

# 73 MNOs worldwide have launched 5G services, bringing benefits to consumers and communities

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## Executive summary

3 April 2020 was the 1-year anniversary of the first 5G network launches by the three mobile network operators (MNOs) in South Korea. Roughly 73 MNOs in 41 countries<sup>1</sup> have launched some flavour of 5G network since these first launches. Some only provide enhanced mobile broadband (eMBB) services to deliver additional capacity and alleviate some of the strain caused by their heavy data users, while others offer a combination of eMBB together with fixed-wireless access (FWA) services.

MNOs want to position their 5G networks and develop tariffs to target the high-value end of the market in order to drive an increase in ARPU. Fast-moving MNOs, such as those in South Korea and China, that are concerned with the declining ARPU trends that have been seen in the last few years have developed various strategies to migrate 4G subscribers to 5G, such as the increased bundling of value-added propositions and the delivery of unlimited data bundles with slight premiums over 4G tariffs. These MNOs are also using 5G to broaden their market reach and are increasingly targeting the enterprise segment to address use cases beyond just communications, such as the remote control of heavy machinery.

However, MNOs cannot deploy 5G networks with a good quality of service (QoS) without adequate spectrum in the appropriate bands. Similarly, smartphone and other device manufacturers cannot build economies of scale without national regulatory authorities' (NRAs') spectrum strategies and roadmaps to auctions.

Device manufacturers did not deliver new handsets prior to the launches of 3G and 4G networks, but at least one 5G smartphone was already available before the 5G launches in South Korea, and more followed quickly after. The intense market competition between the ecosystem players together with the consumer demand for high-capacity mobile data networks and services will continue to stimulate the telecoms industry and deliver benefits.

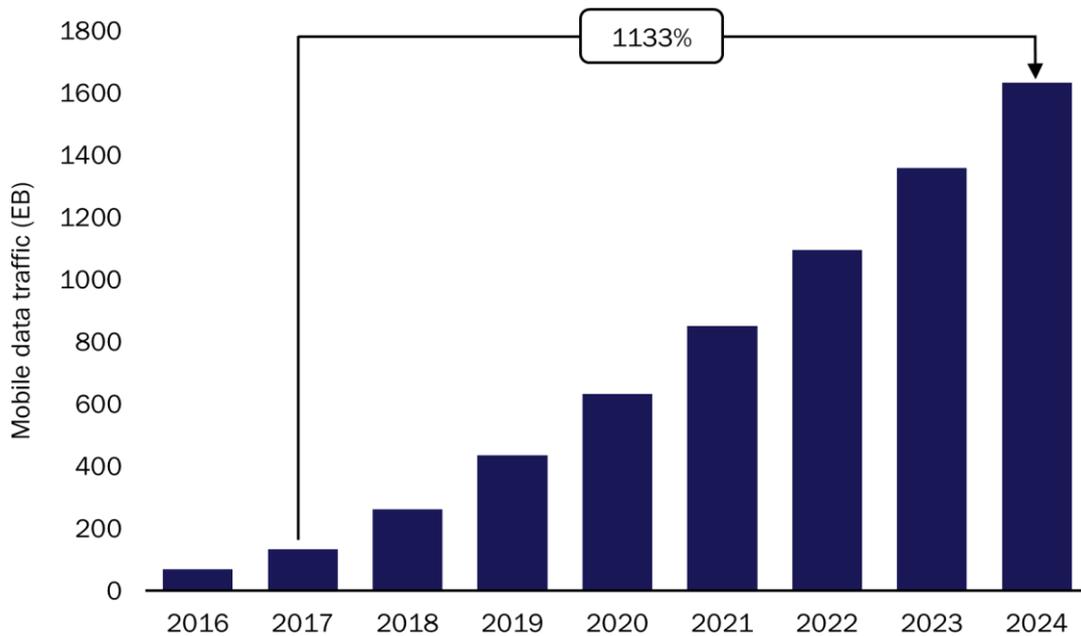
## MNOs are deploying 5G to deliver network capacity, meet customer requirements and grow ARPU

Mobile data consumption on handheld devices continues to grow as customers stream the two applications with the largest bandwidth requirements, music and video. Prior to the COVID-19 pandemic, Analysys Mason forecast that mobile data traffic worldwide would grow at a CAGR of 30% to reach 1632EB by 2024 (Figure 1).<sup>2</sup> During this period, we now forecast that mobile data will grow at a CAGR of 31% in China and 25% in Western Europe.

