

**EXPANDING THE
TELECOMMUNICATIONS
OPERATORS ECOSYSTEM
POLICY AND REGULATORY
GUIDELINES TO ENABLE
LOCAL OPERATORS**



Redes por la
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Executive summary

The COVID-19 pandemic has brought to the fore the critical importance of universal affordable access to internet connectivity. Despite efforts from the different stakeholders, universal affordable access is far from being achieved, as existing national operators focus their efforts on using technologies and building infrastructure in more profitable areas. This means sparsely populated areas, where household incomes are low and infrastructure costs are high, remain unconnected. As a result, there is an emerging consensus regarding the need to do something different from “business as usual”.

Based on recent changes in the telecommunications industry, this paper analyses solutions for the expansion of the telecommunication operator ecosystem. In particular it focuses on the *local operator* as the actor to fill the coverage and usage gaps left by national operators, in a complementary way. These *local operators* serve a much smaller and more distinct market, with deeper knowledge of their users, able to provide more affordable connectivity when it comes to serving a local market. *Local operators* can be further classified into two types: *commercial* and *social-purpose*. In the telecommunications world, the latter manifests itself in the form of cooperative self-provision of connectivity infrastructure. Examples of *local social-purpose operators* are consumer cooperatives, community-owned networks, and even municipal networks whose interest is to meet the communication needs of their communities.

There are a variety of barriers that *local operators* face because most regulatory frameworks have been designed primarily to cater for national operators deploying their own infrastructure. This paper presents an analysis of solutions that have been implemented by regulators worldwide to address the key barriers faced by *local operators*, grouped in the following categories:

- Operator licensing
- Spectrum licensing and fees
- Backbone and backhaul infrastructure
- Financial support
- Access to network information.

Regulatory interventions identified in these five areas are making it more possible for *local operators* to provide coverage in places where there was none, as well as considerably more affordable telecommunication services in areas where users do not have the disposable income to afford the data packages available from national operators.

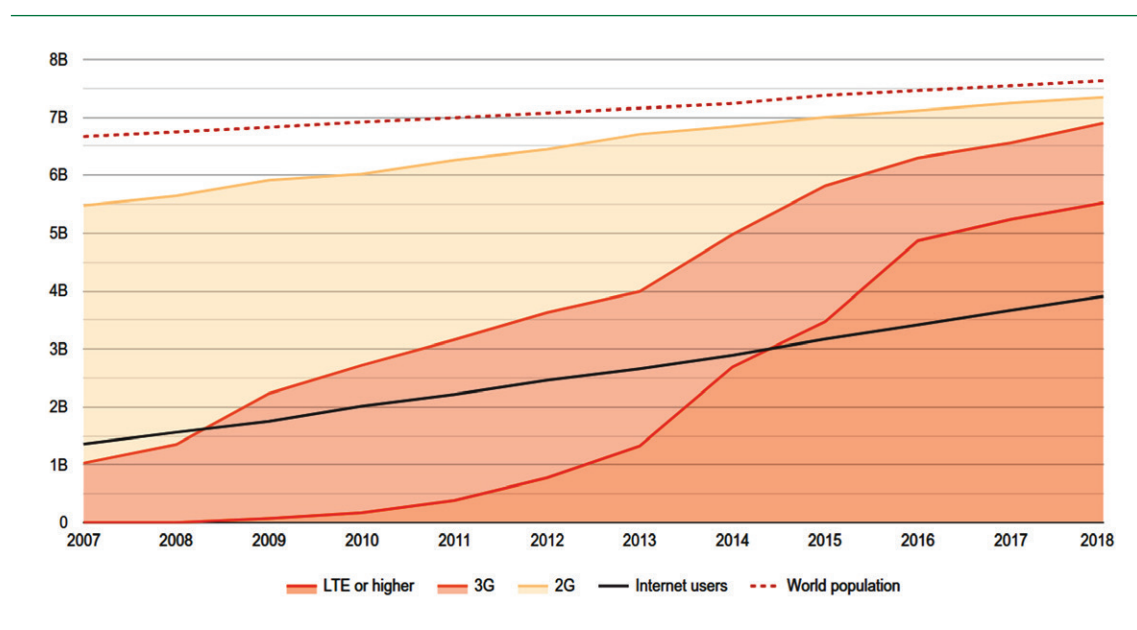
Based on this evidence, this paper concludes with a set of recommendations for regulators wishing to create a more enabling environment for *local operators* by replicating and localising the best practices included in this document.

The need for innovative approaches to closing the rural access gap

Mobile network and internet uptake growth is slowing

The benefits of internet access have reached half the world's population,¹ primarily driven by extension of mobile coverage from 2G to 3/4G networks worldwide, as illustrated in Figure 1. However, as Figure 1 makes apparent, recent declines in the rate of growth of mobile networks are also increasingly being acknowledged.²

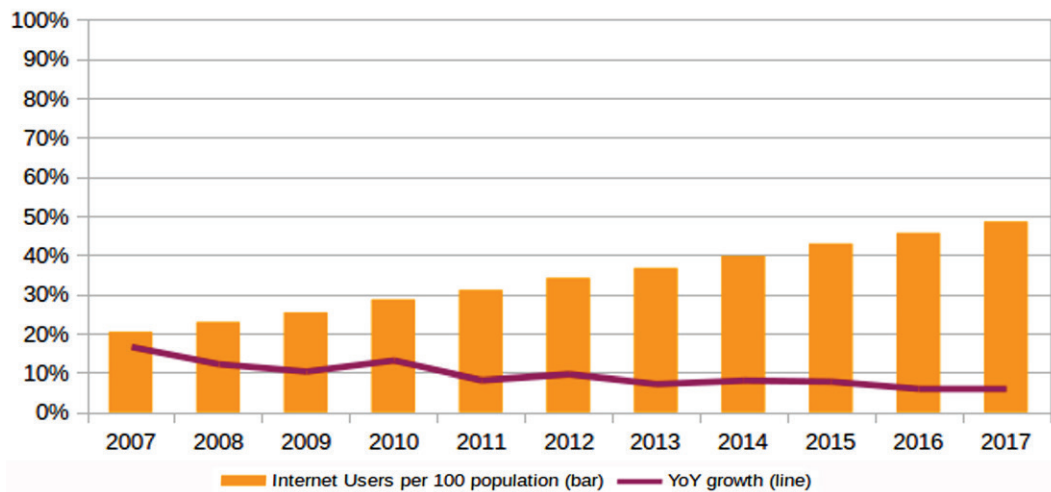
► **FIGURE 1.** Number of people worldwide covered by mobile network, by technology, 2007-2018³



As can be seen in Figure 2, the ratio of internet users globally shows a similar decline in the rate at which it grows, suggesting that current connectivity strategies may not be as effective in connecting the remaining half of the world's population, given that they are located in more economically and geographically challenging environments.

1. ITU News. (2018, 6 December). New ITU statistics show more than half the world is now using the Internet. <https://news.itu.int/itu-statistics-leaving-no-one-offline>
2. ITU. (2019, 22 September). Global internet growth stalls and focus shifts to 'meaningful universal connectivity' to drive global development. <https://www.itu.int/en/mediacentre/Pages/2019-PR16.aspx>
3. <https://unstats.un.org/sdgs/report/2019/goal-09>; although there is a more updated version of this SDG report at <https://unstats.un.org/sdgs/report/2020/goal-09>, the graph does not maintain the same format and does not allow appreciating the decline in the growth rate, so we prefer maintaining that of 2019.

► **FIGURE 2. Growth of internet users in the world⁴**



Affordability is also a key barrier to meaningful access.⁵ The UN Broadband Commission’s target for affordability – 2% of monthly gross national income (GNI) per capita for entry-level broadband services⁶ – is not being met in many income groups. In Africa, the poorest 20% of the population (roughly 200 million people) would have to spend on average 20% of their per capita income for only 500 MB of data, which is insufficient to make robust use of the internet, such as for educational or entertainment purposes. In contrast, the average household data consumption in the United States in 2016 was 190 GB per month.⁷

Coverage and affordability challenges are also compounded by demand-side barriers, such as the gender gap,⁸ limited relevant available content, limited literacy (both

4. Numbers calculated using data from ITU database 2018. The database for 2019 was consulted but did not have data for this variable for most countries.

5. “Meaningful internet access” should be construed as pervasive, affordable connection (of sufficient quality and speed) to the internet in a manner that enables individuals to benefit from internet use, including to participate in the public sphere, exercise human rights, access and create relevant content, engage with people and information for development and well-being, etc.; irrespective of the means of such access (i.e. whether via a mobile or other device; whether through private ownership of a device or using a public access facility like a library). See: IGF Best Practice Forum on Gender and Access. (2016). *Overcoming barriers to enable women’s meaningful internet access*. https://www.intgovforum.org/multilingual/index.php?q=filedepot_download/3406/437

6. <https://broadbandcommission.org/Documents/publications/wef2018.pdf>

7. Engebretson, J. (2016, 26 September). iGR: Average Monthly Broadband Usage is 190 Gigabytes Monthly Per Household. *Telecompetitor*. <https://www.telecompetitor.com/igr-average-monthly-broadband-usage-is-190-gigabytes-monthly-per-household>

8. Structural, social and economic barriers hinder the ability of women and people with non-binary gender identities to access the internet. The ITU suggests that there are about 250 million fewer women online than men, and that the problem is more pronounced in developing countries. See: EQUALS Research Group. (2019). *Taking Stock: Data and Evidence on Gender Digital Equality*. United Nations University. <https://www.itu.int/en/action/gender-equality/Documents/EQUALS%20Research%20Report%202019.pdf>

basic and digital) and low ownership rates of internet-capable devices.⁹ The sum of these barriers is more acute in rural areas. In low and middle income countries in 2018, measures of the “rural mobile internet gap” indicated that those living in rural areas were 40% less likely to use the mobile internet than those in urban areas. In Sub-Saharan Africa, it is 58%.¹⁰

Challenges of connecting rural areas

Providing telecommunications access to rural areas is subject to a number of constraints, including:

- Low per capita income, as local economies may be based largely on subsistence agriculture, farming, fishing, etc.
- Scarcity or absence of complementary basic infrastructure, such as electricity, water and access roads.
- Low population density and distance between population clusters.
- Underdeveloped social services, such as health care and education.
- Lack of adequately educated and trained technicians, and high potential for those trained to migrate to more lucrative prospects in urban areas.
- High cost of backhaul internet access (where it exists at all).
- Harsh environments leading to failure of electronic communication devices.

