can be led by any single stakeholder organization or by a consortium, with each organization assigned managerial responsibility based on expertise. However, two key characteristics of any MSP are that: 1) **multiple types of stakeholder organizations are involved in the project**; and 2) **the project is built on sustained collaboration between those stakeholders**.

b) Advantages and Disadvantages

There are several advantages that MSPs offer relative to individual projects, particularly with a challenge as complex as bridging the digital divide.

Benefits of MSPs and Cross-Sector Collaboration: Addressing a Multifaceted Problem with a Multipronged Solution

As this report has shown, the digital divide is a multifaceted issue that has a number of inputs and drivers. Struggles with availability of service, affordability, device access, and digital skills, and the perceived relevance of the technology to a person's daily life all contribute to keeping households and individuals offline. Closing the global digital divide, therefore, requires interventions that address each of these barriers.

When managed effectively, **MSPs offer the opportunity to address multiple barriers in a coordinated way**. Organizations with the most expertise in each specific area can lead their

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[47] Darian Stibbe and Dave Prescott for UNDESA and the Partnership Initiative. "SDG Partnership Guidebook 2020: A practical guide to building high impact multi-stakeholder partnerships for the Sustainable Development Goals." 2020. Available at: https://sustainabledevelopment.un.org/content/documents/2698SDG_Partnership_Guidebook_1.01_web.pdf . Accessed April 7, 2025.

specialized line of work (*e.g.,* community-based non-profit partners leading outreach and community engagement, training experts leading curriculum development for digital skills programming, etc.), while simultaneously ensuring efficiency and collaboration by acting as a single, coordinated project team. Moreover, even projects that focus on addressing a single element of the digital divide are likely to require collaboration among different stakeholders. For example, stakeholders looking to deploy a broadband network may require funding support from development finance institutions (DFIs), governments or other grant-makers or lenders; community and civil society support to develop relevant services and address potentially sensitive social or cultural dynamics; and engagement with government officials when planning and deploying the network (*e.g.,* for planning permissions and access to existing infrastructure).

Taking a collaborative approach with these stakeholders from the outset can help to ensure efficiency and secure buy-in, setting the project up for success much more effectively than trying to secure support for the project once deployment has begun. The following Table lists some of the types of resources that different stakeholders have to offer.

Table 2: Complementary resources of different stakeholder types

NGOs and civil society	Business	Government / parliamentarians	International agencies / UN	Donors and foundations
Technical knowledge / capacity	A market- based / commercial / value creation approach	Regulatory framework (e.g., licenses for water etc.)	Technical support, knowledge and experience	Funding and support
Access to and deep knowledge of communities	Power of the brand and access to customer base	Integration with public systems / long term planning	Legitimacy and impartiality	In many cases foundations can be less risk adverse and support more experimental and innovative approaches, providing proof of concept that can be expanded by more traditional donors
Legitimacy / social capital	Technical and process innovation	Taxation policy	Access to a global network	
Passion and people-focus	Power of the value chain	Capacity building (e.g., agricultural extension services)	Political access	
	Infrastructure / logistics	Provision of land and supporting infrastructure		
		Democratic legitimacy		

Source: The Partnering Initiative[48]

In essence, cross-sector collaboration on MSPs can make these projects much more effective in addressing challenges that are too big, complex, risky or costly for any single entity to solve alone. Uniting diverse perspectives, skills and knowledge can generate more innovative and

48 Source: The Partnering Initiative, "An introduction to multi-stakeholder partnerships." November 2016. Available at: https://archive.thepartneringinitiative.org/wp-content/uploads/2017/03/Introduction-to-MSPs-Briefing-paper.pdf. Accessed April 7, 2025.

creative solutions and ensure that the project team is equipped with all the relevant expertise it needs to implement effective solutions. Combining the range of resources contributed by a variety of stakeholders – funding, technology, expertise, data or insights – can result in greater impact on an issue.

Cross-sector collaboration on MSPs can make projects much more effective in addressing challenges that are too big, complex, risky or costly for any single entity to solve alone.

Partnerships between private actors and local government entities can help increase familiarity with and accelerate official procedures, compliance and authorizations. MSPs can help foster economic growth by developing new commercial and investment opportunities for domestic investors, as well as foreign direct investment (FDI) and increasing competition in the provision of public services. Foreign actors can partner with local actors to gain a foothold and access new markets.

MSPs can also increase buy-in to these projects among members of the public. When multiple stakeholders are involved, particularly government and community-based non-profit stakeholders, this can bring a sense of legitimacy and public trust to the project. Community members who have directly engaged with these non-profits will take their involvement as a sign that they can comfortably engage and are not being scammed or somehow misled, and government involvement can also bring a certain level of security and trust among the populace.

Potential Disadvantages of MSPs

The main disadvantage of these MSPs is that the managerial complexity of ensuring efficient collaboration among all of these stakeholders may result in a failure to realize many or any of these benefits. By nature, MSPs are more complex than projects undertaken by a single organization – the more stakeholders that are involved in a project, the more opportunities for miscommunication, misalignment or differences in approach. While there are many benefits of involving different types of stakeholders in a single project, coordinating the activities of multiple organizations and ensuring continued alignment and coordination can prove challenging. Without robust project management practices and clearly defined roles, MSPs may be prone to fail.

These differences can also start early, and lead to delays in even establishing MSPs and associated projects. Differences in working styles, motivations and goals can lead to longer and more complex project planning, due to the different nature of the parties involved. The initial planning phase is when cultural clashes, and potentially contradictory aims and incentives, can come to light most starkly. If incentives cannot be aligned and a common work culture established, the project may fail before it ever actually gets off the ground.

Another risk is changing incentives or expectations and shifting commitments among different stakeholders. MSPs are designed for long-term collaboration, but changing dynamics and priorities within stakeholder organizations may lead to unplanned, early exits from the project by stakeholder organizations integral to its success. Partners may fail to honour their commitments, which may mean that the partnership stalls, falls apart or ends in expensive litigation in the courts.

An additional note of caution about MSPs is their track record of success. **Information asymmetries exist with regards to the outcomes of MSPs, and more specifically, how often these projects can actually accomplish their goals and offer sustained benefits**. MSPs that are not successful are unlikely to publicize their failures; these failed projects usually simply and quietly cease to exist, without fanfare. It is generally harder to find information about MSPs with problems and difficulties than it is to find MSPs that have proven successful, which can paint a rosier picture of the benefits of MSPs (and their track record of success) than warranted. Such information asymmetries mean that stakeholders considering embarking on MSPs may not have a full understanding of some of the key issues that practitioners may run into when attempting to operationalize MSPs. The following section highlights key recommendations on how to set partnerships up for success.

2. Practical Recommendations for Building Sustainable Partnerships

MSPs offer a collaborative approach that will be essential for closing the digital divide efficiently, and as quickly as possible. How can stakeholders successfully maximize the advantages of partnerships, minimize the disadvantages and reflect the on-the-ground realities of what it takes to build and sustain a successful MSP?

To answer this question, interviews were conducted with digital sector veterans who have successfully envisioned, built and led sustainable MSPs and PPPs that have had a noticeable impact on achieving universal, meaningful Internet connectivity. The report presents seven harmonized recommendations based on the feedback of all interviewees.

Figure 22: Recommendations for developing successful MSPs

Source: ITU, using information from experienced multistakeholder partnership leaders

Recommendation: Understand and acknowledge political realities.

As noted above, the political and regulatory environment can determine the success or failure of connectivity projects. For infrastructure projects, national and local governments issue permits and licenses that enable projects to get off the ground and, in some instances, can serve as potential funders. Historically, telecommunication and connectivity projects have required a range of permits and authorizations, from national telecom licenses to operate or spectrum licenses (from national Ministries and regulators), to local rights of way, land permissions or mast authorizations (from local authorities or planning departments). Governments also can take steps to stimulate demand for services, such as through digital transformation initiatives, reducing taxes and duties, and implementing digital skills programmes. Therefore, **it is essential that any stakeholder that is attempting to build a multistakeholder project should consider both the national and local political environment, and design the project (and choose the stakeholders involved) accordingly**. Approaches to addressing the political reality in the design of projects vary significantly.

MSP leaders will often incorporate both national and local government as stakeholders to facilitate a more successful project. Connectivity projects, when successful, can engender enormous goodwill among newly served populations, and many government leaders view them as opportunities to achieve important policy goals and to build political capital. When governments are formally involved in projects, they may offer proactive support, add credibility and prove powerful advocates (within the community and to other policy-makers).

Some MSP leaders design their services and make technology choices to minimize the need for licenses or other forms of government support, such as funding. These projects aim to avoid delays due to potentially slow-moving bureaucracy and changing political dynamics and priorities. At the same time, these MSP leaders still engage significantly with local stakeholders, including local governments and community groups and members, which they view as critical to their project's success.

Whichever approach is taken, practitioners had the most success when taking the national and local political environment into consideration from the start, and understanding the role of local, regional and national governments in the success of the project.

Recommendation: Ensure that there is a value proposition for every stakeholder organization and deliver on it.

The best way to successfully sustain a long-term MSP is by **ensuring that every stakeholder derives some form of value from the project** – whether a direct financial benefit or some other direct or indirect benefit (such as increased market opportunities, economic development or reputational benefits). For leaders of MSPs, understanding which specific value each organization is deriving from the project – and continuing to shape the project with that value-proposition in mind – is critical for long-term success. If stakeholder organizations do not see their needs prioritized and do not derive desired value from the project, these stakeholders are unlikely to remain committed to the partnership over the long-term. Regular communication and alignment about the value each stakeholder derives from the project is critical to ensure that their buy-in is sustained. Ultimately, to sustain engagement, the project must deliver on each stakeholder’s value proposition.

Recommendation: Include organizations that are essential to project success; avoid non-essential stakeholders.

Another important recommendation is **ensuring that every stakeholder adds specific value and expertise that leads to project success**. Sometimes, potential stakeholder organizations will approach project organizers seeking to contribute to or otherwise be involved in the project. However, some of these stakeholders may not bring new expertise or resources to the project. In this case, all practitioners recommended avoiding including these groups as formal project stakeholders. Having organizations with significant brand recognition or senior politicians onboard may appeal to some project leaders, given the expertise and credibility that those types of stakeholders can bring. However, unless these leaders have a vested interest in the project and can facilitate its deployment, these stakeholders invariably add complexity to the project (though in some project contexts, their participation may be a vital and necessary input for success).

Project organizers should focus on recruiting participating organizations that:

- Can fill concrete, identified roles;
- Have the institutional capacity to contribute the resources, staffing and expertise necessary for project success;
- Provide relevant expertise that would not otherwise be available for the project;
- Bring legitimacy to the project in the eyes of the targeted community; and/or
- Offer necessary funding on agreeable terms.

Recommendation: Ensure that the right people (not just organizations) are engaged in the project.

Attracting committed and aligned stakeholders with the right expertise is one of the most critical elements for establishing successful MSPs. This was affirmed in each interview conducted. However, ensuring the presence of the right stakeholder organizations is not enough. Several interviewees also noted that the **specific individuals who are on the project team representing different organizations can also make or break the success of the project**. According to the practitioners interviewed, it is critical to have project team members from each stakeholder organization who are:

- Technically knowledgeable with deep experience on the element that the stakeholder organization is expected to bring to the project (*i.e.*, if the stakeholder organization is expected to develop a curriculum for digital skills training, the project team representative should have established expertise in digital skills training).
- Passionate about the project.
- Junior enough to be involved in day-to-day decision-making and to actively participate in project execution, but sufficiently senior and empowered to make relatively independent decisions and to be able to engage with organizational leadership to ensure their continued buy-in. Leaders of stakeholder organizations should be engaged in the project, perhaps in the form of principals' meetings or other specific, principals-focused communications. However, deploying the project usually requires the regular participation of someone who can devote more attention to that stakeholder organization's role.
- Eager to engage and work collaboratively.
- Expected to be available for the duration of the project's deployment (and ideally beyond for learning and scaling). Having the same project team participate in the full project development process, from planning to successful deployment, helps to maintain stakeholders' understanding of the alignment of interests and provides institutional knowledge that can be useful in establishing MSPs.

Assembling a highly motivated, collaborative and knowledgeable project team of representatives from each stakeholder organization will ensure that there is active involvement in the project from all stakeholders, enable rapid decision-making and problem-solving, and ensure the project has the optimal resources and support to help ensure long-term success.

Recommendation: Know the communities you will serve with the project, what benefits they expect from it and build strong relationships.

Several MSP experts noted that ensuring a project's long-term success requires robust, long-term local community support and engagement. This can help make projects relevant to communities' real needs (rather than perceived or imagined needs) and also minimizes the risks of unintended consequences.

In the project design phase, project leaders should focus on **understanding the communities' real needs in the context of the initial project goals**. Who are the key political and economic stakeholders in the community and what is the best way to engage, partner and work with them? Are there unique cultural considerations or power dynamics that should be reflected in project and service design? Are there opportunities to employ community members throughout the project lifecycle, including in positions of management? For adoption-focused projects, what is the value the community places on connectivity? How are land rights managed in the community? Understanding the community's perceptions and needs relative to the specific goals of the project **will help project leaders shape the project to form partnerships with relevant community stakeholders, address the community's needs and communicate the benefits of the project to the community members.**

Once the project is deployed, **continued engagement with community members will remain essential to get ongoing feedback from the community both about the project itself and the deployment process.** This gives the project team an opportunity to correct any misconceptions, to provide updates on timelines and the rollout process, and to continue to build trust and rapport with members of the community. Stakeholders of the MSP should make regular visits to the project area to engage with the local community. For example, one of the MSP experts interviewed for this section – a C-suite executive for a significant African ISP – visits his projects on a weekly basis to build community engagement.

Some of the MSP experts interviewed noted that **including a trusted local organization** as a stakeholder in the project can be extremely beneficial in developing relationships with the local community. Some MSPs involve unfamiliar stakeholders (such as international organizations or multinational corporations), which may lack local context and be met with skepticism from local community members. Local partners bring a sense of familiarity to the project for community members.

If prospective partners are not familiar with each other, significant due diligence is required to understand each partner's reputation, track record of success, technical, financial, and managerial capabilities, and other key factors. While there is significant potential benefit in finding new and varied partners, choosing the wrong partner can ultimately undermine the success of an MSP.

Recommendation: Align on realistic expectations through clear communication, including with the communities the project serves and any funders who have invested in it.

Once project leaders have developed a deep understanding of their partners and the communities they plan to serve, it is important to have clear communication with them. Particularly when bringing connectivity projects to previously unserved areas or communities where Internet use is extremely low, **it is essential to establish the project and the associated stakeholders as trustworthy actors who deliver on their promises.** Interviewees, and particularly those with MSPs focused in more rural and low-income areas, expressed that **MSPs in these**

areas that fail to meet expectations can erode community trust in the project, as well as in the benefits of connectivity in general.

Multiple MSP leaders interviewed also expressed the particular importance of having **clear, explicit and mutually agreed-upon expectations established with any funders of the project, particularly those offering loans or investments**. Lenders and equity investors require positive financial returns on investment and often prefer companies seeking to maximize revenue and growth. At the same time, different lenders and investors have different risk profiles, expertise and areas of focus. For example, infrastructure-focused funders are often less tolerant to risk than, for example, a tech-oriented venture capital investor, but more willing to accept a lower rate of return over a longer period of time. Likewise, a socially-oriented impact funder – backed by DFIs – might seek social returns beyond traditional profitability measures. To that end, **project leaders should develop and communicate a plan for providing a return on investment and what the expected return will look like. The timeline should be clear and explicitly discussed to ensure mutual understanding.** Particularly when deploying new business models or bringing Internet service to previously unserved areas, it might take longer to see meaningful financial returns on investments, or financial returns might be smaller than an investor would expect in a more developed market or dynamic sector.

