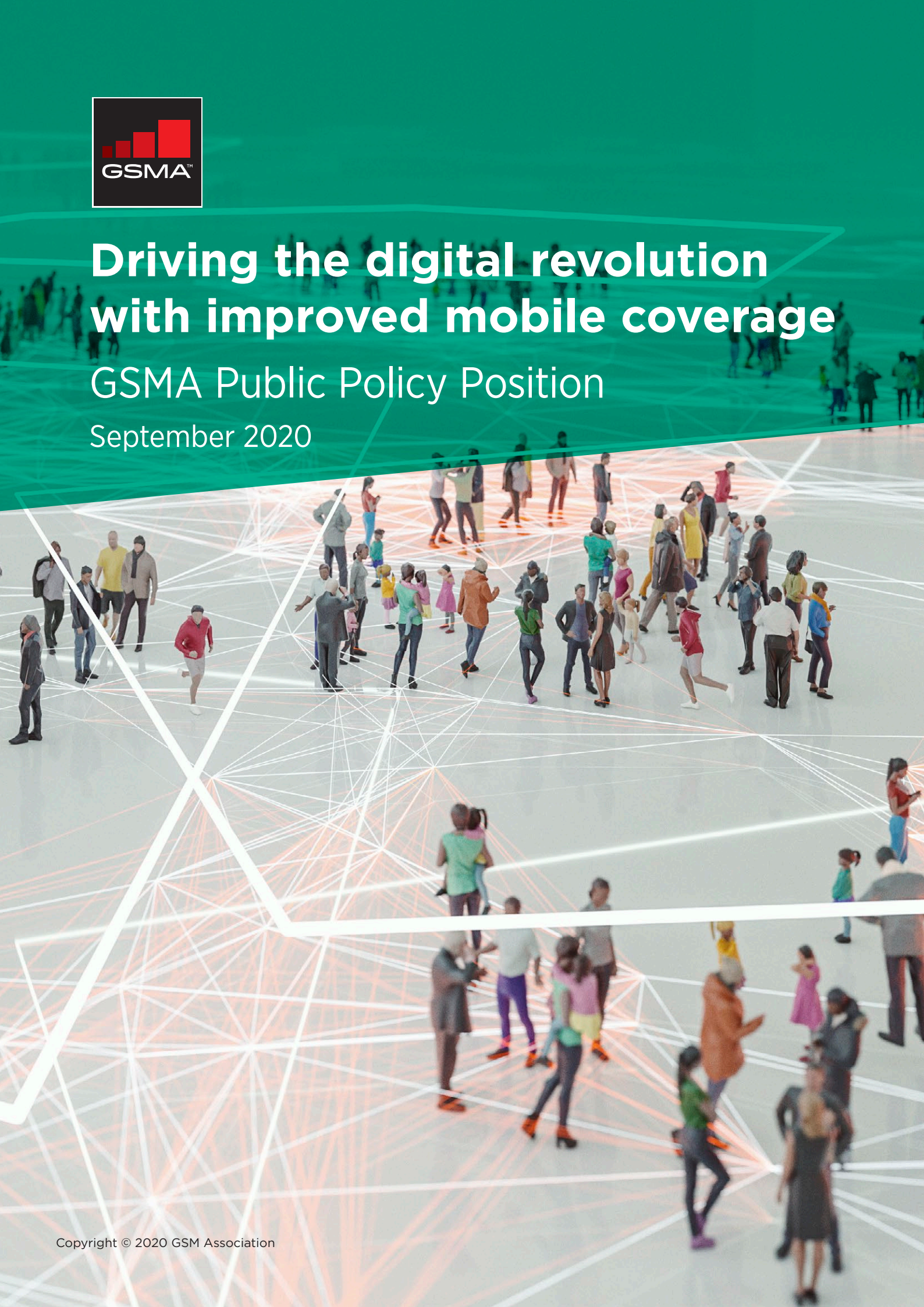

Driving the digital revolution with improved mobile coverage

GSMA Public Policy Position

September 2020

About the GSMA

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators and nearly 400 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

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Executive summary

Increasing access to the internet is one of the great challenges of our time. Currently, around half of the world's population (46 per cent) is not online[1]. This restricts access to jobs, education, healthcare and, more widely, the information needed to fully participate in social, political and economic life. Put simply, the critical benefits of the digital economy are out of reach for far too many. It is therefore vital that the communications industry and policymakers work together to ensure everybody is included in the digital revolution.

Mobile technology already connects 3.8 billion people to the internet,[2] and in low-and middle-income countries (LMICs), mobile is the primary driver of internet access. However, more needs to be done to connect the rest of the planet: if current trends continue, by 2025, more than 40 per cent of the LMIC population will still be unconnected to the mobile internet.