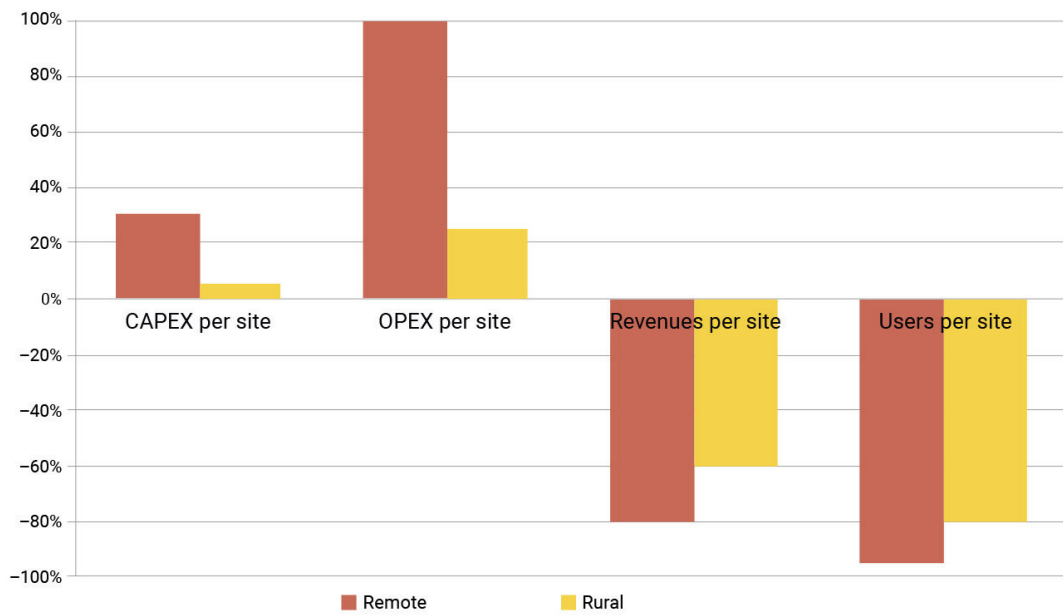
The combination of these factors, as shown in Figure 3, reveals how the revenue potential from people in sparsely inhabited rural areas may be insufficient to justify infrastructure investment by national operators to extend connectivity at an affordable price. The GSMA estimates that at least 3,000 active users are necessary to justify the cost of installing a traditional GSM base station.¹¹

9. Philbeck, I. (2017). *Connecting the Unconnected: Working together to achieve Connect 2020 Agenda targets*. ITU. https://broadbandcommission.org/Documents/ITU_discussion-paper_Davos2017.pdf

10. GSMA. (2019). *The State of Mobile Internet Connectivity Report 2019*. <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/GSMA-State-of-Mobile-Internet-Connectivity-Report-2019.pdf>

11. Internet Governance Forum. (2016). *Policy Options for Connecting and Enabling the Next Billion(s): Phase II*. https://www.intgovforum.org/multilingual/index.php?q=filedepot_download/3416/412

► **FIGURE 3. Economic differences in rural and remote sites vs. urban deployments**¹²



These barriers mean that commercial telecommunication companies have considerable difficulty in justifying the costly investments for providing infrastructure to rural communities. This is typified by the observation from mobile operator MTN Nigeria’s senior manager of Access Transmission Planning, Tolulope Williams:

Compared to our physical sites, of which we have over 13,000, our rural telephony network is less than 300 sites. In a lot of countries, it’s actually the government that drives the broadband initiative to rural areas; operators need a lot of incentives in order to begin offering services. If you’re going into a rural area, you’re not going to make money.¹³

Limited private-sector interest in rural areas has resulted in various national policy strategies for addressing the usage gap, often in the form of universal access funds designed to incentivise investment in rural areas. However, many of these have met with limited success because they have centred around subsidising the capital costs for national commercial operators to provide coverage in these areas, while usage has not proved sufficient to sustain the operating costs of mobile network operators. For example, in Mozambique, the universal service fund paid for construction of 103 base

12. GSMA. (2017). *Unlocking Rural Coverage: Enablers for commercially sustainable mobile network expansion*. https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/07/Unlocking-Rural-Coverage-enablers-for-commercially-sustainable-mobile-network-expansion_English.pdf

13. Developing Telecoms. (2016). *Last Mile Connectivity in Emerging Markets*. <https://www.developingtelecoms.com/images/reports/last-mile-connectivity-dt-report-final.pdf>

stations for operators in underserved regions, yet three quarters of these are now non-operational as of 2018.¹⁴

In conclusion, it appears that new models are likely to be necessary to ensure affordable universal coverage, as is evident from the continued usage gap resulting from the lack of affordable services, the plateau in the number of mobile subscriptions, and the low or non-existent levels of access in rural areas in most developing countries (and even in many developed ones), despite 35 years of GSM mobile network development.¹⁵ Rural roll-outs have in fact recently slowed, or even ceased, as operators focus their investments on more profitable 4G/LTE and now 5G installations in competitive urban markets. Between 2019 and 2025, it is expected that mobile operators across the world will spend USD 1.1 trillion on capital expenditure (CAPEX) and more than 75% of that will be 5G-related.¹⁶ 5G is a technology designed for high density of users and devices in urban environments, with an expected uptake of 3% of users in Sub-Saharan Africa by 2025.¹⁷ In contrast, it is estimated that only USD 450 billion would be required to connect the next 1.5 billion people,¹⁸ but the lack of progress towards this goal suggests that *national operators* are not able to close the rural access gap alone.

Leveraging change in the telecommunications industry

As a result of the current telecom market's limited progress in meeting needs for universal affordable connectivity, alternative strategies for reaching the unconnected are increasingly gaining attention. The ITU's Last Mile Connectivity Toolkit¹⁹ describes many of these strategies that could contribute to providing universal and affordable connectivity by leveraging the available infrastructure and taking advantage of the continued evolution of the technologies combined with new market models. Key changes to the telecoms sector that are enabling these new models include:

- **Disaggregation of the value chain in the telecoms industry.** A key reason there are opportunities for new entrants is that the value chain of telecommunications networks is becoming less vertically integrated and more disaggregated. Previously, in order to enter a market, an operator needed to invest in international, national,

14. Based on conversations with the regulatory agency.

15. <https://www.gsma.com/aboutus/history>

16. Shabelnikova, A. (2020, March). 2025 CAPEX outlook (2020 update): The \$1 trillion investment. *GSMA Intelligence*. <https://data.gsmaintelligence.com/research/research/research-2020/2025-capex-outlook-2020-update-the-1-trillion-investment>

17. GSMA. (2019). *The Mobile Economy: Sub-Saharan Africa 2019*. https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/03/GSMA_MobileEconomy2020_SSA_Eng.pdf

18. UN Broadband Commission for Sustainable Development. (2016). *Working Together to Connect the Next 1.5 Billion by 2020*. https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.16-2016-PDF-E.pdf

19. <https://www.itu.int/md/D18-SG01-C-0362/en>

middle-mile and last-mile infrastructure. Today many countries allow competition in each of these segments.

- **The spread of fibre optic backbone infrastructure.** This is now changing access markets in many areas in developing countries, opening up possibilities for new players who can deliver targeted, localised, more affordable solutions to unserved populations.
- **Growing availability of low-cost high-speed satellite connectivity.** New generation high throughput satellites (HTS) offer broadband speeds to end-users at prices that are closer to terrestrial broadband services,²⁰ and the emergence of middle earth orbit (MEO) satellite operators, such as O3B, has reduced latency times to about 150 ms round-trip, making it comparable in many cases with terrestrial internet offerings. There are also a number of companies launching low earth orbit (LEO) constellations, such as SpaceX's Starlink, which promise to further reduce the cost of connectivity in remote areas.
- **High altitude platforms.** Added to the above are a handful of initiatives that seek to deploy aerial infrastructure within the earth's atmosphere. These high-altitude platform stations/systems (HAPS), such as Alphabet's (Google) Loon project, float hundreds of 4G balloons in the upper atmosphere, essentially acting as a very tall mast. Loon is testing communications services in western Peru, and has recently entered into partnership with Telkom Kenya to deliver access in rural areas.²¹
- **Commodity last-mile technologies.** Innovations in low-cost electronic networking technologies have created new possibilities for affordable access. Riding on increasingly pervasive terrestrial fibre infrastructure, low-cost Wi-Fi is now provided by a wide variety of different types of providers. By 2022 about 550 million Wi-Fi hotspots worldwide are expected,²² as many have realised that wherever there are high-speed backhaul networks, the marginal cost to add Wi-Fi access points is minimal. In addition, IMT (mobile) base stations using software-defined radios can now be deployed for a fraction of the cost of traditional mobile networks, based on technology from a variety of start-ups in this space such as NuRAN, Fairwaves, Facebook's Open Cellular and others. The result is that it is now possible to put up a mobile network serving hundreds of users for less than USD 5,000.
- **New middle-mile/backhaul technologies.** Point-to-point (PtP) links can be operated in many different bands, but the 11 GHz band is attracting considerable

20. For example, YahSat's YahClick internet service offers service in 10 countries in Africa at prices starting at USD 60 per month for 2 Mbps.

21. Gagliardi, N. (2020, 7 July). Google's Loon launches service in Kenya. *ZDNet*. <https://www.zdnet.com/article/google-loon-launches-service-in-kenya>

22. Cisco. (2020, 9 March). Cisco Annual Internet Report (2018–2023) White Paper. https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html#_Toc953332

interest, driven by a new generation of devices covering this band both from new microwave companies, such as Mimosa and Cambium, as well as companies historically focused on licence-exempt bands, such as Ubiquiti and Mikrotik. Similarly, equipment in licence-exempt mmWave bands – 24 GHz and 60 GHz – makes possible fibre-like wireless connections. Dynamic spectrum technology is also gaining interest, benefiting from the opportunistic use of spectrum frequencies on a secondary basis where the frequency in question may be already assigned on a primary basis to another organisation.

These developments suggest that it may be technically and economically possible to provide affordable access to communications, wherever there are supportive policy and regulatory environments for new and complementary access models for rural access.

Expanding the operator ecosystem

Telecommunications policy and regulatory frameworks have traditionally taken a “one size fits all” approach. Conventional views of the universal access challenge treat the economy as a single entity but, in reality, the economies of the rural poor are significantly different from comparatively wealthy urban economies. In this section, we present an alternative view, and accompanying evidence, to explain how different economies complement each other in addressing the access challenge.

The economic contribution of small and medium-sized enterprises (SMEs) is already well recognised by governments around the world. Most countries have developed policies to encourage their growth. Adding to the important role of the informal sector in rural areas, the economic contribution of small business is substantial. In the United States, for example, SMEs employ 47.5%²³ of all private sector employees. In South Africa, SMEs contribute 34% towards gross domestic product (GDP)²⁴ and provide employment to about 60% of the labour force, while in Mexico, they contribute 50% of the GDP and provide employment to 70% of the labour force.