Recommendation: Consider long-term sustainability and scalability from the outset.

Having built trust and goodwill with stakeholder organizations, investors and the community, the next step is ensuring the long-term success of the project. Several of the MSP experts noted the importance of **planning for success to the maximum extent possible, even in the initial project design and planning stages,** which makes it clear to all stakeholder organizations that the project is a long-term commitment, that it may expand its reach or scope of work, and that these organizations should also be planning for long-term participation. This is equivalent to focusing on initiating long-term needs and processes, rather than shorter-term project deliverables. Additionally, it should **allow stakeholders to plan preemptively for and address considerations that only come up if the project is a success, but that will be important for maintaining the viability of the project and measuring its effectiveness.** If the project depends on external funding, what are the potential sources of that funding? Can long-term funding commitments be secured? How regularly will project results be reported publicly, and how will project leaders track and measure success? Could the project be expanded, and what additional burdens might this growth place on project stakeholders? Can the project scale to serve other areas, and is there an appetite for that among project participants? How will you decide what areas to target when scaling? Contemplating these questions will allow stakeholders to design the project for long-term viability.

3. Action Blueprint Partnership Framework

Based on the MSP best practices and recommendations described above, the Action Blueprint Partnership Framework provides a practical approach that operationalizes the recommendations above and provides a roadmap to developing sustainable partnerships that make an impact on achieving universal, meaningful Internet connectivity. From the pre-planning phase and throughout the ongoing operation and close-out of the project, the framework emphasizes consistent alignment, planning ahead, clear communication with all stakeholders (including the target community the project will serve), and assembling the right organizations and individuals for the project team. The framework is visualized in the Figure below.

Figure 23: Action Blueprint Partnership Framework

Source: ITU, using information gathered from experienced multistakeholder partnership leaders

This framework does not cover specific situations that may arise when deploying and operating an MSP (such as what happens if a stakeholder drops out of the project or if one or more partner organizations notifies the project leader of a misalignment of incentives). These situations may require a more case-specific approach.

D. Case Studies – Strategies that Work

In addition to substantive policy measures, closing availability and adoption gaps by 2030 will also require the deployment of a multitude of programmes and projects designed to address connectivity needs.

To close the digital divide, governments have partnered with international organizations, DFIs, the private sector and civil society to leverage various creative, thoughtful and replicable strategies to achieve universal, meaningful connectivity in different countries. While new approaches should be encouraged, stakeholders might deliver the greatest impact by focusing on strategies and programmes with a proven track record of measurably addressing barriers to universal, meaningful connectivity. This also ensures that the limited attention, time and financial resources of project partners and stakeholders are used most wisely and effectively.

Each of the case studies selected:

- Addresses at least one gap in achieving universal, meaningful connectivity
- Stimulates private sector investment while furthering key policy priorities
- Leads to improved lives and livelihoods in impacted areas

This section highlights selected strategies that have a proven track record of success in closing national or regional broadband availability and adoption barriers, which may serve as inspiration for stakeholders seeking to address similar issues in other countries or regions.

Table 3: Case studies featured and gaps addressed

CASE STUDY	GAP(S) ADDRESSED			
	1	2	3	4
	Infrastructure	**Affordability**	**Skills**	**Policy and Regulation**
Brazil's Connected North Initiative	✓			✓
Colombia Low-Cost Smartphone Tax Exemption		✓		✓
Healthcare Electrification and Telecommunications Alliance	✓	✓		
India 4G Saturation Project	✓			✓
Malaysia Regulatory Intervention	✓	✓		✓
ITU's Digital Transformation Centre Initiative			✓	
Ghana's Girls in ICT Trust			✓	✓
Connecting the Kingdom of Saudi Arabia: Advancing Digital Inclusion Through Vision 2030	✓			✓

1. Brazil's Connected North Initiative

The Challenge

Brazil enjoys a unique natural heritage, characterized by vast geographical diversity and a population of over 215 million people, including many native and indigenous communities. While the country's urban areas are home to robust broadband infrastructure, large parts of Brazil struggle with limited Internet access and connectivity issues, especially in its northernmost regions. Northern states such as Amazonas, Acre and Maranhão lag significantly behind the rest of the country in terms of broadband availability and adoption,[49] due to their incredibly dense forests and predominantly rural areas with low population densities, which make broadband costly to deploy. Given that these are rural areas, it is difficult for an ISP to recoup high average and marginal deployment costs through its revenues, which has limited the willingness of network operators and ISPs to operate there. The lack of available road and power infrastructure in these areas also makes backbone and last-mile networks very difficult to deploy and maintain and can further increase costs.

The Project

To solve this problem and bring connectivity to the region, the Government of Brazil helped create the Connected North project. This project is deploying a sub-fluvial fibre backbone network through the Amazon River to cover 10,000 km and reach 59 previously unconnected municipalities, operated by a consortium of eight ISPs and providing high-speed broadband access to last-mile providers on a non-discriminatory basis. The project will benefit approximately 10 million Brazilians. Through this initiative, the government was able to fund the CapEx of broadband deployments by reinvesting 5G spectrum auction revenues. A consortium of providers is responsible for operating and maintaining the backbone network, and for covering the OpEx of the network, once it is deployed. They also have the technical capacity and expertise to successfully manage the network day-to-day in a way that government may not.

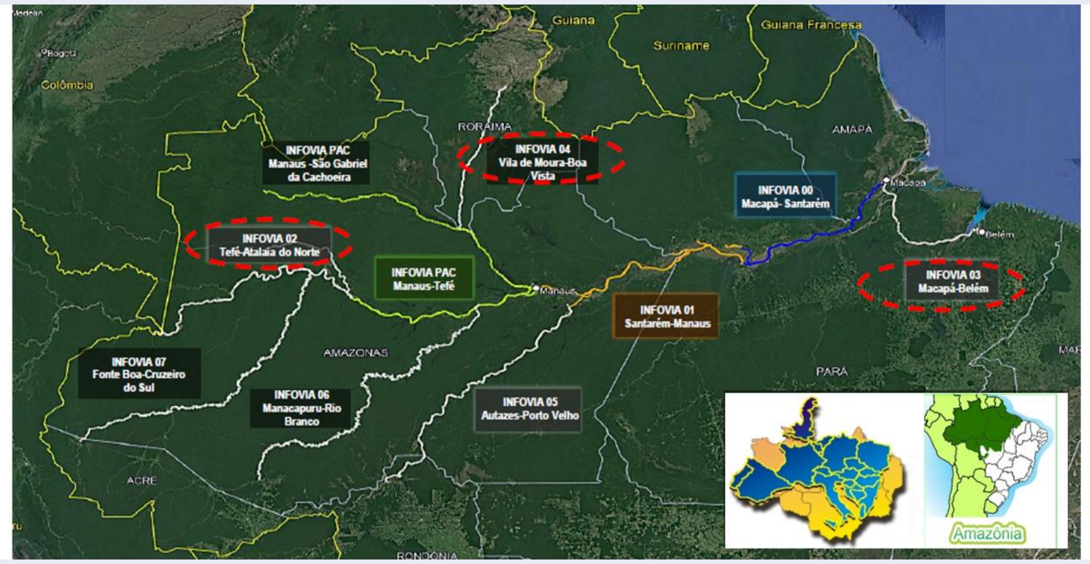
Further ongoing funding is sourced from the private sector, but the government remains a key stakeholder in the consortium (given that they covered the initial CapEx costs) and continues to play an oversight role, ensuring that project deployment remains on schedule and that access to the backbone is being provided on a non-discriminatory basis. Access to the network is also provided to federal, state and local government buildings, which helps make operations more efficient and expands access to government services in these rural areas.

[49] Niccolo Comini, Niccolo Gozzi, and Nicola Perra for the World Bank. "Bridging Brazil's digital divide: How internet inequality mirrors income gaps." June 2024. Available at: https://blogs.worldbank.org/en/digital-development/bridging-brazil-s-digital-divide--how-internet-inequality-mirror. Accessed April 7, 2025

(continued)

1. Brazil's Connected North Initiative

Figure 24: Planned segments of the Connected North fibre network



Source: Brazil Ministry of Management and Innovation

Innovation

Historically, the vast majority (around 90 per cent) of spectrum auction revenues in Brazil have gone directly into the national government's treasury (often the case in other countries as well), to be spent on government priorities. These revenues have been directed toward other important government needs, leaving a sizeable digital divide, particularly in rural and remote areas. Policy-makers in Brazil therefore changed the way that the proceeds from auctions were distributed. Instead of the majority of spectrum auction revenues going into the treasury, such revenues are now invested in a telecommunication innovation fund, used specifically for supporting telecommunication advancement and closing the digital divide in Brazil. By ensuring that funds are reserved for this specific purpose, Brazil has been able to boost funding for the initial CapEx investment, which led to robust participation in the partnership by the private sector, both from large-scale leading ISPs and smaller service providers.

Results

Given its size and scope, 10,000 km of fibre deployment has been split into eight segments. The first two segments have been completed and deployed, making high-speed broadband available for the first time to thousands of people in the Amazonia region. These two segments have been deployed on schedule, while the next six segments are advancing. This model could be replicated in other countries looking to bridge their broadband availability and adoption gaps.

(continued)

1. Brazil's Connected North Initiative

Gaps Addressed

By using novel deployment approaches to expand the availability of backbone fibre through an innovative use of spectrum auction proceeds, this project has helped address the **infrastructure** and **policy and regulatory gaps** in Brazil.

2. Colombia Low-Cost Smartphone Tax Exemption

The Challenge

Colombia is a country where a significant portion of the population – approximately 40 per cent – lives in poverty. For these very low-income households, the affordability of service, as well as broadband capable devices, is a large barrier to high-speed Internet connectivity and the utilization of digital services. Until 2016, Colombian government policies tended to compound affordability problems by adding a value-added tax (VAT), a customs duty and a customs service tax, which amounted to 22.2 per cent of the cost of smartphone devices. This has put already-expensive smartphones out of reach for many consumers. For example, based on analysis conducted for this report, 14 per cent of all Colombians aged 15 and over cannot afford the full cost of a USD $30 smartphone. The affordability gap is obviously most severe for the lowest-income 40 per cent of the total population, with 36 per cent of the population unable to afford the full cost of a USD $30 smartphone.

The Project

To increase smartphone purchases throughout Colombia, in particular among lower-income populations, the Colombian government eliminated the taxes and customs duties on lower-end smartphones (defined as those costing less than USD $245). Colombia's average per capita income is approximately USD $18,000,[50] meaning that USD $245 mobile devices fall into the "affordable" range for the average Colombian (although these still remain very unaffordable for the bottom 40 per cent of the population, many of whom are unable to afford the full cost of a USD $30 smartphone). The effect of eliminating taxes and customs duties on smartphones was two-fold: 1) It immediately lowered the cost of these devices by a significant amount, making them more affordable for consumers; and 2) It incentivized device manufacturers who were pricing their products above that threshold to find ways to further lower the costs of their devices, making them affordable for more Colombian consumers. This policy change also helped eliminate the public perception that smartphones were luxury items.

[50] World Bank Group. "Data Indicators: Gross National Income Per Capita, PPP: Colombia." 2023. Available at: https://data.worldbank.org/indicator/NY.GNP.PCAP.PP.KD?locations=CO. Accessed April 7, 2025.

(continued)

2. Colombia Low-Cost Smartphone Tax Exemption

Innovation

Eliminating the taxes and duties on low-cost smartphones based on their price is an innovative regulatory strategy in itself. However, the Colombian government partly compensated for this loss of tax revenue by increasing the VAT tax on certain categories of digital services and expanded the definition of what fell into those categories. The increase was relatively small – from 16 per cent to 19 per cent – but the government's strategy of increasing smartphone adoption meant there were also more consumers for these digital services, meaning the government had a wider base from which to collect these other taxes. By using tax reform to eliminate a gateway barrier to broadband adoption, Colombia also increased subscribers and activity in their digital economy and expanded the base for other revenue-collecting opportunities.

This initiative was also undertaken in the context of a broader effort to close the digital divide. Colombia adopted the same tax and duty elimination reform for low-cost laptops (those under USD $550) and undertook other reforms in the mobile sector to expand access and improve adoption.

Results

Since eliminating taxes and customs duties on smartphones, Colombia now has one of the highest smartphone adoption rates in Latin America. In 2016 (prior to eliminating these taxes and import duties), Colombia's smartphone ownership rate was 34 per cent.[51] By 2021, smartphone adoption had increased to 76 per cent.[52] Partly as a result, Colombia's Internet traffic has also grown significantly.

Gaps Addressed

By significantly reducing the cost of devices through a regulatory approach, this project has helped to address **affordability** and **policy and regulatory gaps** in Colombia.

[51] BNAmericas. "Colombian smartphone penetration reaches 34% in 2016." May 2017. Available at: https://www.bnamericas.com/en/news/colombian-smartphone-penetration-reaches-34-in-2016. Accessed April 7, 2025.

[52] Media and Journalism Research Center. "Colombia: Technology, Public Sphere, and Journalism." January 2024. Available at: https://journalismresearch.org/2023/08/colombia-technology-public-sphere-and-journalism/#:~:text=In%202021%2C%20the%20national%20level,highest%20ownership%20penetration%20at%2085.3%25. Accessed April 7, 2025.

3. Healthcare Electrification and Telecommunications Alliance

The Challenge

One of the areas where the digital divide can result in the greatest negative consequences is in the delivery of healthcare services. There are over 100,000 healthcare centres and clinics in sub-Saharan Africa that lack access to even basic connectivity, either mobile or fixed. Many of these facilities also lack access to reliable electricity, cutting them off from the online resources, digital services and communication capabilities connectivity brings, seriously impacting the care they can provide. While alternative energy systems such as solar power are becoming available, they usually have high upfront and maintenance costs, which can prove unaffordable for supporting organizations.

The Project

To comprehensively address the infrastructure needs of local healthcare centres, a consortium of five flagship partners (USAID, Abt Global, RESOLVE, bechtel.org and Orange) launched the Healthcare Electrification and Telecommunications Global Development Alliance (HETA). Through this alliance, the partners supported local healthcare centres with funding, technical resources and in-kind assistance to deploy and maintain renewable energy infrastructure linked directly to mobile or fixed broadband networks. HETA and its founding partners engaged directly with companies that have developed market-based, sustainable solutions for off-grid energy and connectivity solutions (which could also create revenue-generating opportunities for the clinics themselves) and selected over 15 partners with different solutions that could be deployed to healthcare clinics in various contexts. HETA deployed a model of working directly with selected healthcare clinics to understand their needs and identify the appropriate solutions, provide technical assistance and expertise during the deployment, and support ongoing monitoring and maintenance through funding and technical support.

Innovation

Access to reliable electricity has been a significant barrier to deploying broadband networks in certain areas and regions. Advances in renewable energy solutions mean that locations no longer need to be connected to a grid to have a reliable source of power, but the costs of these systems can place them out of reach for many of the communities, households and businesses who would benefit most from basic electrical power. Healthcare centres need both reliable energy and connectivity, and their status as community hubs positions these locations as places where the community-at-large could benefit from the power and connectivity delivered. Deploying complementary, co-located infrastructure for both power and connectivity, along with technical support, can help ensure reliable service and improve the quality of care offered by these healthcare centres to the community at large.

