

Working Group on 21st Century Financing Models for Sustainable
Broadband Development

21st Century Financing Models for Bridging Broadband Connectivity Gaps

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BROADBAND COMMISSION
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Report of the Working Group on 21st Century Financing
Models for Sustainable Broadband Development

Innovative Financing Models for Bridging Broadband Connectivity Gaps

Disclaimer:

This report has been prepared, with the support of a third-party consulting, by the members of the Working Group for the Broadband Commission for Sustainable Development co-chaired by Bocar Ba, CEO of SAMENA Telecommunications Council and CEO-Operations of Zain. The ideas and opinions expressed in this publication do not necessarily reflect the views of the Broadband Commission members or their organizations. This Working Group report does not commit the Broadband Commission for Sustainable Development.

Acknowledgements

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The Chairman's Executive Summary of the report and its strategic recommendations, which received full endorsement of the Commission, is available separately and published online.¹

The Working Group was co-chaired by Bocar Ba, CEO of SAMENA Telecommunications Council and CEO - Operations of Zain.² The co-chairs would like to thank all of the Working Group's commissioners and their focal points and external experts for their invaluable contributions and support and also extend gratitude to other Broadband Commissioners and members of the Broadband Commission Secretariat who agreed to be interviewed for the purposes of the study (see Annex I, Sources for this study, for a comprehensive list of all contributing parties).

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About the SAMENA Telecommunications Council

The SAMENA Telecommunications Council is the South Asian, Middle Eastern, and North African (SA-ME-NA) region's premier industry association of telecom operators and service providers from the terrestrial and satellite domains. The Council voices telecom operators' issues and needs to regulators, policy-makers, and international institutions, and specifically focuses its advocacy efforts on fostering multistakeholder collaboration to drive inclusive digital growth, good governance, and transparency, and promote policies that incentivize investment and socioeconomic transformation within the region. With a vision of becoming the ultimate promoter of collaboration and knowledge-sharing within the region, SAMENA Council is widely recognized as a development partner to the private and the public sectors. The Council serves as a resource with advocacy expertise, to help aid incubation of novel approaches and ideas that can assure sustainability of the digital ecosystem. To this effect, by leveraging its leadership congregation platforms that draw large multi-regional participation by industry leaders and decision-makers, the Council empowers stakeholders to communicate together and address the most pressing industry issues, to help create a sustainable business environment for the ICT industry.

About Zain

Zain is a leading telecommunications operator across the Middle East and Africa providing mobile voice and data services to over 48.3 million active customers as of 30 June 2021. Zain has a commercial presence in seven countries, operating in Kuwait, Bahrain, Iraq, Jordan, Saudi Arabia, South Sudan and Sudan. In Morocco, Zain has a 15.5 per cent stake in 'INWI', through a joint venture. Zain is listed on Boursa Kuwait (stock ticker: ZAIN). For more information please email info@zain.com or visit: www.zain.com; www.facebook.com/zain; www.twitter.com/zain; www.youtube.com/zain; www.instagram.com/zaingroup; www.linkedin.com/company/zain; <https://www.zain.com/en/about-us/overview/>.

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Endnotes

- ¹ https://www.broadbandcommission.org/wp-content/uploads/dlm_uploads/2021/09/Executive_Summary_financing-broadband.pdf.
- ² Scott Gegenheimer was the CEO - Operations of Zain until November 2020, after which he left the organization.

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In our industry-wide and cross-stakeholder collaborative strive to build a truly inclusive and sustainable digital future, we are now at crossroads that demand foresight in decision-making, thinking beyond current approaches and business practices. Thanks to the joint aspirations of many leaders and organizations to achieve the UN SDGs with targeted investments into ICTs, we are now treading a path that may lead us to a future where digital inclusion is a given, and where digital technologies can bring to bear their full potential and contribute to improving the human condition.

The new world of connectivity requires acceleration and implementation of new forms of multistakeholder cooperation in digital development. As co-chair of the Working Group, I firmly believe that achieving such cooperation may require us to be imaginative and experiment and create a culture of human-technology collaboration that is sufficiently flexible to adequately respond to natural disasters and health crises. Moreover, such cooperation needs to prioritize the fulfilment of our goals and targets – including the Broadband Commission's own 2025 Targets, which were issued back in 2018 with the aim of 'Connecting the Other Half', the 3.7 billion people not yet benefiting from access to meaningful connectivity. The 2025 Targets specifically focus on addressing three critical issues that are integral to this aim: *access, affordability, and equality*.

Our world faces many new challenges that require extraordinary partnerships and multi-lateral approaches as a priority above and beyond individual stakeholder needs. Recognizing the fact that we now need to approach business, infrastructure financing and funding, and the digital divide with fresh strategies and models by creating new synergies at all fronts, I am excited about what the 21st Century Financing, Funding and Investment Working Group has achieved, as is presented in this report.

The Working Group underscores the importance of increasing connectivity and closing the digital divide to ensure a sustainable future for everyone and emphasizes the need for new and innovative financing and funding mechanisms for digital infrastructure expansion, impactful partnerships, and people-centred approaches to decision-making. Over the past two years, therefore, the group has been particularly attentive to the challenges our world now faces in the 21st century and the necessity of bringing together a multitude of stakeholders to share responsibilities and leverage common aspirations regardless of how different their individual business needs and modes of operation, or business models, may be.

The Working Group's output is a rich report, which reflects a true multistakeholder collaborative approach to defining a framework of cooperation, centred on four key strategic recommendations that address the need to (1) increase the circle of contributors of financial resources to overcome digital infrastructure and connectivity gaps; (2) introduce new efficiencies in the utilization of resources for ICT players; (3) renew the role of universal service funds; and (4) create an international funding body to oversee and provide resources for expanding broadband connectivity. The report is fully reflective of the needs to react in accordance with the changes that have transpired due to the COVID-19 pandemic and, in fact, even much earlier. What has been the most prized output of our work has been the level of understanding, compassion, practicality, and willingness to act, as demonstrated by each member of the Working Group.

Our Working Group highlights the urgent need to overcome infrastructure funding and meaningful-connectivity challenges, in order to reach the goals and targets set forth earlier by the Commission. There is much work to be done, and many obstacles to be tackled. Fortunately, this report has now laid a foundation for thinking about financing and funding in a new light in the 21st century.

It has been an honour and pleasure to chair this group and to work with my fellow commissioners to put this report together, and I encourage the reader to indulge in our findings and recommendations.

Bocar Ba



1

Introduction

1 Introduction

The objective of the Working Group on 21st Century Financing Models for Sustainable Broadband Development is to provide governments and policy-makers with a set of policy recommendations for consideration to foster innovative funding, financing and investment strategies. These should enable and empower existing and new business models to achieve the Broadband Commission's targets for broadband connectivity and adoption and to reach the global goal of connecting the unconnected.

This report's main objective is to propose models for investing in, financing, and funding broadband development beyond its current geographical and demographic footprint. This effort includes conducting a comprehensive study of the financing models used so far, together with developing new models and broadening the base of contributors to disrupt the current way of thinking and operating.

The urgency and importance of this initiative cannot be overemphasized. Resolution 200 (*rev. Dubai 2018*) for the Connect 2030 Agenda for global telecommunication and ICT reaffirmed a shared global vision where *'telecommunications/ICT enable and accelerate social, economic and environmentally sustainable growth and development for everyone'*. Access to the Internet is central to the 2030 Agenda for Sustainable Development, acknowledged as an essential tool to achieve the UN's Sustainable Development Goals (SDGs). Furthermore, the Broadband Commission's targets for 2025 call for broadband Internet services to reach 75 per cent of the worldwide population, including 65 per cent of people in developing countries and 35 per cent in the least developed countries.

Today, half the world's population – that is 3.7 billion people – are not online, particularly in Africa, Asia, South America and the Pacific Islands. Various studies reflect that it would cost

between USD 428 billion and USD 2 trillion to 'close the gap' to ensure universal connectivity. The current average level of broadband penetration in Africa is approximately 30 per cent, and the UN Broadband Commission's Digital Moonshot for Africa Working Group estimates that in Africa alone, it will cost about USD 100 billion to achieve ubiquitous adoption by 2030. That estimate accounts for 3G and 4G radio access connectivity but does not consider future emerging technologies designed to support higher connection speeds.

As the Internet has become a global infrastructure, digital companies that place it at the core of their business models have emerged on a global scale. Over the past decade this has resulted in the digital economy evolving from a niche developed-world phenomenon into a global ecosystem. The COVID-19 pandemic has accelerated this shift to an online economy. The World Economic Forum Global Risks Report 2021 notes that:

For the technology giants, [the COVID-19 pandemic] has been a major opportunity. Demand grew rapidly for services ranging from e-commerce and remote working technologies to online gaming and streaming. As other sectors struggle, the big technology players will likely emerge from the pandemic with stronger, more diverse revenue streams and enhanced investment power.¹

Over the coming decade it is clear that businesses which build global digital platforms will be even more central to an ever-more data-driven digital economy. On the other hand, as the digital economy continues to develop, there is a real risk that those without adequate connectivity will be progressively excluded from participation. Given the global nature of the digital economy it is imperative to have global responses to the connectivity gap to ensure that no one is left behind.

'Closing the connectivity gap' requires accelerated investment to ensure that the Global South does not end up with a lesser quality of experience than is available across the developed world. **What is evident is that there is a funding gap.** It is also apparent that existing models of funding and distribution are insufficient to fill the gap. For example, traditional models for universal service and access funds (USAFs)² – which are designed to take contributions only from nationally licensed network operators and issue grants to operators to build infrastructure in underserved areas – are known to be inadequate.

As a result, there is a need to examine ways to **augment and expand on the current financing and investment models.** This approach requires **new paradigms** including: (1) broadening the base of contributors; (2) ensuring that all who derive benefits from the digital economy, as consumers or as producers contribute objectively, equitably and fairly towards *connecting the unconnected*; (3) for such contributions to be made by all ecosystem players, taking into account the new realities of the disaggregation of digital service provision and, therefore, revenue generation from underlying network infrastructure investments; (4) making such contributions sustainable and predictable; and (5) for such contributions to be managed efficiently and disbursed in a timely and prioritized manner.

The report therefore focuses on innovative funding, financing and investment options to enable network expansion and upgrades and support other non-network initiatives to reduce the broadband connectivity gap. It also covers policy and regulatory issues that can be used to lower the cost of projects and increase their efficiency, and proposes demand-side initiatives that can increase adoption. Addressing these issues can help to close the residual connectivity gap that needs to be covered by the innovative models, while also ensuring that the new models can be implemented efficiently.

Figure 1.1 highlights the need for this work, showing that the growth of Internet adoption has slowed down in recent years while

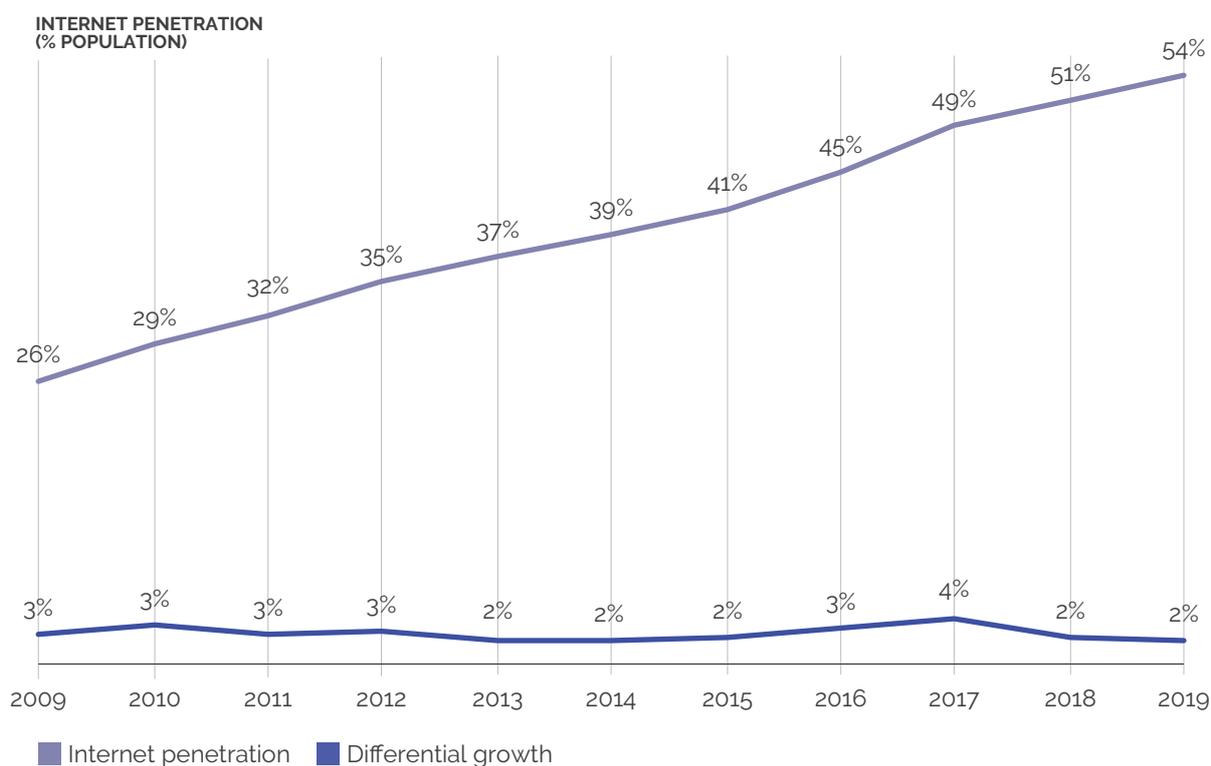
penetration has only reached 54 per cent. The necessity to rethink investing, financing and funding models to connect the unconnected is urgent and growing.

The developing digital economy – which includes all economic actors who benefit from access to the Internet as a 'general purpose technology'³ – has witnessed a decoupling of networks from services. It is in this context that this report focuses on the need to identify funding, financing and investment models for broadband to close the connectivity gap. The Broadband Commission recognizes that stakeholders in the traditional telecommunication sector are already making significant mandatory contributions and that increasing the level of their contributions would not be a sustainable solution. Indeed, legacy contribution mechanisms, including sector-specific taxes and USAFs focused on the current network operators, are distorting. The goal should be to broaden the base in order to reduce these mandatory contributions over time.

The Broadband Commission states that current contributions are insufficient to advance the adoption of broadband services. In the Digital Moonshot for Africa report⁴ published in October 2019, the Commission recommended that governments should review the sources of USAFs and 'develop innovative models to ensure the contribution base is broadened to encompass all those who derive economic benefit from the investment'.

This report outlines ways to implement this urgent call to action, and includes recommendations for how to do this outside a traditional USAF and for countries without a USAF. The Working Group recommends broadening the base of contributors by including companies participating in and benefiting from the digital economy, as outlined in subsection 3.2. At the same time, the report notes that existing USAFs are often mismanaged, and offers suggestions for how they could be reformed, along with guidelines for how a reformed USAF could collect additional funds. The report also recommends that a portion of the ICT sector's⁵ contributions

Figure 1.1: Internet penetration across the world and year-on-year growth rate



Source: ITU, 2020.

to governments is earmarked to be spent on initiatives supporting the Broadband Commission's connectivity and adoption goals. Finally, the report recommends the creation of an international fund whose objective is to support the sustainable development of broadband connectivity.

In addition to broadening the base of contributions, fund disbursement should embrace new and innovative models. It should facilitate the expansion of infrastructure in high-cost areas that are un- or under-served, but also support demand from low-income users. It must also foster other initiatives aimed at the development of a digital ecosystem. Moreover, governments should explore new and innovative vehicles for disbursement, considering a wider choice of programmes managed by different and non-traditional actors, to sustain operating and capital expenditure, and expansion of networks over time.⁶

Overall, in order for the results of this report to be implemented, a new approach must be

taken at the national level. Existing elements can be enhanced with best practices used in other countries, alongside new operating models and contributors who have not traditionally participated in the advancement of broadband connectivity. The global community can be harnessed to enhance national-level models through the creation of an international fund that can help governments to raise capital and implement policies and regulations. This entity could provide governments with recommendations on how to screen projects and recipients of funds at a national level and/or collate a list of 'vetted projects' which could be presented to both national and international organizations to fund such projects. This follows a model that has already been adopted for global health and education issues.

An international fund may aggregate investments that can be deployed across countries, lending it credibility while lowering the risk that applies when investing in one country. It can advise governments on policies that should be enacted to decrease the funding gap, while also ensuring that the money

invested is used efficiently. For other projects that are less scalable, such as community networks, the fund can act as a clearing house for knowledge and best practices, while also potentially providing loans or other resources. Such a fund should be implemented within an existing international organization, to provide instant recognition and credibility and reduce set-up costs. This is a logical extension of the Broadband Commission model itself, and will help to turn the advocacy in this report into actions.

In conclusion, the Working Group believes that the situation has become critical, especially in the era of COVID-19. The fiscal space has constricted, revenues and donor support have declined, and advanced economies have been hard hit. At the same time, competing priorities are taking precedence (vaccine cost and deployment, employment support, etc.), and the case for increased contributions from more contributors must be framed strategically. The response to the global pandemic has heightened the need to close the digital divide, and with the accompanying reduction of economic activity in the short term, digital inclusion risks falling even further behind. Ensuring that the necessary contributions are provided urgently will help mitigate this risk and unlock a virtuous circle enabling the least developed countries in terms of broadband adoption to catch up with the rest of the world and set themselves on a path to self-sustainability.

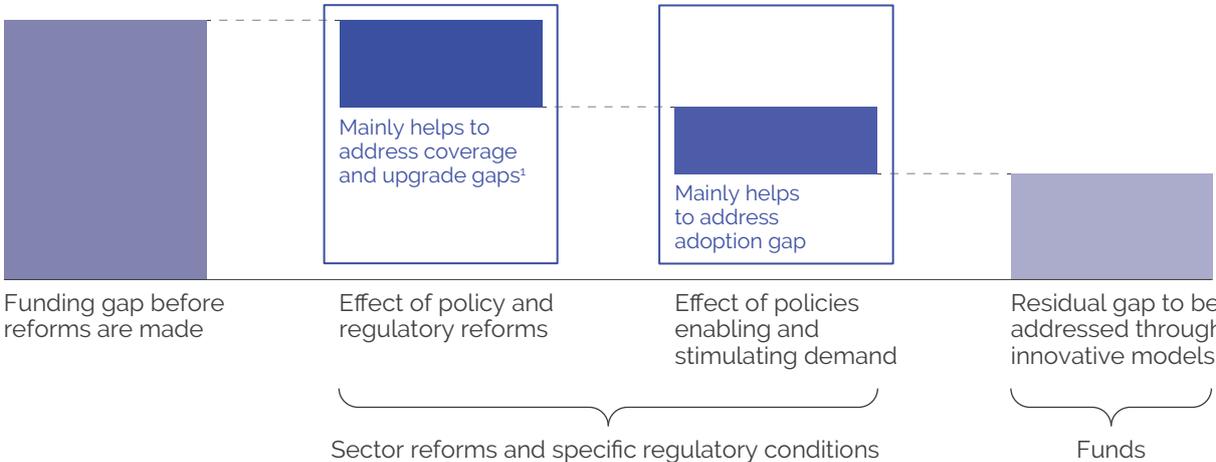
1.1 Overview of this study

In the course of this study, the Working Group identified the most relevant solutions to address the broadband connectivity gap. Some of the identified solutions will influence the selection of a particular innovative investing, financing and funding model, whilst other solutions (mostly those related to demand measures and to the regulatory and policy environment) can be, and should be, applied independently. Efforts on the demand side and on the policy and regulatory environment side will decrease, but not eliminate, the residual connectivity gap that is the focus of this study. This concept is illustrated in Figure 1.2.

The reform of policies and regulations is considered a priority due to their cost-effectiveness; policies and regulations can make a significant impact on the connectivity gap without requiring an equally significant budget effort. These may also include demand-stimulating measures, some of which can be funded through one or more of the recommended schemes. The demand support side is important because the unconnected population who are already within range of broadband coverage and could go online today is far greater than the population whose access is contingent on networks being built (or upgraded).⁷

Therefore, the contribution models considered here focus on the funding required to bridge

Figure 1.2: Illustrative impact of reforms of policies and regulations



1. Even in cases where healthy competition also improves service affordability, resulting in increased adoption

the connectivity gap once it has been reduced via the implementation of demand-side measures and policy and regulatory reforms. This is referred to as the 'residual gap', as illustrated in Figure 1.2. The Working Group notes that certain measures and reforms will also lower the cost of implementing the project to fill the residual gap and maximize the resulting take-up. Thus, at the very least, certain targeted reforms could be conditions for the implementation of the project.

1.2 Structure of the report

The goal of this study is to propose models that will support investing, financing and funding the sustainable development of broadband connectivity beyond its current geographical and demographic footprint. To do so, the Working Group has structured this report as follows:

- Section 2 identifies the ultimate needs that innovative models are expected to fulfil, facilitating a menu of recommended models to be used when designing new broadband-supporting projects.
- Section 3 focuses on broadening the base of contributions to support projects aimed at increasing sustainable broadband development. The different types of contributions are presented, followed by three main ways to achieve an increase in these contributions.
- Section 4 presents the overall framework for investing, financing and funding broadband development projects and the potential areas of contribution. This section also discusses innovative possibilities in the disbursement of project funds.
- Section 5 provides more detail on the framework for this study, and explains the set-up of a broadband-supporting project. The section also details investment, financing, and funding models and sets out the most promising combinations and the methodology used to define them.
- Section 6 identifies a number of policy and regulatory issues and discusses the main aspects that need to be considered to help attract investments and support infrastructure projects that aim to improve broadband coverage and adoption.
- Section 7 suggests how to select and combine contribution elements in order to design the ideal contribution model.
- Section 8 summarizes the overall conclusions and recommendations of the report.

Endnotes

- ¹ See http://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2021.pdf, page 66.
- ² Sometimes referred to as USF; this report uses 'USAF' to refer to the range of such funds.
- ³ See, for example, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/630411468338366817/the-internet-as-a-general-purpose-technology-firm-level-evidence-from-around-the-world>; and 'Addressing the Tax Challenges of the Digital Economy, Action 1 Deliverable 2014', https://read.oecd-ilibrary.org/taxation/addressing-the-tax-challenges-of-the-digital-economy_9789264218789-en#page1.
- ⁴ The Digital Moonshot for Africa is a World Bank Group/African Union project to connect the whole of Africa by broadband (3G or above) and provide accessibility. It appeared under the name: 'Connecting Africa through Broadband: A strategy for doubling connectivity by 2021 and reaching universal access by 2030', and is available at https://broadbandcommission.org/Documents/working-groups/DigitalMoonshotforAfrica_Report.pdf.
- ⁵ Defined in Section 3 of this report.
- ⁶ At the time of writing, extensive work is under way within the ITU on a 2021 publication focusing on reforms of USAFs. Therefore, the Working Group believes that the recommendations outlined in this report should be integrated with the findings coming out of the ITU publication.
- ⁷ The adoption gap, upgrade gap, and coverage gap are described in Annex A.3.

2



Key issues and methodology

2 Key issues and methodology

The goal of this study is to propose models to invest, finance and fund broadband development beyond its current geographical and demographic footprint: in this section the Working Group identifies the ultimate needs that innovative models are expected to fulfil, in order to establish clear requirements to be able to design a menu of recommended models to be used for new projects. This study is informed primarily by interviews with members of the Broadband Commission and additional external experts, together with the review of a large amount of relevant literature, as detailed in Annex I.

This section is structured as follows:

- Subsection 2.1 summarizes the key issues and expectations regarding these models.
- Subsection 2.2 presents a framework for the analysis of models for investing, financing and funding.

2.1 Key issues and expectations

In relation to investing, financing and funding models, the Working Group has identified concerns and expectations which are key to the success of any future innovative model, and therefore should be considered when selecting sustainable models or designing new ones.

These can be articulated around the following key issues:

- project stakeholders' contribution and involvement (2.1.1 below);
- operational hurdles (2.1.2);
- demand-side issues (2.1.3); and
- other project risks (2.1.4).

Minimizing the impact of demand-side obstacles and operational and project risks will help to attract contributions and involvement from the stakeholders.

2.1.1 Project stakeholders' contribution and involvement

Telecommunication network operators have historically been at the forefront of network deployments, investing over USD 2 trillion each decade in infrastructure with over USD 1 trillion required for mobile networks between 2020 and 2025.¹ Based on commercial viability, they have covered urban locations and then extended their networks to more rural areas as well. Over time, they have been pushed to cover more and more remote areas (based on regulatory obligations and using state aid where available) but their progress is slowing down as these remaining areas are less and less viable. Network operators are facing significant pressure on their traditional sources of revenues given the weakened link between service revenue and network cost recovery through the disaggregation of the revenue-generating service platforms from the underlying network.² The Asian Infrastructure Development Bank has concluded that '[t]he telecommunications industry - which is the main funder of 5G, fibre expansion, and other digital infrastructure developments - cannot independently raise the financial resources needed for network expansion over the next decade'.³

In addition to the network operators, other companies (including digital platforms such as Google, Facebook and Microsoft, who are key beneficiaries of broadband infrastructure) have made billions of dollars worth of selective investments in network infrastructure, including in less profitable areas. This infrastructure includes submarine cables, terrestrial backbone and in some cases last-mile networks, in consortia or partnerships with local providers.

Indeed, the Digital Moonshot for Africa report states that 'Digital services are increasingly provided by non-network operators and as the infrastructure gap is caused by a funding gap, innovations to finance models may of necessity

require obtaining contributions from non-network operators on a direct or indirect basis.’ This report builds on this identified necessity to broaden the base of contributors. In addition, recent ITU work provides similar guidance to enhance cross-sector collaboration, and source additional contributions from actors other than the traditional operators. This is embodied in the ITU’s new paradigm ‘Collaborative Regulation’ and the G5 Benchmark for Regulatory Excellence.⁴

In order to identify priorities and provide governments and policy-makers with policy recommendations for consideration, the Working Group would like to reaffirm⁵ the fundamental importance of reliable and transparent information on the collection and use of the contributions. The group recommends that governments develop a database that could also help them identify best practices and assess their impact on broadband adoption and, ultimately, economic development.

The contribution database will help them to assess the amount of funding which is currently sourced from the ICT sector but not spent to support its development. In some countries, network operators frequently face a greater tax burden than companies in other sectors due to numerous sector-specific taxes and fees. Taxes account for more than 30 per cent of sector revenue in some markets, and exceed 40 per cent of sector revenue in Jordan, Tunisia and Brazil.⁶ This includes taxes on network equipment, revenues, profits and regulatory fees. In many cases the amount of funding disbursed to support the development of the ICT sector is a fraction of what is collected.⁷ Therefore, a very significant source can be sought within the contributions that are already being collected from the ICT sector. While this may require a short-term reassessment of priorities, the Commission believes that the medium- to long-term benefits of connecting the unconnected justify some rebalancing of disbursement towards this purpose.

One way to attract new contributors is the **creation and use of innovative financial instruments**. Many of these instruments

(such as securities) have been successfully used for years, even centuries, but mostly concentrated in mainstream geographies and types of investments. However, the types of interventions needed to reach the stated objectives would focus on activities and geographies which traditionally appeal less to the typical users of these financial instruments. The innovation would be derived from ensuring that these instruments can be also used for projects that aim to increase broadband connectivity.

Governments in developing countries have especially limited resources and funds, and broadband deployment and adoption must compete with other needs, a problem underscored by the challenges of COVID-19. However, besides adopting a national broadband plan and a supportive policy and regulatory environment, governments can significantly bolster infrastructure projects through in-kind⁸ contributions and incentives such as **tax credits, moderate- to low-cost spectrum, free or low-cost permits such as rights of way (RoW), and financial guarantees to investors**.

Governments are not the only entities capable of offering in-kind contributions. Private organizations worldwide possess very valuable knowledge, skills, patents, processes and products which could be exploited to assist with the adoption of broadband services where needed.

Moreover, it appears that funds already available for allocation to broadband-adoption projects are not fully disbursed. These funds include countries’ **USAFs** and could also include funds from **multilateral development banks (MDBs)**. Where initiative, leadership and skills in setting up broadband projects are insufficient, there is often an inability to obtain these funds, especially in the case of international sources that have strict project evaluation frameworks and processes. This lack of capacity could be tackled by international institutions or a specialized entity that could be created for this purpose. Remaining obstacles need to be reduced through a more significant involvement of current or new stakeholders in

the project design and planning as well as in the operational phase.

With regards to the specific case of USAFs, it appears that these funds are often either directed to non-ICT government needs, or not disbursed at all.⁹ This leaves open the question of their relevance and effectiveness, and whether they should be included in any future innovative model or phased out entirely. It is important not only that funds raised within the USAF model are used for the scope initially agreed, but that this is done in the most efficient way. Therefore, USAFs may need to undergo extensive reforms to ensure that the funds reach the target project with the highest possible efficiency and identify projects which best support broadband adoption.

Besides, there is a need to involve **local communities**. Limited availability of information on the demand side is an issue faced by operators when rolling out new networks, in new territories. Local communities are more familiar with local conditions (related to demography, culture and income) and therefore better aware of the demand characteristics. Communities are key stakeholders to collaborate with and improve the understanding of the demand. While existing demand is often deemed insufficient, it could be commercially interesting if aggregated (e.g. at village level) or if an anchor tenant (school, hospital, government) is engaged. Therefore, this leap in demand knowledge has the potential to make operators and entities in charge of the roll-out improve their financial forecast and consider more areas to be viable.

Finally, this study has identified another potential issue: **the lack of collaboration among mobile network operators (MNOs) and, more generally, between infrastructure providers, along with a lack of regulations promoting voluntary network sharing** in developing countries. The Working Group, together with the external experts that they interviewed, believes that voluntary network sharing is a key enabler for broadband adoption; some interviewees mentioned cases of existing networks (such as long-distance fibre

networks) which were rolled out by operators, governments or utility providers, and are not being sufficiently used. Some stakeholders also highlighted a failure of governments to map existing ICT and non-ICT infrastructure and plan network roll-out. This results in inefficient use of infrastructure. Innovative investment, financing and funding models could also involve infrastructure sharing and joint infrastructure roll-outs between operators and network utility providers, with infrastructure usage optimized by appropriate government regulations and policies.

2.1.2 Operational hurdles

Once the contributions are made, the networks need to be deployed as efficiently as possible. In rural and remote areas in developing countries, one of the key operational obstacles for network roll-out is the absence of a **reliable power supply** for network equipment. To overcome this obstacle, operators should take into account potential innovative business models, such as partnering with an energy supplier to coordinate the roll-out of energy and connectivity networks.

A second important obstacle is the **absence and cost of spectrum and permits** (such as RoW). In addition to the in-kind contribution, governments and local authorities should also foster innovative models by facilitating the granting of permits for civil works, and the use of spectrum and related conditions.

A third operational obstacle for network roll-out in rural areas is the scarcity of **backhaul and international connectivity** (with a consequently high unit cost). While the gap is primarily in the 'last mile', innovative models should encompass the associated backhaul and long-distance connectivity that enables the extension of networks and upgrades.

A fourth and last operational hurdle is the **theft of telecommunication equipment**. This issue affects both service quality (due to interruptions) and set-up costs, as operators need to install protective infrastructure, such as fences. This study has found that involving

local communities helps to mitigate this issue, as they can provide safe locations to host operators' equipment and advocate for the common benefits of a working broadband network.

2.1.3 Demand-side issues

Low demand for broadband services is a key factor behind the large adoption gap, which can affect up to 52 per cent of a population depending on the region (see more detail in Annex E). Low demand is also the reason why some telecommunication infrastructure projects are deemed to be unattractive and are thus not implemented. Insufficient demand for broadband service can be due to issues as diverse as **affordability, digital literacy and awareness**, and the **relevance and attractiveness of the content**. These issues were identified by previous studies and are described in further detail in Annex A.4.

However, this study has also identified **demand volatility** as a more specific issue in developing countries. Demand volatility is observed in some regions or countries as a consequence of income volatility in rural areas, and is particularly associated with agricultural activities. Bad weather conditions can seriously threaten the disposable income of the local population and impact broadband service revenue. A good option to mitigate this risk would be to structure innovative investment, financing and funding models around a multi-country portfolio approach, as weather emergencies are unlikely to hit all the portfolio regions at the same time. Another option may be to design insurance products that could hedge network operators against demand volatility. The multi-country approach could target regional trading blocs like ASEAN, the African Union, the European Union, and the USMCA (formerly NAFTA), whose existing political and economic cohesion could help in project implementation and disbursement of funds. These blocs could also give a higher priority to the funding of the regional broadband connectivity and accessibility to advance their cohesive agenda.

2.1.4 Other project risks

Risks that affect the sustainability of broadband projects may also render infrastructure models commercially non-viable. A particular country's **political situation and its currency volatility** are potentially major risks for investors and other stakeholders.

On the one hand, public entities and governments can offer guarantees against certain risk events that may deter private investors from investing or make them demand a high risk-adjusted yield. For example, governments could design loss-guarantee schemes to protect investors and hedge them against currency volatility. However, this may only work for governments that have a strong reputation and credibility and the financial ability to do so.

On the other hand, some international institutions could offer insurance products to hedge against certain risks (such as bankruptcy), but political stability remains an important factor to obtain these types of insurance. International organizations such as import/export banks and other specialized risk-protection institutions like the World Bank's Multilateral Investment Guarantee Agency (MIGA) can provide **financial and political risk mitigation** products to suit developing country infrastructure projects. Pooling investments across various projects in different countries can also help to mitigate risk.

2.1.5 Summary of identified key issues and expectations

The overall concerns and expectations identified during the preparation of this report and through a literature review are summarized in **Figure 2.1**.

2.2 Conducting a comprehensive study of financing models

The analysis of financing models is structured around a framework designed specifically for this study. To be able to understand the choices

Figure 2.1: Summary of key issues and expectations

Key topics	Concern / Issue
Project stakeholders' contribution and involvement	<ul style="list-style-type: none"> • Lack of initiative, leadership and skills in setting up broadband projects in rural and remote areas • Operators are heavily indebted and need support to raise funds from traditional financial institutions • Need to increase contributions from stakeholders already involved as well as seeking new potential contributors • Need to increase in-kind support from governments • Need to solve USAF disbursement issues • Need to improve attractiveness of infrastructure projects and appeal to new groups of contributors • Need for reliable and transparent information on the collection and use of contributions globally
Demand-side issues	<ul style="list-style-type: none"> • Limited availability of information on demand • Low affordability of services • Low affordability of broadband devices • Lack of digital literacy and awareness • Low perceived relevance and attractiveness of Internet content for end-users
Operational hurdles	<ul style="list-style-type: none"> • Excessive restrictions on licence conditions • High licensing costs • Low availability of spectrum • Public and private permit acquisition issues and high corresponding costs • Regulators' lack of power and capabilities to take decisions within the legislative framework • Inefficient dispute arbitration • Lack of collaboration among MNOs and infrastructure providers more generally resulting in an inefficient use of existing infrastructure • Lack of mapping of both existing ICT infrastructure and roll-out plans • Lack of mapping of non-ICT infrastructure • Lack of backhaul and international connectivity • Lack of power supply in certain rural areas • Theft of telecommunication equipment
Other project risks	<ul style="list-style-type: none"> • Political risk • Currency volatility risk • Demand volatility risk

behind the design of this framework, it is necessary to make the following observations:

- **Different obstacles are more effectively overcome by different models:** as discussed in Annex E, not all broadband connectivity gaps are the same - there are three diverse types of gaps (adoption, coverage and upgrade). Coverage and upgrade gaps relate to the availability of infrastructure and services, while adoption gaps relate to the conditions of the population. As a clarifying example, targeting the financing requirements of building telecommunication infrastructure has little direct overlap with targeting the

affordability issues faced by the poorest part of the population. This report focuses on improving the availability of funds for infrastructure, whilst also suggesting measures that can address the adoption gap.

- **Ecosystem conditions are important when choosing a model:** the broader ecosystem must be carefully assessed when a telecommunication infrastructure project is designed and implemented. These conditions are typically historical, resulting from policy and regulatory choices and corresponding business models, and therefore subject to various degrees of control by current national or international

organizations. This report discusses only those conditions which can be controlled to a reasonable extent by organizations, as these forms of control are intrinsically linked to the choice of telecommunication infrastructure project set-up, and greatly influences its future performance. The three sets of conditions are:

- **Regulatory and policy conditions**, which are entirely dependent on (i) the legislative framework of a country, (ii) the policy set by national governments, or (iii) the approach taken by regulators. Ultimately, these choices are driven by the relative importance attached to the universal provision of broadband compared to other services in a specific country.¹⁰ These conditions can be fully controlled by a national government or other national entities.
- **Natural and demographic conditions**, relating mostly to the characteristics of the territory and the distribution of the population. These conditions are taken as a parameter in the infrastructure project design and cannot be reasonably controlled.¹¹ Nevertheless, the effect of these conditions on the telecommunication infrastructure project is of primary importance, and they must be accounted for.
- **Demand characteristics**, in terms of disposable income and living conditions, availability of electricity and devices, awareness of the benefits of the Internet or other broadband services, and literacy and digital literacy, among others. These characteristics can partially be controlled by a national government, mostly depending on its policy and on the availability of resources. But certain aspects of demand characteristics should be considered as being outside reasonable control when designing a telecommunication infrastructure project, as they derive from problems which are sizeable and may not be easily solved, even for the sake of extending the adoption of broadband.¹² However, other aspects of the demand characteristics can be influenced by the actions of national governments, international organizations, the private sector, and local organizations or communities. In this report, the Working

Group focuses on the controllable demand characteristics and provides detailed guidelines and case studies on the measures that can be used.

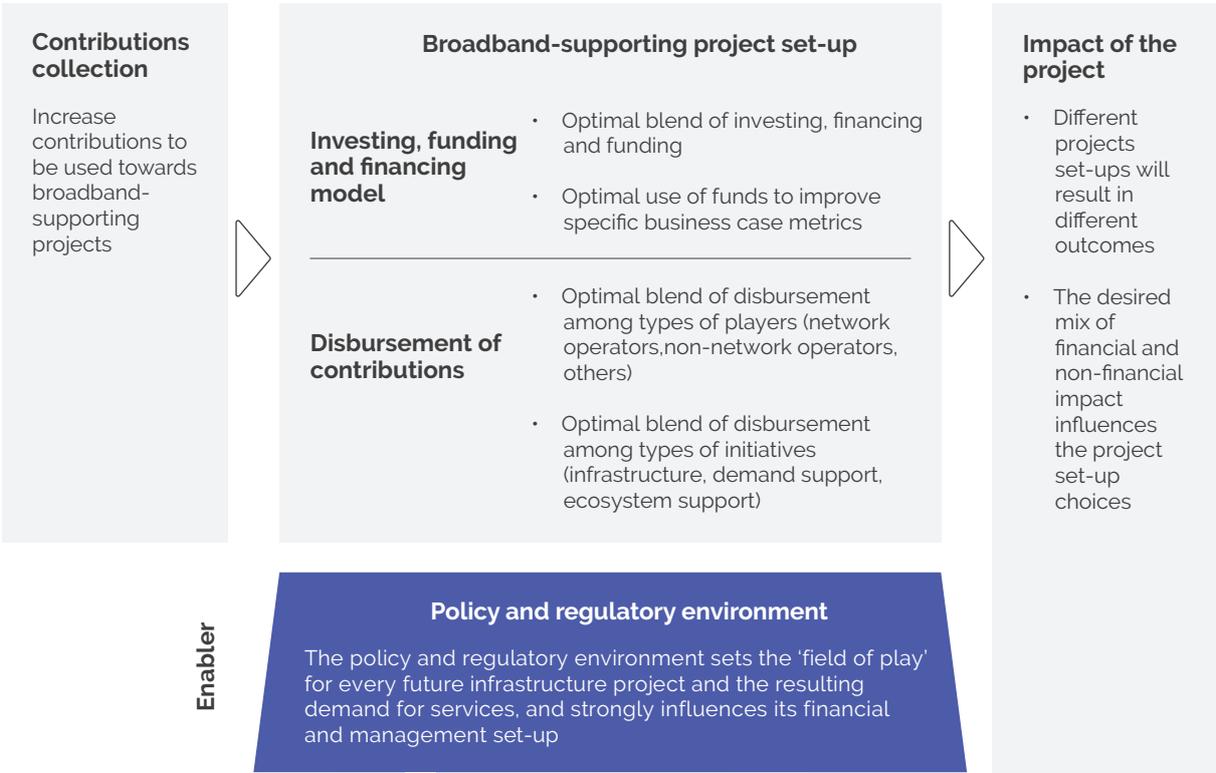
- **Different models generate different types of impact:** a telecommunication infrastructure project, as well as other projects aiming at improving the adoption of broadband connectivity, often results in a blend of different types of impact, rather than a single, homogeneous effect. A project may create financial returns for certain contributors, while also helping to extend broadband adoption to new portions of the population or create a social or economic return locally. Depending on the way a project is designed, the consequent impact (for each type discussed) will vary. Viewed from the opposite angle, this also means that a project can be designed based on the desired impact (and blend of different types of impact). This is discussed further in Annex G.

