



The Mobile Economy
Russia
& CIS
2021



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Executive summary



The pandemic underlines the crucial role of connectivity

The Covid-19 pandemic has had a profound impact on the digital landscape in the Commonwealth of Independent States (CIS) region and elsewhere around the world. The restrictions on social interaction, trade and travel that have been implemented to contain the spread of the virus have highlighted the value of connectivity for social wellbeing and economic activity. The pandemic has also emphasised the importance of universal access to fast, reliable internet and a range of digital services for individuals and businesses alike.

The mobile industry in the CIS region has played a vital role in keeping citizens connected during the pandemic, such as by offering call and data tariff discounts, providing free access to entertainment and healthcare services, and donating to national Covid-19 relief funds. Though the situation remains challenging in many CIS markets, the mobile sector is taking measures to help society recover and to build more resilient economies. This includes providing remote workplace solutions, utilising digital channels and supporting children's education through technology.



High regional market penetration, but scope for growth remains

At the end of 2020, the CIS region was home to 238 million unique mobile subscribers, more than 70% of whom were accounted for by Russia and Ukraine. Unique mobile subscriber penetration in these two markets is particularly high and significantly higher than the penetration rates of many other countries (e.g. 62% in Tajikistan). As such, some headroom for subscriber growth remains, with the most substantial gains set to materialise in

relatively underpenetrated markets, including Kazakhstan and Uzbekistan.

With good availability of lower-cost handsets, smartphone adoption continues to rise steadily and is forecast to surpass 85% in six markets by 2025. The expanding number of smartphone and mobile internet users in the region is leading to a surge in data traffic as engagement with bandwidth-hungry applications rises.



4G is the priority in the near term, with 5G yet to take root

Though later than many developed markets, the CIS region is now seeing an accelerating shift to mobile broadband. 4G cemented itself as the leading mobile technology in the region during 2020 and remains a strategic priority for operators. Greater use of data-intensive services and demand for higher speeds will drive further adoption, with 4G accounting for two thirds of total connections by 2024. In certain countries, GSMA Intelligence expects this to deliver some revenue uplift.

In late 2020, the Russian government released a 5G roadmap, requiring operators to build 5G networks using locally produced equipment. This decision, along with unresolved issues around spectrum, risks delaying the launch of commercial 5G services in Russia until 2024

at the earliest. In the meantime, operators will shift focus to testing various use case for the enterprise and consumer segments. By 2025, the CIS region will be home to over 30 million 5G connections, equivalent to an adoption rate of 8%.

Capex is expected to dip slightly in 2021 as operators target capital efficiency. However, the focus will shift quickly to 5G in the coming years. Between 2020 and 2025, mobile operators in the CIS region will invest over \$26 billion in their networks, of which an increasing share will be 5G-related. Initial monetisation strategies will be centred on enhanced mobile broadband (eMBB) services for consumers, in addition to private networks for enterprise customers.



Mobile industry drives economic growth and social development

In 2020, mobile technologies and services generated 7% of GDP in the CIS region – a contribution that amounted to almost \$143 billion of economic value added. The mobile ecosystem also supported approximately 740,000 jobs (directly and indirectly) and made a substantial contribution to the funding of the public sector, with almost \$13 billion raised through taxes on the sector. By 2025, mobile's contribution will grow by around \$17 billion (approaching \$160 billion) as countries in the region increasingly benefit from the improvements in productivity and efficiency

brought about by the increased take-up of mobile services.

Operators are also making significant contributions to the welfare of society more broadly. Continued investments in networks are helping bridge the digital divide and drive inclusion across the region. The mobile industry is contributing to progress towards the UN's Sustainable Development Goals (SDGs). This includes providing access to life-enhancing educational tools and platforms, delivering the infrastructure that spurs innovation, and supporting efforts to combat climate change.



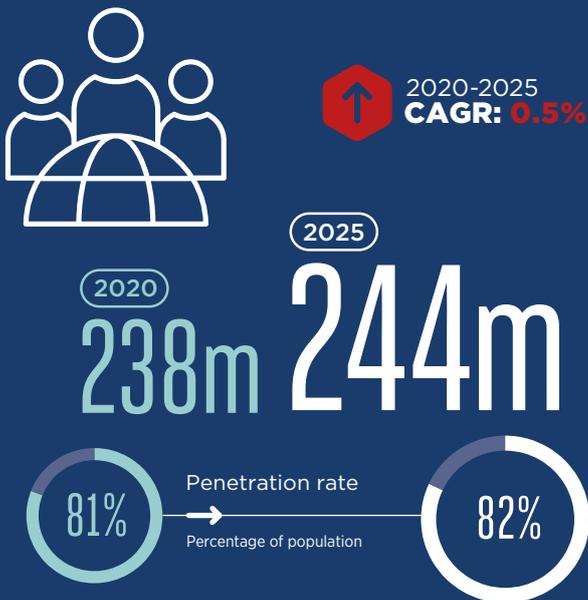
Policies to support the region's recovery and future prosperity

In a post-pandemic world, digital services and technologies will be vital to reinvigorate the CIS economy and rebuild businesses and communities. The rollout of mobile broadband can help spur socioeconomic growth and transform traditional industries. There has never been a more relevant time for governments to implement policy measures to stimulate investment in connectivity and address the barriers to internet use.

In the context of 5G, which will underpin the digital economy this decade, specific measures on spectrum and efficient network rollout are particularly important to stimulate investments as well as innovation in applications and solutions for a variety of use cases. Policymakers should also revise the outdated electromagnetic emission rules that could hinder cost-efficient 5G deployments, and rethink fiscal policy to strike the right balance between tax revenue generation and operator investment.

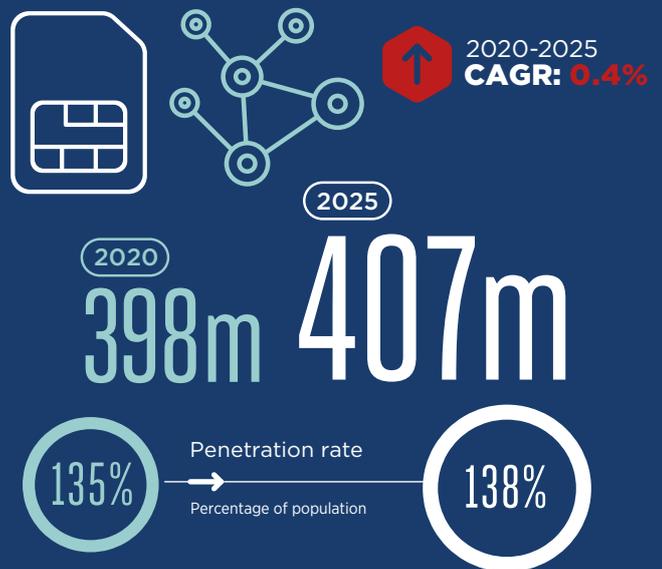
Mobile Economy Russia & CIS

UNIQUE MOBILE SUBSCRIBERS

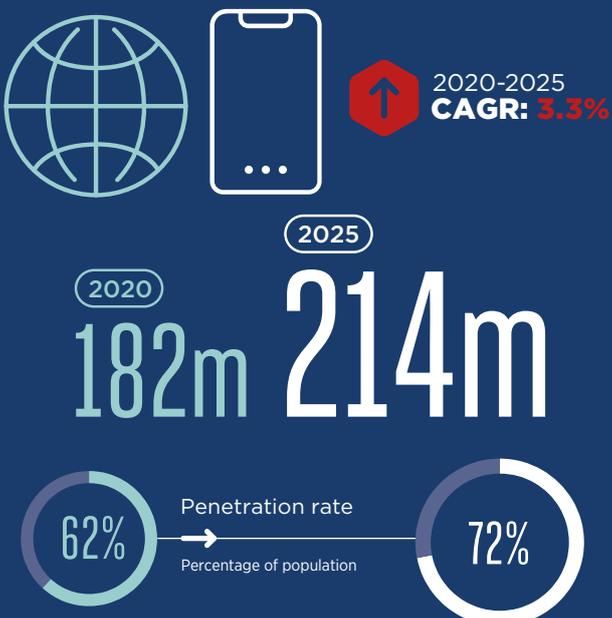


SIM CONNECTIONS

(excluding licensed cellular IoT)



MOBILE INTERNET USERS



OPERATOR REVENUES AND INVESTMENT

Total revenues

2020: \$22.7bn

2025: \$23.0bn

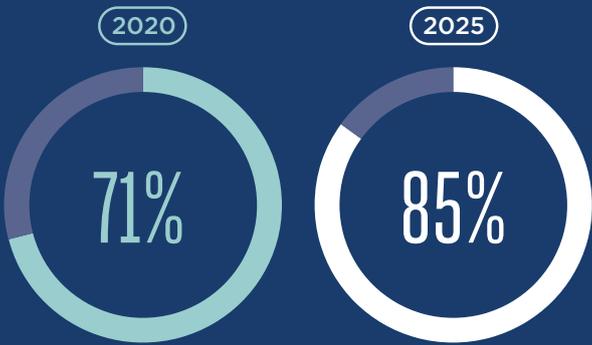
Operator capex of **\$26.5 billion**
for the period 2020-2025

4G

Percentage of total connections
(excluding licensed cellular IoT)



SMARTPHONE ADOPTION



Percentage of connections
(excluding licensed cellular IoT)



MOBILE INDUSTRY CONTRIBUTION TO GDP



2020: \$143bn
2025: \$160bn

5G

2025

33m
Connections



Percentage of total connections
(excluding licensed cellular IoT)

LICENSED CELLULAR IOT CONNECTIONS



2020

421m
Total connections



2025

727m
Total connections

PUBLIC FUNDING



2020

\$13bn

Mobile ecosystem contribution to public funding

(before regulatory and spectrum fees)

EMPLOYMENT

Jobs supported by the mobile ecosystem



405,000
Direct jobs (2020)

+330,000 Indirect jobs

The CIS region¹



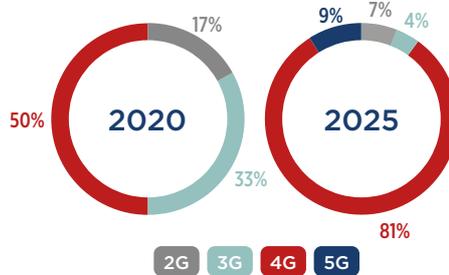
1. In this report we define the CIS region as the 12 markets shown in the graphic. However, we note that Georgia withdrew its CIS membership in 2008, while Ukraine ended its participation in CIS statutory bodies on 19 May 2018.

Subscriber and technology trends for key markets

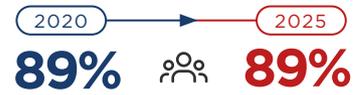
Russia



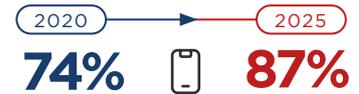
TECHNOLOGY MIX*



SUBSCRIBER PENETRATION



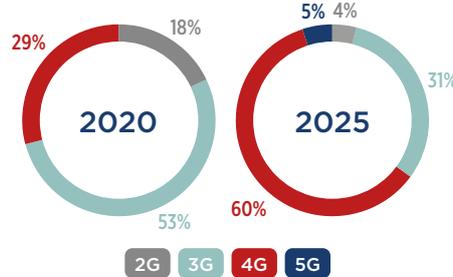
SMARTPHONE ADOPTION



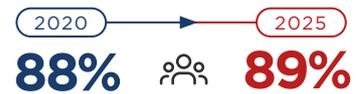
Ukraine



TECHNOLOGY MIX*



SUBSCRIBER PENETRATION



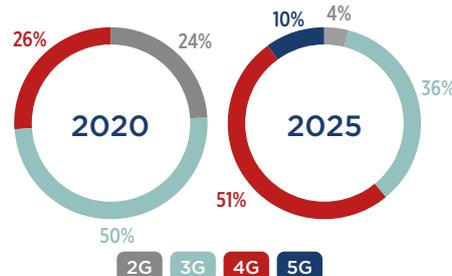
SMARTPHONE ADOPTION



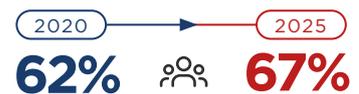
Uzbekistan



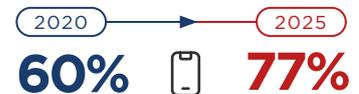
TECHNOLOGY MIX*



SUBSCRIBER PENETRATION



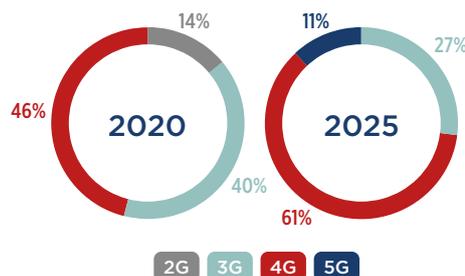
SMARTPHONE ADOPTION



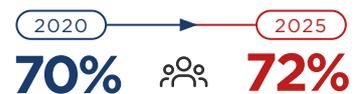
Kazakhstan



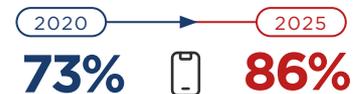
TECHNOLOGY MIX*



SUBSCRIBER PENETRATION



SMARTPHONE ADOPTION



* Percentage of total mobile connections (excluding licensed cellular IoT)
 Note: Totals may not add up due to rounding