Of the four billion people who do not use the mobile internet, 3.4 billion live within mobile broadband coverage.[i] This mobile internet usage gap is largely explained by issues related to the affordability of devices and services, low levels of literacy and digital skills, a perceived lack of relevance, as well as safety and security concerns.

The remaining 600 million people have no internet access because they live in areas where there is no mobile broadband coverage – this is the so-called mobile coverage gap.[3] This gap, however, is declining relatively quickly - it fell from 24 per cent to 7 per cent of the global population between 2014 and 2019. With this said, the coverage gap disproportionately affects people living in LMICs and especially those living in rural areas. For example, in North America, only 1 per cent of the population lacks mobile broadband coverage, whereas in Sub-Saharan Africa, the gap is currently 25 per cent of the population.

The greatest coverage challenge remains in rural areas, where network CAPEX and OPEX are higher than urban areas and revenues can be as much as ten times lower due to the smaller population,[4] This means there are areas where it is simply unprofitable for operators to cover today. However, major progress has been made on understanding and overcoming the coverage gap in recent years, including making progress on speeding up rollouts and covering challenging areas. For example:

- **Innovative technologies and deployment models helping to expand mobile coverage:** The mobile industry has been exploring innovative approaches to improve the business case for rural connectivity. Newer mobile technologies make mobile data more affordable[5] while a new generation of lower-cost base stations that can exploit evolving backhaul options, help extend networks more widely, including in rural areas in developing markets.[6] Similarly, the declining cost of renewable energy sources and energy efficient mobile equipment can also help in areas where consistent energy supplies are not available. The growth of various infrastructure sharing models is also helping to reduce operator costs in rural areas.[7]

- **Policy measures to support increased network investment and rapid, wide area rollouts:** Studies show that reasonable taxation policies and spectrum prices, long-term technology-neutral licences and the early assignment of sufficient amounts of spectrum have a major impact on coverage by driving greater network investment.[8] Reduced red tape for new base stations, faster approval processes and regulatory support for infrastructure sharing also improve coverage.[9;]

- **Policy measures to stimulate mobile internet demand:** Governments can implement measures to stimulate demand for internet services to help reduce the usage gap and improve the business case for wider rollouts. This includes reviewing consumer taxes on mobile usage (e.g. on mobile devices, activation and usage) which can impact the affordability of the mobile internet,[10] Governments can also support digital skills training to help people understand how to use the internet and take advantage of its social and economic benefits.

- **Policy measures focused specifically on rural and remote mobile coverage:** There have been a growing number of interventions to support services in areas which are challenging to cover due to the higher costs and lower revenue potential. These include offering discounted spectrum[11] in return for obligations to cover specific rural and remote areas as defined by the regulator. It also includes various other approaches including public–private partnerships and community networks.

i. Mobile broadband is defined as a standardised 3GPP mobile technology that is 3G or above

1. According to the ITU an estimated 4.1 billion people (representing 53.6 per cent of the world's population) are using the Internet in 2019. Source: "Measuring digital development. Facts and figures", ITU (2019)
2. GSMA Intelligence
3. GSMA Intelligence
4. "Unlocking Rural Coverage: Enablers for commercially sustainable mobile network expansion", GSMA (2016)
5. The incremental steps to newer mobile technology generation (i.e. 2G to 3G, 3G to 4G etc) improves spectrum efficiency which means more data can be carried in the same amount of spectrum. This means the cost per bit to provide data falls and this can be passed on to consumers. In recent years, the cost per MB for consumers has fallen considerably around the world. For more see: 'The Benefits of Technology Neutral Spectrum Licences', GSMA (2019)
6. How innovation can drive rural connectivity, GSMA (2019)
7. The rise of network sharing arrangements has been tracked by Coleago Consulting (see - http://www.coleago.com/mobile-network-sharing-managed-services/mobile-network-sharing/)
8. e.g. Policy Tracker study for the European Commission (2017) and 'The impact of spectrum pricing on consumers' GSMA intelligence (2019)
9. "Unlocking Rural Coverage: Enablers for commercially sustainable mobile network expansion", GSMA, 2016
10. 'Rethinking mobile taxation to improve connectivity', GSMA (2019)
11. This can also include reductions to other types of telecom fees and tax relief

However, caution is needed to avoid distorting efficient mobile markets.

