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The 5G Readiness Guide

Over the past six months, The EIU has collected data and information on the 5G environment in the top 60 telecoms markets worldwide, in order to score them on six key metrics: the business environment, spectrum availability, the current level of 5G deployment, 5G network speed, progress on industry trials of 5G and the robustness of 5G policy. This paper contains a snapshot of our scores for each region, with the full 5G scoring table and analysis available as part of our [EIU Viewpoint](#) service. For a full description of our methodology, see page 9.

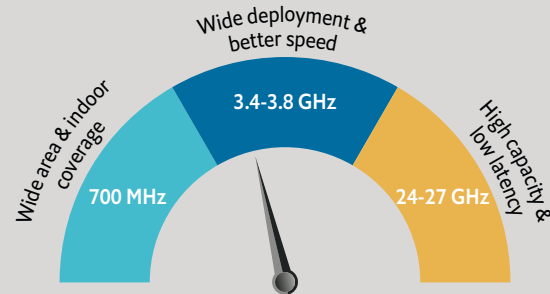
Our assessment is intended to help companies planning to invest in the 5G ecosystem to understand where each country stands in the 5G race, as well as its future potential. It also allows policymakers to benchmark their 5G regulations and policies against those of other countries, and make improvements that could attract more investment into the sector.

Key findings:

- An early start in 5G preparation, along with better management of the coronavirus (Covid-19) pandemic in 2020, has helped many Asian countries to free up spectrum in the higher bands in order to forge ahead on 5G rollouts.
- Gulf countries are also among the most 5G-ready globally and offer significant market opportunities for providers of next-generation technologies.
- Despite lagging in spectrum auctions, Western European countries are at the forefront of testing and rolling out 5G-based industrial applications.
- Inadequate spectrum policy and a lack of regulatory coordination have held back 5G development in the US, but progress is being made under the Biden administration.
- Most countries in Africa and Latin America are likely to remain focused on expanding 4G and fibre broadband in the medium term, given a lack of funding and the low capacity to monetise 5G.
- A 5G-specific policy that covers auctions, deployment targets and trials, coupled with government support in the form of tax incentives or low-cost loans, is the best way to support faster rollouts.
- The US-China dispute over Huawei and other Chinese telecoms equipment manufacturers poses the biggest risk to 5G rollout across all regions, second only to disruption caused by Covid-19.

Recommendations

The 24-26 GHz band is crucial to deliver high speed and low latency



Source: The Economist Intelligence Unit.

What private investors should look for:

- Countries with a national 5G policy that covers auctions, deployments and industrial trials.
- Governments that enable collaboration between operators, vendors and industry players.
- Countries with a high mobile-service penetration rate and a high average revenue per user, where 5G smartphone shipments are on the rise.

- Industrial economies where businesses are keen to adopt 5G technology.

What governments should do to attract investment:

- Ensure availability of contiguous blocks of spectrum and equitable distribution to all operators.
- Consult industry players on spectrum base-price prior to auction, in order to avoid delays.
- Offer single-window clearance for telecommunications licences and a medium-term national 5G policy.
- Offer incentives to encourage infrastructure and spectrum-sharing among operators that can reduce investment costs.
- Partner with vendors and the industry to facilitate industrial trials.
- Make 5G spectrum directly available to enterprise users, such as manufacturers, who want to deploy a private 5G network.
- Explore opportunities for public-private partnerships (PPPs).

The global rollout of 5G has been affected by the pandemic

Until the pandemic derailed rollout plans, dried up investment and diverted government focus, 2020 was expected to be the year of 5G, the next generation of mobile standards. Countries such as India and Poland cancelled 5G auctions planned for 2020. The telecoms sector has also had to deal with the ongoing US-China trade war, which has increasingly focused on technology. US efforts to restrict the activities of Huawei, a Chinese telecoms equipment manufacturer, is forcing several countries to modify their 5G strategies and, in the process, risk losing investment from either of the two largest economies in the world. The US-China split could lead to a global bifurcation of technology standards that would delay 5G rollout by several years.