(continued)

3. Healthcare Electrification and Telecommunications Alliance

Results

As of 2023, the programme provided 301 healthcare centres with energy access and 262 with reliable connectivity in four countries (the Democratic Republic of the Congo, Eswatini, Tanzania and Nigeria). Additional planning and partnership development also occurred in seven countries (Guinea, Kenya, Malawi, Mozambique, Sierra Leone, Uganda and Zambia). In total, nearly two million people are benefiting from higher quality healthcare at these locations.[53]

Gaps Addressed

By expanding access to both sustainable, affordable broadband solutions and increasing the affordability of essential infrastructure, this project has helped to address **infrastructure** and **affordability** gaps in eleven countries in sub-Saharan Africa.

4. India 4G Saturation Project

The Challenge

India has the largest population in the world, many of whom live in rural, remote and/or mountainous areas. The country's telecom market is sizeable and robust, with many private and state-run operators competing with each other. However, like many other largely privatized markets, concerns about the profitability of networks in low-population density areas have constrained private investment in rural areas, and much of India's rural population has remained unserved by either mobile or fixed broadband service. India's government has therefore focused on how it can expand access to both mobile and fixed broadband service as quickly and efficiently as possible.

The Project

To expand access to 4G mobile services, the Indian Government initiated the 4G Saturation Project. This project provided funding to the national state-run service provider, Bharat Sanchar Nigam Limited (BSNL), to reach 24,680 previously unconnected villages with 4G service and to upgrade 2G and 3G infrastructure in 6,279 additional villages to 4G service. The project specifically focuses on 4G saturation as opposed to other mobile technologies because of its ability to provide both voice and mobile broadband service through the same network. By expanding 4G coverage in these rural areas (where network congestion is less of an issue, because the density and number of users are relatively low), the Indian Government was able to address voice and mobile broadband availability. The project also prioritizes the deployment of solar-powered infrastructure in areas without electrical service or with unreliable power grids.

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53 Health Electrification and Telecommunications Alliance (HETA). "2022-2023 HETA Annual Report." Available at: https://www.hetaglobal.org/report/. Accessed August 5, 2025.

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4. India 4G Saturation Project

Innovation

Supporting this project required the government to make available significant funding to deploy extensive new infrastructure across India. India was able to operationalize a programme like this because of the way that it has designed its Universal Service Fund. India's Universal Service Fund is divided into different subcomponents, with funding allocated for things like supporting innovation, supporting service affordability and funding the deployment of infrastructure to unserved and underserved areas. By having a dedicated source of funding for closing the broadband availability gap in the country, India was able to quickly operationalize the 4G Saturation Project.

Results

As of October 2024, over 6,600 villages had been connected to a 4G network by installing more than 4,900 4G mobile towers through this project. This project has succeeded in connecting nearly 3 million previously unserved individuals that now have access to mobile voice and broadband services. Gaps Addressed

By significantly expanding the availability of 4G broadband infrastructure to previously unserved, rural areas in this manner, the project is helping to address the **infrastructure** and **policy and regulatory gaps** in India.

5. Malaysia Regulatory Intervention

The Challenge

Up until 2018, Malaysia faced lagging Internet speeds and lower rates of fixed broadband penetration and use compared with other countries in the East Asia and Pacific region, including those with similar demographics. At the time, a World Bank study found that this was at least partly due to limited competition in the broadband sector. Up until 2018, Malaysia had the most concentrated broadband sector in all of East Asia and the Pacific for a country with a population over one million people, with a single company controlling 90 per cent of the market. One of the ways that this company was maintaining dominance was by making it prohibitively expensive (and logistically challenging) for smaller ISPs to connect to its backbone infrastructure, raising prices and resulting in generally lower average Internet speeds in Malaysia, because customers could only afford the most basic Internet packages.

The Project

To encourage competition in the sector and drive lower prices and improved user experience, in 2018, the regulator, the Malaysian Communications and Multimedia Commission (MCMC), took steps to actively eliminate some of the barriers preventing the entry of additional, non-incumbent providers into the market. Specifically, the MCMC sought to make it easier for last-mile service providers to access the backbone fibre infrastructure owned by the incumbent.

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5. Malaysia Regulatory Intervention

Innovation

The MCMC issued regulations that control the price that the incumbent can charge as well as conditions on the process for alternative providers to connect to the incumbent's wholesale fibre network (*e.g.*, ensuring that it is made available on a non-discriminatory basis, and that the incumbent cannot create additional technical or managerial complexity that would prevent alternative service providers from making use of this wholesale capacity). These regulations allowed for more small providers to enter the market and for existing service providers to lower the costs of fixed broadband packages considerably.

Results

The impact of implementing this regulatory intervention was extremely positive. Within a year, the average fixed broadband connection speed was three times higher than it had been at the beginning of 2018.[54] Malaysian consumers immediately started subscribing to higher speed services, because lower prices made higher speed packages affordable to more consumers. On average, the price of fixed broadband service in Malaysia fell 44 per cent between 2018 and 2019,[55] and the number of subscriptions to 100 Mb/s fixed broadband increased by a factor of eight during the same period.[56] Facilitating less expensive access to wholesale fibre for alternative providers has also led the incumbent provider, which still maintains a dominant position in the market (although their market share has reduced by 20 per cent since the adoption of this new regulatory approach), to lower its wholesale prices in order to compete with new entrants. Gaps Addressed

By making regulatory and policy reforms that enhance competition and improve the affordability and availability of services, this regulatory intervention helped address the **infrastructure**, **affordability** and **policy and regulatory gaps** in Malaysia.

54 Siddhartha Raja and Richard Record for World Bank Blogs. " Malaysia's need for speed: How regulatory action is unleashing ultrafast Internet." August 2019. Available at: https://blogs.worldbank.org/en/eastasiapacific/malaysias-need-speed-how-regulatory-action-unleashing-ultrafast-internet. Accessed April 7, 2025.

55 https://cdn.twimbit.com/uploads/2023/11/09141131/State-of-malaysia-telco-2023.pdf. Accessed April 7, 2025.

56 Siddhartha Raja and Richard Record for World Bank Blogs. " Malaysia's need for speed: How regulatory action is unleashing ultrafast Internet." August 2019. Available at: https://blogs.worldbank.org/en/eastasiapacific/malaysias-need-speed-how-regulatory-action-unleashing-ultrafast-internet. Accessed April 7, 2025.

6. ITU's Digital Transformation Centre Initiative

The Challenge

Digital skills are a key factor in closing the digital divide. By acquiring basic and above-basic digital skills, consumers can make more meaningful use of their Internet connectivity and do so safely and securely. While only limited data is available about digital skills at the global level, there is universal recognition that digital skills gaps exist, particularly in historically unserved areas and among older populations, those with low-incomes, and those with low levels of education. Beyond basic digital skills, there is also a major need for more advanced digital skills training and for digital skills training specifically for entrepreneurs and small-sized businesses, particularly in countries that have historically faced larger broadband availability and subscription gaps.

The Project

To address these critical gaps and prepare individuals to make meaningful use of connectivity, the ITU launched the Digital Transformation Centre Initiative in partnership with Cisco in 2019. Through this initiative, the ITU, Cisco and Hewlett-Packard (HP) partner directly with governments – and/or national institutions endorsed by the government in the host country – to collaboratively develop a network of in-community digital skills training centres. Governments (or endorsed institutions) provide the infrastructure, funding and staffing to provide training. In exchange, ITU and Cisco train the trainers and provide access to training curricula and resources. Once the partnership is established, ITU and Cisco work collaboratively with governments to identify and engage local in-country partners who can help mobilize the community to take advantage of these resources.

Innovation

This project represents a unique and innovative style of collaboration. In many cases, governments have sufficient infrastructure and staffing capacity to support digital skilling programmes but do not have the in-country expertise to develop digital skills training curricula that will be effective and personalized to the country's individual context. By contrast, organizations like the ITU, Cisco, and HP have the expertise to develop curricula but lack the in-country staffing and infrastructure, as well as the legitimacy with the population to conduct trainings themselves and solicit widespread participation. By leveraging external expertise through the ITU and its private sector partners, along with the internal capacity of governments, this initiative has been able to deploy training programmes across countries that are effective in increasing digital skilling and reach as large a population as possible.

(continued)

6. ITU's Digital Transformation Centre Initiative

Figure 25: Students at a Digital Transformation Centre in the Dominican Republic

Source: ITU

Results

The first phase of the project ran from January 2020 – August 2021, and included nine Digital Transformation Centres, concentrated in regions with significant broadband use gaps in Asia Pacific, the Americas and Africa. Although the first phase occurred during the height of the COVID-19 pandemic, over 106,000 individuals received digital skills training during phase one. Significantly, 65 per cent of trainees were women. This project proved successful and a second, expanded phase was initiated in 2021, which has resulted in the creation of five more Digital Transformation Centres.

Gaps Addressed

By expanding access to digital skills programming through the deployment of community-based digital skills training centres, this project has helped to address the **digital skills gap** in countries across Asia Pacific, the Americas and Africa.

7. Ghana's Girls in ICT Trust

The Challenge

Like many developing countries, Ghana faces not just a significant digital divide impacting the general population, but also a gender digital divide, with a lower percentage of women and girls accessing the Internet than men and boys. Ghana's gender gap in Internet use is 5.8 per cent, but the gap in meaningful connectivity – which means having sufficient speeds, access to a device and access to sufficient data capacity at an affordable price – is more than twice as large, at 14 per cent.[57] Ghana faces a particularly large gender gap in digital skills.[58] Achieving universal, meaningful Internet connectivity means ensuring that all people, irrespective of gender, are both using the Internet and benefiting from the broader socio-economic advantages that connectivity can enable. In countries where gender gaps persist, like Ghana, specific interventions are needed to address connectivity, affordability and digital skills needs among women and girls.

The Project

To address this challenge, Ghana created the Girls in ICT programme in 2017 (which was later solidified as the Girls in ICT Trust in 2024). The Trust focuses on engaging with girls through age-appropriate resources over the course of their education and early career. During primary school, the Trust focuses on encouraging girls' participation in Science, Technology, Engineering & Mathematics (STEM) and incorporating digital skills training into existing educational opportunities. This is accomplished through monthly community engagement sessions, as well as trainings provided directly to teachers, who can then go back into the classroom and provide the same training to students. Once students are in secondary school, the Trust offers them fully accredited trainings and certifications focused on digital skills and STEM competencies, including a laptop distribution component. Once students have exited secondary school, the Trust offers networking opportunities, including an extensive mentorship program, to facilitate the employment of young women in STEM fields. This work has been complimented with the creation of Cyber Labs that are specifically designed to be safe spaces for women and girls to continue to hone their digital skills and to develop their own Internet-based projects.

The Government of Ghana partners with numerous organizations, including Oracle, the Tony Blair Institute, the United Nations Development Programme (UNDP) and USA for Africa to provide these services. The Trust also engages directly with individual community-based organizations and schools in each of Ghana's 16 regions to publicize the programme and recruit participants.

57 Paul Gilbert for Connecting Africa. "New report shows digital gender gaps in Ghana, Uganda." October 23, 2020. Available at: https://www.connectingafrica.com/women-in-tech/new-report-shows-digital-gender-gap-in-ghana-uganda. Accessed April 28, 2025.

58 *Ibid.*

(continued)

7. Ghana's Girls in ICT Trust

Innovation

The success of this project is underpinned by Ghana's financial investment in an initiative specifically focused on enabling opportunities for women and girls. By providing sufficient seed funding to establish a long-term trust, the Ghanaian government created a programme that has long-term funding certainty and can support women and girls at different stages of their educational and professional development. By creating a comprehensive programme that includes both skills acquisition and professional development support, the Trust allows women and girls not only to obtain digital skills, but to actually use those skills to their advantage and deliver real socio-economic benefit to themselves and their families.

Results

As of 2024, approximately 7,000 girls and 1,000 teachers have received training through the program. The Trust has also created 51 Cyber Labs and distributed over 1,100 laptops. Ghana expects to provide training to 9,000 girls per year through this program.

Gaps Addressed

By leveraging government resources and policymaking to support gender parity in digital skills, this project has helped to address the **skills** and **policy and regulatory gaps** in Ghana.

8. Connecting the Kingdom of Saudi Arabia: Advancing Digital Inclusion Through Vision 2030

The Challenge

Saudi Arabia, with its vast territory spanning deserts, mountains and rural regions, faced a unique challenge in ensuring that all its citizens have access to high-speed Internet. While urban centres such as Riyadh, Jeddah and Dammam enjoyed advanced telecommunications infrastructure, many rural and remote areas remained underserved or entirely unserved. As Saudi Arabia advanced its Vision 2030 agenda, launched in 2016 to diversify its economy and enhance digital inclusion, the government recognized that nationwide broadband connectivity was a foundational requirement. Low population densities in remote regions and the high costs associated with network deployment in challenging terrains had historically constrained private investment, necessitating direct government intervention to bridge the digital divide.

While the urban centres of the Kingdom did have advanced infrastructure, telecommunication services in more remote areas were limited due to the unavailability of critical spectrum bands. Several frequency low-bands, mid-bands and high-bands (700 MHz, 800 MHz, 2300 MHz, 2600 MHz, 3500 MHz) – which are critical for International Mobile Telecommunications (IMT) systems – were occupied by legacy governmental uses. These existing uses limited the availability of these bands for commercial mobile broadband, delaying efforts to meet the rapidly increasing demand for IMT services.

(continued)

8. Connecting the Kingdom of Saudi Arabia: Advancing Digital Inclusion Through Vision 2030

The Project

To address these disparities between urban centres and remote areas, the Saudi Government, through the Ministry of Communications and Information Technology (MCIT) and the Communications, Space and Technology Commission (CST), launched the Broadband Initiative in 2018. The initiative included two primary projects: one targeting urban areas with fibre optic expansion and the other focused on rural and remote areas using wireless broadband technologies. In partnership with national service providers, the government provided financial support to extend fibre coverage to over 3.5 million homes in urban centres and wireless broadband access to over 500,000 homes in remote regions. The rural project leveraged 4G LTE and other wireless technologies to rapidly expand coverage, with the added deployment of solar-powered base stations to address energy supply challenges in isolated areas.

In parallel, a spectrum re-farming initiative was launched to support the effective deployment of IMT systems in urban and rural areas. This included evacuating legacy uses and re-farming the fragmented and narrow channel assignments previously occupied by mobile operators. The initiative aimed to enable wider contiguous channels in order to foster an efficient deployment of mobile broadband.

Innovation

Saudi Arabia's success in implementing this initiative was underpinned by regulatory innovation. In 2020, CST launched the innovative "Open Access" initiative, allowing subscribers to choose their preferred broadband service provider regardless of infrastructure ownership. By enabling all providers to access existing fibre networks, the initiative significantly reduced deployment costs and accelerated the availability of high-speed broadband across the Kingdom.

Furthermore, Saudi Arabia started to adopt spectrum auctions as an efficient tool to release commercial spectrum. Between 2017 and the end of 2024, Saudi Arabia conducted five spectrum auctions to make additional spectrum available for IMT systems, covering key IMT bands including 600 MHz, 700 MHz, 800 MHz, 1800 MHz, 2300 MHz, 2600 MHz and 3500 MHz.

(continued)

8. Connecting the Kingdom of Saudi Arabia: Advancing Digital Inclusion Through Vision 2030

Results

By December 2024, the Broadband Initiative had successfully achieved its coverage targets. In total, 100 per cent of the populated areas in Saudi Arabia now have access to broadband services. This achievement played a pivotal role in driving Internet penetration to 100 per cent, enabling widespread access to digital services across key sectors such as education, healthcare, business and government. As a result, the Kingdom has made significant strides toward realizing a fully digital economy. This progress is also evident in the sharp increase in consumer demand, with average daily mobile data consumption surpassing 1,600 megabytes per user—three times the global daily average.