This paper asserts that careful cooperation between the mobile industry and policymakers is vital to improved mobile coverage and making the availability of digital services universal. The following positions outline key mobile industry recommendations:

1. **Assign sufficient amounts of mobile spectrum to operators in a timely manner - including coverage bands**

2. **Do not inflate spectrum prices. Also, look for trade-offs between reduced spectrum fees and carefully considered wider coverage obligations**

3. **Avoid licence terms and conditions that discourage network investment and innovation and needlessly increase costs**

4. **Reduce mobile-specific taxes and fees that impede rollouts and harm internet affordability**

5. **Provide non-discriminatory and timely access to public infrastructure**

6. **Simplify and streamline the planning approval process for new base stations to incentivise and speed-up deployments**

7. **Adopt competition policy which supports investment in high quality mobile networks**

8. **Allow infrastructure sharing on a voluntary basis**

9. **Only consider state intervention to support coverage once all regulatory measures to maximise coverage through market-driven mechanisms have been exhausted and after a careful assessment of different options.**
    - Ensure that Universal Service Funds (USFs) are targeted, time-bound, robustly supported by the regulatory framework and managed transparently following best practices. If this cannot be achieved within a reasonable timeframe, adopt a roadmap to phase out USFs;
    - Consider whether community networks can play a role in enabling rural coverage in areas that are not commercially viable, taking care not to deter wider mobile rollouts or damage a level playing field in the provision of telecom services;
    - Consider carefully planned and executed Public Private Partnership projects to widen access in areas where commercial networks are not viable and existing regulatory best practice has not worked but avoid the Single Wholesale Network (SWN) approach.

Background

The internet makes life-enhancing information and services available at the touch of a button, while mobile technology brings it into the palms of our hands. The mobile internet helps people to keep in touch, obtain news and information, enhance their education and access financial services, health information, clean energy and water. Indeed, mobile technology contributes to the empowerment of citizens globally, including women, people with disabilities and those who are the most marginalised. The GSMA and Gallup research shows that mobile ownership, combined with internet connectivity, is associated with an improvement in peoples' lives[12]. Mobile and internet access also contributes to the fulfilment of the UN Sustainable Development Goals (SDGs), which include specific targets to provide universal and affordable access to the internet in LMICs and to enhance the use of enabling technologies, particularly ICT, to promote the empowerment of women.

Today, 46 per cent of the world's population does not have access to the internet.[13] The mobile industry already connects over 3.8 billion people to the internet (49 per cent of the global population) and continues to lead efforts on digital inclusion by connecting more people every day. Mobile is the primary means of internet access in LMICs[14] as the availability of fixed broadband is typically more limited, and satellite services are often too expensive. While the reach of mobile networks has expanded significantly in recent years, there is still a coverage gap of 600 million people who live in areas that are not covered by mobile broadband.[15] There is also a much bigger usage gap with more than 3.4 billion people living in areas covered by mobile broadband networks but who are not using mobile internet services, thus indicating that whilst coverage is a necessary criterion, it alone cannot address the problem of digital inclusion. In particular, women are 20 per cent less likely to use mobile internet than men.[16]

Figure 1

State of mobile internet connectivity by region, 2019 (Base: total population)[17]

	Global	North America	LatAm & Caribbean	Europe & Central Asia	Sub-Saharan Africa	South Asia	Middle East & North Africa	East Asia & Pacific
Coverage gap	7% 570m	1% 5m	6% 40m	3% 30m	25% 270m	6% 120m	9% 60m	2% 60m
Usage gap	44% 3400m	23% 80m	39% 260m	27% 230m	49% 520m	61% 1130m	47% 290	38% 900m
Population connected	49% 3780m	76% 280m	54% 350m	70% 590m	26% 270m	33% 600m	43% 260	60% 1420m

The lack of mobile coverage in rural areas is typically the result of a fundamental economic challenge. Mobile networks in remote areas can be twice as expensive as in urban areas, while revenue opportunities are as much as ten times lower due to smaller populations in these areas.[18] Specifically, the operating costs for a rural base station are 1.5 to 3 times higher than an urban base station, while up-front costs are 1.25 to 2 times higher on average. In practice, this means a lack of coverage is often because network investment in these locations would be unprofitable, if not loss-making. Furthermore, investment cycles in new technologies are shortening, putting additional pressure on operators in terms of capital allocation planning.

This economic challenge means that the coverage gap cannot be resolved in isolation from the usage gap. In order to deliver the best mobile coverage possible, it is vital to address both supply-side factors (i.e. the steps needed to rollout mobile infrastructure in rural areas) and demand-side factors (i.e. the steps needed to ensure that enough users are willing and able to pay for mobile internet devices and services in these areas). Rural mobile broadband services can only be economically viable if both factors are addressed.

Progress in both of these areas has been made in recent years, helping to illustrate useful best practice for operators, policymakers and regulators.

