GSMA Intelligence

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Global 5G Landscape
Q2 2020

July 2020

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

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GSMA
Intelligence

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily.

GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself.

Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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This quarter's five key takeaways

5G will be a key pillar of the era of intelligent connectivity, supporting economic growth, transforming businesses and delivering innovative new services. With 5G at a nascent stage, GSMA Intelligence's quarterly review identifies key developments in areas influential to the development of next-generation networks and the wider 5G ecosystem.

This report aggregates our latest data on 5G connections, adoption and coverage, as well as information on network trials/launches and spectrum assignments that occurred over the past quarter.

1 **Spectrum:** A number of 5G spectrum assignments that were planned to take place in Europe this year have been postponed because of the Covid-19 pandemic, including auctions in France, Spain and Portugal. Singapore and New Zealand moved away from using auctions to assign 5G spectrum, a shift from the previous governments' policies.

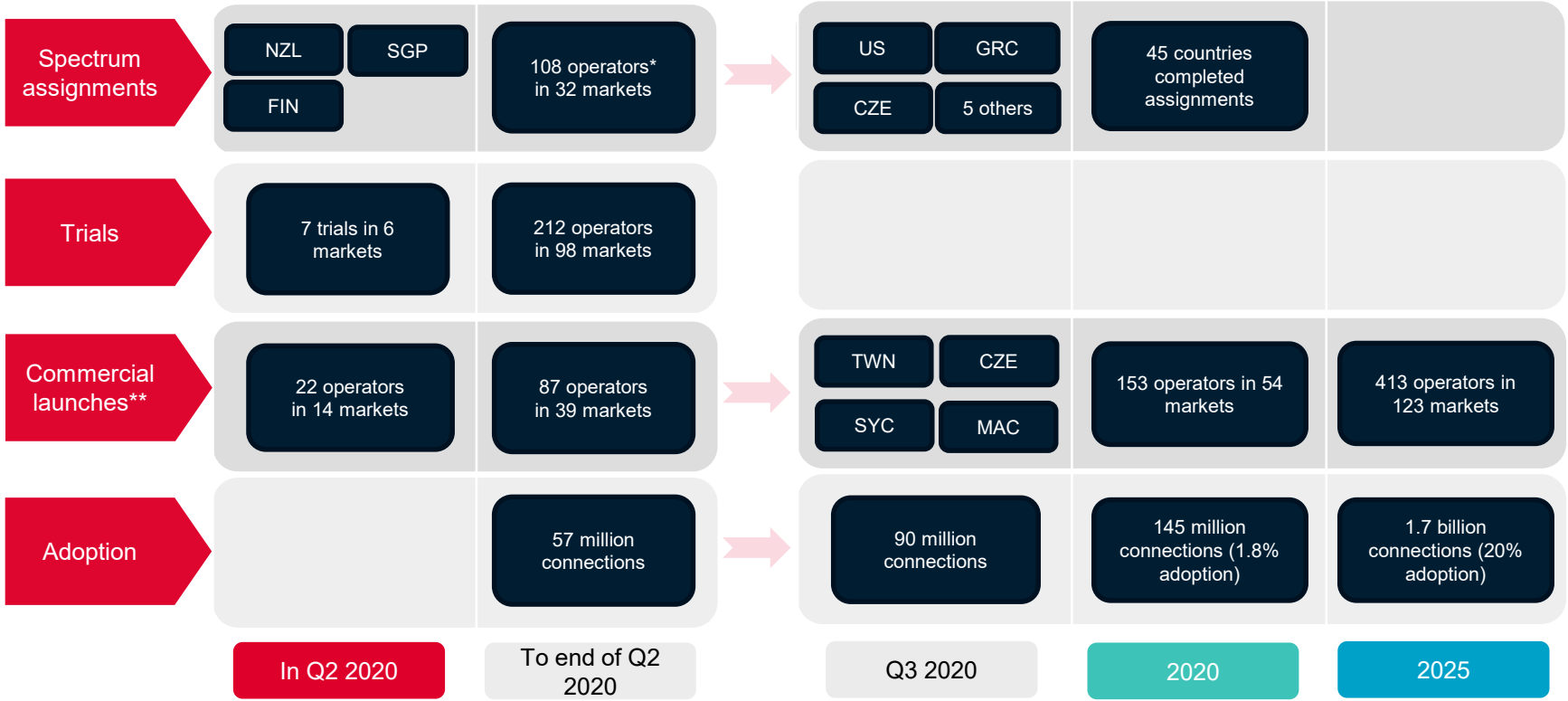
2 **Launches**: 22 operators launched commercial 5G services across 14 countries during the quarter, including 21 mobile networks. At the end of Q2 2020, 5G was commercially available from 87 operators in 39 markets worldwide. 5G was launched earlier than planned in Sweden and South Africa, while Covid-19 caused launches to be delayed in India, Greece and Portugal.