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<sup>1</sup> GSA (2020), *LTE & 5G Market Statistics: Global Snapshot: April 2020*. Available at: <https://gsacom.com/technology/5g/>.

<sup>2</sup> For more information, please see Analysys Mason's [DataHub](#)

**Figure 1: Mobile data traffic (pre-COVID-19), worldwide, 2016–2024**

Source: Analysys Mason, 2020

This growth in traffic has already caused congestion on 4G networks and it will continue to be a challenge for many MNOs. Network congestion usually leads to network speed fluctuations, which reduce the quality of experience (QoE) and customer satisfaction.

Analysys Mason's *Connected Consumer Survey* is an annual multi-region survey, and price and network coverage remained the first- and second-most-cited reasons for churning by customers in six European countries plus Turkey and the USA in 2019.<sup>3</sup> Mobile data speed moved from the fourth-most-cited reason to the third, and was most notably an issue in Turkey and the USA. A high proportion of customers of Sprint (53%), T-Mobile Germany (41%), AT&T (41%) and Vodafone Turkey (40%) cited insufficient data speeds as a reason for churning.

MNOs understand that the perception of network performance plays a major role in overall customer satisfaction. This is one of the most important reasons why MNOs in South Korea, Switzerland and the USA wanted to launch 5G services quickly and migrate consumers from LTE to 5G. Another reason is to attempt to reverse declining ARPU trends.

The use cases that are delivered in the first phase of 5G deployments (between 2019 and 2021) are eMBB and FWA. MNOs can use eMBB to deliver network capacity enhancements to improve the QoE for consumer smartphone usage, while FWA services will enable them to address the broadband market.

Mobile-only MNOs can compete with integrated operators to address the fixed broadband market. Some MNOs, such as Rain (South Africa) and Three (UK), attempted to provide 4G FWA services but did not gain significant traction. Upgrading their networks to 5G will enable these MNOs to provide a richer proposition (including TV services) and compete with fast fixed broadband service providers, such as fibre-to-the-home (FTTH) providers. We believe that 5G FWA services offer significant revenue growth opportunities for MNOs due to their current

<sup>3</sup> For more information, see Analysys Mason's [Connected Consumer Survey 2019: mobile customer satisfaction in Europe and the USA](#).

low penetration rate (for example, there were only 44 000 and 3774 5G FWA subscribers in emerging Asia–Pacific (EMAP) and the Middle East and North Africa (MENA), respectively, in 2020).

Following years of development and trials, the three MNOs in South Korea (KT, LGU+ and SK Telekom (SKT)) announced simultaneous 5G network launches on 3 April 2019. MNOs in other countries, such as Rain (South Africa), Sunrise (Switzerland), Telstra (Australia) and Verizon (USA), quickly followed suit. There was at least one MNO with a live 5G network in every continent by September 2019. 63 5G phones<sup>4</sup> had been announced by mid-December 2019; 29 of these plus one low-cost smartphone (under the USD300 price point) were commercially available in China.