Local SMEs serve a much smaller and more distinct market. Being in direct contact on a day-to-day basis with their customers, they typically have a much deeper knowledge of and are able to serve them in a manner that a global company cannot. The economics of local SMEs are also different to those of global companies. Some elements are more expensive, but many are cheaper when it comes to serving a local market. Similarly, a *local commercial operator* is not burdened by having to maintain

23. U.S. Small Business Administration. (2018). *Frequently Asked Questions About Small Business*. <https://www.sba.gov/sites/default/files/advocacy/Frequently-Asked-Questions-Small-Business-2018.pdf>

24. African News Agency. (2018, 18 June). Successful economy lies in small businesses. *The Citizen*. <https://citizen.co.za/news/south-africa/1957487/successful-economy-lies-in-small-businesses>

expensive headquarters in the capital city or outlets in shopping centres and does not require costly marketing campaigns.

As yet, few communication regulators have fully recognised the potential value of *local operators*, and government policies that empower them are largely absent, with few economic or social incentives to local investment in local communications infrastructure and services.

Beyond global and local economies, there are also communal efforts to satisfy basic needs. In the telecommunications world, this manifests itself in the form of cooperative self-provision of connectivity infrastructures. These *local social-purpose operators* take a number of different forms, such as a cooperative, a not-for-profit company, or a civil society organisation.

Examples of existing *local operators*, both *commercial* and *social-purpose*, can be found in the section on “Impact of a more diverse operator ecosystem”, below.

Diversity of types and sizes of operators that complement each other

We can visualise efforts to provide affordable connectivity for all as a glass jar that we are trying to fill up with stones, where the volume of the jar represents all those we would like to connect and the stones represent our efforts at connectivity.²⁵ Our current focus on national and multinational communications operators can be visualised as filling the jar with large uniformly shaped stones which have the virtue of each occupying a significant amount of the jar and of having a common, readily understandable shape. Yet our jar can only hold three or four of these stones and while the jar may look full at this point, these stones ultimately occupy less than half of the volume of the jar. This is analogous to the current situation in the telecommunications industry in that most countries cannot sustain more than three to four *national operators*, yet half of the world remains unconnected to the internet.

Imagine then, that we might use smaller stones to represent *local operators* providing connectivity. Even though the jar appeared to be full, there are spaces for many of them. Yet again, the jar appears to be full, but if we fill it with water, it becomes evident that there is still a significant amount of volume that can be filled by even smaller stones of varying size and shape, symbolising the diversity of types of *local operators*, and their capacity to adapt to the gaps left by the market.

25. Idea originally conceived by Steve Song.

► **FIGURE 4.** Seeing the challenge of affordable access for all through the metaphor of a jar of stones



Not all *local operators* are driven by the market economy. There are also *social-purpose operators* that have a significant role to play in filling the “underserved” spaces remaining in the jar. Examples of these are consumer cooperatives, community-owned networks, and even municipal networks whose interest is to meet the communication needs of their communities in geographies where commercial services are either unavailable or unaffordable.

It is worth noting that smaller stones do not diminish the size of the larger stones, but occupy spaces that do not fit within the scope of the larger operators. Additionally, *local operators*, both *commercial* and *social-purpose*, increase traffic for large-scale operators through overall network effects.

Local social-purpose operators

Although the business models of *national operators* and *local commercial operators* providing connectivity are fairly well understood, less is known about *local social-purpose operators* and their role in providing affordable access to communication in places where the commercial operators see no interest. Among them, a number of community-owned networks have demonstrated their ability to contribute to closing the rural access gap. This is being increasingly recognised in the outcomes of many international forums on connectivity gaps, as shown in Annex 1.

One of the recurring features of communities that have organised to produce their own services, such as connectivity, is the use of shared infrastructures, that are open and adapted to local conditions, which can enable and facilitate the development of

added value and lower-cost service offerings. Modern data networks typically follow a three-layer model,²⁶ and opportunities for sharing can occur in each of the different layers. These collaboratively built and operated infrastructures tend to follow a common property or common-pool resource model of governance. Another recent study which identified community-owned networks in 43 countries around the world²⁷ underscored the diversity in models of participation, organisation, operation, technologies used and business models. In general, the guiding strategy of these networks is based on the principles of cooperation, which are often characteristic of economic activity in subsistence economies.

Aside from providing affordable access, recent research²⁸ highlights other additional economic and social benefits resulting from local ownership of these “first-mile” networks. One of the most evident benefits is the contribution to the local economy, creating local employment, efficiencies in local markets or helping local markets diversify.²⁹

More generally, working to build and operate the network on a collaborative basis can support improved community cohesion and help to build technical self-reliance, which in turn can reduce the cost of maintenance by minimising transport costs and downtimes. Similarly, local ownership of the network also provides an inherent form of security against theft and vandalism. These networks hold the potential for more deliberate inclusion of women in the network, and for better local accountability, often also prioritising accessibility and digital skills for marginalised groups and people with disabilities. A particularly important feature is that most of these networks usually do not have traffic-based charges, which leads to more extensive use, and more local content sharing as there is little to no cost for hyperlocal on-net traffic.

In summary, access technologies have changed significantly in recent years, becoming less expensive while increasing in capabilities. This change has put powerful access technology within the reach of small organisations and community-owned operators, both non-profit and for-profit. As a result, *local operators*, and, in particular, those community-owned networks appear to have considerable potential to sustainably fill connectivity gaps while supporting local socioeconomic development. However, policy and regulation have yet to catch up with these developments in most countries. As a result there are as yet relatively few examples of these types of *local operators*.

26. Baig Viñas, R. (2019). *Development and management of collective network and cloud computing infrastructures*. Universitat Politècnica de Catalunya. https://dsg.ac.upc.edu/sites/default/files/dsg/phd_roger_20190930.pdf

27. Finlay, A. (Ed.). (2018). *Global Information Society Watch 2018: Community Networks*. APC and IDRC. <https://www.giswatch.org/community-networks>

28. Bidwell, N., & Jensen, M. (2019). *Bottom-up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South*. APC. <https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure>

29. An equivalent to that is open-source software and tools, such as GNU/Linux, as an infrastructure for the development of cheaper and better internet services.

Creating an enabling environment for local operators

This section explores the different elements of an enabling policy and regulatory framework for complementary access models so they contribute to connect the unconnected.

Operator licensing

A more inclusive telecommunications ecosystem can be achieved through the creation of a tiered licensing framework that caters for the needs of operators of all sizes. Such a framework would include categories for *local commercial operators* and SMEs, which would be associated with a more modest fee structure and lower administrative burden. Additional exemptions may be extended to *local social-purpose operators* and those wishing to provide affordable access in localised geographical areas and communities and on a not-for-profit basis.

Table 1 offers a summary of the major challenges identified, the proposed solutions, and the countries where they have been implemented.

► **TABLE 1. Licensing challenges and solutions**

CHALLENGE	SOLUTION	EXAMPLE
Licences of national/ regional scope	More granular approach to licensing	South Africa, Brazil, Kenya
High initial and annual fees and onerous compliance requirements	Licence exemptions for private networks and non-profits	Brazil, Mexico, South Africa
No specific licence for community networks	Create specific licences for community networks or fit them into existing exemptions	Argentina, Uganda
High administrative burden on regulator	Simple authorisation or notification system	Canada, New Zealand, United States, European Union

As a general trend, regulators are moving away from technology-specific or application-specific licences to neutral “unified” licences that accommodate a range of players and services. This matches the trend toward converged communications technologies and services based on internet protocols. The most common type of unified licensing framework is a licence for infrastructure (the physical assets, e.g. cables, base stations, routers, earth stations, etc. that make up the network) and a different licence for

services (bandwidth services, packet switching, VoIP, streaming media, etc. delivered over the network). Although the separation of physical infrastructure from the services that run over them is a welcome trend, it is still not the norm in most countries. Instead, technology-specific licences (e.g. mobile and fixed wireless) are still widely used. In addition, where unified licences are required, these are usually only available as national or perhaps regional licences. Following the analogy of the jar of stones, most licensing frameworks only allow for the biggest rocks. These licences also come with initial financial and administrative requirements that are beyond the capabilities of even *local commercial operators*. There are some notable exceptions such as in Brazil,³⁰ Kenya³¹ and South Africa, where **sub-national licensing frameworks** exist, which cater for the middle-sized stones in the jar analogy, but still do not fully meet the needs of the smallest, village-level operators. For example, the regulatory frameworks may establish lower licence fees, but they maintain many of the administrative requirements that apply to larger operators. In some countries the installation and maintenance of telecommunications infrastructure can only be carried out by licensed professionals. In others, a business plan and a technical plan signed by an engineer registered by a professional association are required.

While there is merit to ensuring sufficient quality in deployments, this may need to be balanced against the barriers to entry for *local operators* in the early start-up phase. In relation to licence compliance, in South Africa, for instance, licensees have to follow a compliance calendar containing 22 reports, in English, throughout the year.³² Licensing fees and administrative overheads are often accompanied by many other financial requirements, which make it even more challenging to provide affordable communications to economically poor populations. For instance, it is common that operator licences include obligations to contribute to a universal service and access fund. This adds additional burdens on *local social-purpose operators* which can be counterproductive, given that their main goal is addressing digital exclusion.

One response to this problem is the use of **licence exemptions**. This is the approach in some countries for private network operators which engage in the self-provision of services to their constituency, e.g. a corporation connecting their offices nationally; a cooperative or a non-profit community network that self-provides to its members. For these situations, the designation of “private network” exists in many regulatory frameworks and is exempted from an infrastructure licence.³³ In service provision licences there are exemptions based on specific criteria such as not-for-profit operation

30. <https://www.anatel.gov.br/institucional/component/content/article?id=1737>

31. <https://ca.go.ke/wp-content/uploads/2018/03/New-Market-Structure-Under-The-Unified-Licensing-Framework-January-2016.pdf>

32. <https://www.ellipsis.co.za/compliance-calendar>

33. Baca, C., Belli, L., Huerta, E., & Velasco, K. (2018). *Community Networks in Latin America: Challenges, Regulations and Solutions*. Internet Society. <https://www.internetsociety.org/resources/doc/2018/community-networks-in-latin-america>

or providing services to underserved regions, such as in South Africa and Mexico. In Nepal, there is a de facto exemption, with the rural internet service provider (ISP) licence fee set at USD 1.³⁴

SOUTH AFRICA: ENABLING A MORE GRANULAR APPROACH IN THE LICENSING FRAMEWORK

In South Africa there are two categories of licences regarding electronic communications which are (i) Electronic Communications Service (ECS) and (ii) Electronic Communications Network Service (ECNS) licences. Both ECS and ECNS can be either Individual or Class. Individual ECNS (IECNS) are national in scope and Class (CECNS) are regional, e.g. District Municipality.³⁵ The initial registration fee for a Class licence is USD 815.³⁶ If both CECS and CECNS are needed then the fees total USD 1,630. There is also a renewal fee of USD 408 after 10 years. If a *local operator* builds infrastructure in two different municipal districts, then two different CECNS are required.