01

The mobile market in numbers

1.1 A mature regional mobile market, with diversity at the country level

Figure 1

Source: GSMA Intelligence

Key milestones over the next five years in the CIS region

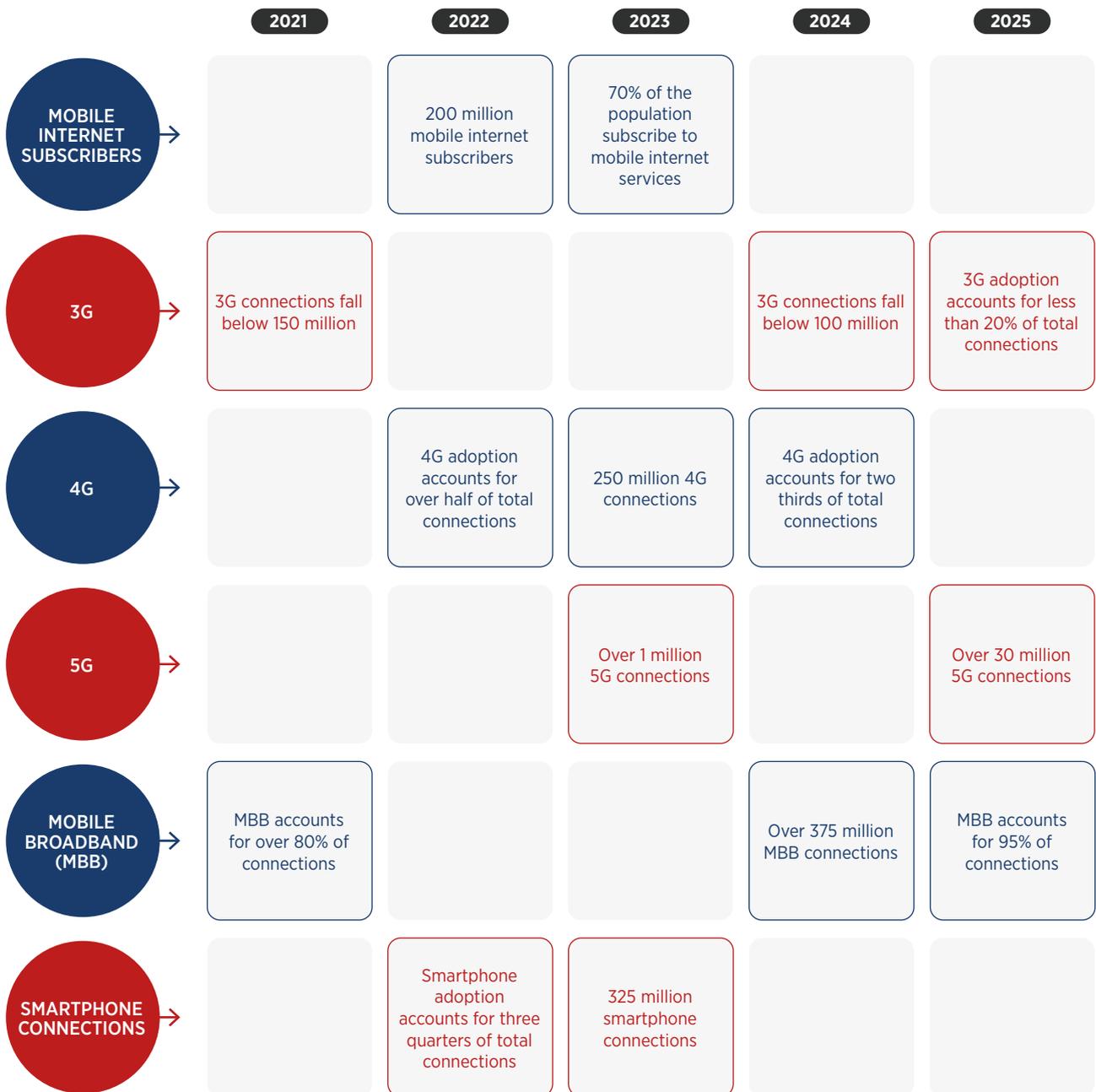


Figure 2

Four in five people subscribe to mobile services in the CIS region; Russia and Ukraine lead the way

Subscriber penetration (percentage of population)

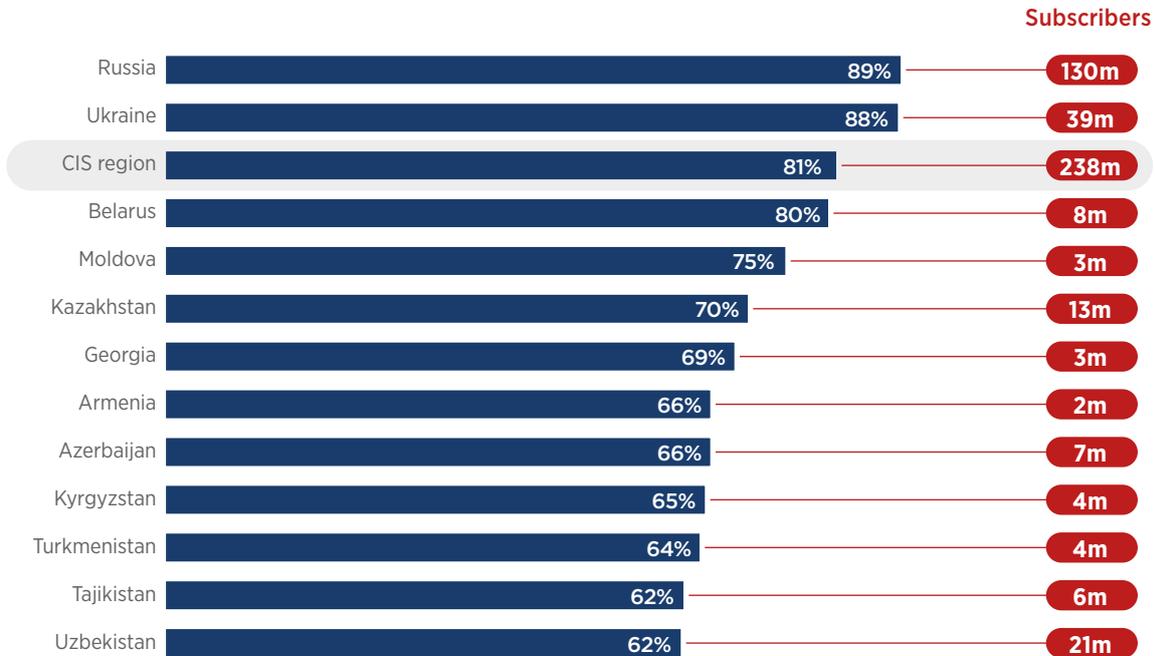
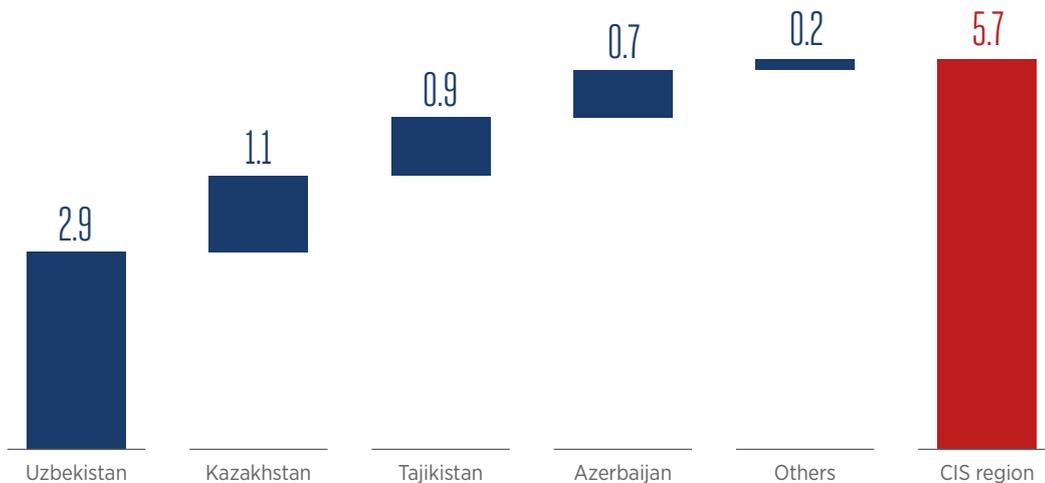


Figure 3

There remains headroom for growth in under-penetrated markets, such as Uzbekistan

New mobile subscribers, 2020–2025 (million)



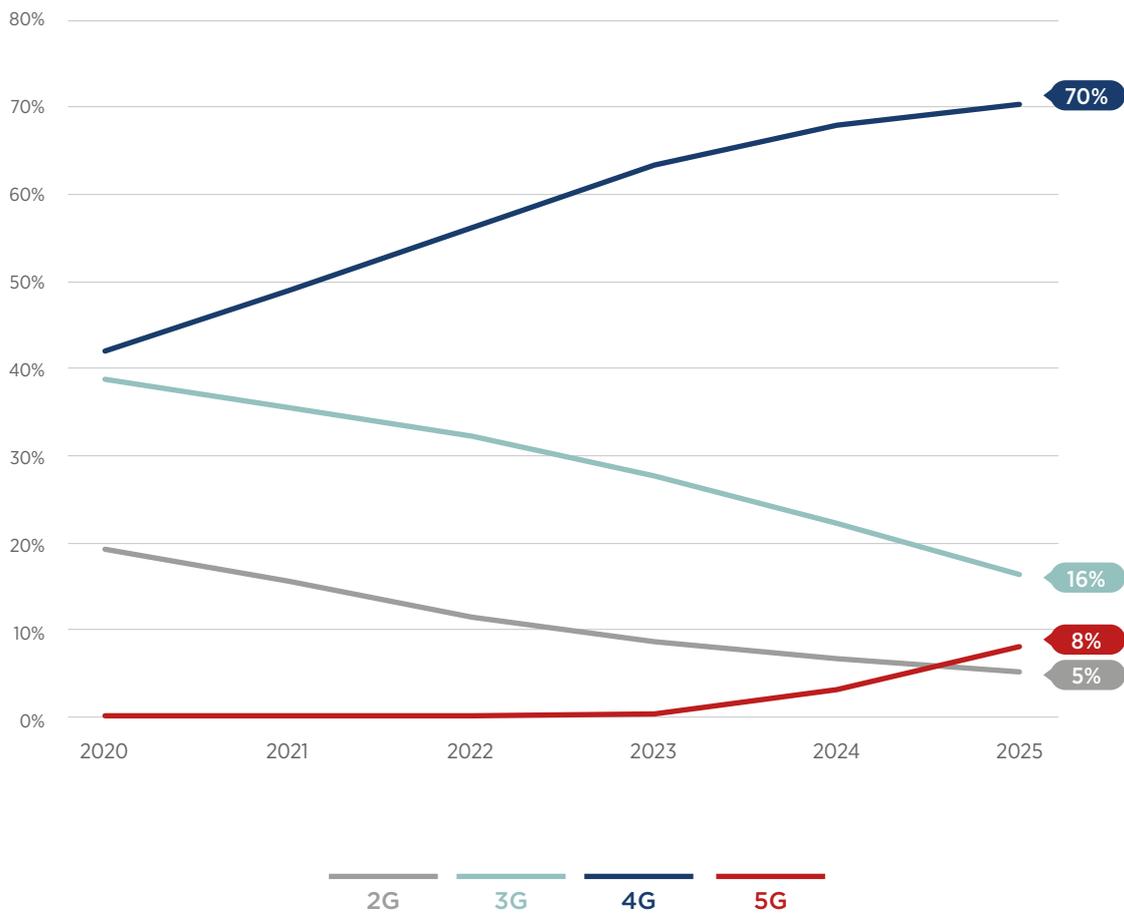
1.2 5G launches begin, but the 2020s will still belong to 4G

Figure 4

Source: GSMA Intelligence

4G adoption nears 50% in 2021 as migration from 2G and 3G gathers pace

Percentage of total connections (excluding licensed cellular IoT)



4G remains the foundation of the mobile industry

New mobile traffic demands and use cases will continue to fuel 4G's growth, underpinned by the following market dynamics:

- IoT and digital transformation:** Between 2020 and 2025, GSMA Intelligence forecasts IoT connections to grow by 1.7x in the CIS region. While 5G will deliver critical IoT capabilities, such as massive machine-type communications and ultra-reliable low-latency communication, much of this will require 5G standalone (SA) deployments. In the meantime, LTE-M and NB-IoT will be expected to do the heavy lifting.
- 2G/3G migration:** With 2G and 3G accounting for around 60% of connections (excluding licensed cellular IoT) in the CIS region, shutdowns of networks supporting 2G or 3G services might seem a way off. However, with 2G expected to account for only 5% of connections by 2025, operators in the region are likely to soon begin advancing plans to refarm spectrum to expand 4G and 5G coverage and capacity.
- VoLTE support:** Voice over LTE (VoLTE) represents the default voice solution for 5G. In the CIS region, 15 operators have launched VoLTE services, including most recently Tele2 Kazakhstan (January 2021), Kyivstar (December 2020) and MegaFon Tajikistan (December 2020). GSMA Intelligence expects there to be 145 million VoLTE (including voice over 5G) connections in CIS in 2025, representing a penetration rate of nearly 60%. To be successful, VoLTE requires all parties to adhere to a single, common implementation of interfaces between every device and network, which helps to facilitate interconnection and roaming.

Source: GSMA Intelligence

Figure 5

Commercial mobile 5G services have launched in the CIS region, but 5G remains a longer-term strategy for most operators

Commercial mobile 5G launches





1.3 Consumers go digital

Figure 6

Source: GSMA Intelligence

Mobile internet adoption will rise quickly in several CIS markets

Mobile internet penetration (percentage of population)

