**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| 2024 Communications Marketplace Report | ) | GN Docket No. 24-119 |

# COMMENTS OF CTIA


Thomas C. Power
Senior Vice President & General Counsel

Scott K. Bergmann
Senior Vice President, Regulatory Affairs

Dr. Robert Roche
Vice President, Research

Sarah Leggin
Assistant Vice President, Regulatory Affairs

**CTIA**
1400 16th Street, NW Suite 600
Washington, DC 20036
(202) 736-3200


Date: June 6, 2024

## Executive Summary

The U.S. wireless market continues to thrive, providing significant benefits to consumers, businesses, workers, students, public safety, the environment, and the economy. Strong consumer demand and competition among providers are driving innovation and investment, leading to faster, better, and even more affordable wireless broadband. These efforts epitomize a highly competitive, pro-consumer market. As the Commission has recognized, the best metrics for effective competition are "lower prices, higher quality, and greater choice of services," which are the "tangible benefits to consumers" sought in a competitive market.[1]

By these metrics and many others, the wireless marketplace is robust, and consumers are benefiting. For example:

- ***Adoption.*** At the end of 2022, nearly a third of the 523 million wireless subscriber connections were 5G-powered. By 2028, 5G devices are projected to account for 91% of all wireless connections in the United States.
- ***Usage.*** Americans used more than 73 trillion megabytes of data in 2022—a nearly four-fold increase from 2017 and year-over-year increase of nearly 40%. Between 2022 and 2029, consumers' mobile data use is expected to quadruple to 315 trillion megabytes.
- ***Investment.*** In 2022 alone, the top U.S. wireless providers invested a historic $63 billion in the U.S. economy. Between 2020 and 2022, the top five wireless providers invested an average of $54 billion annually, including to deploy next-generation wireless technology such as investments into network infrastructure deployment and network coverage, security, and capability enhancements. Since 2011, the five largest wireless providers' capital expenditures of $591 billion were comparable to the $611 billion capital expenditures of the "Big 5" tech companies.

[1] *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, Thirteenth Report, 24 FCC Rcd 6185, 6290 ¶ 187 (2009).

- ***Deployment.*** 5G deployment has vastly outpaced 4G deployment. The first 5G network achieved nationwide coverage twice as fast as the first 4G network, and the three major providers constructed nationwide 5G networks 1.5 times faster than they constructed 4G nationwide networks. In fact, since wireless operators first launched 5G service in 2019, three nationwide networks—and regional provider networks across the United States—already cover more than 330 million Americans.
- ***Performance.*** In the fourth quarter of 2022, the three major wireless providers' 5G networks had average median speeds of 95.32/9.95 Mbps. By 2024, these wireless providers' 5G networks had average median speeds of 123.8/10 Mbps, far surpassing the throughput-and-speed average combination available to Americans just a few years ago.
- ***Lower costs.*** Wireless continues to offer consumers more for their dollar, which is particularly important in a tightening economy. From 2012 to 2022, the cost per megabyte of wireless data decreased by 98% from $0.126 to $0.003.

5G is also being leveraged to deliver broadband to the home, bringing new competition to the home broadband market as well. 5G home broadband—also called 5G Fixed Wireless Access ("FWA")—is a relatively new home broadband option, yet early FWA offerings are the fastest-growing type of broadband connection in the nation. In fact, in 2022, 5G FWA was the connection of choice for 90 percent of new home broadband subscribers who chose 5G home broadband over cable or other options. And one-in-five of those were entirely new home broadband subscribers, underscoring 5G's role in helping to close the digital divide. By 2023, FWA accounted for 104% of the approximately 3,522,000 net broadband additions (inclusive of both wireline losses and fixed wireless additions). In 2023, new providers entered the market, and FWA became available in more communities as networks expanded, providing more than 94 million U.S. households with access to 5G home broadband—more than doubling the number of households in just a year.

Consumers and businesses are reaping the benefits of the fiercely competitive U.S. wireless market. The wireless industry is expanding its broadband footprint, creating millions of jobs, delivering innovative services for nearly every industry vertical, combating climate change,

promoting diversity, equity, and inclusion ("DEI"), protecting consumers and the safety of the public, and demonstrating its ongoing commitment to assisting U.S. consumers in times of need.

***Powering job creation and growth.*** Over the 2010s, economic activity facilitated by wireless providers accounted for more than a $500 billion increase in annual Gross Domestic Product ("GDP") (9% of the total increase in annual U.S. GDP) and 10 million additional jobs (25% of the increase in U.S. employment). Today, the wireless industry adds more than $825 billion in GDP *annually* to the American economy. And during the next decade, 5G is projected to create $1.5 trillion in economic growth and 4.5 million new jobs in the United States.

