Testimony of

Scott Bergmann

Senior Vice President, Regulatory Affairs

CTIA

on

Our Wireless Future: Building A Comprehensive Approach to Spectrum Policy

before the

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Chairmen Doyle, Ranking Member Latta, and members of the Subcommittee, on behalf of CTIA and the U.S. wireless industry, thank you for the opportunity to testify today.

CTIA commends this Committee, Congress, the FCC, and the Administration for their ongoing leadership in identifying and repurposing spectrum for 5G. This Committee's focus on crafting smart spectrum policies will be critical to our country's 5G future. Every benefit that we expect to reap from 5G in the U.S.—economic growth, job creation, smart cities, and improvements in public safety, health care, and our environment—is predicated on the availability of spectrum.

Thanks to this Committee's past efforts, we are leading the world in initial 5G deployments. U.S. wireless providers were the first to market with 5G last year and by year-end 2019, 92 deployments will have launched across the United States—nearly double that of any other nation.[1] And a recent study shows that our initial 5G networks are the fastest, too.[2]

Our leadership today in 5G is thanks to wise spectrum policies adopted over the past several years. But to fully achieve our 5G future, we need to identify and repurpose more spectrum. And that need is pressing. This Committee, Congress, the FCC, and the Administration have identified all the right bands. Now we need to finish the job fast.

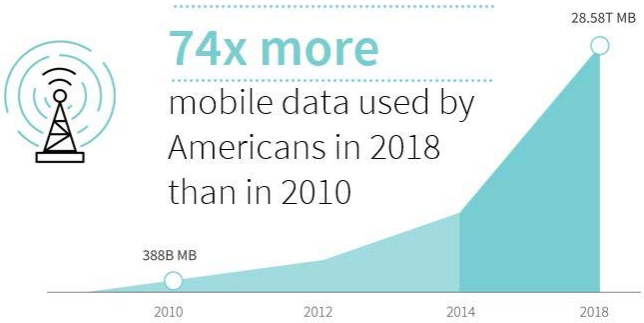
Fortunately, we have a roadmap for success: an all-of-the-above 5G spectrum policy that includes low-, mid-, and high-band spectrum. Our ubiquitous mobile wireless networks—built on licensed, exclusive-use spectrum—will need access to all three types of spectrum. They are effectively the three-legged stool of spectrum needed for 5G. Thanks to your leadership, Congress has directed the federal government to identify additional bands for

flexible-use service like 5G. And FCC Chairman Pai has launched the 5G FAST Plan to help get us there.[3] As of July 2019, we are in mid-execution—wireless providers are already deploying 5G networks on the high- and low-band spectrum recently made available, but there is more work to do, especially on the mid-band spectrum front. We now need policymakers to act on our nation's mid-band needs and provide long-term certainty by establishing a consistent pipeline of future high-, mid-, and low-band spectrum.

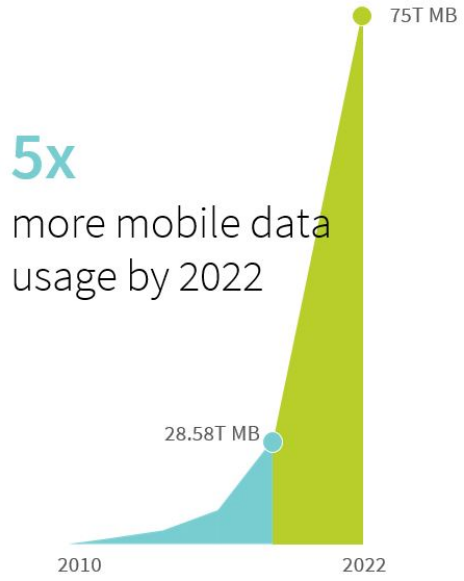
Americans' Ever-Growing Demand for Wireless, the Arrival of 5G, and the Importance of More Spectrum

Americans are consuming more wireless service than ever before and wireless providers are investing billions in efficiency-enhancing technologies and new 5G networks—all of which underscore the need to free up additional spectrum to keep up with demand and enable the capacity needed for new 5G use cases and services.