These issues are all important in the set-up of a broadband-supporting project. Figure 2.2 is a schematic summary of the key areas of this study and how they relate to each other. From this point onwards, the report will refer to 'investment, financing and funding models', or the shorter form 'contribution models'.¹³

The ecosystem conditions are briefly summarized below, and further described in detail in the corresponding sections of this report, some of which analyse complex problems, necessitating the introduction of additional specific frameworks.

- **Contributions** significantly affect the characteristics of a project, and vice versa, because certain projects can only be implemented if the contributions increase, and certain contributions can only be generated if the project possesses particular characteristics. A foundation targeting educational programmes may not directly contribute to a network project, but it may contribute to demand-support initiatives which contain network funding aspects if these are enablers for creating new digital skills through schools.

Figure 2.2: Framework for the analysis of investing, financing and funding models, together with the impact and key influencing factors



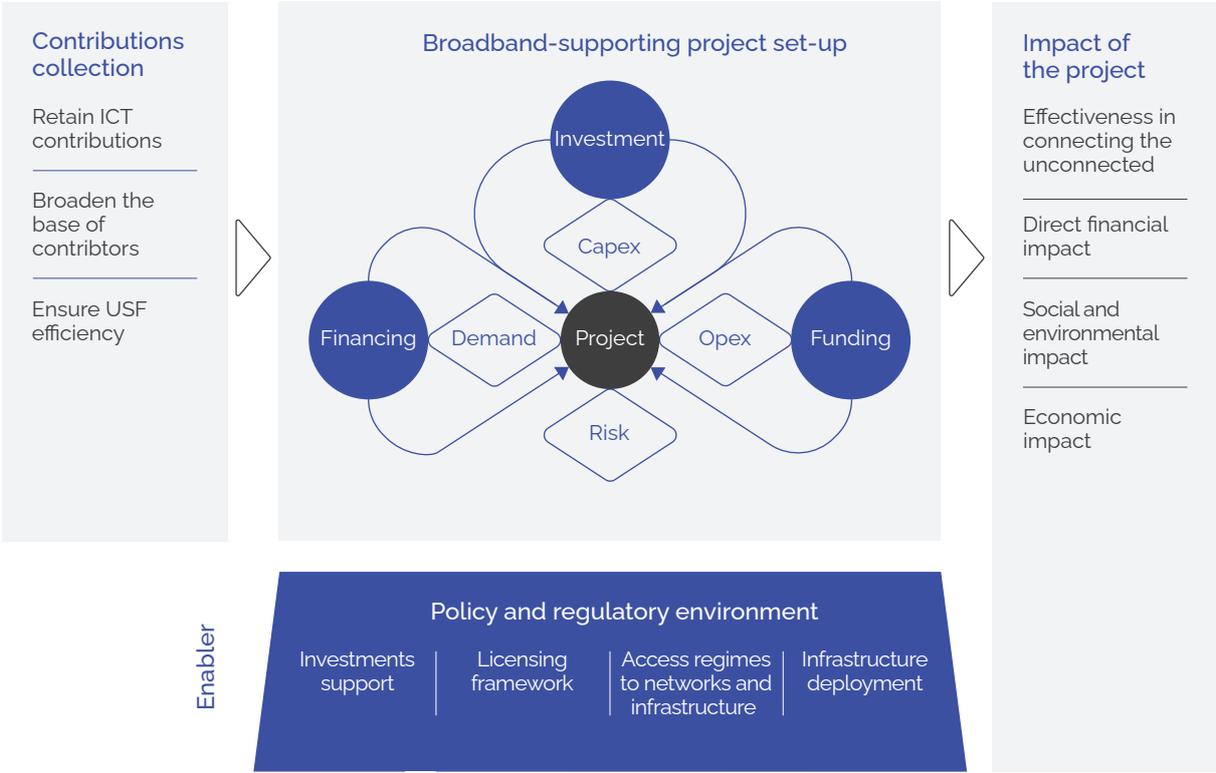
Recommendations with regard to collecting contributions are discussed in Section 3.

- **The policy and regulatory environment** influence the profitability of a project, its effectiveness in increasing broadband coverage and adoption, its sustainability, and how attractive it is for contributors. Appropriate policy and regulation can reduce costs, open new possibilities, or enable/stimulate the interest of new actors; poorly designed policy and regulation can quickly put the brakes on any kind of beneficial innovation. The effect of policy and regulations can apply to the whole telecommunication industry in a country and thereby reduce the connectivity gap, or can be tailored to particular situations, such as projects that the government believes will increase broadband adoption in order to lower the cost of deploying a new infrastructure project. Some characteristics cannot be controlled by a national government, while others can. Some are

specific to broadband demand (e.g. any direct tax on broadband services), whereas some can be controlled but are not specific to the portion of the population that is targeted by a project (e.g. people with a certain level of disposable income). Policy and regulation are discussed in more detail in Section 6.

Each part of the framework shown in Figure 2.3 below is explored in detail in the corresponding sections, while the discussion about efficient fund disbursement and recognized contribution models can be found in Section 4 and 5 respectively.

Figure 2.3: Detailed breakdown of the elements of the analysis framework



Endnotes

- ¹ See two reports by GSMA: Mobile Economy 2017; and 2025 Capex Outlook (2020 update): The \$1 trillion investment, March 2020.
- ² The global telecommunication industry has faced a decline or only marginal increases in year-on-year quarterly revenues for six of the seven quarters leading up to the second quarter of 2020. The primary reasons for this are pricing pressures due to increased competition, new regulations reducing interconnection and roaming revenues for operators, and new OTT applications competing with traditional call and messaging revenues.
- ³ AIB, 10 March 2020, Digital Infrastructure Sector Analysis.
- ⁴ Regulatory Outlook 2020; see https://www.itu.int/pub/D-PREF-BB.REG_OUT01.
- ⁵ As initially stated in the Digital Moonshot for Africa report, page 113; see https://broadbandcommission.org/Documents/working-groups/DigitalMoonshotforAfrica_Report.pdf.
- ⁶ GSMA, 2014, Digital Inclusion.
- ⁷ As an example: A4AI (in its 2018 Affordability Report) provides a figure for African countries of undisbursed USAF of some USD 400 million.
- ⁸ Contributions that do not involve cash outflow from the contributor. Such contributions could be in the form of assets, authorization transfers, human resources or incentives (e.g. tax).
- ⁹ According to reports by the ITU (Universal Service Fund and Digital Inclusion for All) and GSMA (Survey of Universal Service Funds).
- ¹⁰ To clarify this point, the reader can think of a government's tax choices: it could heavily tax revenues from telecommunication services to subsidize other government-provided services, or reduce the tax burden to a minimum to ensure as much broadband development as possible.
- ¹¹ Although some of these conditions can be controlled, it would be unreasonable to think that a government would make these efforts (e.g. shaping the territory, relocating population, etc.) just for the sake of providing broadband access.
- ¹² Two examples of such problems are poverty and illiteracy: governments are aware of these problems and would work towards eradicating them if they had sufficient resources. However, they would do so with the aim of improving the living conditions of their citizens, not just for the sake of allowing them to enjoy broadband connectivity. For these reasons, these conditions are considered as not controllable for the purpose of our analysis.
- ¹³ The reason for not merely using the term 'financing' will become clearer to the reader in Section 3 of the report, where this term will be used to define a specific type of contribution, which is different, and complementary, to investments and funding.

3

Broadening the contribution base to support a sustainable broadband development

3 Broadening the contribution base to support sustainable broadband development

The Working Group recommends broadening the base of contributors and contributions to support projects that focus on increasing broadband deployment and adoption and closing the coverage and usage gaps. This is especially relevant in locales where traditional funding, financing and investment models have been insufficient. After outlining the types of contributions to be targeted and the potential contributors for each case (3.1), this section identifies three main ways to achieve an increase of contributions:

- Broadening the existing contribution base to include new contributors (detailed in 3.2);
- Retaining contributions from the ICT players to support sustainable broadband development (3.3); and
- Ensuring that efficient USAF schemes can play a central role in the collection of contributions to support broadband development (3.4).

3.1 Types of contribution

The three most relevant types of financial contributions in an infrastructure project are investing, financing and funding, which can be defined as follows:

- **Investing** is the action of contributing cash or assets in exchange for equity. Investments are made by entities that expect to recover the investment and generate additional risk-adjusted market-value return, through dividends and/or sale of the business (or part of it). Investing is the most basic contribution to any infrastructure project and the primary source is typically the entity in charge of the roll-out. Examples of traditional investors in infrastructure projects are network operators, tower companies, and carriers,

including long-distance and international and infrastructure funds.

- **Financing** is the action of contributing cash or assets in exchange for credit notes of various types, repayable following a pre-set schedule. Funds obtained through financing are either loans from financial institutions and/or government or 'in-advance payments' from future customers (community/final customer). Financing is widely used but not always necessary for a traditional infrastructure project. Examples of traditional financiers for infrastructure projects are commercial banks, MDBs, development credit institutions established by national or regional governments, and pension or mutual funds.
- **Funding** is the action of contributing cash or assets, either pro-bono or seeking a return which is inferior to the risk-adjusted return expected by the market. Such contributions can be 'in kind' (including assets, RoW transfer, or human resource allocation) or 'in cash' (such as money provided as a grant or government subsidy). Unlike the other two types of contributors, funders often seek social and/or broader economic impacts, rather than direct financial gain. Examples of traditional funders for infrastructure projects are USAFs and governments (by dedicating a portion of their expenditure to subsidize infrastructure and support demand). For each of these contribution types, the Working Group has identified traditional and potential new contributors,¹ as discussed in the next section.

3.2 Broadening the existing contribution base to include new contributors

When discussing the key issues of the current contribution models and the expectations of future ones, subsection 2.1.1 highlighted how

the ICT sector finds itself in need of expanding its contribution base beyond those who have traditionally participated (predominantly network operators contributing through investments along with telecommunication-specific levies, licence and spectrum fees). As the benefits of the digital economy expand to all sectors, including notably areas not traditionally seen as involving ICT, other companies in those sectors can be encouraged and incentivized to contribute in order to increase their benefits.

The Broadband Commission stated this principle in the Digital Moonshot for Africa report:² 'Digital services are increasingly provided by non-network operators and as the infrastructure gap is caused by a funding gap, innovations to finance models may of necessity require obtaining contributions from non-network operators on a direct or indirect basis.' This approach stems from the need to avoid placing additional financial burdens onto already-strained network operators in developing markets, as mentioned at the 2014 Dublin Broadband Commission meeting.³ Historically, telecommunication service platforms – such as voice switches and short message service centres (SMSCs) – were integrated into the network infrastructure. The channel used to access the network was specific to the service. This resulted in a model where recovery of telecommunication network investments was primarily by way of charges on voice and messaging services. This is particularly true of mobile networks in developing markets where low and unpredictable incomes are not well suited to pricing based on recurring payments for network access.

The move to data-based broadband access and the proliferation of different online services (cloud storage, video streaming, messaging, social media, e-commerce, etc.) means that the channel is no longer closely aligned to the service. Platforms have increasingly become disaggregated from the underlying transport and connectivity networks that support their services. In the context of online activity, they are in the main hosted away from the access network. This disaggregation has

been identified as problematic in terms of investments in networks.

The ITU's 2019 report on Digital Infrastructure Policy and Regulation in the Asia-Pacific Region⁴ observes that '[B]oth profitability and competitive tension are necessary to encourage investment; profitable operators that face no competition have little incentive to undertake investment. The popularity of 'over-the-top' (OTT) services has further complicated regulation because these services have diverted operator profits to OTT technology platform operators and arguably weakened operator market power.'

The Florence School of Regulation notes⁵ that digital platforms require a smaller investment to create network effects than the industries that supply the infrastructure over which the platforms provide services. Its report finds that

[T]he involvement of online platforms in the network industries benefits consumers by fulfilling unmet needs, often efficiently and at low cost. Platforms do this partly by exploiting access to existing network infrastructures that are often vital for national economic growth and wellbeing. However, if online platforms are allowed to side-line traditional network operators, it may mean that vital investment in building and maintaining the infrastructures on which these markets are founded becomes unsustainable in the long-term.

The Working Group recommends that governments and policy-makers explore ways to incentivize new types of voluntary contributors, and that these contributors⁶ begin to consider how making contributions can help them achieve their aims. Figure 3.1 provides examples of international organizations' definitions of the digital economy and its participants. In the context of this evolving body of literature, the Working Group set out a non-exhaustive list of digital economy participants:

- **ICT companies (excluding telecommunication firms)** contribute towards initiatives that can support broadband development by providing the enabling infrastructure underlying Internet

adoption and usage for individuals and businesses. They include manufacturers of devices and components (hardware), software developers, and providers of IT services. For example, mobile handset manufacturers can propose low-cost handsets to ensure better adoption. Tax incentive schemes should be considered by policy-makers to identify and support such opportunities.

- **Digital companies**⁸ have already shown their interest in investing in initiatives supporting the development of broadband, including investments in telecommunication infrastructure.⁹ These companies are characterized by the central role of the Internet in their operating and delivery model. They include purely digital companies (Internet platforms and providers of digital solutions) that operate entirely in a digital environment, and mixed players (e-commerce and digital content) that combine a prominent digital dimension with a physical one. Governments and policy-makers should be aware of existing case studies and the benefits of contributions and investments from such players and ensure a mutually rewarding collaboration with them. Consideration should be given to the extent to which the parties should be subject to traditional regulatory requirements for telecommunications.¹⁰
- **Other companies deriving economic benefit from the development of broadband**, as stated in the Digital Moonshot for Africa report. Government and policy-makers should not be restricted to thinking that only ICT-sector companies benefit from the development of broadband; in fact it has been reported that 75 per cent of the economic impact of the Internet benefits actors outside the ICT sector.¹¹ Such companies should be incentivized to make investments in broadband infrastructure just like digital companies. As an example, they can help provide digital skills in the communities where they operate, and develop the broader economy in which they operate. Possible definitions of the participants in this category provided by other international organizations are shown in Figure 3.1.
- **MDBs** are willing to contribute to broadband-supporting projects and should

be encouraged to prioritize ICT projects. The Working Group promotes increased commitment to these projects, and transparency with regards to disbursements made towards them. Indeed, the Alliance for Affordable Internet (A4AI) noted¹² that only 1 per cent of MDBs' funding of development projects in low- to middle-income countries have gone to ICT projects. MDBs should review allocation criteria to ensure balanced funding across all SDGs including broadband as a key underlying enabler. The same report from A4AI surveyed different MDBs, and nearly all of them noted that 'their current level of investment in the ICT sector should be higher than it is'. One of the respondents 'believes there is substantial potential for intervention beyond what we've been doing'. These commitments can come from international aid agencies (e.g. USAID), MDBs (including regional ones such as the African Development Bank), and international development programmes (e.g. NEPAD¹³).

- **The corporate social responsibility (CSR) funds of large corporations** may be willing to contribute to broadband-supporting projects if they help to achieve global sustainability goals such as reducing carbon emissions. The UN's SDGs provide a globally accepted framework to define what the objectives could be. Both project promoters and governments should assess the benefits of broadband-supporting projects in terms of impact on SDGs to stimulate the interest of CSR funds. Improving the regulatory environment and tax incentives will allow governments to increase the efficiency and therefore the attractiveness of the projects. The Working Group notes that in-kind contributions may be equally important to the success of broadband-supporting initiatives and hence should always be enabled in addition to cash contributions. Nonetheless, the overall proportion of such in-kind contributions should not be to the detriment of actual funding for infrastructure deployment.

On the other hand, companies' CSR contributions are usually constrained by the objective or target industry of the CSR fund. In most cases, connectivity is not listed among their objectives or industries, because it is not recognized as an important element to achieve the

typical charity's prime objectives, such as fighting hunger, improving education, reducing poverty, or improving health care. But increasingly, digital connectivity helps to achieve broader goals (most obviously education and health care), and develop entire sectors such as agriculture and mining. Indeed, as discussed in Annex H.1.3, connectivity plays a catalytic role in meeting the SDGs, and this can be used to attract corporate funds.

However, given the impact of Internet access on development, advocacy for contributions toward reducing the broadband gap should be focused on their role in achieving the SDGs, rather than as a standalone issue. This would help the CSR funds properly recognize that such infrastructure funding falls within their mandate. (The methodology that can be used to measure the related impact of broadband connectivity projects is discussed in Annex H.1.)

It is very important that projects obtain sufficient and durable funds to ensure their completion and maximize their efficiency, not just in terms of the capital expenditures required for building the infrastructure, but also for ongoing operating expenditures. Therefore, new identified contributions will have to be predictable and sustainable, and suitable to address shortfalls and avoid the sudden halting of projects already under way.

Finally, while the language of the Digital Moonshot for Africa report refers to broadening the base for USAFs, the Working Group notes that this should not be restricted to that target. On the one hand, not every country has a USAF, and on the other, there are concerns about the efficiency of existing USAFs, which are addressed in the next subsection. The new sources of contributions discussed here could be distributed through a well-functioning USAF.

Figure 3.1: Definitions of the 'digital economy'

A growing body of literature is emerging which is attempting to define the components and players in the digital economy; however, the Working Group recognizes that this is an evolving area as every business and every consumer has, or soon will have, a stake in the digital economy. Previous definitions used by the OECD, UNCTAD, and Broadband Commission in the past are as follows:

OECD

A 2020 OECD report for the G20 Digital Economy Task Force, 'Roadmap toward a Common Framework for Measuring the Digital Economy',¹⁴ proposes a common definition and tiered framework to help establish clear, comparable measures for policy-making:

'The Digital Economy incorporates all economic activity reliant on, or significantly enhanced by the use of, digital inputs, including digital technologies, digital infrastructure, digital services and data. It refers to all producers and consumers, including government, that are utilizing these digital inputs in their economic activities.'

UNCTAD

UNCTAD recognizes in its 2019 Digital Economy report¹⁵ that there may be many interpretations of the same term in the relevant literature and analyses, as well as in different forums:

'The digital economy is becoming increasingly inseparable from the functioning of the economy as a whole. The different technologies and economic aspects of the digital economy can be broken down into three broad components:

- i) Core aspects or foundational aspects of the digital economy, which comprise fundamental innovations (semiconductors, processors), core technologies (computers, telecommunication devices), and enabling infrastructures (Internet and telecommunication networks).
- ii) Digital and information technology (IT) sectors, which produce key products or services that rely on core digital technologies, including digital platforms, mobile applications and payment services. The digital economy is to a high degree affected by innovative services in these sectors, which are making a growing contribution to economies, as well as enabling potential spillover effects to other sectors.
- iii) A wider set of digitalizing sectors, which includes those where digital products and services are being increasingly used (e.g. for e-commerce). Even if change is incremental, many sectors of the economy are being digitalized in this way. This includes digitally enabled sectors in which new activities or business models have emerged and are being transformed as a result of digital technologies. Examples include finance, media, tourism and transportation. Moreover, although less often highlighted, digitally literate or skilled workers, consumers, buyers and users are crucial for the growth of the digitalized economy.'

Broadband Commission for Sustainable Development

The Working Group aligns with UNCTAD on the idea that the digital economy is not limited to network operators: 'Digital services are increasingly provided by non-network operators'.

Sources: OECD, UNCTAD, and Broadband Commission for Sustainable Development, 2021.

3.3 Retaining contributions from the ICT players

Telecommunication operators are typically subject to mandatory contributions imposed by the government or by other specific governmental entities, such as national regulators. Some of these contributions are of a general nature and similar to those that apply to players in other sectors (e.g. corporate tax), while others are specific to the telecommunication sector and do not have equivalents in other sectors (e.g. USAF contributions).

The following contributions are those typically applied to players in the ICT sector,¹⁶ but additional and less common obligations may exist in certain countries.

- Mandatory contributions which are specific to the ICT sector, including:

- Operating licence fees;
- Spectrum licence fees;
- USAF contributions;
- Digital or content tax;
- Rights of way and recurring fees linked to telecommunication infrastructure; and
- Equipment import fees (both for network and user equipment).
- Mandatory contributions which are not specific to the ICT sector, including:
 - Corporate tax on profits;
 - Non-specific business licensing fees;
 - Digital or content tax;¹⁷
 - Sales tax; and
 - Property tax.

Because the ICT sector is in great need of contributions to reduce the broadband connectivity gap, the Working Group believes

that the starting point of this process should be to earmark the sector-specific contributions which ICT players are already making to the government and its entities, and ensure that these funds are spent for the development of the sector itself. The group recommends that governments should avoid taxes specifically applying to ICT equipment, devices and services¹⁸ and should take a longer-term view of public finances, concentrating on broadband-driven growth and the taxation of business profits and transactions.¹⁹

As a first step, there is a need to ensure that the contributions coming from the ICT players are predictable and sustainable, so they do not unnecessarily divert private-sector investment capability away from broadband deployment. Contributions should also be tracked in a reliable manner, and made publicly available for the benefit of all stakeholders and policy-makers who will then be able to identify best practices globally. Policy-makers and think-tanks can analyse these data and draw conclusions on the effect of the existing practices on overall economic development. Based on the studies already undertaken, as referenced in Annex A, the Working Group asserts that retaining contributions from the ICT players to support sustainable broadband development will have a positive socioeconomic impact.

Governments should therefore draft a list of current contributions coming from the ICT sector and earmark a proportion²⁰ of those to be spent on broadband-supporting initiatives, while non-specific contributions can be used as proceeds to fund governments' budgets.

The Working Group recognizes that global tax reform efforts are ongoing at the OECD. These aim to address the international challenge of multinational enterprises generating value from tangible or intangible assets in one jurisdiction and being subject to taxation on its consolidated profits in another often lower-tax jurisdiction. The evolving digital economy benefits substantially from the digitalization of business models enabling multinational companies to carry out business in countries where they do not have a physical presence.

The relevance of the OECD work will be to seek to correlate, fairly and reasonably, value capture per jurisdiction with the appropriate taxation to apportion to that territory. This work will help localize taxes to these jurisdictions where such companies do not pay tax.²¹

In June 2021, the G7 announced that it had reached an agreement to tackle the tax challenges arising from an increasingly globalized and digital global economy, stating that 'under the agreement, the largest and most profitable multinationals will be required to pay tax in the countries where they operate – and not just where they have their headquarters. The rules would apply to global firms with at least a 10% profit margin – and would see 20% of any profit above the 10% margin reallocated and then subjected to tax [where] they operate'.²² More recently, the OECD embraced the G7 framework, announcing in a joint [statement](#) that 136 countries have agreed to this plan.²³

In addition, certain jurisdictions have implemented digital taxes to address rules around taxable presence and apply special turnover-based taxes to digital companies to generate local contributions. Digital taxes implemented in jurisdictions typically impose a percentage tax on gross revenues derived from the sale of online advertising or the use of user data pertaining to the jurisdiction, with thresholds designed to target the tax at companies operating on a global scale.²⁴

The Working Group recommends that a portion of any such tax revenue is earmarked to finance digital infrastructure development and broadband adoption. This revenue could be disbursed through a dedicated digital fund or a reformed version of the USAF (see subsection 3.4).

Figure 3.2: International examples of sector-generated tax-retention mechanisms

USA: The Federal Communications Commission (FCC) intends to use part of the C-band auction money to incentivize satellite operators to clear the spectrum²⁵

In January 2021, the first phase of the USA's auction of C-band spectrum was completed, raising USD 81 billion. Out of the funds collected, the FCC intends to provide satellite operators with up to USD 9.7 billion in incentive payments to move into the upper portion of the band, and about USD 3.3 billion in estimated relocation costs. This will allow the clearance of the C-band at an accelerated timeline. In line with the FCC's final C-band order, Intelsat will receive about USD 4.87 billion; SES about USD 3.97 billion; Eutelsat about USD 507 million; Telesat USD 344 million; and Star One USD 15 million.

USA: The FCC reinjected money from the spectrum auction into the sector to accelerate 4G roll-out

For the 700 MHz auction, the FCC used part of the money raised by the auction to aid the national conversion to digital television, by subsidizing set-top converter boxes so people with analogue TV sets can view digital signals. The plan was to offer each household up to two USD 40 vouchers for these boxes. This allowed the release of spectrum and therefore accelerated the 4G roll-out.

Canada: Introduction of a levy on digital companies in the context of the modernization of the Broadcasting Act

In November 2020, the Canadian government introduced Bill C-10, which updates its Broadcasting Act by including a clarification that 'online undertakings' (providing curated online broadcasting services in Canada) fall under the scope of the Act regardless of their location. It establishes a requirement that these services contribute financially to the creation and production of Canadian content. This update has been driven by recent changes that have brought digital OTT distribution into the broadcasting sector.

The government expects that once implemented, the amendments will create more opportunities for Canadian content producers, resulting in a more equitable and flexible regulatory framework and a broadcasting system that is more reflective of Canadian society. The bill could result in online broadcasters being required to invest more than USD 600 million in Canadian creators, music and stories by 2023.

Other examples of such retention mechanisms are shown in Figure 3.6 and include Burkina Faso and the Democratic Republic of the Congo investing part of their frequency fees into USAFs.

3.4 Reforming existing USAFs to ensure efficient collection and disbursement of funds

As mentioned in Section 2, despite operators' efforts to extend coverage, certain areas are unprofitable due to the high cost of deployment and it is therefore uneconomical to roll out network infrastructure on a commercial basis. In an effort to address this issue, some governments have sought to use USAFs to extend connectivity via rural infrastructure to these areas. However, it is widely acknowledged that most current USAFs remain inefficient and ineffective. In 2013, GSMA research²⁶ assessing 64 USAFs, showed that there was USD 11 billion waiting to be disbursed.

The organizations contributing to USAF vary depending on the country. For example, Chile does not require any private entity to participate in the USAF, as it is financed entirely from the government's budget. The USAF in Ecuador only involves fixed-network operators. Vietnam includes both fixed and mobile operators but applies differentiated levies between the two. Tanzania applies its USAF to all communication service providers including telecommunication operators, Internet service providers (ISPs) and even post and courier companies. More details regarding the definition of USAF and their typical operating models are shown in Figure 3.3.

Figure 3.3: USAF - Definition and operating models

The underlying concept of universal service is to ensure that telecommunications are accessible to the widest number of people (and communities) at affordable prices. This involves building out into higher-cost areas where commercial networks are not feasible, and can also involve making broadband cheaper for low-income individuals and households.

A USAF is the fund collected by governments to reach universal service. When not entirely financed by the government (as in Chile), USAFs can be financed through a contribution mechanism from licensed telecommunication operators, typically in the form of a percentage of gross revenues, or a fixed recurrent fee. In some countries, the USAF fee is not a separate fee but rather a portion of an overall regulatory or licensing fee. In such cases, the portion of the fee to be directed to the USAF may be fixed. In addition to operator levies, there are frequently other sources of funds for USAFs including licensing fees, full or partial proceeds from spectrum auctions, direct contributions from government budgets, and contributions from international agencies such as the World Bank and regional development banks.

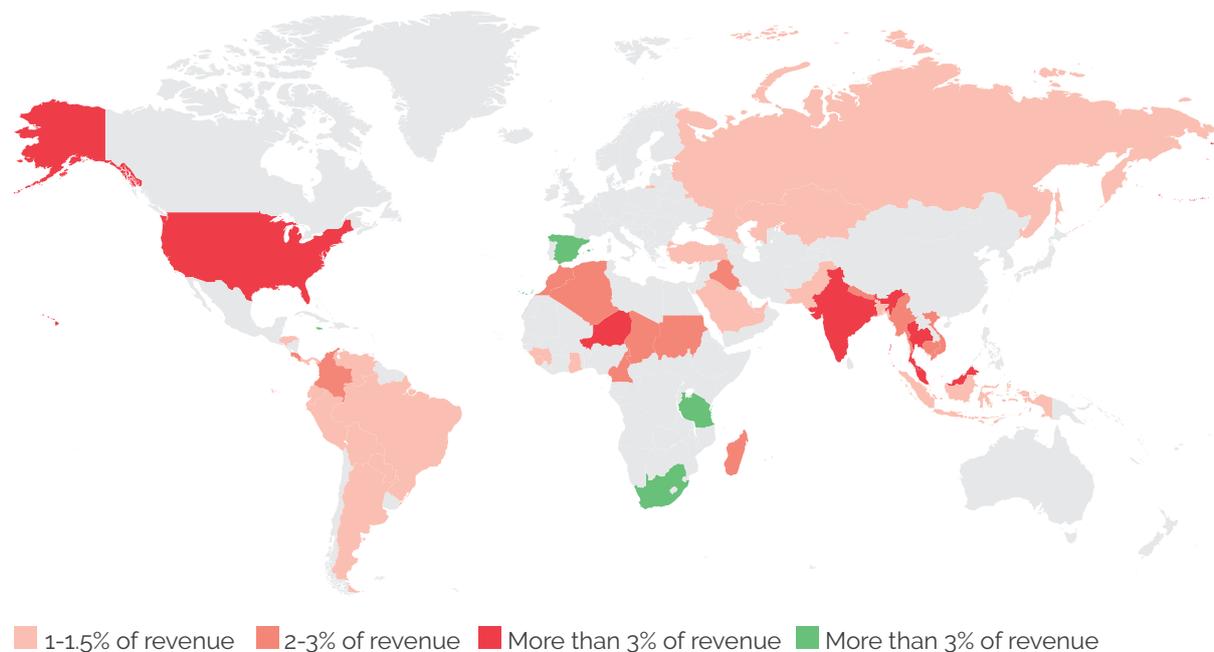
The fees may go directly to the USAF or may be collected by the regulator and then subsequently transferred to the USAF.

The majority of existing USAF models rely on contributions from network operators with limited or no contribution from other entities that would benefit from investments in network infrastructure. In a report published in 2019, the GSMA reported USAF contribution rates for selected countries, as displayed in Figure 3.4.

These range from 1 per cent to more than 3 per cent for countries such as Niger (4 per cent) and Malaysia (6 per cent).

In the view of the Working Group, USAFs present a range of complications in implementations observed globally.

Figure 3.4: Universal service and access fund rates worldwide - selected examples



Disclaimer: The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of ITU and of the secretariat of ITU concerning the legal status of the country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

Source: GSMA, 2019²⁷

Figure 3.5: Pay or play – example of incentivized partnership – recent developments

It may be possible to incentivize digital companies and local network operators to strike commercial infrastructure deals through a system similar to the one established to fund media in Australia.²⁸

Under the Australian system, digital companies and local publishers and broadcasters are required to negotiate commercial agreements for the use of locally produced content with the possibility of an arbitrator deciding terms if the parties cannot agree. Agreements were reached quickly once the scheme was announced.

A similar model for infrastructure in unserved areas could be established to incentivize digital companies and local infrastructure operators to reach commercial agreements. Many stakeholders may welcome a formal structure and there are already examples of digital companies seeking to partner with network operators on infrastructure.²⁹ Incentives could be provided in the form of taxation credits. This could be an attractive incentive if digital taxes become more common. Partnerships with network operators could also count as ‘play’ contributions to USAF funds that use a ‘pay or play’ basis.

Similar to the Australia model, if terms cannot be agreed, an arbitrator could find a resolution by looking to models for capacity payments in other network industries. In this regard guidance for arbitrators is available. It has been established that contractual relations between platform operator and physical infrastructure providers are driven by the requirements of intermodal market transactions involving local loop network access to enable platform operators to deliver services to end users. Platform operators’ access to physical network infrastructure capacities (such as airport slots and track capacities) may be organized by spot markets or long-term contracts.³⁰

Administrators have faced challenges collecting the funds in some countries (such as Niger and Tanzania). More commonly, problems arise from the disbursement process. There is evidence suggesting that many USAFs are not administered effectively and are underutilized: studies by the ITU and GSMA show that across the world, more than half of the sums collected for USAFs were never utilized and over a third of the funds were not able to distribute any of the levies collected.

In this context, the Working Group strongly supports a comprehensive reform of USAF in terms of both fund collection and disbursement. In Figure 3.8, best-practice guidelines for the disbursement are discussed. Applying these guidelines as part of a wider USAF reform would increase the willingness of contributors to participate in the funds.

After countries have improved the efficiency of the disbursement process, they may choose to innovate by incentivizing additional voluntary

contributions from entities which have not traditionally participated, particularly those discussed in subsection 3.2. For example, this is already the case in Ghana’s USAF scheme, which includes a broad list of potential contributors and donations, grants and gifts, as summarized in Figure 3.6. Potentially, this reform could be introduced in conjunction with a ‘pay or play’ option as observed in Morocco and Argentina where operators have the choice to either contribute to the USAF or directly implement projects that fit with USAF objectives. This is described in Model E (Reformed USAF) in Annex C.

Some countries are already aware of the need to broaden the contribution base and have an extended list of contributors and contributions that can bring funds into national USAF schemes (see Figure 3.6).

USAFs could be used as mechanisms to catalyse contributions that certain contributors are trying to channel towards a specific country,

Figure 3.6: Case studies for collection of USAFs

Country	Source of the fund
<i>Burkina Faso</i>	<ul style="list-style-type: none"> • Operators: 2% of annual revenue net of interconnection payments • Government and local authorities: possible contribution • Part of new or renewal licence fees
<i>Democratic Republic of the Congo</i>	<ul style="list-style-type: none"> • Operators: from annual licence fees (2% of gross annual revenue)
<i>Ivory Coast</i>	<ul style="list-style-type: none"> • Mobile operators: 2% of gross annual revenue from mobile operators only • Loans by the fund • Revenues from fund's investments • Other taxes on telecommunication • Other gifts and grants
<i>Ghana</i>	<ul style="list-style-type: none"> • Operators: 1% of annual net revenue • Monies provided by Parliament • Donations, grants and gifts
<i>Mauritius</i>	<ul style="list-style-type: none"> • Operators: 5% of gross revenue generated from international roaming or a percentage of the price of every incoming call on each operator's network • Grants from country's NRA
<i>Nigeria</i>	<ul style="list-style-type: none"> • Operators: 1% of net revenues • Monies from the National Assembly • Gifts and aid
<i>Rwanda</i>	<ul style="list-style-type: none"> • Operators: 2% of gross annual revenues • Grants from international donors
<i>Tanzania</i>	<ul style="list-style-type: none"> • Operators: 0.3% of yearly gross operating revenue • Grants from government, regulator, parliamentary • Development Partner grants • Loan from World Bank

Source: 'Universal Service Fund and Digital Inclusion for All', ITU and 'Report Survey of Universal Service Funds', GSMA.

such as those coming from donors and MDBs. Funding could come from government budget, spectrum fees, grants from CSR funds, development banks and other donations.

The recommendations in respect of reformed USAFs do not preclude the existence of other funds and it is noted that current USAFs often coexist with other funds. USAFs need not necessarily play a central role in the management of funds to support broadband

development. As far back as 2013, the GSMA advised phasing them out entirely, discontinuing the collection of levies and returning undisbursed funds to the operators so that they could extend mobile services to remote areas themselves.

Some countries do not have a USAF, but use an equivalent initiative. Thailand's 'Digital Economy and Society Development Fund' is an example (Figure 3.7:).

Figure 3.7: Example of national ICT fund

Thai 'Digital Economy and Society Development Fund'³¹

In 2014, Thailand launched a Digital Economy and Society Development Plan covering a 20-year period, to address development challenges, and adapt to and seize economic opportunities. To help achieve its targets, the Digital Economy and Society Development Fund was established in 2017 to upgrade Thailand's telecommunication infrastructure by retaining existing sector-specific revenues and using a variety of relevant sources, including:

- funding from the government's annual budget
- National Broadcasting and Telecommunications Commission (NBTC): **15 per cent of proceeds available from frequency allocation and 15 per cent from the NBTC's annual income**
- other sources such as donation money and properties

In fiscal year 2019, over USD 85 million was allocated to the fund and disbursement was started in October 2020, due to a delay in the announcement of the regulations for the fund's use.

The fund plans to allocate money for:

1. digital infrastructure;
2. government technology improvement;
3. human resource development;
4. educational technology;
5. health technology;
6. agri-tech;
7. government tech;
8. human resource tech; and
9. fintech.

According to an ITU report³² surveying 69 USAFs, almost 50 per cent have a low level or no level of activity. Given that the largest part, if not all, of the funds come from sector-specific taxation, many operators see contributions to USAFs as potential investments not being pursued. In addition, in a context where more investments are needed to bridge the connectivity gap, governments should address this issue to encourage broader contributions into USAF. It is also important to improve USAF management through reforms to allow for greater autonomy, increased transparency, and promotion of operational efficiency.

Based on benchmark analyses from ITU and UNCTAD³³ reports as well as previous recommendations made by the Broadband Commission in the State of Broadband annual report,³⁴ the Working Group recommends the following best-practice guidelines while reforming USAFs:

- USAFs should have a clearly defined governance structure and be managed

by impartial administrators (not subject to political interference). USAFs should have responsibilities clearly separated from those of other government agencies.

- USAFs should have specified and measurable objectives including coverage and service delivery targets: this implies the definition of targets and the publication of status reports.
- USAF allocation to projects should be done on a fair and competitive basis through tender processes.
- The potential beneficiaries should include not-for-profit complementary access solution providers, such as community networks.
- To ensure operational efficiency, consultation with stakeholders is key. Operators should have representation in the USAF oversight committee.
- The focus should be on project sustainability and promotion of efficient deployment and/or innovation and cost minimization.

Figure 3.8: Examples of best practice for management and disbursement of USAFs

Best practice	Example country	Details
Autonomous/independent structure	<i>Pakistan and Nigeria</i>	Separate companies for managing USAFs: USAF Co. (in Pakistan) and USPF (in Nigeria) with their board of directors including representatives from both the private and public sector
Clearly specified and measurable objectives	<i>Colombia</i>	Production of four-year plans for USAFs, which include detailed project descriptions, targets to be achieved and associated costs
	<i>Peru</i>	USAF publishes a yearly report on performance of the fund, including allocations to different projects, their targets and performance against targets
Fair project allocation process	<i>Nigeria, Colombia and Pakistan</i>	Projects are allocated to bidders that require subsidies to compensate for network unprofitability. Successful bidders are also posted on USAF websites and in publications (only in the case of Pakistan)
Consultation with stakeholders to ensure operational efficiency	<i>Morocco</i>	Implemented a 'play-or-pay+' practice (that is, either financing networks in hard-to-reach and remote areas or making in-cash contributions to the USAF). This is implemented through constant discussions with operators and evaluation of their projects
	<i>Ghana</i>	Board of directors of the USAF includes representatives from all the major telecommunication operators in the country
Focus on project sustainability	<i>Pakistan</i>	BTS (base stations) which are funded by USAF are supposed to have renewable energy generation systems, such as solar power, which are used to provide free energy to its telecentres
	<i>Dominican Republic</i>	Heavy focus on education-related measures to complement the deployment of telecentres (also accompanied by community centres)
Flexible regulatory frameworks to permit USAF adjustments, when required	<i>Chile</i>	Provision to adjust USAF parameters to incorporate inputs related to new technologies and innovative practices

Sources: 'Universal Service Fund and Digital Inclusion for All', ITU, 2013; and 'World Investment Report', UNCTAD, 2017.

- USAF regulatory frameworks should be flexible to permit fund adjustments where required.
- Where USAFs exist, they need reform and accountability mechanisms to ensure the funding is appropriately disbursed.

While the proposed best practices encompass several aspects of the management of USAFs, the Working Group would like to highlight the need to focus primarily and critically on new, incremental infrastructure deployment rather than upgrades of existing infrastructure. An additional focus is that a portion of the USAF should be used to fund demand-supporting

initiatives aimed at securing affordable connectivity for many people.