## MNOs in South Korea benefited from a fast 5G roll-out

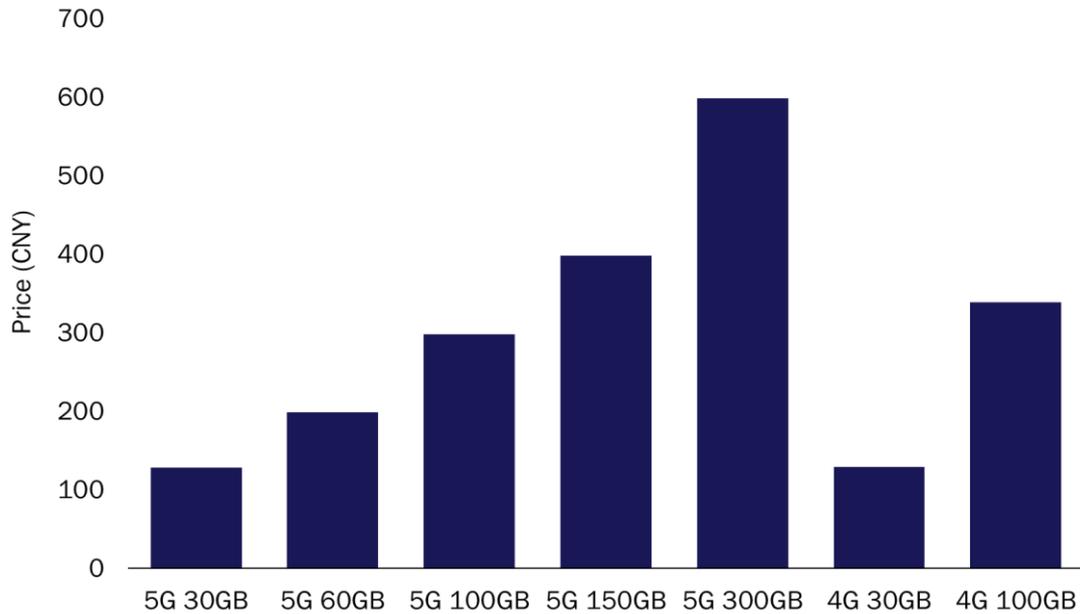
The South Korean government said, in April 2019, that 5G should be available nationwide by 2022, and announced an ambitious national plan to develop the domestic ecosystem. This incentivised both SKT and LG U+ to invest heavily in deploying 5G networks, and both committed to delivering approximately 90% population coverage by the end of 2019. There was strong competition over device subsidies to facilitate the purchase of 5G devices, given that only one device (the Samsung S10 costing USD1356) was available at the time of the network launch. The first LG 5G smartphone (the V50) was launched in late April 2019. SK Telecom spent more than LG U+ on marketing (27% of its revenue in 3Q 2019); this marketing enabled the number of 5G subscribers to grow quickly, and there were nearly 5.6 million 5G subscribers in South Korea in 4Q 2019 (representing 8% of all wireless subscribers in the country).

Mobile ARPU in South Korea had been falling prior to the 5G service launch, partly due to the government push to increase tariff discounts, but also as a result of the high 4G penetration. The population in South Korea is tech-savvy, and video and gaming usage is high in the country, so the MNOs understood that ARPU growth depended on their ability to upsell 5G customers to higher-value packages. SKT created a rich value-added services proposition using its own video streaming service, Wavve, and rights for the distribution of e-sports. It also bundled UHD video and VR/AR services. LG U+ bundled video, music and game services with its 5G tariffs, and both SKT and LGU+ reported ARPU growth between 4Q 2018 and 4Q 2019. All three MNOs had expected that ARPU would grow in 2020 (prior to the COVID-19 pandemic), and their investor announcements suggest that there is little appetite for a price war in a bid for market share.

The three MNOs in China also made significant investments in order to launch 5G services following the award of licences in June 2019. They considered rapid national deployment to be a strategic goal, similarly to the MNOs in South Korea. For this reason, they deployed 126 000 5G base stations by the end of 2019 and plan to add a further 500 000 by end of 2020 (according to the regulator, MIIT).

China Mobile offers five 5G plans costing between CNY128 (USD19) for 30GB and CNY598 (USD87) for 300GB (Figure 2). Its strategy is to migrate customers to 5G plans with significantly larger data bundles, but for only a small price premium. At the time of the 5G network launch, China Mobile offered a 30% discount on 5G plans for users that had been clients for more than 5 years, and a 20% discount for others. Both discounts were for a 6-month period.

<sup>4</sup> GSA (2019), *5G Device Ecosystem – December 2019*. Available at: <https://gsacom.com/paper/5g-device-ecosystem-december-2019/>.

