Keeping Your Options Open:

Why Organizations Need Access to All Spectrum Options for a Successful 5G Strategy

As the rollout of 5G begins in earnest, the three primary spectrum options have been getting a lot of attention. Article after article has talked about what organizations will be able to do with low-band (600 to 800 MHz), mid-band (1.6 to 5.8 GHz), and high-band (24-plus GHz) 5G. But by deconstructing 5G into its distinct spectrums, we lose touch with this important fact: It is the combination of all three spectrums that makes 5G such a transformational technology.

While it's true that each of the three spectrums is ideally suited for various use cases, organizations could get the incorrect perception that there are hard boundaries between them. Businesses should focus foremost on the use cases they can implement with 5G and worry about where those will fall on the spectrum later. In fact, there will be times when the useful spectrum will change for a single use case.

For example, the IoT sensing category may start using low-band with limited amounts of data but then progress to larger and more continuous data flows as mid-band becomes available. The belief that mid-band is required for all IoT sensing projects may lead a business to wait longer than necessary to deploy the new solution.

The same is true for critical IoT projects. This category is often positioned as dependent on high-band millimeter wave (mmWave) spectrum, yet there are likely to be many projects where mid-band or even low-band spectrum is sufficient for a specific scenario or to deploy the first version of a solution faster.

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The need for agility, flexibility and speed to market requires that organizations keep their spectrum options open by working with a carrier that has full spectrum availability. Without a comprehensive set of options, an organization may unnecessarily limit its 5G options and strategy. As IT and the organization ascend the learning curve, they will gain a better understanding of how the spectrum options interact and overlap. In the real world, the potential of 5G demands that all the spectrum options work together in concert to support these broad use cases.

A great network needs ALL spectrum bands
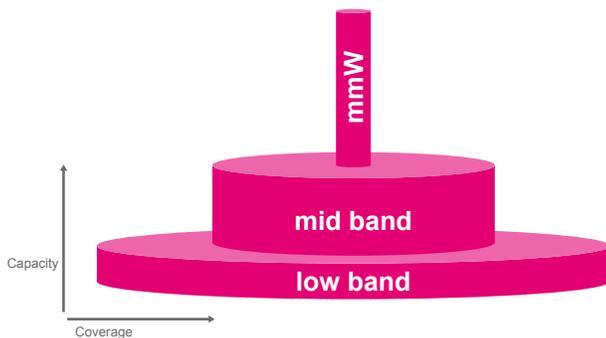
Customers need a 5G strategy that incorporates all three spectrum options

The competitive necessity of many 5G digital initiatives makes it essential to move fast. Moving quickly may require an initial deployment of a project using a different spectrum than what will be used in the more mature versions. For this reason, it is necessary to view multiple spectrum options for the long-term project plan. This will enable faster deployment, a quicker and more timely learning curve, and the ability to optimize the solution moving forward. Working with a carrier that can provide all spectrum alternatives is central to success. Any piecemeal or one-off approaches that ignore this need may delay updates or new initiatives. Worse, they may foster a siloed approach to 5G that would create numerous problems down the road.

It is impossible to perfectly forecast the specific needs of any new 5G use case. This is the key reason why customers need to keep all their options open. For example, a use case may be geographically limited to one location at the start but change as remote workers or

Spectrum and Use Case Category Overview

There are three generally recognized categories of expected 5G capabilities: enhanced mobile broadband, massive IoT and critical IoT. While it is useful to think of use cases within these categories, which spectrum band is best should not be seen as an inviolable rule.

Enhanced mobile broadband (eMBB): This category will ultimately leverage all three spectrum bands to provide higher speeds and bandwidth for many existing use cases and new ones that require more video or the ability to move larger amounts of data or stream information. Low-band has very broad coverage with performance that can exceed 4G today, which is particularly relevant for smartphone and hotspot use cases outside of metro areas. Mid-band will come into play in metro areas where more users are and more capacity is needed. Millimeter wave will come into play in high-traffic areas like venues, stadiums and train stations.