***Spurring innovation in all industries.*** As Chairwoman Rosenworcel said, 5G technology is "the foundation for digital transformation around the globe" where "next-generation wireless networks connect everyone and everything around us."[2] In practice, competition and innovation in the wireless sector are creating immense opportunity in the 5G economy. To name just a few examples, 5G is helping teachers and students stay ahead of the curve and providing opportunities to learn through immersive applications, such as virtual and augmented reality, sparking imagination and increasing engagement. Innovators across America are using 5G to make cars driverless and roads more efficient. It's making travel 40% faster, cutting transportation costs by $450 billion each year, and could even reduce up to 90% of transportation emissions. And 5G is the engine of smart city innovation, with wireless-powered smart city solutions expected to deliver $160 billion in benefits and savings through things like lower energy use and less congestion.

[2] Jessica Rosenworcel, Chairwoman, FCC, Remarks at the Center for Strategic and International Studies (Jan. 17, 2023), https://tinyurl.com/2jrxmj3z.

***Promoting diversity, equity, and inclusion.*** The wireless industry is deeply committed to advancing DEI within its companies and throughout the wireless ecosystem. For example, CTIA's members are striving to ensure that all employees feel welcome and supported through employee resource groups ("ERGs"), best practices, and partnerships with outside organizations. CTIA members also help employees realize their ambitions through tuition assistance and professional development programs, alleviating the limitations imposed by personal economic resources and prior educational attainment. By spearheading educational opportunities to learn about science, technology, engineering, and technology—with particular outreach to groups that are underrepresented in these fields—the industry is preparing young people to pursue exciting new career paths. And by significantly increasing spending with diverse businesses, the industry is extending its reach, promoting DEI among its collaborators.

***Combating climate change.*** The wireless industry is creating a greener future built on sustainable technologies and eco-friendly best practices. Due to their rapid, data-rich connections, 5G networks make it possible to pursue a host of innovations that will reduce carbon emissions at a massive scale, such as more efficient transportation systems, smart grids, and smart buildings. CTIA members are also fighting climate change by reducing their energy consumption, improving packaging, and prioritizing device and equipment recycling, resale, and reuse. And they have set ambitious goals for reducing carbon emissions over the next several years.

***Promoting accessibility.*** Wireless services and devices are now central to consumers' lives, including people with disabilities. Through world-leading wireless services, devices, and applications, CTIA's member companies deliver access to voice, video, and messaging services for people of all abilities. The wireless industry continues to develop devices and services with a

wide range of accessibility features and customizable options to meet consumers' unique needs. Ever-advancing built-in accessibility features, such as voice commands, assistive technologies, and visual capabilities, as well as downloadable applications, likewise continue to see enhancements that benefit people with disabilities.

***Delivering reliable connectivity.*** Wireless providers remain dedicated to ensuring that networks are able to withstand any number of challenges. This commitment is critical to provide consumers everywhere with reliable connectivity for when they need it most. The last several years have tested the nation's networks, including challenges posed by a global pandemic, wildfires, floods, and hurricanes. As one example, in the wake of the devastating West Maui wildfires, wireless providers restored service using satellite-based backhaul solutions, mobile hotspots, free routers, and drones to assess cell site damage, among other measures.

***Protecting consumers and maintaining trust in our networks.*** The wireless industry is dedicated to protecting consumers from illegal and unwanted robocalls and robotexts, while supporting legitimate calls and messages to help ensure that consumers get the communications they want. For example, the wireless industry has led the way for years in deploying a variety of robocall mitigation tools and enhanced call authentication services that help inform and empower consumers. For instance, the wireless industry is currently developing secure, trusted, branded calling solutions. CTIA, in particular, is developing a next-generation call authentication service, "BCID," that will leverage the STIR/SHAKEN framework and a standards-based Rich Call Data ecosystem engineered to be secure-by-design and to deliver trusted, branded calls nationwide for enterprise business.

In the text messaging ecosystem, wireless providers and their messaging partners for decades have developed and deployed sophisticated tools and algorithms, industry-leading best

practices, consumer education, consumer complaint reporting, and more to protect consumers while supporting innovative uses of messaging. Building on this multi-layered approach, CTIA launched the Secure Messaging Initiative, which is enhancing information sharing and enforcement efforts to take down bad actors behind spam and scam texts. By doing so, CTIA and the wireless industry are working to maintain trust in messaging so it remains the preferred and innovative communications platform it is for consumers today.