**Figure 2: Prices for China Mobile's 4G and 5G tariffs, China, 2020**

Source: Analysys Mason, 2020

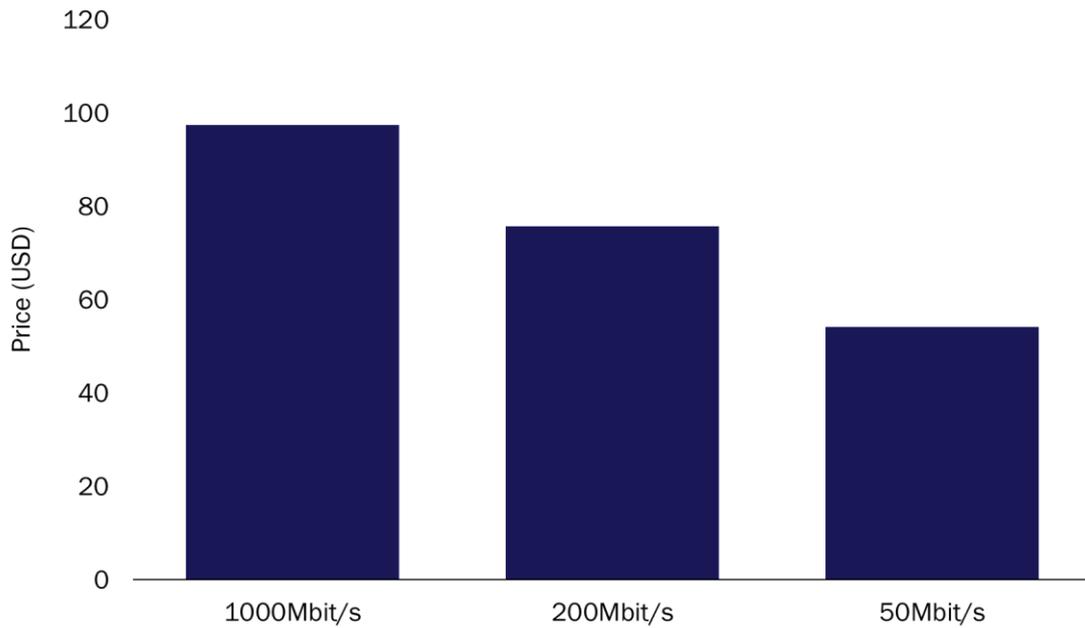
China Mobile is using exclusive 4K video and VR content from its subsidiary Migu to promote 5G in order to address its ARPU growth challenges on the consumer side. It has also introduced various 360-degree content and HD music streaming services to upsell customers to its 5G tariffs.

All three MNOs in China (China Mobile, China Telecom and China Unicom) are investing in B2B and enterprise use cases. These include proof of concepts (PoCs) and trials in collaboration with their vendor partners in a range of industries such as smart factories, healthcare and the national grid. They have also worked to deliver crane automation using 5G networks in shipping ports, such as in [Ningbo Zhoushan port](#).

Switzerland's second-largest player (in terms of the number of mobile subscribers), Sunrise, became Europe's first MNO to launch 5G services and claims that it had rolled out 5G in over 426 cities and towns by the end of 2019 to supply both businesses and consumers with high data rates. Switzerland's small size means that it is less capex intensive and therefore quicker and easier to deploy a nationwide network. Sunrise also claims that it launched the world's first 4K cloud-gaming platform as part of its 5G proposition to compete with [Google Stadia](#).

FTTP and DSL accounted for 22% and 49% of all fixed broadband connections, respectively, in Switzerland in 3Q 2019, and the market had a penetration of 110% (4.1 million subscribers). Sunrise will use its 5G FWA networks to migrate subscribers to fibre-like speeds, given the large number of customers that still use slower DSL technologies in rural and suburban areas.

Sunrise has three 5G FWA packages (Figure 3), with advertised download speeds of up to 50, 200 and 1000Mbit/s. Sunrise's 5G FWA offers also include unlimited data, which is the market standard.

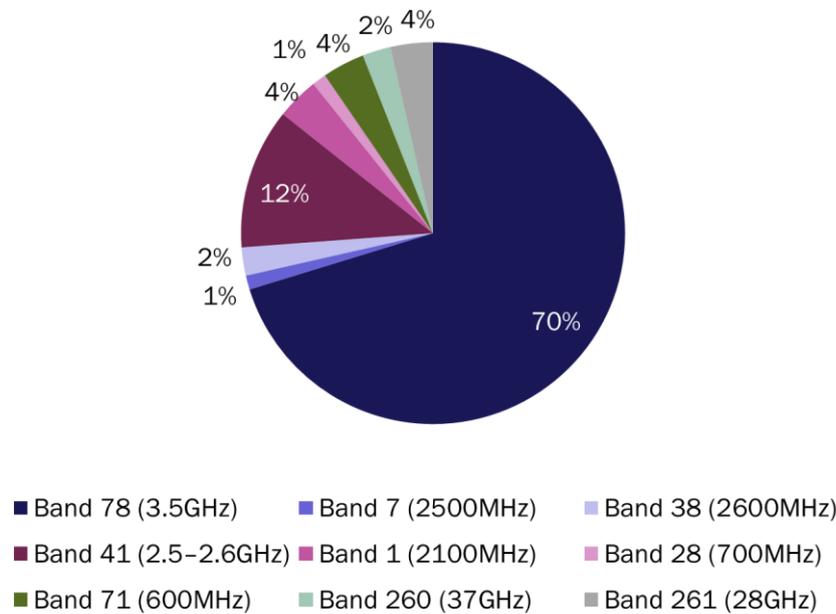
**Figure 3: Prices for Sunrise's 5G FWA tariffs, Switzerland, 2020**