3 **5G arrives in Sub-Saharan Africa:** Africa has had its first major 5G network launches: Vodacom and MTN have both launched commercial services in several large cities in South Africa. But with 4G adoption still below 30% in the country, 5G services will likely initially target niche market sectors, including the enterprise segment. 5G and fixed wireless access (FWA) will play a key role in connecting homes and SMEs in Africa not currently served by fixed broadband.

4 **B2B core networks are being deployed in China:** Chinese operators have made distinctions between B2C and B2B tenders and associated investments, signalling a dedicated B2B core network strategy. For China Mobile, the information available on the second phase of its 5G tender reveals that 13% of the total investment in standalone 5G core networks will be dedicated to B2B.

5 **Energy consumption:** Energy consumption has always been an important consideration for mobile network operators, and 5G networks are expected to use more energy. The rising number of new 5G use cases and skyrocketing data traffic will work against 5G's theoretical energy-efficiency potential.

5G at a glance: global outlook



*Excludes regional US and Canadian operators
**Launches of commercial mobile and FWA 5G services

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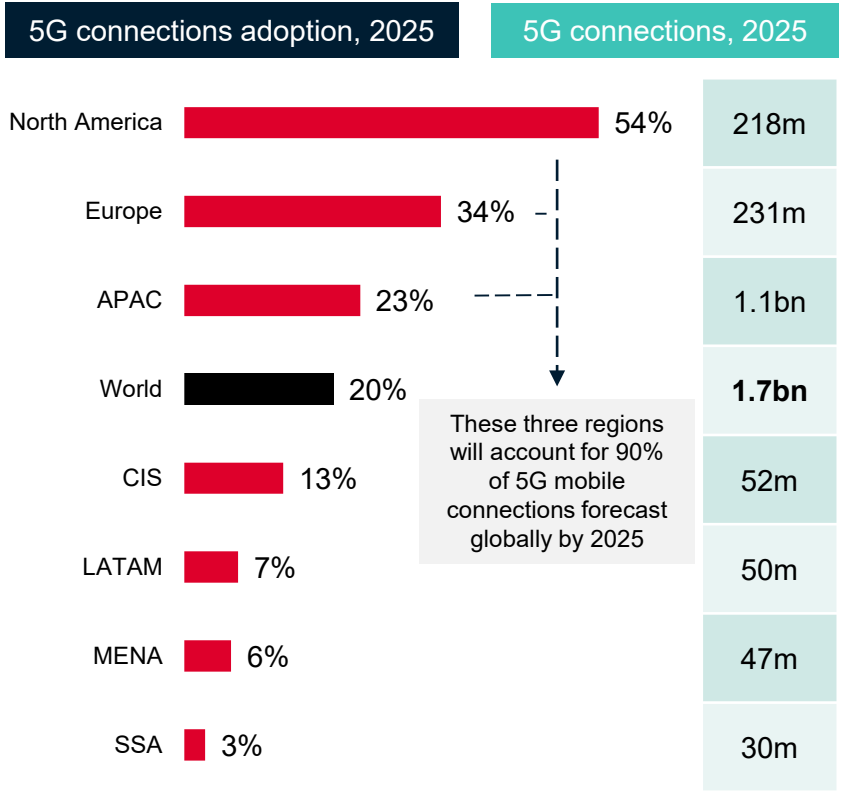
Regional breakdown