Additionally, if any of the licences generate revenue, the holder needs to pay an annual fee based on revenues. For the lowest group (annual turnover of USD 0 to USD 3,000,000),³⁷ the annual fee is 0.15% of revenue. In addition, holders of class and individual licences pay 0.2% of annual turnover as a contribution to the Universal Service and Access Fund (USAF). ECS licence exemption from all these fees and compliance requirements is possible for different reasons, among them “a person or company who provides ECS on a non-profit basis”, as well as ECNS exemptions for a Private Electronic Communications Network (PECN).³⁸

Countries with developed markets are increasingly moving toward a **simple authorisation system** which permits service provision without need for a special licence or an exemption. This includes the United States,³⁹ Canada,⁴⁰ New Zealand⁴¹ and the countries of the European Union, among others, where operating a wireless ISP with licence-exempt (typically Wi-Fi) spectrum is the same as starting any other business, and no specific telecommunications operator licence is required.

34. http://nepalpolicy.net.com/images/documents/Information%20and%20Communication/Regulations/1997_Telecommunication%20Rules.pdf

35. Electronic Communications Act. South African Government Gazette, 490(28743), 2006.

36. The fee in ZAR in 2019 was 12,760: <https://www.icasa.org.za/legislation-and-regulations/fees-for-service-licences-2019>

37. The smallest bracket is from ZAR 0 to 50,000,000: <https://www.ellipsis.co.za/wp-content/uploads/2013/03/General-Licence-Fees-Regulations-2012.pdf>

38. Regulations Regarding License Exempt Electronic Communication Networks. South African Government Gazette, (31289), 2008.

39. <https://www.fcc.gov/obtaining-license>

40. <https://crtc.gc.ca/eng/comm/telecom>

41. <https://www.mbie.govt.nz/science-and-technology/it-communications-and-broadband/our-role-in-the-ict-sector/telecommunications-and-broadcasting-network-operators/register-as-a-network-operator>

In other countries, steps have been taken to more formally recognise the role and importance of community networks. In Uganda and Argentina, a **new operator licence category specifically for community networks** has been established.

CREATING A COMMUNITY NETWORKS LICENCE: ARGENTINA AND UGANDA

Countries which have created particular categories for community networks in their licensing framework have followed a combination of being more granular while providing exemptions:

ENACOM, Argentina's regulator, passed a resolution in 2018 to create a community networks licence type. It defines community networks as those where either the users manage the infrastructure or provide services on a not-for-profit basis in villages smaller than 5,000 people. Holders are exempted from licensing fees as long as they present an annual report on the regulator's site with the information requested.⁴²

The Uganda Competition Commission, after a public consultation to review its licensing framework, incorporated a "communal access licence" category in January 2020. The licence targets the provision of telecommunication services to specifically defined communities, i.e. a "group of persons living in the same geographical location, having particular characteristics and interests in common".⁴³ A holder of a communal access licence will be authorised to establish, operate and provide communal access to telecommunications services to a particular community for five years renewable.

Spectrum licensing and fees

Provision of affordable connectivity to the half of the world that still lacks access to the internet will mostly take place via wireless networks. As a result, the regulation of access to spectrum is a critical issue. Although there are innovations in spectrum management taking place around the world,⁴⁴ adoption of these innovations has not kept pace with the growing need for affordable access solutions to create a more inclusive internet.

In terms of ensuring that all citizens are within reach of a wireless signal, regulatory challenges regarding spectrum are related to the development of innovative mechanisms to allow access to spectrum on fair terms for those operators willing to attend to uncovered areas. Countries have developed different approaches, summarised in Table 2.

42. <https://www.boletinoficial.gob.ar/#!DetalleNorma/190061/20180817>

43. <https://uccinfo.blog/2020/01/27/approved-new-telecommunications-license-categories>

44. Song, S., Rey-Moreno, C., & Jensen, M. (2019). *Innovations in Spectrum Management*. Internet Society. <https://www.internetsociety.org/resources/doc/2019/innovations-in-spectrum-management>

► **TABLE 2. SPECTRUM-RELATED CHALLENGES AND SOLUTIONS**

CHALLENGE	SOLUTION	EXAMPLE
Performance of licence-exempt spectrum (2.4 GHz and 5.8 GHz) is degrading as the frequencies become more crowded	Make more licence-exempt spectrum available	US: The FCC recently designated 1200 MHz of spectrum in 6 GHz for licence-exempt use
Assigned IMT (mobile) spectrum remains under-utilised in rural areas	Set aside IMT spectrum for rural connectivity	Mexico: Set aside 10 MHz in the 850 MHz band to allow indigenous operators to connect communities with less than 3,000 inhabitants
	Establish use-it-or-share-it mechanisms for IMT licences	UK: Small and rural operators can apply for a licence in secondary use in areas of no interest for big operators
Rural wireless backhaul requires cost-effective solutions	Implement dynamic spectrum sharing regulation	US, UK, Colombia, ⁴⁵ South Africa ⁴⁶ and Mozambique have implemented TVWS regulations, with Nigeria, ⁴⁷ Kenya ⁴⁸ and Uganda ⁴⁹ soon to follow. The US is implementing dynamic spectrum regulation in 3.5 GHz ⁵⁰
	Implement light-licensing regulation for microwave	US ⁵¹ and New Zealand ⁵² have implemented simple authorisation mechanisms for the issuing of licences for point-to-point use in 11 GHz
High recurring fees for spectrum	Consider fee exemptions for social-purpose licensees	Mexico establishes spectrum fee exemptions for indigenous operators ⁵³

45. Wolfe, J. (2017, 31 August). Colombia sets first TV White Space regulation in LATAM. *Rapid TV News*. <https://www.rapidtvnews.com/2017083148611/colombia-sets-first-tv-white-space-regulation-in-latam.html>

46. Liedtke, S. (2020, 11 May). Television White Spaces network operators can now use CSIR's geolocation spectrum database. *Engineering News*. https://www.engineeringnews.co.za/article/television-white-spaces-network-operators-can-now-use-csirs-geolocation-spectrum-database-2020-05-11/rep_id:4136

47. Ibeh, J. (2020, 9 January). Nigerian Communications Commission Develops Draft Guidelines For Use Of TV White Spaces In Nigeria. *Space in Africa*. <https://africanews.space/nigerian-communications-commission-develops-draft-guidelines-for-use-of-tv-white-spaces-in-nigeria>

48. <https://ca.go.ke/public-consultation-on-the-draft-dynamic-spectrum-access-framework-for-authorisation-of-the-use-of-tv-white-spaces>

49. <https://www.ucc.co.ug/wp-content/uploads/2017/09/UCC-TVWS-standards.pdf>

50. Allevin, M. (2019, 16 September). FCC approves initial commercial deployments in CBRS. *FierceWireless*. <https://www.fiercewireless.com/wireless/fcc-approves-initial-commercial-deployments-cbrs>

51. <https://www.fcc.gov/wireless/bureau-divisions/broadband-division/point-point-microwave>

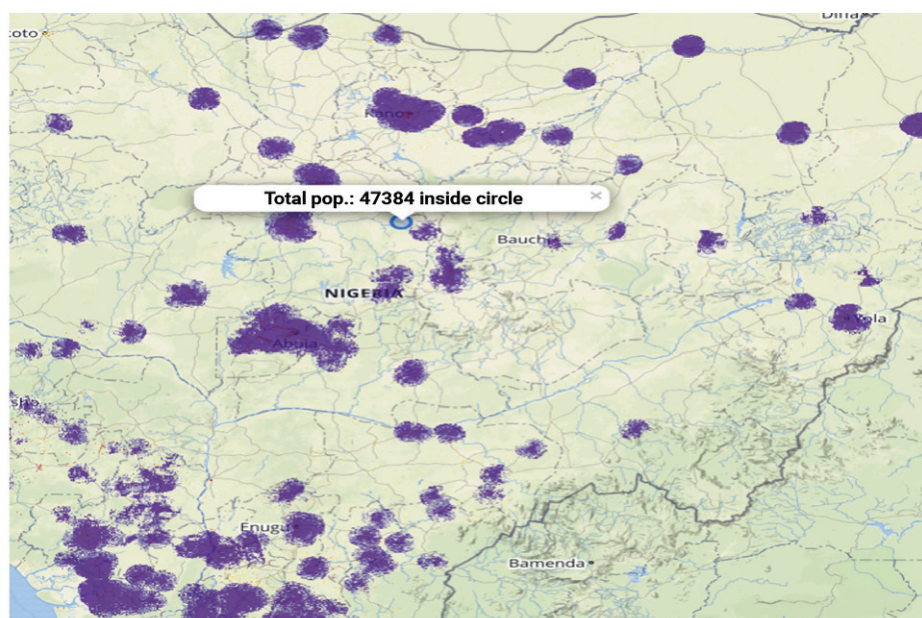
52. <https://www.rsm.govt.nz/engineers-and-examiners/how-to-become-an-approved-radio-engineer-or-certifier>

53. https://www.dof.gob.mx/nota_detalle.php?codigo=5581293&fecha=09/12/2019

Due to the potential for interference when two operators use the same frequency, the use of most radio spectrum requires a licence. However, the rapid spread of **licence-exempt spectrum use in the form of Wi-Fi**, the technology of choice for many *local operators*, is an important lesson about the power of frictionless innovation and about the pent-up demand for affordable internet access. It makes sense for regulators to leverage this success by expanding access to licence-exempt spectrum and further reducing costs and bureaucracy associated with its use. In addition to the traditional Wi-Fi bands in 2.4 and 5 GHz, some countries are incorporating new licence-exempt bands in their radio frequency plans, such as 6, 24 and 60 GHz. The US Federal Communications Commission is leading the way in substantially expanding frequencies for licence-exempt use.⁵⁴

While demand for spectrum for international mobile telephony (IMT) often exceeds the pace at which regulators are able to make it available in urban areas, large amounts of licensed spectrum lie unused in sparsely populated, economically poor regions. For example, the purple circles in Figure 5 show the regions in Nigeria where LTE mobile network operators are providing coverage. The map also displays population distribution data based on the high resolution settlement layer (HRSL) data research by the Earth Institute.⁵⁵ As can be seen, the total coverage of the land area and populations within the **LTE signal footprint is still relatively small**. For illustration, the blue circle with the pop-up dialogue within the image, which has a radius of 10 kilometres, contains nearly 50,000 people living where none of the LTE operators in the country are using their spectrum.