Massive IoT with massive machine-type communications (mMTC): There will be many new use cases in this category, such as using massive arrays of sensors, big data and AI. Low-band is where this will start with low-cost, low-bandwidth, low-power devices. As use cases in this space require more bandwidth, mid-band will come into place with much greater capacity.

Critical IoT using ultra-reliable low-latency communications (URLLC): This is another use case category that will be primarily composed of new apps or services, including autonomous vehicles and industrial automation. Depending on the specific use case, low-band could come into play with broad coverage. Mid-band will provide incremental capacity in metro areas for certain use cases. Millimeter wave could be deployed in a private network to enable flexible manufacturing at a manufacturing facility, which can yield ultra-high bandwidth and ultra-low latency within a limited area.

those in other locations start to use the solution, changing geographic support demands. Similarly, an autonomous device solution may start with limited data flow, requiring less bandwidth and battery power, but over time, capabilities and requirements will evolve. In both cases, the most efficient spectrum to use could change over time.

The net of this is that organizational agility requires spectrum flexibility.

The need for full spectrum flexibility is often overlooked because organizations still lack real experience with 5G and may have gotten the idea that there are immovable boundaries between the three primary categories of 5G. As 5G goes mainstream, businesses should be aware that use cases can evolve and move between spectrum options over time and that forcing a use case to a specific spectrum based on artificial segmentations is a poor idea. And once they realize that, they will see that working with a partner that provides all spectrum options is the best way to support this evolution and provide more options.
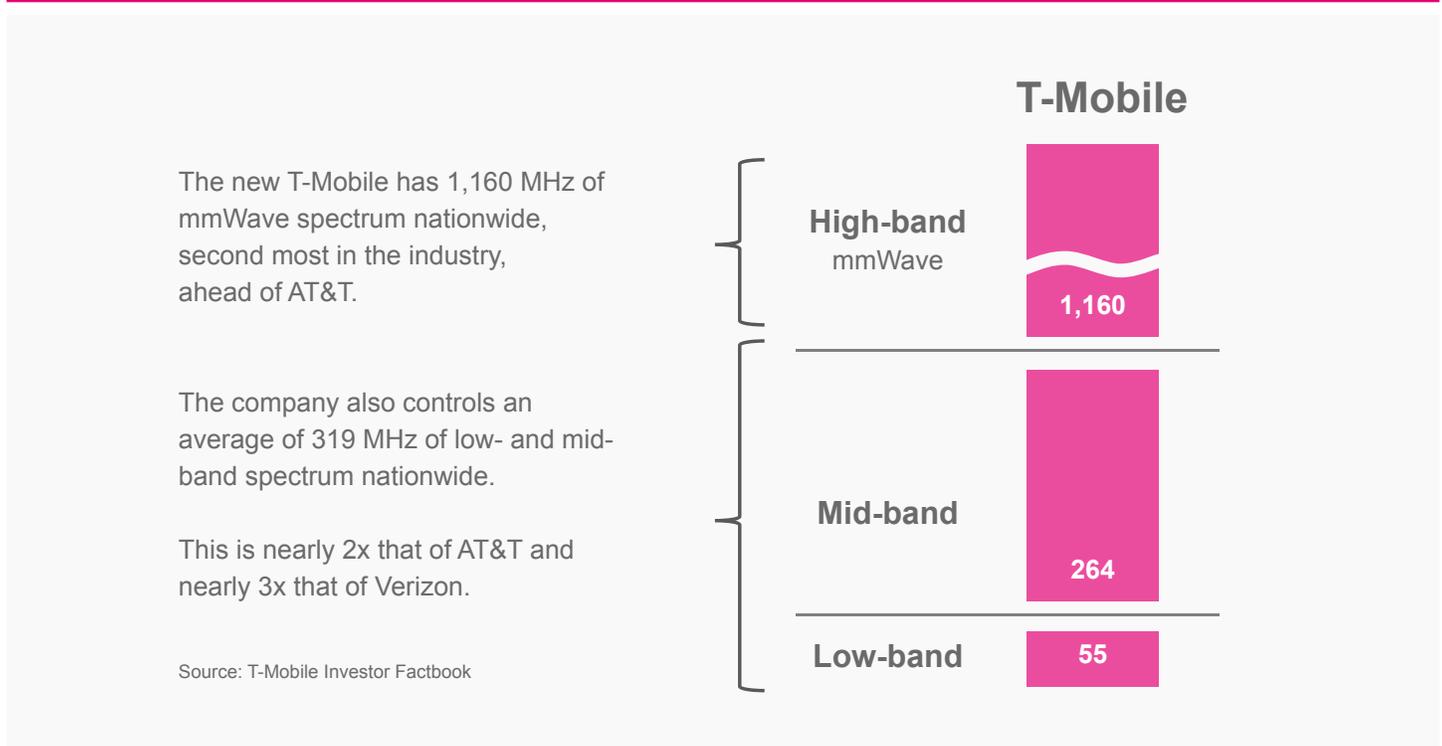
Being an excellent partner: **T-Mobile's comprehensive strategy for 5G**