12. The Impact of Mobile on People's Happiness and Well-Being, GSMA and Gallup (2018).
13. "Measuring digital development. Facts and figures 2019", ITU (2019).
14. GSMA Intelligence: "Mobile is the primary means of internet access in low- and middle-income countries (LMICs). In 15 countries surveyed, 67% of those using the internet accessed it exclusively via a mobile phone, ranging from 43% in Mexico to 95% in Myanmar. According to ITU estimates, in developing markets in 2019, there were 72 mobile broadband connections per 100 inhabitants compared with 11.2 fixed broadband subscriptions per 100 inhabitants
15. Mobile broadband coverage is defined as coverage a network that is at least 3G but could be a more recent technology such as 4G or 5G. Currently, mobile broadband coverage is more widely available than 4G coverage specifically. As of Q4 2019, mobile broadband networks covered 91 per cent of the world's population while 4G networks covered 85.38 per cent. The difference is more pronounced in some regions such as Sub-Saharan Africa where mobile broadband networks cover over 70 per cent of the population while 4G networks cover just over 40 per cent. Various policies that are discussed later in this paper contribute to this difference (e.g. spectrum availability including the digital dividend, spectrum affordability and lack of technology-neutral spectrum licences).
16. "The Mobile Gender Gap Report 2020", GSMA (2020).
17. "The State of Mobile Internet Connectivity Report" GSMA (2020).
18. It should be noted that these costs do not consider 5G which are likely to be higher given the larger backhaul requirements. "Unlocking Rural Coverage: Enablers for commercially sustainable mobile network expansion", GSMA (2016).

Innovative technologies and deployment models helping to expand mobile coverage

It is often a challenge to deploy mobile broadband in rural and remote areas, as costs can be prohibitive, revenues lower and logistics complex. Specifically, there are three main areas where infrastructure costs can be prohibitive:

1. The mobile base station;

2. The backhaul which connects base stations to the core network; and

3. The energy (both supply and storage) that enables both these components to function.

These elements account for a major share of the total cost of ownership for each network deployment, including operators' capital and operational expenditure.[19]

A rapidly-growing approach to overcoming this challenge in many areas is infrastructure sharing.[20] This allows operators to share network deployment and operating costs, thus making rural sites more affordable and avoiding the unnecessary duplication of infrastructure. These agreements can include just the site costs or also the base station, antennas and backhaul as well as aspects of the core network in some cases. This trend also includes the use of third-party tower companies that offer access to cell sites and backhaul for several operators. Operators are also exploring neutral-host mobile infrastructure models[21] as well as leasing mobile spectrum in rural areas where it is currently unused.[22]

Innovation also has real potential to make rural broadband coverage commercially feasible. Considerable innovation with the potential to drive down the cost of delivering mobile broadband coverage is occurring. However, it ranges from already tested solutions to many ideas that are still in the formulation and design phase:

- Innovations in base station technology are amongst the more commercially developed. These focus on a simplified or modular infrastructure – this can range from lighter towers, wide-area coverage solutions, or technologies that require minimal management and maintenance. Mobile operators have also been actively trialling high-altitude base stations on balloons and drones to determine whether they are a cost-effective means of covering widely dispersed populations in rural areas, but these have yet to be fully proven;

- Innovations in backhaul also have potential but these are currently not ready for mass-market use. In-band backhaul could allow operators to reduce costs - by using their existing 'access' spectrum for backhaul rather than having to pay for alternatives – but this remains to be widely commercially proven. Next-generation satellite technologies could also play a backhaul role in remote areas where alternative options aren't available. However, the price and performance of these technologies have yet to be demonstrated on a commercial basis and at scale; and

- Finally, reliable and cost-efficient energy supply for rural mobile internet infrastructure in developing markets is needed. While renewable energy is playing an increasingly important role in markets where access to a consistent supply of energy is a challenge, further efforts are needed to displace environmentally unsound diesel generators that remain a mainstay of cell sites. Fuel cell solutions could play a critical role here.

Through the GSMA's Innovation Fund for Rural Connectivity, mobile network operators are testing innovations to support the deployment of mobile broadband networks in rural areas in developing markets. The GSMA is working with network-as-a-service providers in pilots to showcase RAN, energy, and backhaul innovations in remote communities of Ghana and Uganda. The pilots will evaluate technical and commercial viability of these solutions to determine which can be scaled and replicated in similar environments across the region and elsewhere. Beyond innovation on the technology, the GSMA is also working with MNOs to improve the commercial viability of rural deployments using coverage and population maps to identify the optimal location of greenfield deployments.[23]

Policy measures to support increased network investment and rapid, wide area rollouts

The priority for a growing number of policymakers is expanding the reach of commercially sustainable networks as much as possible. The best way for governments and regulators to achieve this objective is by creating an enabling environment, including pro-investment and pro-innovation policies and regulations that reduce the costs and uncertainty around spectrum assignment, remove obstacles to network deployment and promote best practices on tax policy.