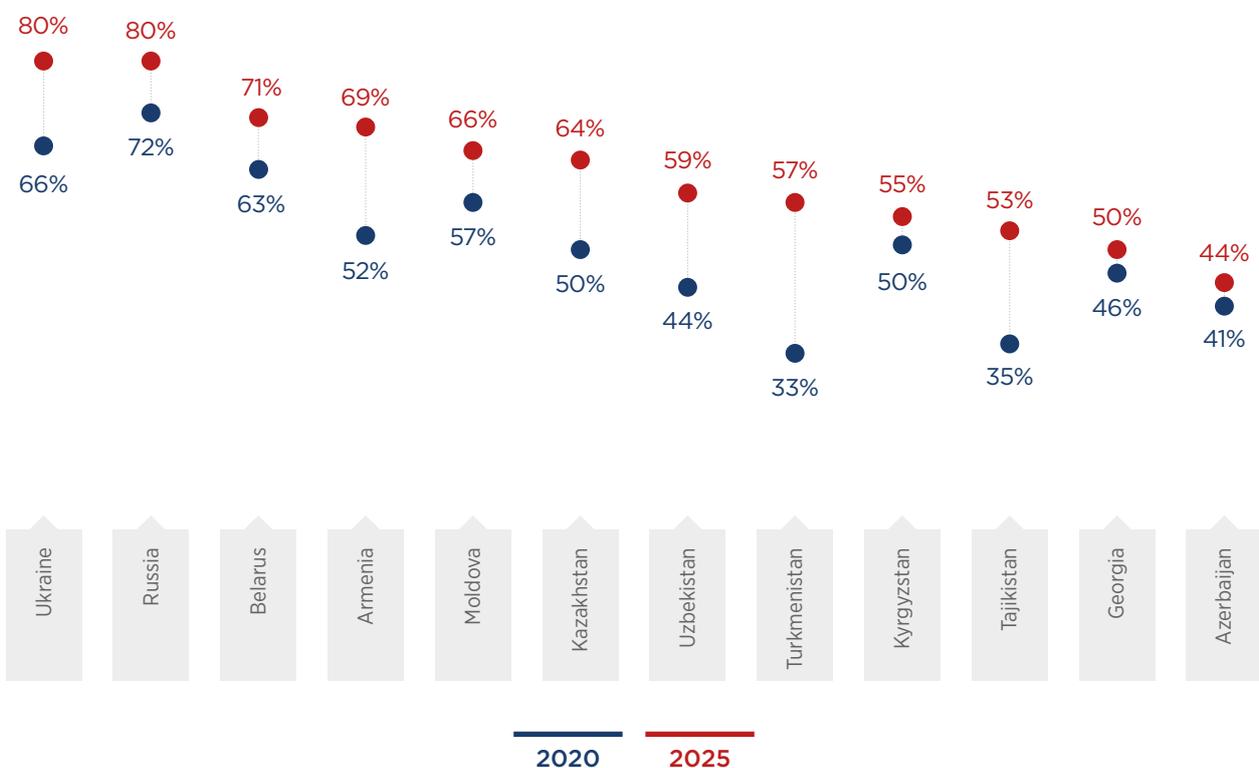


Figure 7

Smartphone penetration will surpass 85% in six markets by 2025

Smartphones as a percentage of total connections

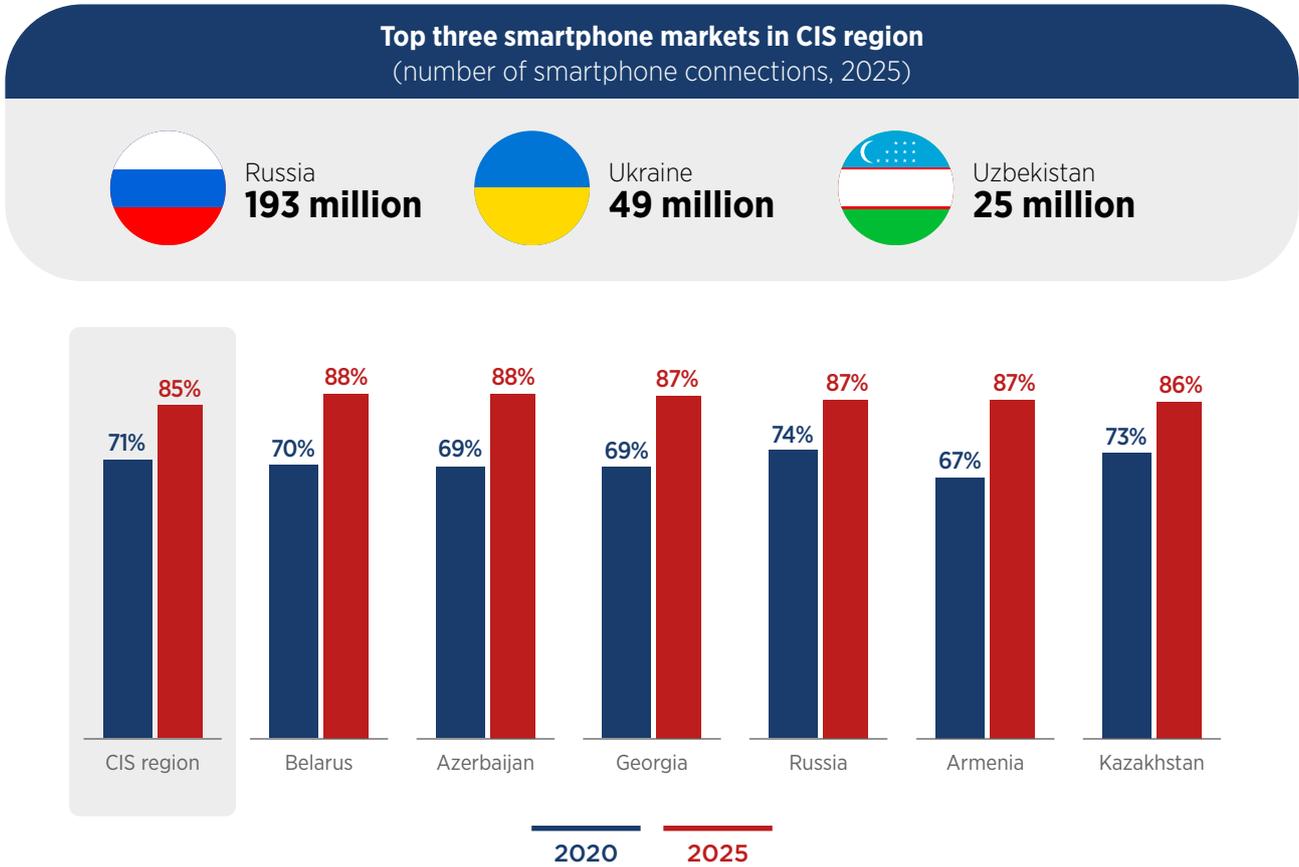


Figure 8

Migration to 4G services is triggering a data boom

Data traffic per smartphone in Central and Eastern Europe (GB/month)

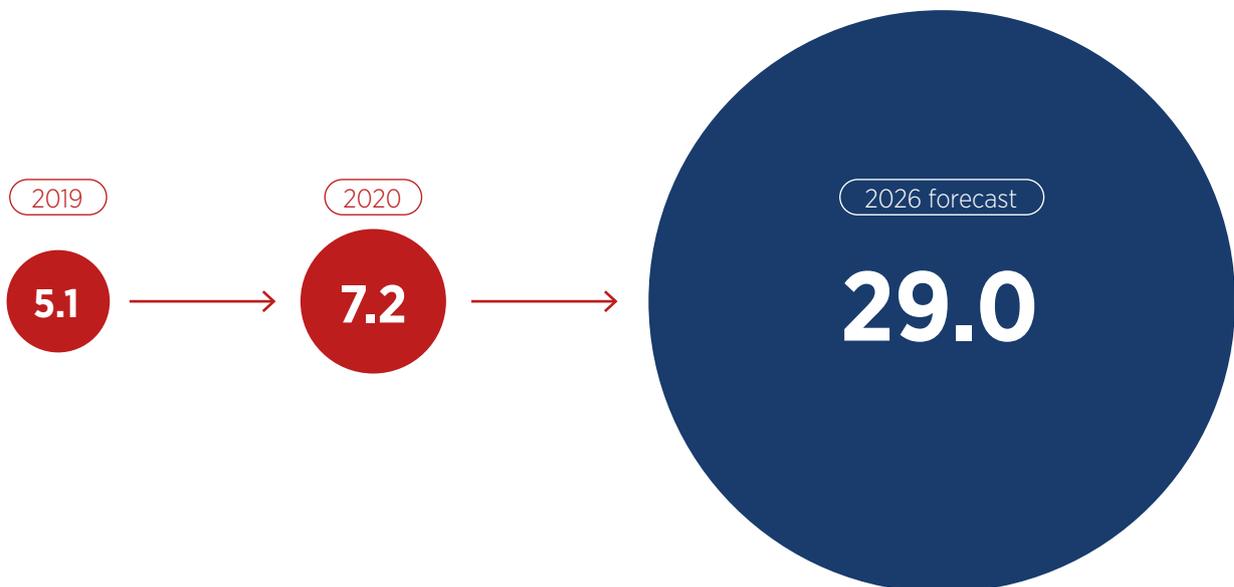
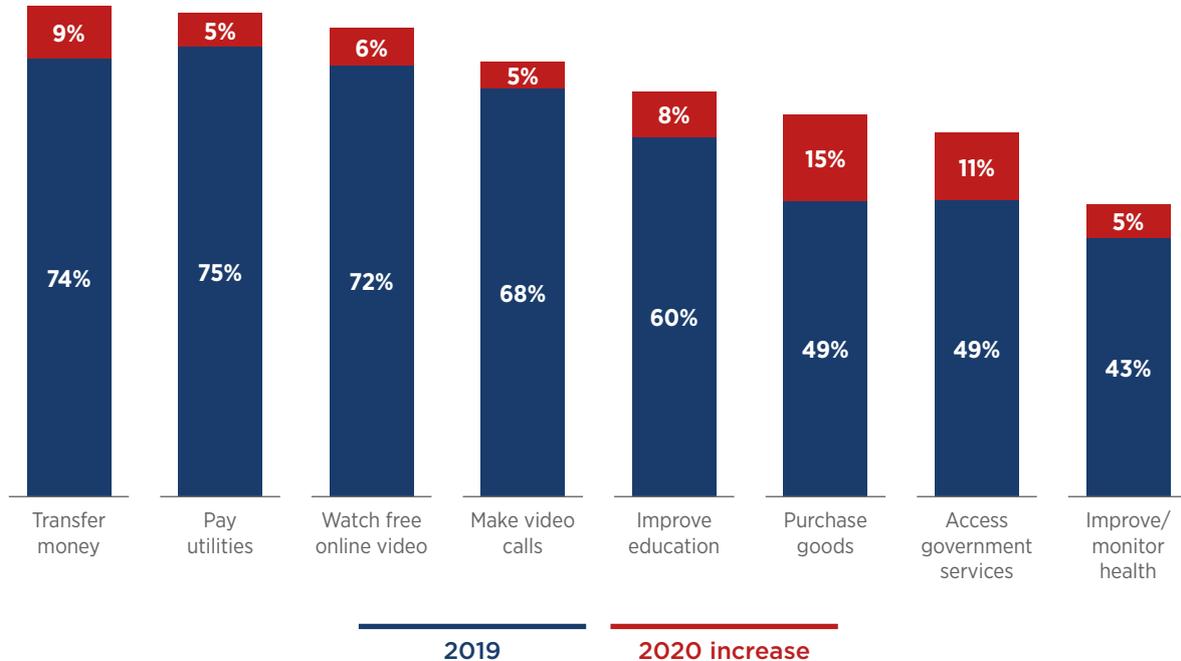


Figure 9

Source: GSMA Intelligence Consumers in Focus Survey 2020

The pandemic has spurred usage of mobile-enabled services

Percentage of mobile users in Russia that have engaged in an activity on their mobile phone at least once a month



Covid-19 accelerates smartphone trends

The pandemic disrupted smartphone supply chains and caused a sharp drop in consumer demand due to economic uncertainty. Though shipment volumes have begun to recover, the pandemic is likely to have profound implications for the smartphone industry:

1. **Lengthening handset replacement cycles:** Prior to the pandemic, the average handset replacement cycle worldwide was 2.25 years. With consumers facing tough economic prospects, the replacement cycle could extend to three years or more, slowing sales in the short to medium term.
2. **Handset sales moving online:** As 35–40% of handset sales for operators worldwide still go through retail outlets, lockdown-related store closures have constrained upgrade volumes and handset revenues. This has accelerated the migration to digital channels; MTS, for instance, reported a 136% year-on-year increase in e-commerce sales in Russia for Q4 2020. Other operators in the CIS region have reported similar trends, leading them to reconsider the size of their retail footprints. Beeline permanently shut 872 stores across 2019 and 2020, while MegaFon closed 300 stores in 2020.
3. **Shifting vendor landscape:** Given the impact of the pandemic on consumer spending, lower-cost handsets are likely to remain an important battleground in CIS markets. Sales of Huawei smartphones have been hit by US sanctions, paving the way for Xiaomi, Realme and other Chinese vendors to grow their market share in the CIS region and beyond.

1.4 A modest revenue outlook as 5G capex begins to rise

The pandemic contributed to a decline in mobile revenue in Russia in 2020. The number of subscribers fell due to lockdown-related store closures and steeper disconnections in the prepaid segment; there was also a drop in roaming revenues from guest workers and tourists. However, there

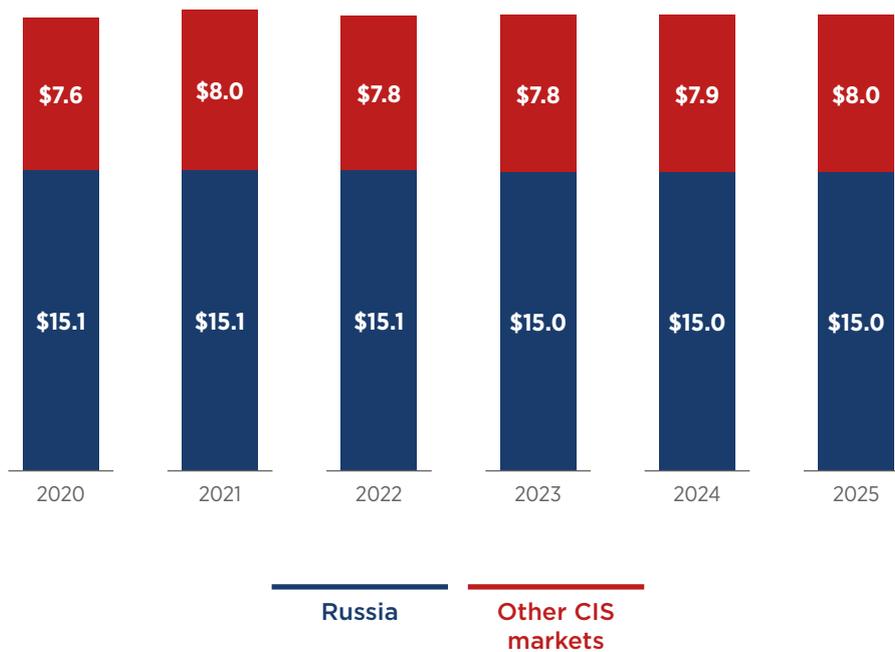
were some bright spots, with revenue growing by more than 5% year on year in Azerbaijan, Kyrgyzstan, Moldova, Turkmenistan and Uzbekistan. Looking ahead, monetising the growth in 4G penetration will be key to increasing mobile revenues across the region.