In addition, by the end of 2024, the total licensed frequencies for mobile operators had reached 1400 MHz, compared with a total of 170 MHz in 2017. This positioned the Kingdom of Saudi Arabia as the leading country among the G20 countries in total licensed spectrum for mobile operators in bands below 6 GHz. Additionally, the Kingdom became the first country across Europe, Africa and the Middle East to license the 600 MHz band for mobile operators. This progress has had a profound impact on the speed and quality of telecommunications services in the Kingdom. Mobile download speeds have surged from just 10 Mb/s in 2017 to 129 Mb/s by 2024, while 5G networks now deliver download speeds exceeding 318 Mb/s—demonstrating the rapid evolution of the digital infrastructure and the Kingdom's commitment to world-class connectivity.

Gaps Addressed

By expanding the availability of broadband infrastructure in previously unserved urban and rural areas through regulatory innovation, this project has helped to address the **infrastructure** and **policy and regulatory gaps** in Saudi Arabia.

E. Digital Inclusion Transformative Projects

Connecting the remaining unconnected population over the next five years is a sizeable challenge. While progress driven by individual, sub-national and national-level projects is critical and should continue, achieving the ITU's aspirational targets will require thinking and acting at a larger scale, moving from incremental to exponential progress.

To inspire the imagination of what could be possible, this section outlines eight example projects – called "Digital Inclusion Transformative Projects" (DITPs) – that have been selected or developed based on their potential to drive significant global or regional impact and progress towards connecting the unconnected. The eight projects are not meant to be an exhaustive or comprehensive list, but in most cases, do already have an identified potential champion who is or can help drive the project forward.

Criteria for what makes a project a DITP are listed below:

Criteria of Digital Inclusion Transformative Projects

Main Criteria

- **Visionary and inspirational**, that will serve as a game-changer for accelerating progress toward meaningfully connecting the remaining 2.6 billion people,
- **Wide and deep impact** (quantitative and qualitative),
- Benefits **marginalized communities** (women/girls, rural dwellers, older people, persons with disabilities),
- **Global or regional** in scope,
- An organization has been identified that could **champion** the project,
- Leverages **multistakeholder, partnerships-based approach**,
- Can deliver significant **impact and benefits relative to the cost**, with the potential to be economically sustainable and scalable.

Bonus

- Impacts **multiple gaps** in achieving universal, meaningful connectivity (infrastructure, skills, affordability, policy and regulation),
- Contributes to **environmental sustainability**.

DITPs are designed to be **aspirational**, **inspirational** and **achievable**. While each of these projects could prove transformative, no one project – on its own – will solve the global digital divide. The proposed DITPs complement and reinforce one another by addressing different aspects of the digital divide. Taken together, these projects could go a long way to achieving universal, meaningful connectivity. The Table below shows how each proposed DITP fulfills the established criteria.

Table 4: Suggested Digital Inclusion Transformative Projects relative to proposed criteria

PROJECT	CRITERIA							BONUS	
	1	2	3	4	5	6	7	1	2
	Visionary and inspirational	Wide and deep impact	Benefits marginalized communities	Global or regional scope	Identified champion	Multistakeholder approach	Large benefits relative to costs	Impacts multiple gaps	Environmental sustainability
Connecting All of the World's Schools through the Giga Initiative	✓	✓	✓	✓	✓	✓	✓	✓	
Closing the Backbone Infrastructure Gap in 16 African LLDCs	✓	✓	✓	✓		✓	✓	✓	
Closing the Energy Infra. Gap and Converged Energy/Connectivity Off-Grid Solutions Across Africa	✓	✓	✓	✓	✓	✓	✓	✓	✓
Last-Mile Connectivity Investment Fund	✓	✓	✓	✓	✓	✓	✓	✓	✓
Developing a USD $20, 4G-capable Smartphone	✓	✓	✓	✓	✓	✓	✓	✓	✓
Preparing for AI Proliferation with a Global Digital Skills Campaign	✓	✓	✓	✓	✓	✓	✓		
Centre of Excellence for Policy and Regulatory Collaboration	✓	✓	✓	✓	✓	✓	✓		
Global Digital Divide Data Observatory	✓	✓	✓	✓		✓	✓	✓	

Potential Projects

a) Connecting the World's Schools Through the Giga Initiative

Project Description

This project focuses on expanding the existing Giga initiative and expediting its work so that all schools are mapped and connected by 2030. A partnership between ITU and UNICEF, this DITP was founded in 2019 and is currently engaged in 43 countries, with early interest from an additional 27. Along with governments and schools, Giga's stakeholders include ISPs, mobile network operators, international organizations, multilateral development banks and other funders.

The initiative has four main focus areas: 1) mapping the locations of all of the world's schools and monitoring their connectivity in real-time; 2) modelling the infrastructure, policies and regulations needed for school connectivity; 3) supporting governments in identifying and structuring the financing and investments needed for connectivity; and 4) providing procurement support.

Giga operates from two main centres: The Connectivity Centre in Geneva and the Technology Centre in Barcelona. The Geneva centre, launched in June 2025, serves as Giga's global headquarters and home to the Learning Hub, in collaboration with ITU Academy, the main arm of Giga's capacity development activities. Through training workshops, the Learning Hub provides the knowledge and practical skills needed for effective school connectivity planning, from data collection to policy and regulatory strategies. The Connectivity Centre is also the focal point for the development of innovative procurement and financing approaches, such as the Africa Bulk Purchase Marketplace, which aggregates demand for lower Internet costs.

(continued)

a) Connecting the World's Schools Through the Giga Initiative

At its Technology Centre in Barcelona, Giga develops various open-source tools to aid countries in planning, implementing and monitoring school connectivity. The centre is also responsible for the recently launched Giga Accelerator Programme, the project's first business development initiative, a five-month programme to scale breakthrough, open-source solutions that accelerate school connectivity worldwide, especially in underserved and unserved regions.

Giga's pivotal role as a stepping stone to helping connect all schools to the Internet was recognized in the Global Digital Compact in September 2024 as part of a strategy to close all digital divides and accelerate progress across the SDGs.

The motivations driving this project are three-fold: first, broadband can have a transformative impact on the way schools educate students, leading to improved education, and resulting in citizens with the skills needed to participate in the 21st century economy. Second, schools serve as important on-ramps for community members to begin to understand the potential benefits of connectivity and to begin using the Internet, even in the absence of a home connection. Third, schools can sometimes serve as foundational revenue-generating customers for ISPs and network operators and are places where infrastructure, such as small towers, can be located and used to provide services to other customers in addition to school students.

Expanding the reach of this initiative, as well as speeding up the pace at which it is achieving its goals, are the main focuses of this DITP.

Proof of Scalability

As of July 2025, the Giga initiative has supported expanded connectivity at 24,000 schools, benefiting approximately 11 million students, with efforts concentrated in Central Asia, Latin America and the Caribbean, and sub-Saharan Africa. Expanding participation in the initiative through partnerships and additional funding would allow Giga to accomplish its goals more quickly, as this will increase the available human capital for the project and allow for Giga to incorporate innovative new business models and technology solutions for closing the connectivity gap at schools.

Actions Taken to Overcome Barriers

Making shared infrastructure ubiquitous: In order to extend connectivity to community anchor institutions (CAIs), such as schools, network operators will need to deploy a variety of infrastructure including backbone connections, on-grid and off-grid electrical infrastructure, utility poles and cell towers and base stations. This infrastructure could also be used by network operators to extend service to areas surrounding CAIs and could be deployed as shared infrastructure to further advance connectivity in the communities where deployed.

(continued)

a)	Connecting the World's Schools Through the Giga Initiative

Developing sustainable business models: Successful ISPs require a variety of customers to be commercially sustainable, including small- and medium-sized businesses, enterprises, consumers and CAIs, such as schools. A DITP that successfully connects all the world's schools will improve the business case for providing Internet connectivity to surrounding communities.

Closing skills gaps: Schools frequently serve as on-ramps to Internet use, allowing people without regular Internet access to begin to use and benefit from the technology. Through their regular Internet use, these individuals develop a familiarity with certain use cases and best practices. It will also ensure that digital skills acquisition can be incorporated into existing educational opportunities, ensuring that future generations acquire digital skills prior to adulthood, reducing the need for additional training in the future.

Gaps Addressed

Infrastructure gap: This project will expand access to connectivity infrastructure to previously unserved areas and can help ensure that the locations are prioritized to have the greatest benefits for the broader communities.

Skills gap: As noted above, this project will provide Internet use for community members and allow them to experience its benefits without a home broadband subscription. Additionally, school connectivity will allow students to acquire digital skills during the course of their school career, further shrinking the skills gap.

Affordability gap: Securing a reliable anchor customer in previously unserved communities can allow ISPs to lower prices for residential customers while still meeting financial goals and ensuring return on investment. A component of this project might also be partially or fully funding the costs of broadband service for schools in lower-income and rural areas where resources are more limited and deployment costs are higher, which would directly contribute to reducing the affordability gap.

b) Closing the Backbone Infrastructure Gap in Africa's 16 LLDCs

Project Description

This project proposes the deployment of high-capacity fibre backbone across Africa's 16 landlocked developing countries (LLDCs). Stakeholders in this project might include international organizations, telecommunication infrastructure companies, development finance institutions and governments.

Delivering last-mile connectivity to every household and individual requires the deployment of backbone fibre to reach most cell towers and to provide the backhaul for last-mile fibre deployments. Particularly in LLDCs, a lack of robust and (ideally) redundant backbone infrastructure is a significant barrier to last-mile deployment. LLDCs and SIDS will be unable to benefit from creative last-mile broadband solutions (such as pay-as-you-go fibre) without first addressing the need for backbone infrastructure. An initial first stage of the project would be to deploy a backbone fibre network across the 16 LLDCs in sub-Saharan Africa (Botswana, Burkina Faso, Burundi, Central African Republic, Chad, Ethiopia, Lesotho, Malawi, Mali, Niger, Rwanda, South Sudan, Eswatini, Uganda, Zambia and Zimbabwe). Africa's LLDCs have a total population of over 378 million and low rates of connectivity. Making backbone fibre available is essential in expanding the reach of both fixed and mobile broadband. These backbone fibre deployments will also lower upstream bandwidth costs for last-mile providers attempting to serve new markets.

Proof of Scalability

Efforts are underway to expand access to backbone infrastructure in sub-Saharan Africa's LLDCs. For example, Liquid Intelligent Technologies,[59] a pan-African technology group, operates a 110,000 km-long fibre broadband network across 25 countries in Central, Eastern and Southern Africa, including some LLDCs. Likewise, CSquared,[60] an African technology company owned by Convergence Partners, IFC and Mitsui, is focused on deploying fibre networks with a shared (open access) infrastructure model for backbone in both urban and rural areas. CSquared has already deployed 7,500 km of fibre in Ghana, Kenya, Uganda, Togo, Liberia and the Democratic Republic of the Congo. This demonstrates that, despite challenges, there are ways to deploy backbone in these areas in a commercially sustainable way. Through collaborative efforts of funders, governments and network providers and operators, this project could include all of Africa's 16 LLDCs, and, if successful, be replicated as needed in other LLDCs worldwide. Actions Taken to Overcome Barriers

59 For additional information on Liquid Intelligent Technologies, see: https://liquid.tech/. Accessed August 21, 2025.

60 For additional information on CSquared, see: https://csquared.com/. Accessed August 21, 2025.

(continued)

b) Closing the Backbone Infrastructure Gap in Africa's 16 LLDCs

Making shared infrastructure ubiquitous: This project focuses explicitly on the development of additional shared infrastructure. Backbone fibre is increasingly made available on an open access basis, allowing any last-mile provider (whose network meets technical and compatibility requirements) to connect to the network and use it to extend broadband service directly to communities. This project would make that type of infrastructure available on a regional scale, promoting competition where technically and commercially feasible and implementing regulations when needed to minimize abuse of market power.

Developing sustainable business models: As noted above, backbone infrastructure is an essential input for providing last-mile connectivity. Making this infrastructure available and at the lowest possible cost is a prerequisite for the expansion of last-mile providers in previously unserved areas, many of whom will be leveraging creative business models to connect consumers in low-income and rural areas. Keeping the costs of backbone fibre access low will also allow these last-mile providers to lower costs for consumers, improving adoption and business sustainability.

Increasing access to project financing: There are two dimensions to this project's relationship with project financing. First, constructing this network will require a large amount of capital, and will likely require convening all types of potential funders (DFIs, private capital, national governments) to secure the necessary funding to deploy the project. Second, the presence of backbone infrastructure across all of these countries – if competitively priced – could improve the business case for extending last-mile connectivity to unserved communities in these countries and, therefore, also will help last-mile connectivity providers raise capital.

Gap(s) Addressed

Infrastructure gap: Backbone connectivity is essential broadband infrastructure, and expanding its reach will also facilitate the closure of the last-mile infrastructure gap.

c) Closing the Energy Infrastructure Gap and Converged Energy/Connectivity Off-Grid Solutions Across Africa

Project Description

This DITP proposes to build on the World Bank's Mission 300 Initiative[61] by delivering converged off-grid energy and connectivity solutions to communities in Africa lacking access to grid-based power and connectivity. The project could be led by the World Bank in partnership with the African Development Bank. Stakeholders in this project include telecommunication network operators and infrastructure companies, alternative energy access providers, governments and funders.

A significant portion of the world's population (685 million people as of 2022),[62] particularly in LDCs, have no direct access to the electrical grid. According to the World Bank, 600 million of these people live in Africa (with the remainder in South Asia and Central America). Moreover, a much larger number of people lack access to reliable grid electricity. Without a reliable on-grid or off-grid power source, it is impossible to deliver reliable and resilient broadband. Closing the energy infrastructure gap is vital for closing the overall digital divide, and essential to achieving universal, meaningful Internet connectivity.

This project proposes expanding the World Bank's Mission 300 initiative. The Mission 300 Initiative is a World Bank partnership with the African Development Bank whose mission is to deliver affordable power, expand electricity access, boost utility efficiency, attract private investment and improve regional energy integration across Africa. The project currently has a goal of cutting the African energy access gap in half by covering 300 million additional people with reliable energy infrastructure. The Mission 300 Initiative could expand its remit and its reach by financing the development, introduction and proliferation of alternative converged power and connectivity solutions. This could include converged power and connectivity solutions at towers and other network infrastructure locations, as well as converged solutions at homes, businesses and other customer premises.

[61] For additional information on the World Bank's Mission 300 Initiative, see: https://www.worldbank.org/en/programs/energizing-africa. Accessed August 21, 2025.

[62] World Health Organization. "Progress on basic energy access reverses for first time in a decade." June 12, 2024. Available at: https://www.who.int/news/item/12-06-2024-progress-on-basic-energy-access-reverses-for-first-time-in-a-decade #:~:text= Today%2C%20685%20million%20people%20live,the%20global%20population%20without%20access. Accessed August 5, 2025.

(continued)

c) Closing the Energy Infrastructure Gap and Converged Energy/Connectivity Off-Grid Solutions Across Africa

Proof of Scalability

There are numerous examples of companies and initiatives that have focused on deploying complementary on- and off-grid energy and broadband technologies. The HETA Initiative (detailed previously in the case study section above) focused on the deployment of off-grid electrical and complementary broadband solutions at healthcare centres in rural and remote areas of Africa. Moreover, tower companies (such as American Tower Company, Helios Towers, Africa Mobile Networks and Vanu), mobile network operators (such as Orange and MTN Group) and other network operators, as well as the equipment vendors that supply them, are all deploying solar-powered broadband infrastructure in areas without reliable grid access. The World Bank's success with the Mission 300 Initiative in its current form, to which partners have already committed over USD $50 billion in funding, demonstrates that there is also a path forward for financing additional traditional energy infrastructure deployments at a multiregional scale.