The coronavirus has, nevertheless, accelerated digitalisation and opened up new opportunities for telecoms operators. Fast, reliable connections have become vital to businesses, consumers and governments as they try to cope with this global crisis. For companies, the pandemic has underlined the benefits of deploying online offerings, automation and developing the Internet of Things (IoT) to manage supply chains. For consumers, it has increased demand for online goods and services. And, for governments, it has highlighted the importance of deploying online services, including healthcare, as well as the potential benefits of advanced data analytics, artificial intelligence (AI) and robotics.

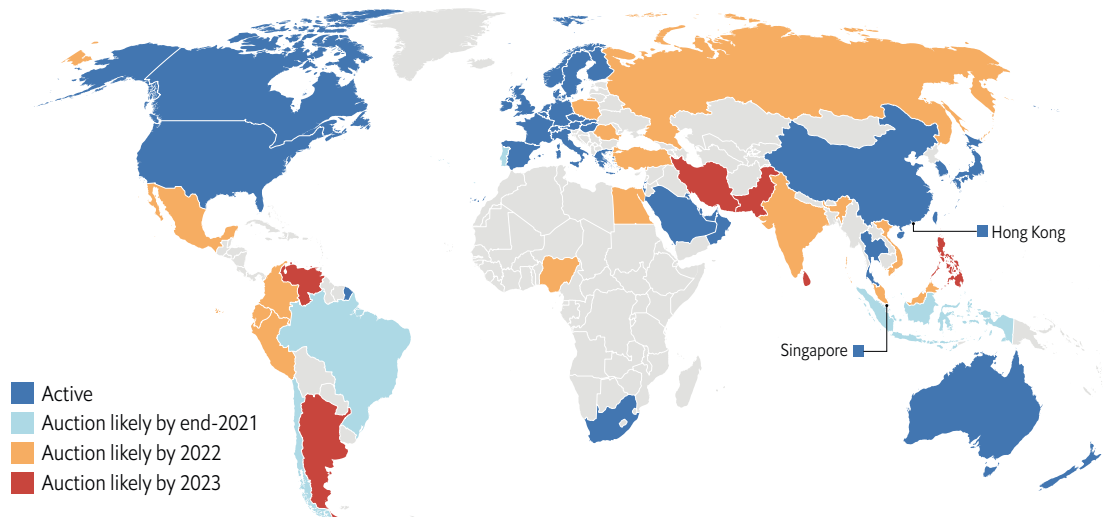
THE 5G READINESS GUIDE

DEPLOYMENT STRATEGIES, OPPORTUNITIES AND CHALLENGES ACROSS THE GLOBE

Looking further ahead, 5G will be the launchpad for countless new applications, from self-driving cars and smart cities to augmented reality (AR). 5G networks will offer benefits in the form of hyperfast connections, improved reliability, high capacity and low latency (meaning faster response times for requests). For telecoms operators, the upgrade represents an opportunity to move beyond communication services to offer hi-tech solutions to businesses. Businesses can use these technologies to transform their operations and optimise efficiency, while governments can create a robust 5G infrastructure to attract investment, create jobs and drive economic growth.

The benefits of 5G are significant, but so is the investment necessary for its rollout. European operators have not forgotten the lessons of 3G, when heavy outlay on licences left them loaded with debt that some have still to repay. As operators and governments decide which markets will offer the best returns on 5G, there are several factors to consider. Strong and affordable infrastructure (with the right spectrum and good coverage of base stations) will be the foundation, but operators will also need to find the right 5G products and service applications to sell. Finally, the business environment will need to support significant research and development (R&D), so that 5G capabilities are developed and used in the most efficient way. The weighting of these factors differs markedly by region.

About 68% of the countries covered by the EIU are likely to switch on 5G by the end of 2021



Sources: National telecoms regulators and governments; The Economist Intelligence Unit.

Asia: Good availability of high-band spectrum

South Korea, Taiwan and China are among the world leaders in terms of their 5G rollouts. Thailand has emerged as a dark horse, while India and Indonesia, two of the largest economies in the region, have made little progress.