Figure 10

Source: GSMA Intelligence

The pandemic has added to pressure on top-line growth

Operator revenue (billion)



Mobile networks in the CIS region showed notable resilience during the pandemic, despite the changes in consumption levels and patterns, reflecting the levels of investment by operators in recent years. Capex is expected to dip slightly in 2021 as operators maintain their focus on capital efficiency. Investment

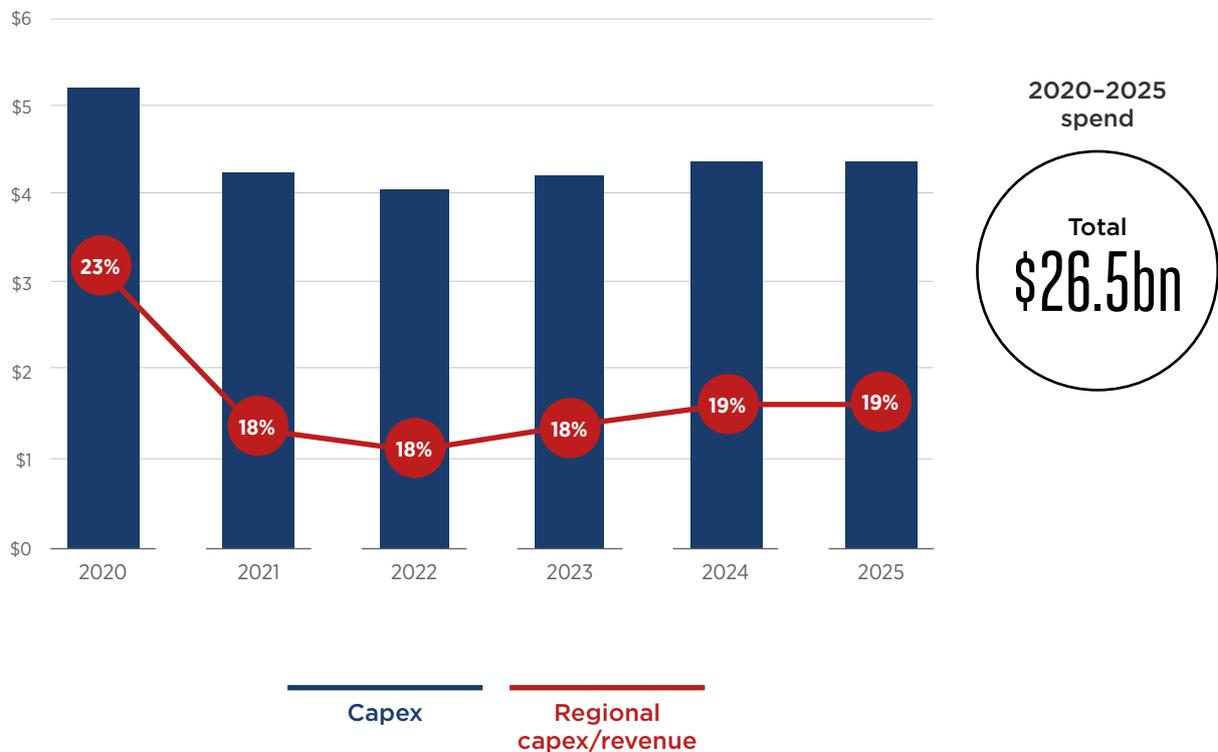
priorities will then shift quickly to 5G. Between 2020 and 2025 mobile operators in CIS will invest \$26.5 billion in total; 5G will account for an increasing proportion of capex in this period, driven by early deployments in Uzbekistan, Belarus and Kazakhstan.

Figure 11

Source: GSMA Intelligence

Capex to rise steadily in the 2020s, though cost efficiency remains an immediate priority

Billion





02

Key trends shaping the digital landscape

2.1 5G: on the horizon

As of June 2021, 5G was commercially available from 176 operators in 66 markets worldwide – and many more operators have announced launch plans. While pioneering markets such as China, South Korea and the US are witnessing next-generation networks expand and adoption gain scale, the 5G era has yet to truly begin for the CIS region. For instance, Veon has stated that its priority is increasing smartphone take-up and 4G access across its footprint, and it does not expect to commercialise consumer 5G over the next three years.²

At the time of writing, various 5G field trials are ongoing, but deployments are yet to begin in earnest and only Uzbekistan has reached the commercialisation stage. Ucell announced in April 2021 the launch of 5G services in the central business district of Tashkent using C-band spectrum. Until the end of May, customers with 5G-capable devices (around 2,500 people) were able to sign up to a promotional tariff valid for five days, which cost UZS5,000 and offered unlimited 5G data usage at speeds of around 1 Gbps.³

Meanwhile, other mobile operators are laying the groundwork for the future arrival of 5G:

- MTS has launched the first multi-location pilot 5G network for consumers in Russia, covering 14 high-footfall public spaces in Moscow. The network uses spectrum in the 4.4–5 GHz range, with frequencies in the 700 MHz and 3.4–3.8 GHz bands unavailable due to their continued use by broadcasters and military/satellite.
- State-owned Beltelecom has successfully completed the testing of a 700 MHz 5G network in Belarus – the first in the CIS region. The Minister of Communications and Informatization has confirmed that the government is aiming to achieve nationwide 5G coverage by 2025. In May 2020, A1 launched a 5G SA network in test mode, the first 5G network in Belarus constructed on the basis of standalone architecture.
- Huawei and Beeline have finished the 5G integration process in Kazakhstan and are looking to set up a pilot project in Nur-Sultan in 2021. The first part of the trial will concern data transmission, with the second part focused on applications such as augmented and virtual reality (AR/VR) and cloud gaming.

2. "Veon to strive for deeper 4G coverage, no current 5G plans", Reuters, June 2021

3. "Ucell launches 5G in Tashkent", Ucell, April 2021

The initial focus of 5G in the CIS region will be on enhanced mobile broadband (eMBB) to augment capacity in congested areas (e.g. airports, shopping malls, train stations) and to offer higher network throughput – 81% of Russian consumers expect 5G to deliver an improvement in data speeds, which operators may use as a marketing differentiator against 4G.⁴ Though 5G’s superior capabilities have the potential to underpin a range of rich, new end-user experiences, half of Russian consumers do not know enough about the technology or do not consider its benefits appealing.⁵ The low level of awareness of innovative use cases highlights the need for targeted messaging from operators on the advantages of 5G. Further, with fibre broadband penetration relatively high in the likes of Belarus and Russia,⁶ there may be limited opportunities for 5G-based fixed wireless services in the short term.

In Russia, 5G suffers from relatively low recognition among consumers compared with those in South Korea and the UK, for example.⁷ However, there has been a notable year-on-year improvement in awareness and our survey results suggest that, after a primer on 5G, Russian consumers are more likely than most (including European and North American consumers) to express an interest in upgrading – and that the majority would pay a premium to do so. However, the government’s decision for 5G networks to be built using only domestic equipment risks delaying the launch of commercial services until 2024.

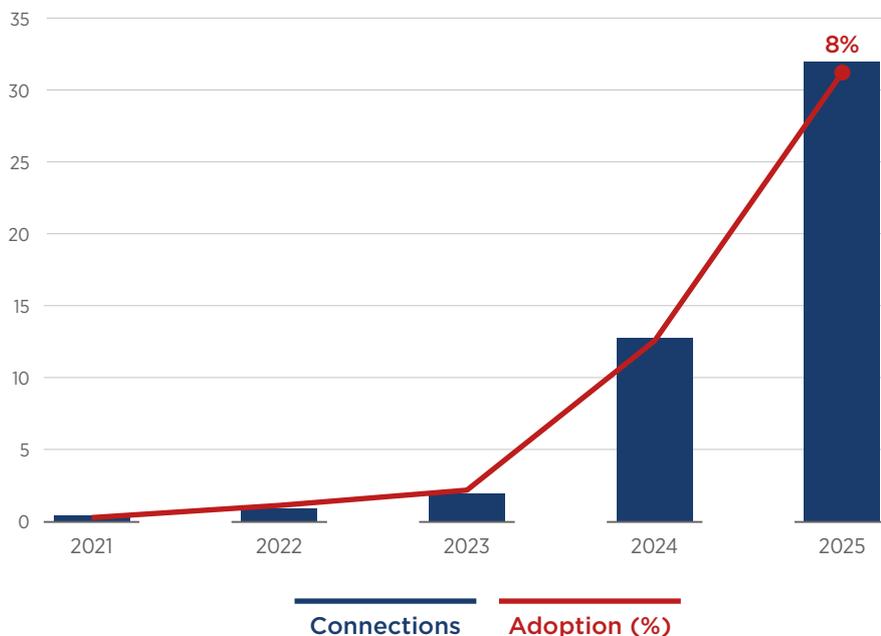
Positive word of mouth from early adopters, together with the increasing portfolio and declining prices of 5G handsets, will be key to kick-starting the CIS region’s transition into the 5G era. Momentum for 5G uptake will start building towards 2025, with more than 30 million connections expected by the end of that year.

Source: GSMA Intelligence

Figure 12

With most CIS markets yet to launch 5G services, widespread adoption will not be seen over the medium term

Million, percentage of total connections



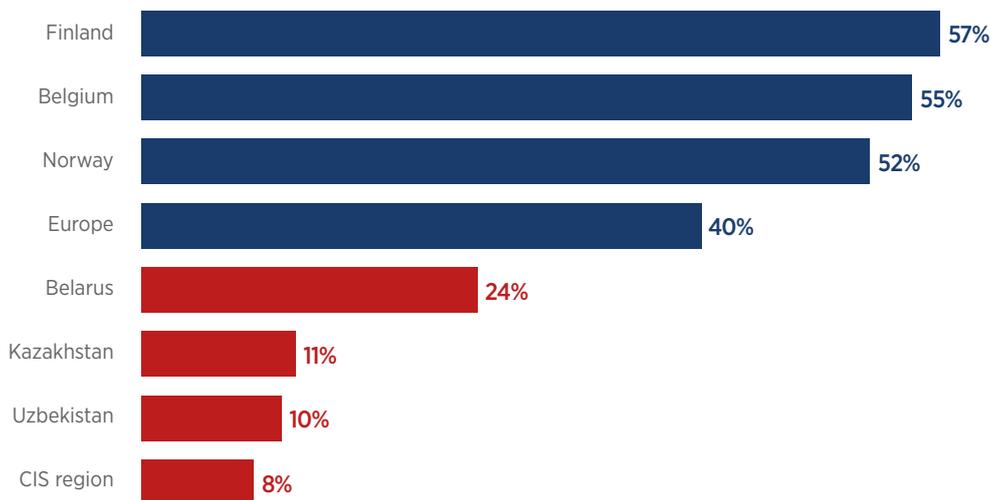
4. [How spectrum will shape the outlook for 5G in Russia](#), GSMA Intelligence, 2020
 5. GSMA Intelligence Consumers in Focus Survey 2020
 6. FTTH Council Europe – Panorama, IDATE, 2020
 7. 5G Consumer Scorecard, GSMA Intelligence, 2021

Figure 13

Source: GSMA Intelligence

The CIS region's leading 5G markets will trail their European counterparts in terms of adoption rates

5G adoption in 2025 (percentage of total connections)



Enterprise 5G is pivotal to the fourth industrial revolution

In addition to the benefits of 5G for consumers, next-generation networks hold significant promise for the digital economy and the transformation of industries. Operators are therefore eager to create value in the enterprise market, supplying high-performance connectivity and 5G-based services to various sectors, including agriculture, manufacturing and mining. In Russia, stakeholders see the potential of 5G for use cases such as public security systems, smart cities and utilities, as well as autonomous vehicles when employed with AI technologies.⁸

Veon has stated that while it is not targeting the consumer 5G segment over the short term, it is looking to deploy 5G private networks for enterprise customers. These networks allow enterprises to have more control over their connectivity and changing latency, coverage, edge or security requirements. Of those Russian enterprises that require location-specific coverage, three quarters are interested or have invested in a private network – and over 60% would prefer to partner with an operator or vendor for that venture.⁹

Pilot or commercial private networks currently in operation will use LTE connectivity and spectrum, for example MegaFon's projects with the Lebedinskiy and Udokanskaya Med mining companies. However, as demonstrated by the private networks deployed by MTS and Ericsson for energy corporation Gazprom and automotive manufacturer Kamaz, some are 5G-ready, which would allow for an upgrade in the future as the enterprise's needs or processes evolve.

8. [5G in Russia: a local and global view on the way forward](#), GSMA Intelligence/Analytical Center for the Government of the Russian Federation/LTE Union, 2019

9. [Enterprise in Focus Survey Dashboard: understanding IoT purchasing decisions](#), GSMA Intelligence, 2021



2.2 Telco of the future: revenue diversification

With slowing subscriber growth and intense price competition across the region, mobile operators are increasingly diversifying into adjacent markets to create innovative business models and generate new income streams. Operators continue to look for opportunities beyond core connectivity, which includes a range of consumer- and business-focused services, such as pay TV, media and advertising, cloud, security, financial services, and solutions for vertical industries. Much of the growth achieved to date has been organic or delivered through partnerships, but M&A has also played a role; in July 2021, MTS acquired a data centre near Moscow for RUB5.2 billion, stating that the purchase would be used in part to develop its cloud proposition.

Two current strategic priorities for operators in the CIS region are financial services and media and entertainment. Consumer awareness of digital financial services (DFS) is strong, with mobile technology supporting a transformation in how people pay utility bills, transfer or save money, access credit and purchase items. As such, operators have identified scope to capitalise on their trusted brand and position in the value chain to adapt and move into the DFS space. For example, in February 2021, MegaFon, Mail.Ru Group, USM Group, Ant Group and RDIF agreed to establish two joint ventures to provide digital payment solutions and financial services to help consumers save when paying for goods and services online.

Media and entertainment is another component of operators’ diversification strategies. The market is already seeing disruption from rising mobile broadband and smartphone adoption and the increasing availability of locally relevant content; this has been boosted by the Covid-19 pandemic, which has increased dependence on digital platforms for streaming services and social interactions, especially during lockdown periods. For Veon, the entertainment segment presents “significant long-term upsell opportunities”, as well as the chance to integrate its television offerings into mobile bundles. In Q1 2021, Veon reported that its Beeline TV subscriber base in Kazakhstan had reached 386,000, representing 73% year-on-year growth. MTS’s video-on-demand service KION, launched in April 2021, features a library of thousands of licensed titles, which will be supplemented by a pipeline of original, exclusive programming that reflects the operator’s “deliberate, targeted approach to content investment”.

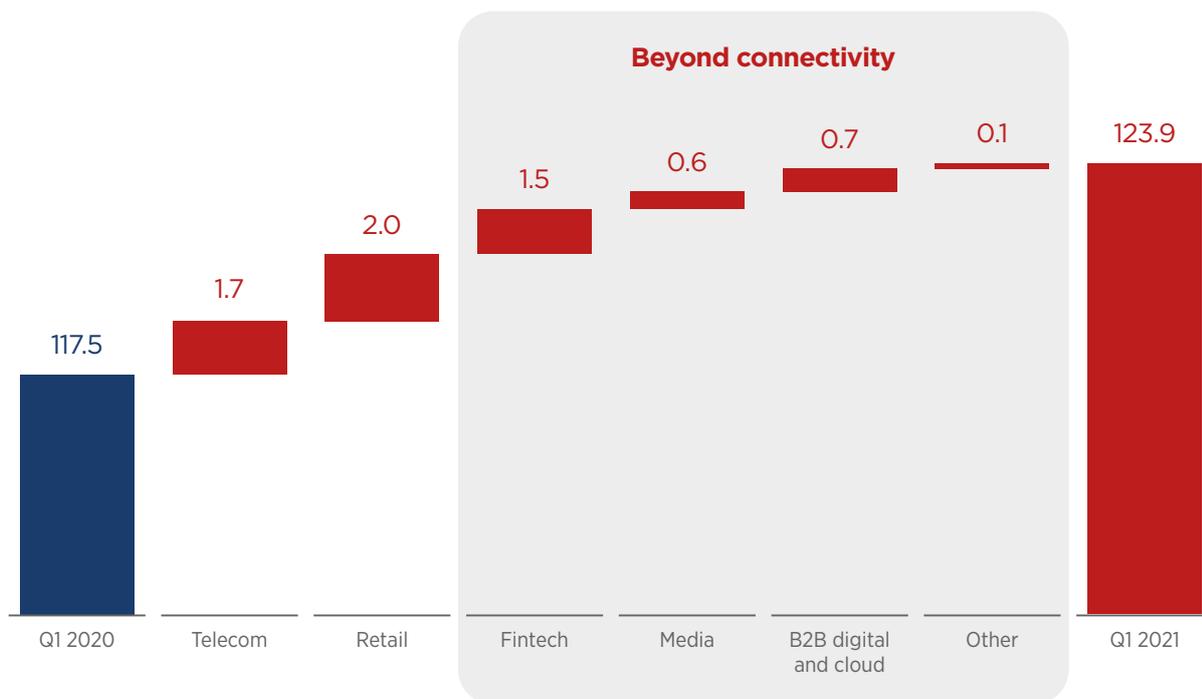
Expansion into these verticals is translating into positive impacts on operators’ top lines, as illustrated in Figure 14. In Q1 2021, MTS reported 5.5% year-on-year group revenue growth in its interests “beyond connectivity”. MegaFon reported that data and digital services (in particular, solutions for remote work and remote management of facilities, big data services and content services) were the principal drivers of service revenue growth in the first quarter of 2021, while new revenue streams made an “encouraging contribution” to Kyivstar’s financial results for the same period. There may also be some revenue growth correlation, meaning that services beyond core could help the performance of the traditional telecoms business and vice versa.