The ITU has published a report 'Financing Universal Access to Digital Technologies and Services' which focuses on USAFs. The Working Group recommends that all policy-makers refer to this document for more guidance on the matter.³⁵

Endnotes

- ¹ Some contributors (like pension funds) may be considered traditional contributors as there have been many cases where they have invested in ICT infrastructure projects. However, they have not typically done so in developing markets, but limited themselves to the most-developed and lowest-risk markets.
- ² See https://broadbandcommission.org/Documents/working-groups/DigitalMoonshotforAfrica_Report.pdf.
- ³ 'No other sector is facing a similar capex investment challenge. We need to identify viable new operating and financing models', ITU press release, 2014, available at https://www.itu.int/net/pressoffice/press_releases/2014/09.aspx.
- ⁴ See https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/SiteAssets/Pages/Events/2019/RRITP2019/ASP/ITU_2019_Digital_Infrastructure_5Sep2019FNL.pdf.
- ⁵ Finger, Matthias, and Irina Lapenkova, 2019, Digital Platforms - The New Network Industries? How to regulate them? *Network Industries Quarterly*, Vol. 21, No. 3, September.
- ⁶ The two first categories are mainly based on UNCTAD's mapping of the digital economy, the methodology for which was developed as part of its 'World Investment Report 2017 - Investment and the digital economy'.
- ⁷ The first three categories also match the categorization used by the UNCTAD's report *Digital Economy Review 2019* where ICT companies are labelled as 'Core, Digital sector', digital companies are labelled as 'Digital economy', and other companies deriving economic benefit from the development of broadband are labelled as 'Digitalized economy' (see Table II.2 of UNCTAD's report).
- ⁸ A detailed assessment for this category has been conducted as part of the OECD's work on the report 'Tax Challenges Arising from Digitalization - Interim Report 2018'. The OECD proposes a further breakdown of digital economy players in Chapter 2: Digitalization, business models and value creation. Also, a detailed discussion of various taxonomy options for digital companies is provided with the UNCTAD's report *Digital Economy Review 2019*.
- ⁹ Digital companies have invested in these types of initiatives in several cases around the world, some of which are discussed in other parts of this report.
- ¹⁰ ITU-T Recommendation D.1101.
- ¹¹ From McKinsey Global Institute, 2011, Internet Matters: The Net's sweeping impact on growth, jobs, and prosperity.
- ¹² A4AI, April 2018, Closing the Investment Gap: How multilateral development banks can contribute to digital inclusion.
- ¹³ New Partnership for Africa's Development. Under the guidance of NEPAD, MDBs contributed to certain broadband-supporting projects: a project to improve the environment for the private sector to invest in high-speed broadband infrastructure (ICT Enabling Environment), and another to secure for each country a connection with at least two broadband infrastructures and access to submarine cable for all landlocked countries (ICT Terrestrial for Connectivity).
MDBs should link funding across multiple SDGs so that where appropriate, capital funding for one type of project includes elements of connectivity (e.g. if a new road is funded, the design should be mandated to include open access ducts at incremental cost, and electrification projects could similarly include wrap-around fibre).
- ¹⁴ See <https://www.oecd.org/digital/ieconomy/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf>.
- ¹⁵ See https://unctad.org/system/files/official-document/der2019_en.pdf.
- ¹⁶ See Section 4.5 of the State of Broadband 2019 report, published by the Broadband Commission.
- ¹⁷ Digital or content taxes could also be considered as non-sector-specific depending on legislators' definitions of 'contributors' and the scope of the particular digital tax. As such, digital or content tax would not fall into sector-specific tax in the traditional sense and context of traditional ICT stakeholders. However, digital or content tax falls into contributions specific to ICT according to the OECD's detailed assessment of what are called 'digital' players (in 'Tax Challenges Arising from Digitalisation - Interim Report 2018' as well as sub-section 3.2).
- ¹⁸ Such taxes are often regressive, fall hardest on the poorest and most disadvantaged communities, and have been shown to be counterproductive to the cause of broadband expansion.

- ¹⁹ A New Deal: Investing in Our Common Future, Report of the Expert Group to the Broadband Commission, February 2018.
- ²⁰ Future work on this aspect will be needed to examine existing mechanisms in other sectors, such as inclusivity levies in the broadcasting sector or green levies in agriculture. Such work should aim to develop models and recommend the preferred approach to be adopted for broadband development support.
- ²¹ For further discussion please see e.g. the ITU's 2019 report on Digital Infrastructure Policy and Regulation in the Asia-Pacific Region, [https://www.itu.int/en/ITU-D/Regional Presence/AsiaPacific/SiteAssets/Pages/Events/2019/RRITP2019/ASP/ITU_2019_Digital Infrastructure_5Sep2019FNL.pdf](https://www.itu.int/en/ITU-D/Regional%20Presence/AsiaPacific/SiteAssets/Pages/Events/2019/RRITP2019/ASP/ITU_2019_Digital_Infrastructure_5Sep2019FNL.pdf); UNCTAD's Digital Economy Report 2019, <https://unctad.org/webflyer/digital-economy-report-2019>; 'Addressing the Tax Challenges of the Digital Economy', Action 1 Deliverable 2014, https://read.oecd-ilibrary.org/taxation/addressing-the-tax-challenges-of-the-digital-economy_9789264218789-en#page1; and any subsequent reports on BEPS by the OECD. See also Section 4.5 of the State of Broadband 2019 report, published by the Broadband Commission.
- ²² See <https://www.g7uk.org/g7-finance-ministers-agree-historic-global-tax-agreement/>.
- ²³ See <https://www.oecd.org/tax/beps/international-community-strikes-a-ground-breaking-tax-deal-for-the-digital-age.htm>: '136 countries and jurisdictions, representing more than 90% of global GDP, joined the Statement on the Two-Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy. It updates and finalises a July political agreement by members of the Inclusive Framework to fundamentally reform international tax rules. A small group of the Inclusive Framework's 140 members have not yet joined the agreement. The framework updates key elements of the century-old international tax system, which is no longer fit for purpose in a globalised and digitalised 21st century economy. The two-pillar package – the outcome of negotiations coordinated by the OECD for much of the last decade – aims to ensure that large Multinational Enterprises (MNEs) pay tax where they operate and earn profits, while adding much-needed certainty and stability to the international tax system. Pillar One will ensure a fairer distribution of profits and taxing rights among countries with respect to the largest MNEs, including digital companies. It would re-allocate some taxing rights over MNEs from their home countries to the markets where they have business activities and earn profits, regardless of whether firms have a physical presence there. Pillar Two seeks to put a floor on competition over corporate income tax, through the introduction of a global minimum corporate tax rate that countries can use to protect their tax bases. The two-pillar solution will be delivered to the G20 Finance Ministers meeting in Washington D.C. on 13 October, then to the G20 Leaders' Summit in Rome at the end of the month. The OECD will develop model rules for bringing Pillar Two into domestic legislation during 2022, to be effective in 2023.'
- ²⁴ A non-exhaustive list of digital taxes already implemented or under review by governments is set out in Annex B.
- ²⁵ See <https://www.reuters.com/article/us-usa-wireless/fcc-adopts-rules-to-auction-spectrum-for-5g-backs-9-7-billion-in-satellite-payments-idINKCN20M2L9?edition-redirect=in>.
- ²⁶ See https://www.gsma.com/publicpolicy/wp-content/uploads/2016/09/GSMA2013_Report_SurveyOfUniversalServiceFunds.pdf.
- ²⁷ GSMA, 2019, Rethinking Mobile Taxation to Improve Connectivity.
- ²⁸ News Media and Digital Platforms Bargaining Act.
- ²⁹ See <https://www.fiercetelecom.com/telecom/facebook-wants-to-embrace-mobile-carriers-instead-compete-against-them>.
- ³⁰ Finger, Matthias, and Irina Lapenkova, 2019, Digital Platforms – The New Network Industries? How to regulate them? *Network Industries Quarterly*, Vol. 21, No. 3, September, page 66.
- ³¹ Sources: [https://www.onde.go.th/view/1/Digital Economy and Society Development Funds/EN-US](https://www.onde.go.th/view/1/Digital_Economy_and_Society_Development_Funds/EN-US), [https://www.onde.go.th/view/1/Digital Development Fund for Economic and Social Development/EN-US](https://www.onde.go.th/view/1/Digital_Development_Fund_for_Economic_and_Social_Development/EN-US), and <https://www.bangkokpost.com/business/1762099/digital-economy-fund-expedience-mandated>.
- ³² ITU, 2013, Universal Service Fund and Digital Inclusion for All.
- ³³ ITU, 2013, Universal Service Fund and Digital Inclusion for All; and UNCTAD, 2017, World Investment Report.
- ³⁴ The last version was published in September 2020 and is accessible on the Broadband Commission's website: see <https://www.broadbandcommission.org/publications/Pages/SOB-2020.aspx>.

³⁵ See <https://www.itu.int/en/myitu/Publications/2021/09/28/11/09/Financing-universal-access-to-digital-technologies-and-services>.

4

Ensuring efficient disbursement of funds to sustain broadband development

4 Ensuring efficient disbursement of funds to sustain broadband development

The previous section discussed the recommendations of the Working Group for broadening the base of contributions to support projects aiming at increasing sustainable broadband development. While this step is important, broadening the base alone is not sufficient to achieve the necessary goals; ensuring efficient disbursement is equally important. Indeed, given the importance of the adoption gap with respect to the coverage and upgrade gaps (see Annex E), the Working Group believes that it is critical to ensure that support from contribution schemes is also given to initiatives other than infrastructure expansion and upgrade, notably demand-supporting initiatives. The three types of initiatives that the Working Group recommends are:

- **Infrastructure incentives in high-cost areas (supply side):** these incentives aim to improve the business case for infrastructure roll-out and upgrade in high-cost areas, which are not viable in purely commercial terms. They may support capex or opex, or help reduce certain investment risks (or a combination of these three). Section 5 offers a very detailed view of various ways of providing incentives to the infrastructure operators. There should be no preference for any particular technology or business model, but incentives should be provided to whichever technology helps achieve the best improvement in broadband adoption in the most cost-efficient way. This will include mobile, fixed, Wi-Fi, and satellite technologies; and commercial, community, and non-profit networks.
- **Demand-support initiatives:** these initiatives aim to increase demand for broadband services where there is no need to expand or upgrade the existing infrastructure. They can be of the following types:
 - Initiatives to support affordability, such as micro-financing of devices, reductions on import duties for

equipment and devices, reduction of or exemption from royalties, demand aggregation for devices, subsidies reducing the cost of devices, etc.

- Initiatives to increase digital awareness and literacy, such as learning programmes in schools, incentives for independent learning, and community-based awareness programmes aimed at minority, under-represented or disadvantaged groups.
 - Initiatives to increase the attractiveness of content, such as productions in or translations into the local language, and the development of Internet-based essential services (e.g. remote doctor consultation).
 - Support going directly to infrastructure projects through pre-sales (sales that are agreed in advance and paid for before project completion and service delivery) and pre-orders (or sales guarantees, which generally come in the form of one or more agreements with parties that engage in advance for the use and payment of the service).
- **Digital ecosystem initiatives:** these initiatives include other government programmes that support the broader digital ecosystem. The goal is to help develop a digital economy, producing content and services that will increase demand for broadband, but also help to create a sector with jobs and revenues. This can include supporting venture capital funds and incubators to assist innovators and start-ups, developing e-government services that assist citizens while providing jobs and training for developers, and facilitating the local manufacturing of devices where feasible.

Before discussing in detail these three identified ways to increase contributions (4.2), this section provides some background on the target areas which most benefit from

contributions and the key initiatives within each of them (4.1).

4.1 Areas of contribution

Contributions can be disbursed towards projects to improve the economics of broadband connectivity in one or more of four main aspects: supporting demand, providing capex, subsidizing opex, and offering protection against certain risks. While supporting demand is necessary for improving the overall economics of broadband adoption, capex and opex contributions should also be considered to make a specific infrastructure project sustainable. Additionally, other types of contributions can alter the overall risk profile of the investment. Our framework analyses contribution models by assessing which of these aspects they affect:

- **Demand:** the appetite to use broadband services, both where they are available and where they are not. Contributions that support demand can improve the overall economics, for example by allowing certain segments of the population to afford adoption and use of services. As an indirect effect, demand-supporting initiatives also help optimize an infrastructure project's business plan by ensuring or increasing its revenue (and ultimately the project's profitability). However, the timescales for demand-side initiatives to bear fruit and feed into commercial infrastructure deployments are likely to be longer than those of direct supply-side initiatives. They should therefore be seen as a complement to supply-side initiatives. These contributions can take different forms, the most important of which include the following (a detailed discussion of these is included in Annex A):
 - initiatives to support affordability by subsidizing the cost of a device and/or data;
 - initiatives to increase digital awareness and literacy; and
 - initiatives to develop locally relevant content.
- **Capex:** the funds used by an infrastructure project to acquire, maintain, or upgrade
 - assets. These may include passive and active network equipment as well as other set-up fees, including civil works, one-off licence fees, or permit costs. Capex also includes project design and implementation management costs. These are usually long-term tangible and intangible assets that have a useful life or a productive purpose beyond one accounting period. Given the nature of an infrastructure project, contributions to capex are crucial and can take different forms, the most important of which are:
 - in cash: one or several instalments used for infrastructure and project set-up;
 - in kind: in the form of an asset that can be used in the operations of the network, a permit that will be used by the project infrastructure, or savings in the form of a waiver of a one-time cost that a project would otherwise have to incur (e.g. spectrum fee, licence fee, RoW).
- **Opex:** the money that the infrastructure project will spend on a regular, ongoing basis to run its operations. Contributions that affect opex can improve a business plan by reducing these costs to make it sustainable. These contributions can take different forms, the most important of which include:
 - in cash: an amount of money distributed on a recurring basis to compensate entirely or partially for the project's opex over a predetermined duration;
 - in kind: similar to the in-kind capex contributions but relating to opex instead.
- **Risk protection:** action to reduce the probability or impact of issues that typically negatively affect an infrastructure project's overall business plan. This category is used to identify general risks that are not specific to individual revenue or cost items, but rather affect the overall investment decision, such as political risks, currency volatility risks, and some demand-side risks.
 - Public entities and governments can help by issuing guarantees relating to certain risk events that could deter private investors or make them demand a high risk-adjusted yield.

For example, governments can offer loss-guarantee schemes to protect investors and offer hedging against currency volatility. However, this could only work for governments that have a strong reputation and credibility, and the financial ability to do so. Some international institutions could offer insurance products to hedge against certain risks (such as bankruptcy and political risks), but political stability remains an important factor to obtain these types of insurance.

- As highlighted in subsection 2.1.3, demand volatility is an additional consideration.

4.2 Innovating in the disbursement of available funds

Traditionally, most of the contributions intended to be spent on broadband-supporting initiatives have gone towards supporting the development of infrastructure. But the service may not be affordable for certain potential users, thus making part of the infrastructure operate at a loss for the long term. A wide range of regulatory practices can be deployed, typically requiring operators to cross-subsidize costs directly or redistribute revenue through a programme such as a USAF. More recently, with the advent of widespread mobile broadband coverage, demand-side issues have been given greater weight, to try and target those who were not taking up available services. The GSMA estimates that the usage gap is much bigger than the connectivity gap, with 3.2 billion people living in an area covered by a mobile network but not using it, and only 600 million living in areas not covered by any connectivity.

Nevertheless, addressing demand-side issues in developing countries is challenging. Broadband network costs are not a direct reflection of the cost of living of a country, because many items are sourced at an international market price. When considering this aspect in developing countries, together with the lower expected demand and higher cost of capital than in developed countries, it becomes clear how broadband services in the former will be much less affordable

relative to the cost of living. One consequence of this is that affordability in developing countries plays a much more important role in the adoption of broadband services (see Annex A). It then becomes clear how a more holistic and innovative approach should be used in developing countries to address the broadband connectivity gap. An approach tailored around the characteristics of developing countries should therefore consider a wider range of disbursement methods and of target initiatives:

- **Wider range of disbursement methods:** the approach should not be limited to using traditional methods such as a USAF, national broadband plan, or direct infrastructure cost subsidy, but should also embrace innovative methods, e.g. new types of funds. Section 5 provides a detailed list of recognized traditional and innovative methods that can be used.
- **Wider range of target initiatives:** target initiatives should not be limited purely to infrastructure interventions, such as network expansions and upgrades. Demand-supporting initiatives should also be considered for the disbursement of funds. As such, the landscape of entities potentially receiving funds will no longer be limited to network operators, but will include new types of players, as long as they guarantee efficiency in achieving the desired results. Examples of such initiatives are included in Annex E.

It should be remembered that even where there is coverage, the existing networks are not equipped to accommodate the traffic that would result from rapidly closing the usage gap, and any demand-side initiatives targeting current coverage areas must be conducted in parallel with (or slightly lag behind) supply-side infrastructure deployment. Therefore they should not be prioritized to the extent that they negatively affect the supply-side funding models.

5

Investment, financing, and funding models

5 Investment, financing, and funding models

The previous section, and particularly Figure 2.3, provided an overall framework for this study, showing how the set-up of a broadband-supporting project is defined by two key pillars: the contribution models and the disbursement elements. Investment, financing, and funding models are the promising combinations of these two components and are the topic of this section, which is structured as follows:

- Subsection 5.1 discusses the methodology used to define investment, financing, and funding models, starting from the contribution models and disbursement elements.
- Subsection 5.2 presents a range of models emerging from a review of existing literature, together with the inputs from interviews with commissioners and external experts.

These proposals reflect the models that are commonly used, those which are seen as best practice when connecting the unconnected, and those which are potential innovations for the future.

5.1 Investing, financing, and funding model framework

The setting up of a broadband-supporting project can require a broad base of different kinds of contributions, in cash or in kind, targeting different operational and financial factors, and carrying different expectations of return depending on the contributor. Defining the financial contribution model of one or more parties is therefore a key task when establishing a broadband-supporting project.

This report analyses investing, financing, and funding models through the prisms of the type of contribution and the disbursement element. The former is indicated in dark blue in Figure 5.1, with the latter in light blue.

The most common form of project financing is also the simplest: the operator decides to invest some of its financial resources in a project, with the aim of generating attractive returns in the future. This model comprises a single part: what the operator contributes. However, the connectivity gap reflects limits to what an operator can contribute, even with backing from shareholders, debt holders etc., and especially in situations of decreasing margins. Indeed, these limits are driving the need for the new innovative models being studied in this work.

Figure 5.2 provides a matrix for assessing the 'contribution type' (investing, financing, or funding), and 'disbursement element' (demand, opex, capex or risk protection). The example illustrated shows a contribution of 'own resources', denoting the contribution of the entity in charge of the roll-out – conventionally the operator investing in its own network. The box is placed across 'investing' and 'financing' as both types of contributions are possible for this model (based on the definition provided earlier for these two types of contribution, which ultimately means that operators' resources can be contributed as equity or debt). In terms of disbursement elements, own resources are usually used to support project capex¹ – the revenue is forecast to cover the capex and the opex, and the operator has assessed that the risk is manageable.

When thinking about an infrastructure project, it is unlikely that the entity in charge of the roll-out can proceed without equity investment or debt financing, and similarly for a non-infrastructure project. That is why the 'own resources' element will be central to many of the models described below. Most projects undertaken by operators (network expansion, network upgrade, technology swaps, etc.) are financed through the operator's own resources

Figure 5.1: Areas and types of contributions in a project set-up

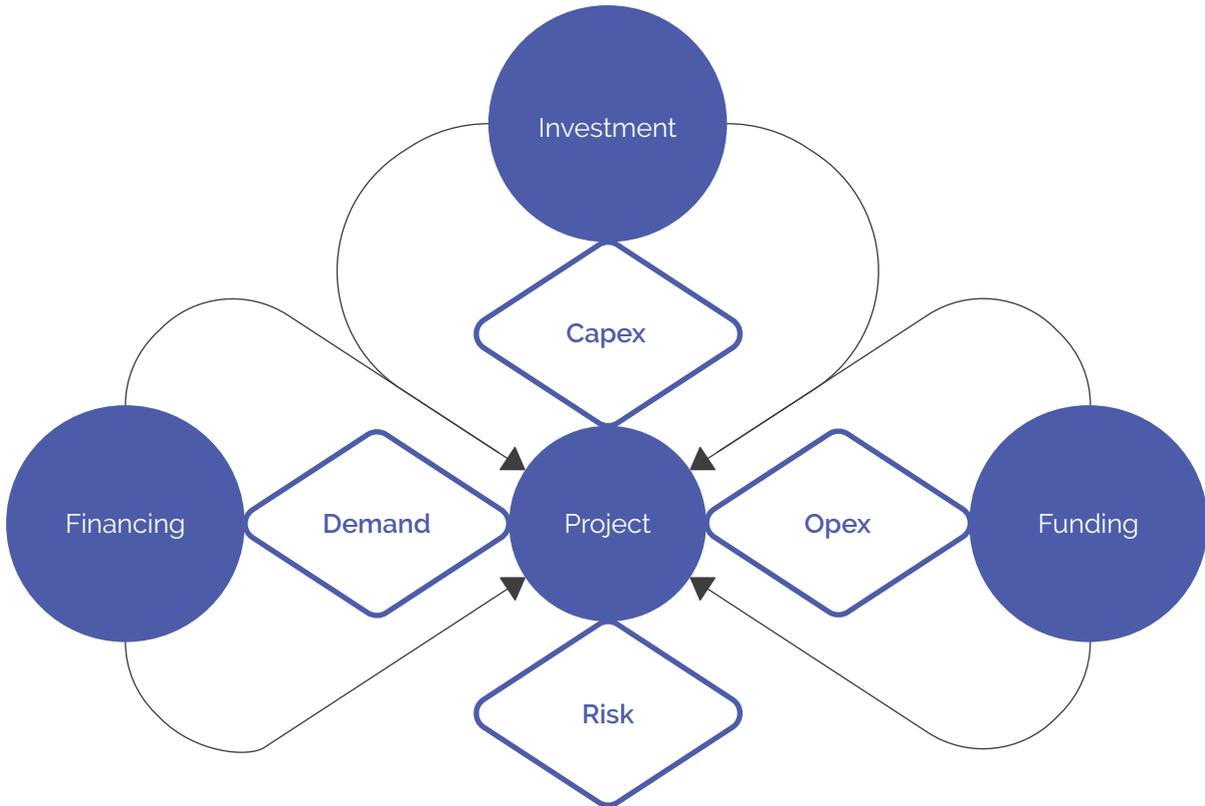


Figure 5.2: Example of how a private investment through 'own resources' would be positioned within the analysis matrix

		Contribution area			
		REVENUE	OPEX	CAPEX	RISK PROTECTION
Contribution type	FINANCING				
	INVESTING			Own resources	
	FUNDING				

because they are the ones that directly profit from the investments.

When own resources of the rolling-out entity (generally the network operator but could also be the government, a digital player, etc.) are insufficient for unilateral roll-out, additional contributions from other sources are required. Similarly, the same issue may arise in the case of a non-infrastructure project. Using only own resources implies that whenever the profitability of the project does not satisfy the requirements of the network operator or managing organization (e.g. their target return on invested capital), the project will not take place. However, by introducing additional elements into the matrix, in areas where it has been demonstrated that traditional funding, financing, and investment models are insufficient, it is possible to augment the 'own resource' element in order to connect the unconnected. Contribution models are shaped by one or more of these elements.

5.2 Identified traditional and innovative models

This subsection presents models resulting from a review of the literature, and interviews with commissioners and external experts, as well as our own innovations.

In line with the methodology discussed so far, this subsection begins with a discussion of the elements that comprise the contribution models (5.2.1), and goes on to present the findings in terms of existing and suggested models and their potential contributors (5.2.2), making use of the framework discussed above.

5.2.1 Identified elements of investing, financing, and funding models

A number of investing, financing, and funding elements are presented in Figure 5.3, and then described in Figure 5.4.

5.2.2 Investing, financing, and funding models

The elements identified above can be used in a large number of combinations to create an array of possible investing, funding, and financing models. These are split here between 'traditional' and 'innovative' models, both of which benefit from the new sources of contribution described in Section 3 and summarized in Figure 5.5. The Working Group highlights where those contributions could be most useful in each set of models.

Updates to traditional models

Traditional models have been used successfully in the past, but their limits are tested in situations that are further away from the ideal profitable cases, like the case of extending mobile broadband coverage to areas at low or no profit: some areas can still be covered by these traditional models once demand-side and/or regulatory and policy measures are taken. They can also be made effective thanks to technological progress (that decreases costs for example). However, they are worth revisiting with the new sources of contributions proposed by the Working Group.

The traditional models are illustrated in Figure 5.6, which shows that the demand subsidization model (marked as F) is made of two elements included inside the light green circle (namely demand-side government subsidies and own resources).

The contributors to the models are listed in Figure 5.7, which includes both traditional and new contributors (in bold). It is worth noting that traditional models have been tested, are well known in most markets with broadband connectivity gaps, and may be deployed in a faster manner than innovative ones, which might require more time for understanding and implementation. The addition of new contributors helps revamp traditional models, thus giving them a 'second life'.

Figure 5.3: Identified elements of contribution models

	REVENUE	OPEX	CAPEX	RISK PROTECTION
FINANCING	<ul style="list-style-type: none"> Pre-sales Demand aggregation Anchor tenant contract (e.g. from the government) Dual service provision (another product sold on top of connectivity subsidizes the service) 	<ul style="list-style-type: none"> Vendor financing Government loan 	<ul style="list-style-type: none"> Subscriber finance Community financing 	<ul style="list-style-type: none"> Hedging against Volatility in currency Loss guarantee scheme
INVESTING		<ul style="list-style-type: none"> Own resources Equity capital market Government equity participation 	<ul style="list-style-type: none"> Financing equity participation or grant from responsible and impact investors 	
FUNDING	<ul style="list-style-type: none"> Demand side gov. subsidies (e.g. connectivity coupons) 	<ul style="list-style-type: none"> Infrastructure or asset transfer (spectrum, right of way, infra.) Government operation subsidies Human resource Government roll-out subsidies Tax incentive 	<ul style="list-style-type: none"> USF Funds Community funding 	<ul style="list-style-type: none"> Government loss guarantee scheme Gov. hedge against Volatility in currency

■ In-cash contribution ■ In-kind contribution

Figure 5.4: Description of each identified element of contribution models

Disbursement element	Contribution	Details
Demand	Pre-sales	Cash contribution from advance sales closed before project completion and thus before service delivery.
	Demand aggregation	Aggregation of multiple users to sign up for a service, which can help to finance the underlying infrastructure. For instance, several individuals can contribute financially to have the service delivered at a central point (e.g. a Wi-Fi hotspot).
	Anchor tenant contract	Agreement with a key client that engages to buy the service for many of its sites within a network coverage area. This client is often the government or a public entity willing to connect public sites, schools, hospitals etc., and provides enough revenue assurance to deploy the infrastructure.
	Dual service provision	An additional product sold on top of connectivity subsidizes the service. As an example, the operator can roll out infrastructure to provide both energy and connectivity. This not only lowers costs, but the other service could be more profitable and cross-subsidize the connectivity.
	Demand-side government subsidies	As discussed in Section 4 and in Annex A, demand-side government subsidies at the user level may target affordability issues, content attractiveness, and digital awareness and literacy. A common practice consists of the distribution of 'connectivity coupons' among a targeted population.
Opex	Infrastructure or asset transfer	In-kind contribution that consists of giving (or allowing the use of) a physical asset (infrastructure or equipment for example) or an intangible asset (such as spectrum or permit/RoW) in exchange for equity or future cash payments, or even for no return. This element can also include capex.
	Government operation subsidy	Government subsidies distributed to compensate the operating costs of the network.
	Human resource	Contribution that consists of offering human resources to maintain, operate or commercialize the service.
	Tax incentive	Financial contribution to the infrastructure project through tax deduction for long-run operations (such as corporate tax reduction). This element can also include capex if the tax deduction applies in project set-up (such as tax reduction on equipment and infrastructure).

(continued)

Disbursement element	Contribution	Details
Capex	Vendor financing	Equipment vendor contribution through financing the supplied equipment in full or in part.
	Government loan	Contribution from the government through the provision of a loan to finance infrastructure set-up.
	Debt capital market (DCM)	Sourcing the financing from the DCM, which is an international market where companies and governments raise funds through the trade of debt securities, including bonds.
	Community financing	Debt financing from a community or grouping of communities that will benefit from the service provided by project infrastructure.
	Equity capital market (ECM)	Equity financing from global ECM where companies raise capital (in general with the help of a financial institution) from savers, banks, and investors. The ECM covers more activities and financial instruments than the stock market.
	Government equity participation	Equity financing through government contribution.
	Financing, equity, participation or grant from responsible and impact investors	Responsible and impact investor contribution to the infrastructure project that happens in the form of grant (funding), equity participation (investing), or debt financing. Impact investors generally accept returns below market rates.
	Government roll-out subsidy	One-off contribution from government to subsidize infrastructure roll-out.
	Reformed USAF	Contribution from USAFs collected by governments. These are categorized in the funding part as they generally expect returns lower than the market or even no return.
	Community funding	Funding from a community or grouping of communities that will benefit from the service provided by project infrastructure.
	Corporate social responsibility (CSR) grants	Funding from CSR funds of large companies.
	Foundations and philanthropic grants	Funding from foundations and philanthropists. Although they come from a different source, they can be included with CSR in the models in subsection 5.2.2, as both categories provide funding for social, environmental, or economic impact.
Risk protection	Hedging against volatility in currency	Contribution to the project through provision of insurance that mitigates currency volatility risk. This can also be in the form of a financial instrument such as a currency put/call option.
	Loss guarantee scheme	Contribution through the provision of insurance that mitigates political risk.
	Government loss guarantee scheme	Complementary government guarantee against the failure or unprofitability of the project.
	Government hedge against currency volatility	Complementary government contribution to the project by guaranteeing it against currency volatility risks. If currency volatility negatively impacts the project, the government will cover the loss, provided they have the capacity to do so.

Figure 5.5: Summary of new contributions to identified innovative models and updated traditional models

Contribution	Contributor	Identified element
Contribution through earmarking industry-generated revenue from existing taxation schemes ²	Applies to every applicable contributor. There is already a focus at the OECD on those who are currently not paying taxes in the countries where services are provided ³	Industry-generated revenue going into general government budgets ⁴ (rather than being recycled back into the sector)
New USAF contributions	Network operators (traditional contributors), complemented by contributions open to everyone	Existing or reformed USAF
Broader contributor base: Capital (equity or debt)	Open to everyone	ECM
		DCM
		Own resources ⁵
Broader contributor base: Commercial agreement with connectivity providers	Open to everyone	Dual service provision
Broader contributor base: Non-profit/charity, CSR contributions	Open to everyone	Financing, equity, participation or grant from impact investors
		CSR grants
		Foundations and philanthropic grants
Broader contributor base: Provision of rights to use assets, tangible or intangible (e.g. intellectual property)	Open to everyone	Infrastructure or asset transfer

Figure 5.6: Identified updates to traditional models

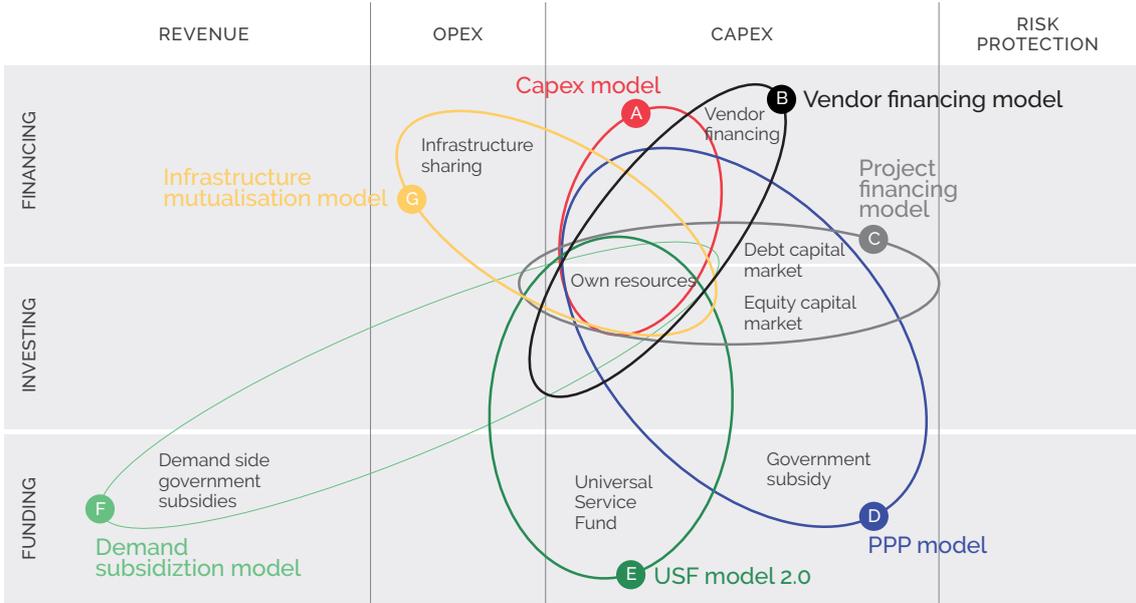


Figure 5.7: Contributors to updated traditional models

Code	Model name	Contributors
A	Capex model	<ul style="list-style-type: none"> Traditional contributors are network operators, tower companies and infrastructure companies This model can be innovative when new or alternative contributors finance a project. The actors can be infrastructure funds, financial institutions,⁶ and companies that derive economic benefit from infrastructure investment including digital companies and firms from outside the ICT sector⁷
B	Vendor financing model	<ul style="list-style-type: none"> Network operators Network equipment vendors
C	Project financing model	<ul style="list-style-type: none"> Traditional contributors are network operators, tower companies, infrastructure companies, commercial banks, development banks, infrastructure funds and other financial institutions This model can be used in an innovative manner, through the securitization of equity and debt to allow the participation of a larger selection of institutional and retail investors via global financial markets (including pension and mutual funds)
D	PPP model	<ul style="list-style-type: none"> Same as model C above with the addition of: <ul style="list-style-type: none"> Government contributing from its budget. The expenditure budget can be funded through traditional tax streams along with sector-specific taxes that are redirected back to the sector
E	Reformed USAF model	<ul style="list-style-type: none"> Traditional contributors are the network operators, through levies applied on their services' prices Innovative contributors can include a broader base of voluntary contributors, as described in Section 3
F	Demand subsidization model	<ul style="list-style-type: none"> The traditional contributor is the government, from its expenditure budget (see model D) An innovative contribution could be a country's reformed USAF, which will in turn fund itself in the possible ways described in Section 3
G	Infrastructure sharing	<ul style="list-style-type: none"> Contributors are network operators, or whoever owns network assets including electricity utilities, railways, and roads Contributions are not intended to be financial, but rather in-kind, in the form of existing or new network assets

Innovative models

Innovative investing, funding, and financing models should be harnessed to improve project business cases through cross-collaboration between different public, private, national, and international contributors. The innovative models explore new combinations of the elements used in traditional models or introduce altogether new elements.

Examples of innovative models are shown in Figure 5.8 and the contributors to each innovative model are listed in Figure 5.9.

Figure 5.8: Identified innovative contribution models

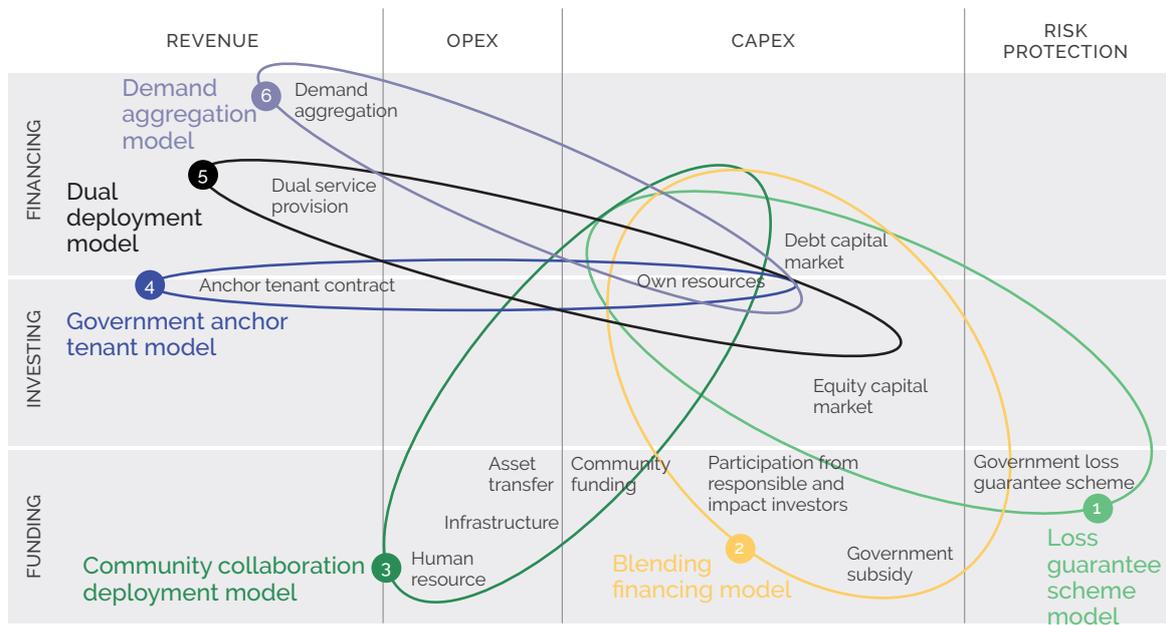


Figure 5.9: Contributors to innovative models

Code	Model name	Contributors
1	Loss guarantee scheme	<ul style="list-style-type: none"> • Network operators, or whoever owns a network • Equity investors • Creditors, such as commercial and development banks • Government, in the role of guarantor for certain risks • International insurers or banks, also in the role of guarantor for certain risks
2	Blended financing model	<ul style="list-style-type: none"> • Network operators, or whoever owns a network • Equity investors • Creditors, such as commercial and development banks • Impact investors • Foundations, companies' CSR funds and other philanthropic organizations • Government contributing from its expenditure budget, which can be augmented with sector-specific taxes that are redirected back to the sector • Companies participating in and benefiting from the digital economy, including digital companies
3	Community collaboration deployment model	<ul style="list-style-type: none"> • The community may provide capex for the network, in-kind contributions such as land plots, rooftops and ducts; and opex contributions such as labour • Network operators and others providing backhaul connectivity for the community network and, potentially, a part of the network capex
4	Government anchor tenant model	<ul style="list-style-type: none"> • Network operators, or whoever owns a network • Government, purchasing services it needs
5	Dual deployment model	<ul style="list-style-type: none"> • Network operators, or whoever owns a network • The provider of the second product bundled with connectivity, e.g. a utility company
6	Demand aggregation model	<ul style="list-style-type: none"> • Network operators, or whoever owns the network assets • Demand aggregation could be done by the demand provider, public entities, or international organizations

Endnotes

- ¹ This may not be true in all cases, but as we focus on infrastructure projects (which typically require high initial investments) we can make this broad assumption without risk to the analysis.
- ² Reduction of tax leakage on income tax, consumer tax, etc., and regulatory fees, including licence fees, auction revenue, spectrum fees, etc.
- ³ The issue closely relates to the discussion of the 'base erosion and profit shifting' (BEPS) being led by the OECD at an international level; see details at oecd.org/tax/beps/.
- ⁴ Importantly, governments have the choice of contributing the income from these taxes into the general budget or ring-fencing certain income for specific ICT-related spending.
- ⁵ It is important to clarify that we intend the elements 'equity capital markets' and 'debt capital markets' as capital contributions into a broadband connectivity project where another entity is in charge of the roll-out. This capital is dedicated to the project. However, the same contributors can also decide to be in charge of the project roll-out, if regulations allow. In this case, it is more appropriate to talk about 'own resources', which are from the entity itself, not dedicated exclusively to the project.
- ⁶ Infrastructure funds and other financial institutions are listed under innovative use of this model because they do not usually finance an infrastructure project entirely, without any equity from a strategic partner (e.g. network operator). They traditionally finance projects which are run by strategic partners, as in model C.
- ⁷ As mentioned in Digital Moonshot for Africa report.