Actions Taken to Overcome Barriers

Making shared infrastructure ubiquitous: One of the main focal points of this project is to make energy infrastructure, which is available on a shared basis, ubiquitous across Africa. In addition, making both off-grid energy and broadband infrastructure more available at CAIs will also allow individuals living off-grid and outside the range of broadband networks to benefit from access to both electricity and broadband.

Increasing access to project financing: A critical input, both for expanding traditional grid access and deploying off-grid energy and broadband solutions, is access to financing. These types of infrastructure projects have high upfront costs that often prevent their deployment in low-income, rural and remote areas (where the need for these solutions is greatest) and financing these costs will eliminate this particular barrier.

Creating enabling technologies: Increasing investment in the energy sector in Africa and encouraging the deployment of off-grid energy and broadband solutions as the traditional electrical grid expands offers the potential to foster the development of new and innovative technology solutions, improve efficiency and minimize costs.

Gaps Addressed

Infrastructure gap: This project would focus on addressing the infrastructure gap, inclusive of both connectivity infrastructure itself as well as energy infrastructure, which is a key enabler to broadband deployment.

d) Last-Mile Connectivity Investment Fund

Project Description

In thriving digital economies, small- to mid-sized ISPs play a crucial role in fostering competition, expanding consumer choice and delivering affordable network access. However, in many LMICs, limited access to capital, regulatory challenges and insufficient technical capacity have constrained the growth of the ISP sector. Investors have traditionally been reluctant to finance last-mile broadband deployments in these markets, particularly if they use innovative or newer business models or operate in lower-income countries or communities. Broadband network deployment is capital-intensive and typically requires external funding; yet, payback periods are often too long for venture capital and investment sizes too small to attract traditional digital infrastructure funders. Compounding these challenges, many investors lack a clear understanding of ISP business models and perceive them as high-risk in already uncertain markets. New entrepreneurs frequently face difficulties in securing funding from institutional investors and often require targeted technical assistance to strengthen their organizations and improve investment readiness. This reluctance to invest and inexperience raising commercial capital inhibit expansion of affordable, high-speed broadband services into unserved and underserved communities.

To address this financing gap and unlock expansion of the ISP market and affordable networks, innovative blended finance models such as the Connect One Billion initiative have emerged. Connect One Billion is a blended finance fund designed to support ISPs in LMICs through an integrated approach combining technical assistance, concessional capital and growth equity. This holistic approach supports ISPs from early-stage pilots to raising their first commercial capital.

Connect One Billion was incubated by Vernonburg Group with seed funding from the United States Agency for International Development (USAID) in 2024 to target investments in ISPs that have innovative business models or technologies to overcome key barriers to universal connectivity, such as pay-as-you-go fixed broadband service in low-income communities. The fund aims to cultivate an ecosystem of ISPs, connecting them with peers as well as equipment vendors and investors who might not otherwise engage with smaller ISPs operating in emerging markets.

Alongside Connect One Billion, other organizations and funds such as ISOC, Association for Progressive Communications (APC) and Connectivity Capital are also working to support ISPs and community networks in emerging markets, employing diverse approaches to support innovative and affordable ways of expanding Internet access through smaller and alternative providers. Stakeholders required for this DITP include DFIs, donors, multilateral banks, private investors and companies to expand, scale or build upon these last-mile connectivity funding models.

(continued)

d) Last-Mile Connectivity Investment Fund

Proof of Scalability

According to market research conducted by Vernonburg Group, there are approximately 7,000 ISPs in LMICs with over 5,000 subscribers, representing a vast potential pipeline for immediate support. Additionally, there are approximately 800 million people in LMICs living in households that could afford to spend more than USD $10 per month for home broadband – a representative price typically charged by ISPs in these markets for entry-level high-speed home Internet connections – indicating significant untapped market potential.

Some funders, such as Finnfund, Meridiam and E3, are investing in early-stage ISPs in emerging markets, but far more of these investments are needed to close the digital divide at scale. This DITP calls for innovative and sufficiently more funding be directed to small- and mid-sized last-mile connectivity providers. ISPs, community networks and other alternative providers will be needed to expand coverage and offer affordable services where existing models have not worked.

Actions Taken to Overcome Barriers

Developing sustainable business models: This project supports innovative financing approaches to advance ISPs and community networks that are deploying innovative, sustainable models to make broadband service more accessible and affordable to consumers, particularly in LMICs. Additionally, providing capital, patient funding and technical assistance can strengthen business fundamentals, enhance service offerings and improve average and marginal costs.

Increasing access to project financing: This project aims to enhance financing opportunities for small- to mid-sized providers and community networks by offering appropriately structured capital, building capacity and supporting various organizational models as they scale – creating clear pathways to both commercial investment and other sustainable funding sources.

Gaps Addressed

Infrastructure gap: Access to capital is critical for emerging providers and network operators to build broadband infrastructure, especially in low-income communities where infrastructure deficits are largest and financing access is weakest. This project focuses on early-stage financing, building technical skills and capacity of providers, and positioning them for sustainable growth and access to additional funding in the future.

Affordability gap: This project improves affordability through two mechanisms: 1) providing lower-cost capital that reduces pressure on consumer pricing; and 2) supporting innovative business and operational models specifically designed to enhance accessibility and affordability for lower-income consumers, while maintaining appropriate investor returns where relevant.

e) Developing a USD $20, 4G-capable Smartphone

Project Description

The GSMA through the Affordable Handset Coalition, in collaboration with device manufacturers, mobile operators, fintech and funders (including banks and DFIs), has been leading joint action to identify ways to reduce the cost of 4G smartphones. Research published by the coalition indicates that making entry-level smartphones available in the USD $20 – USD $30 range could significantly help close the usage gap, particularly in low-income countries. In addition to lowering device costs, the coalition also focuses on ensuring widespread availability of these entry-level smartphones, both in LICs and in underserved communities within HICs, supporting the development of innovative financing models, and on eliminating taxes and import duties that increase costs. In some countries, particularly across South Asia, South America and sub-Saharan Africa, taxes can increase the handset cost by more than 30 per cent. In addition to standard VAT, many governments also apply import duties and other sector-specific taxes on mobile devices.

Thanks to advances in the development of low-cost smartphones, there are now 4G-capable smartphones which retail for as little as approximately USD $30. This is a momentous achievement and has brought smartphone ownership in reach for many consumers. There is enormous demand for these products, with demand for ultra-low-cost smartphones increasing 87 per cent between 2023-2024. Despite this progress, these devices still remain out of reach for many consumers. Based on analysis done for this report, a USD $30 smartphone is unaffordable for 1.4 billion people (15 years old and above) around the world. A lower number of people – 800 million (15 years old and above) – would not be able to afford even a USD $20 smartphone, but further lowering the costs of devices would further reduce the device affordability gap. In any case, increasing smartphone ownership will require more than simply lowering device costs. While affordability is important, willingness to pay is equally critical, and is influenced by factors such as social norms, perceived device quality and the value individuals place on connectivity. To drive broader smartphone adoption, it is essential to address these non-financial barriers alongside cost.

Proof of Scalability

As noted above, there have already been concerted efforts on the part of numerous device manufacturers to develop ultra-low-cost smartphones that can support high-speed broadband service and remain affordable. For example, Google has developed and launched a USD $30 smartphone aimed at meeting this affordability target. Mobile operators and distributors are also creating opportunities for consumers to finance the purchase of low-end 4G-capable smartphones by making low monthly payments for a defined period of time. All these efforts are encouraging companies to pursue even more innovative ways to lower prices and improve consumers' ability to absorb the expense.

(continued)

e) Developing a USD $20, 4G-capable Smartphone

Actions Taken to Overcome Barriers

Creating enabling technologies: The focus of this project is on technological innovation in devices, and on maintaining or improving the functionality of low-cost smartphones while further reducing costs. Creating a USD $20 smartphone will have a significant global impact on smartphone affordability, which will lead to an increase in both broadband subscription and use.

Gaps Addressed

Affordability gap: The widespread availability of a USD $20 4G capable smartphone would have an enormous impact on overall smartphone affordability. Using the analysis done for this report, lowering the cost of smartphones to USD $20 would shrink the smartphone affordability gap from approximately 23 per cent to 14 per cent of the world population (over 15), and would further lower the cost of closing that gap from USD $17.7 billion to approximately USD $6.4 billion. Consistent access to a reliable, high-speed capable smartphone is an essential element of achieving universal, meaningful Internet connectivity.

f) Preparing for AI Proliferation with a Global Digital Skills Campaign

Project Description

This DITP encompasses a comprehensive digital skills campaign comprised of: 1) Developing globally-harmonized definitions of basic and above-basic digital skills, which reflect specific skills needed to make use of AI and associated applications; 2) Establishing a global public education curriculum/standard that incorporates digital and AI literacy as a basic and fundamental educational requirement; 3) Training and empowering government (agricultural extension, healthcare, etc.) workers to deliver basic digital and AI skills training to community-members; and 4) Implementing a multi-year monitoring and evaluation function to evaluate countries' digital skilling levels. This initiative might replicate the community health worker model (widespread in developing countries) with a digital navigator model, complemented with a computer lab and digital skills resources. This DITP could be led by the ITU. Stakeholders in this DITP could include the ITU, UNICEF, bilateral donors, national governments, foundations and private sector corporate social responsibility programmes. An important existing initiative in this space is the ITU-led AI Skills Coalition, an MSP launched in 2024 to advance inclusive AI-related upskilling and reskilling globally. The Coalition brings together over 60 partners, including governments, international organizations, private sector actors and academia, to coordinate efforts, develop shared tools and track progress on AI and digital skills development.

(continued)

f) Preparing for AI Proliferation with a Global Digital Skills Campaign

There is an enormous need for improved digital skills among the population. As discussed above, to meet the ITU's aspirational targets, **nearly two billion people** around the world need to acquire basic and above-basic digital skills. For users who have never consistently accessed digital services over the Internet, it is essential that they develop skills needed to safely and securely use connectivity as early as possible while they're coming online. There is also a significant percentage of existing Internet users who do not adhere to privacy and security best practices related to broadband use, making them more susceptible to scams or bad actors online. Additionally, many of these users may restrict their own Internet use to a relatively limited list of applications, because they are not confident enough in their skills to experiment with new online services. As infrastructure expands and more people come online, the importance of acquiring digital skills increases. This challenge is compounded and aggravated by the rapid mainstreaming of AI, which is increasingly shaping both professional and personal spheres of life. Many individuals lack even a basic understanding of how AI systems work or how to use them responsibly, making inclusive and widespread AI literacy a growing priority.

While billions remain unconnected or digitally under-skilled, a much smaller segment of the global population is gaining advanced access to AI tools and upskilling opportunities. This widening disparity risks creating a new layer of digital inequality: one where AI capabilities are concentrated among the already-connected, leaving others even further behind. AI has enormous potential to transform numerous aspects of life – from how we use Internet search functions to how we learn, work and receive healthcare. These benefits can only be derived from widespread use of the technology and an understanding of when and how to make use of it effectively, understanding its limitations, and ensuring that everyone has the foundational digital skills to use the Internet safely. The ITU AI Skills Coalition is already addressing this challenge, by identifying critical AI-related skills across different sectors and providing a collaborative platform for partners to scale relevant training efforts in an inclusive and context-sensitive manner.

Proof of Scalability

There are numerous examples of initiatives focused on improving digital skills at the regional level. Go Digital ASEAN (Asia),[63] Eidos (Latin America)[64] and Digital Skills Africa (Africa)[65] are all examples of initiatives with a sustained, long-term presence that have improved digital skills at scale. This project would build on these regional efforts by creating a harmonized initiative with a global reach while working in parallel, or partnering, with these regionally focused organizations to adapt the initiative and content to local contexts. In parallel to these initiatives, the AI Skills Coalition complements these efforts by specifically focusing on AI upskilling and education, and serving as a global coordination mechanism that brings together regional and sectoral actors under a shared framework for AI and digital skills development.

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[63] For more information on Go Digital ASEAN, see: https://asiafoundation.org/go-digital-asean-boosts-digital-growth-of-more-than-215000-small-businesses/. Accessed August 21, 2025.
[64] For more information on EIDOS, see: https://www.eidosglobal.org/. Accessed August 21, 2025.
[65] For more information on Digital Skills Africa, see: https://digitalskillsafrica.org/. Accessed August 21, 2025.

(continued)

f) Preparing for AI Proliferation with a Global Digital Skills Campaign

Actions Taken to Overcome Barriers

Closing skills gaps: As described above, closing skills gaps is essential to achieving universal, meaningful Internet connectivity. Establishing a globally focused initiative that will align stakeholders on goals and lead a concerted effort to define digital skills, improve them, and track progress is a powerful first step in closing these gaps. The ITU AI Skills Coalition plays a central role in this effort when it comes to AI skills specifically, enabling collaboration between diverse partners and helping to streamline and scale digital skills initiatives with an emphasis on AI readiness.

Gaps Addressed

Digital skills gap: This project is specifically focused on shrinking the digital skills gap through the creation of a formalized, global digital skills campaign.

g) Centre of Excellence for Policy and Regulatory Collaboration

Project Description

The right enabling ICT policies and regulations are critical to advancing digital progress. In today's rapidly evolving digital landscape, adaptive and forward-thinking policy and regulatory frameworks are essential to unlock the investment, innovation and partnerships needed to close the digital divide and ensure no one is left behind.

To support this goal, the creation of a Centre of Excellence for Policy and Regulatory Collaboration is proposed as a global hub to promote inclusive and forward-looking regulatory approaches. The Centre will assist countries in designing and implementing adaptive, "fit-for-future" policies and frameworks that foster enabling environments for investment, innovation and equitable digital access.

Such assistance could include: 1) developing a peer-to-peer network to facilitate the exchange of best practices, co-develop practical tools and provide tailored guidance to support joint progress; and 2) providing policy development assistance resources to country governments to support agenda setting and capacity building. Other stakeholders would include national governments, funders (inclusive of DFIs and private investors) and market participants.

The centre will be a key platform for convening regulatory authorities and coordinating country support to bridge the digital divide. It will foster the creation of the enabling environment to facilitate universal, meaningful Internet connectivity. Building on ITU's already existing mandates and leveraging ongoing initiatives such as Giga, an initial phase focusing on enabling a policy and regulatory environment for sustainable school and hospital connectivity is proposed.

(continued)

g) Centre of Excellence for Policy and Regulatory Collaboration

Proof of Scalability

Bilateral and multilateral peer-to-peer regulatory networking occurs frequently across various policy domains worldwide. Formalizing these interactions – and directing them towards harmonized policy and regulatory frameworks to achieve universal, meaningful connectivity – will add value and improve efficiency.

Actions Taken to Overcome Barriers

Implementing supportive laws and regulations: This initiative will support countries in developing and implementing supportive laws and regulations that not only address critical regulatory and policy gaps, but are proven (through the example of other countries that have taken similar approaches) to be effective in supporting vibrant broadband sectors and stimulating the development of innovative technologies, new business models and creative strategies for adoption that will be essential to achieving universal, meaningful Internet connectivity.

Gaps Addressed

Policy and regulatory gap: This project is specifically focused on closing the policy and regulatory gap through peer-to-peer networking and technical assistance. By supporting countries as they develop more robust policy and regulatory regimes, infrastructure, affordability and digital skills gaps can also be addressed.

h) Global Digital Divide Data Observatory

Project Description

Using timely, accurate and precise data can help inform and direct policy interventions, investment, deployments and programming to where they will deliver the greatest impact. While extensive data is available at the global and regional level, relatively little data is available about digital divides at the sub-national and local levels.