Figure 14

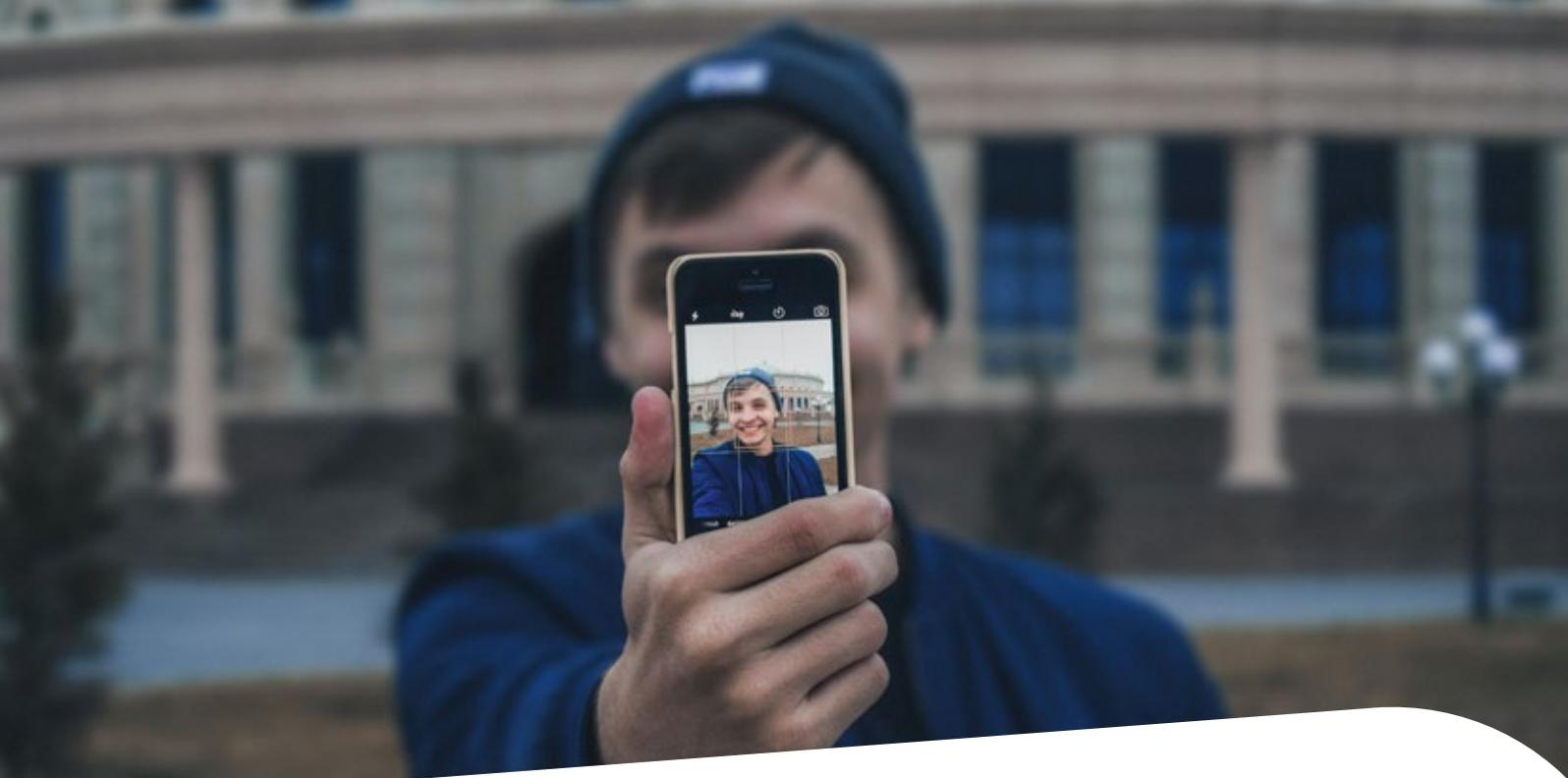
Source: MTS Q1 2021 results

Services beyond core telecoms have become an operator priority and are proving to be growth engines

MTS group revenue (rubles, billion)



Note: Totals may not add up due to rounding



Digital identity: a gateway to a multitude of services

Identity has emerged as a new area of growth for mobile operators to capture incremental value. In 2020, Russian operators began to deploy mobile ID services, which allow consumers to use their smartphones for simple, safe and convenient access to internet banking and shopping, social networks, e-government portals and other applications, replacing the need for the traditional username and password log-in mechanism. Meanwhile, Azerbaijani operators are linking individual and business SIM cards to the country's Asan Imza mobile ID solution, which provides users with a digital signature so they can conduct activities and transactions online, including submitting electronic customs declarations and applying to educational institutions.

Internet companies, too, are involved. Yandex's passport provides users with a single account for authorisation for access to its services (e.g. Mail and Taxi), to which they can bind a mobile number or enable two-factor authentication. In the Mail.ru Group ecosystem, subscribers can use a single VK Connect account to manage subscriptions, pay for goods and services, and control personal data security. The company intends to add other services to this account, including Boom, Citymobil, Youla and its eponymous email service. In addition, Sberbank has launched a unified authorisation system for services jointly with Mail.ru and Rambler Group, enabling 12 million users to use a Sberbank ID to access a growing ecosystem of services and partners, including DeliveryClub and SberFood.

E-commerce is a key opportunity for the mobile ID solution that is being targeted by Russian operators. It enables online commerce platforms to offer their users an easy way to log in with a mobile number and push notification, and saves them time when buying goods, tickets, holidays and more while preserving data security. Mobile ID also expedites the application process for financial services (e.g. credit and debit cards and loans), thereby driving inclusion. In the future, the technology may be linked with electronic passports and even used to bind mobile wallets with the digital ruble, the central bank digital currency that is under development.

2.3 IoT: eyes on the enterprise

The pandemic has affected virtually all sectors, resulting in enterprises rethinking their operational processes and how they interact with the rest of the economy. Covid-19 has accelerated the digitisation plans of some firms as they look to boost productivity and efficiency. The latest GSMA Intelligence Enterprise in Focus Survey shows that in 2020, 52% of Russian enterprises viewed IoT as a transformational technology, up from 46% the previous year.¹⁰

However, Covid-19 has caused considerable disruption to the IoT market, both in the CIS region and globally, with squeezed IoT budgets resulting in delays to the start of projects, particularly for small and medium-sized enterprises. This has had the effect of reducing GSMA Intelligence’s IoT connections projection for the next five years compared to the original 2020 forecast.

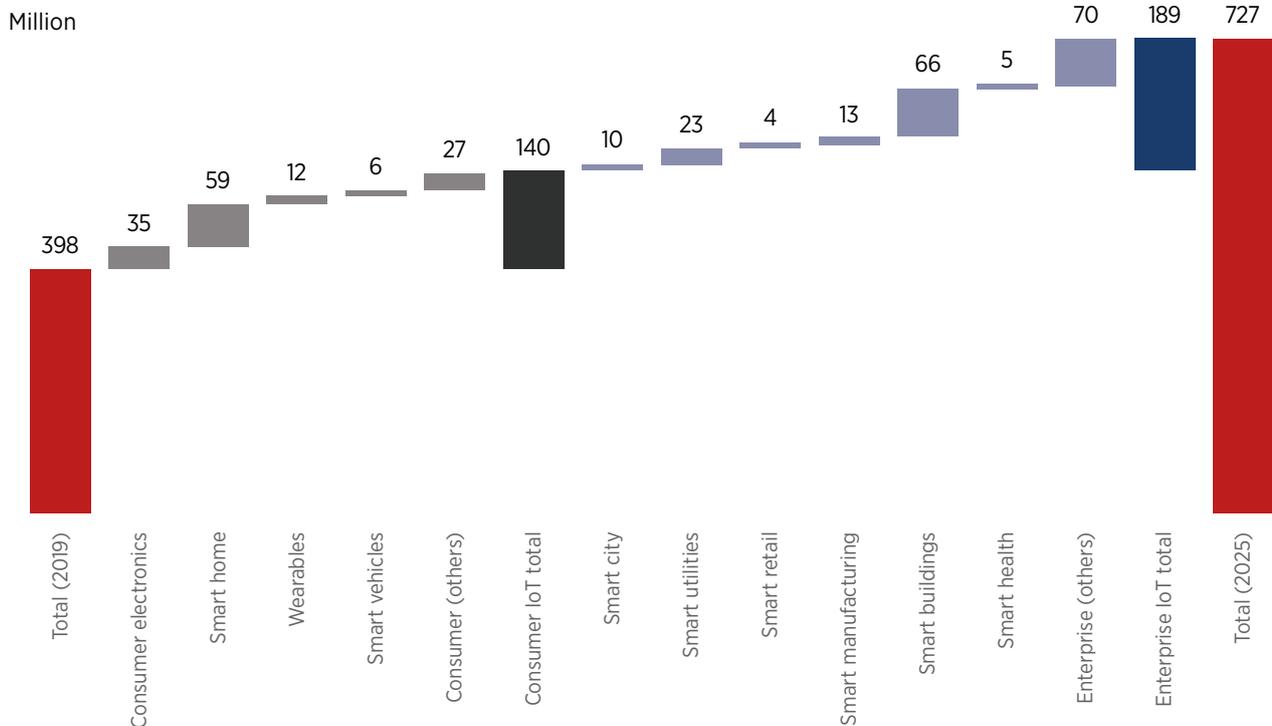
Nevertheless, there will be more than 725 million IoT connections in the CIS region by 2025, representing an 11% CAGR for the period.¹¹ A little over 3% of these will use licensed low-power wide-area (LPWA) networks, such as NB-IoT or Russia’s indigenous narrowband fidelity (NB-Fi), with the vast majority of IoT connections unlicensed.

The biggest increase in connections is expected in enterprise IoT; this will account for 42% of the total by 2025, driven in particular by a rise in connections for smart buildings. eSIM will play a role in expanding the enterprise IoT market, connecting millions of utilities and smart city devices. MTS has been operating eSIM for IoT devices in test mode since December 2020, although there are concerns that eSIM implementation is currently hampered by the lack of a regulatory framework and equipment available on the market.¹²

Figure 15

Source: GSMA Intelligence

There will be almost 330 million new IoT connections in the CIS region by 2025; smart homes and smart buildings are two key growth areas



Note: Totals may not add up due to rounding

10. Enterprise in Focus Survey Dashboard: State of the IoT Market, GSMA Intelligence, 2021

11. IoT connections forecast: the impact of Covid-19, GSMA Intelligence, 2020

12. “Интернет уходит в вещьность. Технология eSIM стимулирует рост рынка IoT в России”, Kommersant, July 2021

Regional IoT revenue forecasts

Despite Covid's slowdown effect, IoT revenue in the CIS region will increase at a CAGR of 19% between 2019 and 2025 – a faster growth rate than Europe and North America.¹³ With connectivity revenue forecast to double over the period, mobile operators are continuing their investments in NB-IoT, which is appropriate for stationary objects such as smart meters. In April 2021, Kyrgyz operator MegaCom launched its IoT tariff plan aimed at consumers and small businesses, providing connectivity for various sensors, power meters, navigators, GPS modules and other smart devices. By Q2 2021, there were seven live NB-IoT networks in the CIS region, most of which have nationwide coverage (e.g. A1 in Belarus and Kyivstar in Ukraine).¹⁴

The bulk of future IoT revenue growth will come from sources other than connectivity, including

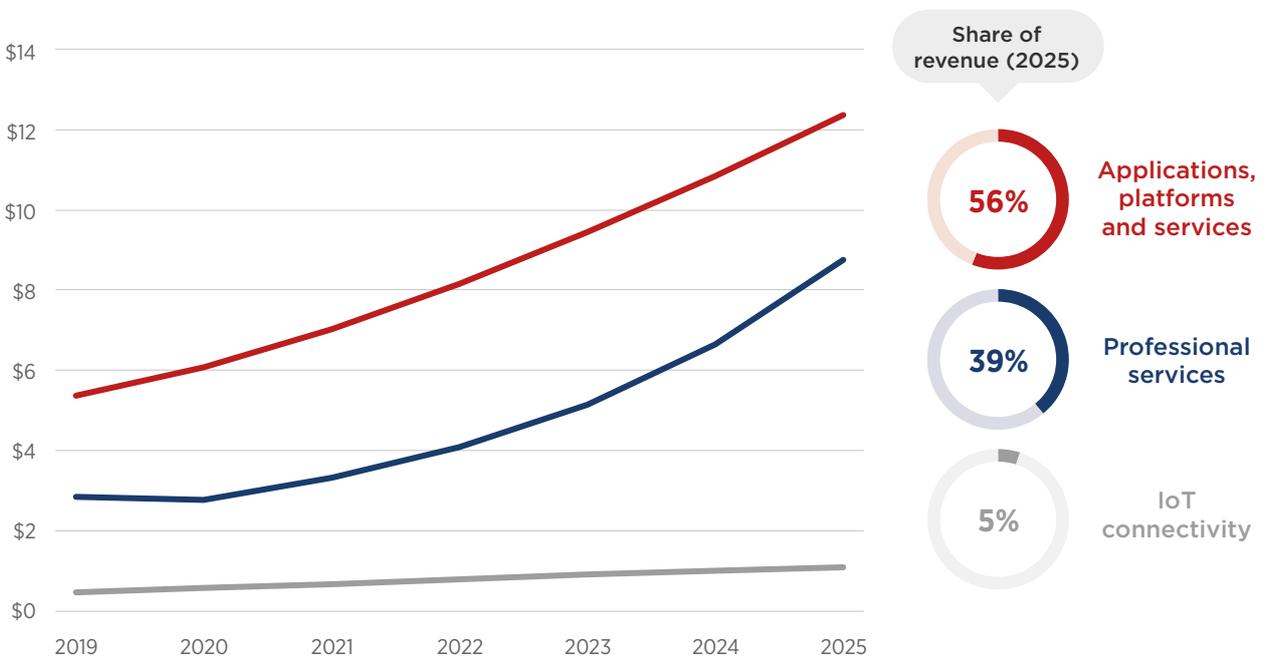
applications, cloud storage and data analytics. Operators have therefore expanded their capabilities to bundle connectivity with value-added services to capture a larger proportion of the overall market. Since first opening a dedicated innovation lab in 2017, Kcell has developed, piloted and debuted IoT solutions for smart cities and homes, and verticals such as agriculture, retail and transport.¹⁵ Realising the \$22 billion IoT revenue opportunity in 2025 will also involve collaborating with tech companies to build services capable of meeting enterprises' digital transformation needs. The strategic agreement between MTS and Microsoft reflects this imperative, with the two firms bringing together their cloud, connectivity and IoT infrastructure to develop solutions for independent software vendor partners in Russia.