The region's frontrunners benefited from their decision, in 2019, to release spectrum in the low 700-megahertz (MHz) band (suitable for covering large geographic areas, at the expense of speed) for trials. An early start to auctions, along with better management of the Covid-19 pandemic, have also helped many Asian countries to free up spectrum in the higher bands, which are capable of delivering higher speeds, albeit over shorter ranges. One-third of the Asian countries studied were able to make

the coveted 3.3-3.5-gigahertz (GHz) and 26-28 GHz bands available, unlike many wealthy nations in Europe or North America.

Government support in the form of tax incentives, subsidies and low-cost loans has been crucial to 5G progress in Asia. In parts of South and South-east Asia, however, pandemic-related lockdowns have drained public finances. In India and Malaysia, operators have instead focused on raising funds for spectrum auctions from private investors and by divesting infrastructure assets (such as mobile towers).

Overall, strong regulatory oversight has worked well for the region. In China, the telecoms ministry's active involvement has ensured that operators reached their target of rolling out 700,000 5G base stations by November 2020. Regulators in Australia and Hong Kong, meanwhile, have boosted investment by setting low spectrum base-prices. This could hold lessons for India, where high spectrum costs have prompted protests from debt-laden operators.

Opportunities: Strong take-up of 5G-based home broadband in Australia, New Zealand and Hong Kong.

Challenges: A lack of government support for industrial trials of 5G applications (apart from in China, South Korea and Japan).



Asian frontrunners benefited from an early auction of high-band spectrum

| Country | BER | Spectrum availability | 5G deployment | Network speed | Progress on 5G trials | Robustness of 5G policy |
|-------------|--------|-----------------------|---------------|---------------|-----------------------|-------------------------|
| South Korea | High | High | High | High | High | High |
| China | Medium | Medium | Medium | High* | High | High |
| Taiwan | High | High | High | High | Medium | High |
| Japan | High | High | Medium | Medium | High | High |

* 4G average download speed used to evaluate 5G speed potential.

Sources: National telecoms regulators and ministries; companies; Ookla; Opensignal; The Economist Intelligence Unit.

Europe: A late start but a strong focus on industrial applications

The pandemic has posed several roadblocks for Europe's 5G rollout, with long lockdowns delaying auctions and trials in Portugal and elsewhere. Digitally advanced countries, such as the Netherlands and Sweden, have had to delay auctions of the coveted 3.5-GHz spectrum. Overall, only eight out of the 23 European countries covered in this report have made all the necessary bands of spectrum available to operators. Some countries have also been delayed by indecision over whether to use Huawei equipment.

However, Europe's 5G rollout will pick up pace in 2021-22 as the region tries to catch up with the US and China. A strong regulatory environment will be essential. The European Commission (EC) has laid down targets for EU member states, which include being able to offer uninterrupted 5G coverage in urban areas by 2025. A Nordic 5G Action Plan will boost industrial applications of the technology in that region. Some countries have tied coverage targets to their decisions on spectrum licences; for example, Switzerland requires operators to supply 50% of the population with coverage in the 700-MHz band and 25% with other frequencies by 2024.

Western European countries are generally ranked better than their Eastern counterparts, owing to better technological infrastructure and government support. Despite auction delays, Europe has already deployed a high number of 5G base stations, boosting industrial uptake. Governments have been prioritising tie-ups between operators and businesses to explore applications in auto manufacturing, public services and elsewhere. Trials range from using drones and robots to prevent weeds from strangling crops, to testing autonomous minibuses and trialling smart-energy and water-management systems. Some countries, such as Czech Republic, the UK and Germany, have set aside spectrum for industries that want to deploy an independent 5G network, without using a mobile-service provider.

Opportunities: PPPs to test 5G-based applications.

Challenges: Strong public concern about radiation from 5G towers.

High debt levels among operators may force consolidation or delay investment.