Remarkably, wireless data use nearly doubled last year, up 82 percent to a record 28.58 trillion MB of mobile data.[4] And Americans are connecting with more and more devices, about 1.3 devices per person, for a total of 421.7 million wireless devices.[5] The graphs below illustrate historical growth in mobile data traffic and the striking projections for future growth.



As significant as the growth in mobile data traffic was between 2010 and 2018, the anticipated growth in the coming years presents an even greater challenge.



Driven by this need to meet rapidly escalating demand, wireless providers are investing heavily to do more with the spectrum they have today. Wireless providers are re-farming existing bands and investing in new generations of wireless technology, in innovative radio antennas, and in network densification that increases capacity.[6] As a result, U.S. wireless

providers have increased their spectrum efficiency by a factor of 42 since 2010 on a megabyte-per-megahertz basis.[7] But good spectrum stewardship is not enough; we need more spectrum to unlock the full benefits of 5G.

5G Will Usher in Massive Innovation for Consumers and Across Industries

With the right spectrum resources, 5G will unlock innovation, unleash economic growth, create jobs, and foster the industries of the future. By identifying and repurposing key low-, mid- and high-band spectrum at regular intervals in the coming years, this Committee can put in place a spectrum foundation to add nearly $400 billion to the U.S. economy and create more than 1.8 million new jobs.[8]

Of course, the full societal and economic impact will be even greater as U.S. entrepreneurs leverage new 5G platforms to lead the world in tomorrow's advancements across health care, public safety, transportation, robotics, and every other key economic sector. Let me share with you a few examples:

Rush University Medical Center in Chicago is creating the first 5G-enabled hospital in the U.S, where 5G will support telemedicine, smart scheduling, and enhanced patient care through artificial intelligence and augmented reality training sessions for doctors.[9] Dr. Shafiq Rab of Rush Hospital has said, "[w]e strongly believe 5G is a game-changing technology that when fully implemented will help us … provide the highest quality patient and staff experience."[10]

Qwake Technologies has been working to develop and test augmented reality products to help firefighters see in smoke-filled, zero-visibility, hazardous environments.[11] The low latency that 5G offers has made such virtual reality possible, resulting in 267 percent faster navigation and 300 percent greater consistency by firefighters that tested the equipment in dark, smoky buildings.[12]

As 59 percent of surveyed Generation Z students report that video is their preferred educational tool, the reduced latency, increased capacity, and faster speeds for 5G will be ideal for the first generation of 21st century students.[13] Further, the Verizon Foundation recently announced that 10 teams will harness 5G, $1 million, and Verizon engineers to engage students, including students with disabilities, and prepare teachers using AR and VR experiences, machine learning, Artificial Intelligence, and mixed reality solutions.[14]

More broadly, 5G is poised to unlock the promise of smart cities. Accenture's Managing Director Tejas Rao concluded that "5G-powered Smart City solutions applied to the management of vehicle traffic and electrical grids alone could produce an estimate of $160 billion in benefits and savings for local communities and their residents. These 5G attributes will enable cities to reduce commute times, improve public safety, and generate significant smart-grid efficiencies."[15]

The impact of 5G is limitless. Freeing up spectrum is the linchpin.

Much of the World is Moving Aggressively to Identify Spectrum and Seize the Mantle of 5G

The lessons learned from the rollout of 4G—namely, that U.S. leadership in 4G profoundly benefitted the national economy—show the high stakes at play with 5G. The launch of 4G nearly doubled the number of U.S. wireless-related jobs in just three years—an increase of 84 percent from 2011 to 2014—and 4G leadership helped drive nearly $100 billion in GDP growth outside the wireless industry.[16]

Other nations have internalized the U.S. 4G playbook and are striving to lead in 5G by making substantial amounts of spectrum available. Allies and competitors alike have been aggressive in identifying spectrum for 5G. By 2020, approximately 80 operators in more than 40 countries worldwide will be providing 5G services.[17]

While the U.S. has led the world in low-band and high-band spectrum availability, other nations have moved forward more quickly in terms of mid-band. Indeed, China and many other countries are ahead in making critical mid-band spectrum available for 5G. Just last month, the Chinese Ministry of Industry and Information Technology assigned three of its state-owned telecom operators 5G commercial licenses of 100 megahertz each in the 3.5 GHz, 3.6 GHz, and 3.4-3.5 GHz bands.[18] Australia, Italy, Japan, South Korea, Spain, Sweden, and others continue to forge ahead in making similar spectrum available.[19] As discussed below, action this year is critical to rectifying this mid-band deficit.