This DITP would advance efforts – such as the Gates Foundation Digital Connectivity learning agenda – and leverage the existing work of the ITU DataHub to achieve universal, meaningful Internet connectivity by fostering more standardized, harmonized and publicly accessible data on connectivity. This initiative calls for co-investment in a globally coordinated survey effort to standardize how connectivity – especially for women and girls and other marginalized groups – is measured across countries, and to gather as granular a dataset as possible on the different types of connectivity gaps (including infrastructure, affordability, digital skills and policy/regulatory gaps) to inform investment decisions, policy choices and programmatic interventions. The goal is to create a harmonized framework that can be embedded across existing surveys and platforms or added to planned national surveys, to enhance data collection efforts at the sub-national level, and to collect all available connectivity data in a single location to facilitate efficient, coordinated and data-driven efforts by stakeholders.

(continued)

h) Global Digital Divide Data Observatory

This survey would feed into an online dashboard on the global digital divide, hosted by an organization such as the ITU. This dashboard would aggregate various sources of data and provide a user-friendly, interactive way to examine country-level data.

A key part of this DITP also involves strengthening access to existing datasets, improving documentation and facilitating technical dialogue among partners. Together, these efforts can unlock a step change in how digital connectivity is measured and leveraged. This can enable smarter, more equitable investments in connectivity and ensure that the existence of barriers that are specific to certain marginalized groups – such as women and girls, people with disabilities and elderly populations – or certain localities is not being obscured in the collection of less granular datasets.

Proof of Scalability

This Action Blueprint itself demonstrates proof of scalability. In this report, cost estimates leverage sub-national data on availability of existing broadband infrastructure to make better informed and more precise estimates of the cost to close the infrastructure gap. Some of this data is already being collected and made available at a sub-national level, demonstrating that it should be possible for governments and other stakeholders to undertake similar collection processes focused on gathering sub-national data to paint a complete picture of the infrastructure, digital skills and affordability gaps at the local level.

Actions Taken to Overcome Barriers

Developing Sustainable Business Models: Standardized, high-quality data enables governments, companies and other actors to segment markets more precisely, design user-centric solutions for marginalized users and identify barriers like safety, literacy or affordability to enable growth.

Increasing access to project financing: Governments, DFIs, donor agencies and private investors require clear, evidence-based assessments of market potential and risk. This initiative's harmonized data fills a gap by providing credible, consistent and disaggregated metrics that can de-risk investments in digital inclusion projects. With shared metrics and comparable benchmarks, the data also enables alignment between public and private sector actors, enabling co-investment models, subsidy targeting or shared infrastructure strategies.

Implementing supportive laws and regulations: This initiative will allow governments to craft specifically tailored policies, laws and regulations that can address specific sub-national gaps as evidenced in the available data. It could be particularly important in reducing disparities between access, adoption and digital skilling rates among marginalized groups relative to the overall population and to ensure that discrimination, in particular gender discrimination, is not inhibiting overall closure of gaps.

(continued)

h) Global Digital Divide Data Observatory
Closing skills gaps: As described above, closing skills gaps is essential to achieving universal, meaningful Internet connectivity. There is wide variability in the digital skill level of each country's population, and many times the experience of barriers to acquiring digital skills is highly localized and dependent on cultural norms, education access and the identity of the person seeking to acquire them. Digital skills attainment is particularly impacted by cultural norms around gender, and it will be essential that data is collected to monitor progress and ensure that women and girls, and other marginalized communities, are not left behind. *Gaps Addressed* **Infrastructure gap:** Data collected through this DITP can be used to identify specific areas (down to a localized level) that are poorly served by existing infrastructure, and target funding to areas of greatest need. This granular data can also be used by funders to make investment decisions and better understand the local context in which ISPs currently operate. **Digital skills gap:** Data collected through this DITP can be used to inform digital skilling programmes and to better understand systemic barriers that marginalized populations face in acquiring digital skills. Barriers to acquiring digital skills are highly localized, and tailoring effective interventions will require first understanding which populations face the greatest need, and to identify differences in outcomes between marginalized populations and the average. **Policy and regulatory gap:** Data collected through this DITP can be used to inform more tailored and effective policy interventions, and to identify areas in which law or regulation may need to evolve to support improved outcomes for specific populations.

F. Monitoring and Assessment Mechanisms

In order to measure the effectiveness of the projects and strategies presented in this report, it is essential that progress towards universal, meaningful Internet connectivity is monitored and assessed. To do so effectively, national governments should be collecting data down to the sub-national level, with as much geographic granularity as possible, on the current state of the country relative to the aspirational targets. Collecting this sub-national data, and making it publicly available, can be enormously useful for targeting resources within the country and for planning projects and programmes down to the local community level.[66] Sub-national data can then be aggregated up to the country level and subsequently reported to international organizations and other stakeholders. This section identifies specific key performance indicators (KPIs) that can be used to measure progress toward achievement of the aspirational targets.

1. Key Performance Indicators

Tracking progress toward the ITU's aspirational targets can be effectively supported through the identification and monitoring of various KPIs directly tied to them. These metrics will be useful at the national level so countries can better understand and accelerate their progress toward achieving universal, meaningful Internet connectivity.

The KPIs identified in this report are designed to leverage data already being collected in many countries around the world and reported annually to the ITU, the World Bank and other international organizations. A few exceptions are noted below. Making use of data that is already reported to the ITU and other organizations will: 1) enable rapid and consistent analysis and use of the data to direct global resources to where they are of greatest need; 2) avoid the need to create entirely new data collections; and 3) minimize the complexity of the process for countries that are not already collecting and reporting this data. Countries that are not already collecting and reporting this data should strongly consider doing so.

The following Table summarizes the KPIs for each of the aspirational targets and sources for this data.

[66] If data has not been published at the sub-national level, stakeholders who are considering deploying sub-national or more localized projects can supplement available national-level data with market research and surveying.

Table 5: KPIs mapped to relevant aspirational targets and data sources

Target Category	Aspirational Target	Relevant KPIs	Data Source
Universality Targets	100 per cent of the population 15+ uses the Internet	Percentage of the population 15+ using the Internet	World Bank and ITU Datahub
	100 per cent of households have Internet access	Percentage of households accessing the Internet Number of operators providing connectivity	ITU Datahub Asia Pacific Network Information Centre (APNIC)
	100 per cent of businesses use the Internet	Percentage of businesses using the Internet	There is no current global data collection effort that includes the percentage of businesses using the Internet. Market research firms (e.g. Statista, IDC) prepare market research reports at the country or regional level that include analyses of Internet use by businesses. Countries also may conduct their own statistically representative surveys of businesses and business types to determine levels of connectivity.
	100 per cent of schools are connected to the Internet	Percentage of schools connecting to the Internet	OpenStreetMap, GigaMaps and ITU Datahub
	100 per cent of the population is covered by the latest widely deployed mobile technology	Percentage of the population that is covered by 4G	ITU Datahub
	100 per cent of the population 15+ owns a mobile phone	Percentage of the population age 15+ that owns a mobile phone	ITU Datahub and GSMA
	At least 70 per cent of the population 15+ has basic digital skills	Percentage of the population that has basic digital skills	ITU Datahub
	At least 50 per cent of the population 15+ has above-basic (formerly intermediate) digital skills	Percentage of the population that has above-basic digital skills	ITU Datahub

Table 5: KPIs mapped to relevant aspirational targets and data sources (continued)

Target Category	Aspirational Target	Relevant KPIs	Data Source
	Gender parity has been achieved in Internet use, mobile phone ownership/ use, and digital skills	Percentage of men/ women accessing the Internet	ITU Datahub
		Percentage of men/ women owning a mobile phone	ITU Datahub
		Percentage of men/ women with basic digital skills	ITU Datahub
		Percentage of men/ women with above-basic digital skills	ITU Datahub
Technology Targets	100 per cent of fixed broadband subscriptions are 20 Mb/s or faster (formerly 10 Mb/s)	Percentage of households subscribing to a fixed broadband connection capable of 20 Mb/s or faster	ITU Datahub
	20 Mb/s download speed at every school	Percentage of schools subscribing to 20 Mb/s minimum download speeds	The ITU/UNICEF Giga initiative maps the locations of schools and measures if the schools are connected at 20 Mb/s. Countries may wish to collect their own data through robust surveying of educational institutions in order to better assess broadband speeds at educational institutions.
	50 Kb/s minimum download speed available per student	Percentage of students with minimum download speed availability of at least 50 Kb/s	There is no current data collection effort tracking download speeds by student. Countries may wish to collect their own data on student population by school, as well as available download speeds, to better understand speeds and network capacity by student.
	200 GB minimum data allowance for every school	Percentage of schools purchasing Internet services with a monthly data allowance of at least 200 GB	There is no current data collection effort tracking broadband subscription rates by school, or the available speeds of those subscriptions. Countries may wish to collect their own data through robust surveying of educational institutions in order to better assess broadband speeds at educational institutions.

Table 5: KPIs mapped to relevant aspirational targets and data sources (continued)

Target Category	Aspirational Target	Relevant KPIs	Data Source
Affordability Targets	Entry-level broadband subscription costs less than two per cent of gross national income per capita	The cost of entry-level mobile broadband relative to the gross national income per capita. The cost of entry-level fixed broadband relative to the gross national income per capita.	ITU Datahub and World Bank
	Entry-level broadband subscription costs less than two per cent of average income of the bottom 40 per cent of population	The cost of entry-level mobile broadband relative to the average income of the bottom 40 per cent of population. The cost of entry-level fixed broadband relative to the average income of the bottom 40 per cent of the population.	ITU Datahub and World Bank

Measuring the Impact of Expanded Broadband Use

In addition to tracking metrics that specifically measure universal, meaningful Internet connectivity, it is important that countries continue to monitor economic, health and education indicators to better understand indirect benefits of increased Internet access and use. While not the only determinant, connectivity might correlate with improved economic, health and education outcomes.[67] Suggested metrics to track include:

- Macroeconomic Changes[68]
  - Employment levels (overall, by age group, and by gender)
  - Trends in country's per capita Gross Domestic Product (GDP)
  - Trends in country's per capita gross national income (GNI)
- Educational Outcomes[69]
  - Primary and secondary school graduation rates
  - Literacy rates

[67] Sophia Campbell, Jimena Ruiz Castro, and David Wessel for the Brookings Institution. "The benefits and costs of broadband expansion." August 2021. Available at: https://www.brookings.edu/articles/the-benefits-and-costs-of-broadband-expansion/. Accessed April 7, 2025.

[68] Many countries collect this data internally for planning and policymaking purposes. For those that do not, data is available through the World Bank.

[69] Many countries collect this data internally for planning and policymaking purposes. For those that do not, data is available through UNICEF.

- Health Benefits[70]
  - Life expectancy rates
  - Infant mortality rates

2. Setting Targets and Monitoring

These KPIs align directly with the ITU's aspirational targets for 2030 (*e.g.*, 100 per cent of the population 15+ using the Internet, 70 per cent having basic digital skills, etc.). Leveraging the framework provided by the ITU, each country should establish their own 2030 aspirational targets, as well as mid-point targets, based on their specific context. If countries are not currently collecting this data, it is recommended that they begin by focusing on data collection and analysis, which will inform their understanding of the status quo and allow them to set personalized targets. Countries should collect data at the most refined feasible level of geographical granularity to help target policy interventions in the specific areas of greatest need. This will allow for more granular examination of where people are falling behind and will help target individual projects and resources within the country.

Countries should focus on setting targets that are aspirational but achievable. A country seeking to achieve the aspirational targets should set annual or midpoint targets that keep it on track to meeting its goals. In cases in which a country does not believe there is a realistic possibility of meeting any or all of the aspirational targets by 2030, it can identify more realistic five-year targets based on the country's current state of broadband availability and adoption. In addition, these countries should also set a specific timeline for meeting ITU's aspirational targets (which represent achieving universal, meaningful connectivity), even beyond 2030. Other, more advanced countries might seek to exceed some of those targets where possible. For example, a country that has already exceeded the aspirational targets for basic and above-basic digital skills might increase its targets to 90 per cent for basic and 70 per cent for above-basic to increase digital opportunity for the population.

The Table below shows how a country might set its targets for each of the KPIs identified. The Table below uses a hypothetical country and hypothetical current state, showing a country's internal assessment of the current state of its connectivity networks and availability of services and skills. In this example, one can see that this country is on track to achieve several (but not all) of the ITU's 2030 aspirational targets.

Table 6: Hypothetical country-specific KPIs

KPI	Current State	2028 Target	2030 Target
Percentage of the population 15+ using the Internet	78.5%	90.75%	100%
Percentage of households have Internet access	85.5%	88%	100%
Percentage of businesses using the Internet	80.25%	92.75%	100%

70 Many countries collect this data internally for planning and policymaking purposes. For those that do not, data is available through the World Health Organization (WHO) and UNICEF.

Table 6: Hypothetical country-specific KPIs (continued)

KPI	Current State	2028 Target	2030 Target
Percentage of schools connecting to the Internet	75%	88.5%	100%
Percentage of the population that is covered by 4G	90%	96%	100%
Percentage of the population age 15+ that owns a mobile phone	70.5%	88.75%	98%
Percentage of the population that has basic digital skills	55.5%	63%	70%
Percentage of the population that has above-basic digital skills	36%	42%	48%
Percentage of men/women accessing the Internet	85%/71%	96%/85%	100%/100%
Percentage of men/women owning a mobile phone	77.5%/63.5%	96%/81%	100%/96%
Percentage of men/women with basic digital skills	66.5%/44%	70%/56%	76%/70%
Percentage of men/women with above-basic digital skills	46%/36%	50%/48%	53%/55%
Percentage of fixed-broadband subscriptions that are 20 Mb/s or faster	73%	89.25%	100%
Percentage of schools subscribing to 20 Mb/s minimum download speeds	69%	89%	100%
Percentage of students with minimum download speed availability of at least 50 Kb/s	75%	92%	100%
Percentage of schools purchasing Internet services with a monthly data allowance of at least 200 GB	69%	89%	100%
Cost of fixed and mobile broadband subscriptions as a per cent of gross national income per capita (Target: that each service cost less than two per cent of a country's gross national income per capita)	Mobile: 2% Fixed: 4.5%	Mobile: 1.9% Fixed: 3.25%	Mobile: 1.8% Fixed: 2%
Cost of fixed and mobile broadband subscriptions as a per cent of the average income of the bottom 40 per cent of the population (Target: that each service cost less than two per cent of the average income of the bottom 40 per cent of the population)	Mobile: 3.25% Fixed: 7.3%	Mobile: 3.1% Fixed: 5.3%	Mobile: 2.9% Fixed: 3.25%

A critical element of achieving universal, meaningful Internet connectivity will be tracking progress as global stakeholders continue to work to close the digital divide – including through the MSPs that the ITU hopes will be inspired by this report. As noted throughout the report, it is also essential that initiatives designed to advance progress towards universal, meaningful connectivity should not further entrench existing divides; in particular urban/rural connectivity gaps, differences based on income and the gender digital divide. It is critical that countries collect data at a sufficiently granular level – including disaggregated by gender – to allow for analysis of differences in outcomes between different populations in each country.

As the UN's specialized agency for digital technology, the ITU is the official source of international telecommunication and ICT statistics. The ITU's Data and Analytics team collects, verifies, harmonizes and disseminates digital statistics for about 200 economies and over 200 indicators. The ITU is well-positioned to monitor and evaluate progress towards universal, meaningful Internet connectivity.