6

**Ensuring efficiency
in the use of
contributions
through the
implementation of
an optimal policy
and regulatory
environment**

6 Ensuring efficiency in the use of contributions through the implementation of an optimal policy and regulatory environment

The policy and regulatory environment sets the 'field of play' for future broadband-supporting projects and influences their financial and operational set-up. The framework for this environment influences the decisions of all actors in the telecommunication sector, including private operators and investors. Therefore, decisions are specific to the environment where the actors operate, which typically differs from country to country, with rare exceptions outside our target geographies.¹ A global-level analysis of the policy and regulatory environment is thus not necessarily a perfect diagnosis of the issues in all countries; similarly, suggested remedies are not a 'one-size-fits-all' solution for policy and regulation issues. It should also be noted that assessing the status of policy and regulation across the world is not the prime objective of this report, but extensive literature on this topic is available.²

However, it is not possible to decouple the choice of contribution models to be applied in countries suffering from low broadband adoption from their policy and regulatory environment. In cases of broadband networks in areas of low or no profitability, policy and regulation gain a special importance: regulators should focus on reducing any non-essential burden to increase the reach of commercially viable networks, while policy-makers should take particular care in defining the most effective incentives for connecting the unconnected. In addition, even after narrowing the funding gap, specific policies or regulations can be attached to the contributions to ensure that they are efficiently deployed.

This section is structured as follows:

- Subsection 6.1 identifies a number of policy and regulatory issues based on the literature review and interviews with commissioners and external experts.
- Subsection 6.2 discusses the main policy and regulatory aspects that need to be considered to help attract investments and enable infrastructure projects that improve broadband coverage and adoption.

6.1 Key regulatory areas

Private operators and investors in the telecommunication sector face challenges that are ecosystem-specific and stem from regulatory requirements and industry policies. Relevant regulatory and policy aspects have been organized around the following four key areas of intervention:

- **Infrastructure investment outlook:** public initiatives that aim to enlarge available financing pools by encouraging local financing, and improving policies that provide confidence and security to investors (thus facilitating investment inflows).
- **Licensing framework:** public initiatives that aim to reform the licensing process (i.e. decrease its complexity and address prohibitive conditions and fees), optimize spectrum management and facilitate market entry.
- **Network access regimes:** public initiatives that aim to safeguard against anticompetitive behaviour by encouraging infrastructure competition in commercially viable areas and open-access and infrastructure sharing in areas where it is

Figure 6.1: Framework for the analysis of regulatory and policy levers influencing the infrastructure project set-up

	Areas of intervention	Regulatory levers shortlisted and analysed		
	Infrastructure investment outlook	Increase local financing		Facilitate foreign direct investment
	Licensing framework	Simplify licensing process, fees and conditions	Optimize spectrum availability and planning	Enable market entry
	Network access regimes	Facilitate competition management	Provide open access	Enable ICT infrastructure mapping and sharing
	Infrastructure deployment	Optimize right of Way and permit procedures	Enable 'dig once' policies	Enable other deployment facilitation measures

not profitable to roll out more than one network.

- **Infrastructure deployment:** public initiatives that aim to facilitate civil works by improving procedures for permits, encouraging non-telecommunication infrastructure sharing and inter-sector cross-collaboration.

To each of the above areas, the Working Group associates regulatory and policy levers that have the potential to steer the behaviour of industry actors in the desired direction. The levers identified by our analysis are organized across the framework shown in Figure 6.1 and regrouped according to the four areas of intervention.

Governments' national digital agendas may be the ideal instruments to drive best-practice

policies and regulatory frameworks to support the increase of broadband adoption. The ITU recommends³ that national digital agendas include a clear implementation roadmap, which should turn high-level plans into concrete steps to be followed by decision-makers, policy-makers and regulators: 'While general roadmaps provide critical guidance, it is important that these be adapted and adjusted to meet the needs and realities of the country and environment where they are being applied'.

This roadmap should include a sequence of clear objectives designed specifically to fit the context of the country. An example of that has been proposed by the Broadband Commission in its 2019 Connecting Africa through Broadband report, as shown in Figure 6.2.

Figure 6.2: Roadmap for universal access to affordable and good-quality broadband services

1	Ensure that the commercial broadband market is open and structurally prepared for competitive private investment.
2	Reduce non-economic costs and risks of market entry and investment.
3	Provide public/donor funding support for larger, high-cost infrastructure investments to reduce risk and increase commercial viability.
4	Expand the market through government procurement and implementation of broadband based digital services, networks, and facilities.
5	Provide direct funding support for extending affordable broadband access to commercially challenging rural and remote areas to women and low-income users under a Mobilizing Finance for Development approach.
6	Increase ICT market commercial attractiveness through demand stimulation and affordability initiatives.
7	Promote long-term sustainability by ensuring that appropriate technical skills to operate and maintain digital infrastructure are increasingly available on the African continent.

Source: Broadband Commission, 2019.

6.2 Policy and regulatory guidelines that enable infrastructure project set-up

This section includes a detailed discussion of each regulatory lever shown in Figure 6.1 by explaining its context and best-practice guidelines and providing real-world case studies. The regulatory levers are grouped under the four areas of intervention (see also Annex G).

Figure 6.3: Policy and regulatory guidelines

Area	Regulatory lever	Key issues	General guidelines
 Infrastructure investment outlook	Increase local financing	<ul style="list-style-type: none"> • Certain countries lack a local finance ecosystem willing to engage in sophisticated financing • In such conditions, infrastructure projects cannot rely on local financing 	<ul style="list-style-type: none"> • Governments should encourage local banks to provide adequate banking services, mobilize savings, and allocate financing to firms wanting to invest
	Facilitate foreign direct investments	<ul style="list-style-type: none"> • Many developing countries struggle to attract foreign direct investments due to actual or perceived barriers or risks for foreign investors 	<ul style="list-style-type: none"> • Tailored policies are needed to remove barriers hindering the inflow of international investments and increase attractiveness for investors
 Licensing framework	Simplify licensing process, fees and conditions	<ul style="list-style-type: none"> • In many countries, radio spectrum management lacks flexibility, resulting in extensive inefficiencies. In addition, the licensing of each technology and each service (separate licensing needed in some countries) creates inefficient and costly approval systems for regulators and operators 	<ul style="list-style-type: none"> • Governments need to avoid excessive restrictions on license conditions and increase process transparency. Also, spectrum licensing conditions should focus on service and coverage goals rather than revenue
	Optimize spectrum availability and planning	<ul style="list-style-type: none"> • Some developing countries do not make efficient use of their spectrum assets. With wireless services outpacing wireline connectivity, these countries need to focus on current modes of spectrum management 	<ul style="list-style-type: none"> • Some countries' governments need to revise frequency allocations to maximise the social and economic benefit of spectrum use • Effective spectrum policy should promote the roll-out of services and innovation
	Enable market entry	<ul style="list-style-type: none"> • Certain telecom markets lack effective competition, thus reducing affordability and consequent penetration 	<ul style="list-style-type: none"> • Authorities should implement procompetitive regulation and adopt a spectrum licensing format that allows potential market entry

Area



Network access regimes

Regulatory level	Key issues	General guidelines
Facilitate competition management	<ul style="list-style-type: none"> • Certain developing countries' regulators lack the power and capabilities to make decisions within the legislative framework. • Operators also complain that the dispute arbitration is not quick enough, thus making procompetitive regulations ineffective 	<ul style="list-style-type: none"> • Regulators should safeguard against anticompetitive behaviour, while simultaneously encouraging infrastructure competition, where commercially viable. Protections are particularly important where an operator is state owned, to provide assurance to investors that they will be treated fairly
Provide open access	<ul style="list-style-type: none"> • In rural and remote areas where a network has already been rolled out, developing markets often lack fair wholesale offers. This represents a major barrier to entry and limits competition in the retail market 	<ul style="list-style-type: none"> • To enable affordable end-user access to broadband in these areas, governments should encourage services that are carrier neutral and are provided on an open-access basis
Enable ICT infra. mapping and sharing	<ul style="list-style-type: none"> • Lack of mapping of both existing ICT infrastructure and network roll-out plans does not allow an efficient use of infrastructure 	<ul style="list-style-type: none"> • Governments should: <ul style="list-style-type: none"> • promote the sharing of existing telecoms infrastructure among players that would benefit operators through a reduction in roll-out costs • Enable coordination in the roll-out of communications networks by telecoms operators • Provide transparent Open Data frameworks for mapping

Area



Infrastructure deployment

Regulatory level	Key issues	General guidelines
Rights of Way and permit procedures	<ul style="list-style-type: none"> • Public and private permit acquisition is a key issue and major cost for operators. It involves multiple authorities, complicated procedures, and diverse fees. Further, some local governments regard permit acquisition fees as an important source of income which can make permit charges inconsistent 	<ul style="list-style-type: none"> • Governments should improve procedures for RoW and other permits, ensure that fees are fair and only recoup administrative costs
Enable 'dig-once' policies	<ul style="list-style-type: none"> • Existing non-ICT infrastructure is not documented, and access is difficult. Thus, infrastructure companies do not co-ordinate their roll-out plans to optimise costs 	<ul style="list-style-type: none"> • Governments need to document existing non-ICT infrastructure, foster cross-collaboration between infrastructure companies and improve regulation for shared infrastructure
Enable other deployment facilitation measures	<ul style="list-style-type: none"> • Regulations may cause additional costs and delays to civil works, e.g. design/environmental constraints might be outdated and hinder the development of the latest technologies 	<ul style="list-style-type: none"> • Governments should give operators more flexibility when designing their infrastructure to allow them to upgrade, modify and deploy more efficient networks and perform regular review and public consultation on civil work regulations to ensure efficiency of future roll-outs

Endnotes

- ¹ The European Union is an important example of harmonization of regulations and policy. While certain powers related to decision-making still exist at national levels, most of the policies or regulation principles are defined in a centralized way.
- ² Refer to Annex I for a list of highly relevant literature.
- ³ ITU, 2020, Connecting Humanity.

7

**A new
international
structure to foster
new and optimal
contribution
models**

7 A new international structure to foster new and optimal contribution models

The key issues and expectations relating to the contribution models were listed in Section 2 (Key issues). Subsequent sections of the report plotted the interplay between these issues and the expectations of contributors and took note of proposed solutions among the contribution models and their elements, including a wide range of financial approaches, together with demand support measures and regulatory and policy measures. Additionally, Annex H (Project impact) discusses how the design of a contribution model is closely linked to the desired mix of types of impact, to highlight that in the context of connecting the unconnected, there is a trade-off between financial return and effectiveness.

In this section, the Working Group proposes how to select and combine the optimal contribution elements in order to design the ideal contribution model. It is notable that the ideal model includes elements of the discussed models that could have been adopted in countries today but were not. Thus, in addition to the national-level models discussed earlier, which make use of traditional and innovative elements, this section also presents an international vehicle to provide additional effectiveness to closing the broadband connectivity gap, by making use of a mix of these and other powerful elements.

The Working Group recommends an assessment of the feasibility of creating an international fund to support the sustainable development of broadband connectivity, to be hosted by an existing international or multilateral development bank. The existing organization would act as the financial institution into which investors and NGOs could make voluntary contributions for the provision of financing at low capital cost, over a long amortization period, or access other forms of risk mitigation instruments for financing to underserved markets.

The Working Group considers it important that the fund operates as part of an existing international organization with expertise in this type of activity. This approach would enable the maximization of the fund's efficiency and reduce the need for duplicate administrative functions. The fund could also provide technical advice and/or assistance to governments, local entities, and private companies involved in designing and implementing relevant broadband connectivity and adoption projects.

The rest of this section, along with the more detailed analysis presented in Annex D, is intended to outline the framework of the future assessment work that could be undertaken. This includes combining elements to form a new model (7.1), optimally designing an internationally managed contribution fund (7.2), and considering real-life examples of such funds in the fields of health care and utilities (7.3).

7.1 Combining the right contribution elements to design a contribution model

In the course of this study, including literature research, primary research, and additional desktop research, inputs were analysed to extract and collect the most relevant contribution elements to address the broadband connectivity gap. All the identified contribution elements answer requirements related to either:

- key issues identified by the stakeholders, mostly as consequences of challenges that they have already experienced, or
- stakeholders' expectations of innovative models and measures.

Some of the identified contribution elements will influence the choice of contribution model,

while other elements are intended to support demand and improve the policy and regulatory environment.

The choice of contribution model should take into account the fact that the ongoing funding required to bridge the broadband connectivity gap may decline over time once the gap has been narrowed via the implementation of demand support measures and policy and regulatory reforms. Additionally, the chosen contribution model should be capable of working well with the reformed policy and regulation, e.g. be able to leverage the support and incentive instruments that are made available in each country. Conversely, some reforms may be required to allow, or empower, the creation and operations of the chosen model. However, it may take years for reforms to be put in place and as such, the Working Group recommends that all activities need to be undertaken in parallel: additional contributions through broadening the base, regulatory reform, and demand-side measures. The Commission should not wait for all reforms, and demand support measures, to be enacted before actively dealing with the funding required to close the gap.

This section focuses on the contribution elements related to the design of the model. In order to fully close the residual gap after the reduction produced by demand support measures and policy and regulatory reforms, the Working Group makes the following observations with reference to the elements contained in subsection 5.2:

- Certain contribution elements can address more than one issue or expectation, and therefore appear multiple times. This also implies that they may have a significant impact on bridging the connectivity gap.
- Most contribution elements are not incompatible with each other; therefore, the chosen model should aim at including as many solutions as necessary to ensure its comprehensiveness.
- The contribution elements apply at different scales, ranging from the community scale up to the national and international scale. Certain solutions can only be applied at

one, while others can be applied at multiple scales:

- Contribution elements that are most suitable at a small (e.g. regional or community) scale include community funding, vendor financing, government subsidies, demand aggregation and pre-sales. These solutions are effective in specific small areas, but variability of local characteristics make them challenging to implement in densely populated areas.
- Contribution elements that apply at a national level include traditional USAF funds, government loans, government subsidies, government anchor tenancies, and the transfer of infrastructure or other assets/rights. These elements are closely linked to the budgetary and political constraints of governments. Furthermore, they have been available for a long time and are well known, but their potential to reduce the broadband connectivity gap has not been captured at a global level.¹ They can still be used as part of the chosen model, but it would be idealistic to assume that these solutions alone can play a central role.
- Other contribution elements can be applied either nationally or internationally but restricting them to the national level could reduce their potential significantly. They include:
 - *Accessing equity and debt capital markets in a traditional way.* International markets are more mature than those in developing countries and have much bigger potential in terms of volume. Aggregating the effort of several countries in an international scheme would make these traditional methods more attractive in terms of the size of investments, and a portfolio approach would reduce the risk involved.
 - *Accessing traditional funding from philanthropy and CSR funds.* Similarly, aggregating countries for fundraising activities helps to increase visibility and credibility and reduce the risks that large philanthropic funds are perceived to carry.

- Some contribution elements, like guarantee schemes offering protection from political, currency and demand volatility risks, may apply only at international level.

Based on these observations, along with the need for efficiency and the potential synergy in design and procurement, the Working Group can consider an international-level model that would then be disbursed through national-level entities and projects. This international model would be expected to operate in a more efficient manner than the previous national and regional models. Indeed, these models have been available for a long time but have not yet been implemented. Certain models require limited or no funds (such as infrastructure sharing) but rather coordination between stakeholders; other models require significant amounts of funds, and therefore may face additional obstacles on the way to their implementation.

In summary, the chosen model should aim to include as many of the identified contribution elements as possible (listed in Figure 5.4). These elements present different scales of

applicability and may be of a financial or operational nature. By using these criteria, the identified elements can each be allocated to one of the four parts of the matrix, as illustrated in Figure 7.1.

Governments, operators, and other contributors can decide between many different models (described in subsection 5.2.2), and particularly they have the choice of:

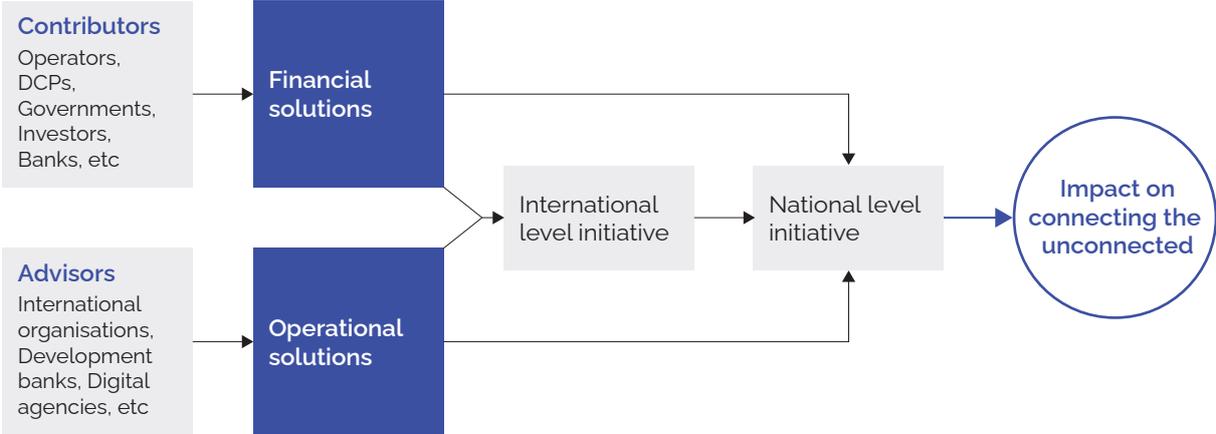
- making an innovative use of the traditional models, together with the involvement of new contributors;
- using innovative contribution models; or
- designing their own contribution models, by combining the elements listed in Figure 7.1.

In conjunction with the choice of model, the choice of contributors creates further opportunities. The multiple stages of decisions that governments, operators, and other contributors can take are illustrated in Figure 7.2.

Figure 7.1: Contribution elements identified in subsection 5.2.1 are allocated based on their nature and scale of applicability

Scale of applicability	Financial contribution elements	Operational contribution elements
International	<ul style="list-style-type: none"> • Equity/debt capital markets • International risk protection schemes (loss, currency, political risk) • Contributions from companies participating in and benefiting from the digital economy • Contributions from impact investors' CSR grants • Philanthropic grants 	<ul style="list-style-type: none"> • Demand-side measures that would benefit from a volume effect (e.g. increasing relevant content, offering lower-cost devices)
National	<ul style="list-style-type: none"> • Government equity participation • Government risk protection schemes (loss, political risk) • Government loan • USAFs or alternative (e.g. ITC fund) • Contributions from companies participating in and benefiting from the digital economy • Tax incentives • Demand-side government subsidies • Community financing/funding • Infrastructure or asset transfer (spectrum, RoW) 	<ul style="list-style-type: none"> • Dual service provision • Anchor tenant contract • Pre-sales • Demand aggregation • Non-financial demand-supporting initiatives

Figure 7.2: Schematic illustration of contributions which the international fund can make use of



For the sake of clarity, and for the benefit of the reader, the international contribution elements are described in detail in the next sections. The community ones can take place within the national initiatives. However, this shortlisting is not intended to limit the freedom of adopting any other combination of the identified elements to design the most appropriate model for each situation.

7.2 Optimal design of an internationally managed contribution fund

A sophisticated contribution fund organized at the international level would allow the integration of all of the identified elements, and also possess characteristics that can be sufficiently scaled up to bridge the global connectivity gap in a significant manner. This would require the involvement of a large number of stakeholders and new processes to ensure it is managed efficiently. It would not, however, be the first example of an internationally managed contribution fund: this path has been followed in the past to solve similar issues faced by other industries in developing countries. Subsection 7.3 provides a brief description of examples taken from the fields of health care and utilities.

The fund, which should be hosted by an existing international organization or MDB, allows investors and NGOs to make contributions for the provision of financing

at low capital cost, over a long amortization period or by using other forms of risk mitigation instruments for financing to underserved markets, through the contribution elements. This approach will eliminate the need for duplicate administrative functions and maximize the fund’s efficiency. This structure will be able to help with aggregating contributions globally, including those from MDBs, companies and CSR funds, and market-driven banks and investors.

In order to implement the demand-side measures and policy and regulatory solutions, the MDB can work at the national and community level to, for example, develop and communicate best practices and provide grants or loans, tailoring smaller solutions to individual projects. The organization can also provide technical advisory services, reaching a better understanding of the needs of national and local governments, the potential solutions which can be considered, the required effort from the national and local government, and the expected impact. Emphasizing this advisory role will ensure that recommendations can be implemented and that the efficiency and reach of a global organization is applied in the context of smaller-scale projects. The Working Group would encourage MDBs and other financial expert groups to create a vehicle to evaluate and implement the recommendations included in this report. The design of an internationally managed contribution model is expected to incorporate as many solutions as possible from those identified in Figure 7.2,

and it should have the appropriate financial and operational capabilities. This is discussed in more detail in Annex G and complemented by a discussion of potential management models in Annex D.

The Working Group recognizes that the establishment of a fund will require an in-depth study on the procedures and processes which can be adopted to ensure the efficient working and sustainability of the fund as well as the appropriate organization in which to host it.

7.3 Examples of internationally managed contribution schemes

Similar internationally managed contribution schemes have already been implemented in other industries, such as education, health care and utilities. Figure 7.3 below provides some relevant examples.

Figure 7.3: Existing examples of internationally managed contribution schemes supporting developing countries

GAVI - the global vaccine alliance

The GAVI alliance (previously the Global Alliance for Vaccines and Immunization) is a partnership of public and private organizations dedicated to 'immunization for all'. Currently, GAVI-partnered countries, which are mostly lower- and middle-income countries, constitute more than half of the world's population born every year. GAVI aggregates demand for vaccines from these countries, which sends a signal to the manufacturers of vaccines and gives GAVI better negotiation power. GAVI then procures these vaccines on behalf of its partner countries, mostly from mass manufacturers in developing countries to keep the prices even lower.

Partner countries pay a share of the cost for these vaccines, while the remaining share is paid through financing and funding mechanisms. As a country's income grows, its payments gradually increase over time, to eventually cover the full cost of vaccines.

Until such time as the country can cover the full cost, the following sources of funding and financing are used to bridge this gap:

- direct contributions by government donors, sovereign entities, regional funds, and foundations;
- contributions (financial as well as in-kind) from the private sector; and
- innovative financing, such as the issuing of vaccine bonds in the capital markets.

Furthermore, GAVI makes use of the operational and financial capabilities of its partner institutes to procure and distribute these vaccines:

- the health ministries of countries benefit from the advice of regional and national WHO offices regarding the use and appraisal of new vaccines;
- the World Bank plays a key role in innovative financing;
- UNICEF's supply divisions handle the procurement of vaccines; and
- vaccines reach the remotest parts of countries through on-the-ground networks of in-country health systems, NGOs, and civil society organizations.

Since 2000, GAVI has helped to vaccinate more than **822 million children around the world**, preventing more than **14 million deaths**.²

The International Finance Facility for Education (IFFEd)

IFFEd³ is a new, cost-effective mechanism designed to provide additional education finance including for digital solutions. It expands currently available international financing and boosts the supply provided by MDBs, who will be the main implementers of IFFEd programmes. By using existing and established organizations like MDBs, it avoids placing additional administrative burdens on developing countries, meaning that resources can be swiftly and effectively deployed.

IFFEd mobilizes and multiplies two sources of financing:

- Contingent contributions from official donors which are used to guarantee loan repayments from borrowers to the MDBs, effectively providing the MDBs with a quasi-equity that they can multiply on capital markets.
- Additional grant contributions which can help lower the cost of education financing packages, allowing countries to borrow on more affordable terms. However, continued low interest rates significantly reduce the need for grants.

IFFEd adds value in times of resource scarcity. Donors pay 15 cents in cash for each dollar in contingent financing contributed, which in turn will be leveraged four-fold, with the result that recipient countries will have additional resource allocations equalling approximately 27 times the amount contributed in cash by donors – above what they would receive from MDBs without IFFEd.

IFFEd will have an impact on financing for lower- and middle-income countries:

- Around 50 countries will stand to benefit from IFFEd;
- Even before the crisis, lower- and middle-income countries faced chronic funding shortfalls in education and were projected to account for nearly 80% (more than USD 70 billion annually) of the global shortfall in international funding by 2030;
- Lower- and middle-income countries are home to over half of all school-aged children – 700 million – and more than half of the world’s poor, as well as a significant number of refugees and displaced people;
- More than 550 million children and youth in lower- and middle-income countries are not on track to learn the necessary skills needed to thrive, or even participate in the workforce;
- Countries eligible for IFFEd support will need to demonstrate a commitment to improving opportunities for marginalized children, increasing their domestic education budgets, and using results-based approaches to achieve national targets.

IFFEd will give developing countries fiscal space to respond to the current crisis. Given today’s interest rates, countries will be able to borrow at affordable terms. With initial grace periods of five years or longer, finance ministers will not need to service these loans during the pandemic. The terms and volumes for IFFEd-supported programmes will also need to be fully consistent with each country’s debt sustainability framework to ensure that the additional borrowing does not contribute to the risks of debt distress.

After more than two years of negotiations with governments and MDBs, IFFEd is ready to launch and help galvanize educational investments. A group of potential contributors and the MDBs concluded negotiations on IFFEd’s design and legal structure, and credit rating agencies issued strong, positive assessments. Results and risk management frameworks have been developed, and the OECD-DAC has recognized IFFEd as a fully ODA-eligible organization.

Power Africa - Enabling electricity access in sub-Saharan Africa

Launched in 2013 by USAID, Power Africa is a global coalition of more than 170 public- and private-sector partners. It brings together technical and legal experts, businesses, financial institutions, and governments from around the world to work in partnership to increase the number of people in sub-Saharan Africa with access to electrical power.⁴

Power Africa helps countries to manage resources responsibly, build power generation and transmission units, and expand the reach of mini or off-grid solutions.

To achieve these ambitions, Power Africa provides the following support to its host governments:

- An inter-agency transaction-solutions team, that helps to bring power and transmission projects to fruition by leveraging financing, technical assistance, insurance and grant tools from the US government and private-sector partners;
- On-the-ground transaction advisers who work directly with partner countries to help governments prioritize and implement power projects;
- Once power projects are finalized, Power Africa also helps, through its interventions, to accelerate 'financial closure', which includes facilitating financing, mitigating risks, and providing technical and transaction support to plan and implement the project.

In 2013, the USA committed USD 7 billion for projects under the supervision of Power Africa, in addition to more than USD 9 billion in initial commitments from private-sector partners. Other sources of support for these projects include:

- public funding from African governments;
- direct contributions from foreign donors; and
- financing from financial institutions.

The long-term aim is to attract private and public investors through de-risking measures implemented by Power Africa.

In addition to financial and technical assistance, operational partnerships from the private sector can offer quicker delivery of these projects.

Power Africa's achievements include the following:

- It has supported **124 power-generation deals** with a capacity of over 11 GW and an estimated value of **~USD 22 billion**. Of these deals, 46 are operational and already generating nearly 4 GW of reliable electricity.
- It has connected nearly **17 million homes and businesses** to on-/off-grid solutions, bringing first-time electricity to more than **77 million people**.

UNITAID – Accelerating innovation in global health

UNITAID is an international organization and hosted partnership of the WHO, which invests in innovations to prevent, diagnose, and treat HIV/AIDS, tuberculosis, and malaria more quickly, affordably, and effectively. It uses novel financing mechanisms to provide short-term grants for directed health measures, such as price reduction for antiretroviral HIV treatment. UNITAID is most active in Africa and 85 per cent of its funding is channelled towards lower- and middle-income countries.

One of the innovative financing mechanisms used by UNITAID donors, such as France, is airline-ticket levies. Since 2006, French Government has been charging an obligatory levy of EUR 1 to EUR 40 on various categories of airline tickets sold to passengers boarding a flight in France. These funds are forwarded to the Solidarity Fund for Development, which makes contributions to UNITAID's financial resources. Some other countries, such as Madagascar, the Democratic Republic of the Congo, Mali, Mauritius, South Korea, and Niger also charge airline-ticket levies, and ultimately contribute to UNITAID.

UNITAID raises funds from some other sources as well:

- Government budgets and public funding;
- Donors, NGOs, and foundations (notably the Bill and Melinda Gates Foundation); and
- Other national taxes, such as a carbon tax in Norway.

UNITAID's achievements include the following:

- 400 000 children suffering from HIV have received treatments;
- The price of anti-HIV medications in lower- and middle-income countries has been reduced by up to 60%;
- Over 800 000 HIV-positive pregnant women have received treatments to prevent their babies being infected; and
- 1.5 million first- and second-line HIV, malaria and tuberculosis medicines have been distributed in more than 72 countries.

Endnotes

- ¹ These contribution elements may still have plenty of potential in developed countries, but are significantly limited in the case of developing countries, which is the focus of this report.
- ² GAVI progress report, 2019.
- ³ See <https://educationcommission.org/international-finance-facility-education/>.
- ⁴ Power Africa and USAID.

8



Conclusion

8 Conclusion

The main objective of this study was to propose models for investing in, financing and funding broadband development beyond its current geographical and demographic footprint, with the ultimate goal of providing recommendations on how to reach the global goal of connecting the unconnected. The report has highlighted the great importance of broadening the base of contributors in circumstances where it has been demonstrated that traditional funding, financing, and investment models are insufficient, and ensuring that the funds generated are spent in an effective manner. To achieve this, new models were developed to disrupt the current way of thinking.

The Working Group recommends that the following actions are taken by governments:

- Reform policies and regulations to broaden the base of contributions to broadband-supporting projects, by doing the following:
 - Ensuring that a portion of the ICT sector's contributions to governments is earmarked to be spent on initiatives supporting the Broadband Commission's connectivity and adoption goals. Such initiatives should include projects to extend broadband service availability and enhance the demand for and adoption of services in areas where coverage already exists, but penetration is low.
 - Expanding the base of contributors to enable and incentivize participation by new and non-traditional investors. This is needed to ensure that, overall, contributions are predictable, sustainable, and sufficient to cover the costs of achieving the connectivity and adoption goals set by the Commission. The primary goal is to increase the number of stakeholders that will support projects to increase both deployment and adoption - particularly in locales where market forces up to now have proven to be insufficient. The Working Group recognizes the
- new realities of the digital economy in the 21st Century - more companies are creating value over existing network infrastructure beyond those who have traditionally invested in, funded, or financed such networks or contributed to extending universal service. In addition, there are new players building and investing in new infrastructure, often in partnership with traditional players. Governments are encouraged to develop and combine, as appropriate, the mechanisms that are locally or nationally most relevant in order to institute incentives and reforms to attract a wider cohort of contributors.
- Reform policies and regulations and adopt new models to ensure that the contributions are used in the most effective manner to improve the adoption of broadband. These actions should aim at both reforming existing USAFs to enable them to receive contributions from a broader base of contributors and improve their efficiency, and going beyond funding traditional infrastructure expenditures, to include demand-supporting initiatives. An additional focus is that a portion of the USAF should be used to fund demand-supporting initiatives directed at securing affordable connectivity for many. The Working Group further recommends that reformed USAFs recognize various types of contributions from the broader base identified in subsection 3.2, depending on the context as well as regulatory and policy best practices.
- Lastly, governments should collaborate with each other and with international organizations to create a new international fund. This should preferably be situated within the structures of an existing organization or MDB that is capable of collecting the investments needed for broadband-supporting projects in developing countries, from a wide variety of investors with different expectations of returns. It should also be able to provide technical advice on the management of these projects. Investors and NGOs could

make voluntary contributions to such a fund for the provision of financing at low capital cost, over a long amortization period. Other forms of risk mitigation for financing to underserved markets might be exploited as well.

The Working Group believes that this is urgent, as the pandemic has heightened the need to close the digital divide, and with the accompanying reduction of economic activity in the short term, the advancement of digital inclusion risks being stalled. Ensuring that the additional contributions are secured in a timely

fashion will help mitigate this risk and unlock a virtuous feedback loop so that connectivity in the least developed countries can catch up with the rest of the world. These countries will then be better able to set themselves on a path to self-sustainability. If the result could be achieved in the short term, the need for contributions to the development of broadband in the long term would be considerably reduced and the focus could move to upgrading technology and capacity to ensure that all regions can experience the Internet equally.

Annex A

Connectivity funding gap

Annex A. Connectivity funding gap

While the number of broadband users around the world continues to grow, a significant part of the world is still unconnected. It is important to note that this connectivity gap is not uniform and mainly affects Africa and developing regions of Asia and Latin America, which are the focus for this report.

This annex provides estimates of the funding gap needed to connect the unconnected, based on a review of a number of studies. It includes a discussion of:

- how the funding gap depends on the definition of broadband used (A.1);
- the three elements of the broadband connectivity gap and how these take on different levels of importance in different geographies, including the regions of focus for this study (A.2);
- funding gap estimates from various studies (A.3).

A.1 Definition of broadband

The importance of broadband connectivity cannot be overstated – it enables a robust communication channel for individuals and businesses, connects to the vast universe of online knowledge, helps in upskilling, and improves the standard of living in general. Overall, it creates a positive impact on the economy: one study estimated¹ that a 10 per cent increase in broadband penetration could raise the economic growth of a country by between 0.25 and 1.4 per cent. This not only includes the direct financial benefits of providing connectivity, but also broader economic benefits from being online.

According to the same study, there is general consensus about the correlation of broadband penetration and economic and inclusive growth. However, ‘broadband’ is defined through different lenses by different organizations, each emphasizing either the

underlying technology or the resulting speed of access, both of which have a significant impact on the benefits of having broadband. The estimation of the funding gap discussed below depends very much on the chosen definition of broadband connectivity.

A.2 Unconnected population

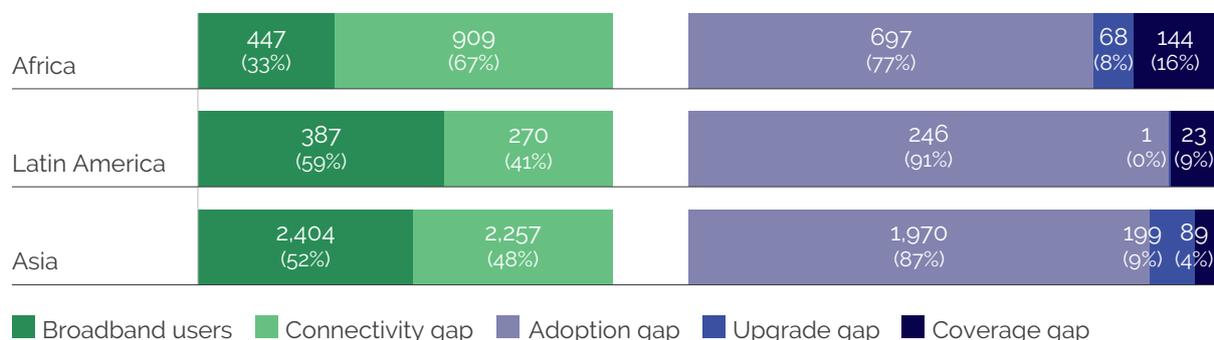
The importance of good-quality digital connectivity has been starkly underscored by the ongoing COVID-19 crisis. With social distancing becoming the norm, the Internet has become the sole or preferred means to perform many day-to-day activities, including work, education and health care. Unfortunately, this crisis has also highlighted the digital divide separating those who have access to broadband and those who do not. While the focus of the current study is to connect the unconnected, it is important to note that this connectivity gap is not uniform. There are different reasons why users are not online, and these reasons affect the models that are needed to fill the gaps.

A portion of the global population is currently not served by any digital communication network and is therefore excluded from the benefits of the Internet. Another portion is served by networks that are not yet capable of enabling any broadband-based services, including high-bandwidth and interactive content, services and communications. The largest group are those who could potentially be served by broadband networks but have not gone online yet.

When taking all these levels of ‘connectedness’ into account, the gap which still needs to be filled can be broken down into three elements:

- **Coverage gap:** The part of the population that is not covered by any connectivity infrastructure, mobile or fixed.

Figure A.1: Estimates of broadband users and connectivity gap (broken down into adoption gap, upgrade gap and coverage gap) across regions in millions of people (and per cent of the population)



Source: GSMA, ITU, Analysys Mason, 2020.

- Upgrade gap:** The part of the population that is covered by mobile or fixed network services that do not qualify as broadband. These services typically do not use the latest technologies but rather older ones, such as 2G mobile networks or dial-in PSTN/ISDN fixed networks. Nevertheless, some of the basics are in place, such as the mobile towers or copper lines, so the cost, while still substantial, is less than building where there is no network.
- Adoption gap:** The part of the population that is covered by existing broadband services but is not connected. These people are unable to use broadband services either because they cannot afford them or because they do not have the skills to use them. Additional reasons may be linked to the content, its availability in a suitable language or appropriateness in a particular culture. However, it should be noted that networks which cover adoption gap areas are likely to be significantly underdimensioned relative to the unserved base, and significant infrastructure investment will be required to underpin activity to close this gap.

These three components vary in prevalence across different geographies and must be put into the context of the overall gap. In addition, these components are not static. A population's status in terms of connectivity needs can change for a number of reasons. For example, in a humanitarian crisis, communities may be forcibly displaced from their homes and thus face new dynamics of access or exclusion

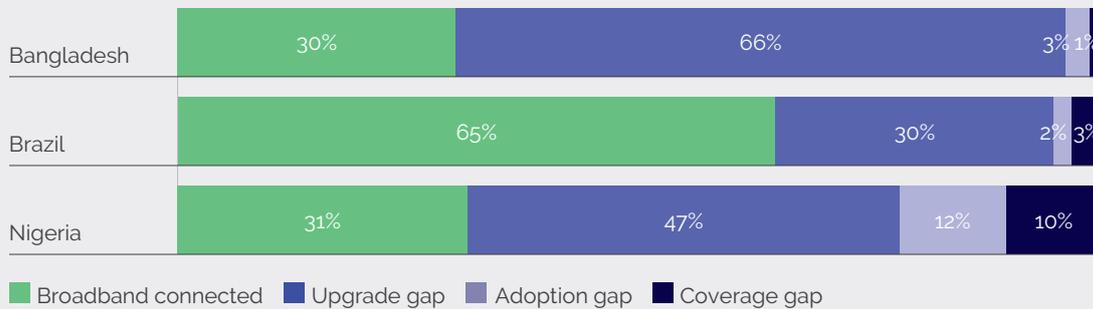
based on a temporary or protracted change of circumstances.

In terms of the three regions covered in this report (Africa, Latin America and Asia), Africa presents a much larger gap than the others, as can be seen in the data shown on the left-hand side of Figure A.1. Africa's broadband connectivity gap is 19 per cent larger than Asia's, and 26 per cent larger than Latin America's. In terms of absolute numbers, however, two thirds of the 3.4 billion unconnected people in the target geographies are located in Asia.

The three geographies are, however, quite different in terms of the breakdown of the overall connectivity gap, as shown on the right-hand side of Figure A.1:

- The coverage gaps represent 9 per cent and 4 per cent of the overall connectivity gap in Latin America and Asia, respectively. However, the coverage gap in Africa represents 16 per cent of its overall gap (i.e. there is a population of 144 million people who do not have any communication network). This indicates that Africa's basic communication infrastructure is relatively less developed than in that of the two other regions.
- In all three regions, the adoption gap is the largest component (making up 77-91 per cent of the total gap). This suggests that issues related to demand have a large and relatively similar weight across the regions.

Figure A.2: Estimated coverage gap, upgrade gap, adoption gap and connected users across Bangladesh, Brazil and Nigeria



Source: GSMA, ITU, 2020.

Bangladesh: A large portion of the population in Bangladesh is covered by broadband but does not use it, and so the country has a wide adoption gap. Bangladesh mostly requires demand-side measures to connect the unconnected.

Brazil: While a significant proportion of users in Brazil are covered by broadband, a large part of the population is not connected, and a wide adoption gap remains. The state of connectivity in Brazil can be improved by tackling the demand-side inhibitors.

Nigeria: All three gaps are significant in Nigeria: network expansion and upgrades are required, while demand-side factors need to be addressed as well.

- The upgrade gap ranges between 0 and 9 per cent across the regions, and is most significant in Africa and Asia, reflecting the fact that a larger proportion of the networks there require upgrade to a higher level of technology than in Latin America.

It should be noted that the extent and composition of the connectivity gap may vary significantly among the countries within these geographies, and even among different parts of the same country (see Figure A.2), and hence different approaches are required to deal with each individual situation.

Overall, in the three focus geographies, the broadband connectivity gap consists of approximately 3.4 billion individuals, of which

- 2.9 billion are in the adoption gap;
- 268 million in the upgrade gap; and
- 255 million in the coverage gap.

Bridging the whole gap requires significant funding, which is discussed in subsection A.3.