* * *

Cutting-edge wireless connectivity grows the U.S. economy and makes key sectors more competitive. Without additional spectrum, however, U.S. networks will inevitably lag behind those deployed in other nations, giving our competitors the advantage in developing the wireless innovations of tomorrow. To ensure continued wireless-enabled productivity gains throughout the U.S. economy, more full-power, exclusive-use mid-band spectrum must be made available for commercial use. In doing so, policymakers can ensure that the wireless industry has the tools it needs to continue serving America's innovators and advancing U.S. competitiveness.

Specifically, America's wireless future hinges on:

- Congress restoring FCC auction authority with a forward-looking and comprehensive pipeline of future auctions for 5G and beyond;
- The National Telecommunications and Information Administration ("NTIA") and other federal stakeholders steadfastly implementing the National Spectrum Strategy ("NSS"), including abiding by the two-year study schedule NTIA established in the NSS Implementation Plan;
- The United States resolving the current spectrum imbalance and quickly providing licensed commercial access to the lower 3 GHz band (3.10-3.45 GHz), correcting the faulty assumptions and incomplete scope of the prior government study; and

- The United States reasserting its lead on the global stage in driving 5G-friendly access to the 7/8 GHz band (7.125-8.500 GHz) to help close our nation's widening deficit of licensed spectrum compared to other countries, creating economies of scale with upper 6 GHz licensed wireless deployments around the world, and ensuring that the United States leads in wireless technologies.

Along with replenishing the spectrum pipeline, policymakers should ensure that subsidies are made available to support both fixed and mobile broadband in areas with difficult geography or sparse populations. For example, the 5G Fund for Rural America ("5G Fund") will distribute approximately $9 billion to bring voice and 5G broadband to rural areas and other parts of the country that are otherwise unlikely to see unsubsidized 5G network deployment. To maximize every dollar of 5G Fund support, the auction should be timed to account for important deployment information from the NTIA Broadband Equity, Access, and Deployment ("BEAD") program and further refinements to the mobile broadband maps and challenge process.

With so many industries and communities already realizing the benefits of 5G, the Commission should continue to promote siting policies that encourage the continued, rapid deployment of these advanced offerings. On these issues and more, CTIA looks forward to working with the Commission to continue to ensure the communications marketplace remains highly competitive for years to come.

## TABLE OF CONTENTS

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| 2024 Communications Marketplace Report | ) | GN Docket No. 24-119 |

## COMMENTS OF CTIA

CTIA[3] respectfully submits these comments in response to the Public Notice released by the Office of Economics and Analytics of the Federal Communications Commission ("FCC" or "Commission") in the above-captioned proceeding.[4] The Public Notice "seeks public input . . . [on] the state of competition in the communications marketplace [for the Commission's] upcoming *Communications Marketplace Report*."[5] These comments highlight the vibrant and increasing competition in today's wireless industry.

## I. THE WIRELESS COMMUNICATIONS MARKETPLACE REMAINS COMPETITIVE, AND COMPETITION CONTINUES TO INTENSIFY.

Since the Commission released its previous Communications Marketplace Report, wireless competition has become even more vigorous. The wireless market exhibits the

[3] CTIA – The Wireless Association® ("CTIA") (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st century connected life. The association's members include wireless providers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry's voluntary best practices, hosts educational events that promote the wireless industry and co-produces the industry's leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

[4] *Office of Economics and Analytics Seeks Comment on the State of Competition in the Communications Marketplace*, Public Notice, GN Docket No. 24-119, DA 24-374 (OEA rel. Apr. 22, 2024) ("*Public Notice*").

[5] *Id.* ¶ 3.

hallmarks of fierce competitive rivalry along virtually every dimension, including expanded service coverage and offerings, the continuous deployment of new technologies, and new entry by well-capitalized competitors—to benefit U.S. consumers, businesses, the environment, and the economy. Service providers are investing significant capital to deploy even more advanced networks and meet consumers' and businesses' growing and seemingly insatiable data demands. Traditional players and new entrants alike are aggressively vying to offer lower prices, greater speeds, enhanced coverage, and consumer-friendly options.

### A. There Is Exceptional Growth in Wireless Devices, Connections, and Traffic, and These Trends Are Expected to Continue.

For nearly 40 years, CTIA's regular surveys of U.S. wireless providers have provided valuable insight into the successes, opportunities, and challenges facing the industry. The most recent 2023 survey revealed that wireless data usage and mobile services growth proceed apace despite the receding tailwinds of pandemic-driven demand.[6] The continued growth in all three categories—devices, connections, and traffic—demonstrates the tremendous value that wireless data and mobile services provide to consumers.