- 22 operators launched 5G services in Q2 2020 across 14 markets, taking the total number of 5G operators to 87 in 39 markets.
- By 2025, we project global 5G connections to reach 1.7 billion. Asia Pacific will have the largest share of these connections
- Our forecast for China has increased by 16.6 million (18%) for 2020, based on the rapid rollout of its 5G network and strong adoption rate.
- In Q2 2020, a number of operators in markets such as Sweden and South Africa were allowed to launch 5G early to ensure that sufficient capacity was available during the Covid-19 crisis.
- Conversely, Covid-19 has delayed the spectrum auction in India to at least 2021, while other markets, including Greece and Portugal, will also experience an interruption to 5G rollouts.
- The first mobile 5G networks in Sub-Saharan Africa were launched in Q2 2020. FWA has been available since 2019 from Rain, but Vodacom and MTN are now offering mobile 5G alongside FWA.



Data correct to 30 June 2020
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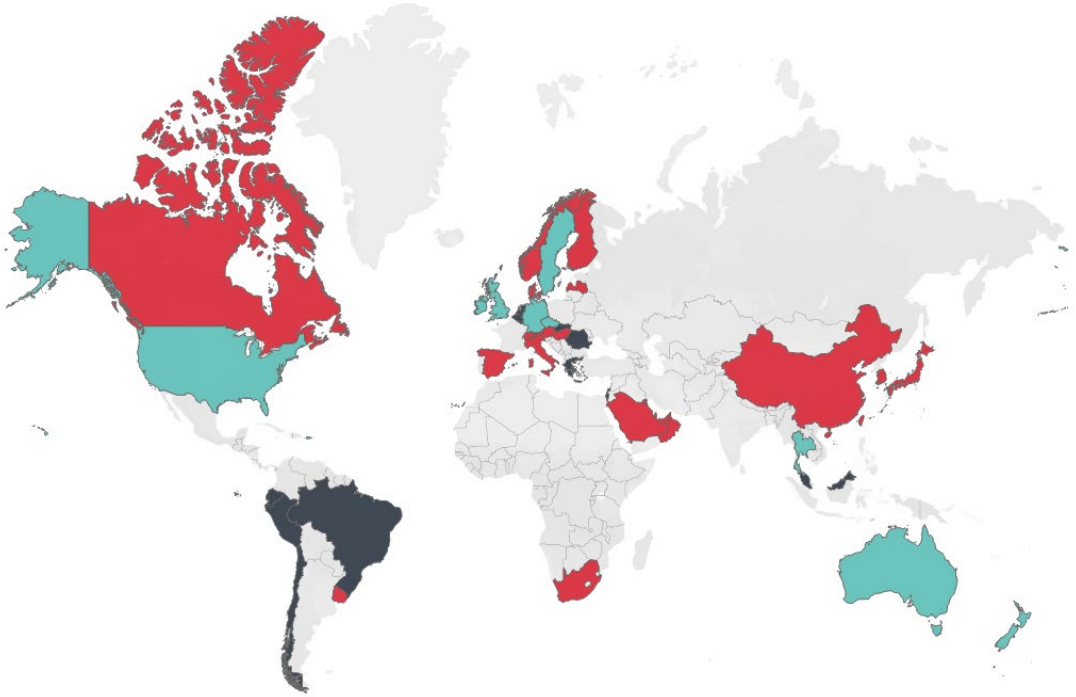
5G spectrum assignments in Q2 2020

Market	Date	Bands	Bandwidth	Upfront fees	$/MHz/pop/year (PPP adj.)	Number of winners
New Zealand	May 2020	3.5 GHz	160 MHz	$2.2 million	$0.00200	3 – 2degrees (Trilogy), Dense Air (Airspan), Spark
Finland	June 2020	26 GHz	2400 MHz	$7.9 million	$0.00013	3 – Elisa, Telia, DNA
Singapore	June 2020	3.5 GHz	200 MHz	$80.46 million	$0.00800	2 – Singtel, JVCo
Singapore	June 2020	26 GHz	3200 MHz	$0.72 million	$0.00000	4 – M1, Singtel, StarHub, TPG Telecom