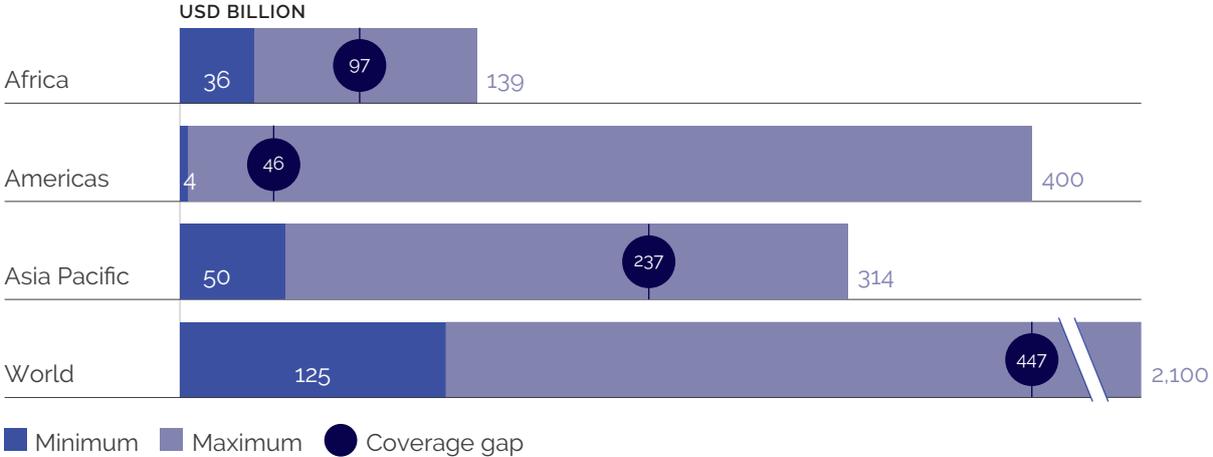
A.3 Estimation of the funding gap

As discussed in the previous section, the broadband connectivity gap in the three relevant regions currently consists of 3.4 billion individuals. It is natural to expect that large amounts of funding would be required to fill this gap. Numerous studies on the funding gap have been published in the last decade – the most important of which have been shortlisted by the Broadband Commission for Sustainable Development.

It should be noted that the infrastructure requirement is only one piece of the puzzle: the resulting network service must be sustainable, the network must be maintained, and there must be demand for the services. As a result, studies shortlisted by the Working Group (listed in Annex I) estimate funding gap requirements in the following areas:

- infrastructure roll-out;
- network operations and maintenance;
- local skill and content development; and

Figure A.3: Minimum, maximum and median funding required to connect the unconnected according to studies listed in subsection A.4



Source: Analysys Mason based on third-party estimates, 2020.

- policy and regulations.

Figure A.3 reports the range and median values of the funding gap estimates, adjusted and aggregated as far as possible for the three regions targeted in this report,² together with global estimates. The value ranges derived from the shortlisted studies leave a considerable uncertainty about the exact level of the funding needed to bridge broadband connectivity gaps in different regions. Globally, these estimates range from USD 125 billion to more than USD 2 trillion.

So far, traditional financing methods have fallen short of funding this gap, due in part to its tremendous size.

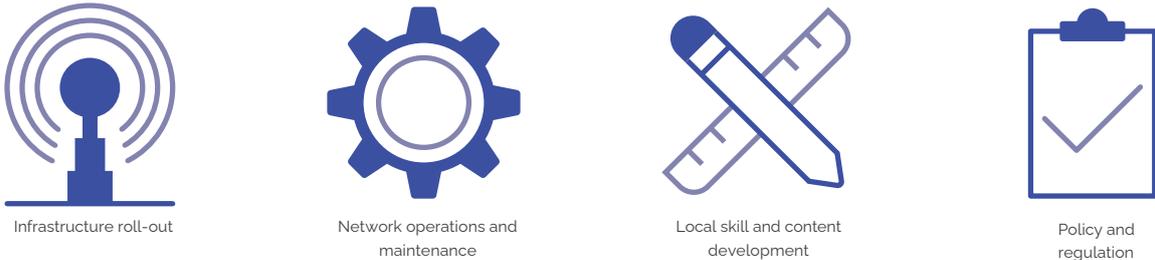
A.4 Estimates of funding gaps from the literature review

Four key focus areas that require funding to bridge the connectivity gap were identified by the literature review and are shown in Figure A.4.

Figure A.5 provides a summary of the shortlisted studies which estimate the size of the broadband connectivity gap at global level or for specific geographies (including Africa, Latin America and Asia). These studies also estimate the funding necessary to bridge the gap, thus encompassing all three components (coverage, upgrade and adoption).

The shortlisted studies in Figure A.5 also estimate the size of the broadband connectivity

Figure A.4: Key focus areas for funding



Source: Analysys Mason elaboration, 2021, a. o.

gap. However, when estimating the funding required to fill this gap, the studies only consider infrastructure roll-out and network maintenance and operations, i.e. only the coverage and upgrade gaps.

A.5 Estimation of the connectivity gaps

The methodology for estimating broadband connectivity gaps takes into account unique subscribers, unique broadband subscribers, and population coverage across all three focus regions to estimate three levels of unconnected population:

- **Unique subscribers:** calculated by dividing the total active SIMs in any region by the number of SIMs per subscriber. Thus, if there are 100 SIMs in a region and every subscriber has two SIMs, then this region will have 50 unique subscribers
- **Unique broadband subscribers:** defined as using 3G or 4G technology
- **Upgrade gap:** corresponds to the population that is covered by fixed or

mobile service that does not qualify as broadband

- for the purposes of this report, an upgrade gap is taken to refer to 2G population coverage across any region
- **Adoption gap:** corresponds to the population of individuals who could be served by existing broadband, but are not connected as they do not use the service
 - broadband population coverage is estimated as the maximum population that is covered by either 3G or 4G networks
 - the adoption gap is then estimated by subtracting unique broadband subscribers from this broadband population coverage
- **Coverage gap:** corresponds to the population that is not covered by any connectivity infrastructure
 - the coverage gap is the residual population after subtracting unique broadband subscribers, the upgrade gap, and the adoption gap from the total population across that region

Figure A.5: Funding gap studies that target all three gaps

Report	Year	Region	Target definition	Tech used	Funding gap (USD billion)	People to be connected (million)	Estimated costs include
Digital moonshot project (Broadband commission)	2019	Africa	Target definition: To double broadband connectivity by 2021 (from 2016 levels). Broadband speed is 3Mbps	Tech. neutral	9	220	Antenna, Gear, Bandage
			To achieve universal (90% coverage), affordable (2% of avg monthly income), and good quality broadband internet access by 2030. Broadband speed is 10Mbps	Tech. neutral	100	1100	Antenna, Gear, Bandage
Connecting humanity (ITU)	2020	World	90% penetration of broadband by 2030. Average speed > 10Mbps	4G and Fixed	428	N/A	Antenna, Gear, Bandage
World Investment Report 2017 - Investment and Digital Economy (UNCTAD)	2017	Developing economies DE Asia DE Africa DE Latin America LDC (Least developed countries)	Build universal basic 3G coverage	3G	89 50 36 4 36	N/A	Antenna, Bandage
Internet for All: An Investment Framework for Digital Adoption (WEF)	2017	Kenya, Rwanda, South Sudan and Uganda	Connect 25 million new internet users by 2019	3G and above	-2	25	Antenna, Gear, Bandage
A \$2 Trillion Plan to Bring Two Billion More People Into the Digital Age (BCG)	2020	World	To bring 2 Billion people online and increase the percentage of high-speed internet users (30 Mbps) from 53% to 80% by 2025	Tech. neutral	2100	2200	Antenna, Gear, Bandage
Challenge 2020: Investments to close the digital divide in Latin America (Convergencia Research)	2020	Latin America	Increasing fixed and mobile penetration levels to predefined targets per country - up to 75% for different countries for fixed (100 Mbps), and up to 95% for mobile (30 Mbps)	Tech. neutral	400	N/A	Antenna, Gear, Bandage

Source: Various sources, 2020.

Figure A.6: Funding gap studies that target only coverage and upgrade gaps

Report	Year	Region	Target definition	Tech used	Funding gap (USD billion)	People to be connected (million)	Estimated costs include
Working together to connect the world by 2020 (ITU)	2017	World	As per Europe's standards Target 1: Basic broadband for all (150kbps to 30Mbps) by 2013 Target 2: High access broadband for all (30-100Mbps) by 2020 Target 3: 50% HH have 100-1000Mbps speeds by 2020	T1: copper, cable, 3G, WiMAX, Satellite T2: copper, 4G, FTTH T3: FTTH	450	1500	
Financing a Forward-Looking Internet for All (WEF)	2018	World	Projected ICT infrastructure need is defined as the level of infrastructure that would bring a country's infrastructure stock equal with its best performing peer (by 2025)	Tech. neutral	251	N/A	 
Working together to connect the world by 2020 (ITU)	2017	MENA	10 Mbps for 100%, >=30 Mbps 50% population	LTE and FTTC	28-35	N/A	
Costing the Needs for Investment in ICT Infrastructure in Africa (World Bank)	2008	24 African countries 2008-2015	Universal Voice and broadband services	Tech. neutral	-14	N/A	 

Source: Various sources, 2020.

Endnotes

- ¹ Imme Philbeck (ITU), 2017, Working Together to Connect the World by 2020: Reinforcing Connectivity Initiatives or Universal and Affordable Access.
- ² These funding gap studies do not provide estimates at country level and so it is not possible to replicate the geographical focus perimeters of this report in a precise manner.

Annex B

**Examples
of digital
taxes already
implemented or
under review by
Governments**

Annex B. Examples of digital taxes already implemented or under review by governments

Several European OECD countries have already proposed, announced, or implemented a digital service tax (DST), in advance of any OECD taxes. As of now, France, Austria, Poland, Italy, Spain, Turkey, and the UK have implemented some form of DST. Slovakia, Belgium, and Czech Republic have proposed digital taxes, while Latvia, Slovenia and Norway have either announced or shown intentions to apply them.

The form of DST varies across different countries though: while Hungary and Austria tax revenues from digital advertising, France is taxing revenues from targeted advertising, digital interfaces and also transmission of data collected from users from advertising purposes. These tax rates range from 2 per cent of revenues in the UK to around 7.5 per cent in Turkey and Hungary¹ (see Figure B.1).

Figure B.1: Digital tax rates and approaches by different countries

Country	Tax Rate	Scope	Global Revenue Threshold	Domestic Revenue Threshold	Status
Austria	5%	Online advertising	EUR 750 million	EUR 25 million	Implemented (Effective from January 2020)
France	3%	Provision of a digital interface Advertising services based on users' data	EUR 750 million	EUR 25 million	Implemented (Retroactively applicable as of 1 January 2019; France has agreed to suspend the collection of the DST until December 2020 in exchange for the US agreeing to hold off on retaliatory tariffs on French goods)
Hungary	7.5%	Advertising revenue	HUF 100 million	N/A	Implemented (As a temporary measure, the advertisement tax rate has been reduced to 0%, effective from 1 July 2019 through 31 December 2022)
Italy	3%	Advertising on a digital interface Multilateral digital interface that allows users to buy/sell goods and services Transmission of user data generated from using a digital interface	EUR 750 million	EUR 5.5 million	Implemented (Effective from January 2020)

(continued)

Country	Tax Rate	Scope	Global Revenue Threshold	Domestic Revenue Threshold	Status
Kenya	1.5%	Each gross transaction value payment received as consideration for a digital service ²	-	-	Implemented (Effective from 1 January 2021)
Poland	1.5%	Audiovisual media service and audiovisual commercial communication	-	-	Implemented (Effective from July 2020; there is a separate proposal to tax advertisement revenues 5% where global revenues > €750 million and revenues in Poland > €5 million)
Sierra Leone	1.5%	Digital transactions	-	-	Implemented (Effective from January 2021)
Spain	3%	Online advertising services Sale of online advertising Sale of user data	EUR 750 million	EUR 3 million	Implemented (Effective from January 2021)
Turkey	7.5%	Online services including advertisements, sales of content, and paid services on social media websites	EUR 750 million	TRY 20 million	Implemented (Effective from March 2020; the president can reduce the DST rate to as low as 1% or increase it to as much as 15%)
Uganda	-	200 Ugandan shillings a day to access social media platforms	-	-	Implemented from July 2018, but during the course of this study, replaced by new legislation
United Kingdom	2%	Social media platforms Internet search engine Online marketplace	GBP 500 million	GBP 25 million	Implemented (Retroactively applicable as of April 1, 2020)
Maryland, United States	2.5% to 10% (depending on revenues)	Gross revenues derived from digital advertising services	USD 100 million	USD 1 million	Enacted for 2021. Legislature considering delaying to 2022.
United States	-	-	-	-	Proposals to tax digital advertising or use of consumer data under consideration in the states of New York, Nebraska, Kansas, Connecticut, Indiana, Oregon, and Washington, and in the District of Columbia.

Source: OECD, Analysys Mason, 2020.

Endnotes

- ¹ Taxfoundation.org, 2020, What European OECD Countries are Doing about Digital Services Taxes.
- ² The subject of the tax is certain supplies made through a digital marketplace defined as 'a platform that enables direct interaction between buyers and sellers of goods and services through electronic means'. In the context of a digital marketplace provider, the transaction value is the commission or fee paid for the use of the platform.

Annex C

Details of innovative and traditional contribution models

Annex C. Details of innovative and traditional contribution models

C.1 Detailed analysis of updated traditional contribution models



Capex model

Main contributors		
Funders	Investors	Financiers
N/A	 Operators (or entity in charge of the roll-out)	N/A

Traditional	Innovative
	

Maturity	Scalability	Replicability	Sustainability
			

Description
<ul style="list-style-type: none"> The capex model is the traditional deployment model for operators (or private consortiums) looking to roll out a network. The operator is the key actor providing the capex, securing financing, and managing operations. The operator can also be a new market entrant driven by a desire to address market gaps to serve its wider interests. For example, organizations operating higher up in the Internet value chain - traditionally not ISPs - can benefit from a strong Internet ecosystem that will allow their services to be more widely used. This approach can be applied in any setting and scales in dense addressable markets. However, in rural and less dense areas where roll-out capex per subscriber is higher and average revenue per user (ARPU) lower, the private actor has little incentive to invest.

Example of case study
<p><i>Network deployment by Digicel, Papua New Guinea</i></p> <ul style="list-style-type: none"> In the past 10 years, Digicel has invested more than USD 850 million to deploy 1100+ towers² and telecom networks in Papua New Guinea (PNG). Currently, Digicel's 3G and 2G networks cover around 88 and 89 per cent of the population in PNG respectively, with a landmass coverage of around 53 per cent. It has also deployed LTE-enabled base stations in some parts of the country, including in the capital, Port Moresby. Digicel plans to expand their network further, with a specific focus on covering rural areas and upgrading existing 3G/2G sites to 4G sites.

This model is suitable in commercially viable areas only. The model is thus not applicable as commercial viability is a key driver for operators.

Technological improvement driving costs down could help operators extend their networks, along with more favourable policies, but limits remain.

B

Vendor financing model

Main contributors			
Funders	Investors	Financiers	
N/A	 Operators (or entity in charge of the roll-out)	 Equipment vendor	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • The vendor financing model consists of the provision of the necessary funds (full or partial financing) by the vendor itself for the purchase of its products. The entity that will manage and commercialize the network (usually an operator) maintains ownership of the network and typically signs a fixed-term agreement to repay its debt over a certain period. • Instead of providing the funds itself, the vendor can also play the role of facilitator and leverage its relationship with financial institutions including government entities (such as the EXIM bank in the USA), to help its client finance the network. • This type of financing most commonly occurs when a vendor sees a higher value in a network than a traditional lending institution does, or when the financing context in the country is not favourable enough. 			
Example of case study			
<p><i>Telecom Egypt - Huawei deal</i></p> <ul style="list-style-type: none"> • In mid-2018, Huawei facilitated the provision of competitive conditions to Telecom Egypt to finance the roll-out of the 4G network and the deployment of transmission and core networks. • Telecom Egypt and Huawei announced a long-term financing agreement worth USD 200 million with Chinese financial institutions. 			

This model is commonly used by vendors when it comes to real conditions testing of some of their innovative solutions.

However, the model has a lower probability of achieving scale in rural developing areas where the return is low.



Project financing model

Main contributors			
Funders	Investors	Financiers	
N/A	 ECM Operators Funds	 DCM Banks	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • This model involves an operator taking the lead on investing in a project while seeking additional project-specific investments and financing in equity and debt capital markets, respectively. • The debt and equity used to finance the project are then paid back from the cashflow generated by the project. • The debt is referred to as 'non-recourse' in that it is secured by a pledge of collateral, but for which the borrower (the operator) is not liable. The debt is therefore not guaranteed by the operator's main business or parent company, which limits the risk for the operator. • This model has proven to be effective and has been mainly used in developed countries where the economic climate is more suitable for attracting investments and financing. 			
Example of case study			
<p><i>Poa! Internet</i></p> <ul style="list-style-type: none"> • The Poa! Internet service was launched in 2016 and provides affordable wireless broadband to low-income and rural communities across East Africa, including individuals and small businesses. • Poa! is financed by both private equity firms and debt from financial institutions. 			

The complex set-up and preparation phase as well as the lack of available data and uncertain economic context might prevent this model being used extensively.

Some public capital effort may help in initiating the mechanism, as it would decrease risks.

D Public-private partnership model

Main contributors		
Funders	Investors	Financiers
 Government	 ECM Operators	 DCM Banks

Traditional	Innovative
	

Maturity	Scalability	Replicability	Sustainability
			

Description
<ul style="list-style-type: none"> Public-private partnerships (PPP) have long been used to build and operate infrastructure projects and have naturally been extended to the telecoms sector. Government involvement in a PPP project can vary significantly from selecting an operator only for certain tasks while the state keeps full funding and ownership responsibility, to selecting an operator that takes full responsibility for funding, building, operating and owning the network. Most commonly, in a PPP infrastructure project covering commercially non-viable areas, the government brings capital or subsidies that expect a sub-investment level of risk-adjusted return, in order to allow private capital to achieve acceptable risk-adjusted return. The PPP model can also include contributions from CSR funds and grants from foundations and philanthropic institutions.

Example of case study
<p><i>Egypt's Free Internet</i></p> <ul style="list-style-type: none"> Egypt's Free Internet is an initiative by the Ministry of Communications and Information Technology, to provide every citizen in the country with easy and affordable access to the Internet. This project represents a PPP success story and has resulted in higher quality and less expensive Internet access in Egypt.

This model offers a good balance of responsibility shared between the public and private entities. Public subsidies tend to decrease project risk and increase profitability while models with private management have proven to be more viable financially and therefore sustainable over the long term.



USF model 2.0

Main contributors			
Funders	Investors	Financiers	
 Government	 Funds Operators	N/A	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • USFs are typically funded via some form of contribution from service providers. In most cases, operator contributions take the form of a levy based on a percentage of annual operating revenues. • Some countries offer flexibility regarding the way service providers can fulfil their USF obligations. <ul style="list-style-type: none"> – As an example, Morocco offers operators the option to develop and propose their own universal service project or answer tenders issued by the Universal Services Management Committee. In this way, operators can actively participate in the design of a universal service project. • Governments can also collect from other contributors to increase funds. For those that did not implement USF, another possibility is to implement a USF 2.0 model or a national ICT infrastructure fund as illustrated in Figure 3.7. • The USF model can also include contributions from CSR funds and grants from foundations and philanthropic institutions. 			
Example of case study			
<p><i>FITEL, Peru</i></p> <ul style="list-style-type: none"> • <i>Fondo de Inversion de Telecomunicaciones (FITEL)</i>, a USF established in Peru in 1993, has implemented lowest-subsidy auctions for the deployment of telecoms infrastructure in rural areas. • FITEL collects 1% of gross revenues from all telecoms and cable TV operators for its fund, which is managed by a technical secretary and six professionals appointed by the Telecoms Ministry. • The 2016 FITEL fund has initiated 21 regional projects (worth USD 1.8 billion in financing) for connectivity in rural areas and is expected to provide broadband access to 6 000 localities.³ 			

(continued)

Example of case study

Morocco's 'pay or play' mechanism

- Moroccan legislators introduced the 'pay or play' regime in 2004 whereby operators can either pay their financial contributions to the fund, or implement projects approved by the fund's management committee. Operators submit their proposals to the committee which validates them and sets the conditions.
- The Moroccan regulator, ANRT, recognized that this regime was successful and many universal service projects were suggested by the operators and approved, including the coverage of more than 1 500 rural villages within four years.
- The Moroccan regulator, ANRT, recognized that this regime was successful and many universal service projects were suggested by the operators and approved, including the coverage of more than 1 500 rural villages within four years.

While ca. 50% of USFs are not disbursed fully, governments can address that by improving the management of USF by allowing for greater autonomy, increasing transparency, and promoting operational efficiency.

Governments could offer operators the option to develop and propose their own universal service projects and fund them.

USF funds could also be included with other contributions in the models below to help achieve universal connectivity.



Demand subsidization model

Main contributors			
Funders	Investors	Financiers	
 Government	 Operators	N/A	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • This model involves subsidies from the government to specific connectivity users (enterprises, public companies, certain communities, etc.) so that they can use Internet/broadband services. • These subsidies can be direct (in terms of cash or 'connectivity coupons' to the customer) or indirect (providing the connection) and can meet the full cost of the service or only a part of it. • In terms of management, usually the national/regional government provides the finances, which are then disbursed through local government bodies, such as municipalities. Private operators are responsible for creating the network infrastructure or providing the services. • Some countries such as Mexico already have the social infrastructure in place for conditional cash transfer poverty programmes, which can be used to provide and capitalize on 'connectivity coupons'. 			
Example of case study			
<p><i>Project Isizwe, South Africa</i></p> <ul style="list-style-type: none"> • Project Isizwe is a South African non-profit Wi-Fi service provider, established in 2013, which aims to bring free connectivity to public spaces in low-income communities across South Africa. • The project works with municipalities, who pay a set fee for the service for a fixed period, including all bandwidth and maintenance. The government pays for these services through subsidies.. 			

This model addresses demand-side affordability. However, it alone is insufficient to spur operators to roll out the network. Operators need the confidence of the subsidy being guaranteed over a minimum period, as well as confidence in the project's sustainability to ensure that the demand will not disappear if the subsidy is removed.



Infrastructure mutualization model

Main contributors			
Funders	Investors	Financiers	
N/A	 Operators (not only telecom)	N/A	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • In this model, two or more operators share their telecoms infrastructure in areas where demand is low but sufficient to make such sharing commercially sustainable, and where deploying redundant infrastructure would not be economically viable. • The sharing can occur in many ways: passive sharing, where non-active telecoms equipment such as towers are shared; or active sharing, where active telecoms equipment, and sometimes even spectrum, is shared. • Often, sharing is managed through independent infrastructure companies, where these third-party network providers build the network, and lease it to operators. 			
Example of case study			
<p><i>Tri-party sharing in Tanzania</i></p> <ul style="list-style-type: none"> • GSMA supported a rural connectivity project in Tanzania, where the country's biggest operators (Tigo, Vodacom and Airtel) provided 3G connectivity across six pilot sites in 2017. • Each operator deployed networks on two sites, while two other operators 'roamed' on the networks through active equipment and spectrum sharing. • This sharing significantly reduced costs for operators. 			

Infrastructure sharing can be an excellent way to reduce both investment and operating costs, which makes this model very relevant in areas where demand is scarce and the costs for building the network are prohibitively high for a single operator. There is a need to foster trust and communication between operators to encourage such initiatives.

Governments can make sharing of infrastructure mandatory in some areas/regions, as has been done by several countries.

C.2 Detailed analysis of innovative contribution models

1 Loss-guarantee scheme model			
Main contributors			
Funders	Investors	Financiers	
 <p>Government Impact investors</p>	 <p>ECM Operators Funds</p>	 <p>DCM Banks Insurers</p>	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • In a loss-guarantee scheme, public entities or governments are guarantors for certain risk events that may deter private investors from investing or make them require a high risk-adjusted yield. • Loss guarantees have been shown to address some risk elements that inhibit private investors, thus enabling capital inflow to underserved regions and populations. • Major risks highlighted by stakeholders include country-specific political and currency risks. • Additionally, international/regional organizations (such as development banks) can hedge risks in some cases. 			
Example of case study			
<p><i>Multilateral Investment Guarantee Agency</i></p> <ul style="list-style-type: none"> • The Multilateral Investment Guarantee Agency was set up by the World Bank to insure development projects against risk from currency volatility, expropriation, war, and failure to honour financial contracts. • It has supported several telecoms projects, including the deployment of networks in Myanmar, Democratic Republic of the Congo, Pakistan, Tanzania, and many other countries. 			
<p>This solution could work in countries where the government can serve as debt guarantor for the financing or provide insurance against risks.</p> <p>Private-loss-guarantee insurance often proves to be either expensive or very time-consuming to obtain, thus discouraging investors.</p>			

2

Blended financing

Main contributors			
Funders	Investors	Financiers	
 <p>Donors Impact investors</p>	 <p>ECM Operators Funds</p>	 <p>DCM Public entities</p>	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • This model consists of financing a project with a mix of sources of funds from contributors with different, but compatible, interests (investors, financiers, and funders). • Combining investments that require market returns with the use of funds that expect a lower return and public subsidies (generating no return) allows all parties to receive the return they require. • Usually such layering of financing is done by international organizations or funds, whose support also adds credibility (and thus viability) to the project, attracting further investments. • The borrowers of such funds are MNOs, infrastructure companies, or even governments. • This model can also include contributions from CSR funds and grants from foundations and philanthropic institutions. 			
Example of case study			
<p><i>4Afrika Initiative</i></p> <ul style="list-style-type: none"> • Microsoft launched the 4Afrika initiative in 2013. It has not only had a positive effect on developing affordable Internet access, but has also had transformational impacts on financial inclusion, smart devices, skills development, agritech, health, and cloud services uptake for SMEs and start-ups. • Various projects were developed in Kenya, South Africa, Namibia, Tanzania, and Ghana. • Investments in these projects have come from a variety of sources, encompassing strategic investors, development agencies, 'angel' investors, and private companies, to create a blended financing approach. Namely, these include Telecom operators such as MTN, Safaricom, Liquid Telecom and Vodacom; financial institutions such as IFC, Kenya Commercial Bank, and FirstBank; and agency initiatives like the World Bank One Million Farmers Campaign and AGRA. 			
<p>Governance and disbursements of multistakeholder funds is an issue, as all the stakeholders have their own expectations, and mutual agreement can take time. Also, collecting and disbursing such funds is a slow and complex process.</p>			

3

Community collaboration and deployment

Main contributors			
Funders	Investors	Financiers	
N/A	 Operator Community	N/A	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • In a community collaboration model, a community deploys the last-mile network and takes responsibility for its maintenance. The network is usually composed of simplified small cells, satellite-enabled cellular or Wi-Fi sites, which are relatively easy to deploy and maintain. • Community involvement in the deployment and maintenance of the network results in lower costs for the operator, thus increasing its willingness to deploy networks in rural areas. • In an alternative version of this model, governments can allow an operator to count community networks towards its coverage obligations, and in exchange, the operator can provide backhaul at a reduced cost. • This model can also host contributions from CSR funds and grants from foundations and philanthropic institutions. • Besides the investing, financing and funding issue, most important barriers⁴ to scalability are social (lack of awareness of the potential benefits), technical (lack of local competencies to operate and maintain the network), and legal (lack of support from the government). The last aspect is discussed in the policy and regulatory section (6.2), which gives some guidelines for tackling the legal issues 			

(continued)

Example of case study

Zenzeleni Networks, South Africa

- Zenzeleni (meaning 'Do it yourself' in Xhosa) is a Wi-Fi-based ISP that provides affordable voice and data services.
- Its networks are managed by people in the local community, and customers can use Wi-Fi-enabled devices to access its services.
- It has provided Internet access over a 30 km radius in the Mankosi community and is on track to connect 300 000 people in 20-30 villages in the region.

Community networks can be deployed in inaccessible areas, where deployment by operators would not make financial sense

Governments can provide licensed spectrum for free to support community networks, and local authorities can ease access to RoWs and allow the use of public sites as well.

However, the scalability of such networks is low, mainly for social, technical and legal reasons.

Main contributors			
Funders	Investors	Financiers	
N/A	 Operators	 Government	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • The government commits to certain purchases of ICT services as the anchor tenant of the new infrastructure project; the network is usually managed and deployed by operators or ISPs, and the government only provides demand through tenancies. • This model is suitable for broadband networks (where the government commits to leasing some of the capacity or access lines) and data centres. • While this model could mitigate demand risk for operators, there is still a limit to the volume of services the government can buy. • As a variation of this model, other organizations such as retail chains, supermarkets, or PSUs could be anchor tenants as well to ensure a certain level of demand. 			
Example of case study			
<p><i>Simbanet, Malawi</i></p> <ul style="list-style-type: none"> • Simbanet deployed 900 km of fibre and a virtual landing station within Malawi, a land-locked nation. • Simbanet contracts for connectivity to the actual cable landing stations via Tanzania and Zambia through subsea cables. • To improve the business case, the government offered an 'off-take' arrangement guaranteeing a sufficient level of sales to the new entity. 			

This model can stimulate the creation of new infrastructure where demand is uncertain (such as rural areas) or price-sensitive. Still, there is uncertainty surrounding the level of demand from consumers, while demand from government will be limited and dependent on its financial stability.

5

Dual deployment model

Main contributors			
Funders	Investors	Financiers	
N/A	 Operators	N/A	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • This model involves deploying another complementary service in addition to connectivity - for example, selling energy or other utility services on top of connectivity. Digital services are also an example of this, and digital content platforms (DCPs) can be considered as co-suppliers. • Supply of energy/utility services can be of great relevance to remote rural communities which do not yet have access to electricity, and therefore cannot make use of broadband. • In more developed areas, certain network services (such as energy and water) are available, but broadband may not be. In this case, a partnership with DCPs can be considered. • Typically, an operator engages in a partnership with a provider of the additional service and deploys and manages the network. The two services are billed together. • However, this model can be radical, as it requires the operator to effectively function as a utility service provider, or partner with one, thus requiring some commercial and organizational transformation. 			
Example of case study			
<p><i>Nokia Fusion Grid, Namibia</i></p> <ul style="list-style-type: none"> • The Fusion Grid project aims to deliver connectivity and power to areas where full-scale roll-out of infrastructure has not been commercially viable. • An initial pilot has been undertaken in Namibia in collaboration with MTN. This combined Nokia's Kuha (a small-cell 3G and 4G BTS) with a fusion-grid solution that powers the mobile network. • The pilot showed that a Kuha can deliver connectivity and power to up to 600 consumers simultaneously. 			

This model could be applied in rural and remote areas where there is demand for utility services but uncertainty over demand for broadband services.

In more developed areas, this model can be used in collaborations between network operators and DCPs. Operators can face difficulties in securing private capital for a radical shift in their business model.

Main contributors			
Funders	Investors	Financiers	
N/A	 Operators	N/A	
Traditional		Innovative	
			
Maturity	Scalability	Replicability	Sustainability
			
Description			
<ul style="list-style-type: none"> • This model includes clustering demand to make investments more attractive by knowing the demand before launching a service or deploying a network. • The aggregation of demand could be done by the demand provider, public entities, or international organizations. Typically, the demand is aggregated by taking surveys of the settlement/area to be covered (for example, small ISPs in Germany ensure that they have demand from at least 30-40% of homes before they deploy infrastructure in rural areas). Operators can also pre-sign clients before the roll-out starts. • The aggregation of demand could be done around a single proxy unit of aggregation. For example, the Giga project is a demand-aggregation scheme for schools. 			
Example of case study			
<p><i>The Giga project</i></p> <ul style="list-style-type: none"> • Giga is a programme jointly undertaken by UNICEF and the ITU to aggregate demand in developing countries and unlock sources of capital to meet such demand. • For this purpose, Giga aims to map schools and their connectivity status. This can then be used for the purpose of aggregating demand from schools. • It has already conducted 'deep-dives' and demand-mapping for 10 countries. 			

For end users, this model would be more suited for countries where pre-signing of demand is possible. It is difficult to do so in certain developing countries, where many individuals do not have bank accounts or even identification documents.

Local government bodies, such as municipalities, could also act as an aggregator of the demand in villages.

Endnotes

- ¹ The full list of contributors is mentioned in Figure 5.7.
- ² Quote from Digicel founder Denis O'Brien in 'Digicel Chairman says Papua New Guinea "fantastic" location for investment', a 2018 article in *Business Advantage*, available at <https://www.businessadvantagepng.com/digicel-chairman-says-papua-new-guinea-fantastic-location-for-investment/>.
- ³ FB Newsrooms, 2019, New Approach to Rural Connectivity: The case of Peru
- ⁴ Internet Society, 2017, Understanding Community Network in Africa, available at https://www.internetsociety.org/wp-content/uploads/2017/08/CommunityNetworkingAfrica_report_May2017_1.pdf

Annex D

Requirements of an internationally managed contribution model

Annex D. Requirements of an internationally managed contribution model

The design of an internationally managed contribution model is expected to incorporate as many solutions as possible from those identified in Figure 7.1, and it should have the financial and operational capabilities summarized here in subsections D.1 to D.4.

D.1 Financial objectives and capabilities

From a financial point of view, the internationally managed contribution model will be implemented as an international fund, which collects contributions from a range of entities and manages the disbursement of these funds in the most optimal manner to achieve its objectives.

The financial objectives of such an international fund are to:

- 1) Maximize contributions (D.1.1) by using blended financing schemes to ensure the return expected by each category of investors: i) market-return equity, ii) market-return debt, iii) impact investors, iv) strategic investors, and v) donors;
- 2) Make use of appropriate risk-reduction mechanisms to reduce the overall risk of the fund (D.1.2);
- 3) Achieve the maximum possible reduction in the broadband connectivity gap (D.1.3), while ensuring that the returns needed to achieve objective #1 are met. The broadband connectivity gap should be reduced by targeting the optimal mix of coverage, upgrade and adoption;
- 4) Leverage existing or new national-level contribution mechanisms (D.1.4).

While objective #1 provides guidance on how the international fund will collect contributions, the other objectives (together with the operational objectives outlined in subsection D.2) outline how the international fund will use these contributions. The rest of this section provides details on each of the financial objectives. Further work may be required to develop an implementation plan based on them.

D.1.1 Financial objective #1: Maximize contributions by using blended financing schemes to ensure the return expected by each category of investors

The international fund must be able to capture several types of contributions from a wide range of contributors. There will be several categories of contributors, each with different rules for contributing and obtaining financial returns:

Market-return equity

- a) Market-return equity is capital for which the risk-adjusted expected return should be comparable with other forms of long-term equity market investments.
- b) Equity can be contributed both through private placements and through the issuing of securities.
- c) Typical contributors of market-return equity through private placements are private equity funds, infrastructure funds, mezzanine funds and mutual funds (depending on the investment profile offered), while typical contributors through securities are mutual funds, exchange-traded funds (ETFs), and retail investors.
- d) The management of the international fund should ensure that it assesses the risk that this category of investors will face and thus offer a risk-adjusted return which will be attractive to market participants. This can be done in collaboration with private and public financial institutions.
- e) The use of publicly traded securities has the potential to significantly extend the participation of market-return-seeking investors in the international fund. However, it also significantly increases the complexity of fund management in terms of regulatory compliance and required investor-relations activities. Therefore, it may be preferable to consider this option at a later stage, once the international fund is well established, has a demonstrable track record, is of significant size, and has a well-defined investment roadmap.

Market-return debt

- a) Market-return debt is capital for which the risk-adjusted expected return should be comparable to similar debt market investments.
- b) Typical contributors of market-return debt through private placements are commercial banks, infrastructure funds, pension funds, sovereign wealth funds and credit specialist funds (depending on the investment profile offered), while typical contributors through securities are mutual funds, ETFs, and retail investors.
- c) As discussed for market-return equity contributions, market-return debt contributions can be made through both private placements and the issuing of securities.
- d) Similar recommendations apply with regard to assessing the attractive risk-adjusted return offered and the use of securitization.

(continued)

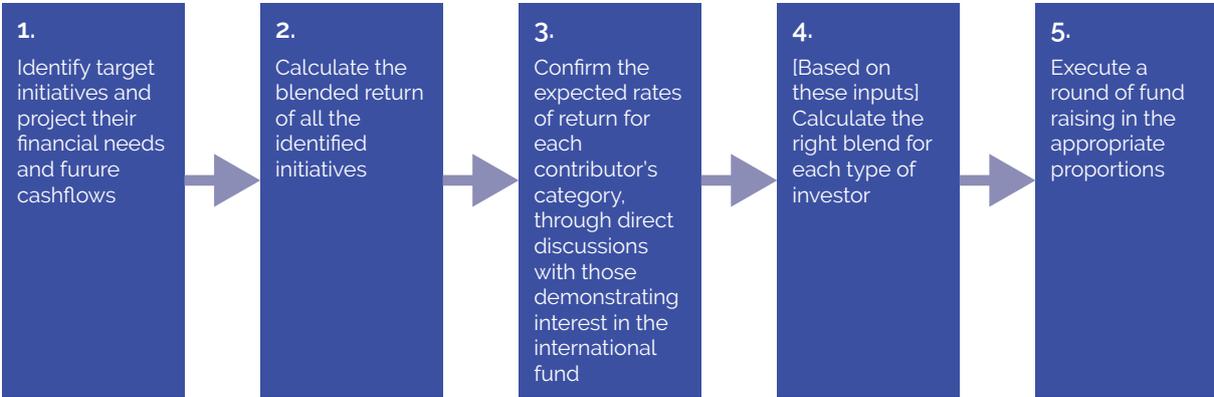
<i>Impact investors</i>	<p>a) Impact investors provide capital to the international fund without expecting the same level of risk-adjusted return that market-return investors expect. Impact investors expect a lower financial return complemented by other types of return: see Annex G for a description of an adoption-supporting project's impact in both financial and non-financial terms.</p> <p>b) Impact investors may include MDBs¹ and other organizations who, while seeking to realize returns, have a broader mandate to realize positive social and environmental impacts. Such investors, subject to their internal policies, procedures and official mandates, may also be suitable candidates to contribute towards an international fund.</p> <p>c) In most cases governments can be considered as impact investors rather than donors, because their contributions aim to increase the well-being of their population and sustain economic growth (which are both examples of non-financial return that governments request when providing funds) but also to generate a lower-than-market risk-adjusted return. In line with what was discussed in subsection 3.2, the Working Group recommends that a portion of the proceeds from contributions made by the ICT sector should be earmarked for initiatives that contribute to a reduction of the broadband gap. One possible approach could be to pay those contributions to the international fund.</p> <p>d) Governments may participate as impact investors in two ways: through international development aid, where developed countries contribute to the international fund to support the development and implementation of projects managed by the international fund; or as a local investor, where a national government provides funds to complement those from the international fund to finance projects in that country.</p>
<i>Strategic investors</i>	<p>a) Strategic investors are entities other than network operators that benefit from investments in network infrastructure, and volunteer to contribute to the international fund or one of its local projects.</p> <p>b) Strategic investors are typically unable to own and operate network infrastructure directly, for instance because of licence regulations or because the mandate of their shareholders does not allow them to do so; or they are reluctant to do so because they believe it is more efficient for another party to take this role.</p> <p>c) However, strategic investors benefit from externalities that a reduction in the broadband gap will generate; for example, because the target population will be able to start using, or increase its current usage of, services provided by the strategic investors.</p> <p>d) As an example, a health company offering e-health services might be interested in joining as a strategic investor as this would enlarge its customer base. The COVID-19 pandemic has brought a significant increase in demand for e-health services, including in emerging and low-income countries, and connectivity is an important enabler for these services. Strategic investors will seek a lower-than-market risk-adjusted return from their contribution to the international fund, because they will also benefit from the externalities that the fund will generate.</p> <p>e) Because the nature of these externalities is highly specific to each investment and strategic investor's business model, the appropriate mix of financial and non-financial return will more likely be negotiated on a case-by-case basis for each project managed by the international fund. Also, strategic investors may prefer to contribute to specific projects managed by the international fund, rather than to the fund itself.</p>

(continued)

<i>Donors</i>	<p>a) Donors do not seek any financial return; however, they seek non-financial returns of the types discussed in Annex H.</p> <p>b) Typical donors are foreign governments, NGOs and philanthropic/CSR funds.</p>
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In order to satisfy the expectations of all the contributors across these five categories and ensure that contributions are maximized, fund management should ensure the optimum blend. The steps illustrated in Figure D.1 can be used to strike the right balance for the fund, at each round of capital increase.