► **FIGURE 5. LTE COVERAGE IN NIGERIA FROM ALL GSMA MEMBERS**⁵⁶



54. <https://www.fcc.gov/document/fcc-opens-6-ghz-band-wi-fi-and-other-unlicensed-uses>

55. <https://ciesin.columbia.edu/data/hrsl>

56. <https://www.mobilecoveragemaps.com>

There is an opportunity for innovative approaches to reuse this spectrum to provide affordable access for all. As indicated in the section above, a variety of low-cost IMT base station manufacturers have emerged in recent years that offer the potential to dramatically change the cost model for sustainable rural mobile network deployment. Incumbent operators may not see sufficient return on investment to justify the roll-out of these new technologies. Yet, because regulation focuses on national operators, *local operators*, who do have that potential, are currently excluded from access to the radio spectrum required to deploy networks that could directly reach handsets already available in these areas. To address the under-use of assigned spectrum in rural areas, a strategy is needed to enable **sharing of unused IMT spectrum** that has already been assigned to a primary licensee. In addition to this, in many countries, there are still many blocks of IMT spectrum that remain unassigned.⁵⁷ Evidence has shown that when **IMT spectrum set-asides for social use** of these bands are created, such as the case of Mexico,⁵⁸ *local social-purpose operators* provide affordable mobile services in places of little economic interest to national operators. Regulators aiming to address digital exclusion may want to consider setting aside small spectrum blocks of IMT spectrum for *local operators* wishing to provide affordable connectivity in under-served areas. Similarly, they may consider use-it-or-share-it provisions when preparing new IMT spectrum bands for allocation and assignment. Alternatively, an effective strategy may be to allocate this new spectrum to smaller regions than nationally, or to **allocate IMT spectrum dynamically on a secondary-use shared basis** to prevent it lying unused where the need for affordable access solutions is greatest. Countries such as the United Kingdom have already pioneered these approaches.⁵⁹

The reduced interference from antennas designed for **point-to-point (PtP) links** that can focus wireless communication along very narrow beams/paths has also led some regulators to extend the use of bands traditionally assigned for satellite services, for PtP backhaul links. Additionally, powerful, low-cost microwave technology pioneered by Wi-Fi manufacturers can be used in almost any frequency band. Some countries are benefiting from the market availability of low-cost microwave solutions in **11 GHz and other frequencies**, and have adapted the regulations to encourage their uptake. This has taken the form of a light-licensing scenario such as is operated in the United States and in New Zealand for the cooperative assignment of geo-located frequency assignments.

The high cost of exclusive-use spectrum licences, particularly through spectrum auctions, stands in stark contrast to licence-exempt spectrum that is available at no cost. **Dynamic spectrum management**, which assigns spectrum on an on-demand basis, offers the opportunity to establish a middle ground between both approaches.

57. <https://opentelecomdata.org/spectrum-chart>

58. http://www.ift.org.mx/sites/default/files/anexo_i_programa_2020.pdf

59. https://www.ofcom.org.uk/__data/assets/pdf_file/0033/157884/enabling-wireless-innovation-through-local-licensing.pdf

While TV white space (TVWS) regulation has been implemented in the United States, the United Kingdom and Singapore, its real potential may yet to be realised as an affordable access technology in developing countries where spectrum in the UHF band is largely unoccupied, especially in rural areas. In the global South, Colombia, Mozambique and South Africa are pioneers in this regard, having recently introduced **TVWS regulatory frameworks** aimed at exploiting the technology for addressing digital exclusion.

Spectrum usage fee calculations vary from country to country. In most cases they are determined by a formula that considers a combination of parameters, including size of the spectrum block being assigned, the centre frequency (value of that particular spectrum band), and the type of application (point-to-point backhaul vs. access). Some countries have come up with more innovative formulas that make more fine-grained calculations, with parameters such as the size of the area being covered, and whether the area is urban or rural or whether the spectrum is shared.⁶⁰ This allows the same formula to generate modest fees for a small, rural, local network, while exclusive, national use of spectrum would entail sums of the order of magnitude that national governments would like to see collected from the telecommunications industry.

Another issue for consideration is whether *local social-purpose operators* such as community networks should be exempted from spectrum fees. In 2019, the Mexican social-purpose operator, TIC AC, challenged attempts by the national regulator to levy spectrum fees on spectrum that has been assigned to it for social-purpose use. TIC AC was successful in its challenge, with the result that spectrum fees do not apply to indigenous operators using social-purpose spectrum.⁶¹ These provisions will further ease the provision of access in unserved areas.

Backbone and backhaul infrastructure

Throughout the communication infrastructure value chain there are many cost elements that play a critical role in determining the viability of *local operators*. Access to backhaul capacity in particular is often the single biggest cost element for these operators. While this is often due to limited competition and few incentives to commercial operators to extend backbones to remote, sparsely populated areas, it is also the result of the lack of enabling regulations for *local operators*. Table 3 summarises the major challenges and regulatory responses identified.

60. Song, S., Rey-Moreno, C., & Jensen, M. (2019). Op. cit.

61. Article 239, Ley Federal de Derechos 2019. https://www.dof.gob.mx/nota_detalle.php?codigo=5581293&fecha=09/12/2019

► **TABLE 3. BACKBONE/BACKHAUL CHALLENGES AND SOLUTIONS**

CHALLENGE	SOLUTION	EXAMPLE
Financial infeasibility of backhaul for local operators, due to lack of coverage or unaffordable capacity pricing	Deploying wholesale open-access network (WOAN)	Public WOAN: Stokab, Sweden; NTB, Uganda; GUILAB, Guinea Private WOAN: CSquared, Uganda, Ghana and Liberia
	Impose non-discrimination and access obligations on network elements and associated facilities for interconnection, and fair and cost-based pricing, including pricing transparency (published prices), and distance-independent pricing	Benin, Côte d'Ivoire, Niger
	Make low-cost satellite capacity available to local operators	Mexico
	Allow national research and education networks to provide backhaul services to local social-purpose operators	Argentina, Kenya, South Africa
Barriers to deployment from private land and building owners	Rights of way for the common good in national law and municipal ordinances to regulate deployments, including price caps on rental fees	European rights of way regulations, ⁶² South Africa
	Infrastructure sharing and dig-once policies	EU cost reduction directive, mandatory dig-once rules in many European countries
	Policy for sharing by default, oriented to reduce cost and prevent duplication; mandate to incorporate ducts for telecom operators	Cost-sharing directive across EU Several municipal and regional regulations in Spain
Lack of access to numbering and voice interconnection	Interconnection regulations ensure local operators can have access to numbering resources at cost and to asymmetric voice termination rates in their favour	Asymmetric interconnection tariffs are well known as a means to help ensure the viability of small rural operators. ⁶³ In South Africa for operators with less than 20% market share ⁶⁴ this applies for the first four years.

62. <https://ec.europa.eu/digital-single-market/en/rights-way>

63. Dymond, A. (2004). *Telecommunications Challenges in Developing Countries: Asymmetric Interconnection Charges for Rural Areas*. World Bank. <http://documents1.worldbank.org/curated/en/881171468780577005/pdf/284020PA-PER0WBWP027.pdf>

64. <https://www.icasa.org.za/uploads/files/Briefing-note-termination-rate-asymmetry.pdf>

Some governments have taken measures to help reduce backbone costs by establishing national **wholesale, open-access backbone networks**, usually through a parastatal company. These networks offer a business model that separates operation and ownership of the physical network from the sale of broadband services to the end-user. In these networks, the owner of the network does not supply any retail services; instead, several independent service providers purchase in bulk from the wholesale operator for resale to the end-user. Similar to wholesale services in other sectors, wholesale open-access networks create a shared infrastructure for many retail service providers, which provides the scale needed for cost reduction that can drive increased availability and uptake. However, tariffs often reflect the premium that national operators are willing to pay, instead of being priced as a public utility/enabler. In addition, minimum bandwidth purchase requirements from wholesale backbone operators are usually more than needed by small *local operators*, especially in the start-up phases.

Most countries in Africa have deployed these types of backbones, usually with support from the Export-Import Bank of China. Typical examples include Uganda's National Transmission Backbone⁶⁵ and the Dorsale à Fibre Optique Nationale of Guinea.⁶⁶ Another common version of this type of network is where the government knits together the passive and fibre infrastructure of various state companies, such as the rail lines, fuel pipelines and high tension electricity distribution grids. Both Brazil⁶⁷ and South Africa⁶⁸ have taken this approach. At a more local level, a well-documented⁶⁹ case is in Sweden where the municipal optic fibre company Stokab was established in 1994, and is one of the earliest wholesale-only initiatives. Through its optic fibre network, it serves more than 100 operators and has significant socioeconomic influence in the region. While the aim of these projects is usually to provide a backbone where there is none (or to complement existing private infrastructure), in other cases the aim is to drive down prices on commercial infrastructure by competing with them. To address government service delivery issues, some countries have outsourced the management of the backbone to a private operator while retaining ownership of the asset. Privately led wholesale open access networks have also been established in many countries, including in developing regions, such as Liquid Telecom⁷⁰ which now operates a fibre backbone from Cape Town to Cairo, and CSquared in Uganda, Ghana and Liberia.⁷¹

65. <https://ict.go.ug/projects-programmes/national-backbone-infrastructure-project>

66. <https://guilab.com.gn>

67. <https://www.telebras.com.br>

68. <https://infraco.co.za>

69. B. Felten, B. (2012). *Stockholm's Stokab: A Blueprint for Ubiquitous Fiber Connectivity?* Diffraction Analysis. <https://www.stokab.se/Documents/Stockholms%20Stokab%20-%20A%20Blueprint%20for%20Ubiquitous%20Fiber%20Connectivity%20FINAL%20VERSION.pdf>

70. <https://liquidtelecom.com>

71. <https://csquared.com>

The wholesale-only model can be a valuable strategy to enable *local operators*. This model helps limit duplication of costly network infrastructure, and makes more efficient use of existing capacity. In addition, access to increased wholesale capacity at lower unit costs can help to ensure sustainable business cases, and can benefit diverse users and operators of any size and service type (mobile, fixed, content). To maximise the potential impact of a wholesale network, regulatory authorities may impose non-discrimination and access obligations on network elements and associated facilities for interconnection, and fair and cost-based pricing. This can also include pricing transparency (published prices), and even distance-independent pricing, to mitigate the handicap of remote areas. In West Africa, dominant operators are required to publish this type of information, in line with the Economic Community of West African States (ECOWAS) Supplementary Act,⁷² and examples of the offers by dominant operators can be found in countries such as Benin,⁷³ Côte d'Ivoire⁷⁴ and Niger.⁷⁵

As discussed earlier, *local operators* may be able to use satellite capacity to backhaul traffic. Although this is usually a more costly solution than a terrestrial one, in remote areas this may be the only option, as the cost of erecting a series of towers to connect to the nearest fibre point of presence may be beyond the financial resources of a local operator. However, low-cost satellite capacity may be available from governments that have their own satellites or have access to capacity on commercial satellites, such as in the case of Mexico. Mexican regulations require satellite operators with a presence in the country to provide the government with 8 Mhz of capacity on each satellite. The government is now providing this capacity to an indigenous community mobile *local social-purpose operator* for backhaul.⁷⁶ This has allowed the operator to bring mobile communications to areas where other types of backhaul are difficult to obtain.