Source: GSMA Intelligence

Figure 16

The IoT revenue opportunity lies beyond connectivity

IoT revenue in the CIS region (billion)



13. IoT revenue: state of the market 2020, GSMA Intelligence, 2020

14. For more information, see: <https://www.gsma.com/iot/deployment-map/>

15. Establishing a solid base for future growth: Annual Report and Accounts 2020, Kcell

2.4 Mobile towers: wholesale changes

Tower sell-offs and spin-outs are ongoing in many markets, with an increasing number of operators recognising the need to monetise extensive, yet often underutilised, assets. Some have opted for sale-and-leaseback deals to free up financial resources for paying down debt or for more productive uses, including investing in new projects or business lines. Other operators have spun off infrastructure in partnerships with private equity groups, resulting in a leaner cost structure.

In the CIS region, most towers and rooftops remain operator-owned, although Russian Towers, Ukrtower and Verticali have created independent site portfolios of varying sizes. MegaFon moved early, establishing First Tower Company in 2015 to improve infrastructure management and capex efficiencies. In May 2021, it was reported that First Tower Company and the tower company Vertikal intend to create an independent public company that will go public on the US stock exchange.

Other operators present in the CIS market are providing momentum to the current wave of tower commercialisation, but not all are following the same approach. Veon – the first Russian mobile operator to carve out its tower assets into a separate subsidiary entity (National Tower Company) – has

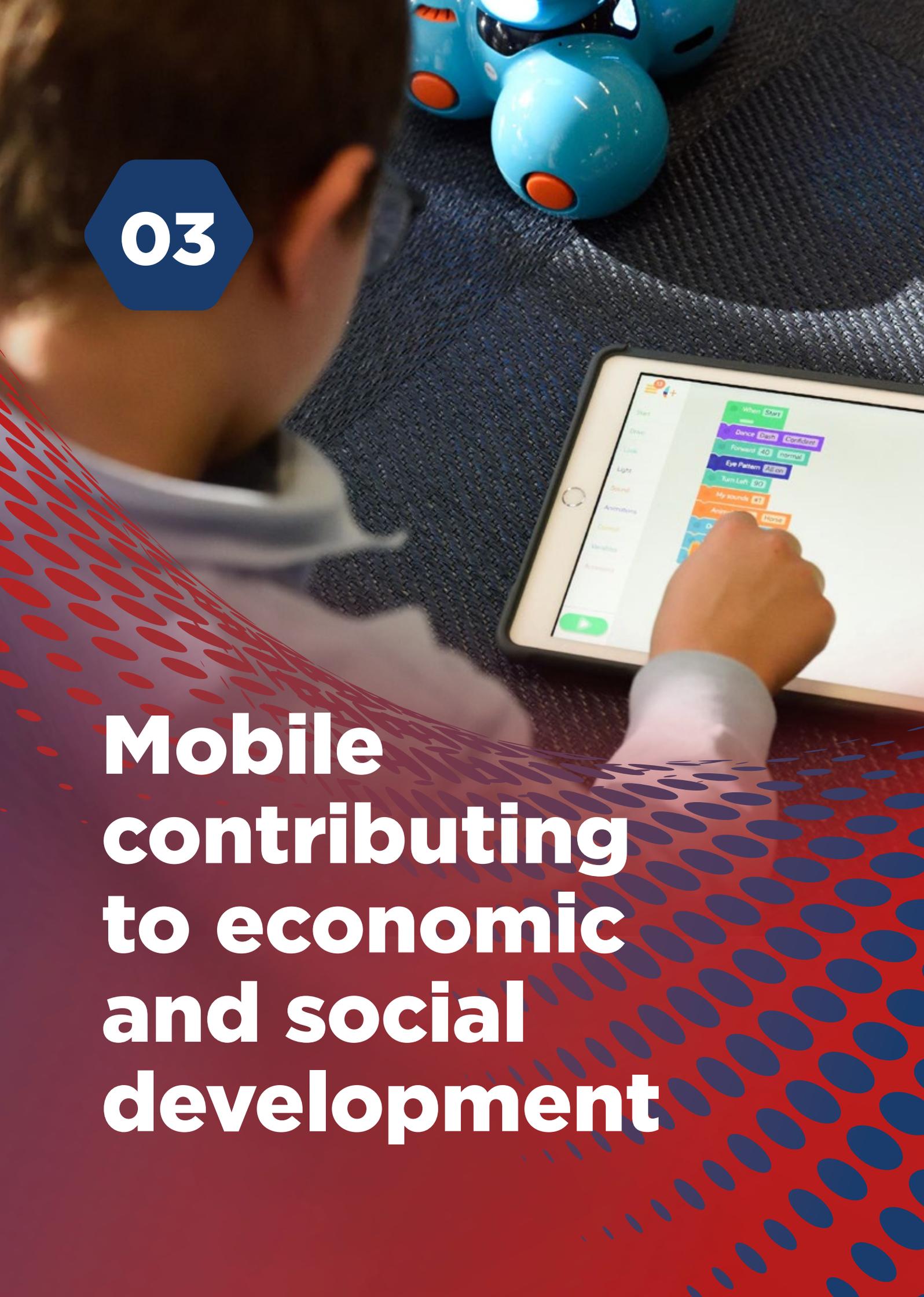
agreed the sale of over 15,000 towers in Russia to Service-Telecom for close to RUB71 billion. Veon has also established separate legal entities for its mobile towers in Pakistan and Ukraine, and intends to do the same in Bangladesh. The operator is actively working on evaluating and executing strategies for its infrastructure assets, “from improving efficiency of operation to monetisation”.¹⁶ Meanwhile, Orange has created Totem, an independent company to house its tower assets in France and Spain, before incorporating those in other markets, including the 1,500 in Moldova. Orange envisages the possibility of leveraging Totem to compete with tower companies by hosting and deploying sites for other operators in the future.

While Rostelecom-owned Tele2 has reportedly paused plans to split off its tower infrastructure into a separate company,¹⁷ thousands of towers are expected to come to market across the CIS region in the coming years, with operators triggered by competitors’ tower monetisation initiatives. The future will therefore see network ownership shift away from traditional vertical integration and towards shared and/or leased access, and the creation of independent tower units, which could have positive implications for operators’ costs and capital intensity.

16. Veon Q1 2021 results

17. “Tele2 Russia drops plans to outsource its tower infrastructure”, Telecompaper, December 2020



A child is seen from behind, sitting at a table and programming a blue, spherical robot on a tablet. The robot has two large eyes and a mouth. The tablet screen displays a block-based programming interface with various colored blocks like 'When Start', 'Dance (Dance Confident)', 'Forward (40 Normal)', 'Eye Pattern (All on)', 'Turn Left (90)', 'My sounds (3)', and 'Answer (None)'. The child's hand is touching the screen. The background is a dark blue textured surface. A red and blue polka-dot pattern is overlaid on the bottom left of the image.

03

**Mobile
contributing
to economic
and social
development**

Between 2000 and 2019, the expansion of mobile technology in the CIS region has contributed to 10% of income per capita growth, or \$350.¹⁸ Since the outbreak of Covid-19, the mobile industry has served as a lifeline for society by enabling many business activities to continue, allowing people to maintain contact with friends and family members, and helping governments to effectively manage the spread of the virus. Operators' efforts in the early stages of the pandemic to keep citizens, firms and institutions connected and informed are well documented. Response measures included donating to national Covid-19 relief funds, offering call and data tariff discounts, and providing free access to entertainment, healthcare and conferencing services.

Further, amid the pandemic, operators have persevered with efforts to reduce deficits in mobile internet adoption, especially among vulnerable groups. Though the situation remains challenging

in many CIS markets, the mobile sector is taking measures to help society recover and to build more resilient economies capable of withstanding future shocks. For instance, MegaFon is providing remote workplace solutions to other businesses, incorporating lessons from its own shift to remote working. Veon is making greater use of digital channels to maintain engagement with customers, while Orange Moldova has signed a memorandum of understanding (MoU) with the Ministry of Education, Culture and Research to support children's education through technology.

Looking ahead, operators will continue to pursue initiatives and make investments to narrow the digital divide and facilitate industrial transformation, allowing more citizens and enterprises to access the myriad benefits of connectivity. The development of 5G will be one impetus for growth of national economies, driving efficiency gains and raising standards of living.

3.1 Mobile's economic contribution

In 2020, mobile technologies and services generated 7% of GDP in the CIS region, a contribution that amounted to more than \$143 billion of economic value added. The mobile ecosystem also supported almost 740,000 jobs (directly and indirectly) and made a substantial contribution to the funding of the public sector, with almost \$13 billion raised through taxes on the sector.

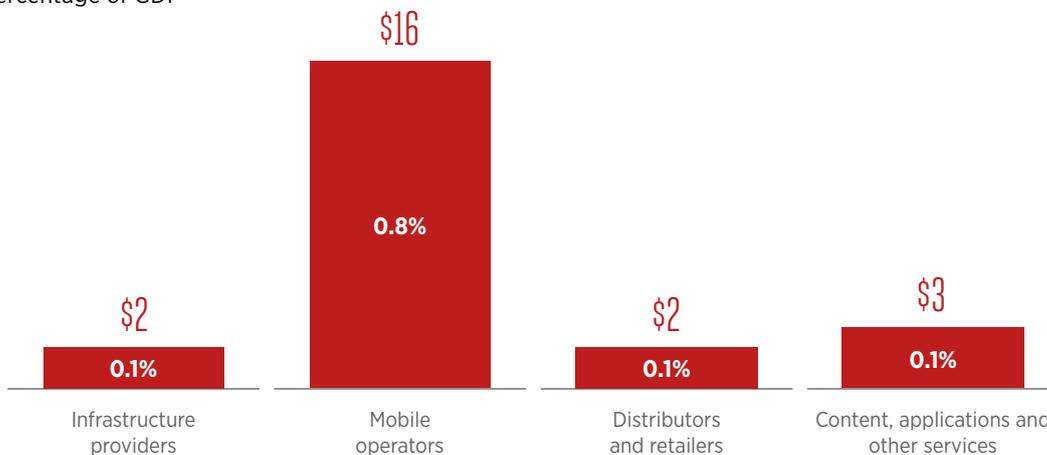
By 2025, mobile's contribution will grow by around \$17 billion (approaching \$160 billion) as the countries in the region increasingly benefit from the improvements in productivity and efficiency brought about by the increased take-up of mobile services.

Source: GSMA Intelligence

Figure 17

The regional mobile ecosystem directly generated almost \$23 billion of economic value in 2020, with mobile operators accounting for the vast majority

Billion, percentage of GDP



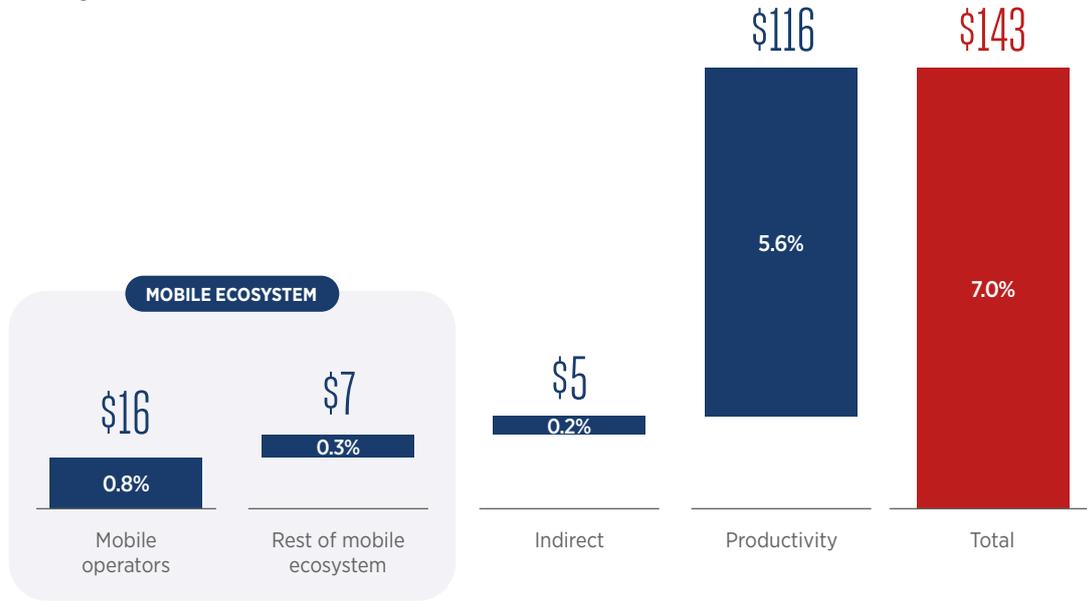
Note: Totals may not add up due to rounding

18. Mobile technology and economic growth: Lessons to accelerate economic growth and recovery. GSMA, 2020

Figure 18

Additional indirect and productivity benefits bring the total contribution of the mobile industry to the CIS economy to more than \$143 billion

Billion, percentage of GDP (2020)