5G spectrum auction pipeline

**Postponed due to Covid-19*
***Q4 2020+ data not exhaustive; preference by date*

5G spectrum state of play



Assignments planned

Assignments completed and planned

Assignments completed

Completed assignments

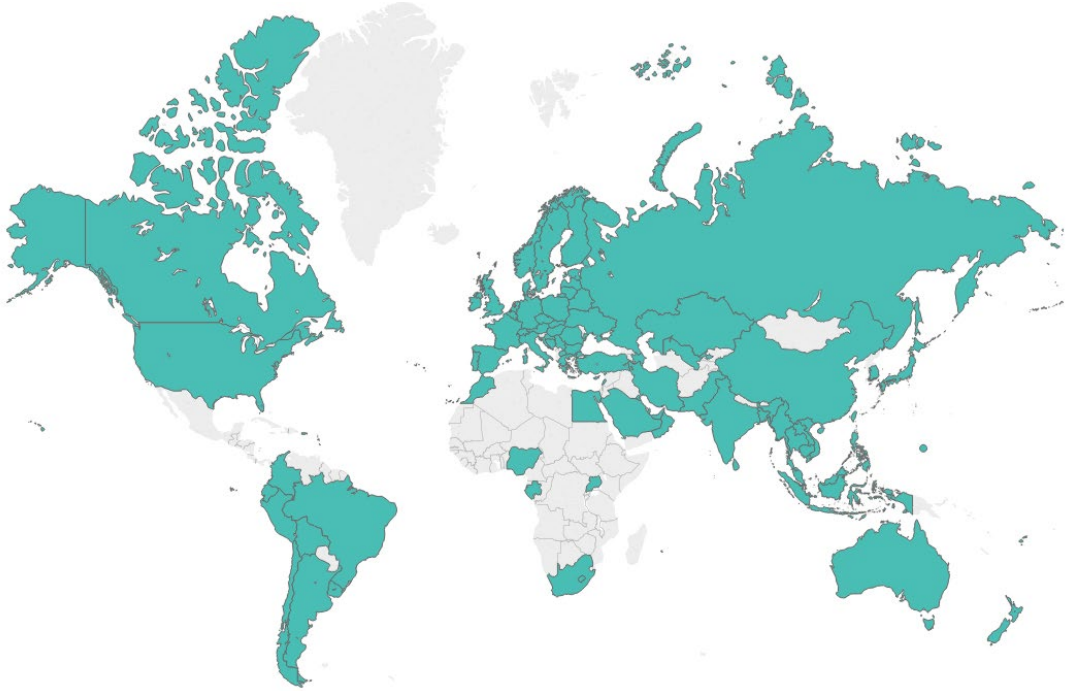
- As of Q2 2020, 'new' spectrum specifically earmarked for 5G had been assigned in 32 markets.
- 108 operators received spectrum across low-, mid- and high-bands to date*:
  - 34** operators in low-band
  - 81 operators in mid-band
  - 35** operators in high-band.

*Low = <1 GHz, mid = 1–6 GHz, high = >6 GHz

**Excludes US and Canadian regional operators/winners

5G trials

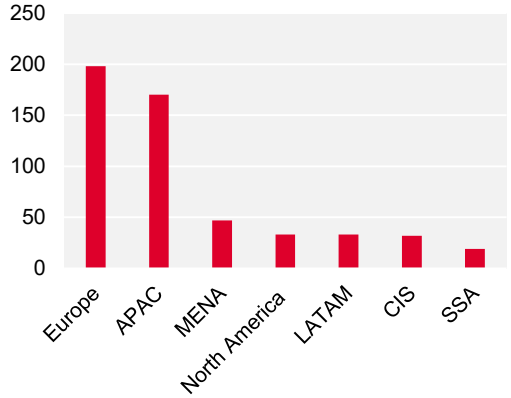
- To date, 212 operators across 98 markets have conducted a total of 541 5G trials.
- In Q2 2020, 7 trials were conducted by 6 operators, but no operators conducted their first 5G trial.