As discussed elsewhere in this document, enabling *local social-purpose operators* to do so would make those benefits go beyond internet access. A similar approach is followed by many national research and education networks (NRENs), which have a **utility-based model** that facilitates the optimisation of the unused resources by *local social-purpose operators*. In the case of South Africa's NREN, TENET, its connection policy provides for participating institutions to share their connections with "Non-profit entities (non-profit companies, trusts, associations not-for-gain) that the Participating Institution collaborates with or supports in educational, research and/or community engagement endeavours."⁷⁷ Because of the currently high cost of backhaul, which has not yet been

72. <https://www.ecowas.int/ecowas-sectors/ict>

73. http://www.benintelecoms.bj/public/telecharger.php?fichier=Cat_2017-2018.pdf

74. http://www.artci.ci/images/stories/pdf/autre_documents/catalogue_interconnexion_mtn_ci_2016.pdf

75. <http://www.orange.ne/particuliers/1/203/catalogue%20da%C2%80%C2%98interconnexion%202018.pdf>

76. <https://www.tic-ac.org>

77. <https://www.tenet.ac.za/downloads/connection-policy/view>

addressed by the regulatory environment, this clause was critical in the first stages of the service delivery by Zenzeleni Networks. A similar agreement has been central to the service provision of AlterMundi in Argentina and Tunapanda in Kenya, where the cost of commercially available backhaul remains unaffordable for rural communities. To help address this, some regulators may be able to support these practices from NRENs, given the social-purpose nature of these agreements.

Another important element of the enabling environment is regulating access to **rights of way** (ROW). An example is in Spain, where ROW are covered by the general telecom law which provides operators with the right to occupy private property and the public domain.⁷⁸ However, taxes on deployments, such as usage of public ducts in streets or roads, are often seen as a source of income for the authorities. That includes taxes that are charged in terms of the distance covered by the deployment, which has the most negative impact on the rural areas most distant from the points of interconnection. This is exemplified by the cases of the new per-metre tax of the Torelló city council (Spain) and the Catalan government for passing fibre through the ducts of public infrastructure (water, roads). The supporting decree was amended so that the tax would be minimised or not apply when used to connect citizens,⁷⁹ but it was applied against and subsequently challenged by the guifi.net community network against the national regulator. In contrast, fees and public prices for open-access wholesale fibre networks in Catalonia are regulated to be distance-independent. This means rural and remote areas are not discriminated against in comparison to the more wealthy central areas with regard to interconnection.

To reduce the need for expensive negotiated rights of way, regulations vary considerably between different countries. As with most of Europe, use of ROW in Spain simply depends on a notification and municipal permit; however, in the UK, rights of way are subject to economic compensation. In both Spain and the UK, *local operators*, guifi.net and B4RN respectively, have also negotiated rights of way at no cost⁸⁰ in recognition of the social and economic impact to the community that a new open-access deployment brings. The universal deployment model proposed by guifi.net⁸¹ provides clear guidelines on regulating deployment on public land, and facilitates otherwise controversial authorisation decisions resulting from the private ownership and use of private infrastructure in public space.

This simplification of rights of way negotiations for public interest infrastructures makes a major difference to the speed of deployment and risks, and therefore to the feasibility

78. Notification, negotiation or an administrative procedure for expropriation or easement. <https://avancedigital.gob.es/urbanismo-despliegue-redes/Paginas/derechos-paso.aspx>

79. https://fundacio.guifi.net/en_US/blog/our-blog-1/post/ressusciten-les-taxes-per-accedir-a-internet-que-discrimin-en-als-que-viuen-en-pobles-petits-i-allunyats-48 (Catalan)

80. One notable conflict was a school deployment, finally resolved. See: Carr, S. (2019, 20 March). Caton is GO! *B4RN*. <http://b4rn.catonvillage.org.uk/2019/03/20/caton-is-go>

81. Roca, R., Dalmau, L., Baig, R., & Navarro, L. (2018). Universal network deployment model for universal connectivity. *PoliTICS*, 28. <https://arxiv.org/pdf/1812.11525.pdf>

of open-access and community-owned network deployments. In South Africa, the government has just gazetted its Rapid Deployment Guidelines, which aim to remove impediments to telecom infrastructure deployment, such as withholding of access to existing infrastructure by national, provincial and local government authorities, as well as in some instances, private property owners. This includes utilities such as road, rail, water and electricity infrastructure as well as access to high points such as tall buildings or natural peaks necessary for line-of-sight from transmitter to transmitter.⁸²

Similarly, **access to existing passive essential infrastructure**, such as the towers of mobile operators and the masts and poles of public broadcasters and energy distribution grids, can be shared to reduce the cost of extending access, under a cost-sharing and non-profit oriented pricing to promote the offering of added-value services. Infrastructure sharing regulations also help to leverage privately laid fibre and to reduce the cost of infrastructure duplication. For example, in France, and in the European Union in general,⁸³ if an operator digs to lay fibre then it must make space available in its ducts for other operators. This type of “dig-once” mandate has also been extended to ensure that any new passive linear infrastructure (roads, rail lines, fuel pipelines, high tension electricity grids) incorporates ducts for telecom operators.

Access to domestic transit for peering, numbering and cost-based voice interconnection for *local operators* remains an important constraint on their ability to operate on an equal footing with national operators. Where numbering and interconnection is available, it is often dimensioned, and priced, for large operators with volume and cost commitments that are beyond the scope of most *local operators*.

Financial support

Usually *local operators* scale in three phases: pilot, consolidation and expansion. In some locations, even *local social-purpose operators* may be able to fundraise internally to cover the costs of the network, especially if there are some potential businesses or other organisational users willing to contribute or to commit to being anchor tenants (ideally with an upfront payment for services). However, in most rural areas in the developing world, the resident population is unlikely to have the financial or human capacity to be able to provide the needed resources, and external fundraising will be required⁸⁴ for each of these phases of development.

82. <https://www.gov.za/documents/electronic-communications-act-proposed-policy-and-policy-direction-rapid-deployment>

83. The Broadband Cost Reduction Directive, which aims at incentivising cooperation across sectors and exploiting synergies (e.g. with energy, water, transport) to the benefit of the citizens by creating the conditions for more efficient deployment of new physical infrastructure, so that the networks can be rolled out at lower cost. See: <https://ec.europa.eu/digital-single-market/en/cost-reduction-measures>

84. Jensen, M. (2018). Towards financial sustainability in community-based networks. In A. Finlay (Ed.), *Global Information Society Watch 2018: Community Networks*. APC and IDRC. <https://www.giswatch.org/en/infrastructure/towards-financial-sustainability-community-based-networks>

Table 4 presents a summary of the major challenges identified, the proposed solutions, and the countries where they have been implemented.

► **TABLE 4. FINANCING CHALLENGES AND SOLUTIONS**

CHALLENGE	SOLUTION	EXAMPLE
Public financing	Non-recoverable subsidies, non-repayable contributions by public administrations	Universal service funds, least cost subsidy auction
Public incentives to promote private investment	Tax deductions for economic donations to public interest infrastructure	Infrastructure (CAPEX) donation to the guifi.net Foundation results in 35-75% tax deduction from the Spanish government (tax office)
Financial risks in infrastructure deployment	Public administrations financing initial deployments	Xafogar fibre deployment in Spain
Investment from public banks	Global, regional, national whole-sale and public banks	National development banks, World Bank and IFC, combined with retail banks such as ethical banking, private lenders, interested in impact investment

Based on the extensive experience of guifi.net⁸⁵ over the last 15 years, the two main sources of finance for new infrastructure are external resources and reinvestment. In this document we focus mainly on the former, where public policies can create tax incentives for private and public investment and donations for shared infrastructures, as well as providing direct financial support to local operators. Public funding should ideally cover or incentivise the three different phases of scalability of these types of projects: pilot, consolidation and expansion.

Tax benefits or deductions for donations from members of a *local social-purpose operator* provided to infrastructure for the public good. In the case of guifi.net, donation of infrastructure (CAPEX) to the guifi.net Foundation results in 35-75% tax deduction to the donor.⁸⁶ That tax deduction and the fact the infrastructure is shared at cost, on a non-profit basis, results in efficient infrastructure deployments. For example, B4RN is owned by its members through community shares⁸⁷ to raise the investment to cover the work and materials required for installation in a new area. An effective fundraising strategy for helping to address digital exclusion is for administrations to offer tax breaks for contributions to the deployment of network infrastructures for underserved communities.

85. Baig Viñas, R. (2019). Op. cit.

86. http://intranet.fundaciones.org/EPORTAL_DOCS/GENERAL/AEF/DOC-cw5565970265664/InformaciOnfiscalparadonantesdeduccionesnuevas.pdf

87. <https://b4rn.org.uk/community/investors>

Non-recoverable subsidies, non-repayable contributions by public administrations, such as universal service funds (USFs). Many countries have established a USF from the contributions from licensed operators. However, many have already accumulated large amounts of unspent funds, partly because of the limited capacity of regulators to evaluate and disburse funds to the right projects,⁸⁸ and also because of the paucity of appropriate projects to support. In this scenario, some countries are restructuring their USF to support *local operators*.⁸⁹ Apart from financial support, prospective stakeholders could help with the proper legal and regulatory establishment of such funds. Aside from simple direct grant or loan funding, another vehicle is the **least cost subsidy auction** where the government calls for expressions of interest in serving a location and accepts the one with the lowest proposed subsidy. Additionally, most countries have programmes to develop rural enterprises as well as SMEs, but currently these usually do not cover the field of telecommunications, despite the potential impact of rural telecommunication micro-enterprises presented throughout this report. The problem with this situation is exemplified by the following case: Telecomunicaciones Indígenas Comunitarias (TIC AC), an Indigenous GSM network in Mexico, was one of the winners of the Innovatis Prize, the National Prize for Social Innovation Research.⁹⁰ Apart from this recognition, the different government entities responsible for the prize were supposed to support the winners through their different programmes. From the three winners, TIC AC was the only one that did not receive any support, as none of the programmes of the entities covered telecommunications.

Public administrations financing initial deployments to be repaid by customers or operators at term or when reaching thresholds of usage levels to reduce risk. In the Xafogar fibre deployment project in a rural area of Spain by guifi.net,⁹¹ the county's agency is contributing to the implementation of fibre in the area where the guifi.net foundation receives funds from the municipalities under the commitment to deliver connectivity in commons model to the municipal buildings. The public administration contributes in lending an initial amount to be returned as new investors join, and coordinating and disseminating the initiative, but not in grant funding. In less than four years the initial amount loaned by the county's agency, used to create a backbone and show feasibility, has been returned to the public agency, and fibre connectivity has become widespread in previously unconnected rural areas.

Traditional **bilateral and multilateral development institutions such as national development banks** or UN agencies and organisations such as the World Bank and the

88. Thakur, D., & Potter, L. (2018). *Universal Service and Access Funds: An Untapped Resource to Close the Gender Digital Divide*. Web Foundation. <http://webfoundation.org/docs/2018/03/Using-USAFs-to-Close-the-Gender-Digital-Divide-in-Africa.pdf>

89. https://www.enacom.gob.ar/institucional/avanzamos-hacia-una-mayor-conectividad-y-reduccion-de-la-brecha-digital_n2444

90. <https://www.youtube.com/watch?v=VcdDlsl7qY>

91. https://fundacio.guifi.net/en_US/page/xafogar

International Finance Corporation have financed the deployment of telecommunications infrastructure. However, these agencies face three challenges when their funds are to be used by small operators and community-owned networks: small scale, high real and perceived levels of risk, and low surplus revenues⁹² with which to repay the loan. Another source is impact investment from ethical banking.⁹³ For example, B4RN carried out a successful regulated crowdfunding campaign offered in coordination with the Triodos ethical bank in the UK for GBP 3.3 million. Their experience, combined with being a community business owned by its members, offers a key competitive advantage.

