

# Are you ready for 5G?

This transformative new technology combines enormous performance gains with a handful of new use cases but challenging economics. Smart operators will consider seven no-regrets moves to position themselves for advantage amid radically changing industry dynamics.

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The fifth generation of wireless technology promises lightning-fast speed, incredibly low latency, and the capacity to carry massive numbers of connections simultaneously. Not surprisingly, the imminent arrival of 5G is creating a buzz in both the industry and the wider world.

Though standards will not be fully defined until the 2019 World Radiocommunications Conference, early progress indicates that two distinct “flavors” will emerge: low- and mid-band 5G focused on spectrum below 6 gigahertz and high-band 5G on spectrum above 6 gigahertz, particularly in the millimeter wave bands. Both these flavors will be used to augment and enhance existing LTE networks rather than replace them.

#### The paradox of the 5G use cases

The focus to date has been on four key use cases that 5G will enable:

##### Enhanced mobile broadband.

Faster speed, lower latency, and greater capacity could enable on-the-go, ultra-high-definition video, virtual reality, and other advanced applications. However, wireless data prices are falling and growth in demand can be met in other ways (for example, densification of LTE networks and Wi-Fi off-loading). Another hurdle is that constant connectivity—a must-have for mobile broadband—will be severely limited for high-band 5G due to propagation losses at higher frequencies.

##### Internet of Things.

With the explosive growth in the number of connected devices, existing networks are struggling to keep pace. The advent of 5G will unlock the potential of the Internet of Things (IoT) by enabling more connections at once (up to 1 million per square kilometer) at very low power. This could create additional monthly revenues for

carriers, but average IoT revenues will be a fraction of those for mobile broadband because of low usage. Moreover, 5G will have to compete against other technologies, such as Wi-Fi and Zigbee.

##### Mission-critical control.

As connected devices become increasingly central in applications that demand absolute reliability—medical devices and vehicle safety systems, for instance—latency will serve as a limiting factor. Because 5G has the potential to deliver significantly lower latency (to about 1 millisecond), it opens the door to use cases in healthcare, utilities, and other time-critical contexts. But, as with IoT, operators can expect the associated revenue to be incremental at best.

##### Fixed wireless access.

Fixed wireless access (FWA) has existed for years, primarily in areas with no viable wired broadband. 5G, particularly in the millimeter wave spectrum, is capable of delivering speeds of more than 100 Mbps to the home, making it a viable alternative to wired broadband in many markets, especially in markets without fiber. As such, 5G FWA could represent a truly new revenue stream for wireless operators, but typically only in areas where consumers don't already have access to fiber to the home and DOCSIS 3.0/3.1 cable broadband.

Yet the economics, business model, and ability to monetize these use cases at scale in the near-term to justify a nationwide roll-out of 5G in any country today remain unclear. That said, 5G's performance characteristics are getting proponents excited about the next wave of killer applications that could justify such deployment before too long.

##### The economics

In considering the economics of 5G, it's best to look separately at the two flavors discussed earlier.

*A low- to mid-band 5G network*, especially in bands below 2 gigahertz, would look and cost much the same as current LTE networks. For example, deployment costs would be similar for cell sites of comparable density.

Delivering the promised performance improvements of 5G through *high-band spectrum*, on the other hand, would require a fundamentally different architecture with much denser networks—something like 15 to 20 sites per square kilometer in highly populated urban environments, as opposed to two to five sites today. The total cost of ownership of deploying small cells at this density would be four to six times higher than for LTE macro-cell deployment. Unless costs fall dramatically, wireless operators will need to rethink their approach to deploying 5G in these bands and carefully review their business case. Although some of them are already exploring the potential of the use cases described earlier, these use cases are unlikely to generate enough incremental revenue to justify nationwide or near-nationwide deployment in high-band spectrum.