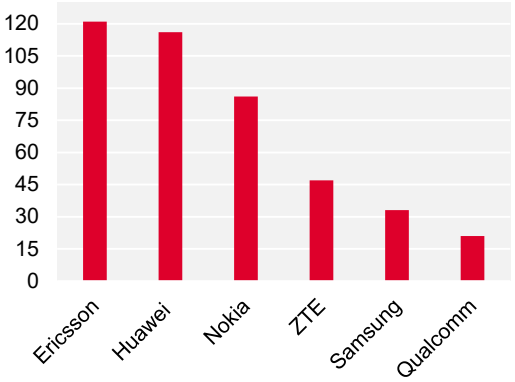
Markets launching their first 5G trial in Q2 2020

Markets launching their 5G trials before Q2 2020

5G trials by region



5G trials to date by vendor



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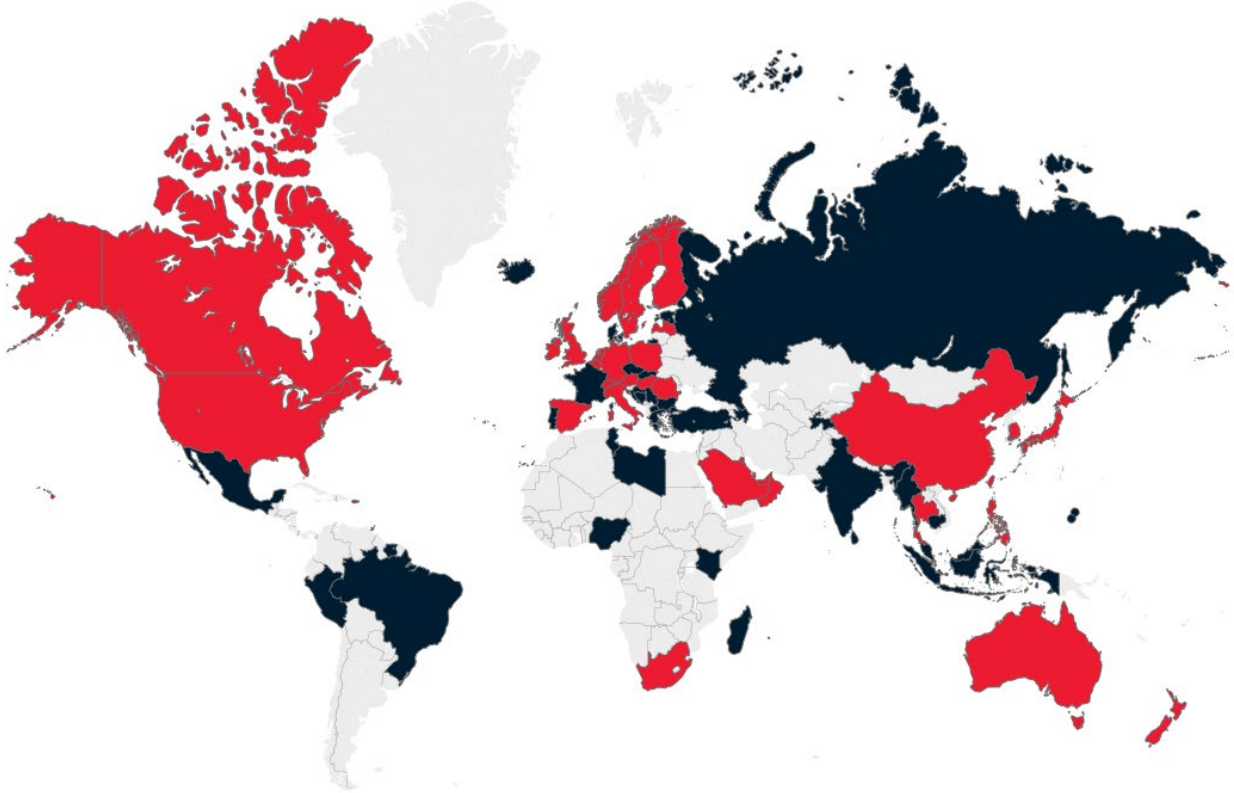
5G commercialisation