Figure D.1: Representation of the steps to identify target projects and disburse funds



In order to achieve the objective of maximizing the contributions and the number of contributors to the international fund and its projects, the careful work of fund segmentation should be done while setting up the fund itself. The segmentation aims to ensure that contributions are used for initiatives which are consistent with the contributors’ mandate. Indeed, all categories of contributor are likely to be obliged to follow the instructions contained in their mandate. Therefore, in the event that the international fund has a vaguely defined target, many contributors will decline to participate because of possible misalignment with their mandate. Examples of misalignment include:

- An infrastructure fund wanting to avoid the risk that its contributions might end up funding the purchase of devices.
- A philanthropic fund for Africa not wanting its contributions to end up funding initiatives in Latin America.
- A philanthropic fund with a focus on diversity, inclusion, and making content suitable for ethnic minorities, not wanting its contributions to end up funding infrastructure.

The number of potential clashes is very high, if the fund is not segmented properly. Therefore the segmentation should be based on two dimensions, so that all participants can find a comfortable position in the international fund: that is, geographical targets and initiative targets.

An example of this segmentation is illustrated in Figure D.2. However, the initial segmentation will be defined by the fund management at the time of setting up the fund. Care should be taken to get the correct balance between contributors focusing only on a single segment (or a few of them), and contributors who can participate in a large number of segments (if not in all of them). In order to effect a speedy establishment the fund could initially focus on obtaining the participation of larger

multi-segment contributors and subsequently move to find contributors whose requirements are more restrictive, based on the funds needed to balance the contribution types in different segments.

Figure D.2: Illustrative segmentation of the international fund

Initiative type	International level	Grouping of country-level investments - limited to target geographies (e.g. North Africa, South-East Asia, Latin America)	National level	Sub-national level (e.g. regional, local, and community levels)
Broadband coverage	[\$\$]	[\$\$]	[\$\$]	[\$\$]
Network capacity upgrades	[\$\$]	[\$\$]	[\$\$]	[\$\$]
Internet for public spaces	[\$\$]	[\$\$]	[\$\$]	[\$\$]
Demand support - devices	[\$\$]	[\$\$]	[\$\$]	[\$\$]
Demand support - connectivity fees	[\$\$]	[\$\$]	[\$\$]	[\$\$]
Demand support - relevance of content	[\$\$]	[\$\$]	[\$\$]	[\$\$]
Demand support - IT skills	[\$\$]	[\$\$]	[\$\$]	[\$\$]

While the segmentation increases the likelihood of finding contributors who are interested in participating in the international fund, it also greatly increases the complexity of the fundraising process identified in Figure D.1. Therefore, the fund should ensure that appropriate capabilities are available to support its implementation.

D.1.2 Financial objective #2: Make use of appropriate risk-reduction mechanisms to reduce the overall risk of investing in the fund

Use of the blended financing techniques described in the previous subsection contributes to the reducing the risk for contributors of market-return equity and debt thanks to the blending with other capital which does not require the same levels of return. However, the international fund should not just rely on blended financing techniques to adjust the return distribution; it should also use appropriate mechanisms to reduce the overall risk of the fund.

The portfolio effect allows the international segment of the fund to present a lower level of risk than the average of its projects taken separately. This is due to:

- the inclusion of countries with different currencies to reduce the currency volatility risk;
- the blending of several countries to reduce the overall political, geographical, and demand-volatility risks.

The managers of the international fund will be responsible for maximizing risk mitigation through portfolio diversification optimization, and should ensure that appropriate capabilities are available to support an adequate implementation.

D.1.3 Financial objective #3: Maximize the reduction in the broadband connectivity gap, while achieving the returns needed to ensure objective #1 is met

The international fund will be able to choose from a wide range of initiatives, in terms of both their type and their geographical coverage – these correspond to the fund segments discussed earlier. The international fund management will have the delicate task of finding the optimal approach between increasing the blended return of the projects (which increases the ability to attract capital from market-return contributors) and maximizing the reduction in the broadband connectivity gap,² which is the ultimate objective of the fund itself.

D.1.4 Financial objective #4: While aiming to reduce the broadband connectivity gap, the international fund will seek to leverage existing or new national- and international-level contribution mechanisms

The international fund should take particular care not to disrupt, render inefficient, or compete with, other ongoing initiatives or contribution mechanisms at the national level (such as national broadband plans or USAF-driven initiatives) or private initiatives driven by operators or other entities.

One way to maximize the coordination between projects managed by the international fund and those managed by other entities at the national or local level is for these other entities to become contributors to the international fund's projects. A separate level of contribution and a return-blending scheme will then be required at the national or local level, which can be facilitated through the expertise of the international fund's managers. There are various possible approaches:

- National governments can contribute to projects in their country, either in cash or in kind (e.g. asset transfers). These projects can be managed by the international fund or co-managed by the national team and the international fund. The government's contribution could be sourced from its budget, or could come from contributions that the ICT sector makes to the government, as discussed in subsection 3.2.
- Governments could put in place demand-subsidizing schemes or tax incentives to support projects in their countries, which have the effect of increasing the affordability of services, and consequently their adoption and the cash inflows available for the projects.
- Governments could also help with further risk-reduction initiatives, such as loss-guarantee schemes or guarantees against currency volatility.

Another way to ensure coordination between projects managed by the international fund and those managed by other entities at the national or local level is for the international fund to contribute to existing national-level projects, thus empowering them. Two notable examples could be national broadband plans and USAF service-expansion plans, which are typically limited by the availability of government funds. If the international fund obtains sufficient guarantees that these projects will be managed in line with international best practice, and will be subject to sufficient management oversight, the international fund could opt to contribute to this type of national initiative.

Lastly, it should be noted that other international projects and funding schemes are ongoing, such as the ITU/UNICEF Giga project and the UN Secretary General's Roadmap on Digital Cooperation.³ The international fund should collaborate with – and wherever possible participate in – other international projects and funding schemes.

D.2 Operational capabilities

The international fund will also require operational capabilities in terms of investment opportunity scouting, assessment and selection, together with portfolio management. However, the international fund could also offer advice on policy/regulation improvement to the governments of countries that receive contributions from it, and support the management teams of the projects it supports.

D.2.1 Operational objective #1: Provide operational support to assess and select broadband projects and ensure the most effective outcomes

The international fund could provide skills and resources to assess and select the target broadband-supporting projects. In collaboration with other organizations with expertise in this field, the fund will be able to receive requests from project sponsors and conduct independent assessments. This means that international and national contributors will be able to take decisions on the basis of detailed and independent assessments, without the need to run their own due-diligence exercises.

D.2.2 Operational objective #2: Provide operational support to governments and to the management of projects supported by the international fund

The operational support that the fund offers to the management of projects may be particularly important, because non-supportive policy and regulation, and insufficient skills to manage large infrastructure projects are among the most critical issues which limit the availability of contributions in developing countries, as pointed out in Section 2.⁴

Therefore, the capacity of the fund's management team is critical, and special attention should be dedicated to establishing an expert team equipped with the right skills.

D.2.3 Operational objective #3: Make use of traditional and innovative operational solutions to increase efficiency

The international fund can make use of both traditional and innovative operational solutions to increase the efficiency of its contributions to projects. For example:

- A traditional solution would be to seek to secure relevant anchor tenancies before commencing projects, in particular from government entities of the countries receiving contributions.
- An innovative solution would be to facilitate the establishment of a partnership for the dual provision of broadband connectivity with other services, in order to improve the economics of the projects.

D.2.4 Operational objective #4: Leverage existing national- and international-level contribution mechanisms, from an operational and knowledge-sharing point of view

The international fund should leverage national- and international-level contribution mechanisms from an operational and knowledge-sharing point of view, by:

- reusing infrastructure financed by these mechanisms to increase the efficiency of fund utilization;
- leveraging expertise of the previous in-country projects' teams (including those managed by entities other than the international fund);
- leveraging institutional communication channels of the previous in-country projects' teams;

- organizing regular meetings to exchange ideas and case studies with other international contribution schemes with a similar scope to that of the international fund; and
- coordinating the initiatives with those of other international contribution models, such as when advocating for the broadband-supporting actions.

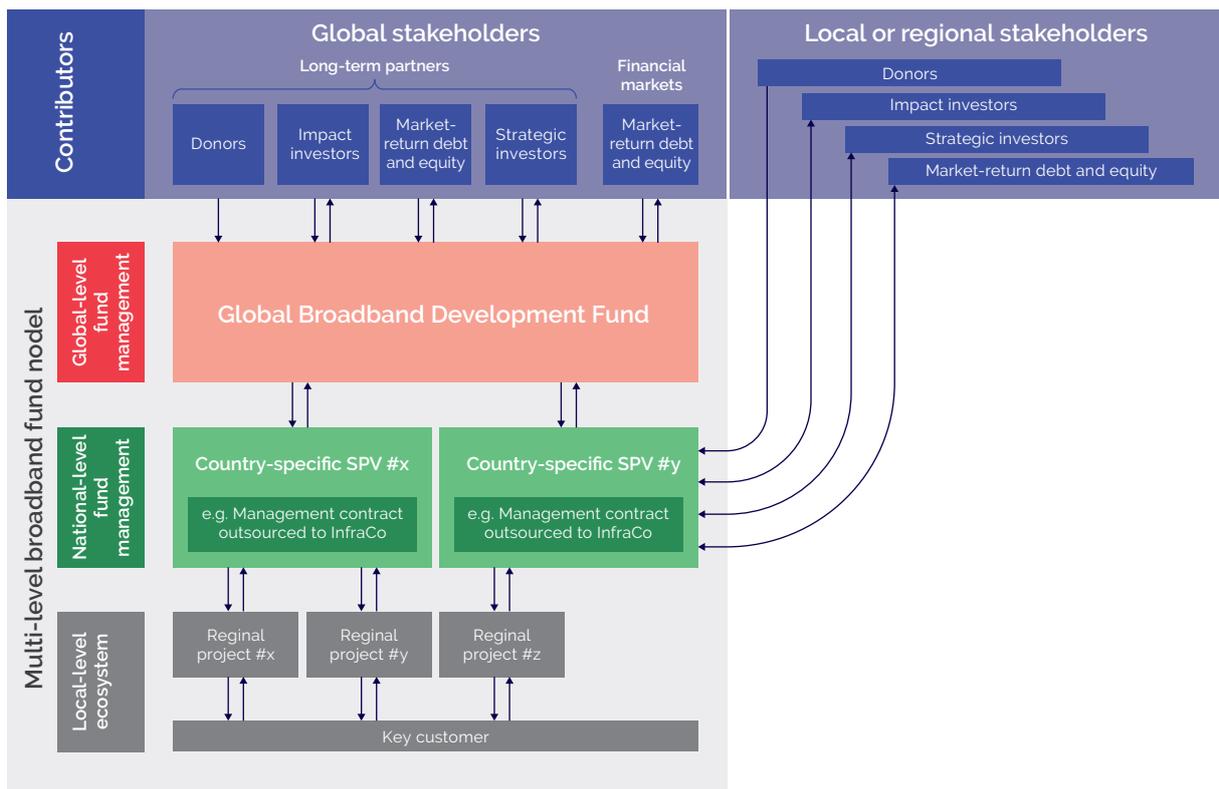
D.2.5 Operational objective #5: Focus on large-scale projects, while ensuring smaller projects can also benefit from the international fund

Wherever possible, the international fund will ensure the participation of communities on a voluntary basis according to certain predefined schemes which will not shift the focus of the fund management from its global targets. For example, it will apply standard terms and conditions for communities, to avoid time being needed to negotiate customized approaches.

D.3 Proposed organization of the fund management

A preliminary schematic representation of the organization of the international fund is provided in Figure D.3.

Figure D.3: Schematic representation of the international fund



D.4 Implementation and management of the target projects

As discussed earlier, the international fund will be able to capture contributions from USAFs. It will have responsibility for evaluating and selecting the projects it contributes to, and overseeing their implementation. Given the number of countries potentially involved, it is unlikely that the

international fund will be able to establish large and skilled teams in each country. Therefore, the solution could be twofold:

- cluster together country teams with similar characteristics; and
- ensure the central team of the international fund supports the activities of the local team.

Nevertheless, the international fund will be unable to participate directly in the design, implementation and operation of the projects selected, due to their number, location and variety of topics. Therefore, the international fund will have to decide on a management model for each project, depending on the specific context, the stakeholders and the available funding. A suitable management model should ensure efficiency, the optimum balance of responsibilities between stakeholders, and the availability of the required technical capabilities.

The management of any broadband-supporting project is based on three activities:

- Sourcing funds for roll-out and operation, which will depend on the investing, funding and financing model associated with the project and the relevant stakeholders.
- Executing deployment of the infrastructure / implementation of the project:
 - Inception and initial preparation may require complex contracts which can take up considerable time. The international fund, in partnership with local governments, can help to centralize and streamline processes to ease the contracting phase and thus accelerate execution.
 - Planning and designing a first high-level phase can be done at an aggregated level (for several different projects). These tasks can be either undertaken directly or outsourced to a subcontractor, but will still require a certain level of supervision by the international or local fund. However, a second and more detailed phase will have to be conducted on site. This could therefore be performed by a specialist firm that could also be contracted for several projects, even across different countries.
 - Implementing a project (e.g. building infrastructure) generally needs to be performed at a more granular/local level, ideally with the support of local governments and firms (MNOs, infrastructure providers, etc.). It will need to be carried out by a specialized entity that is selected through a standardized tender process. Such projects will need technical assistance from international organizations and/or the local pool of experts and the execution capabilities of local governments and private players. Also, in situations where similar projects are being tendered in different geographies, a more sophisticated, flexible multi-country approach should be allowed, where a bidder can submit an offer to support the implementation in more than one country.
- Running the operations: the operation and commercialization of the services offered are often managed by local private players that must be selected through a tender process. Governmental and public entities may also participate in management of the operations, depending on the context. In the case of projects which are not self-sustaining, the fund may have to identify ways to increase profitability by identifying some subsidization mechanisms (e.g. from the government).

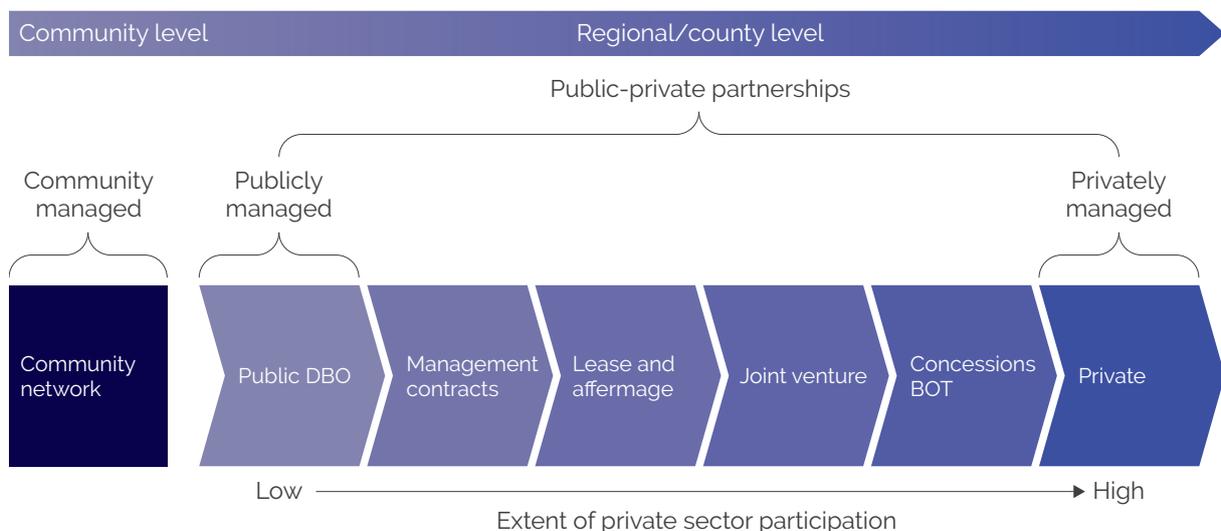
Each of the activities mentioned may involve contributions from one or more stakeholders, such as governments, MNOs, local communities and international organizations. Choosing the most suitable approach for a particular project depends on a range of variables, including the market structure, level of Internet maturity, and political landscape.

Based on the project scope and involvement of stakeholders at various levels of management, there can be four broad classifications of management model (as shown in Figure D.4):

- *Community management*: infrastructure projects that are managed by local communities and usually have minimal involvement of private or public players across management levels.
- *Public-private partnership (PPP)*: an agreement between government bodies (within the same country) and private entities to provide infrastructure or certain services for the benefit of the population. The exact structure of PPPs varies widely depending on the private party's involvement across various management levels and share of risk it assumes. The government's experience of funding, owning and running broadband networks is also an important consideration when deciding which management approach should be taken. Most PPP projects in broadband infrastructure fall into one of the following categories:
 - public design, build, operate (DBO) - the public entity (or grouping of public entities) owns, constructs, deploys and operates the network itself without any input from the private sector;
 - management contracts / lease-and-affermage (L&A) - the public entity (or grouping of public entities) owns or builds a network and engages private entities to manage specific functions for a short period, such as designing and building, or even the maintenance, operation and commercialization of, the network infrastructure;
 - joint venture (JV) - a special-purpose vehicle (SPV) or separate legal entity is created by the private operator and the government to invest in broadband infrastructure in commercially unviable areas. Funding, network ownership and day-to-day management responsibility are shared by the private operator and the government;
 - concessions and BOT (build, operate, transfer) - the public entity (or grouping of public entities) awards a long-term right to use a set of assets to a private operator (or grouping of private operators), with the operator(s) taking on the risks associated with the condition of the assets. The assets may or may not be transferred to the public entity (or entities) at the end of the contract.
- *Private management*: projects that are entirely privately managed, funded, owned and operated by entities (international organizations, MNOs, infrastructure providers, etc.) or private consortia.

This is further developed and detailed in Annex A.

Figure D.4: Types of management model



Endnotes

- ¹ MDBs that could be identified as potential participants in an impact-investor-driven project could include the World Bank Group, European Investment Bank (EIB), Islamic Development Bank (IsDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), Development Bank of Latin America (CAF), Inter-American Development bank Group (IDB, IADB), African Development Bank (AfDB), New Development Bank (NDB), Asian Infrastructure Investment Bank (AIIB), and Eurasian Development Bank (EDB). This is not an exhaustive list and participation would be entirely based on the bank's internal policies, procedures, and official mandate.
- ² It should be noted that the two are not independent from each other, as reducing the connectivity gap will also count towards non-financial return metrics used by impact investors, strategic investors and donors. This adds a layer of complexity to the optimization of the international fund's disbursement allocation.
- ³ See <https://www.un.org/en/content/digital-cooperation-roadmap/>.
- ⁴ This is discussed further in subsection G.1.

Annex E

Management models

Annex E. Management models

E.1 Community management

1 Community management					
Stakeholders					
	Plan/design	Ownership	Build	Operate	Commercialize
					
				✓	✓
	✓	✓	✓	✓	✓
					
	Maturity	Scalability	Replicability	Sustainability	
					

Details

- In a community management model, a local community builds and owns the last-mile network and takes responsibility for its maintenance.
- This model puts the local community 'in the driving seat', with individuals from the local population trained to look after the network infrastructure. In general, the equipment is a simplified solution, often designed to be easy to deploy and maintain.
- Community networks are often operated on a cost-recovery basis and involve no or limited commercial gains - however, they need sustainable returns to cover costs.
- There are limited commercial gains involved for backhaul provided by private operators.
- Once the network solution is rolled out, a licensed operator can run and commercialize its services over the network. The operator must work with the rural community to select an optimal site for deployment and provide suitable technology, including relevant backhaul solutions, to ensure long-term functionality.
- Otherwise, as illustrated in the Brazilian case study below, members of the community could take responsibility for both operation and commercialization. However, this would require more knowledge and resources.
- Model scalability can be improved by using the same solution across a region or the nation. Some solutions are almost as simple as deploying a Wi-Fi access point. A small-cell solution, for example, could be installed in a variety of locations, including public places.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Community networks allow more local control over how the network is used and the content it provides. • This model has lower costs of deployment and operations. • The approach provides a sense of empowerment and agency for the local community/committee involved in the management of the network. 	<ul style="list-style-type: none"> • All costs and risks are borne by the local community. Limited resources for initial deployment and major network maintenance can be a challenge.

Case study/illustration
<p data-bbox="199 663 719 692"><i>Portal Sem Porteiras Association/Coolab (Brazil)</i></p> <ul style="list-style-type: none"> • Portal Sem Porteiras, a community network in a small village in Monterio Labato, Brazil, was started by a group of villagers who are self-provisioning their mesh Wi-Fi network. • Registered as a non-profit in 2018, the network was initiated with some technical and financial support from Coolab, which is a group of community connectivity technicians in Brazil. • Coolab helped Portal Sem Porteiras to establish a tower, wireless routers and network, which now has 12 Wi-Fi mesh nodes. • The network also has some local server applications enabled on low-cost local microcontrollers, which provide instant messaging, web hosting and file-sharing services to its resident users. A free Wi-Fi network is also available in the town square.

Key takeaways and suitability of models
<ul style="list-style-type: none"> • Community management models are a great tool for empowering local communities and providing a quick network at lower cost. This model can also have broad multiplier effects, such as helping to support businesses and building the technical skills of local populations. • The success of this model depends on clearly defined and well-understood roles and responsibilities, particularly in the local community (where individuals should be actively involved in the project), and on ensuring that the network infrastructure and set-up are tailored to the particular context. • Such models are more suitable in rural, remote areas where the provision of service by private operators is not economically viable. While these models are effective for small local communities, they might lack the scalability to be effective for larger communities or infrastructure projects. • One of the main challenges besides leadership and scalability is the financing of such a model.

E.2 PPP (public-private partnership)

2

PPP – public DBO (design, build, operate)

Stakeholders					
	Plan/design	Ownership	Build	Operate	Commercialize
	✓	✓	✓	✓	✓
					✓
					
					

	Maturity	Scalability	Replicability	Sustainability
				

Details

- In a public DBO model, the public sector owns, constructs, deploys and operates the network itself without any input from the private sector.
- The public sector can either operate the whole network or just the wholesale layer, with retail services then offered by the private sector.

Strengths	Weaknesses
<ul style="list-style-type: none"> This is a simple, well-understood and established model. The public sector retains control of the network, decides on priorities, ensures no conflicts of interest, and enforces standards. 	<ul style="list-style-type: none"> The public sector may lack commercial and technical expertise compared to the private sector (e.g. it may struggle to meet targets, and networks may be limited in size and scope). The model does not exploit private-sector economies of scale and efficiency.

Case study/illustration

RAIN and RAIN-2 Public DBO (Lithuania)¹

- The Rural Area Information Technology Broadband Network (RAIN) project was developed between 2005 and 2013 in two phases, mobilizing more than EUR 70 million and four public partners.
- The RAIN network is owned by Lithuania’s Ministry of Transport and Communications (MTC), which also sets the services and tariffs. The infrastructure is managed by a public wholesale operator (*Placiajuostis Internetas*) in an open-access, technology-neutral manner.
- The project mainly focused on building a fibre backhaul and core network. The network connected central copper offices, to allow DSL-based broadband to be provided over existing local copper loops. Fibre connections were also provided to mobile towers, schools, libraries and public Internet centres.
- During the original RAIN project, 3 357 km of fibre-optic cable was built and digital subscriber line (DSL) infrastructure was constructed in 468 rural municipalities. During RAIN-2, a further 4 400 km of fibre-optic cable was built and DSL infrastructure was installed in at least 770 small towns and villages.

Key takeaways and suitability of models

- Public management models are suitable in situations where the public sector needs to have absolute control over the operation of the network, or where small, targeted investment will inspire contributions from private sources.
- They are also a good solution if the public authority does not have confidence in the legal regime for ensuring that private operators do not distort the market (for example, by overcharging consumers for services).

3

PPP – management contracts/L&A

Stakeholders

	Plan/design	Ownership	Build	Operate	Commercialize
	✓	✓	✓		✓
				✓	✓
					
					

Maturity	Scalability	Replicability	Sustainability
			

Details

- In a management (or operations and maintenance, O&M) contract, a government body owns or builds a network and engages a private entity to manage a specific function, ranging from technical assistance through to maintenance and operation, for a short period (typically two to five years), usually in return for a fixed fee.
- Management contracts are usually input-focused, in which case the private management company does not assume the risks associated with the condition of the asset.
- O&M agreements focus on outputs. The operator may take on some commercial risks (e.g. maintaining and replacing minor components and equipment), and the awarding authority can introduce incentives for performance and efficiency.
- In an L&A (lease and affermage) contract, a government body owns or builds a network, and a private entity operates and maintains the infrastructure and equipment for a specified period (typically eight to 15 years).

Strengths	Weaknesses
<ul style="list-style-type: none"> • Management contracts are the least politically sensitive PPP (due to public ownership of the network); they ensure business continuity and can be implemented quickly. • L&As transfer operational risks to the operator, incentivize the operator to perform, and can be implemented quickly. 	<ul style="list-style-type: none"> • Management contracts have limited potential for improving efficiency and performance or incentivizing private investment. There is a lack of transparency, and most of the risks are borne by the government. • In L&As the private entity may reduce the level of maintenance to maximize profit; it can be complicated to agree on tariffs; risks are still almost all borne by the public sector; and there may be a need for considerable regulatory oversight.

Key takeaways and suitability of models
<ul style="list-style-type: none"> • Management contracts are good transitional arrangements for introducing the private sector into a public-sector venture. They are useful in situations where the government requires a high degree of control over the network. • L&As are chosen when the government wants to combine public financing with private efficiency and pass on the commercial risk to the private operator.

4

PPP – concessions and BOT (build, operate, transfer)

Stakeholders					
	Plan/ Design	Ownership	Build	Operate	Commercialize
	✓	✓			
	✓		✓	✓	✓
					
					
	Maturity	Scalability	Replicability	Sustainability	
					

Details

- A concession gives a concessionaire a long-term right to use a set of assets conferred upon it. The concessionaire takes over responsibility for operations, maintenance and some investment. It also takes on risks associated with the condition of the assets.
- The awarding authority retains ownership during the concession period and is usually responsible for any major replacements. Typically, the concessionaire obtains its revenue from the consumer and pays a concession fee to the authority that goes towards asset replacement.
- In a BOT project, a concession is awarded to a private company, granting it specific rights to build and operate a facility. The private entity funds, builds, operates and maintains a state-owned facility in line with performance standards for a specified period (typically 25 to 30 years) so that the private entity recovers its investment, after which responsibilities are transferred to the government.
- The operator funds minor replacements, and the government funds major replacements.

Strengths

- Concessions and BOTs have a high level of private investment, reduce commercial risk, transfer risks associated with asset condition to the operator, and develop local knowledge.
- These models also have a high potential for efficiency gains and innovation.

Weaknesses

- Concessions and BOTs require complex contracts and may require updated regulations for tariff and performance monitoring. Project negotiations may take a long time, so this is not a quick solution.

Case study/illustration

Thailand's BOT agreement²

- A BOT agreement between Telecom Asia and the Telephone Organization of Thailand (TOT) began on 29 October 1992, for a 25-year term. The initial agreement was to expand fixed-line telephony services by 2 million lines in Bangkok, and then this was modified to 2.6 million lines in 1996.
- The end users paid subscription and usage charges to TOT, which then deducted all costs plus 16 per cent of the total, with the remainder going to Telecom Asia.

Key takeaways and suitability of models

- Concessions and BOTs are suitable for situations where the government wants to profit from the network and retain ultimate control, but trusts the private operator to be responsible for the project over the long term.

5 PPP – JV (joint venture)

Stakeholders					
	Plan/design	Ownership	Build	Operate	Commercialize
	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓
					
					

	Maturity	Scalability	Replicability	Sustainability
				

Details

- In a joint venture, new projects are built, or existing projects are run, by partnerships involving several stakeholders such as governments, development actors, MNOs, and advertisers who share a common interest (for example, an interest in connecting rural low-income areas).
- The level of share ownership can vary.
- A minority share does not have to mean a lack of control: weighted voting and veto rights are just two types of protection for a minority shareholder.

Strengths	Weaknesses
<ul style="list-style-type: none"> • JVs are transparent: they share capex, opex and profits, reduce risk and increase returns, and still allow the government some control. • JVs also develop local knowledge and allow more public funds to be redirected elsewhere (relative to previous models). 	<ul style="list-style-type: none"> • JVs require complex agreements, and the operator might expect autonomy in running the day-to-day business.

Case study/illustration

Rwanda's joint venture³

- Rwanda's 2G operators were subject to strict obligations that led to widespread coverage of 2G networks (98 per cent of the population). While the coverage obligations were successful in extending roll-out, their cost implications were too great for some operators, and the incumbent Rwandatel became insolvent in 2011.
- When it came to 4G roll-out, the government chose a different approach: instead of setting strict coverage obligations, or relying on market-driven roll-out, it established a JV with South Korea's KT Corp to build and manage a wholesale 4G network nationwide based on a PPP model.
- In June 2013, KT signed a JV with the Rwandan government to build a nationwide 4G network that would serve 95 per cent of the population. The government allocated 800 MHz and 1800 MHz spectrum to the venture, mandating that KT provide wholesale access to Rwandan ISPs (including incumbent mobile operators) as part of an exclusive licence with an initial 25-year term. KT invested USD 140 million, while the Rwandan government provided additional financial and administrative support, and access to its national fibre-optic networks and spectrum.
- When the single wholesale network (SWN) was launched in November 2014, it had 65 cell sites covering 95 per cent of the capital's population. Nationwide deployment began in 2015 and the 4G network covered more than 95 per cent of the population by 2018.

Key takeaways and suitability of models

- JVs are suitable where the interests of the public and private sectors can be closely aligned.
- International organizations can help by sharing best practices and providing technical assistance to a JV.

E.3 Private management model

6	Private management				
Stakeholders					
	plan/design	Ownership	Build	Operate	Commercialize
					
	✓	✓	✓	✓	✓
					
					
	Maturity	Scalability	Replicability	Sustainability	
					

Details

- Private management projects are entirely privately managed, funded, owned and operated. In general, they take the form of build-own-operate (BOO) models.
- Under a BOO model, the private sector funds, designs, builds, operates and owns the facility and sells the product or service to consumers.

Strengths	Weaknesses
<ul style="list-style-type: none"> • A private management model provides improved efficiency and higher profitability compared to management models that involve the public sector. • Private and foreign investment prospects might be more optimal than in public management models. • There are more opportunities for growth, new technology and innovation. • This model allows the government to maintain strategic focus. • The public sector does not have to bear any costs or risks. 	<ul style="list-style-type: none"> • If there is a monopoly, the private entity may abuse it, likely shifting the motivation from public benefit to profit. • This model may require the implementation of strict regulations.

Case study/illustration

Network deployment by Digicel, Papua New Guinea

- In the past ten years, Digicel has invested more than USD 1 billion to build and operate a telecommunication network in PNG.
- Currently, Digicel's 3G and 2G networks cover about 88 and 89 per cent of the PNG population respectively, with a landmass coverage of about 53 per cent.
- Digicel plans to expand its network further, with a specific focus on covering rural areas and upgrading existing 3G/2G sites to 4G

Key takeaways and suitability of models

- Private management models are suitable for larger-scale investments, provided there is sufficient regulation in place to prevent market distortions (for example, overcharging consumers for services).

Endnotes

- ¹ Placajuostis Internetas (Lithuania), Case study of the broadband infrastructure investment project RAIN in Lithuania, available at <https://www.placajuostis.lt/en/rain>.
- ² ITU, 2002, Bits and Bahts: Thailand Internet case study, available at <https://www.itu.int/ITU-D/ict/cs/thailand/material/THA%20CS.pdf>.
- ³ GSMA, 2015, Rural Coverage: Strategies for sustainability (country case studies), available at <https://www.gsma.com/mobilefordevelopment/resources/rural-coverage-strategies-for-sustainability/>.

Annex F

Demand-support measures

Annex F. Demand-support measures

This section examines the adoption gap, discussed in subsection A.2 above, and the demand-side issues that lead to this gap. Low demand for broadband services results in a large adoption gap, as a significant proportion of the population is not using these services, despite being nominally covered by the infrastructure. This section discusses the importance of the adoption gap within the overall broadband connectivity gap, highlights key obstacles limiting the demand for broadband in the focus geographies (Africa, Asia and Latin America), and suggests measures that can be taken to overcome these obstacles. It also highlights key demand-side contributors and illustrates good practices through case studies.

Merely deploying network infrastructure to provide coverage is not sufficient if the majority of the population does not connect to broadband services. Underdeveloped demand has a negative impact on the deployment of these services in two ways:

- Low demand means telecommunication operators incur higher infrastructure deployment and maintenance costs per subscriber, decreasing revenue and weakening their business case.
- Operators are discouraged from deploying networks in new areas where demand is low, and this hinders the offer of broadband services to people in those areas who are willing to connect to broadband.

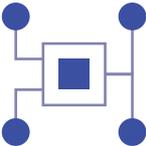
However, it should be noted that, particularly for mobile networks, as adoption and hence penetration increases, the higher capacity demands often result in requirements for significant additional network infrastructure investment. This may bring about similar commercial viability challenges to those experienced in the coverage and upgrade gap areas.

As discussed in subsection A.2 (see Figure A.1), the adoption gap is the largest component of the broadband connectivity gap in all three focus regions, representing 77-91 per cent of the gap. This means that the population in those regions face demand-side issues. Three key obstacles need to be removed to increase the attractiveness of broadband services for unconnected populations in the focus regions:

- limited affordability;
- limited digital literacy and awareness; and
- lack of relevance and attractiveness of content.

These three obstacles are further described in the following subsections, together with relevant measures to overcome them, as shown in Figure F.1. As noted earlier, some of these measures could be funded directly by reformed USAF models or other ICT funds, and others by general government spending, such as on educational efforts in schools and communities.

Figure F.1: Primary adoption obstacles and key measures to overcome them

Adoption obstacle		Key measures	
 Limited affordability	1	A	Micro-financing of devices
	1	B	Reduction in taxes and import duties on devices and usage of services
	1	C	Reduction or exemption of patent royalties
	1	D	Demand aggregation for devices
	1	E	Subsidies reducing the the cost of devices
	1	F	Facilitation of reuse of discarded devices from developed countries
 Limited digital literacy and awareness	2	A	Community-based awareness and learning programmes
	2	B	Use of schools to galvanise awareness
	2	C	Independent learning enabled through incentives
 Lack of relevance and attractiveness (content)	3	A	Translation/production of content in local languages
	3	B	Support for development of internet-based essential services
	3	C	Support for local start-up ecosystem to develop locally relevant applications

F.1 Limited affordability

The affordability of broadband-capable devices and the recurring costs of data and access to broadband services are some of the major challenges in connecting the unconnected, as highlighted in a number of the interviews conducted for this study. The average cost for 1 GB of data is 4.7 per cent of the average monthly income across lower- and middle-income countries and 10.9 per cent across lower-income countries, compared to the target of 2 per cent as outlined in A4AI's report and set by the Broadband Commission.¹ Moreover, the average cost of a basic device in lower- and middle-income countries is 34 per cent of the user's average monthly income.²

Service affordability will be indirectly addressed by many of the models presented in Section 3 that aim to improve the business case by lowering costs, aggregating contributions from different stakeholders, and so forth. Service costs can be directly lowered with other initiatives presented here.

Devices can also be made affordable through micro-financing/alternate financing mechanisms, while the cost of devices themselves can be reduced through the following measures:

- reduction in taxes and import duties on devices and usage of services;
- reduction or exemption of patent royalties;
- demand aggregation for devices;
- subsidies reducing the cost of devices; and
- reuse of discarded devices from developed countries.

Governments, device vendors, telecommunication operators, financial institutions and NGOs can all contribute in various ways toward executing these measures.

1

A

Micro-financing of devices

Contributors



MNO



Vendor



Financial institutions

Details

- Consumers who cannot afford an upfront payment for devices are provided with micro-loans from financial institutions, alternative credit providers, MNOs, or device vendors.
- Consumers can pay back this credit in small monthly instalments over a set period.
- Possible issues relating to this approach are:
 - Identifying citizens in some lower- and middle-income countries due to lack of proper 'know-your-customer' (KYC) measures;
 - Credit assessment of these customers, as the majority of them do not have a bank account or prior credit history;
 - High default rates, including lost, broken, and stolen phones.
- Approaches that can overcome these obstacles include issuing micro-credit to customers that is linked to their bank accounts, offering alternative credit assessment mechanisms, bundling devices with solar-system or farm loans, and enabling repayments through mobile wallets.

Case study/illustration

Mobisol and MTN, Rwanda

- **MTN** and **Mobisol** (solar-system provider) have launched a pilot project in **Rwanda** to provide smartphones for rural citizens who have already obtained a solar-system loan from Mobisol.
- These customers can buy a smartphone (bundled with an MTN SIM card) at a cost of ~USD 60 (which is a 25 per cent discount from the market price) and repay it over a period of one year in small monthly instalments.
- Mobisol uses an alternative credit assessment mechanism to build the credit profile of a lender based on non-bank data such as family size, household income and expenses, farmland size and tenure.
- To ensure timely payments and reduce default rates, **repayment** is facilitated through MTN's mobile money platform.
- Mobisol plans to expand this service to **Tanzania** and **Kenya**.

Key takeaways

- Alternate credit mechanisms (for example bundling with other essential services such as energy systems) can be used in the case of users who do not have a traditional credit history, while ensuring lower default rates.
- However, bundling reduces the extent of the eligible population, and the success of alternative credit mechanisms is still unclear.
- This also does not lower the cost of the device, but simply lengthens the payment period.
- Governments, with some support from international organizations, could provide digital IDs to their citizens; this can be linked to citizens' bank accounts and may help in identifying customers and assessing credit.

1

B

Reduction in taxes and import duties on devices and usage of services

Contributors



Government

Details

- In some countries, Internet devices still attract heavy taxes, including luxury taxes, value-added taxes (VAT), and import duties. Additionally, some countries also tax the purchase of SIM cards and the use of broadband services.
- According to a GSMA study,³ 41 per cent of countries still charged sector-specific consumer taxes on handsets or usage in 2017. The highest proportions of countries were in sub-Saharan Africa (63 per cent) and Latin America (57 per cent).
- In sub-Saharan Africa, these taxes average 23 per cent⁴ of the cost of devices, in addition to the import duties and taxes on broadband use. Governments should reduce or waive these taxes and duties to support device and service affordability.
- Governments should follow a smart taxation strategy of waiving unnecessary taxes in the short term, which would increase the penetration of broadband, enhance the development of broadband-enabled services, and eventually generate more fiscal income.

Case study/illustration

VAT exemption on handsets, Kenya and Pakistan

- To increase the affordability of devices, **Kenya** decided to exempt mobile phones from VAT in June 2009. This resulted in a 200 per cent increase in the handsets purchased per quarter and an increase in SIM penetration from 50 to 70 per cent over three years.⁵
- **Pakistan** followed a similar approach when it removed 16 per cent VAT on mobile handsets in 2016.
 - It had seen declining growth in its handset sales over 2013–2016, including falls in sales in 2014–15.
 - After the VAT exemption, handset sales increased by 25 per cent (22 per cent higher than in neighbouring countries).

Key takeaways

- Waiving/reducing taxes and import duties on handsets can increase device affordability.
- Governments may need to be persuaded to follow this long-term approach, and advocacy from international organizations will be required to highlight the future economic and social benefits as well as higher future tax revenues from the increased economic activity, as discussed below in Annex G on impacts.

1

C

Reduction or exemption of patent royalties

Contributors



Vendor



Government

Details

- Royalty stacking in the context of patents occurs when a company pays multiple royalties to avoid the infringement of existing patents on a device, or components used in a device. It can be a significant challenge to smartphone affordability.
- A study suggests that patent royalties can contribute up to 31 per cent of the total cost of an entry-level smartphone. Physical components for such a smartphone would another cost 30-35 per cent of the total.⁶
- Exemption or reduction of patent royalties on entry-level smartphones can significantly increase device affordability
 - Since a smartphone is impacted by about 250 000⁷ active patents, it will be difficult to establish agreement among multiple stakeholders (including academic institutions and vendors of components, processors, devices and software).
- Advocacy by international organizations and patent exemption reforms by governments can overcome this obstacle.

Case study/illustration

TRIPS waiver on drugs for LDCs

- In the 2001 Doha Declaration on the TRIPS (Trade-Related Aspects of Intellectual Property Rights) Agreement and Public Health, the World Trade Organization (WTO) exempted the least developed countries (LDCs) from patents on medicines.
- As per this declaration, LDCs are exempt from obligations under the **TRIPs Agreement** or any other intellectual property rights on pharmaceutical products and clinical data (this was until 2015 according to original agreement, then extended till 2033).
- This exemption enables LDCs to buy or produce generic drugs that are 80-85 per cent less expensive than their branded equivalents.