A Policy Tracker study for the European Commission concluded that countries with low spectrum auction prices and long spectrum licence lengths tend to have better network coverage, a wider choice of services, better take-up and healthier competition.[24] An econometric study by the GSMA found that reasonable spectrum prices, early spectrum awards and assigning sufficiently large amounts of spectrum all had significant positive impacts on mobile coverage.[25] It also highlighted that high spectrum costs represent an especially large burden in developing markets where they are three times higher than in developed markets, once income differences are taken into account.

Technology-specific spectrum licences, rules preventing network sharing and excessively bureaucratic application processes at the local government level present significant regulatory barriers and disincentives to extending networks. Measures to simplify and expedite planning applications, facilitate non-discriminatory access to public infrastructure and permit voluntary network and spectrum sharing between operators have helped to stimulate nationwide deployments. In the US and Europe, for example, legislation has been introduced aiming to streamline siting regulations, foster a predictable and timely process for applicants and reduce licensing fees.

However, more can still be done to further support rapid network rollouts and improved coverage.

- Permitting network sharing can help reduce rural infrastructure CAPEX and OPEX by 50-80 per cent;[26]

- Rules to make spectrum licences technology neutral at no extra cost can also dramatically speed up mobile broadband availability by allowing 2G 'coverage' bands (e.g. 900 MHz or 850 MHz) to be used for 3G or 4G; and

- In 2018, 3G population coverage in sub-Saharan Africa jumped from 63 per cent to 70 per cent in large part because operators in the region started to use the 900 MHz band for 3G services – this was only possible with technology neutral licensing.

Sector-specific taxation on mobile consumers and unstable corporate taxation of the operators pose additional barriers for private sector investment, particularly so when a tax regime is not stable and predictable. Mobile-specific taxes, often levied on operators' revenues, as opposed to profits, reduce both the operators' incentive and ability to invest. The GSMA has also found a negative relationship between consumer tax volatility and infrastructure development, with more uncertain markets attaining lower infrastructure outcomes.[27]

19. It should be noted that there are other barriers to cell site deployments especially in developing markets. These include: where roads require construction or river/water navigation is required How innovation can drive rural connectivity, GSMA (2019).
20. See end note 8
21. For example. Telefónica is part of the 'Internet without borders' initiative
22. Vodafone is leasing the 2.6 GHz band in some rural areas in the UK
23. www.MobileCoverageMaps.com
24. e.g. Policy Tracker study for the European Commission (2017) & 'The impact of spectrum pricing on consumers' GSMA intelligence (2019)
25. See end note 8
26. "Unlocking Rural Coverage: Enablers for commercially sustainable mobile network expansion", GSMA (2016).
27. Tax volatility is measured by the number of consumer tax changes over 2011 to 2017 and infrastructure development measured through GSMA's Mobile Connectivity Index Infrastructure rating. 'Rethinking mobile taxation to improve connectivity', GSMA (2019)

Policies measure to stimulate mobile internet demand

Measures to drive mobile internet usage are vital to overcoming the usage gap. This will also reduce the coverage gap as increased demand improves the business model for rural connectivity and makes rural base stations more economically viable. A critical challenge remains the affordability of mobile devices and services for consumers. Mobile data is becoming more affordable in all regions but still falls short of the target of two per cent of monthly income per capita[28] in more than half of LMICs. The cost of an entry-level mobile internet-enabled device is more than 20 per cent of average monthly income in more than half of LMICs – and in many, it is over 50 per cent.[29]

Governments have an opportunity to alleviate the affordability barrier by rebalancing the tax burden on mobile consumers. Mobile-specific taxes are felt most acutely by the poorest in society, including women[30], as they take up a larger proportion of their incomes. These include a variety of taxes on activating mobile services (e.g. SIMs), use of the services and on devices. Countries that have removed a number of these taxes in return have experienced growing mobile internet device and service adoption.[31] At a regional level, lower sector-specific taxation is also linked with higher 4G penetration, suggesting a potential lever to increase demand.[32]

Digital skills, including awareness and understanding of the mobile internet, are another key barrier to uptake. The mobile and wider technology industry is increasingly focused on this area by highlighting the benefits that the mobile internet can offer, as well as the promotion of relevant content and services to drive mobile internet uptake and usage. This includes a growing focus on women as the mobile gender gap means that 300 million fewer women than men use the mobile internet in LMICs.[33] Governments can help to increase usage through the development of eGovernment services (which encourage more people to go online) and by including digital skills training in public education programmes.