As a result, we expect high-band 5G to be deployed selectively in those micro-markets where the economics work best. Nationwide networks are unlikely to materialize in the short to medium term. Low-band deployment could be a different story because of the much more moderate investments required. Carriers in some markets could seek to gain a competitive advantage by marketing a low-band 5G network to existing and potential subscribers. Additional insights on the economics of 5G are detailed in a related article, “5G infrastructure: Change your game or halve your profits,” forthcoming on McKinsey.com

### The timeline

Given the challenging economics, at least for now, the build-out of 5G won't happen overnight. Market

trials and small-scale launches will continue to grab headlines, but large-scale deployment is unlikely to take place until the early 2020s.

There is no one-size-fits-all approach for rolling out 5G, given the number of factors that come into play at both the national and local level, including fiber availability, spectrum availability, and local regulation. In practical terms, most operators are likely to opt for low-band 5G in the near term while trialing—and in some cases deploying—high-band 5G in key micro-markets.

### What should carriers do?

Wireless operators need to start preparing for 5G now. As they flesh out their approach, they should monitor the landscape for new entrants to the market—especially moves by cable and wireline operators to use their fiber assets and street-furniture access to deploy 5G networks.

In the meanwhile, we see seven no-regrets moves that operators should take, some of which will complement their ongoing initiatives to increase the density of their LTE networks:

**1. Develop 5G offers.** 5G's performance characteristics provide reasons to be excited about the next wave of killer use cases. Operators should flesh out these use cases, develop corresponding customer offers and business cases, and develop the ecosystem (devices and app developers for example) necessary to take the offers to prospective customers.

**2. Plan at the micro-market level.** To date, all roll-outs of wireless technology in developed markets have ultimately extended nationwide, and building an overlay on top of the previous generation of the technology has proven to be a valid approach for both technological and commercial reasons. But as mentioned earlier, 5G—and especially high-band

5G—will be different because of its economics. Roll-out decisions are likely to be made at the level of micro-markets, based on their individual economics. To equip themselves for such an approach, wireless operators need to develop new technical and commercial capabilities such as using advanced analytics to identify and prioritize micro-markets for 5G deployment.

### 3. *Rethink network deployment and operations.*

Given the much greater density of cell sites required for high-band 5G, the traditional model for macro-cell deployment will be too expensive and impractical to adopt. With its highly customized approach to network deployment, sites can take more than six months to go live. To reduce deployment time and costs, operators should rethink their processes, digitizing and automating them as much as possible. And to cut the costs of operating and maintaining a network, operators may also have to re-examine their view of network architecture and reliability. For example, could they design a network with a higher tolerance for node failure by emulating the approach that Google, Facebook, and other tech giants use for servers in their data centers?

4. *Consider sharing the cost.* Operators facing high deployment costs should consider the potential benefits of network sharing. Even in countries where operators have been reluctant to entertain the idea, such as the United States, the challenging economics of 5G should force serious reconsideration. A successful sharing approach will require operators to begin by answering three questions: *whom* to share with, *where* to share, and *what* to share.

5. *Secure access to key resources.* Wireless operators must secure access to fiber backhaul, prime cell tower locations, and street furniture, as these resources will be critical to 5G, especially high-band 5G.

6. *Work closely with regulatory authorities.* From spectrum auctions to street-furniture access and from network sharing to government funding, regulation will have a material effect on the cost and speed of 5G deployment. Operators that maintain a positive working relationship with regulatory authorities will be best placed to contribute their perspective on regulation as it develops.

### 7. *Develop a comprehensive spectrum strategy.*

Spectrum will be the life-blood of 5G, as it has long been for wireless networks. But developing a spectrum strategy will be more complicated for 5G, as it includes both licensed and unlicensed spectrum. Operators will need to move quickly to formulate a strategy that straddles the whole spectrum.



The advent of 5G will have a profound impact not just on wireless operators but on participants across the communications value chain. From tower companies to local governments, back-haul providers to original equipment manufacturers, and over-the-top programming providers to handset manufactures, 5G will radically alter industry dynamics. The time to plan a strategy for this transformative new technology is now. ■

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