Key takeaways

- Waiving patent royalties on entry-level smartphones can reduce their price by up to 31 per cent, thus increasing affordability.
- Establishing an agreement across various stakeholders may be challenging and will require advocacy from international organizations.

1 D Demand aggregation for devices

Contributors



Operator



Vendor



Financial institutions

Details

- Demand aggregation for devices across several countries/regions can provide price reductions through benefits related to economies of scale and better negotiation power.
- Economies of scale in the manufacturing of devices (for vendors), and the procurement and marketing of devices (for MNOs and retailers), can reduce device cost.
- A study by A4AI suggests that original-design-manufacturer (ODM) telecommunication devices sold in lower- and middle-income countries cost ~51 per cent less than non-ODM devices.⁸
- However, the alignment on the specifications of these devices may be challenging due to the number of stakeholders involved and lack of standardization across countries (e.g. of spectrum bands).
- An existing or new global/regional alliance between public and private organizations can perform this grouping of demand by coordinating with various stakeholders.

Case study/illustration

Partnership between Orange and Google for affordable devices

- **Orange** and **Google** jointly launched an affordable high-quality smartphone in 2020 at a low price point of USD 30, which was also bundled with a voice, SMS and data package. The device will be initially available in Guinea-Bissau, Ivory Coast and Madagascar, and in other countries at a later date.
- This partnership leverages Orange's network across 18 countries in the Middle East and Africa to aggregate demand, and Google's applications to enrich the online experience of these consumers.
- The low price of this package was made possible by using an Orange-branded ODM device, reducing marketing expenses and forgoing margins on sales and distribution.
- The margin associated with these waivers is expected to be recovered through future revenue from new subscribers.

Key takeaways

- Grouping of demand will be particularly beneficial to countries with low levels of demand to achieve scale benefits.
- Agreement on device specifications among a multitude of stakeholders is a challenge that could be solved by a dedicated international alliance.

1

E

Subsidies reducing the cost of devices

Contributors



Government



Operator



Vendor



NGOs

Details

- Direct subsidies reducing device costs can effectively help lower the barrier to affordability.
- Governments, NGOs, or private players can partner with MNOs to subsidize the cost of devices for marginalized populations.
 - **NGOs** and governments can directly fund these devices while private players can use pre-loaded applications and advertising to subsidize the cost of the service.
- While the upfront cost is subsidized, consumers still need to pay for connectivity and maintenance costs. Also, subsidizing devices often requires large investments.
- Pre-loaded advertising applications, which reward users for watching ads, can also be used to subsidize service costs.
- Governments can use USAFs to fund these costs.

Case study/illustration

YCP package, Malaysia

- In 2013, the government of **Malaysia** announced the **Youth Communications Package (YCP)** to encourage young people to buy 3G smartphones.
- The government **offered a** USD 45 (40 per cent) rebate on a USD 112 smartphone.
- Young adults (aged 21 to 30) were to register with the government first, after which they could purchase these subsidized phones from MNO retailers. MNOs would receive the rebate from the government at a later stage.
- These rebates significantly increased smartphone penetration in Malaysia – smartphone shipments accounted for 49.6 per cent of total mobile shipments in the country in the first half of 2013, up from 31.8 per cent in the previous six months.

Key takeaways

- Subsidies can reduce costs in the short term, but do not represent a sustainable model due to affordability issues related to recurring service costs.
- The high upfront investments required by a subsidizing entity limit the scalability and replicability of the measure. International organizations can support governments and NGOs in designing, implementing, and monitoring the national subsidy schemes.

1

F

Reuse of discarded devices from developed countries

Contributors



Government



Operator



Vendor



NGOs

Details

- Almost 1.5 billion⁹ smartphones were sold across the world in 2019. In the USA, 416 000¹⁰ phones are thrown away every day (~152 million per annum).
- Used phones from developed countries could be refurbished and given or sold at a low cost to the unconnected population in developing countries.
- International MNOs and NGOs could establish a collection scheme for these phones in developed countries and collaborate with vendors to refurbish them. The refurbished phones could be distributed in developing countries in collaboration with local governments and MNOs.
- Collecting the devices in developed countries, refurbishing them, and distributing them in other countries presents an important logistical challenge, as it requires coordination between multiple stakeholders in different locations, economies, and tax environments. Encouraging people in developed countries to donate their phones is also a challenge, although increasingly the environmental impact of unwanted phones is understood, and the development benefit of donation may be appealing.
- An international alliance can help manage the process, while advocating for governments in the developed countries to introduce a regulation to support the reuse of devices, in light of global environmental sustainability.

Case study/illustration

Device repurposing, HYLA Mobile

- HYLA Mobile (formerly eRecyclingCorps), a company headquartered in the USA, is one of the largest providers of mobile trade-in and reuse solutions.
- It runs a trade-in programme for MNOs across more than 16 000 stores. Customers can return their used devices, and get instant store credit in exchange; this credit can be used to buy new devices.
- HYLA manages to repurpose up to 95 per cent of the devices collected. They are then sold in other markets where people cannot afford high-end devices.
- HYLA was established in 2009 and has repurposed more than 25 million devices in its first five years of operation. In 2019, it returned repurposed devices worth USD 2.4 billion.

Key takeaways

- The refurbishing and reusing of devices can make good quality smartphones available to the unconnected population in developing countries at a lower cost. Managing the logistics related to such a geographically broad multistakeholder operation can be a challenge.
- An international alliance should advocate for the full alignment of the stakeholders, provide technical support and funding, and work with governments in developed countries to introduce supportive regulations.

F.2 Limited digital literacy and awareness

A considerable proportion of the population in developing countries are not able to make full use of broadband services, due to lack of awareness about the Internet and lower literacy levels, including reading ability and technical skills. Many people use mobile phones only for making calls, despite having an Internet-enabled device and connection.

During our interviews, a number of stakeholders cited low digital literacy as a major obstacle to broadband adoption. Digital literacy and skills can be defined as 'citizens' ability to trust, utilize, understand and take full advantage of the capabilities of ICT in their lives'.¹¹ Sub-Saharan Africa and South Asia have **literacy rates of 66 per cent and 73 per cent** respectively, compared to a **global average of 86 per cent**,¹² and thus much lower levels of digital skills can be expected in these areas.

The data suggest that about **25 per cent of the unconnected adult population**, including people who own devices, are not aware of the Internet.¹³ One reason for this is that their first point of contact, the phone retailers, have limited incentives to educate their customers about the Internet and its benefits.¹⁴ This lack of awareness and digital skills is currently being addressed by digital training programmes run by several public and private organizations. Innovative approaches can enable learning through:

- community-based awareness and learning programmes;
- the use of schools to galvanize awareness; and
- independent learning enabled by incentives.

Potential contributors, such as governments, telecommunication operators, NGOs, impact investors and communities can execute these measures.

2

A

Community-based awareness and learning programmes

Contributors



Government



Community



Operator



NGOs

Details

- Awareness of mobile Internet and digital literacy is observed to be low in rural areas of lower- and middle-income countries.
- Rural citizens in such countries are usually part of several local community and social groups, such as self-help groups, village meeting groups (e.g. Panchayats in India), or religious gatherings
 - Such communities/groups can be used to improve rural citizens' digital skills.
- Training village/community leaders first, then training the rest of the community through the advocacy of leaders, can reduce social and cultural barriers and increase willingness to learn.
- Using influential government/social employees, such as teachers, to engage with these communities and their leaders can also reduce these barriers to some extent.

Case study/illustration

Digital Ambassador Program, Rwanda

- The **Digital Ambassador Program (DAP)** was an ambitious project, led by the Rwandan Ministry of Information Technology and Communications (MITEC) and implemented by Digital Opportunity Trust (DOT), with the aim of increasing digital literacy among Rwandan citizens.
- In the first phase, DOT recruited 50 young citizens, trained them to be digital ambassadors, and deployed them in five districts.
- These ambassadors delivered digital skills training to about 17 000 citizens in six months. The success of the programme was gauged through a survey, where 75 per cent of the respondents said that their ICT skills improved 'a lot' because of DAP.
- After the success of the initiative, Rwanda decided to deploy a further 5 000 digital ambassadors across the country to provide hands-on IT skills training to rural citizens.

Key takeaways

- Community-based programmes are particularly helpful in rural areas with social and cultural barriers.
- UN agencies' efforts are required to design these programmes and help tailor them to the local cultural environment.
- It can be an operational challenge to mobilize the most relevant influential resources to interact with these communities.
- On-the-ground networks and resources of international organizations and NGOs can be used for such mobilization and to help implement the programme.

2

B

Use of schools to galvanize awareness

Contributors



Government, Schools



NGOs

Details

- About 25 per cent¹⁵ of the global population is below 15 years of age. For many of these children, **schools** represent the most effective learning channel, and digital literacy counts among the potential skills to be learnt.
- Additionally, the improved digital literacy of schoolchildren also promotes the digital literacy of their families.
- As on-the-ground digital-skill resources may be limited, teachers or NGOs can help to impart these skills to other instructors.
- A school-based digital-literacy initiative could be made more effective if coupled with the school connectivity programmes run by governments and NGOs. This would also allow these connected schools to be converted into digital learning and training centres for the adult population.

Case study/illustration

Talkshawk and I-champ by Telenor, Pakistan

- In 2012, **Telenor** launched **Talkshawk, the I-champ initiative** that aimed to increase mobile Internet adoption by improving awareness and addressing negative perceptions of the Internet.
- The goal was to introduce mobile Internet to students and demonstrate to parents that it is an effective tool that can enhance education.
- I-champ achieved this by holding competitions at the school, regional and national levels. Students used Telenor's Internet-enabled handsets to see who could perform the fastest searches for information on educational topics.
- I-champ reached over 35 000 students and their parents over a period of two years; it directly imparted digital skills to these students and raised their parents' awareness of the benefits of the Internet.

Key takeaways

- This initiative can be particularly helpful in rural areas where digital literacy is still nascent.
- However, it can be a challenge to spread digital skills to the adult population via their children due to the lack of devices and connectivity in homes.
- This initiative could benefit from existing school support programmes run by international organizations, NGOs, and governments. These sponsors could be approached to ensure that digital skills are part of their literacy programmes.

2

C

Independent learning, enabled by incentives

Contributors



MNOs



NGOs



Vendor

Details

- Most of the people who own broadband devices in rural areas of lower- and middle-income countries use them predominantly for making phone calls.
 - It appears that the main reason is the lack of information/training provided by device/SIM retailers.
- Self-directed or independent learning can impart better digital skills and allow users to learn at their own pace.
- MNOs can decrease the cost and time required for self-learning by offering offline help, or videos of Internet applications in operator web stores. Device vendors can offer support by playing these videos while setting up customers' new phones for them. NGOs can help by creating content in local languages.
- MNOs can augment digital learning through an immersive voice response system (IVRS) and offer free starter data packs that will enable users to explore the Internet by themselves.
- After completion of this digital training, subscribers could be incentivized further through free data packs and talk time.

Case study/illustration

Har Mobile Par Internet by Idea, India

- In 2014, **Idea (now Vi)** launched its **Har Mobile Par Internet** (meaning 'Internet on every mobile') initiative to address the issue of **digital literacy among rural customers**.
- This initiative provided step-by-step lessons on digital literacy through an **IVRS** that was available in both English and Hindi.
- The lessons focused on basic Internet skills, including searching on Google, opening Facebook and Google accounts, and checking rail timetables.
- After the lessons, users received an SMS which contained links to the content being taught and further steps to take.
- Idea has had about **500 tutorial activations** per day since the launch of this initiative.

Key takeaways

- This initiative is helpful for people who already have a device, but do not know how to use the Internet.
- However, IVRS methods may have low efficacy. The training content requires some prior basic knowledge for it to be appealing (e.g. knowing how to use videos or a smartphone).
- An international organization could help to identify successful approaches to IVRS and work with NGOs and volunteer groups to tailor the content to the local environment.

F.3 Lack of relevance and attractiveness (of content)

The perceived relevance of the Internet is a major barrier in lower- and middle-income countries: many non-users see few reasons to connect or do not find content in their local languages. **Almost 25 per cent of the population** surveyed across Asia, Africa and Latin America **consider lack of relevance as a major barrier** to connecting to the Internet.¹⁶

The world's linguistic and cultural diversity is not reflected in the content and services available online, which is mostly in English (a primary content language on **60 per cent of the websites** involved in the survey¹⁷) and not locally relevant for lower- and middle-income countries. In African or Asian countries, even in cases when some content is available in one or two national languages, it does not satisfy the needs of the population, as thousands of dialects are spoken in these regions. In many cases the content is often simply translated without reflecting the cultural diversity of the targeted region.

The next billion people to start using online services mostly live in the rural areas of developing countries,¹⁸ including countries in sub-Saharan Africa and South Asia. These regions have very high in-country and in-region social, cultural, and linguistic diversity. In this context, there is a need to increase the attractiveness of the Internet in this population through:

- translation/production of content in local languages;
- support for development of Internet-based essential services; and
- support for local start-up ecosystems in order to develop locally relevant applications.

Potential contributors, such as governments, digital platforms, telecommunication operators, communities, and financing institutions can support these measures.

3

A

Translation/production of content in local languages

Contributors



Government



Digital content providers



Community



NGOs

Details

- According to a W3Techs survey, about 90 per cent¹⁹ of website content is currently provided in only ten languages, with the majority of these being European languages.
- Given that the unconnected people are from marginalized groups, such as rural, low/mid income and less-educated people, there is a need to support the creation and translation of content in local languages.
- **Governments** can lead this initiative by providing their e-government and e-health services in major local languages.
- Content should be also made available in video and audio format, and digital platforms should be supported to create such content.
 - It might not make business sense for platforms to develop content for all languages, and some minority groups may remain neglected.
 - Academics, NGOs and volunteers can be recruited to create/translate some content in major local languages.

Case study/illustration

Bindez, Myanmar

- **Bindez** (an acronym for **Burmese Index**) is an app-based news aggregator platform in **Myanmar** that supports local languages.
- Established in 2014, Bindez initially started as a search engine which allowed users to search in Burmese, and later evolved into an app-based platform because of the proliferation of mobile handsets in the region.
- The aim of Bindez is to provide locally relevant content to the Burmese-speaking population in Myanmar and Burmese diaspora abroad, through local content discovery and aggregation.
- In 2016, Bindez had more than 75 000 app downloads and 20 000 active users.

Key takeaways

- While Latin America benefits from higher language homogeneity, countries in sub-Saharan Africa and South Asia have high degrees of linguistic and cultural diversity and thus need to focus on ensuring universal suitability of content.
- NGOs and volunteer groups can help to translate content into local languages, but renowned international agencies should help coordinate their efforts and provide credibility to this initiative.

3

B

Support for development of Internet-based essential services

Contributors



Government



MNOs

Details

- Popular applications and social media will be less likely to motivate unconnected populations in the rural areas of lower- and middle-income countries to move online, compared to users in more developed countries – in particular when few of their contacts are already using them.
- Services that can improve standards of living in remote areas would be more likely to motivate people to use broadband Internet. For example, there was an increase in Internet adoption among citizens in rural Kenya when they wanted to enable the use of mobile money services.
- **Governments** and the private sector (including **MNOs**) should focus on providing essential services to help the socioeconomic development of citizens, such as:
 - **E-government:** basic citizen services, including property registration, birth/death/marriage certificates and licence renewal through online channels (for example, Turkey's YereiNet, a local government portal)
 - **E-health:** online medical consultation, medical records, and delivery of medicines (for example, Accuhealth in Chile)
 - **Mobile money:** utility bill payment facilities, mobile wallets, money transfer, and payment gateways (for example, the UPI stack in India).

Case study/illustration

eGovernment initiatives, India

- In 2011, the government of **India** launched an e-government portal, called **mSeva** (meaning 'mobile help'), which aims to deliver information to, and facilitate basic services for, consumers and businesses.
- This followed the digitalization of government services, the issuing of a digital ID (called the Aadhar) to all the citizens of India, and the linking of the Aadhar to citizens' mobile numbers and bank accounts.
- Through this multitude of measures, citizens have been able to use several government services online, including railway ticket purchases, utility bill payments, property registration, and access to the national health portal.
- The mSeva platform covers 1 624 government departments, sees about 300 million monthly transactions, and won a UN public service award in 2014.

Key takeaways

- Locally relevant services will motivate the unconnected population to go online.
- However, some of these services will require skills and financial resources from governments, while the digital security and privacy of citizens will also be significant challenges.
- International organizations can provide financial and technical assistance to governments. Also, certain linguistic and cultural inclusivity requirements could be made part of the conditions to receive funding for specific projects from international organizations.

3

C

Support for local start-up ecosystems in order to develop locally relevant applications

Contributors



Government



Digital content providers



MNOs

Details

- Mobile broadband adoption rates are often higher in countries that have vibrant digital ecosystems, offering highly localized and culturally relevant online applications, services and content.
- The development of local applications and digital services should be promoted by investing in local start-up and SME ecosystems and creating/supporting technology hubs and accelerators.
- These resources can support already booming sectors, such as the EdTech (digitalizing schools and digital courses), logistics (digitalization of supply chain) and e-commerce sectors.
- A lack of skilled individuals, mentors and facilities can be a hindrance in the development of such an ecosystem.
- Governments can provide financial resources and facilities; digital platforms, e-commerce players and MNOs can provide knowledge, mentorship and technology support to these local entrepreneurs.

Case study/illustration

Financing Innovative Start-ups and SMEs Project, Morocco

- In 2017, the World Bank and the International Finance Corporation (IFC) supported Morocco to create a fund of funds to invest in the local start-up ecosystem. Altogether, the World Bank provided a loan of USD 50 million to the government of Morocco to kick-start this fund.
- The objective of the project is to facilitate private funding for start-ups and SMEs. The project has three components:
 - Financing programme: this component will focus on supporting early-stage start-ups by connecting them with angel investors, and early-stage and venture capital (VC) funds.
 - Ecosystem support: this component will focus on stimulating innovative enterprises, by providing them with pre-seed grants, soft loans and entrepreneurship support.
 - Project management, coordination, monitoring and evaluation: this component focuses on the management of the fund, handling of all its administrative/operational tasks, and evaluating its performance.

Key takeaways

- This approach requires financial and human resources (mentorship) investment over a long period of time.
- However, start-ups in lower- and middle-income countries may struggle to get up to speed and implement global best practice. They may not have access to key VC business circles or may be seen as less attractive in the eyes of foreign funds if they do not have deep knowledge of the market in which they operate.
- International financial institutions and funds can help governments invest in relevant start-ups, while digital platforms/e-commerce players can provide mentorship and technology support to such start-ups (for example by sponsoring innovation incubators).

Endnotes

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- ¹⁶ GSMA, 2020, The State of Mobile Internet Connectivity
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- ¹⁹ W3Techs, 2020, Usage statistics of content languages by websites

Annex G

**Details of
recommendations
for an optimal
policy and
regulatory
environment**

Annex G. Details of recommendations for an optimal policy and regulatory environment

G.1 Infrastructure investment outlook

Increase local financing

Context
<ul style="list-style-type: none">• Issue: Certain countries lack a local ecosystem able to engage in sophisticated financing. In such conditions, infrastructure projects to close the connectivity gap cannot necessarily rely on local financing.• Governments should encourage local banks to provide adequate banking services, mobilize savings, and allocate financing to firms wanting to invest.

Guidelines
<ol style="list-style-type: none">1) Governments should support banks to start financing local infrastructure projects by offering guarantees.<ul style="list-style-type: none">• Local commercial banks are often small and risk-averse with excessive collateral requirements, making loan tenures too short for long-term projects.2) Governments need to help financial institutions develop their skills in project financing and financial instruments.<ul style="list-style-type: none">• Local financing options do not match infrastructure project requirements, mainly due to banks not having experience in project financing, identification, design, and negotiation with capabilities equal to the investors.• Other financial services such as bonds and guarantees are also limited and need to be encouraged and developed.3) Pension reforms should be undertaken as they could spur the development of capital markets, thus releasing substantial sums for investment. However, this would not be done specifically for the ICT sector but rather as an overall economic reform.

Case studies
<ul style="list-style-type: none">• India offers tax holidays and incentives to domestic investors in specific sectors, such as infrastructure.• The Government of Mauritius has partnered with major commercial banks to set up a private equity fund. The aim is to provide capital and help these banks invest in local SMEs. This fund specifically focuses on SMEs in the manufacturing, ICT, service, and agricultural sectors.

Facilitate foreign direct investment

Context

- **Issue:** FDI targeting telecommunication infrastructure contributes to the creation of value-adding jobs, an enhanced skill base, and more competitive domestic firms. Many developing countries struggle to attract FDI due to actual or perceived barriers or risks for foreign investors.
- Tailored policies are needed to remove barriers hindering the inflow of international investment and increase attractiveness for investors.

Guidelines

- 1) Authorities should improve transparency and simplify the process for investment registration and authorization procedures (e.g. digitalize the process, reduce the number of documents required, remove some preliminary authorizations).
- 2) Developing country governments should offer investment incentives to attract FDI. These can be in the form of tax incentives, fund transfer facilitation, subsidies, visa facilitation, etc., and may be attached to existing or future special economic zones within the country.
- 3) Governments should also update their overall regulatory framework to increase the level of certainty and protection of investors, and reform the domestic system for investment dispute resolution.
- 4) Investment liberalization in the infrastructure sector can also help attract investment, as many countries have strict limits in terms of foreign ownership of companies, either in general or specifically in the telecommunication sector.

Case studies

- Several countries have taken positive steps to attract foreign investors, including simplifying investment registration processes, incentivizing FDI, updating PPP legal frameworks and liberalizing investments in various sectors of the economy, as shown in Figure G.1.

Figure G.1: Sample measures taken by several countries to attract FDI

Type of measures	Sample case studies
Simplifying investment registration and approval procedures	<ul style="list-style-type: none"> • Kazakhstan has introduced a one-stop shop for the issuance of various permits and licences • The Republic of Korea has amended the FIPA (Foreign Investment Promotion Act) to simplify FDI registration procedures • Saudi Arabia has reduced the number of necessary documents and shortened its review period to reduce registration time for foreign investors • Ukraine has removed mandatory state registration of foreign investment
Incentivizing FDI	<ul style="list-style-type: none"> • Algeria offers tax incentives and the infrastructure needed for investment projects • Mauritius offers various tax incentives • Tunisia has removed profit taxes on major investment projects for ten years and given flexibility to transfer funds out of the country • The Ministry for the Economic Development of Italy created an agency (<i>Invitalia</i>) dedicated to promoting and facilitating FDI • The Lao People's Democratic Republic is attracting investment in specific industries and hardship areas through various tax incentives
Updating PPP legal frameworks	<ul style="list-style-type: none"> • Argentina has established a PPP legal framework and law to attract private investment in areas such as infrastructure and technology • Romania has enacted a new PPP law to determine the technical and economic indicators of a project on more flexible terms and provide more options for investment financing • Ukraine has amended its PPP law in order to increase legal certainty and provide more protection for investors in various PPP arrangements
Liberalizing investments in various sectors	<ul style="list-style-type: none"> • India has allowed 100 per cent FDI in the telecommunication sector, in the capital of asset re-construction companies • Argentina has eased some restrictions on the acquisition and leasing of lands in rural areas by foreign legal entities and individuals • The Philippines has allowed 100 per cent foreign ownership in lending, financing, and insurance-adjustment companies, and investment houses • Thailand has made foreign companies exempt from licensing requirements in some banking, financial services, and insurance (BFSI) activities

Source: World Investment Report - UNCTAD, 2017.

G.2 Licensing framework

Simplify licensing process, fees and conditions

Context
<ul style="list-style-type: none"> • Issue: In many countries, radio spectrum management lacks flexibility, resulting in extensive inefficiencies. In addition, the licensing of each technology and service (separate licensing being needed in some countries) creates inefficient and costly approval systems for regulators and operators. • Governments need to avoid excessive restrictions on licence conditions and increase process transparency. Also, spectrum-licensing conditions should focus on service and coverage goals rather than revenue.

Guidelines
<ol style="list-style-type: none"> 1) Regulators should grant multi-service, multi-technology¹ licences rather than service-specific ones. This allows for changes in the business model and the de-risking of investments. 2) Governments should make the application process and conditions for obtaining a licence fully transparent to remove uncertainty for investors. 3) Governments should trade full or partial mobile-spectrum licence fees for other conditions (such as coverage obligations) or recycle them back into the sector, as discussed in Section 3: the primary goal for policy-makers and regulators should be to maximize the use of spectrum rather than its short-term value.² <ul style="list-style-type: none"> • Too many governments consider spectrum as an asset whose full financial value to the seller should be realized immediately, rather than as a powerful means of expanding coverage and use. 4) Governments can consider offering moderate- to low-cost licences³ and simplify licensing process for community players willing to roll out network infrastructure in un- or under-served areas. 5) Governments should rethink the necessity of some restrictions attached to licences. Imposing a minimum capital investment, for example, constitutes an additional barrier to entry for small players.

Case studies

Licences and licensing procedures: the conditions and scope vary significantly across countries, with an increasing trend toward removing restrictions. While most countries have service-specific licences, more now have multiple-service licences or unified licences allowing all services, while also making it easier to obtain a licence, in some cases with a simple registration or notification:⁴

- Licensing fees and conditions: As part of a spectrum auction in 2012, the Brazilian telecommunication regulator (Anatel) included specific coverage obligations, such as connecting 30 per cent of Brazilian cities by June 2014, 60 per cent by December 2014, and 100 per cent by December 2015. The criteria for determining the winner included bringing the lowest costs to consumers.
- GSMA suggests⁵ that 4G mobile coverage would increase by 7.5 per cent if countries with the most expensive mobile spectrum had sold it at the global average price instead. High spectrum costs represent an especially large burden in developing markets where they are three times higher than in developed markets (once income differences are considered).
- The rules of spectrum licensing can also influence the level of competition in a country. For example, higher reserve prices in the 2013 3G auction in Bangladesh left 37.5 per cent of the spectrum unsold. This unsold spectrum is estimated to cost Bangladesh USD 1 billion per year in GDP growth.⁶

Optimize spectrum availability and planning

Context

- **Issue:** Some developing countries do not make efficient use of their spectrum assets. With wireless services outpacing wireline connectivity, these countries need to focus on current modes of spectrum management.
 - These governments need to revise frequency allocations to maximize the social and economic benefits of spectrum use.
- Effective spectrum policy should promote the roll-out of services and innovation.

Guidelines

- 1) Governments should make sufficient spectrum available to efficiently offer services – particularly low-frequency spectrum, which reaches farther (thus minimizing the investment needed for tower sites).
 - They should also implement spectrum refarming if they need to ensure low-frequency spectrum for 3G/4G for coverage purposes.
 - GSMA figures show that assigning spectrum two years earlier has the potential to increase 4G coverage by 11-16 per cent, and 3G by 20 per cent.
- 2) Governments should encourage dynamic spectrum allocation and sharing to maximize use.
- 3) Governments should allow flexibility in terms of the technology used.
 - This should facilitate potential technological upgrades and ensure the operators can deploy the most efficient technologies in each situation.
- 4) In particular, when aiming to connect the unconnected, some governments could offer free spectrum to entrepreneurs, communities, or operators to roll out networks in remote/unconnected areas. However, they must ensure that this does not distort or reduce the current or future levels of commercial investment; nor should it impede the introduction of new services or technologies, or create challenges for national security.

Case studies

- Spectrum refarming:
 - In France, spectrum refarming has been completely driven by operators. Thanks to technology-neutral licences, operators decide when to deploy new technologies on any spectrum band. All the major operators have already deployed 3G/LTE services on 800, 900 and 1800 MHz.
 - In 2015, Namibia allowed refarming of 2G spectrum (800 and 1800 MHz) for 4G, becoming the second country in sub-Saharan Africa to support 4G.
- Free spectrum licences:
 - In the USA, in the 3.5 GHz band (CBRS band), the FCC allows for the free use of the spectrum as long as the network users ensure that there is no interference with higher-priority licensed users.
 - The FCC offered free airwave licences to remote tribes, including American Indian tribes and Alaska Native villages, to deploy community networks.
 - Community networks in Argentina are exempt from licence fees, as long as the size of the village in which they operate in is less than 5 000 citizens.

Enable market entry⁷

Context

- **Issue:** Certain telecommunication markets lack competition, thus reducing affordability and consequent penetration.
 - Research by the ITU, Cisco and Broadband Commission suggests that competitive markets are associated with mobile broadband penetration levels up to 25 per cent higher than other markets.
- When competition is lacking or has proven to fail, authorities should implement procompetitive regulation and adopt a spectrum-licensing format that allows potential market entry.

Guidelines

- 1) Governments need to ensure that the liberalization of the market encompasses all key elements of broadband service delivery: international gateways, national and regional backbones, and access networks.
- 2) Authorities should lower barriers to entry to allow competition into the market.
 - One-off licence fees paid by operators to the government may appear attractive for countries' finances; however, reducing the amounts of such fees or waiving them altogether and consequently permitting more competition in the market is a good lever to boost broadband adoption.
- 3) The design of spectrum auctions can have a significant impact on market competition. Some auctions are designed in a way to discourage or even disable potential entry.
 - For example, offering as many spectrum blocks as existing MNOs would discourage any potential entry.

Case studies

- Colombia lowered barriers for new broadband entrants through new ICT legislation (law 1341 of 2009).
 - As a result, in 2014 there were five MNOs and six mobile virtual network operators (MVNOs) competing with each other in the Colombian market.
 - This competition led to a price decrease for entry-level broadband plans, from 5.8 per cent of GNI per capita in 2013, to 3.3 per cent in 2014.⁸

G.3 Network access regimes

Facilitate competition management

Context

- **Issue:** Certain developing countries' regulators lack the power and capabilities to make decisions within the legislative framework. Operators also complain that the dispute arbitration is not quick enough, thus making procompetitive regulations ineffective. This reduces incentives to invest, among other impacts.
- Regulators should safeguard against anticompetitive behaviour, while simultaneously encouraging infrastructure competition, where commercially viable. Protections are particularly important where an operator is state-owned, to provide assurance to investors that they will be treated fairly.

Guidelines

- 1) Governments should guarantee sufficient powers and independence for the regulator to take measures, solve disputes and decide sanctions.
 - The regulator should be able to take the necessary decisions within the legislative framework.
 - It should also be able to enforce decisions, arbitrate disputes between operators, and function quickly enough to be efficient.
- 2) Governments should arbitrate differently depending on the area:
 - Where the roll-out of several simultaneous networks is financially viable, the regulator should ensure competition at the wholesale/infrastructure level.
 - Where this is not the case, the regulator should ensure that operators offer wholesale services in a fair, non-discriminatory manner.

Case studies

- In Morocco, the Competition Council is responsible for prohibiting restrictive practices and the abuse of dominance, but the telecommunication regulator has been granted the power to enforce competition law in the telecommunication sector.
 - By using this power, the regulator imposed a fine of USD 340 million on the incumbent (Maroc Telecom) for abusing its dominance by obfuscating the unbundling of the local loop facilities.

Provide open access

Context

- **Issue:** In rural and remote areas where a network has already been rolled out, developing markets often lack fair wholesale offers. This represents a major barrier to entry and limits competition in the retail market.
- To enable affordable end-user access to broadband in these areas, governments should encourage services that are carrier-neutral and are provided on an open-access basis.

Guidelines

- 1) Governments should review and simplify open-access regulations to provide retail operators with access to existing telecommunication infrastructure such as copper, fibre, and towers.
- 2) In the context of open-access offers, regulators should monitor price, process, and product quality. Prices that are charged by the wholesale operator should be fair and reasonable, and process and product quality (delivery times, service-level agreements, product specifications, etc.) should be provided on an equivalent basis between retail providers (including the retail arm of the wholesaler, if relevant).
- 3) Regulators should consider imposing open-access regulations on infrastructure including backhaul, long-distance networks and towers, particularly if public assistance was provided for the deployment.
 - This would enable MNOs to use existing fibre networks to provide enough backhaul capacity and allow 2G-only sites to be upgraded to superior technologies.

Case studies

- A number of countries, notably Kenya, Nigeria, India, Indonesia, and Pakistan have deployed open-access networks in some regions, mostly through public or PPP funding.
 - For example, India rolled out 500 000 km of fibre in 2012 in rural areas, which is shared with operators on an open-access model.
- In Argentina, the public telecommunication company ARSAT is responsible for deploying and operating a nationwide core network, which it operates on the open-access principle for wholesale data.
- France has extended open-access regulation to include backhaul networks, while the UK made a similar amendment to include a long-distance backbone network.

Enable ICT infrastructure mapping and sharing

Context

- **Issue:** Lack of mapping of both existing ICT infrastructure and network roll-out plans does not allow an efficient use of infrastructure.
- Governments should:
 - promote the sharing of existing telecommunication infrastructure that would benefit operators through a reduction in roll-out costs; and
 - enable coordination in the roll-out of communications networks by telecommunication operators.

Guidelines

- 1) A telecommunication infrastructure register should be created and updated regularly. It should include an index of the location and characteristics of all infrastructure components of existing communication networks that are suitable for pooling.
- 2) The regulator should mandate open access to ducts and poles to reduce roll-out costs for alternative operators.
- 3) To enable future infrastructure sharing, the regulator should:
 - mandate technical requirements for new poles and antenna masts; and
 - mandate operators to offer the possibility of joint investment to other communications operators.
- 4) In non-commercially viable areas, regulators could require operators to roll out shared infrastructure with potential active sharing.
- 5) Regulators can also impose an obligation on real estate developers to set up passive infrastructure for telecommunication networks in all new dwellings.

Case studies

- Poland has developed an exhaustive telecommunication infrastructure inventory from scratch, over a period of nine years, which maps fixed and wireless networks, telecommunication hubs, co-location buildings, transmission systems and even buildings under a coverage area.
 - Similarly, Slovenia maps network termination points and fixed and wireless networks, while France also maps fixed networks.
- Malaysia had included infrastructure sharing as one of the licence conditions while issuing 3G mobile spectrum. Operators were expected to share infrastructure, including physical sites and network capacity.
- India has implemented the Universal Access Service Licence (UASL), which allows all the licence holders (operators) to share passive infrastructure across the country, without any further permits. Additionally, India allowed active sharing in this licence from 2008, and offered financial incentives for sharing.

G.4 Infrastructure deployment

Improve RoW and permit procedures

Context
<ul style="list-style-type: none">• Issue: Public and private permit acquisition is a key issue and major cost for operators. It involves multiple authorities, complicated procedures, and diverse fees. Further, some local governments regard permit acquisition fees as an important source of income, which can make permit charges inconsistent.• Governments should improve procedures for RoW and other permits, ensure that fees are fair, and only recoup administrative costs.

Guidelines
<p>With the help of local authorities, governments should simplify permit/RoW procedures in order to allow fast-tracking or reduce or remove the need to obtain civil work permits.</p> <ul style="list-style-type: none">• Central governments and regulators should help optimize local authority activity by setting timelines and criteria for assessing applications.• Relevant authorities need to improve process transparency and communication.

Case studies
<ul style="list-style-type: none">• In Germany, the government has the right to obtain RoW to public land free of charge from local authorities and transfer these to utility/telecommunication operators.• In Australia, carriers are permitted to install low-impact facilities (such as towers less than 5 metres high on buildings, underground cabling, and in-building connections) without obtaining approval from local governments.• In Greece, the regulator has assumed the role of a one-stop licensing body for approval of all permits for the deployment of base stations. The applications are filed through an electronic system.

Enable 'dig-once' policies

Context
<ul style="list-style-type: none">• Issue: Existing non-ICT infrastructure is not documented, and access is difficult. Thus, infrastructure companies do not coordinate their roll-out plans to optimize costs.• Governments need to document existing non-ICT infrastructure, foster cross-collaboration between infrastructure companies, and improve regulation for shared infrastructure.

Guidelines

- 1) Governments should map and document all types of infrastructure to simplify their sharing by:
 - Documenting current civil infrastructure that can be reused; and
 - Developing a database where all planned civil works should be published.
- 2) Relevant authorities should extend the open-access concept to non-telecommunication infrastructure of two types:
 - Public above-ground areas and networks such as railways, roads, waterways, and ports; and
 - Public utility suppliers' underground networks such as electricity, gas, district heating and wastewater systems.
- 3) Authorities should set requirements for new infrastructure to ensure shareability, such as mandatory coordinated roll-out of fibre-optic ducts while constructing roads, water supply networks, etc.

Case studies

- In 2014, the EU issued a directive on measures to reduce the cost of deploying high-speed communications networks, focusing on the following areas:
 - Providing telecommunication operators with access to the physical infrastructure of energy and other utilities (such as ducts, masts, and poles);
 - Ensuring efficient coordination of civil works; and
 - Equipping new buildings with broadband-supporting physical infrastructure (e.g. ducts and access points).
- Some examples of cross-sector infrastructure-sharing measures are summarized in Figure G.2.

Figure G.2: Sample examples of cross-sector infrastructure-sharing measures

Country/organization	Cross-sector infrastructure-sharing measures
PIDA (Programme for Infrastructure Development in Africa)	PIDA has announced a priority action plan to enable fibre deployment along energy transmission lines, railways, and roads
Germany	<p>The Federal Network Agency has introduced a centralized database, the 'Infrastructure Atlas':</p> <ul style="list-style-type: none"> • The Atlas maps all the existing infrastructure that can be used to roll out fibre • Data for this Atlas are collected from companies in the telecommunication, transport, and energy sectors • Access to this database is exclusively granted to operators and government agencies
Italy	In the measures for facilitating infrastructure roll-out, which form part of Italy's second national broadband plan, the government passed regulations for, and drove the implementation of, a nationwide cadastre (i.e. register) of all telecommunication and non-telecommunication infrastructure belonging to publicly owned entities or utility providers
Chad and Cameroon	The Doba-Kribi oil pipeline between Chad and Cameroon also involved fibre deployment
Kenya and Tanzania	Energy/power utilities are deploying and selling fibre capacity to MNOs and ISPs
Turkey and Poland	Infrastructure maps are available for sharing through a centralized database

Enable other deployment-facilitation measures

Context
<ul style="list-style-type: none"> • Issue: Regulations may cause additional costs and delays to civil works (e.g. design/ environmental constraints may be outdated and hinder development of the latest technologies).

Guidelines
<ol style="list-style-type: none"> 1) Governments should give operators more flexibility when designing their infrastructure to allow them to upgrade, modify and deploy more efficient networks, e.g. allow taller tower/ mast structures to improve coverage and avoid blind spots. 2) Governments should perform regular review and public consultation on civil works regulations to ensure efficiency of future roll-outs. 3) Governments should consider tax incentives, such as import duty exemptions for devices and equipment in the early period of network roll-out. 4) During the roll-out of a mobile network, governments should move away from individual base station approvals to notification mechanisms for base stations deployed (or, at a minimum, to batch approvals). 5) Governments may also explore the options and feasibility of funding allocations to empower smaller providers and implementers offering innovative business and programmatic (demand-focused) solutions and models, including, for example, community networks, rural providers, and small and medium-size ISPs.⁹

Case studies

- In the USA, the FCC has issued an order that exempts operators from the usual assessments for increasing the size of the telecommunication infrastructure (under some conditions).
- UAE has issued mandatory guidelines for the roll-out of fibre in new real estate deployments such as new residential and office towers, ensuring ready infrastructure to increase the shareability of fibre.
- South Korea changed its infrastructure tax calculation methodology (from tax per active element on a site to tax per site deployed) to incentivize operators to upgrade their sites with the latest technologies.
- Germany has set up a working group to review the possibility of allowing telecommunication infrastructure to be set up on public-sector properties owned by the Federal Government.

G.4.1 Summary of key issues and expectations addressed by policy and regulatory measures

Finally, the Working Group summarizes in Figure G.3 the main concerns addressed by regulatory and policy guidelines and the corresponding levers.