The data also highlights the wireless industry's vitality and wireless technology's critical role in America's 21st-century economy. The explosive growth in 5G devices shows that Americans' demand for these products has not waned. By year-end 2022, nearly 162 million 5G devices were active in the United States—almost double the number from 2021 and nearly an 11-fold increase since just 2020.[7]

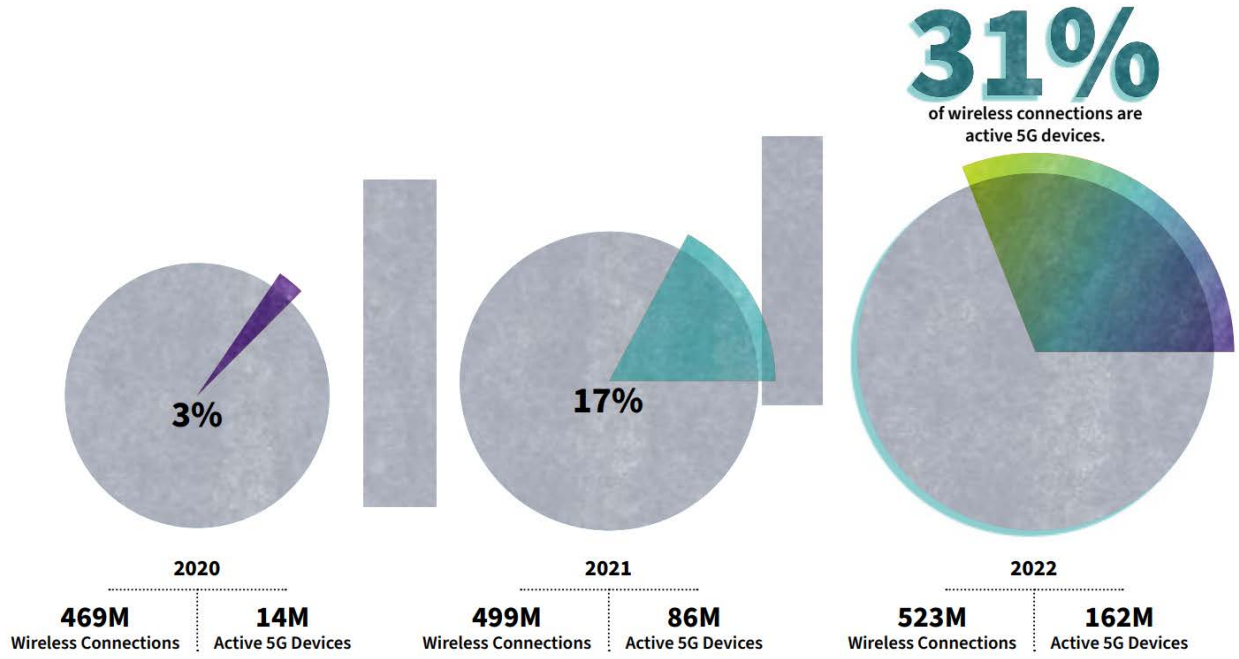
---

[6] *See generally* CTIA, *2023 Annual Survey Highlights*, at 5 (July 25, 2023), https://tinyurl.com/ym7vv24w ("*2023 CTIA Annual Survey Highlights*").

[7] *2023 CTIA Annual Survey Highlights* at 5.

In total, wireless connections grew from 499 million in 2021 to nearly 523 million in 2022, as Figure 1 illustrates.[8]

*Figure 1: Number of 5G and Non-5G Wireless Connections and Devices (2020-2022)*[9]




This figure represents 1.6 connections for every person in the United States, with 5G already accounting for nearly one-third of all connections.[10] And by 2028, 5G devices are projected to account for 91% of all wireless connections in the United States.[11]

Americans' desire to connect with each other has not diminished. Even as Americans returned to schools, offices, and social commitments since the Commission's last report, the volume of both voice calls and text messages continues to grow. In 2022, Americans spent