Planned commercial 5G network

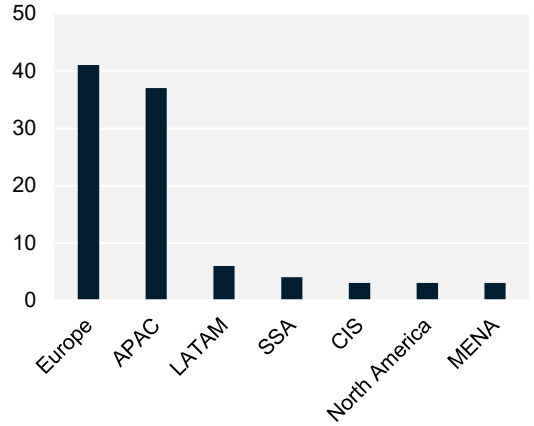
Live commercial 5G network

Operator launch plans

As of Q2 2020:

- 5G was commercially available from 87 operators: 80 operators offered mobile 5G while FWA was available from 30 operators (many operators offer both mobile and FWA).
- Another 84 operators had announced plans to launch mobile 5G.
- 13 operators had stated plans to launch 5G-based fixed wireless services.

Planned operator launches by region



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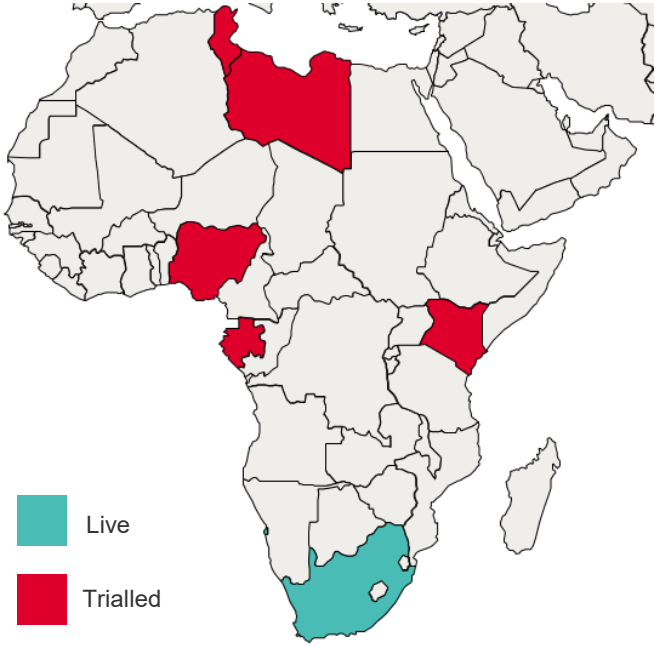
5G comes to Africa but mass adoption is not imminent

- **First major 5G network launches in Africa.** Vodacom and MTN have now both launched commercial mobile services in several large cities in South Africa. Vodacom and data-only operator Rain are also offering 5G FWA services in the country.
- **5G rollout boosted by temporary spectrum.** South Africa assigned a significant amount of free temporary spectrum in the 3.5 GHz band for 5G use. This will be auctioned in December 2020 with the aim of transitioning to a more sustainable framework.
- **5G will initially be a niche service.** As 4G adoption is still below 30% in South Africa, Vodacom's 5G service will likely target niche market segments, including the enterprise segment. But 5G and FWA will play a key role in connecting homes and SMEs not currently served by fixed broadband.
- **4G adoption remains the focus.** 5G trials have been conducted in several other markets in the region; however, with significant unused 4G capacity, the focus for operators remains on increasing 4G adoption. This involves strategies to make 4G devices more affordable and the provision of relevant digital content.
- **Mass adoption of 5G in the region is not imminent.** There are significant deployment challenges, including limited fibre infrastructure and power grids, in addition to likely affordability barriers for large swathes of the population. The initial focus will be on enhancing digital inclusion among underserved users.