Many organizations will be evaluating partners as they start implementing and planning the details of critical and varied digital solutions using 5G. Ensuring that a carrier can effectively enable and support this goal is central

to T-Mobile's strategy for 5G. Right now, T-Mobile has significant spectrum across all three bands for varied applications. This stands in stark contrast to carriers that have very limited or no available mid-band spectrum now. Some may even have to wait until the next spectrum auction to have access to more mid-band. The ability to offer comprehensive and sufficient spectrum ensures that your organization will not have to wait when new solutions and devices are ready to deploy.

T-Mobile is also committed to now, providing the broadest low-band coverage available today. This spectrum is driving many current use cases. For example, highly mobile workers can now get better performance than before in less densely populated areas. And for those working from home using their smartphone either as a device or a hotspot, faster speeds and better bandwidth can result in a better employee experience.

The sort of broad coverage that T-Mobile provides matters a great deal. Users' devices are utilizing the cellular network to run more demanding applications, to upload and download larger files, and to interact more with remote systems. If the network is slow, users' frustration will increase, productivity will be reduced and what employees can do will be limited. The availability of a 5G network with broad geographic coverage enables a business to start its 5G migration now and reap the benefits of this new technology.

T-Mobile

The new T-Mobile has 1,160 MHz of mmWave spectrum nationwide, second most in the industry, ahead of AT&T.

High-band
mmWave

1,160

The company also controls an average of 319 MHz of low- and mid-band spectrum nationwide.

This is nearly 2x that of AT&T and nearly 3x that of Verizon.

Mid-band

264

Source: T-Mobile Investor Factbook

Low-band　**55**

The importance of a partner that can provide the right spectrum both now and in the future is central to being a strong partner. One difference between T-Mobile and the competition is the availability of mid-band spectrum for 5G in select areas today. T-Mobile already has this spectrum and has even begun deploying it for 5G, while competitors still need to source it and then deploy it. Fierce Wireless noted in April that T-Mobile had lit up 2.5 GHz mid-band spectrum in Philadelphia and New York. In fact, New York City is the first market in which T-Mobile has all three layers of spectrum in play.[1] Given that some of the massive machine sensing or big data solutions will be initially brought live on low-band spectrum with the expectation to move into mid-band to add functionality, having this capability available now provides the growth path customers need.

Key takeaways

5G will change how many of our current tasks are completed, along with supporting brand-new digital processes. Unlike many previous wireless technology generations, 5G has more spectrum options and is therefore more agile and able to support more use cases. To optimize the use of 5G, businesses need to ensure they have access to all the spectrum options. Some deployments may start in one spectrum but move to another as they are fleshed out, become more robust or demand different performance characteristics.

Working with a carrier such as T-Mobile, which currently owns spectrum in all three bands, is essential to success with 5G as that spectrum is deployed in the future. When an organization's workloads or apps are ready to go, the spectrum needs to be there to support them. T-Mobile already has the broadest coverage 600-MHz low-band 5G network, and it has started to deploy mid-band spectrum in select cities. For more information about T-Mobile's 5G solution, please visit **t-mobile.com/business**.

1 "T-Mobile launches 2.5 GHz in Philadelphia, tees up NYC for entire layer cake," Fierce Wireless, April 21, 2020