A Spectrum Strategy to Lead on 5G

5G requires a mix of spectrum, including low-, mid-, and high-band spectrum. Low-band offers robust spectrum waves that travel long distances, high-band has big capacity but travels short distances, and mid-band offers a valuable blend of both capacity and coverage. These different types of spectrum are complements, not competitors—they are a recipe, not an a la carte menu. To deliver all of the benefits and applications that 5G will offer, we need a healthy mix of all three.

CTIA commends Congress, the FCC, and the Administration for their commitment to promoting American leadership in 5G and the significant steps taken thus far to do just that.

On the high-band front, the FCC to date has auctioned the 28 GHz and 24 GHz bands and just announced it will auction the upper 37 GHz, 39 GHz, and 47 GHz bands later this year—all told, that's nearly five gigahertz of licensed high-band spectrum. Thanks to this leadership, wireless providers are investing billions in high-band small cell networks that are unlocking new capabilities for American consumers and businesses. A recent study of eight nations with 5G deployments found that initial U.S. 5G networks have the fastest real-world peak 5G download speeds of 1.8 Gbps.[20] This is thanks in large part to our lead in freeing up high-band, wide-channel spectrum.

Today, we are leading the world in high-band spectrum availability, but other nations are scrambling to catch up. Japan, South Korea, Italy, and Norway (among others) are on track to make key high-band spectrum available for 5G. And China plans to make 2,000 megahertz of high-band available per wireless service provider, which will give China more high-band

spectrum than we have available in the U.S.[21] This underscores the need to make continued progress on identifying and making available additional high bands. It also highlights the importance of protecting 5G access to existing high-band resources, like the 24 GHz band, particularly as we prepare for the World Radiocommunication Conference. Our 5G leadership requires us to safeguard commercial access to the five gigahertz of high-band spectrum the U.S. government has promised.

And on the low-band front, Congress and the FCC are to be commended for pushing low-band spectrum into the marketplace through the broadcast incentive auction. Congress directed the FCC to identify 30 megahertz of low-band spectrum for wireless services by 2022.[22] Wireless providers are busy building out existing low-band 5G right now, and we encourage Congress to consider the need for additional low-band spectrum as part of its overall spectrum efforts.

In order to maintain our 5G leadership, and as alluded to above, mid-band spectrum will be a key ingredient, and we need to make quick progress in the near term. Mid-band spectrum is important because it will be a workhorse band for 5G—it represents the "sweet spot" of spectrum innovation. That's because it leverages both capacity and coverage opportunities—meaning it can handle the increased traffic that 5G will bring, and it can travel distances, which is helpful in more rural and suburban settings. Mid-band spectrum has great potential to facilitate the rapid deployment of 5G services because it will accommodate the wide bandwidths necessary to facilitate the faster connections and low latency that 5G technology promises. For these reasons, freeing up mid-band can be a spectrum stimulus for

our country. Recent estimates have shown that making 400 megahertz of mid-band spectrum available in the U.S. will drive $274 billion in GDP growth and 1.33 million new jobs.[23]

Policymakers and industry worldwide have coalesced around the importance of mid-band spectrum. According to a recent survey by Analysys Mason of more than a dozen countries that we compete with on the global stage, our global competitors will each make an average of 300 megahertz of licensed mid-band spectrum available by the end of 2020.[24] By contrast, in the U.S., no licensed mid-band spectrum is currently available above 3 GHz and the U.S. only has concrete plans to deliver 70 megahertz of licensed spectrum in the 3.5 GHz spectrum band—and even that spectrum will be available only on a shared basis.