28. Set by the Broadband Commission for Sustainable Development
29. See end note 27
30. "Who wins? Who loses? Understanding women's experiences of social media taxation in East and Southern Africa", A4AI (2019)
31. 'Rethinking mobile taxation to improve connectivity', GSMA (2019)
32. 'Rethinking mobile taxation to improve connectivity', GSMA (2019)
33. See end note 16
34. Wholesale Open Access Networks', GSMA (2017)

Policy measures focused specifically on rural and remote mobile coverage

Given the economic challenge of delivering mobile coverage in rural areas where costs are high and revenues are low, policy makers have looked at a variety of approaches which have had a mixed track record. They include government funding or subsidies – sometimes using Universal Service Funds (USFs) - to directly invest in schemes such as single wholesale networks, community networks or other types of Public Private Partnerships to support rural networks. In particular, single wholesale networks have received significant attention but have either failed to successfully launch or not been proven to expand coverage into new areas – especially rural and remote locations.[34]

A trend that is gaining increased traction in Western Europe is reducing spectrum costs in a variety of ways in return for network investment in rural and remote areas that policy makers often explicitly define:

- In Sweden, operators have been able to claim back part of the amount they bid at spectrum auctions in order to pay for base stations in rural areas defined by the regulator;
- French and Portuguese operators have been granted very low-cost spectrum licence renewals in return for covering defined rural and remote areas; and
- Operators in the UK are set to build a shared rural network in areas where there is currently no coverage – the industry proposal was for funding to be 50 per cent from operators and 50 per cent from government that would be paid for using spectrum fees.

However, it isn't just in Western Europe where policy measures are being rolled out to improve coverage:

- In the US and Turkey, policymakers have adopted reverse auctions of government subsidies to build networks to cover pre-defined rural areas;
- In Turkey, the winning bidder built a shared mobile network covering 1796 communities with less than 500 inhabitants; and
- In 2019, in Uzbekistan, investments in rural areas were made tax deductible, while in Madagascar, import duties on capital goods required for mobile infrastructure were halved.

Approaches such as these show how a wide variety of targeted policies can help extend coverage into rural and remote areas.

Positions

1. Assign sufficient amounts of mobile spectrum to operators in a timely manner - including coverage bands

Mobile operators need timely and affordable access to a sufficient amount of spectrum in order to support high speed, mobile broadband services with good coverage. It is vital that sub-1 GHz 'coverage' spectrum bands are assigned for mobile broadband use as this frequency range can cover wide areas with a small number of base stations, making it ideal for affordably covering rural areas. This includes the digital dividend[ii] frequency band(s) which is typically the only sub-1GHz band that is available at the outset for mobile broadband services. Without such coverage bands, it can be very expensive – and thus impractical – to provide widespread rural mobile broadband services.

Delays to spectrum awards and limiting how much spectrum is made available also has an impact on coverage levels. Recent research has shown that 4G mobile coverage increases by 11-16 percentage points, and 3G coverage increases by 20 percentage points, when operators are assigned spectrum 2 years earlier[iii]. The same study showed an additional 20 MHz of spectrum per operator increases 4G coverage by 2-4 percentage points. These principles also apply to wireless backhaul spectrum which needs to be affordable and made available in a timely manner in sufficient quantities in the right bands and under an appropriate licensing regime.[35]

ii. The digital dividend is the new spectrum made available for mobile broadband following the transition from analogue to digital terrestrial broadcast television
iii. An econometric model was used to simulate mobile coverage over the period 2010–2017 based on a sample of 64 countries. See GSMA intelligence study 'The impact of spectrum pricing on consumers'
iv. Backhaul refers to the connection between mobile base stations and the core mobile network
v. For more information, see the GSMA's spectrum pricing position paper
vi. See footnote 4
vii. For example, by setting aside valuable spectrum bands for verticals or new entrants
viii. https://www.gsma.com/expanding-mobile-coverage

2. Do not inflate spectrum prices. Also, look for trade-offs between reduced spectrum fees and carefully considered wider coverage obligations

Governments should prioritise improved mobile broadband services with excellent coverage, ahead of revenue maximisation, when awarding and renewing spectrum licences. High spectrum prices have been shown to lead to slower mobile broadband speeds and worse coverage[v] It is also important that governments strongly consider how they can achieve ambitious coverage goals by offering discounted spectrum in return for targeted coverage obligations.

Recent research has shown that 4G mobile coverage would increase by 7.5 percentage points if countries with the most expensive mobile spectrum had sold spectrum at the global average price instead.[vi] There are also a growing number of examples of spectrum going unsold – especially the digital dividend band which is central to improved 4G coverage – due to high prices.[36] The cause is often policy decisions including directly setting high upfront costs and/or annual fees, setting high reserve prices for auctions, restricting the supply of spectrum – creating scarcity[vii] – and due to poorly designed auctions.[37]

A growing number of governments are using reduced spectrum fees in return for operator commitments to provide coverage in carefully targeted areas.[viii] These approaches include offering spectrum for a very low cost or for free when licences are due for renewal, or reductions in annual fees, or reimbursements of a fixed amount of upfront costs in return for coverage commitments in designated areas. These approaches pragmatically recognise the difficulty in providing coverage, or upgrading networks, in specific geographic areas where the economics of mobile service delivery are most challenging.