Source: Analysys Mason, 2020

## MNOs should work with regulators to speed up spectrum auctions

NRAs must make spectrum available to MNOs to enable them to deploy networks and deliver commercial 5G services. There is an expectation that large amounts of spectrum will be required to deliver differentiated 5G services with higher speeds, better reliability and lower latency than 4G services. The 3GPP standards body is planning to open up a number of bands for 5G including the millimetre-wave (mmWave) band, C-band and sub-3GHz band.

The C-band (3.5GHz) is the most commonly used band for 5G so far, both for commercial deployments and for pre-commercial trials. However, other bands (such as 1800MHz, 2100MHz, 2600MHz and 4800MHz) have also been used (Figure 4). For example, China Mobile was given access to spectrum in the 2600MHz and 4800MHz bands in June 2019.

**Figure 4: Spectrum bands used for 5G commercial deployments, worldwide, 2020**

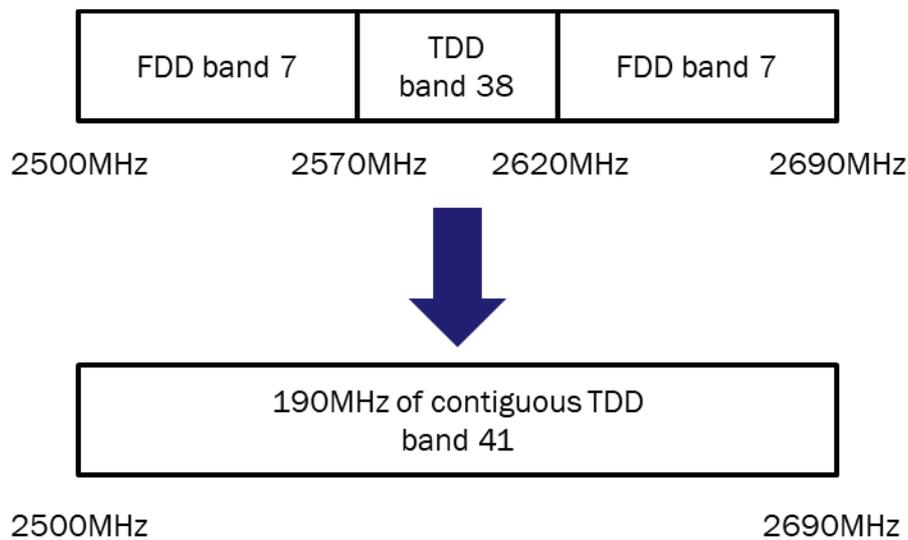
Source: Analysys Mason, 2020

The sub-3GHz frequencies are good for wide-area coverage including indoor coverage, especially in countries where the C-band is not available, such as in the Netherlands and the USA. This band will also be useful where it is difficult to acquire sites to accommodate the new massive-MIMO antenna deployments or where such sites are costly to upgrade (for example, Germany). The sub-3GHz band can also be used alongside the C-band to provide wider coverage.

MNOs should work with NRAs to design spectrum policies that are specific to each country in an attempt to speed up the auction process and release spectrum quickly. For example, the 5G spectrum auction in Hungary lasted only 1 day.

NRAs should also ensure that as much contiguous time division duplex (TDD) spectrum as possible is made available. For example, the full 100MHz in the C-band as specified by the 3GPP standards body was not made available to all MNOs during some recent spectrum auctions. This will limit the ability of these MNOs to provide the highest customer experience possible and to be competitive in the market.

A large contiguous band may not be available due to past auction structures. However, NRAs can take steps to rectify this situation and create the optimum spectrum portfolio for upcoming auctions. This was the case in Thailand: the 2500–2600MHz band was initially divided into two frequency division duplex (FDD) segments (bands 7) and one TDD segment (band 38), but these were later reconfigured into a single 190MHz block of contiguous TDD band (band 41) (Figure 5). Auctions should also be designed with a pro-competition mindset to ensure that MNOs invest in network deployments rather than licence costs in order to create the best customer experience and be competitive in the market.