Western Europe has industry applications at the core of national 5G plans

| Country | BER | Spectrum availability | 5G deployment | Network speed | Progress on 5G trials | Robustness of 5G policy |
|---------|------|-----------------------|---------------|---------------|-----------------------|-------------------------|
| Austria | High | Medium | Medium | Medium | High | High |
| Finland | High | High | Medium | High | High | High |
| Germany | High | High | High | Medium | High | High |
| UK | High | Medium | High | Medium | High | High |

Sources: National telecoms regulators and ministries; companies; Ookla; Opensignal; The Economist Intelligence Unit.

Middle East & Africa: Gulf countries among 5G pioneers, while Africa lags behind

Saudi Arabia, the UAE and Kuwait rank among the top 10 countries globally in terms of average 5G download speed. In fact, all six Gulf Cooperation Council (GCC) members completed 5G spectrum auctions by 2018 and launched their first networks in mid-2019. The region's governments have integrated 5G development into their economic-diversification plans, as they seek to build business, technology and manufacturing hubs.

Nevertheless, 5G network coverage remains limited to 50% for most GCC member states. Outside the GCC, few countries in the region are 5G-ready. In Israel, operators continue to focus on increasing 4G network coverage from 75% in 2020 to 95% by 2022.

Progress in Africa has also been very slow. Nigeria has yet to identify adequate 5G-frequency bands or to frame the auction process. South Africa assigned temporary 5G spectrum to operators in 2020, but most of this was used to cope with the increased demand for remote working and learning during lockdowns. With economies hard-hit by the pandemic, most African governments and operators are likely to focus on 4G networks and fibre broadband infrastructure, before firming up plans for 5G. Even then, revenue opportunities may be limited. Only about 45% of the population of sub-Saharan Africa had a smartphone in 2019. While the mining and manufacturing sectors will be early adopters of 5G, creating business opportunities will require a more concerted effort by governments.

Opportunities: Smart-city ambitions of the UAE and Saudi governments.

Challenges: Uncertainties over the role of Huawei in countries reliant on Chinese investment.

Saudi Arabia, UAE report some of the highest 5G speeds globally

| Country | BER | Spectrum availability | 5G deployment | Network speed | Progress on 5G trials | Robustness of 5G policy |
|--------------|--------|-----------------------|---------------|---------------|-----------------------|-------------------------|
| Saudi Arabia | Medium | High | Medium | High | High | High |
| UAE | High | High | Low | High | High | High |
| South Africa | Medium | Low | Low | Low * | Low | Medium |

* 4G average download speed used to evaluate 5G speed potential.

Sources: National telecoms regulators and ministries; companies; Ookla; Opensignal; The Economist Intelligence Unit.

North America: Spectrum may be lacking for advanced applications

The US is a global 5G leader, benefiting from an early launch and a strong business environment. It has already auctioned off enough 5G-ready spectrum to facilitate early commercial deployment, along with extensive trials that began in 2017-18. It has also put in place a 5G rollout plan focused on spectrum release, infrastructure policy, modernising regulation and encouraging private-sector investment. Government support for trials includes city-scale test beds and innovation zones.

Canada has also made significant advances. The government runs its own research facility, data analytics centre and 5G test site, aimed at encouraging cross-sector collaboration between, for example, mining, utilities and hydrocarbons, to explore how 5G could improve productivity.

Despite all this, both countries have been slow to build out base stations and improve network coverage and speeds. Opensignal, an industry body, as at April 2021, did not rank the US among the top 10 countries for average 5G download speed or experience. In Canada, the 3.5-GHz auction that began in June 2021 has been much delayed. Operators will be unable to offer better speed and coverage before 2022.

US, Canada do not feature among top 10 nations with highest 5G speed

| Country | BER | Spectrum availability | 5G deployment | Network speed | Progress on 5G trials | Robustness of 5G policy |
|---------|------|-----------------------|---------------|---------------|-----------------------|-------------------------|
| US | High | High | High | Low | High | Medium |
| Canada | High | Medium | Low | Medium | High | Medium |

Sources: National telecoms regulators and ministries; companies; Ookla; Opensignal; The Economist Intelligence Unit.