Access to network information

More granular, publicly accessible information on the location, ownership and operation of telecommunications networks is essential to enabling a more diverse operator ecosystem. *Local operators* require access to information on backhaul networks, towers and spectrum assignments to be able to design and plan sustainable networks to address access gaps. Adopting open data⁹⁴ policies and approaches in telecommunications ensures that a more constructive debate on access among civil society organisations, the broader internet technical community, government and industry takes place. Table 5 presents some examples of the solutions offered by open data.

► **TABLE 5. OPEN DATA SOLUTIONS**

CHALLENGE	SOLUTION	EXAMPLE
Local operators and digital advocacy organisations are unable to discover the extent to which IMT frequencies have been assigned.	Standardise good practice of making all IMT spectrum assignments and details of licence fees and obligations publicly available on regulator websites.	Nigeria, UK ⁹⁵
Coverage maps from mobile operators are not subject to any independent verification. Coverage gaps and opportunities may be understated.	Standardise the good practice of making data on all tower and radio operation publicly available.	Canada, Netherlands ⁹⁶
Absence of public data on all national fibre networks hampers strategic planning by national and local operators.	Obligate all fibre operators to publish publicly available network maps including points of presence.	France, Ireland ⁹⁷ Dark Fibre Africa, South Africa

92. Jensen, M. (2018). Op. cit.

93. <https://www.triodoscrowdfunding.co.uk/invest/broadband-for-the-rural-north>

94. <https://opendatahandbook.org/guide/en/what-is-open-data>

95. <https://www.ofcom.org.uk/spectrum/information/spectrum-information-system-sis/spectrum-information-portal>

96. <https://wetten.overheid.nl/BWBR0027031/2013-03-15>

97. <https://fibrerollout.ie/rollout-map>

A simple first step would be to normalise transparency regarding the assignment of spectrum frequencies. It is not fruitful to have a public debate on innovations in spectrum management without a clear understanding of current spectrum assignments and their terms and conditions. Several country regulators offer examples of good practice in this regard, including the UK,⁹⁸ Mexico⁹⁹ and Nigeria.¹⁰⁰

Another important step in transparency is public information regarding network towers and their occupancy. As ensuring affordable access to all of the population becomes an increasingly important strategic priority, having a rigorous understanding of the limits of existing coverage becomes essential. Network operator coverage maps are useful tools, but require a mechanism for independent corroboration. Public access to information on tower location and occupancy is the simplest route to achieving that. As with spectrum assignments, good practice already exists. The Canadian regulator publishes a downloadable database¹⁰¹ of all towers and associated radios. In India, commercial operator Airtel has published a map¹⁰² of their entire tower infrastructure network under the slogan “Because you have a lot to say. And we have nothing to hide.”

Transparency in the deployment of terrestrial fibre-optic infrastructure is important too. Fibre-optic points of presence are the “deep water ports” of the internet, meaning they have very high-capacity, low-latency connections to the global internet. Access to fibre for backhaul is often essential to fully take advantage of the innovations in spectrum management mentioned in this paper. Yet it is surprisingly rare for commercial operators to publish detailed fibre maps. With few exceptions,¹⁰³ governments and regulators have been slow to push for transparency in this area. Good practice in this area can be seen in operators like Dark Fibre Africa in South Africa, who have published a detailed fibre map of their network since their formation over 10 years ago.¹⁰⁴

ITU-D publishes interactive transmission maps¹⁰⁵ of backbone broadband connections worldwide, of core transmission networks including optical fibres, microwaves, submarine cables and satellite links. A missed opportunity in the ITU transmission map is the ability to download the underlying data for the map in an open format. This would allow it to be used by researchers in combination with other socioeconomic data sets in order to produce new insights. In contrast, the African Terrestrial Fibre (AfTerFibre) map¹⁰⁶

98. <https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences>

99. <http://ucsweb.ift.org.mx/vrpc>

100. <https://ncc.gov.ng/technical-regulation/spectrum/frequency-assignments>

101. https://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/h_00010.html

102. <https://www.airtel.in/opennetwork>

103. The French regulatory agency, ARCEP, publishes public maps of fibre, towers, and mobile coverage. They have a published open data policy regarding the collection and publication of telecommunications infrastructure data. <https://www.arcep.fr/cartes-et-donnees/new-deal-mobile.html>

104. <https://dfafrica.co.za/network/coverage>

105. <https://www.itu.int/itu-d/tnd-map-public>

106. <https://afterfibre.nsrc.org>

maintained by the Network Startup Resource Center allows maps of network fibre infrastructure to be downloaded in a variety of open data formats. This has allowed researchers to carry out an econometric investigation of the relationship of terrestrial fibre networks in African countries to employment levels.¹⁰⁷ This is the tip of the iceberg in terms of research opportunities linking telecommunications infrastructure data to other publicly available socioeconomic data sets. The benefits are of course not limited to researchers. The ability to combine socioeconomic data sets and telecommunications infrastructure data will benefit entrepreneurs seeking investment opportunities as well as regulators and policy makers seeking to validate the impact of their interventions.

Impact of a more diverse operator ecosystem

A number of countries have demonstrated leadership in the implementation of a more enabling environment for *local operators*, including nations with large populations and relatively industrialised economies in the global South, such as Brazil, Argentina, Mexico and South Africa. Although a global survey has not yet been carried out, it is apparent that the numbers of these *local operators* are growing significantly, complementing and extending the services provided by the national fixed and mobile operators.

In South Africa, examples of these *local operators* include over 500 local commercial operators, mainly in the form of wireless ISPs. The Wireless Access Service Providers Association (WAPA) has observed that the number of customers of its members has grown 2,000% to 164,000 in the last 11 years. *Local social-purpose operators*, in particular community networks, are also expanding, with Zenzeleni Networks having incubated a new cooperative in the Eastern Cape,¹⁰⁸ and several other community networks appearing elsewhere in the country.^{109 110 111}

This trend has been evident for some time in other countries that have adopted similar policies, such as in Brazil, where there are now more than 12,000 *local commercial operators*, with 200 new ones registering each month. Of them, more than 3,650 small/community/non-profit operators have obtained licence exemption from Anatel to provide internet access. According to Anatel's indicators, *local commercial operators* represented

107. Goldberg, P. (2019, 28 March). Moonshot Africa and jobs. *World Bank*. <https://blogs.worldbank.org/development-talk/moonshot-africa-and-jobs>

108. Luca de Tena, S., & Rey-Moreno, C. (2018). Challenging inequality in post-apartheid South Africa: A bottom-up, community-led business model for connectivity. In A. Finlay (Ed.), *Global Information Society Watch 2018: Community Networks*. APC and IDRC. <https://www.giswatch.org/en/country-report/infrastructure/south-africa>

109. Edwardes, R. (2019, 6 August). Connecting Ocean View. *News24*. <https://www.news24.com/SouthAfrica/Local/Peoples-Post/connecting-ocean-view-20190805>

110. Ditshego Magoro, K. (2019, 8 January). South Africa Gauteng Community Outreach: Why Community Networks Matter. *Internet Society*. <https://www.internetsociety.org/blog/2019/01/south-africa-gauteng-community-outreach-why-community-networks-matter>

111. VPUU. (2019, 20 May). Bridging The New Digital Divide. <https://vpuu.org.za/ict4d/digital-divide-south-africa>

17% of overall internet access in 2017, and today they represent 23%.¹¹² In Argentina, the ecosystem of *local operators* is also vibrant, with approximately 2,000 cooperatives that provide communication services which emerged as a result of the history of self-reliance in the provision of public services in the many sparsely populated areas scattered across the territory. This helped stimulate the growth of local cooperatives providing cable TV, and then internet access.¹¹³ The directive from ENACOM to include community networks as part of its licensing framework is now helping to consolidate the association of *local social-purpose operators*, CARC, which now has representatives from 20 organisations.¹¹⁴ In Mexico, following recent provision of social-purpose mobile spectrum in 2016, about 20 *local social-purpose* community-based IMT operators have rapidly emerged, and now cover about 70 villages in the state of Oaxaca.¹¹⁵

These types of *local operators* are also present in the global North. In the USA, rural telecommunication cooperatives have existed since the early part of the last century. The NTCA–The Rural Broadband Association currently represents about 850 of these independent community-based telecommunications companies that operate in rural and small-town USA. In addition, about 750 municipalities spread across the country have established their own fibre and wireless networks for use by their residents.¹¹⁶ Many of these networks also exist in larger urbanised areas in the USA, including New York City, Oakland, California, and Detroit, Michigan. In Spain, guifi.net – which received the European Broadband Award for the best innovative model of financing, business and investment in 2015¹¹⁷ – supports thousands of individual participants and 26 local for-profit and non-profit telecom operators sharing infrastructure in commons, with a fibre/wireless backbone and multi-homing internet links, with Wi-Fi and FTTH access. B4RN, a community-owned fibre operator near Lancaster, UK serves 74 rural communities with 1 and 10 Gbps. In Greece, another *local social-purpose operator*, Sarantaporo.gr, received the European Broadband Award in the category for “Demand generation and take-up of connectivity” in 2019.¹¹⁸

However, the emergence of *local operators* has so far only been seen in the few countries with conducive policies, often combined with supportive historical conditions or traditions of self-sufficiency. In general, most countries have much smaller numbers of ISPs and private network operators, and in many of them there has been a marked decline. For

112. Federative Republic of Brazil. (2019). Topic for the public consultation of the CWG-Internet. <https://www.itu.int/md/meetingdoc.asp?lang=en&parent=S19-RCLINTPOL13-C&source=Brazil%20%28Federative%20Republic%20of%29>

113. See for example: <https://altermundi.net>, <https://www.telpin.com.ar> and the cooperatives association <http://catel.org.ar>

114. <http://carc.libre.org.ar>

115. See: <https://www.tic-ac.org/>, <https://www.rhizomatica.org/resources> and <https://www.redesac.org.mx>

116. See: <https://muninetworks.org/communitymap>, <https://www.ntca.org> and <https://muninetworks.org/sites/www.muninetworks.org/files/2017-01-UW-Co-ops-RuralBroadband-report.pdf>

117. European Commission. (2015, 16 November). Five projects get first ever European Broadband Award. <https://ec.europa.eu/digital-single-market/en/news/five-projects-got-first-ever-european-broadband-award>

118. European Commission. (2019, 3 December). Winners of the European Broadband Awards 2019. <https://ec.europa.eu/digital-single-market/en/news/winners-european-broadband-awards-2019>

example, in West Africa, one of the regions with the lowest levels of indicators related to coverage and internet usage, and year-on-year growth declining, there is an average of three ISPs per country in the ECOWAS states, with the exception of Ghana and Nigeria.¹¹⁹ In Pakistan, the number of ISPs has dropped from 120 to four in recent times, while Pakistan's internet penetration rates are below 20%.¹²⁰ Similarly, in India, where mobile operators have been engaged in aggressive mobile data pricing that is seeing small ISPs exit the market, internet services still only reach half of the population.