3. Avoid licence terms and conditions that discourage network investment and innovation and needlessly increase costs

It is vital that there is a policy and regulatory environment that gives the mobile industry the ability to upgrade and innovate, as well as the confidence needed to make significant, long-term network investments. This is especially vital for rural mobile coverage as the time needed to make a return on network investment can be significant, so unnecessary risks and limitations create major obstacles.

In the area of spectrum, it is vital that regulators award long-term (e.g. 25 years), technology-neutral licences with the expectation of renewal.[ix] It is not uncommon to see shorter, technology-specific licences with an unclear renewal procedure that is only reviewed close to expiry, creating unclear expectations surrounding future access and the associated costs. This is especially harmful for rural mobile coverage as it discourages investment because it is unclear if it can be recouped. Technology-specific licences – or additional costs for technology neutrality - also mean that highly valuable coverage bands (e.g. 900 MHz) are often only used for 2G rather than mobile broadband. The conditions imposed in licences – including coverage and other quality of service obligations – should always be carefully considered. Imposing onerous and inflexible conditions that may be impractical or impossible to meet can jeopardise investments and incentivise consumer price rises. Instead, regulators should engage in a dialogue with licence holders to arrive at more practical solutions.

More widely, if regulations and policies fail to adapt to change, markets can become distorted in ways that harm competition, slow innovation, and ultimately deprive consumers of the benefits of technological progress. Unnecessary regulations, like mandatory national roaming obligations, can negatively impact the deployment of networks and the widening of mobile coverage. Policymakers and regulators are therefore encouraged to review their approaches, embracing technology-agnostic,flexible visions. This will more effectively align future changes in markets and technologies while still retaining the ability to achieve policy objectives and regulatory oversight.

35. e.g. this could include unlicensed, block, point to point and point to multipoint regimes
36. These are too numerous to mention here but notable examples include India (2016) and Ghana (2018)
37. For more information see the GSMA's spectrum pricing position paper

4. Reduce mobile-specific taxes and fees that impede rollouts and harm internet affordability

Some governments have chosen to impose sector-specific taxes, beyond general taxes, on the mobile industry and consumers of mobile services. These can be borne either by the mobile operators themselves, resulting in reduced investment incentives, or by the consumers by way of higher prices, resulting in lower uptake and use of services, or a combination of the two.

Sector-specific taxes on airtime and devices reduce the affordability of mobile access for end-users, with low-income groups particularly impacted. It is these customer groups who typically make up the addressable market opportunity for rural coverage expansion, and therefore such taxes reduce the incentives for investment in network expansion in those already-less-profitable areas. Network expansion incentives are also negatively affected by specific taxes on network equipment and levies targeting operators' revenues.

These negative impacts result in weaker demand, particularly in rural and lower-income areas and reduced incentives for investment and network build-out in those same areas. Discriminatory, sector-specific taxes deter the take-up of mobile services and can slow the adoption of ICT. Lowering such taxes benefits consumers and businesses and boosts socio-economic development. At the same time, the removal of sector-specific taxes can simplify tax regimes by streamlining how taxes and fees are calculated and levied and thereby improving the investment environment.

5. Provide non-discriminatory and timely access to public infrastructure

Public infrastructure such as government buildings, roads, railways and ducts for utility services has an important role to play in the cost and speed of network expansion projects. Policy makers can support the efforts of mobile operators to expand mobile network coverage by facilitating timely and affordable access to public infrastructure such as buildings, roads, street furniture, railways and ducts for utility services. Such access can be easily implemented, will remove or reduce barriers to deployment and significantly accelerate the network rollout process. This policy approach can save on the up-front and operating costs of setting up a tower.

6. Simplify and streamline the planning approval process for new base stations to incentivise and speed-up deployment

Building mobile networks involves complex and time-consuming planning approvals. Bureaucratic processes including multiple application processes and usage fees (and the resulting red tape) are a significant barrier to deploying mobile infrastructure. Frequently, mobile operators must obtain approvals from multiple authorities at various governmental levels, often creating redundant processes and delaying deployment.

To achieve ubiquitous coverage, governments and regulators should aim to implement streamlined processes while still respecting environmental and community impact considerations. Application processes can be transitioned to one digital administrative channel, improving coordination between government entities, driving cost efficiencies and saving valuable time. Governments are also encouraged to centralise all suitable statistical and geographical information needed to support mobile broadband network rollout.

As the number of small cell sites increase as a part of evolving deployments, governments may consider exemptions for small cell installations, reduce antenna height regulations in order to maximise coverage, allow colocations or certain site upgrades, as well as establish 'one-stop shopping' licensing procedures and even implicit approval.