The FCC deserves credit for working hard to catch up with foreign governments. The FCC recently finalized rules for the 70 megahertz of licensed spectrum in the 3.5 GHz band to be auctioned for mobile broadband next year. We are eager for the FCC to bring to resolution its proceeding to repurpose up to 500 megahertz of mid-band spectrum between 3.7 GHz and 4.2 GHz, the "C-Band." And we welcome Chairman Pai's recent announcement that the FCC will take action in the C-Band proceeding this Fall. We are looking to the Commission to make available as much of this critical spectrum as possible, as soon as possible. As a complement to the 3.7 GHz band, the FCC is also investigating the 6 GHz band. While there are critical incumbent services in this band that must be adequately protected, this band includes 1,200 megahertz of spectrum that should be investigated for potential unlicensed and licensed use. Finally, the Commerce Department initiated last year a review of the 3.45 GHz band, part of the

3100-3550 MHz band that Congress in the MOBILE NOW Act directed the Administration to study for repurposing to flexible-use wireless services.[25]

There is real bipartisan support behind swift U.S. action on mid-band spectrum. As Commissioner Rosenworcel recently observed, we need "to open more mid-band spectrum for new commercial use."[26] And Commissioner O'Rielly noted it is "vital for the United States to have available a serious mid-band play to complement our spectrum work in the low and high bands."[27]

The opportunities for mid-band are there, and it's now about execution. At CTIA, we are eager to work with policymakers on expediting U.S. efforts to address this clear national mid-band priority.

Even as policymakers advance smart spectrum policies here in the U.S., it is critical that, as we prepare for the 2019 World Radiocommunication Conference, we maintain U.S. leadership in wireless on the international stage and support 5G leadership here at home. This includes advancing 5G in the 24 GHz band, which the FCC just auctioned for more than $2 billion. As described above, the 24 GHz band will play a critical role in supporting 5G services. The FCC—the expert agency on spectrum and interference issues—engaged in a deliberative, five-year process to ensure that wireless services could be deployed in this band while protecting existing government services.[28] Policymakers should be skeptical of 11th hour attempts to deny access to this band, which would impact not just the 24 GHz band, but potentially all of our 5G high-band spectrum. As the U.S. government prepares for the upcoming conference, the overarching goal should be to ensure that our efforts are directed

at promoting rapid 5G deployment across the U.S. CTIA urges Congress to encourage the Administration to ensure that its positions reinforce our 5G leadership and do not undermine access to critical spectrum bands that have already been identified for 5G use in the U.S.

Finally, CTIA asks the Committee to consider several principles as it develops forward-looking national spectrum policies. CTIA outlined these principles earlier this year as the core elements of a national spectrum strategy that can advance our shared goals of "empower[ing] the wireless industry to innovate and invest in America's 5G capabilities" and "allow[ing] America to reach the full potential of 5G."[29] CTIA asks this Committee to provide:

- A clear directive for the U.S. to lead the world in 5G spectrum and make available the low-, mid-, and high-band spectrum needed to deliver on our 5G ambitions.
- A firm recommitment to a federal spectrum policy of proven free-market approaches that harnesses the power of competition to enhance our nation's economic and national security.
- A clear vision for modernizing U.S. government approaches to spectrum management to benefit government wireless needs and encourage private sector development.
- A schedule of future auctions that puts more spectrum in the hands of America's wireless industry.[30]

National spectrum policies that embrace these principles will help us meet the needs of tomorrow's wireless users and lead the world in 5G.

* * *

Thank you for the opportunity to testify today. CTIA looks forward to working with you to advance a spectrum policy for 5G.

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[2] Kelly Hill, *OpenSignal: US has the fastest 5G peak speeds*, RCR WIRELESS NEWS (July 8, 2019), https://www.rcrwireless.com/20190708/5g/opensignal-us-has-the-fastest-5g-peak-speeds ("OpenSignal Peak Speeds").

[3] FCC, The FCC's 5G Fast Plan, https://www.fcc.gov/5G (last visited July 12, 2019).