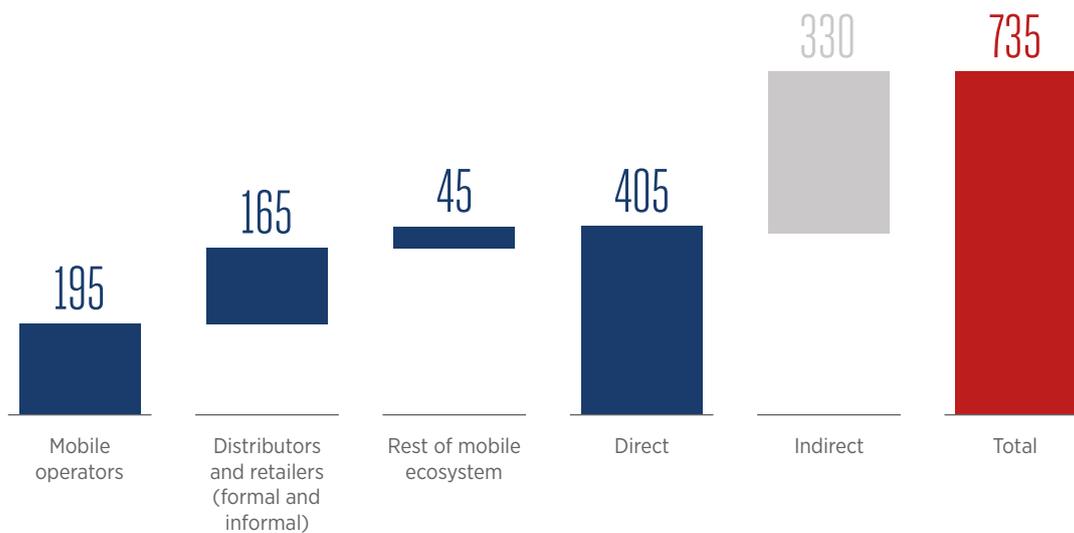


Note: Totals may not add up due to rounding

Figure 19

The regional mobile ecosystem directly employed more than 400,000 people in 2020, plus another 330,000 people indirectly through adjacent industries

Thousands



Note: Totals may not add up due to rounding

Figure 20

Source: GSMA Intelligence

In 2020, the mobile ecosystem contributed almost \$13 billion to the funding of the public sector through consumer and operator taxes

Billion

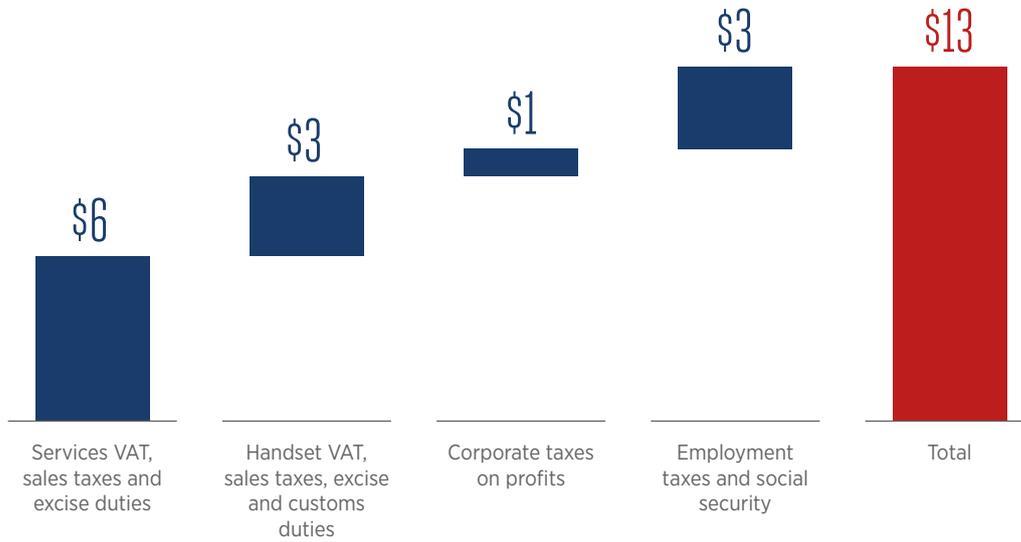
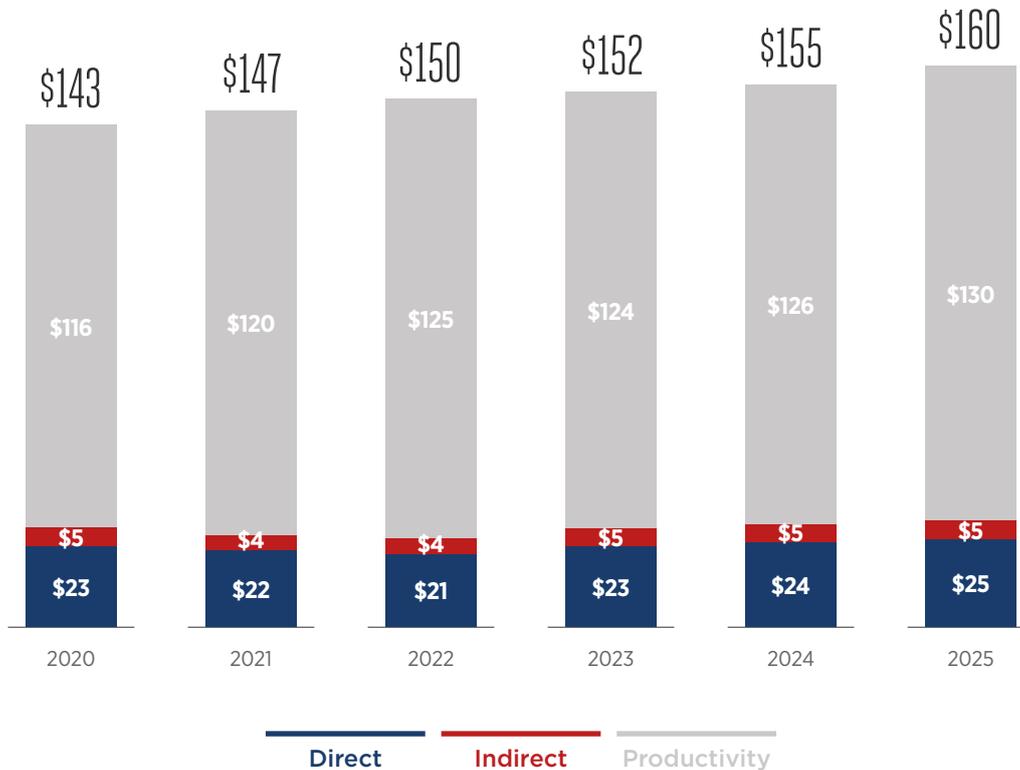


Figure 21

Source: GSMA Intelligence

Driven mostly by continued growth in productivity, the regional economic contribution of mobile will increase by around \$17 billion by 2025

Billion



3.2 Mobile's impact on digital inclusion

At the end of 2020, 182 million people across the CIS region were connected to the mobile internet, equivalent to a 62% penetration rate. This represents an increase of 10 million compared to the previous year and more than threefold growth since 2010. Huge operator investments in the rollout, upgrade and maintenance of their networks have been central to increasing digital inclusion and reducing the 'coverage gap' i.e. those with no access to mobile

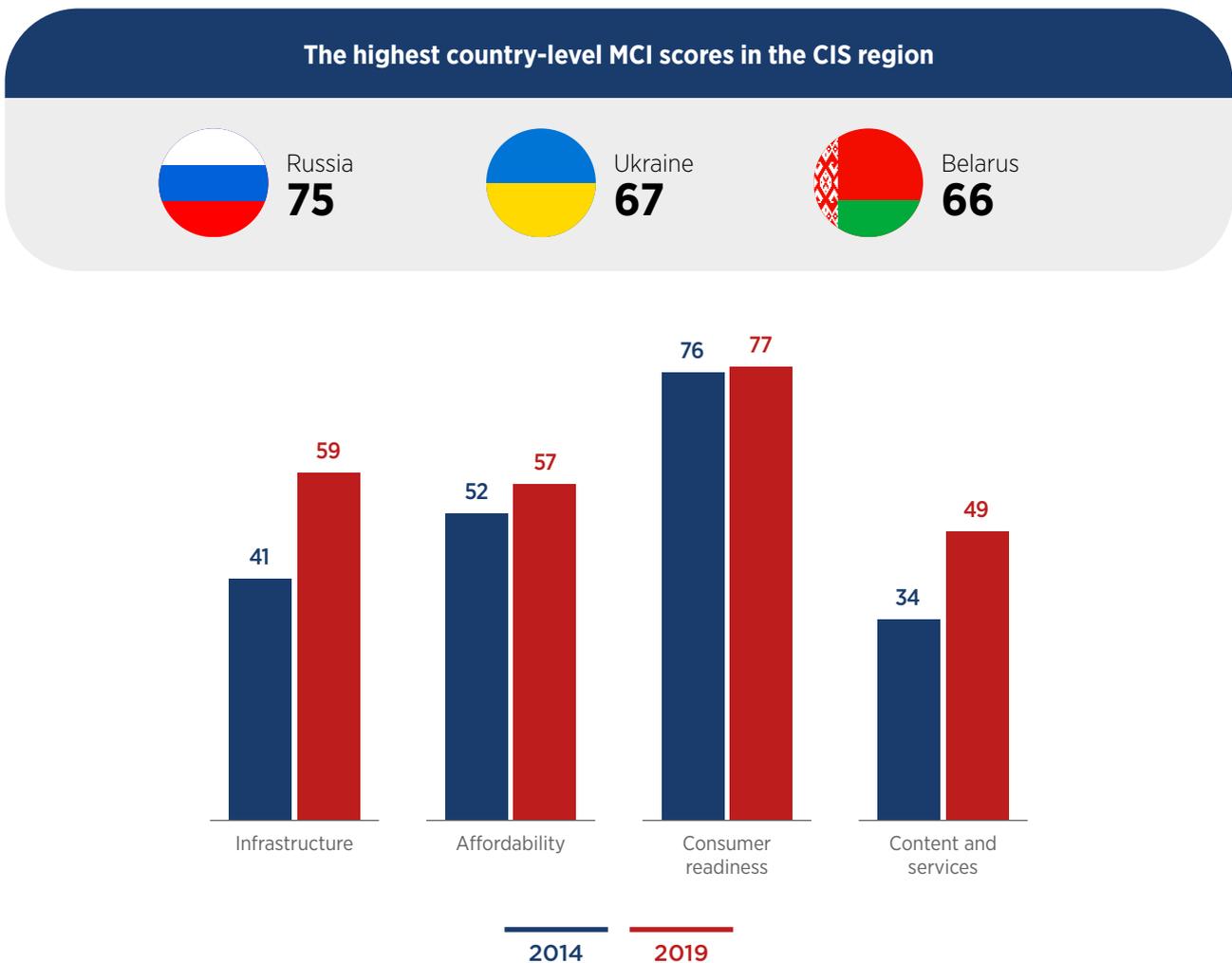
broadband services (3G and above). This is reflected by the CIS region's scores on the Infrastructure enabler of the GSMA's Mobile Connectivity Index (MCI),¹⁹ as shown in Figure 22. In addition to operator investments in network coverage and performance, the region's digital development has been driven by reductions in mobile tariffs, improvements in online security and increases in the use of e-government services and mobile social media platforms.²⁰

Source: GSMA Intelligence

Figure 22

Infrastructure has seen the biggest improvement in the CIS region in recent years, but Consumer Readiness is the standout MCI enabler

GSMA MCI score



19. <https://www.mobileconnectivityindex.com/>

20. For information on how policymakers can make the best use of the MCI, please see: Using the GSMA Mobile Connectivity Index to drive digital inclusion: Guidelines for policymakers, GSMA, 2021

Nevertheless, 113 million people across the CIS region (38% of its population) remained offline at the end of 2020. While mobile broadband networks reach more than 93% of the region's population overall, the coverage gap is still 10% or above in five markets, including Turkmenistan and Uzbekistan. Further, a 93 million-strong 'usage gap' (those who live within the footprint of a network but do not use mobile internet services) suggests there are pressing issues, which extend beyond infrastructure, to address to increase take-up. With connectivity and technology crucial to everyday life, private- and public-sector players across the CIS region are united in their efforts to grow mobile internet adoption and usage:

- In April 2021, Azerbaijan joined the initiative to create a single roaming area between the EU and other members of the Eastern Partnership, namely Armenia, Belarus, Georgia, Moldova and Ukraine. The Regional Roaming Agreement is expected to take effect on 1 January 2022, with roaming costs set to be reduced by 87% by 2026 under the proposed glide path.
- Beeline has selected Nokia to modernise its core network throughout Georgia and to strengthen its customer services, network performance and security as it extends its 4G network with 5G-ready equipment.
- The International Finance Corporation (IFC) has made its first investment in Kyrgyzstan, providing a \$3 million loan to wholesale/corporate broadband network operator EICat. With the IFC funding, EICat intends to expand its network, improve affordability and increase access to fibre broadband for households, businesses and public sites (i.e. schools, healthcare centres and government offices), including those in remote locations.
- In March 2021, Rostelecom began network deployments under the Universal Communication Services 2.0 (UCS 2.0) programme, Russia's scheme to eliminate digital inequality. By 2030, it will provide over 24,000 settlements of 100–500 people each with mobile broadband access, with base stations using 2.3 GHz spectrum and many connected to new fibre backbone links.
- In February 2021, Ukrtelecom issued a proposal to the Ministry of Digital Transformation for its latest plans to cover an additional 2,300 settlements in 19 regions of Ukraine with high-speed fixed broadband. The operator currently provides services to over 3,300 cities, towns, municipalities and villages.

CIS markets look to the sky for broadband connectivity

Satellite broadband is undergoing a period of reinvention through the low Earth orbit (LEO) constellation model that re-emerged five years ago from firms such as OneWeb and SpaceX. Momentum and industry traction have been underpinned by a reduced cost structure and higher performance capability relative to legacy geostationary satellites that operate at much higher altitudes. Continuing to drive this demand are the global internet divide and poor broadband in rural areas of higher-income countries (along with an unfavourable cost/benefit equation for land-based network expansion). The LEO constellation approach has potential to ameliorate both of these issues.²¹

Consequently, in the CIS region, there is interest in satellite from policymakers, space agencies and mobile industry players. In Kazakhstan, Bharti-backed OneWeb has signed an MoU with the government and local partners for the development of satellite communications technologies to support the country's digitisation journey. Meanwhile, MegaFon has unveiled an LEO project – MegaFon 1440 – that aims to beam internet services to consumer and IoT devices in hard-to-reach areas. The operator plans to invest RUB6 billion in R&D and testing for the project in the first two years, which will complement the role of its terrestrial networks. In parallel, Russia's space body, Roscosmos, plans to deliver nationwide satellite broadband access by 2024; however, federal funding will be required to realise this ambition.²²

21. [Look out: LEO satellite goes commercial](#), GSMA Intelligence, 2021

22. For more research in this area, see [Radar: Connectivity from the sky](#), GSMA Intelligence, 2021

3.3 Mobile addressing social challenges

As the first industry to have fully committed to the UN Sustainable Development Goals (SDGs), the mobile industry continues to have substantial positive effects on lives and livelihoods.²³

Source: GSMA

Figure 23

Mobile’s impact on the SDGs in the CIS region, 2019

Highest SDG scores



Most improved SDG scores



SDG 4: Quality Education

SDG 4 seeks to ensure inclusive and equitable quality education, and to promote lifelong learning opportunities for all. Mobile technology contributes to SDG 4 by allowing students, teachers and employees to learn/teach from any location and on the move. Educational content, as well as educational administration and management, is increasingly available over mobile networks on tablets, smartphones and feature phones, thereby helping to bridge the digital divide through e-learning. Lyceum, Rostelecom’s interactive online educational platform, hosts content relevant to the full school curriculum, offers quizzes and helps children prepare for the Basic/Unified State Examination while incorporating a tracking function to enable parents to monitor progress.