Figure G.3: Summary of key issues and expectations addressed by policy and regulatory measures

Key topics	Concern /issue	Regulatory/policy measure levers
Project stakeholders' contribution and involvement	Lack of initiative, leadership, and skills in setting up broadband projects in rural and remote areas	<ul style="list-style-type: none"> • Increase local financing • Facilitate foreign direct investment • Simplify licensing process, fees, and conditions • Enable market entry
	Operators are heavily indebted and need support to raise funds from traditional financial institutions	<ul style="list-style-type: none"> • Increase local financing • Facilitate foreign direct investment • Improve use of USAF
	Promote increased contributions from stakeholders already involved	<ul style="list-style-type: none"> • Increase local financing • Facilitate foreign direct investment • Improve use of USAF • Facilitate competition management • Provide open access
	Need to increase in-kind support from governments	<ul style="list-style-type: none"> • Optimize spectrum availability and planning • Improve RoW and permit procedures • Enable other deployment facilitation measures
	Need to solve Universal Service and Access Funds disbursement issues	<ul style="list-style-type: none"> • Improve use of USAF
	Need to improve attractiveness of infrastructure projects and appeal to new groups of contributors	<ul style="list-style-type: none"> • Increase local financing • Facilitate foreign direct investment • Improve use of USAF • Facilitate competition management • Provide open access

(continued)

Key topics	Concern /issue	Regulatory/policy measure levers
Demand -side issues	Low affordability of services	<ul style="list-style-type: none"> • Improve use of USAF • Simplify licensing process, fees, and conditions • Optimize spectrum availability and planning • Enable market entry • Facilitate competition management • Provide open access • Improve RoW and permit procedures • Enable other deployment facilitation measures
Operational hurdles	Excessive restrictions on licence conditions	<ul style="list-style-type: none"> • Simplify licensing process, fees, and conditions
	High licensing costs	<ul style="list-style-type: none"> • Simplify licensing process, fees, and conditions
	Low availability of spectrum	<ul style="list-style-type: none"> • Optimize spectrum availability and planning
	Public and private permits acquisition issues and high corresponding costs	<ul style="list-style-type: none"> • Improve RoW and permit procedures
	Regulators' lack of power and capabilities to take decisions within the legislative framework	<ul style="list-style-type: none"> • Facilitate competition management
	Inefficient dispute arbitration	<ul style="list-style-type: none"> • Facilitate competition management
	Lack of collaboration among MNOs and infrastructure providers more generally resulting in an inefficient use of existing infrastructure	<ul style="list-style-type: none"> • Enable ICT infrastructure mapping and sharing
	Lack of mapping of both existing ICT infrastructure and roll-out plans	<ul style="list-style-type: none"> • Enable ICT infrastructure mapping and sharing
	Lack of mapping of non-ICT infrastructure	<ul style="list-style-type: none"> • Enable 'dig once' policies
	Lack of backhaul and international connectivity	<ul style="list-style-type: none"> • Provide open access

Endnotes

- ¹ Taking into account the operational parameters needed to coexist with services in the same band and in adjacent bands.
- ² Social purpose licensing is an option for governments in unserved areas such as in Mexico: see <http://www.ift.org.mx/comunicacion-y-medios/comunicados-ift/es/el-ift-autoriza-la-primer-concesion-de-uso-social-indigena-para-prestar-servicios-de> and <https://www.eleconomista.com.mx/opinion/Telecomunicaciones-y-espectro-para-los-indigenas-20210101-0001.html>.
- ³ The low-cost assignments should not alter market dynamics (e.g. an entity getting low-cost spectrum competing in an urban area with an operator who has paid for it).
- ⁴ See subsections 1.5 and 2.8 of this report: <https://digitalregulation.org/wp-content/themes/digital-regulation-theme/images/pages/handbook-en.pdf>.
- ⁵ GSMA, 2019, The impact of spectrum prices on consumers.
- ⁶ GSMA, 2014, The cost of spectrum auction distortions.
- ⁷ When competition is lacking or has failed.
- ⁸ A4AI, 2014 Affordability Report.
- ⁹ The Working Group recognizes that such an endeavour requires careful consideration of vetting procedures for projects and providers, noting that with the current USAF disbursement models, allocations are made to a limited set of qualified and licensed telecommunications operators in the markets. Typically, such operators possess the requisite expertise and backhaul networks to extend coverage. However, examining the potential for smaller players may also provide an opportunity to accelerate roll-out, particularly in locales where such smaller players have the incentive to do so.

Annex H

Assessing project impact

Annex H. Assessing project impact

In previous sections, the Working Group discussed some of the models that can be used to enable and set up an infrastructure project. This section analyses the impact of such projects on the various stakeholders, as well as the impact on the target population, environment, and economy.

While connecting the unconnected is the driver for this study, potential contributors to infrastructure projects may have different goals. The financial impact of an investment is the traditional motivation for investors, while broader social and economic impacts may be important for other stakeholders.

H.1 Measuring the project impact

The Working Group identifies and examines four types of impact:

- effectiveness in connecting the unconnected;
- financial impact;
- social and environmental impact; and
- economic impact.

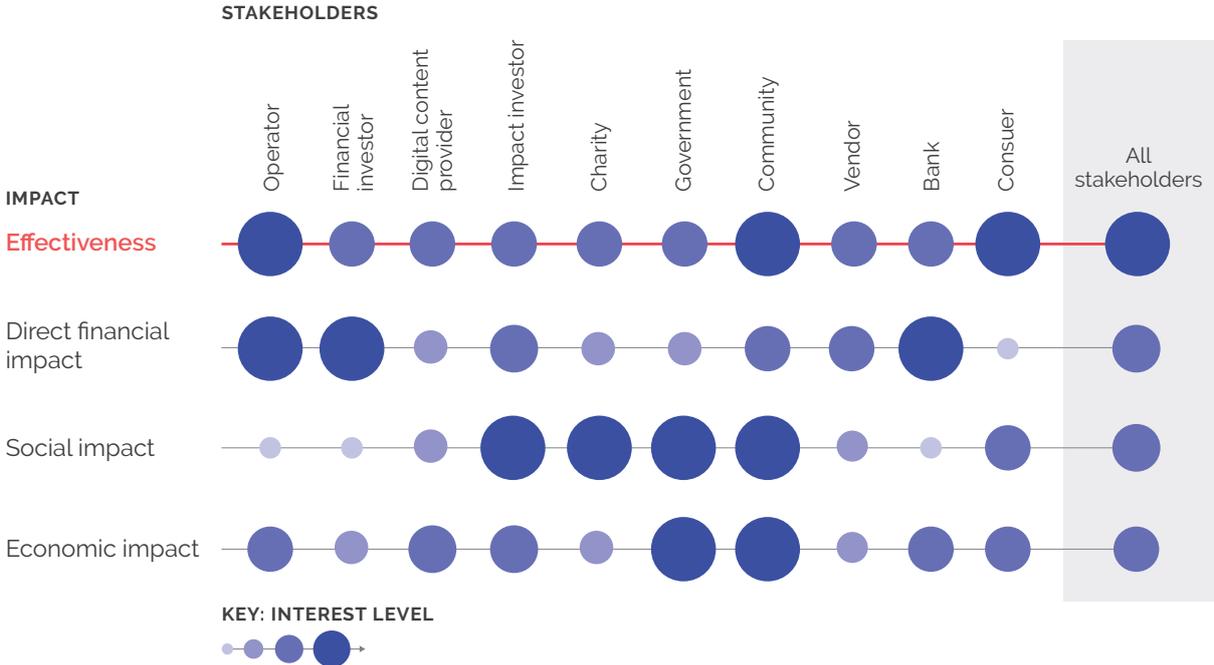
While the Working Group proposes to analyse these separately, there is an overlap as, for instance, connecting the unconnected is the driver for increasing the economic impact of Internet access. The types of impact are summarized in Figure H.1.

Figure H.1: Types of impact

Impact	Details
Effectiveness in connecting the unconnected	Measures the ability of the project to reduce the broadband connectivity gap, ¹ through the reduction of one or more of the three identified gap types (coverage, upgrade, and adoption)
Financial impact	Measures the financial success of a project through its cashflows and return
Social and environmental impact	Measures how the project impacts the social welfare of citizens (including the effect on their standard of living, health, and education level), as well as the environment in which they live
Economic impact	Examines the impact of the project on the overall economy of the area covered by the network

One of the challenges of sophisticated contribution models is the need to mobilize a range of different stakeholders (such as governments, operators, equipment vendors, development banks, communities, and donors) who all have different expectations. Figure H.2 is a qualitative representation of each stakeholder's level of interest in each type of impact; the size of the circle is proportional to their level of interest.

Figure H.2: Impact matrix



Source: Analysys Mason, 2021.

Figure H.2 indicates that stakeholders’ assessment of impact varies, **but all stakeholders are concerned with the project’s effectiveness in connecting the unconnected.** This also includes the Broadband Commission itself, for whom this effectiveness is the key concern. It is the most direct operational impact of project implementation, and the other types of impact depend on it. Effectiveness can therefore be used as the central point to develop support and agreement from all project stakeholders.

To manage expectations, the organizer of the project should agree with each stakeholder on a set of key performance indicators (KPIs) and monitor them during the project. Such indicators, if chosen correctly, would help to keep projects on track to meet their objectives, with the possibility of making adjustments as and when required. These indicators can provide feedback in terms of what measures have worked and can be replicated across other geographies/markets. Subsections H.1.1-H.1.4 below provide the KPIs that emerged as part of the Working Group’s analysis and interviews for each type of impact.

H.1.1 Effectiveness in connecting the unconnected

Effectiveness in connecting the unconnected population is the main goal of any broadband development project and a priority for every stakeholder. This is evident by the fact that the financial, social, environmental, and economic impacts of these projects are ‘by-products’ of how many people use broadband connections.

The importance of effectively connecting the unconnected is highlighted by the SDGs adopted by the UN, which sets a target of significantly increased access to ICT. SDG 9c strives to provide universal and affordable access to the Internet in LDCs. The ITU has set indicators for measuring progress on SDG 9c, which the Working Group have broadly adopted.²

To be effective, an infrastructure project should aim to reach its initially agreed performance indicators: to cover a certain population within an area in the context of a particular budget. These targets must be properly calibrated during the planning phase and are specific to each project. In terms of quality and affordability KPIs, there is already a significant amount of research available which has been approved by global institutions; this was also mentioned by interviewees in this study.

Below is a list of the indicators to capture this impact:

- **Broadband coverage:** percentage of population covered within the target area
- **Broadband penetration:** percentage of population covered that is also connected; this indicator not only depends on the infrastructure that has been rolled out, but also on the demand-enhancement measures that have been put in place
- **Quality of service:** this indicator mainly depends on the speed offered by the network, measured in Mbit/s. A recent report³ indicates a target speed of 3 Mbit/s by 2021 and 10 Mbit/s⁴ by 2030
- **Affordability of service:** this indicator is looked at from the perspective of customers' income
 - affordable broadband is defined by A4AI as providing 1 GB of data per month at a cost that is within 2 per cent of the average monthly income of an individual; this definition was subsequently also adopted by the Broadband Commission in 2018.

H.1.2 Financial impact

This study focuses on projects where the direct financial return is not sufficient to fully justify private investment and financing. However, when investors are involved, the projects should generate enough cashflow to meet or exceed investors' expectations and repay debts.

In addition, all of the contributors, including funders, are concerned about the financial sustainability of a project in the medium to long term. Once the initial investment has been made (including any grants or subsidies), the infrastructure should generate sufficient revenue to at least cover its costs.

A project's overall financial impact can be calculated by using some commonly accepted metrics, including:

- **Net present value (NPV):** NPV is used to determine the current value of all cashflows generated by a project, including the initial investment. A positive NPV means that an investment will give a return that meets or exceeds stakeholders' expectations, while a negative NPV means that it will not.
- **Internal rate of return (IRR):** IRR is the average annual rate of return that an investment is expected to generate (calculated as a discount rate that makes the project's NPV equal to zero). An IRR is considered attractive if it exceeds the cost of capital for a project/company.
- **Return on investment (RoI):** RoI is calculated as a ratio between the net profit and the cost of the project's investment. A positive RoI is desirable for an investment, while a negative RoI means that expenses are higher than revenues, resulting in a loss-making business.
- **Payback period:** this is the point in time when a project's cumulative return equals the cost of the investment. A project's annual average RoI starts to be positive after the payback period.

These indicators are calculated in advance (by using certain assumptions and parameters) to estimate the financial outcome and may be updated during the course of the project.

Different types of investors expect different levels of return. Figure H.3 provides illustrative examples of IRRs in a developed market to show how the expected return on investments can vary depending

on the investor. These rates are higher in developing countries based on increased risk or a perception of increased risk.

Figure H.3: Illustrative IRRs for different types of investors in telecommunication infrastructure projects in a developed market

Type of investor	Typically expected IRRs
Private equity	20-30%
Pension funds	7-15%
Operators	7-15%
Impact investors	Lower than 7%

H.1.3 Social and environmental impact

The social and environment impact of infrastructure projects corresponds to the relevant social and environmental changes that can be attributed to them. Social impact is difficult to predict and quantify and can be considered in various ways, depending on the stakeholders (public authorities, NGOs, project developers, etc.). Environmental impact, on the other hand, can be estimated more precisely.

Social impact

The social impact of broadband connectivity can be considered by examining its role in increasing citizens’ welfare. Internet adoption enhances access to information, entertainment, and public services such as education and health, and communication with family and friends. Broadband’s social impact has been highlighted during the COVID-19 pandemic – it has played a vital role in connecting people and mitigating the impact of physical restrictions.

To track the social impact of projects, experts use the following indicators:

- Standard metrics, such as:
 - **Quality of life index:** this measures the well-being of citizens, and is computed to capture various social indicators, e.g. wealth, employment, health, education, leisure, and social belonging in a society or region.
 - **Global Impact Investing Rating System (GIIRS):** GIIRS is an agency that provides environmental and social impact ratings for funds/companies by assessing their overall business model, operations, and fund management.
 - **Social return on investment (Sroi):** Sroi is the ratio of NPV of social and economic benefits due to the NPV of costs incurred (or capital invested) in achieving those values.
- Custom metrics (created by organizations to be more relevant to their particular context, and set during the development of a specific project), such as:
 - life longevity, health, safety and security, equal opportunities, participation, and influence.

As suggested by various experts, the social impact of broadband can be estimated by the cost of not being connected to the Internet or of entering the digital society at a late stage.

Other indicators to measure social impact that are of concern to the Broadband Commission include: employment rate, economic prosperity of the covered area, students connected, gender gap⁵ indicators, crime rates, social progress indicators, and poverty rate. The SDGs also include goals that are relevant to the adoption of broadband, along with indicators to measure progress

against the goals; to the extent that connectivity impacts the indicators, the relevant SDGs could also be used (see Figure H.4).

Figure H.4: ICT and SDGs

The Working Group strongly believes that the Internet can play a catalytic role in meeting the SDGs.

The Internet enhances information and knowledge sharing, fosters freedom of expression, improves collaboration, and empowers people to participate in economic and social life. It provides the underpinning platform for the growth of ICTs and for an emerging digital economy, in which production, distribution and consumption depend on broadband networks and services.

In many economies, broadband is already helping to promote business sectors, disseminating e-agriculture and e-health information, enabling distance learning and the use of mobile money, and establishing mechanisms to provide early warnings of natural and man-made disasters. Broadband is therefore a critical enabler of sustainable development, particularly in sectors such as agriculture, health, education, services and logistics where new technologies (such as 5G, artificial intelligence and the Internet of Things) will offer even more levers to address the SDGs.

In a previous report ('The Internet and Sustainable Development',⁶ 2015), the Internet Society (ISOC) outlined principles for stronger collaboration between Internet and social development stakeholders and called for urgent attention to incorporate ICTs more thoroughly in the implementation and monitoring of SDGs. ISOC has identified five areas where ICTs can help reach the SDGs:

- **Sustainable development policy:** *Greater integration is needed between the Information Society and sustainable development. Internet and development stakeholders need to build a stronger, and more realistic, understanding of ICTs' potential and the challenges constraining them in difficult development contexts.*
- **Implementing sustainable development:** *ICTs can support the delivery of every SDG. UN agencies have begun to identify synergies between the SDGs and WSIS [World Summit on the Information Society] Action Lines. Once the Goals are formally agreed, these can be translated into practical measures to support their implementation.*
- **Monitoring sustainable development:** *ICTs should play a crucial role in monitoring and measuring progress towards sustainable development, by facilitating data-gathering and analysis of indicators adopted for every Goal and target. UN agencies have begun work to identify these indicators. Indicators for ICTs and Internet themselves will be required, building on experience with targets for connectivity agreed at WSIS.*
- **Leveraging big data for development:** *High hopes have been expressed about big data's potential to improve understanding of development environments, facilitate evidence-based policymaking, and monitor development outcomes. Big data analysis also raises challenges concerning data privacy and security, while governments and other stakeholders will need to build capacity and resources to maximize its value.*
- **Sustainable multistakeholder approaches to developments:** *ICTs and Internet enable more effective collaboration between development stakeholders and new ways to manage programmes. Cooperation between government, business and other stakeholders is especially important because of the private sector's predominant role in networks and services.'*

In 2016, the global mobile industry was the first industry to voluntarily commit to the SDGs and it publicly reports on progress on a yearly basis through the SDG Industry Impact Report at the UN General Assembly.

Environmental impact

The environmental impact takes into account all the modifications of environmental characteristics generated by the project. Despite the increased electricity consumption driven by higher broadband usage, access to the Internet brings efficiencies to processes and systems across various sectors (including communications, commerce, manufacturing, information transmission and even electricity management). Examples of positive environmental impact include lower gas emissions thanks to reduced transportation and less consumption of paper.

To track the environmental impact of projects, the following metrics are widely used by organizations:

- **Emission of greenhouse gases:** net effect of broadband on the emission of greenhouse gases (measured in metric tons), and reductions in the emissions due to Internet efficiencies across other sectors.
- **Number of trees saved:** number in million trees per annum protected from destruction because of reduced paper consumption enabled by the digitalization of information and knowledge sources/transfer.
- **Ecological footprint:** measures the hectares of nature in a region that are required per capita to satisfy the needs of an individual in that region. The metric takes into account the natural resources (such as livestock, timber and land) consumed by humans on the demand side, and the productivity of nations' ecological assets (including lost productivity due to e-waste and CO₂ emissions) on the supply side. A lower ecological footprint per capita is desirable.
- **Environmental consciousness:** a population's awareness of environmental conservation in an area that is covered by broadband networks; this is measured through online contributions, pledges, and commitments towards the environment.

A recent report by the Climate Group⁷ predicts that adoption of ICT across various sectors can lead to a reduction of up to 15 per cent in the growth rate of greenhouse emissions. A previous study found that the wide adoption of broadband applications can achieve a net reduction of 1 billion tons of greenhouse gas over a period of ten years.⁸

H.1.4 Economic impact

Infrastructure investments help to solve several pressing challenges that a country's economy may face:

- In the near to medium term, such investments make a direct contribution to the economy, such as job creation arising from network roll-outs.
- In the long term, increased broadband adoption results in indirect contributions, such as through industries that generate added value due to broadband boosting productivity and efficiencies (e.g. in transportation and warehouse management).⁹
- Increased productivity and efficiencies lead to increased production and thus revenue for enterprises, which results in a boost to GDP and potentially higher salaries and household incomes.

Experts and Working Group members mentioned in the interviews that the positive impact of broadband is also visible at the community level, as it is possible to kickstart an entire digital economic ecosystem in a community thanks to a broadband network. This was observed in several case studies, such as Zenzeleni Networks¹⁰ in South Africa and community networks in Georgia.¹¹

KPIs that can be used to track the economic impact of broadband include the following:

- **Impact on GDP growth:** this indicator measures the impact of broadband infrastructure projects by examining the additional GDP growth since the increased adoption of broadband.
- **Revenue increase of companies:** this could be measured by examining the increase in the revenue of companies covered by a broadband network over a predefined base year. The likely revenue increase can be attributed to the productivity and efficiency gains due to the adoption of broadband.
- **Employment rate:** the impact of broadband can be also measured by looking at the change in the employment rate of a region over a predefined base year. The impact is visible through both direct job creation (for constructing broadband networks) and indirect job creation, which is likely to be greater and more long-lasting.
- **Average household income:** household income is the combined gross income of all of the people in a household or place of residence. Average household income over a region is calculated by dividing gross income over a region by the total number of households in that region.

Research suggests that connectivity impacts are visible across entire economies:

- An ITU study suggests that a 10 per cent increase in broadband penetration is likely to have a positive impact and could raise economic growth by **0.3-1.4 per cent (worldwide)**¹²
- A study by Antonio García Zaballos and Rubén López-Rivas finds that a 10 per cent increase in broadband penetration brought about an average increase of **3.2 per cent in per-capita GDP** across 26 Latin American and Caribbean countries¹³
- Doubling broadband speed across 33 OECD countries increased **GDP growth by 0.3 per cent** on average, as presented in a study by Bohlin Rohman in 2012¹⁴
- A study of 48 US states by the Brookings Institution showed that for every 1 per cent increase in broadband penetration, the **employment rate increased by 0.2-0.3 per cent every year**¹⁵
- Upgrading the average broadband speed per household from 0.5 Mbit/s to 4 Mbit/s in Brazil and China would **increase household income by 4.7 and 2.2 per cent** respectively¹⁶
- A 10 per cent increase in broadband penetration in India would lead to a net revenue increase **of 42 per cent in the healthcare sector, 36.8 in education, and 18.8 in transport**¹⁷

H.2 Impact of contribution models

Numerous contribution models were presented in Sections 3 and 4, while various methods to measure project impact were explored in subsection H.1. It is now reasonable to ask whether it is possible to evaluate the models based on their impact. The Working Group conducts this assessment based on the four types of impact discussed in H.1.

H.2.1 Effectiveness of contribution models in connecting the unconnected

The investing, financing, and funding models described in this report have been designed to facilitate infrastructure roll-out. They are therefore mainly aimed at addressing the upgrade and coverage gaps, while the demand measures discussed in Annex A address the adoption gap. However, service affordability issues can also be tackled by the appropriate infrastructure set-up, either directly supporting affordability or by allowing for more efficient and less costly networks, when coupled with appropriate procompetitive measures. An example of direct support is the demand subsidization model, while an example of the second type of mechanism is the roll-out of a national backbone capable of decreasing the backhaul prices of existing networks, thus allowing more users to find the service affordable.

Every project is designed to achieve its effectiveness targets independently from the selected contribution model. However, some models are more scalable than others and can have a broader implementation on a global scale, which would in turn mean greater effectiveness. So it is important to consider scalability, i.e. whether the model can be used at a large scale to achieve the Broadband Commission's goals.

Figure H.5 summarizes the contribution models, their effectiveness in bridging each of the three types of connectivity gaps, and their potential scalability.

Figure H.5: Contribution models, their effectiveness in bridging connectivity gaps, and scalability



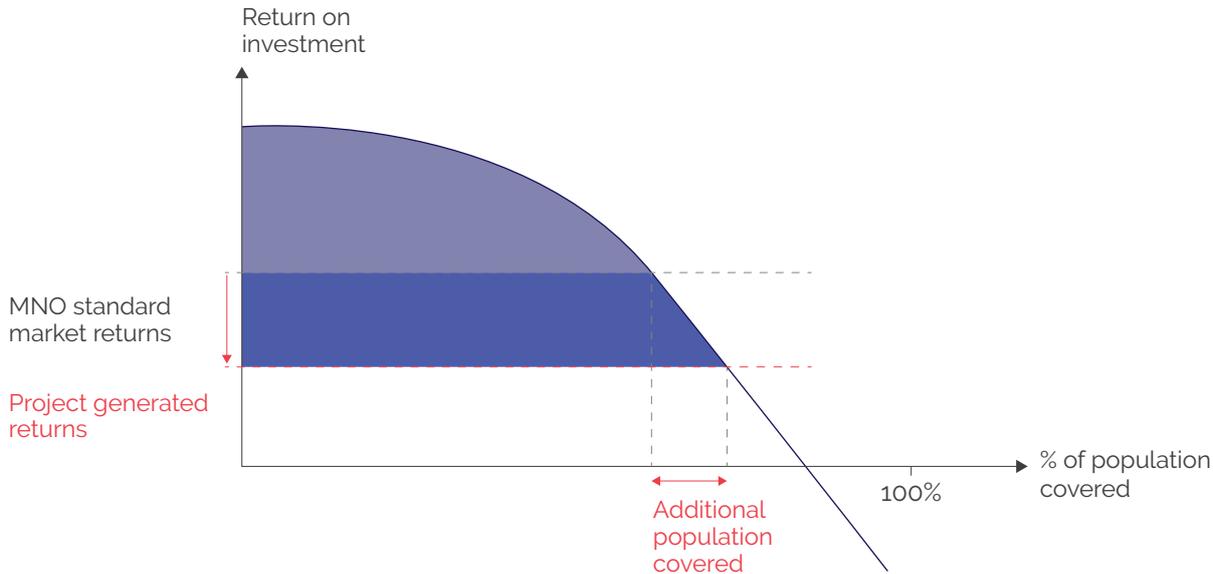
While bridging the adoption gap is not the focus of the above models, the demand subsidization model removes uncertainty on the revenue side while also directly addressing service affordability, thus increasing adoption. Other models, such as demand aggregation, dual deployment and community collaboration, can also help to reduce the adoption gap. However, despite being effective in some specific contexts, these models are not very scalable.

H.2.2 Financial impact of contribution models

In the last few decades, the traditional capex investment model has been effective in addressing both upgrade and coverage gaps. However, as discussed in Section 2, the limits in the commercial viability of most of the rural and remote areas highlight the model's lack of scalability.

As illustrated in Figure H.6, when a telecommunication network extends its reach to cover rural and remote areas, the expected returns decrease. Non-commercially-viable areas are those where the expected return decreases below the minimum market requirements. A network's financial return (and, similarly, a telecommunication infrastructure project's return) is closely linked to the effectiveness in covering the area, and thus to the decisions taken in the design phase. In simpler terms, there is a trade-off between the network's financial return and its effectiveness in terms of additional population coverage.

Figure H.6: Project return variation with population coverage



Demand-side projects and policy and regulatory measures are capable of shifting the RoI curve upwards, so that the same RoI can be achieved while covering a larger population. The implementation of these measures would increase the effectiveness regardless of the chosen model.

Figure H.5 allows the identification of four models that have sufficient scalability to extend broadband coverage: the PPP model, the infrastructure mutualization model, the loss guarantee model and the blended financing model.

Blended financing appears to be the best candidate to reduce the scalability issue: this model would consist of a mix of funding sources from contributors with different but compatible interests (investors, financiers, and funders). It would combine market-return-seeking investments with funds

that expect a lower-than-market return, and with public subsidies (generating no return). The effect of such blending is a return that is more modest than what capital markets or private investors would seek, making lower project returns acceptable and thus enabling the 'shift' illustrated in Figure H.6. In summary, the blending scheme allows an increase in the reach of a telecommunication infrastructure project, while maintaining the keen interest of investors and multiplying the availability of funds with respect to public subsidies only.

An appropriately designed global fund is one of the innovative models which can be harnessed to reach this specific objective, as discussed in Section 6.

H.2.3 Social, environmental, and economic impact of contribution models

The social, environmental, and economic impacts of contribution models are directly dependent on the effectiveness in connecting the unconnected (i.e. the first type of impact analysed in subsection H.1.1). This is because these impacts depend on an increase in broadband penetration. While the chosen contribution model will directly impact the increase, the model does not create direct social, environmental, or economic impacts. Therefore, given this indirect impact, the Working Group does not analyse these impacts separately for each contribution model.

Endnotes

- ¹ As defined in subsection A.3 (estimation of the funding gap).
- ² We have excluded one indicator, 'proportion of individuals using the Internet', because those individuals may not be using the broadband provided by this project. See 'A thematic list of ICT indicators for the SDGs', available at https://www.itu.int/en/ITU-D/Statistics/Documents/intlcoop/partnership/Thematic_ICT_indicators_for_the_SDGs.pdf.
- ³ Broadband Commission, 2019, Digital Moonshot for Africa, available at <https://www.broadbandcommission.org/insight/broadband-for-all-a-digital-infrastructure-moonshot-for-africa/>.
- ⁴ This is the target speed specified for 'good quality of broadband service'. This required speed is expected to increase over time to compensate for the increase in data-heavy broadband use (e.g. high-definition videos).
- ⁵ This is further detailed in the 2020 A4AI report 'Achieving universal and affordable access by closing the digital gender gap', available at <https://a4ai.org/achieving-universal-and-affordable-access-by-closing-the-digital-gender-gap/>.
- ⁶ See <https://www.internetsociety.org/wp-content/uploads/2015/06/ISOC-ICTs-SDGs-201506-Final.pdf>.
- ⁷ The Climate Group, 2008, The Smart 2020: Enabling the low carbon economy in the information age.
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- ¹⁰ Association for Progressive Communications, Zenzeleni Networks NPC, available at <https://www.apc.org/en/member/zenzeleni-networks-npc>.
- ¹¹ ISOC, 2017, Clearing a path to the outside world - Using grit, planning and time to bring internet to Tusheti.
- ¹² ITU, 2017, Working Together to Connect the World by 2020.
- ¹³ García Zaballos and López-Rivas, 2012, Socioeconomic Impact of Broadband in Latin American and Caribbean Countries.
- ¹⁴ Bohlin and Rohman, 2012, Does Broadband Speed Really Matter as a Driver of Economic Growth? Investigating OECD countries.
- ¹⁵ Crandall et al., 2007, The Effects of Broadband Deployment on Output and Employment: A cross-sectional analysis of US data.
- ¹⁶ ITS, 2013, Impact of Broadband Speed on Household Income: Comparing OECD and BIC.
- ¹⁷ GSMA and Analysys Mason, 2011, Assessment of Economic Impact of Wireless Broadband in India.

Annex I

Sources for this study

Annex I. Sources for this study

This study is based primarily on two types of sources: expert interviews and a literature review.

Interviews were conducted individually with 29 representatives of several organizations, either members of the Broadband Commission or external experts suggested by the commissioners. Figure I.1 provides the full list of organizations and their representatives who kindly provided their inputs and opinions.

Figure I.1: List of interviewees

No.	Organization	Status	Representatives
1	SAMENA Council	Co-chair	Bocar Ba Imme Philbeck
2	Zain	Co-chair	Scott Gegenheimer Andrew Arowojolu
3	Digicel	Working group member	Denis O'Brien Kieran Meskell (formerly of Digicel) David Geary
4	Bharti Airtel	External expert	Daddy Mukadi
5	Novartis Foundation	Working group member	Lucy Setian
6	Global Partnerships Forum	Working group member	Amir Dossal
7	The World Bank	Working group member	Doyle Gallegos
8	World Childhood Foundation	Working group member	Joanna Rubinstein
9	Intelsat	Working group member	Jose Toscano Stephen Spengler
10	GSMA	Working group member	Oliver Chapman Kalvin Bahia Belinda Exelby Genaro Cruz
11	América Móvil	Working group member	Carlos M. Jarque
12	Smart Africa	Working group member	Lacina Koné Thelma Efua Quaye Kayihura Chantal Osman Issah
13	KT Corporation	Working group member	Oh Byungki
14	ISTIC	Broadband Commission	Dato Lee
15	Orange	Broadband Commission	Marianne Brunat
16	UNICEF	Broadband Commission	Christopher Fabian Sophia Farrar
17	UNICEF's deputy director	Broadband Commission	Charlotte Petri Gornitzka

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No.	Organization	Status	Representatives
18	ITU	Broadband Commission	Alex Wong Troy Etulain Anna Polomska
19	ITU Director	Broadband Commission	Doreen Bogdan-Martin
20	UNCTAD	Broadband Commission	Torbjorn Fredriksson
21	Nokia	Broadband Commission	Brahim Ghribi
22	Ericsson	Broadband Commission	Mikael Bäck
23	Office of the High Representative for the LDCs, LLDCs and SIDS (UN-OHRLLS)	Broadband Commission	Fekitamoeloa Katoa Utoikamanu Miniva Chibuye
24	OECD	External expert	Verena Weber
25	World Economic Forum	External expert	Isabelle Mauro Jonathan Bahmani Rodrigo Arias
26	IFC	External expert	Carlo Maria Rossotto
27	Bill Tai	External expert	Bill Tai
28	Blue Orange Capital	External expert	Amer Baig
29	IADB	External expert	Antonio García Zaballos

The inputs from the interviews were complemented by a literature review exercise which aimed to shortlist 19 of the most relevant reports out of a pool of 82 report reviews. The shortlisted reports are listed in Figure I.2, categorized by topic in line with our framework for the analysis. These studies are referenced throughout the report when their inputs are used.

Figure I.2: High-priority reports reviewed for this project

No.	Report	Publisher	Year	Topic
1	Giga Connect	ITU and UNESCO	2020	Demand, Infrastructure set-up, Policy enablers, Impact
2	Connecting Humanity	ITU	2020	Demand, Impact
3	World Bank Group's Mobilizing Finance for Development (MFD) approach	World Bank	2020	Infrastructure set-up, Policy enablers, Impact
4	Connecting Africa through Broadband: A strategy for doubling connectivity by 2021 and reaching universal access by 2030	Broadband Commission	2019	Demand, Infrastructure set-up, Policy enablers, Impact
5	State of Broadband 2019	Broadband Commission	2019	Demand, Impact
6	Closing the Coverage Gap: How innovation can drive rural connectivity	GSMA	2019	Demand, Infrastructure set-up, Policy enablers, Impact
7	A New Deal: Investing in our common future policy recommendations to close the broadband gap	Broadband Commission	2018	Demand, Infrastructure set-up, Policy enablers
8	Financing a Forward-Looking Internet for All	World Economic Forum	2018	Infrastructure set-up, Policy enablers, Impact

(continued)

No.	Report	Publisher	Year	Topic
9	Innovative Business Models for Expanding Fibre-Optic Networks and Closing the Access Gap	World Bank	2018	Demand, Infrastructure set-up, Policy enablers, Impact
10	Rural Connectivity Innovation Case Study: Using light sites to drive rural coverage - Huawei RuralStar and MTN Ghana	GSMA	2018	Demand, Infrastructure set-up, Policy enablers, Impact
11	Internet for All: An investment framework for digital adoption	World Economic Forum	2017	Infrastructure set-up, Policy enablers, Impact
12	Investment Strategies for the Deployment of Broadband and Access to the Digital Economy	Analysys Mason (for ITU)	2015	Infrastructure set-up, Policy enablers, Impact
13	Broadband Funding Mechanisms	CAF	2014	Infrastructure set-up, Policy enablers, Impact
14	Digital Inclusion	GSMA	2014	Demand, Infrastructure set-up, Policy enablers, Impact
15	Universal Service Fund and Digital Inclusion for All	ITU	2013	Infrastructure set-up, Policy enablers, Impact
16	A Universal Service Fund Survey (on behalf of GSMA)	GSMA	2013	Infrastructure set-up, Policy enablers, Impact
17	Telco Business Models at a Crossroads: Towards new ways of financing super-fast broadband	Intereconomics	2012	Infrastructure set-up
18	Guide to Broadband Investment	Analysys Mason (for the European Commission)	2011	Infrastructure set-up, Policy enablers, Impact
19	Investment Models	European Commission	N/A	Infrastructure set-up

Figure I.3 provides a summary of the additional list of reports reviewed during this project. Readers can also consult publications from the Education Commission, Dr Liesbet Steer (IFFED), UNESCO, and the ITU Secretariat.

Figure I.3: Additional list of reports reviewed

No.	Report	Publisher	Year
1	ICT Regulation Toolkit	InfoDev.in and ITU	NA
2	Global Risks Report	WEF	2021
3	The Inequality Virus	Oxfam	2021
4	Meaningful Connectivity – Unlocking the full power of Internet access	A4AI	2020
5	How Effective is Investment Promotion? Firm-level evidence	IDB	2020
6	Barriers to Invest in Last-Mile Connectivity	Connectivity Capital	2020
7	Roadmap for Digital Cooperation	Broadband Commission	2020
8	The State of Mobile Internet Connectivity	GSMA	2020
9	2025 Capex Outlook (2020 update): The \$1 trillion investment	GSMA	2020
10	Financing in the 5G Era	GSMA	2020
11	Collaborative Models for Infra Investment in 5g in Cities	WEF	2020
12	The Impact of 5G: Creating new value across industries and society	WEF	2020

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No.	Report	Publisher	Year
13	Digital Development Joint Action Plan and Call for Action: COVID-19 crisis response	WEF	2020
14	Accelerating Digital Inclusion in the New Normal: Playbook	WEF (and BCG)	2020
15	The Impact of Facebook's Connectivity Initiatives in Sub-Saharan Africa	Analysys Mason for Facebook	2020
16	The Impact of Facebook's Connectivity Initiatives in ASEAN	Analysys Mason for Facebook	2020
17	Compendium of Digital Government Initiatives in Response to the COVID-19 Pandemic	UNCTAD	2020
18	Smart Broadband 2025	Smart Africa	2020
19	Action Aid Taxing the Digital Economy	Actionaid	2020
20	Digitalized Economy Taxation Development Summary	KPMG	2020
21	Network Industries Quarterly	Florence School of Regulation	2020
22	Filling the Infrastructure Investment Gap	IDB	2019
23	Fundamental Principles in PPP Laws: A review of Latin America and the Caribbean	IDB	2019
24	How to Solve the Investment Promotion Puzzle	IDB	2019
25	Affordability Report 2019	A4AI	2019
26	Connecting the Unconnected - Tackling challenges to cost-effective broadband Internet in rural areas	FIT	2019
27	Innovations in Spectrum Management	ISOC	2019
28	Digital Economy Report	UNCTAD	2019
29	Report on Digital Infrastructure Policy and Regulation in the Asia-Pacific Region	ITU	2019
30	State of Broadband 2018	Broadband Commission	2018
31	Achieving Universal Connectivity in Least Developed Countries	ITU	2018
32	Public-Private Partnership Databases	IDB	2018
33	The Connectivity Frontier	IDB	2018
34	Unleashing Community Networks: Innovative licensing approaches (Internet Society)	Internet Society	2018
35	Tax Challenges Arising from Digitalisation - Interim report 2018	OECD	2018
36	Community Networks in Latin America: Challenges, regulations and solutions	ISOC	2018
37	Meeting Europe's Connectivity Challenge: The role for community networks	ISOC	2018
38	Lowering Barriers to 5G Deployment	Analysys Mason	2018
39	Social Impact Investment	OECD	2018
40	World Investment Report 2017 - Investment and digital economy	UNCTAD	2017
41	Connecting the Unconnected: Working together to achieve Connect 2020 Agenda targets	ITU	2017

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No.	Report	Publisher	Year
42	Accelerating Access to Digital Services: Policy and regulatory initiatives to incentivize infrastructure investments	IDB	2017
43	Mobile Broadband Expansion: Eliminating barriers for mobile broadband expansion at sub-national level	CAF	2017
44	How to Overcome Barriers for Mobile Broadband Deployment	CAF	2017
45	Operators' Digital Transformation - Unlocking EUR 15 billion through partnerships with OSPs	Analysys Mason	2017
46	Lowering the Barriers to Telecoms Infrastructure Development	Analysys Mason	2017
47	Supporting the Creation and Scalability of Affordable Access Solutions: Understanding community networks in Africa	ISOC	2017
48	Working Together to Connect the Next 1.5 Billion by 2020	ITU	2016
49	White Paper on Broadband Regulations and Policies in Asia-Pacific - Facilitating faster broadband deployment	ITU	2016
50	Two to Tango: Public-Private collaboration for productive development policies	IDB	2016
51	Accelerating Connectivity through Public Wi-Fi	Analysys Mason	2016
52	Towards a Billion Connected People: Investment, innovation, and partnerships to accelerate 'Digital India'	Analysys Mason (for Google)	2016
53	Connecting the Unconnected: How to bring Internet to everyone	Telefónica	2016
54	Business Models for the Last Billion	SSG advisors, USAID	2016
55	Broadband in Asia-Pacific: How investment, partnership and policy are driving a success story	Analysys Mason	2015
56	Broadband Policy Briefing Paper	Analysys Mason (for the Broadband Commission)	2015
57	State of Connectivity - A report on global Internet access	Analysys Mason (for Facebook)	2015
58	Addressing the Tax Challenges of the Digital Economy	OECD	2015
59	Connecting the 4.4 Billion Unconnected	Huawei	2014
60	How to Promote High-Impact Innovations through Social Innovation Funds	IDB	2013
61	Case Studies on PPP Arrangements for Telecommunications	World Bank	2012
62	Financing Mechanisms for Information and Communication Technology for Development	UNCTAD	2010
63	Internet Matters: The Net's sweeping impact on growth, jobs, and prosperity	McKinsey Global Institute	2011

Contributors

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30	Education Commission	External expert	Lisbet Steer

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