5G networks in Africa – live and trialled



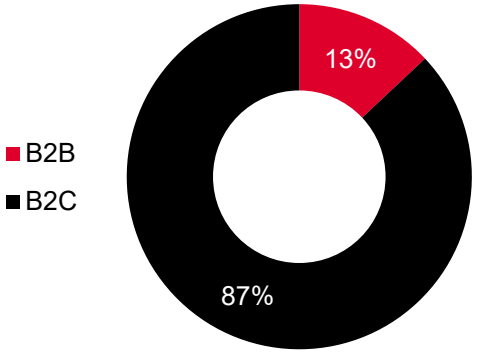
Source: GSMA Intelligence

B2B core networks: are Chinese operators setting a new trend?

- **Deploying 5G core networks for B2B**. As operators ramp up their IoT businesses, many are deploying core networks dedicated to IoT. This is mainly to allow operators to ensure service quality and meet specific network requirements of enterprise customers, including localised coverage and time-sensitive networking. In some cases, data-oriented IoT services do not require the breadth of capabilities (and costs) that come with traditional core network assets. With 5G network slicing, a common core can be used to service many enterprise requirements alongside consumer services; however, we expect to see dedicated B2B core network deployments as operators look to scale their B2B businesses with 5G.
- **Public signals of these strategies are not always available, but China provides an example.** Chinese operators have made distinctions between B2C and B2B tenders and associated investments, signalling a dedicated B2B core network strategy. For China Mobile, the information available on the second phase of its 5G tender reveals that 13% of the total investment in standalone 5G core networks will be dedicated to B2B. Although B2C accounts for the largest share, the B2B aspect of the investment is likely to garner greater attention in the industry because it is – to a large extent – unprecedented. This fits with China Mobile's ambition to leverage 5G and IoT to drive new B2B revenue, especially in industrial manufacturing, transport, energy and healthcare, which together account for nearly 15% of the operator's B2B revenue today.

B2B share of 5G Core Network Capex

China Mobile (most recent tender)



Source: China Mobile, GSMA Intelligence

5G networks and energy consumption

- **5G is more energy-efficient per gigabyte than previous wireless technologies.** Thanks to improvements of the last decade, such as advanced signalling standards and the use of beamforming technology, which transmits the radio signal directly, 5G networks will need less energy to transfer one gigabyte of data. However, global mobile data traffic will grow almost fourfold by 2025 and new 5G use cases will require denser and more complex networks. These factors neutralise 5G's theoretical energy-efficiency potential and may even increase the total energy consumption of the networks.
- **Operators are honing in on energy efficiency.** Energy consumption is already responsible for 10–40% of mobile operator opex, and networks will likely use more energy going forwards. Operators have started to focus on five key areas regarding energy consumption: energy sourcing (buying cheaper or producing renewable energy), energy utilisation (taking advantage of off-peak rates), energy conversion (advanced battery solutions and rectifiers), energy transportation (increased voltage to reduce power loss and deploy equipment closer to the load) and energy consumption (improved equipment efficiency).
- **Utilising AI-driven network management applications.** AI-driven network management applications will help improve 5G's network efficiency because they can shut down or put to 'sleep' a part of the equipment or even the network. Equipment vendors and operators have started to offer such energy-saving solutions as an expansion to existing network management platforms, offering more than 10% energy saving in the RAN. Going forwards, AI-driven energy-saving platforms will likely focus more on data harvested from user equipment: anonymised coverage and data traffic insights from devices can help to optimise the network further and adjust more capacity layers.
- **Going green to counteract 5G energy requirements.** To cover the increased energy requirements of 5G networks, many operators have started complex green transformation plans to source renewable energy. As the level of data traffic and network complexity increases in the 5G era, the gap will only widen further between operators with green transformation plans and those adapting more slowly. For the latter group, this will cause long-lasting competitive disadvantages both in terms of finances and corporate responsibility.

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