[4] CTIA, *2019 Annual Survey Highlights* (June 20, 2019), https://www.ctia.org/news/2019-annual-survey-highlights ("2019 Annual Survey Highlights").

[5] *Id.*

[6] *See generally* CTIA, *Smarter and More Efficient: How America's Wireless Industry Maximizes Its Spectrum* (June 2019), https://api.ctia.org/wp-content/uploads/2019/07/Spectrum_Efficiency.pdf.

[7] *Id.* at 3-4.

[8] David W. Sosa & Greg Rafert, *The Economic Impacts of Reallocating Mid-Band Spectrum to 5G in the United States*, ANALYSIS GROUP, at 1 (Feb. 2019), https://api.ctia.org/wp-content/uploads/2019/02/The-Economic-Impacts-of-Reallocating-Mid-Band-Spectrum-to-5G-1.pdf ("Analysis Group Mid-Band Report"); David W. Sosa & Greg Rafert, *The Economic Impacts of Reallocating Mid-Band Spectrum to 5G in the United States*, ANALYSIS GROUP (Apr. 2019); David W. Sosa & Greg Rafert, *The Economic Impacts of Reallocating Low-Band Spectrum to 5G in the United States*, ANALYSIS GROUP, at 1 (Apr. 2019), https://api.ctia.org/wp-content/uploads/2019/03/The-Economic-Impacts-of-Reallocating-Low-Band-Spectrum-to-5G.pdf; David W. Sosa & Greg Rafert, *The Economic Impacts of Reallocating High-Band Spectrum to 5G in the United States*, ANALYSIS GROUP, at 1 (Apr. 2019), https://api.ctia.org/wp-content/uploads/2019/03/The-Economic-Impacts-of-Reallocating-High-Band-Spectrum-to-5G.pdf.

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[10] *Id.*

[11] News Release, Verizon, Verizon's 5G First Responder Lab unveils the program's first cohort of five public safety technology companies (Mar. 6, 2019), https://www.verizon.com/about/news/verizons-5g-first-responder-lab-unveils-programs-first-cohort-five-public-safety-technology.

[12] *See* Qwake Tech, https://www.qwake.tech/ (last visited July 12, 2019).

[13] *See* Pearson, New Research Finds YouTube, Video Drives Generation Z Learning Preference, https://www.pearson.com/corporate/news/media/news-announcements/2018/08/new-research-finds-youtube--video-drives-generation-z-learning-p.html (last visited July 13, 2019; *see also*, Eli Zimmerman, 5G Set to Open Doors for Education Technology in Higher Ed, Sept. 26, 2018, https://edtechmagazine.com/higher/article/2018/09/5g-set-open-new-doors-education-technology-higher-ed (last visited July 13, 2019).

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[20] Kelly Hill, OpenSignal Peak Speeds, *supra* note 2.

[21] Analysys Mason Report at 37.

[22] Spectrum Pipeline Act of 2015, Pub. L. No. 114-74, § 1008, 129 Stat. 621, 625 (2015), as amended by the RAY BAUM'S Act of 2018, Pub. L. 115–141, § 614, 132 Stat. 1080, 1109 (2018).

[23] Analysis Group Mid-Band Report at 1.

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[25] Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, Division P (RAY BAUM'S Act of 2018), Title VI (MOBILE NOW Act), § 605(a), 132 Stat. 348.

[26] Statement of Commissioner Jessica Rosenworcel, *Allocation and Service Rules for the 1675-1680 MHz Band*, Notice of Proposed Rulemaking and Order, WT Docket No. 19-116, at 1 (May 13, 2019), https://docs.fcc.gov/public/attachments/FCC-19-43A4.pdf.

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[28] Letter from Chairman Ajit Pai, Federal Communications Commission, to The Honorable Maria Cantwell (June 11, 2019).

[29] White House, *White House 5G Summit, Remarks of Michael Kratsios,* YouTube (Sept. 28, 2018), https://www.youtube.com/watch?v=lBbY8fvTidU; *see also* CTIA National Spectrum Strategy at 1.

[30] CTIA National Spectrum Strategy at 1.