Conclusion

Achieving universal, meaningful Internet connectivity by 2030 will take the mobilization of private sector companies, governments, civil society, international organizations and DFIs that are invested in closing the digital divide. To support global efforts to make the leap from incremental to exponential progress in addressing barriers to universal, meaningful connectivity, this report has:

- Provided an update on the current state of global connectivity relative to the ITU's aspirational targets;
- Developed an updated estimate of the cost to achieve universal, meaningful connectivity, inclusive of the costs to close infrastructure, digital skills, policy and regulatory, and affordability gaps;
- Highlighted the benefits of closing connectivity gaps through a multistakeholder partnership approach, and proposed a partnership model based on insights from experienced project leaders;
- Showcased strategies and projects deployed by countries that have helped to meaningfully reduce each of the gaps;
- Proposed Digital Inclusion Transformative Projects that could be achieved through concerted effort on the part of the international community, and which if deployed would have a transformative impact on closing the digital divide regionally or worldwide; and
- Developed a list of KPIs that countries should be collecting data on down to the sub-national level, provided a process for setting targets relative to each of these KPIs and explained ITU's role in monitoring global progress toward achieving universal, meaningful connectivity.

While the estimated USD $2.6 trillion to $2.8 trillion required to close the digital divide is a daunting figure, this report's approach is to combine recommendations for step-by-step targets with a series of more visionary, larger-scale initiatives to accelerate Internet connectivity globally. Recognizing the aspirations and realities of individual countries will differ, the case studies and best practices featured in this report are intended to showcase how innovative approaches can be adapted to various local contexts. The multipronged strategy outlined in this Action Blueprint offers all types of organizations, from governments and international organizations to funders, companies and civil society, an opportunity to advance digital progress, each in its own way. Together stakeholders can unlock still-untapped resources in the form of collaborative partnerships, innovative technologies, new business models and creative policy and regulatory interventions to achieve universal, meaningful Internet connectivity.

Appendix

This Appendix supplements the report with two additional types of information: 1) an assessment of the current state of broadband affordability specifically for low-income populations; and 2) a more detailed breakdown of the methodology used to develop the gap cost estimates.

A. The Current State of Affordability for Low-income Populations

It should be noted that just because a country has achieved an average fixed and mobile broadband subscription cost of less than two per cent of per capita GNI does not mean that these countries have fully addressed broadband service affordability gaps. The aspirational targets also call for entry-level broadband subscriptions to cost less than two per cent of average income of the bottom 40 per cent of the population. There are many households and individuals in every ITU Member State who cannot afford to subscribe even at two per cent of average monthly income, because their incomes are lower than the national average. The Table below shows what per cent of the bottom 40 per cent of households cannot afford fixed and mobile broadband service, regionally and globally.

Table 7: Affordability of fixed and mobile broadband service for the bottom 40 per cent of earners[71]

Per cent of bottom 40 per cent of income earners who…	Cannot Afford Fixed Broadband Service (%)	Cannot Afford Mobile Broad-band Service (2 GB) (%)	Cannot Afford Mobile Broad-band Service (5 GB) (%)	Cannot Afford Mobile Broadband Service (10 GB) (%)
Total	**25%**	**35%**	**50%**	**61%**
South Asia	8%	36%	50%	59%
Europe	2%	11%	16%	19%
Arab States	25%	43%	86%	90%
Africa	89%	100%	100%	100%
Latin America and Caribbean	68%	76%	87%	87%
CIS	6%	13%	37%	41%
East Asia and Pacific	17%	9%	31%	55%
North America	2%	34%	37%	46%

As the Table shows, the broadband service affordability gap widens considerably when looking at low-income households and individuals. From a regional perspective, Africa, Latin America

[71] This is an analysis completed for the report, based on ITU pricing data and World Bank income data.

and the Caribbean and Arab States face the largest affordability gaps for both fixed and mobile broadband service among their low-income populations. In Africa and Latin America and the Caribbean, even the most basic mobile data package is out of reach for a majority of the bottom 40 per cent of earners. In Africa, any mobile data package is unaffordable for over 99 per cent of the bottom 40 per cent of earners. In the Arab States, there is a significant difference in the affordability of the most basic mobile data package, and higher data packages that allow users to leverage more resource-intensive Internet applications. However, affordability challenges are not confined to these regions. With the exception of the Europe and CIS regions, a 10 GB mobile data package is unaffordable for the majority of low-income individuals in every region. Affordability challenges may be the greatest in Latin America and the Caribbean, Africa and the Arab States, but each country should consider strategies to ensure broadband service affordability for its lowest-income residents.

Another significant barrier to broadband adoption is the cost of broadband-capable devices. To fully participate online and take advantage of universal, meaningful connectivity, consumers need smartphones, computers and potentially other devices that can fully leverage mobile and fixed broadband connections with minimum download speeds of 20 Mb/s.

B. Additional Information on Methodology

1. Key Methodological Differences between 2020 and 2025 Reports

Table 8 below summarizes the key updates that this report makes to the original report methodology (with changes/additions reflected as **bolded** text).

Table 8: Key differences between the original Connecting Humanity report (2020) and Connecting Humanity Action Blueprint (2025)

Topic	Connecting Humanity Report (2020)	Connecting Humanity Action Blueprint (2025)
Gaps estimated	Infrastructure (last-mile and backbone), policy and regulatory, Information and Communication Technology (ICT) skills	Infrastructure (last-mile, backbone, **data centres, IXPs**), policy and regulatory, ICT skills, **affordability (inclusive of service and devices)**
Coverage	Aimed to cover 90 per cent of the population aged 10+	Aims to cover **100 per cent** of the population
Data sources	Made use of national-level data	Makes use of **sub-national** data on digital infrastructure, thereby providing a more granular estimate
Aspirational Targets	Used speed target of 10 Mb/s for all connections (fixed and mobile), and former ITU categorization of basic and intermediate digital skills	Uses an updated speed target of **20 Mb/s** for all connections, and updated ITU categorization of **basic** and **above-basic** digital skills

2. Infrastructure Methodology

Definitions

Two variables that have the most significant impact on the cost of extending high-speed Internet access services into unserved areas are the choice of technology utilized (*i.e.*, fibre, terrestrial fixed wireless or satellite) and the area's population density (*i.e.*, how rural or urban the community is).[72] The infrastructure gap estimate developed for this paper defines urban and rural areas for each country examined based on population density definitions used by the World Bank Group – a 1x1 km tile with less than 300 people per square km is considered rural and a 1x1 km tile with equal to or greater than 300 people per square km is considered urban.[73] For this paper, it is assumed that urban areas should be served by fibre infrastructure. Within the rural definition, locations with less than one person per square km are considered extremely rural and served by satellite. Locations with equal to or more than one person per square km but less than 300 people per square km are served by 4G terrestrial fixed wireless.

Table 9: Relationship between population density, technology type, and urban/rural definitions

Description	Inhabitants per square kilometre	Technology mapping
Urban Areas – Found in cities, low-income informal settlements, towns and Suburban areas	More than 300 people per square kilometre	4G (mobile coverage), fibre or potentially fixed wireless access (FWA) in areas without fibre market (home connections)
Rural	1 to 300 people per square kilometre	4G (mobile coverage), FWA (home connections), fibre/microwave backhaul/satellite backhaul
Extreme Rural	Less than 1 person per square kilometre	Satellite (home connections), satellite (mobile connections)

Fibre Broadband Infrastructure Gap Cost Methodology

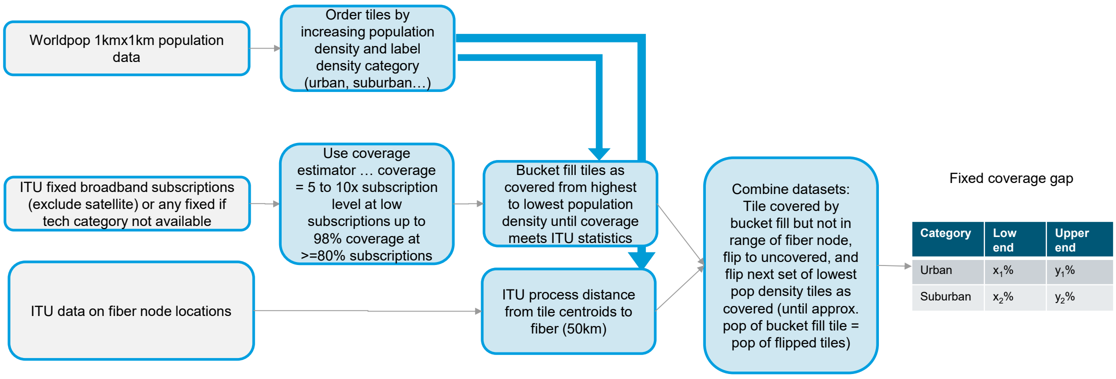
To calculate the cost to close the fibre broadband last-mile infrastructure gap, the estimate leverages 1x1 km geospatial data on population distribution from WorldPop, ITU national data on fixed broadband subscriptions mapped to a fixed broadband availability estimate, and ITU data on proximity to fibre nodes to calculate the cost to cover each unserved location. The costs for this model are based on an analysis of hundreds of fibre broadband project costs across a wide range of population densities – from urban to rural. The cost is then broken down further, allocating 70 per cent to labour costs and 30 per cent to equipment and other costs, with these percentages based on industry-standard cost breakdowns in markets where fibre broadband is currently widespread. These labour costs are scaled for each country based on labour rates from the International Labour Organization (ILO). The estimate provides a lower

[72] The availability and cost of middle-mile infrastructure also has a significant impact and this is addressed in a further section.

[73] Lewis Dijkstra, Ellen Hamilton, Somik Lall, and Sameh Wahba for World Bank Blogs. "How do we define cities, towns, and rural areas?" March 10, 2020. Available at: https://blogs.worldbank.org/en/sustainablecities/how-do-we-define-cities-towns-and-rural-areas. Accessed August 21, 2025.

and upper range for fibre broadband costs to account for a model-based estimate that maps fibre broadband subscriptions to fibre broadband availability in urban and peri-urban markets (areas with greater than or equal to 300 people/square km). The steps to calculate the fixed gap are shown in the Figure below.

Figure 26: Fixed infrastructure gap methodology



Source: ITU

The report models fixed broadband coverage rather than relying solely on reported coverage data because the latter is often outdated or incomplete. Only 87 countries reported fixed broadband coverage data, and much of it is from 2019 or earlier. In contrast, all 192 countries in the study provided fixed broadband subscription data, with most reporting up to 2023 and some up to 2022. While this subscription data includes all fixed technologies – cable, VDSL, fibre, fixed wireless and satellite – it offers more recent and comprehensive insights. Available subscription speed categories are limited to broad groupings (*e.g.*, 2–10 Mb/s, 10–30 Mb/s, 30–100 Mb/s) and do not specifically capture speeds greater than or equal to 20 Mb/s. Since technologies like cable, VDSL, fibre and fixed wireless are generally capable of delivering speeds of 20 Mb/s or higher, modeling based on subscription patterns allows us to estimate practical coverage without assuming unnecessary overbuild in areas already served by adequate infrastructure.

The model estimates fixed coverage from fixed subscriptions using an upper and lower bound curve that has a wider gap between coverage and subscriptions at lower subscription rates and a narrower gap between coverage and subscriptions at higher subscriptions rates.

Costing estimates for fibre deployment are informed by the Fiber Broadband Association (FBA) and Cartesian Annual Report (2023),[74] which found that between June 2022 and June 2023, the cost per home passed in urban and suburban areas ranged from USD $700 to USD $1,500 for aerial deployment and from USD $1,300 to USD $2,700 for buried deployment. For modeling purposes, a baseline assumes a low-end aerial cost of USD $700 adjusted for 10 per cent annual inflation over two years, along with a drop cost equivalent to 10 per cent of the total cost per household passed. This results in an estimated total of approximately USD $1,000 per home. The Cost Model builds on this baseline to project costs across varying household densities, allowing the baseline to decrease to as low as USD $500 (in USD prices) in high-density contexts. These high-density contexts are common in places like India and Brazil. Labour costs, which

[74] Fiber Broadband Association and Cartesian. "Fiber Deployment Annual Report 2023." January 2024. Available at: https://fiberbroadband.org/wp-content/uploads/2024/01/Fiber-Deployment-Annual-Report-2023_FBA-and-Cartesian.pdf. Accessed April 7, 2025.

represent roughly 70 per cent of fibre deployment expenses according to the same FBA study, are a key variable in international cost scaling. For global applications, equipment costs (30 per cent) are treated as constant, while labour costs (70 per cent) are adjusted using country-specific hourly construction sector wages from ILO. The steps to calculate the cost to close the fixed gap with fibre are shown in Figure 26.

Fixed Wireless Broadband Infrastructure Gap Cost Methodology

To calculate the fixed wireless broadband infrastructure gap, the report leverages the ITU's national level data on 4G mobile network coverage as a proxy for coverage and costs, though acknowledges that other technologies may also be used to close the gap. This paper assumes that 20 Mb/s fixed wireless connectivity can be delivered from a 4G mobile network. The analysis first ranks WorldPop 1x1 km geospatial data tiles by population density. It is assumed that 4G coverage is correlated with population density (the densest areas are served first, and least dense areas served last). The report then cross-checks the findings on which geospatial mapping tiles have 4G coverage by examining coverage maps made available by the GSMA.[75] This analysis provides an estimate of how many geospatial data tiles in each population density category lack 4G access. The estimate then determines the cost of deploying additional towers. The number of towers is based on the average tower range in different population densities that can reliably achieve at least 20 Mb/s to a device – 4 km in rural areas, 0.5 – 1 km in urban areas (0.5 km in the densest areas, 1 km in the least dense urban/peri-urban areas) – and the number of unserved geospatial tiles in each density category. Tower costs are based on the costs of materials and labour in the United States (made available through public bid documents for broadband grants) and then scaled using labour rates from the ILO. The estimate provides a range for the fixed wireless broadband infrastructure gap to reflect potential differences in the costs of labour, materials and construction.

Satellite Broadband Infrastructure Gap Cost Methodology

In extremely rural areas, where there is a population of less than one person per square km in each WorldPop 1x1 km geospatial data tile, this paper assumes that the most cost-effective option for connectivity is satellite broadband service. To develop this cost estimate, the report first leverages the analysis of 4G coverage to ensure that any extremely rural areas are not already covered with 4G. The areas that are covered by 4G are eliminated from the cost estimate for satellite broadband. The estimate then leverages publicly available broadband grant data on cost per household in the United States to serve them with low-earth-orbit (LEO) satellite broadband (capable of delivering over 20 Mb/s) – covering customer premise equipment and satellite network capacity. Satellite costs are not variable by country, so these costs are used for all households.[76] The estimate then adds the cost of solar power for these locations, given that these are the most remote households and electricity access and/or reliability is likely to be limited, even in developed markets. The estimate is provided as a range to account for

[75] The reason for this approach is that the GSMA's coverage maps, which provide actual locations of towers, include data from less than half of all MNOs. With such an incomplete data set, it made the most sense to use national-level ITU statistics on 4G coverage as the primary source (and to assume that mobile network operators prioritize areas for service based on population density (*e.g.*, coverage goes from the most dense to least dense area), and to then validate the model using the available coverage maps.

[76] While satellite and launch costs are consistent across markets, there is slight variability in the costs of ground stations by country. However, ground stations are only a small fraction of the total CapEx for satellite broadband service. This variability in costs is absorbed in the existing range used to reflect the variability of satellite and launch costs by type of satellite technology being used to provide service.

potential differences in per household connection costs for different types of satellites and different satellite broadband providers.

The cost to connect each household via satellite in the model ranges from USD $3,800 to USD $5,800 and is based on publicly available estimates of the cost to provide satellite connectivity to unserved rural locations under the Broadband Equity, Access, and Deployment (BEAD) programme in the United States. The bottom end of the range is an estimate submitted by Amazon of its cost to provide its Kuiper LEO satellite service to unserved locations in Washington State (USA). The upper end of the range is a bid submitted by Starlink of its cost to provide its LEO satellite service to unserved locations with supplementary solar power in Nevada State (USA). Relying on these two data sources is far from ideal and should be supplemented as more fulsome satellite cost data becomes publicly available.