By consolidating, harmonising and digitising application and administrative processes, updating base station, small cell and antenna restrictions for evolving deployments and improving the availability of infrastructure data, barriers to designing and deploying mobile networks will be reduced, resulting in more cost-effective rollout which can reach rural areas more efficiently.

7. Adopt competition policy which supports investment in high quality mobile networks

Effective competition spurs investment and innovation and is a principle firmly supported by the mobile industry. When reviewing mobile mergers, it is essential that authorities consider the economic realities of investments in infrastructure-based businesses, and adopt decisions which are consistent with wider policy goals, such as universal access to the internet. The benefit of more concentrated mobile market structures in terms of higher investments and higher performance, and improved consumer experience should be fully factored into any merger review.

8. Allow infrastructure sharing on a voluntary basis

Common in many countries, infrastructure sharing arrangements allow mobile operators to jointly use masts, buildings and even antennas thus avoiding unnecessary duplication of infrastructure. Infrastructure sharing can also provide additional capacity in congested areas where space for sites and towers is limited. This practice can also facilitate expanded coverage in previously underserved areas by reducing both CAPEX and OPEX costs (which are generally higher in more remote areas) for mobile operators.

In order to satisfy aims for universal mobile coverage, governments should have a regulatory framework which allows for voluntary sharing of infrastructure amongst mobile operators. This enables operators to share the cost of network extension and densification without compromising competition and the quality of services. In order to avoid distorting competitive market dynamics, any sharing should be a result of commercial negotiation and should not be mandated or subjected to additional regulatory constraints or fees. Infrastructure sharing agreements should be governed under commercial law and, as such, subject to assessment under general competition principles.

9. Only consider state intervention to support coverage once all regulatory measures to maximise coverage through market driven mechanisms have been exhausted and after a careful assessment of different options.

Universal service funds (USFs)[x], community networks[xi] and public–private partnerships (PPPs)[xii] are being used or explored to ensure greater investment in uncovered areas. However, these initiatives should not distort efficient markets and should only be considered when all other regulatory options to maximise coverage in the most remote areas through market-driven mechanisms have been exhausted.

The GSMA[xiii] and ITU[xiv] studies have shown most USFs to be inefficient and ineffective in extending coverage, with more than USD $11 billion in collected levies not being disbursed. When administered ineffectively, USFs can be counterproductive in that, by effectively taxing communications customers, they actually raise the affordability barrier. Existing USFs should follow a set of best practices,[xv] be targeted, time-bound and managed transparently. If the efficient management of a USF cannot be achieved within a reasonable and defined timeframe, a roadmap should be adopted to phase them out.

Community Networks are a specific solution to often unique geographical, commercial, and/or logistical challenges in delivering connectivity, limiting their scalability and applicability as a general policy mechanism. Regulations and supporting policies should equally empower community networks and operators in ways that do not impair connectivity expansion initiatives through large-scale commercial networks, for example, by carefully assessing the risk of underusing scarce spectrum resources set aside for community networks.

PPPs can be effective for leveraging public-private synergies in areas which lack sufficient potential for private investment in connectivity. Large-scale PPPs often attract the interest of multilateral organisations, which are willing to provide direct funding.[37] Additionally, governments may also look to these institutions for alternative financing mechanisms which may facilitate national coverage goals. Governments should only consider PPPs to expand connectivity in the most remote areas. Such projects should be aligned with operator rollout planning, and service delivery to end-users should be left to the private sector. Preferential conditions that the PPP enjoys should equally apply to other market participants. Single wholesale network (SWN) structures are likely to lead to worse outcomes for consumers than alternative commercial solutions such as network sharing, and should therefore be avoided.

x. USFs are typically funded by levies on telecommunication sector revenues and the funds are disbursed through direct subsidies or through competitive bidding. Depending on the terms of a USF, MNOs may also be permitted to directly invest in coverage-related initiatives or projects in return for a proportionate reduction in their contribution to the USF levy – this is known as "pay to play" in this context. The terms of a USF could also enable non-financial incentives for network roll-out, such as the simplification of permit procedures'

xi. Community Networks can be defined as a 'do it yourself' approach to connectivity: local, community-owned (or community-managed) networks that are addressing specific and local connectivity needs. Community Networks often utilise WiFi technology in unlicensed spectrum for their operation, although very few countries have assigned spectrum specifically for their operation

xii. A Public Private Partnership (PPP) is a legal arrangement between two or more private and public sector parties with the aim of delivering a service via co-investment. Governments see PPPs as a way to drive investment in uncovered areas and leverage the expertise of the private sector

xiii. Survey of Universal Funds: Key Findings

xiiii. Universal Access Fund and Digital Inclusion for All, ITU (2013)

xiv. For more information see the GSMA Policy Handbook: Universal Service Funds

37. For example, the World Bank, International Finance Corporation or the EU Regional Development Fund

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