A policy vacuum in the US has resulted in inconsistent regulations. Oversight of spectrum policy is currently divided between the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC). Although the two agencies meet on a regular basis, the high turnover of leaders at the NTIA, together with delays caused by the pandemic, have resulted in a loss of momentum on spectrum policy. However, the change of administration, coupled with the rapid rollout of vaccines, offers opportunities for a new start.

Opportunities: Strong business environment and a government focus on R&D.

Challenges: A fragmented policy environment and ongoing political conflict with China.

Latin America: The lack of a policy framework will hold back progress

Chile leads the region in terms of 5G preparedness. It has auctioned off a significant amount of 5G-ready spectrum; imposed dynamic spectrum caps to encourage broad distribution across operators; implemented measures for efficient and effective use of spectrum; and set aside US\$3bn for public investment in 5G in 2020-25. Brazil, Mexico and Colombia are also making advances. All three are developing 5G roadmaps and policies, pushing ahead with 5G trials, and either planning or completing spectrum auctions.

However, a lack of 5G-specific policies, delayed or inadequate spectrum auctions, and insufficient public- and private-sector investment are all holding back progress in the region. In Brazil, slow rural deployment and high 5G pricing pose significant challenges, while Colombia has made insufficient progress on infrastructure-sharing guidelines that would lower deployment costs for operators.

The region also suffers from the poor coverage and speeds of its existing 4G networks, as well as the low penetration of smartphones. Many countries are still struggling with a legacy of underinvestment in infrastructure, topographical challenges, or (particularly in the case of Venezuela) economic instability that deters private investment. Political pressure from the US to exclude Huawei from the region's core network could also delay the rollout of 5G, although most countries may opt for Chinese equipment regardless, given a lack of alternatives in the same price range.

Opportunities: Government support for industrial trials of 5G in Chile, Colombia, Brazil and Mexico.

Challenges: The impact of the pandemic and economic volatility. The continuing need for investment in 4G.

4G expansion takes precedence over 5G launch in Latin America

| Country | BER | Spectrum availability | 5G deployment | Network speed* | Progress on 5G trials | Robustness of 5G policy |
|---------|--------|-----------------------|---------------|----------------|-----------------------|-------------------------|
| Chile | High | High | Low | Low | High | High |
| Brazil | Medium | Medium | Low | Low | Medium | Medium |
| Mexico | Medium | Medium | Low | Low | Medium | Medium |

* 4G average download speed used to evaluate 5G speed potential.

Sources: National telecoms regulators and ministries; companies; Ookla; Opensignal; The Economist Intelligence Unit.

Methodology

We have ranked 60 countries as “High”, “Medium” or “Low” on six key parameters: business environment, spectrum availability, 5G deployment, network speed, progress on industry trials and robustness of 5G policy. The aim is to gauge countries’ readiness for 5G rollout and implementation, based not only on the current status of 5G deployment, but also on the government initiatives and policies that will drive future investment.

Business Environment Rankings (BER): use our existing BER scores for 82 countries. “High” = 1-30, “Medium” = 31-60, “Low” = 61 and above.

For the remaining indicators, we have carried out a qualitative assessment based on our research, where:

Spectrum availability: assesses the status of auctions and spectrum bands available as at June 15th 2021. “High” denotes a country that has access to spectrum above 6 GHz. “Medium” means the country has access to, or is in the process of auctioning, spectrum in the 1-6-GHz range. “Low” means either the country only has access to frequencies under 1 GHz or has yet to auction any 5G spectrum.

5G deployment: assesses network deployment based on data from Ookla;

Speed: uses data on 5G average download speeds from Opensignal as at June 2021 or (if 5G data are unavailable) 4G average download speeds from Ookla in May 2021.

Progress on trials: evaluates R&D carried out into industrial applications of 5G technology.

5G policy: assesses whether the country has a national 5G policy in place and whether it covers auctions, deployments and medium-term strategy. We also consider government efforts to support 5G trials via state-sponsored test labs, tax incentives, direct investment and public-private collaboration.

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