A more vibrant and inclusive economy (as illustrated by the “jar of stones” metaphor) is possible, given the wide range of customer bases and value propositions, but regulation to enable a wider range of economic levels is needed to achieve this. For instance, Vodacom, a national mobile network operator, has over 43 million customers in South Africa, while the 250+ WAPA members, mostly local commercial operators, each have between 100 and 20,000 paying customers (who might each be providing access to between one and 100 individuals). Zenzeleni Networks, a *local social-purpose operator* and WAPA member, fits into these ranges as well. At the same time, Vodacom, which has seen its net profit grow more than 11 times over the last 15 years, with a net profit above USD 1 billion in the last year alone,¹²¹ sells 1 GB data bundles valid for one month at ZAR 149.¹²² Simultaneously, TooMuchWifi,¹²³ a *local commercial operator* serving urban townships in Cape Town, is providing similar data packages about seven to eight times cheaper than Vodacom. At the other end of the spectrum, Zenzeleni Networks, which operates on a cost recovery basis for its members, provides unlimited internet for ZAR 25 per month.

Conclusion

The ongoing global pandemic has shown how important internet connectivity is to preserve life as well as to support economic activity. Yet, almost half of the world remains unconnected. With current trends showing how the growth rate of internet users is declining and with national operators turning their attention to new technologies mainly designed to improve the user experience of those already connected, it is imperative that regulators take action to expand the operators' ecosystem to enable complementary access models.

Recent changes in the telecommunications industry have made it technically and economically possible for *local operators*, both *commercial* and *social-purpose*, to fill the coverage and usage gaps left by *national operators*, in a complementary way. Despite

119. World Bank. (2018). *ECOWAS Regional Communications: Toward Integration of Infrastructure and Services*. <http://documents1.worldbank.org/curated/pt/591631535536147484/pdf/ECOWAS-Regional-Communications-Study.pdf>

120. Data from the ITU database 2018.

121. Numbers calculated using Vodacom's Financial Results 2003-2018.

122. These pricing structures have been considered “anti-poor” by the Competition Commission of South Africa. See: <http://www.compcom.co.za/wp-content/uploads/2019/12/DSMI-Non-Confidential-Report-002.pdf>

123. <https://toomuchwifi.co.za>

barriers inherent to the majority of regulatory frameworks that are designed for *national operators*, evidence shows that in countries where regulatory interventions to enable *local operators* have been implemented, users in areas previously unconnected or with unaffordable services have developed their own ways to be connected.

Regulators can create a more enabling environment for *local operators* by replicating the best practices from regulatory frameworks worldwide included in this document. In Table 6 we list a summary of the recommendations along the five categories identified where regulatory intervention is required to enable *local operators*:

► **TABLE 6. SUMMARY OF REGULATORY RECOMMENDATIONS**

CLUSTER OF REGULATORY INTERVENTIONS	GOOD PRACTICE IDENTIFIED
Operator licensing	More granular approach to licensing
	Licence exemptions for private networks and non-profits
	Create specific licences for community networks or fit them into existing exemptions
	Simple authorisation or notification system
Spectrum licensing and fees	Make more licence-exempt spectrum available
	Set aside IMT spectrum for rural connectivity and establish use-it-or-share-it mechanisms for IMT licences
	Implement dynamic spectrum sharing regulation and implement light-licensing regulation for microwave
Backbone and backhaul infrastructure	Ensure the viability of local operators through open mechanisms for affordable and predictable access to backbones, backhaul and interconnection
Financial support	Non-recoverable subsidies, non-repayable contributions by public administrations
	Tax deductions for economic donations to public interest infrastructure
	Public administrations financing initial deployments
	Global, regional, national wholesale and public banks
Access to network information	Standardise good practice of making all IMT spectrum assignments and details of licence fees and obligations publicly available on regulator websites
	Standardise the good practice of making data on all tower and radio operation publicly available
	Obligate all fibre operators to publish publicly available network maps including points of presence

Annex 1

RECOGNITION AND AWARENESS

One of the main barriers to the adoption of an enabling regulatory framework for *local operators* is that few people know they even exist. This applies not only to the rural communities that are most likely to benefit, but also to policy makers and regulators, as well as development organisations. Lack of awareness is compounded by the view among most policy makers and funders that access markets can be sufficiently well served by a handful of large (multi)national operators competing to provide services of sufficient coverage and quality, and at an affordable price. However, there is an increasing body of experience that indicates the benefits of expanding the telecommunications operator ecosystem to include local operators. A number of global policy positions have now reached similar conclusions. Among them:

- Recommendation 19 ITU-D: Telecommunications for rural and remote areas – World Telecommunication Development Conference (Dubai, 2014),¹²⁴ states:

10. that it is important to consider small and non-profit community operators, through appropriate regulatory measures that allow them to access basic infrastructure on fair terms, in order to provide broadband connectivity to users in rural and remote areas, taking advantage of technological advances;

11. that it is also important that administrations, in their radio-spectrum planning and licensing activities, consider mechanisms to facilitate the deployment of broadband services in rural and remote areas by small and non-profit community operators[.]

- The Report of the United Nations Secretary General’s High-level Panel on Digital Cooperation,¹²⁵ in its recommendations for an inclusive digital economy and society includes:

Second, investments should be made in both human capacity and physical infrastructure. Creating the foundation of universal, affordable access to electricity and the internet will often require innovative approaches, such as community groups operating rural networks, or incentives such as public sector support.

124. ITU. (2018). *World Telecommunication Development Conference (WTDC-17) Final Report*. https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17_final_report_en.pdf

125. UN Secretary-General’s High-level Panel on Digital Cooperation. (2019). *The Age of Digital Interdependence*. <https://www.un.org/en/pdfs/DigitalCooperation-report-for%20web.pdf>

- The Annual Deliverable 2019-2020 from ITU-D Study Groups Question 5/1: Telecommunications/ICTs for rural and remote areas,¹²⁶ includes the following recommendation:

Ease regulatory requirements for community network operators.

In Africa, the Specialized Technical Committee on Communications and Information Technologies (STC-CICT) of the African Union included, in its 2019 Sharm El Sheikh Declaration, the following text directing the African Union Commission to:

29. PROMOTE the formulation of strategy and pilot projects for Unlocking Access to Basic Infrastructure and Services for Rural and Remote Areas including Indigenous Community Networks, and develop guidelines on legislation on deployment of technologies and ICT applications, to accelerate infrastructure role out in collaboration with ATU and other regional institutions.

Additionally, the Broadband Commission’s “Connecting Africa Through Broadband: A strategy for doubling connectivity by 2021 and reaching universal access by 2030” recognises the role of community networks in 3 of the 7 Objectives of its Action Plan. Of particular interest is Objective 5: “Provide direct funding support for extending affordable broadband access to commercially challenging rural and remote areas, to women, and low-income users”, and the recommendations under Objective 1: “Ensure that the commercial broadband ICT market is open and structurally prepared for competitive private investment”:

Adopt open wholesale and retail telecommunications market entry policies, especially competitive and unified licensing regimes, and liberal, dynamic spectrum policies. Such policies should also accommodate community and nonprofit focused network operators who offer services in underserved areas.

In addition, some countries include in their policy documents references to community networks, small operators and cooperatives as a vehicle for digital inclusion, among them, Kenya and South Africa. Kenya highlights the need to provide an enabling policy and regulatory framework for community-based operators in its National Broadband Strategy.¹²⁷ South Africa not only mentions them in its National Broadband Plan,¹²⁸ and includes them as part of the telecommunications value chain in its ICT SMME Support Strategy,¹²⁹ but the development and promotion of “SMMEs and cooperatives” is part of the objects of the Electronic Communications Act, the main act of the telecommunications

126. ITU-D Study Groups. (2020). *Broadband development and connectivity solutions for rural and remote areas*. https://www.itu.int/dms_pub/itu-d/oth/07/23/D07230000020001PDFE.pdf

127. <https://ca.go.ke/wp-content/uploads/2018/02/National-Broadband-Strategy.pdf>

128. <https://www.ellipsis.co.za/wp-content/uploads/2013/10/NBP-2013.pdf>

129. https://www.dtps.gov.za/images/phocagallery/Popular_Topic_Pictures/40756_31-3_TeleComPostServ.pdf

sector in the country.¹³⁰ In the particular case of community networks, specific support for their development was articulated in the Budget Speech 2018 from the Department of Telecommunications and Postal Services.¹³¹ Unsurprisingly, South Africa is the country with the most local operators in Africa.

In the Americas region, during the last few years, Brazil has implemented a strong policy and regulatory strategy for facilitating the participation of small operators in serving rural and remote areas,¹³² including a recent note on how to regulate community networks.¹³³ In Mexico, community and Indigenous operators are specifically recognised in the Telecommunications Act, which also specifies that spectrum planning activities should always take into consideration the specific needs of these operators. Mexico's new Social Coverage Programme specifically refers to them as important allies in addressing unconnected areas.¹³⁴ At the regional level, the Inter-American Telecommunication Commission tracks the implementation of Recommendation ITU D-19 regarding small, not-for-profit and community operators, through resolution 268-PCC1. A report presented in 2018 shows the development of inclusive regulation for small and community operators in each of the countries.¹³⁵

The ITU has its own SME programme which aims at integrating the participation of SMEs in ITU processes, such as study groups and other ITU events,¹³⁶ which is a step toward the recognition of the contribution that small enterprises bring to the ecosystem, although as yet it does not include explicit recognition of *local operators* found in other policy documents.

130. https://www.dtps.gov.za/index.php?option=com_phocadownload&view=category&download=34:electronic-communications-act-2005&id=2:legislation&Itemid=142&start=20

131. Africa News Wire. (2018, 17 May). Deputy Minister Stella Ndabeni-Abrahams: Telecommunications and Postal Services Dept Budget Vote 2018/19. <https://africanewswire.za.com/deputy-minister-stella-ndabeni-abrahams-telecommunications-and-postal-services-dept-budget-vote-2018-19/>

132. Expansion of Brazilian Broadband Network Document presented by the Brazilian Delegation at the 35th Meeting of the PCC-1 CITEL 2019.

133. <https://www.anatel.gov.br/setorregulado/component/content/article/2-uncategorised/528-redes-comunitarias>

134. <https://www.gob.mx/sct/acciones-y-programas/programa-de-cobertura-social>

135. The details of the study can be found at <https://www.redesac.org.mx/regulacion>

136. <https://www.itu.int/en/join/smes/Pages/default.aspx>

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