**Figure 5: Reconfiguration of the 2600MHz band in Thailand**

Source: Analysys Mason, 2020

## 5G is expected to boost smartphone sales, and vice versa

TeliaSonera (Finland) was the first MNO to launch a 4G network in December 2009, but the first 4G handsets only became commercially available in mid-2011. Until that time, only USB dongle modems were sold as part of the MNOs' proposition. In contrast, the 5G launches in South Korea were accompanied by one premium handset, followed by another that was released only a few weeks later. The high levels of competition between the established device vendors have led to the release of a large number of 5G devices during the last 12 months. Indeed, 63 5G smartphones had been announced by mid-December 2019,<sup>4</sup> 29 of which are commercially available. This was not the case during the launches of 3G and 4G networks.

China Mobile offered more than 10 5G devices at the time of its network launch and has a broad 5G handset portfolio including models from Chinese brands (Honor, Huawei, Oppo, Vivo, Xiaomi and ZTE) and Samsung. China Mobile also introduced a smartphone under its own brand. The MNO offers premium devices priced above CNY6000 (USD870) as well as mid-range options priced at around CNY3500–5000 (USD507–725); these are not available in other countries yet. China Mobile expects that the average price for a 5G device will fall to CNY1000–2000 (USD145–290) by the end of 2020; indeed, the Redmi K30 is already available for CNY1999 (USD290).

Most vendors, including brands such as Oppo and Vivo that are less well-known outside of Asia, launched 5G devices in time for the 5G network launch in China. The majority of these devices were designed to use the 3.5GHz band; the 2500MHz band was the second-most used band. The launch of 5G gives mid-market brands such as Xiaomi, Oppo and Vivo the opportunity to increase their market share in countries outside of Asia because their 5G devices undercut the competition from premium brands such as Apple and Samsung. Xiaomi already sells a device for less USD300.

Apple is generally not a first mover when a new generation of mobile networks is rolled out. It is likely to wait until 5G technologies have matured and MNOs have deployed networks before releasing a 5G device (as was the case with 4G). It is expected to launch the 5G iPhone in September 2020, and this will be a big driver for

MNOs to not only migrate their premium 4G subscribers to 5G, but also to encourage users to upgrade their devices.

## A significant number of MNOs have now launched 5G services

A further 12 5G networks were launched in 1Q 2020, thereby increasing the number of countries with 5G networks from 34 to 41. The number of commercially available smartphones also increased from 29 to 64, adding more customer choice and increasing market competition.

The first year of 5G launches was successful and MNOs bundled value-added services with their 5G tariffs in order to capture higher spenders and early adopters and grow ARPU. This strategy is similar to that adopted by the early movers when 4G networks were first launched. However, MNOs will also need to develop propositions to address the broader market, including price-sensitive customers.

The COVID-19 pandemic will dampen investments in the short term, but China Mobile and Verizon have already stated that they will increase their 5G network capex by USD5 billion and USD1 billion, respectively, in 2020.

Mobile technology will nevertheless continue to contribute to the global economy. Mobile technologies and services added USD4.1 trillion to the worldwide economy in 2019 according to the GSMA (4.7% of GDP).<sup>5</sup> This figure will approach USD5 trillion (4.9% of GDP) by 2024, and 5G networks are expected to contribute a further USD2.2 trillion to the GDP between 2024 and 2034.

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<sup>5</sup> GSMA (2020), *The Mobile Economy 2020*. Available at [https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/03/GSMA\\_MobileEconomy2020\\_Global.pdf](https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/03/GSMA_MobileEconomy2020_Global.pdf).

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**Roberto Kompany** (Senior Analyst) is a member of Analysys Mason's Telecoms Software and Networks research team and is the lead analyst for the Next-Generation Wireless Networks programme focusing on strategy and market research. He is also a Cambridge Wireless Special Interest Group (SIG) mobile broadband champion. Prior to joining Analysys Mason, Roberto worked for Dixons Carphone, where he analysed the effect on the business of shifts in the telecoms market – for example, in terms of mergers, operator KPIs and technology – in Europe and the UK. Previous positions included consultancy, where he helped a variety of clients worldwide with mobile-related projects, such as a capex reduction and developing a 5-year strategy for an incumbent's wireless infrastructure. He started his career at a leading network equipment vendor, where he served in several different capacities, such as R&D, and deployment and optimisation of mobile infrastructures across multiple continents. Roberto holds an MSc in Mobile & Satellite Communications from University of Surrey and an MBA from IE Business School.

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