Operational Expenses Gap Cost Methodology

The gap cost estimates above reflect the costs to deploy all the additional infrastructure necessary to achieve universal, meaningful Internet connectivity. However, simply deploying this infrastructure is not sufficient to ensure universal, meaningful connectivity. Last-mile network infrastructure and broadband services need to be maintained in the long term, often at a cost significantly higher than the cost of deployment. These expenses are referred to as operational expenditure ("OpEx"). Particularly in areas with low population densities and in areas with large lower-income populations, these long-term costs can present a significant hurdle, because ISPs are unsure that revenues from subscription can support ongoing costs. Therefore, the estimate also reflects the OpEx costs of maintaining new fixed fibre, terrestrial fixed wireless and satellite infrastructure over a five-year time horizon. To calculate these costs, the estimate makes use of an industry standard formula calculated using an assumed capital expenditure ("CapEx") to sales ratio and unlevered free cash flow (FCF) margin. The assumed CapEx to sales ratio (16 per cent) and unlevered FCF margin (8 per cent) are directly tied to the Digital Infrastructure Investment Initiative (DIII) methodology, which reached the same assumptions after extensive discussions with ISPs.

Over the five-year time horizon, it is assumed that a slower initial ramp-up of infrastructure deployment, followed by a more aggressive build-out in the middle years, and a tapering off in the final years to reach full deployment. The assumed percentage of completed infrastructure at the end of each year is as follows:

Table 10: Infrastructure completed at the end of each year

End of Year	Infrastructure Completed (Percent)
1	10%
2	25%
3	50%
4	75%
5	100%

Backbone Infrastructure Gap Cost Methodology

In order to estimate the cost of reaching communities not served by backbone infrastructure, the report leverages fibre backbone cost data from public bids and discussions with backbone infrastructure providers and assumes that the cost was USD $37,500 per kilometre in 2021, and factors in an inflation cost of 10 per cent through 2025. The report does not estimate the cost of using other technologies, such as terrestrial fixed wireless or satellite links, for backbone connectivity (although one can concede that this is a common option, especially in rural and remote locations). This assumption matches the assumption in the ITU's DIII report, which is based on cost data provided by experts from that initiative's working group. The estimate also reflects four years of inflation in backbone infrastructure costs. The estimate is provided as a range to reflect potential differences in the cost of deploying backbone infrastructure, as well as variability in levels of inflation.

Data Centre Infrastructure Gap and Cost Methodology

The report's estimate of data centre costs in LICs and LMICs aims to align their capabilities with those in UMICs. To approximate data centre capacity, the report uses the metric of Watts of electricity available per household – an approach consistent with that taken in DIII. Internal data from the DIII expert working group indicates that data centres in UMICs consume, on average, 24 Watts per household per year. Additionally, industry experts suggest that data centres consume approximately 150 Watts per square foot[77] and cost around USD $850 per square foot to construct.[78] These figures were used as key inputs in the cost estimation model. The model also assumes the construction of one data centre per one million people (approximately 250,000 households in LICs and LMICs) based on expert inputs from ISOC. The final cost estimate is presented as a range to reflect possible variations in construction expenses.

IXP Infrastructure Gap Cost Methodology

The IXP gap is measured based on targets set for all countries irrespective of income. The only criteria as to whether a country needs an IXP is the number of network operators and country size. IXPs are not useful for exchanging traffic across networks where there is only one network operator in a country or if the exchange is between just two network operators. Therefore, IXPs are only targeted in countries that have at least three network operators. Additionally, countries with populations smaller than 100,000 people are unlikely to generate sufficient traffic for an IXP to make a meaningful difference in costs. Therefore, this estimate only reflects the costs of adding IXPs in countries with more than 100,000 people.

For countries without any IXPs and that satisfy these criteria, the estimate factors in the cost of ensuring these countries each have at least one IXP. For countries with at least one IXP, the target is set at one IXP per city of at least 300,000 inhabitants. This target is based on industry expertise from ISOC. The current number of IXPs available in each country is publicly sourced from peeringDB,[79] and data on population centres is sourced from World Cities Database.[80]

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77 Josh Mahan. "Understanding Data Center Energy Consumption." June 8, 2023. Available at: https://cc-techgroup.com/data-center-energy-consumption/. Accessed April 10, 2025.

78 Mary Zhang, "How Much Does it Cost to Build a Data Center?" November 5, 2023. Available at: https://dgtlinfra.com/how-much-does-it-cost-to-build-a-data-center/. Accessed April 10, 2025.

79 PeeringDB is a freely available, user-maintained, database of networks, and the go-to location for interconnection data. Available at: https://www.peeringdb.com/. Accessed August 21, 2025.

80 World Cities Database is an accurate and up-to-date database of the world's cities and towns. Available at: https://simplemaps.com/data/world-cities. Accessed August 21, 2025.

ISOC data is also used to establish the costs for constructing an IXP (both in countries without one and to construct additional IXPs in countries with more complex markets). The estimate factors in training costs as well as the equipment costs to build an IXP and is provided as a range to factor in slight variability in equipment costs.

3. Affordability Methodology

Broadband Service Affordability Gap Cost Methodology

The broadband service affordability gap estimates the cost to ensure that both fixed and mobile broadband service costs are considered "affordable" for the global population (over the age of 15). As noted above, this report aligns with the aspirational targets in setting a two per cent affordability threshold for broadband service. In the case of mobile broadband service, the threshold is two per cent of each user's monthly income. In the case of fixed broadband service, the threshold is two per cent of each household's monthly income, reflecting the fact that a fixed broadband service serves multiple users in a household. The report leverages the best available broadband service pricing data from the ITU and GNI per capita income data and income decile data from the World Bank to determine the percentage of the population by country for whom broadband service is unaffordable, and how much support would be required to make service affordable for these consumers.

Smartphone Affordability Gap Cost Methodology

To estimate the size of the smartphone device affordability gap, the report undertakes a similar process but uses different thresholds and pricing data. The affordability target for a smartphone is that it should cost no more than 20 per cent of one month of a user's income. This is based on the affordability threshold for smartphones established through the ITU's DIII, which reflects the feedback of numerous subject matter experts. Smartphones (and mobile broadband service) are more effective if each user has a personal device, and therefore this estimate is based on individual income.

The report establishes a single, average, global price for an entry-level smartphone at USD $30. The report then leverages World Bank data on GNI per capita and income decile data to estimate the percentage of the population by country for whom smartphones are unaffordable and how much support would be required to make smartphones affordable (costing less than 20 per cent of one month's income).

4. Policy and Regulatory Gap Cost Methodology

The estimated cost of achieving universal, meaningful Internet connectivity reflects the costs of policy development assistance utilizing the costs of providing consulting support to policy-makers and regulators. In collaboration with ITU colleagues and the report's advisory group, a list of component activities was developed which would make up each of the identified categories of support required to help regulators develop and implement a comprehensive telecommunications sector regulatory regime (as designed by the country government). These categories are: 1) provide technical assistance in developing new policies and regulations; 2) provide regulatory capacity-building support in the form of training and planning support; and 3) support stakeholder outreach and engagement. A list of roles and a level of effort required to accomplish those activities was then estimated. An annual cost estimate was then made leveraging World Bank short-term consultant day rates and factoring in a consulting standard of 30 per cent in other direct costs to account for transportation, logistics, event production and other costs.

The cost estimate varies based on the number of years of capacity development, technical assistance and stakeholder engagement provided by consultants. This variation is based on a country's score on the ITU's ICT Regulatory Tracker (based on the Generations of Regulation Model) and on whether the country is one of the SIDS.[81] This estimate assumes that consulting support required for a country to achieve the aspirational targets is only needed in those countries in Generations of ICT Regulation one through three. A breakdown of the support by category is as follows:

Technical Assistance (70 per cent of effort/cost per year):

- Broadband plan update/development
  - Annual audit of current state relative to national broadband plan
- Regulatory audit
- Regulation development (inclusive of process; drafting of regulation)
- Policy development (inclusive of process; drafting of legislation)
- Non-deployment programme development

Regulatory Capacity-building (20 per cent of effort/cost per year)

- Regulator capacity audit – identification of missing critical competencies
- Development of a staffing plan for the regulator
- Training sessions for regulator staff and policy-makers
- Identification of on-the-job training opportunities for regulator staff to work collaboratively with experts providing assistance
- Development of planning resources to be leveraged by the regulator once the period of expert assistance has concluded

Stakeholder Engagement (10 per cent of effort/cost per year)

- Development and administration of a national survey and data collection effort
- Support direct engagement with key stakeholders in the broadband sector
- Education sessions with elected officials and policy-makers
- Facilitation of planning sessions for elected officials around national broadband plan; what are the country's goals related to universal, meaningful connectivity?
- Development of educational and promotional resources to help members of the public understand the value of broadband, particularly in historically unserved areas

The level of effort is then multiplied by World Bank short term consultant day rates. Those rates are:

- Junior: USD $200 – $300/day (average of $250 was used)
  - 660 days/year
- Mid-level: USD $400 – $600/day (average of $500 was used)
  - 600 days/year

[81] According to experts interviewed, SIDS as a general matter have lower levels of infrastructure and regulatory development. They are also challenging to travel to and can be difficult to travel around. Therefore, a 15 per cent escalator of costs was applied to all SIDS countries to account for additional complexity.

- Senior: USD $800 – $1200/day (average of $1,000 was used)
    - 345 days/year

This results in an annual cost for policy and regulatory assistance of USD $1.2 million. This is then multiplied by the number of years of support it will take to elevate countries at each Generation of ICT Regulation to reach G4, at which point the model assumes the regulatory regime is sufficient to support achievement of the aspirational targets. The breakdown of years of support by country type is provided below.

- Non-SIDS Countries
    - Large population (> 300,000 people)
        - G1 – 7 × cost per year
        - G2 – 5 × cost per year
        - G3 – 3 × cost per year
    - Smaller population (≤ 300,000 people)
        - G1 or G2 – 3 × cost per year
        - G3 – 2 × cost per year
- SIDS Country (any size population)
    - G1 – 5 × cost per year
    - G2 – 3 × cost per year
    - G3 – 3 × cost per year

This is one area of inexactitude in the model; within each Generation of ICT Regulation there is variation among the level of regulatory and policy development. It is likely that there are some G1 countries that will require more than seven years of support, and it is likely that there are G3 countries that will require less than three years. In addition, the intensity of support required will vary by country and by issue. The level of support necessary in each country could be personalized based on the country-specific policy and regulatory context.

5. Digital Skills Gap Cost Methodology

The digital skills gap proved more challenging to measure due to the lack of available data on digital skills by country. Therefore, proxies were developed to baseline the existing levels of digital skills of the population aged 15+ in each country. The ITU data on Internet users as a percentage of the overall population is not bound by age. A higher proportion of youth over a certain age generally use the Internet more often than the overall population, but the fact that the ITU's data includes people too young to use the Internet largely counterbalances this increased Internet use. Based on current, publicly available data on Internet use by age, a three per cent increase to the publicly available Internet use statistics was applied in each country to determine the population of Internet users age 15+.

To establish the baseline for basic digital skills, the report applies a multiplier to the Internet use data by country that is available from the ITU based on country income. The multiplier reflects the fact that not everyone using the Internet has the digital skills to do so safely and securely, and tying the multiplier to income is the result of a trend identified by the ITU in the digital skills data that is available from a small subset of countries, as well as additional research from other expert organizations, which indicates that there is a correlation between country income and the level of digital skills in the population. The multiplier for average and high-income countries is 0.91 and the multiplier for middle- and low-income countries is 0.70. The delta between the current number of people with basic digital skills and the 70 per cent target is then calculated.

For above-basic digital skills, the report uses secondary educational attainment as a proxy for above-basic digital skills. This is based on findings from the ITU and other expert organizations on the relationship between educational attainment and the acquisition of digital skills. The analysis therefore assumes that anyone under the age of 50 who has completed secondary education has above-basic digital skills.

To determine the cost of training, the report assumes that individuals will be trained by a qualified trainer in groups of 20, that trainings will be bring-your-own device, will occur in a cost-free location, and that achieving basic digital skills requires 40 hours of training. Achieving above-basic skills requires 80 hours of training. The hourly cost of the trainer varies by country and is determined based on the average hourly cost of a training professional in that country. Dividing the hourly cost by 20 (to account for 20 trainees per class) determines the per trainee cost per hour of training by country.

The estimate further reflects the costs of providing a stipend to trainees; a significant portion of the population without digital skills are individuals in LICs, and another significant portion are lower-income individuals in HICs, and these are the populations least likely to afford to forego work opportunities in favour of training. The stipend varies by country and is equivalent to the average hourly wage of the bottom 50 per cent of the population. Attendees receive the stipend for every hour of training attended.

To determine the cost to close the digital skills gap, the per trainee per hour cost is then added to the stipend cost in each country and multiplied by 40 for basic skills training and 80 for above-basic training to reach the 70 per cent and 50 per cent targets set by the ITU.

6. Country List

For the purposes of this report, the regional classifications listed in Table 11 below have been used.

Table 11: Country list by region

AFRICA
Angola
Benin
Botswana
Burkina Faso
Burundi
Cabo Verde
Cameroon
Central African Rep.
Chad
Congo (Rep. of the)
Côte d'Ivoire
Dem. Rep. of the Congo
Equatorial Guinea
Eritrea
Eswatini
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritius
Mozambique
Namibia

AFRICA
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
South Africa
South Sudan
Tanzania
Togo
Uganda
Zambia
Zimbabwe

ARAB STATES
Algeria
Bahrain
Comoros
Djibouti
Egypt
Iraq
Jordan
Kuwait
Lebanon
Libya
Mauritania
Morocco
Oman
Palestine
Qatar
Saudi Arabia

(continued)

ARAB STATES
Somalia
Sudan
Syrian Arab Republic
Tunisia
United Arab Emirates
Yemen

CIS
Armenia
Azerbaijan
Belarus
Kazakhstan
Kyrgyzstan
Russian Federation
Tajikistan
Turkmenistan
Uzbekistan

EAST ASIA AND PACIFIC
Australia
Bangladesh
Brunei Darussalam
Cambodia
China
Fiji
Hong Kong, China
Indonesia
Japan
Kiribati
Korea (Rep. of)
Lao P.D.R.
Malaysia

EAST ASIA AND PACIFIC
Marshall Islands
Micronesia
Mongolia
Myanmar
Nauru
New Zealand
Papua New Guinea
Philippines
Samoa
Singapore
Solomon Islands
Thailand
Timor-Leste
Tonga
Tuvalu
Vanuatu
Viet Nam

EUROPE
Albania
Andorra
Austria
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France

(continued)

EUROPE
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Latvia
Liechtenstein
Lithuania
Luxembourg
Malta
Moldova
Monaco
Montenegro
Netherlands
North Macedonia
Norway
Poland
Portugal
Romania
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey

EUROPE
Ukraine
United Kingdom

LATIN AMERICA & CARIBBEAN
Antigua and Barbuda
Argentina
Bahamas
Barbados
Belize
Bolivia (Plurinational State of)
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Rep.
Ecuador
El Salvador
Grenada
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Saint Kitts and Nevis
Saint Lucia

(continued)

LATIN AMERICA & CARIBBEAN
Saint Vincent and the Grenadines
Suriname
Trinidad and Tobago
Uruguay
Venezuela

NORTH AMERICA
Canada
United States of America

SOUTH ASIA
Afghanistan
Bhutan
India
Iran (Islamic Republic of)
Maldives
Nepal (Republic of)
Pakistan
Sri Lanka

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