In addition to school-age learning, mobile can assist higher education and vocational training, enabling young people to reach their full potential and improve their employability. In Ukraine, Lifecell has a long-running internship programme to help students gain practical work experience, and it has also opened specialist telecoms laboratories within the country’s technical universities. In March 2021, Vodafone Ukraine signed a cooperation memorandum with the Ministry of Digital Transformation to cooperate on the creation of several educational initiatives focused on anti-fraud, cyber-protection and digital security issues.

23. 2020 Mobile Industry Impact Report: Sustainable Development Goals, GSMA, 2020

SDG 9: Industry, Innovation and Infrastructure

SDG 9 aims to build resilient infrastructure, promote inclusive and sustainable industrialisation, stimulate innovation, and deliver affordable internet access for all. In the CIS region, mobile technology contributes to this goal by serving as a provider of critical infrastructure, with increasing mobile broadband adoption a reflection of operators' considerable network investments – especially those targeted at expanding coverage, improving quality in hard-to-reach areas and closing the urban-rural digital divide.

The CIS region's performance is also driven by mobile's catalytic effect on adjacent sectors. The connectivity provided by mobile operators enables

industrial processes and manufacturing to utilise technological advancements in IoT, AI and big data analytics, which in turn facilitates productivity and efficiency gains. For example, in September 2019, MegaFon launched its digital laboratory, located on the campus of the Graduate School of Management at Saint Petersburg State University. Fitted out with a 5G trial zone, the laboratory has become a platform for developing new 5G services. MegaFon followed this up in December 2020, jointly launching with the Moscow Power Engineering Institute (MPEI) an IoT lab, a testing ground for industrial and smart home IoT solutions.

Mobile industry action on climate change

The mobile sector's support for SDG 9 also has knock-on effects on other goals, including SDG 13: Climate Action. Mobile technology contributes to SDG 13 by improving energy efficiency, effecting changes in behaviour and reducing greenhouse gas (GHG) emissions. Research from the GSMA and the Carbon Trust shows that mobile technologies can help avoid 10× more emissions than they cause.²⁴ The GSMA and operators have developed an industry-wide climate action roadmap to achieve net-zero GHG emissions by 2050, in line with the Paris Agreement. More than 50 mobile operators now disclose their climate impacts and GHG emissions via the internationally recognised CDP global disclosure system, including MTS, Orange and Vodafone.

MTS is part of the GSMA's Climate Action Taskforce and the Joint Audit Cooperation's (JAC) Climate Change workstream, which have been crucial to the operator gaining experience and guidance to successfully disclose its Scope 1 and Scope 2 emissions and climate-related achievements and initiatives in its first CDP questionnaire. For its first CDP disclosure, MTS received a C rating, with feedback helping it to quickly identify areas for improvement. It established a cross-functional carbon management working group and worked with external consultants to conduct a company-wide inventory of GHG emissions (including Scope 3) and develop a map of climate-related risks.

In 2020, the company made swift improvements in all aspects of its climate agenda, which was recognised by CDP. In just one year, it improved its CDP score from C to B, placing it among the top seven Russian companies disclosing via CDP in that year. MTS plans to continue its work to finalise its climate change strategy and set carbon reduction targets, and to look for opportunities to collaborate with local regulators on environmental policy and practices to inspire further change.²⁵

24. [The Enablement Effect: The impact of mobile communications technologies on carbon emission reductions](#), GSMA, 2019

25. [Mobile Net Zero – State of the Industry on Climate Action](#), GSMA, 2021

04



Policies for digital advancement

There has never been a more relevant time for governments to implement policy measures to stimulate demand for digital services and address the barriers to internet use. In the context of 5G, which will underpin the digital economy this decade, specific measures on spectrum and efficient network rollout are particularly important to stimulate investment in advanced infrastructure as well as innovation in applications and solutions for a variety of use cases.

4.1 Establishing an effective spectrum policy

The success of 5G services is heavily reliant on national governments and regulators. The speed, reach and quality of these services depend on governments and regulators supporting timely access to the right amount and type of affordable spectrum, under the right conditions. To maximise the benefits of 5G, governments and regulators should:

- make available sufficient 5G spectrum and avoid limiting the supply, such as via set-asides
- set modest reserve prices and annual fees, to let the market determine spectrum prices

- carefully consider auction design to avoid unnecessary risks for bidders (e.g. avoiding mismatched lot sizes, which create artificial scarcity)
- develop and publish a 5G spectrum roadmap with the input of stakeholders to help operators plan effectively around future availability
- consult stakeholders on the award rules and licence terms and conditions, and also take them into account when setting prices (as onerous obligations reduce the value of spectrum).

Spectrum availability and timing

Successful 5G networks and services depend on a significant amount of new harmonised mobile spectrum. Ensuring the timely availability of prime bands, including those requiring defragmentation, should be prioritised. Policymakers should aim to make available spectrum in low (<1 GHz), mid (e.g. 3.5 GHz, 4.8 GHz and 6 GHz) and high bands (mmWave spectrum).

Spectrum below 1 GHz is required to provide wide-area capacity and ensure that 5G reaches more people. The greatest coverage challenge remains in rural areas, where network capex and opex are higher and revenues can be as much as 10× lower due to the smaller populations, compared to urban areas. The key band to help address this challenge is 700 MHz, which is expected to gain even more momentum in 2021. It is important that governments and regulators in the CIS region accelerate their efforts to reallocate broadcasting services and release this valuable resource.

Mid-band frequencies have been used as the basis for the first commercial 5G networks all over the world. This initial focus – particularly on the 3.5 GHz range, which became the birthplace of commercial 5G – produces the scale needed to bring down the cost of network equipment and mobile devices. Other bands in this range are also playing a complementary role, such as 4.8 GHz, which is in use by three operators in Asia today, and 6 GHz.

Spectrum harmonisation has always played a vital role in the success of mobile networks and the rollout of 5G is no different. However, more mid-band spectrum beyond the initial 80–100 MHz per operator will be needed as 5G demand increases. For example, Moscow is expected to need up to 2.8 GHz of mid-band spectrum by 2030. On average, a total of around 2 GHz of mid-band spectrum will be required for 5G per country by the same year.²⁶ Countries should develop roadmaps that reflect this growing demand – having a solid roadmap is a must for any country that wants to help encourage the rollout of world-class connectivity.

26. [Vision 2030: Insights for Mid-band Spectrum Needs](#). GSMA, 2021

The timely release of spectrum bands is vital. An early release of spectrum drives better consumer outcomes, which is important in markets where long-term value, innovation and cost reductions are driven through relatively short technology cycles. If spectrum is released earlier, operators have more time to invest in making new technologies available nationwide. The spectrum also eases capacity constraints in urban areas, meaning operators are better able to invest in rural areas.

Conversely, unnecessary delays to spectrum awards risk harming mobile broadband service rollouts and leaving more people unconnected. Spectrum carve-outs for vertical industries are causing a barrier to meeting this demand in some cases and should be avoided in priority 5G bands (i.e. 3.5, 26 and 28 GHz). Sharing and leasing are typically better options in these situations.

Technology neutrality is an important capability that should be made available in any current or future band. This gives operators the flexibility to upgrade technologies as soon as the market requires.

Spectrum pricing and conditions

Beyond spectrum availability, the cost of spectrum also has a major impact. Governments and regulators should assign 5G spectrum to support their digital connectivity goals rather than as a means of maximising state revenues. Effective spectrum pricing policies are vital to support better quality

Refarming 2G, 3G and 4G bands can, in time, contribute to meeting future spectrum requirements, but adding new bands will be necessary to keep up with demand. A number of frequency ranges have the potential to help support future mid-band needs. Tech neutrality already exists in many countries in the region, Belarus being a notable exception. However, this does not yet cover 5G services, as operators in every market are required to obtain new permits for 5G.

The momentum behind mmWave spectrum is growing as well. At the World Radiocommunication Conference 2019 (WRC-19), countries supported a harmonised identification of 26, 40 and 66 GHz for ultra-high-speed and ultra-low-latency consumer, business and government services. As of June 2021, 15 countries around the world have assigned mmWave spectrum to operators, with more countries soon to follow. The first commercial mmWave 5G networks are showing the significant potential these bands have.

and more affordable 5G services. High reserve prices, artificially limited spectrum supply (including set-asides) and poor auction design can all have a negative impact (i.e. slower mobile broadband and suppressed network investments).

4.2 Enabling fast and efficient network build-outs

Even where spectrum is assigned early and in sufficient quantities, operators still face challenges in planned rollouts. To accelerate mobile broadband deployments, policymakers should strive to reduce regulatory barriers and fragmented processes, and create pro-investment environments in order to facilitate universal coverage.

Simplified and streamlined planning approval processes

To incentivise and accelerate 5G deployments, policymakers should implement streamlined application and approval processes for mobile networks while respecting environmental and community impact considerations. Leveraging a single digital administrative channel can improve coordination between government entities at all levels (municipal, local, regional and national), driving cost efficiencies and saving valuable rollout time.

As the number of small cell sites increases 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, and establish 'one-stop shopping' licensing procedures and even implicit approval. Taken together, these interventions can lower the barriers and bureaucracy involved with designing and deploying mobile networks, resulting in more cost-effective rollouts that can reach rural areas more efficiently.

Non-discriminatory and timely access to public infrastructure

Policymakers can support operator efforts to expand mobile broadband 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 upfront and operating costs of setting up a tower, and provide additional capacity in congested areas where space for sites is limited, which is especially important in the case of building dense 5G networks.

Aligning wireless exposure standards with international best practice

Public interest in the health effects of electromagnetic fields (EMF) associated with mobile networks may arise with the introduction of every new generation of mobile technology, and 5G is no exception. Last year's updated radio frequency (RF) exposure guidelines by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) – which include frequencies above 6 GHz, including mmWave 5G – confirm that the international limits remain protective of all people, including children, against all established health hazards.

It is important that all countries adopt the updated guidelines. Disparities between national limits and international guidelines can foster confusion for both regulators and policymakers, increase public anxiety and provide a challenge to manufacturers and operators of communications systems that need

to tailor their products to each market. It is projected that 3–5× more 5G sites will be needed in Moscow than if the updated international safety guidelines were adopted.²⁷ In the view of the ICNIRP, national limits that are more restrictive than the international guidance do not offer any additional health protection. In Russia, the government has recently amended its regulations to allow mobile operators to measure and declare EMF from their networks in compliance with set limits. Further, from 1 February 2021, Ukraine's Ministry of Health raised the maximum permissible level of EMF from 10 $\mu\text{W}/\text{cm}^2$ to 100 $\mu\text{W}/\text{cm}^2$. The decision to amend national legislation was taken to support the development of 4G and 5G networks in the country. Compliance rules may also need to be updated to more accurately assess active antenna systems.

27. [Adopting International Radio Frequency Electromagnetic Fields \(RF-EMF\) Exposure Guidelines: Benefits for 5G Network Deployment in Russia](#). GSMA, 2020

4.3 Improving coverage in hard-to-reach areas

Despite heavy operator investment in expanding the reach of mobile broadband networks, there are areas unserved or underserved by 3G or 4G services. The coverage gap brought about by these ‘not-spots’ is largely confined to the most rural, sparsely populated geographies where rollout cost plays a major role. Mobile networks in remote areas can be considerably more expensive to deploy and run compared to in urban areas, while the revenue opportunities are several times lower due to smaller populations. As such, partnerships between authorities and operators are needed to further extend mobile coverage and to support the sustainability of network operations.

One example of collaborative and innovative action to address rural connectivity issues is in Kazakhstan, where the three major mobile operators signed an agreement to deploy a shared network to improve mobile broadband services in rural areas. The deal covers settlements with a population of 250 to 1,000 people, plus national and regional highways and railways. Under the agreement, each operator will independently build and operate the

mobile broadband network and will allow the other parties to use its network infrastructure within their coverage zone. In addition, the government is providing 90% discounts for spectrum fees to operators for building infrastructure in rural areas.

As mobile operators press ahead with 5G rollouts, a similarly collective approach is required to drive coverage of next-generation services into the hardest-to-reach rural areas and communities, safeguarding against the creation of a new digital divide. Voluntary network-sharing agreements are a vital long-term solution, on which governments, regulators and mobile operators should collaborate. Such arrangements can lower the risks and cost of expanding 5G coverage in remote areas by allowing operators to jointly use resources, thus avoiding unnecessary duplication of infrastructure. This can create efficiencies and help to bridge identified investment gaps without compromising competition. Policymakers should encourage voluntary sharing of passive and active network elements to facilitate the swift expansion of high-performance networks across the region.²⁸

Avoiding wholesale 5G networks

The experiences of markets that have rolled out a 4G single wholesale network (SWN) highlight clear difficulties, typically offering an inferior alternative to the traditional network deployment model. These examples should serve as a lesson to countries that may consider an SWN in the 5G era. To ensure next-generation services are available to as many citizens as possible, policymakers should instead put in place the building blocks of mobile connectivity, including cost-effective access to low-frequency spectrum, support for voluntary network sharing and non-discriminatory access to public infrastructure.²⁹

28. For more details, see: <https://cp.gsma.com/expanding-mobile-coverage/>

29. *Single Wholesale Networks: Lessons From Existing and Earlier Projects*, GSMA, 2019

4.4 Adopting a taxation approach that spurs growth

Mobile services are supporting economic growth and social inclusion across the CIS region, with 3G and 4G penetration playing an especially important role in enhancing digital connectivity, which in turn facilitates trade, commerce, communication, service delivery and human development. Going forward, 5G services also have the potential to drive growth.

Governments have an important role to play in realising the full benefits of mobile. That includes, among other things highlighted in this report, putting in place a tax regime to spur investment and consumer adoption.

At the same time, policies can constrain a country's growth potential. For example, taxes on the mobile industry are high in some parts of the CIS region when compared to several European and Asian markets. An example of this is Ukraine, where the average tax burden is significantly higher than in Europe.³⁰

On top of the country's own reforms to simplify tax frameworks, actions to stimulate further investment and growth of the mobile economy are necessary. These should include a phased reduction in corporation tax and a lowering of spectrum fees. Measures like these would raise GDP and annual tax receipts, and also help increase access to mobile broadband, particularly among lower-income groups.

30. [Mobile taxation in Ukraine: Proposals for reform to unlock economic value](#), GSMA/EY, 2020



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