[8] *Id.*

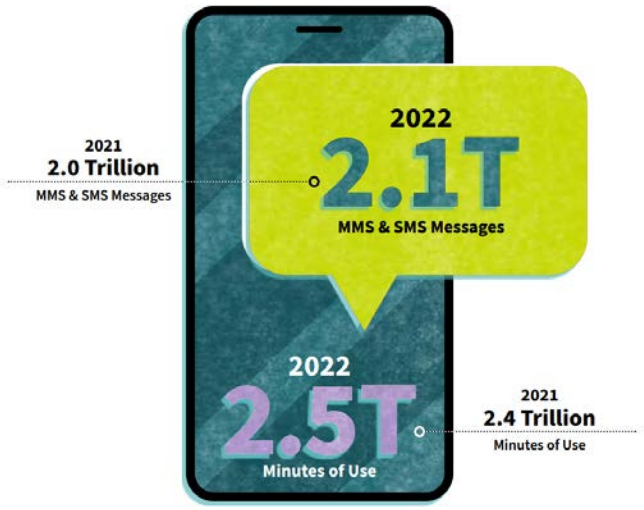
[9] *Id.*

[10] *Id.*

[11] CTIA, *5G in America*, https://tinyurl.com/22zeja45 ("*5G in America*").

nearly 2.5 trillion minutes on voice calls, a roughly 5% increase from 2021,[12] and shared more than 2.1 trillion text messages, approximately 6% more than the prior year.[13]

*Figure 2: Number of Text Messages Sent and Call Minutes Used (2021-2022)*[14]




At the same time, Americans are using their wireless devices for more diverse professional, personal, and recreational activities. Wireless data traffic exceeded 73.7 trillion megabytes, a 157% increase since 2018 and a 38% increase since 2021.[15]

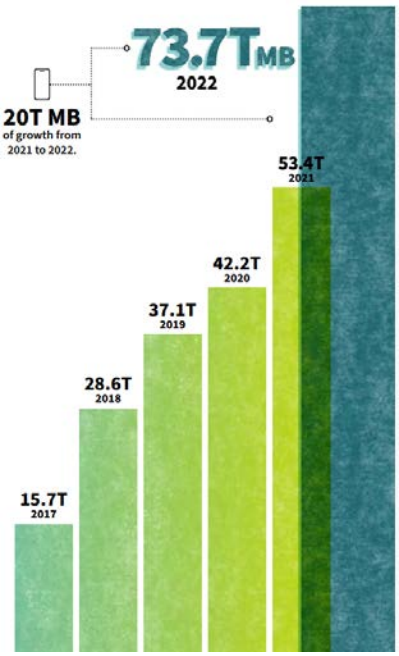
[12] *2023 CTIA Annual Survey Highlights* at 9.

[13] *Id.*

[14] *Id.*

[15] *Id.* at 3.

*Figure 3: Wireless Data Usage (2017-2022)*[16]

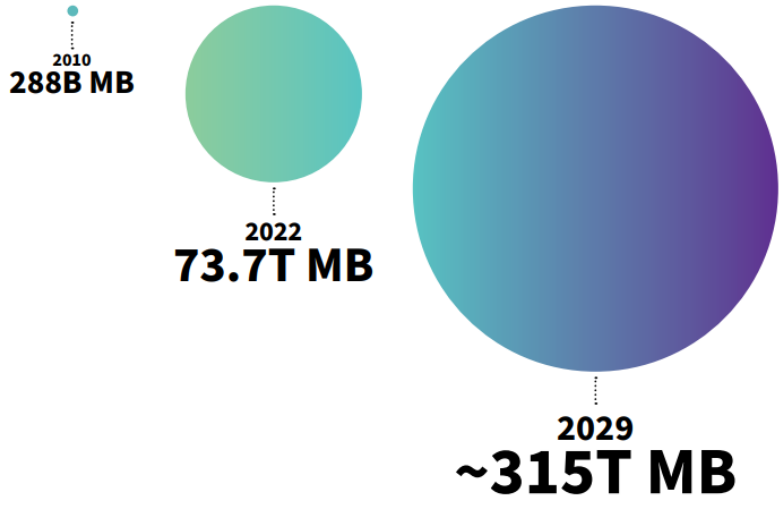



Between 2022 and 2029, consumers' mobile data use is expected to quadruple to 315 trillion megabytes.[17]

[16] *Id*.

[17] CTIA, *How Licensed Spectrum Fuels U.S. Competitiveness*, at 19 (May 6, 2024), https://tinyurl.com/293c3vge ("*How Licensed Spectrum Fuels U.S. Competitiveness*").

*Figure 4: Project Wireless Data Usage (2010, 2022, 2029 (est.))*[18]




Wireless industry investments have driven widespread 5G deployment across the United States, making us the world leader in 5G availability.[19] 330 million Americans now have access to 5G.[20] And according to Ookla, 54% of 5G-capable handsets in the United States connect to a 5G network most of the time.[21]

In addition, 5G access now extends beyond Americans' handsets into their homes due to massive increases in 5G-based FWA availability and usage. 5G FWA is now America's fastest-

[18] *Id*.

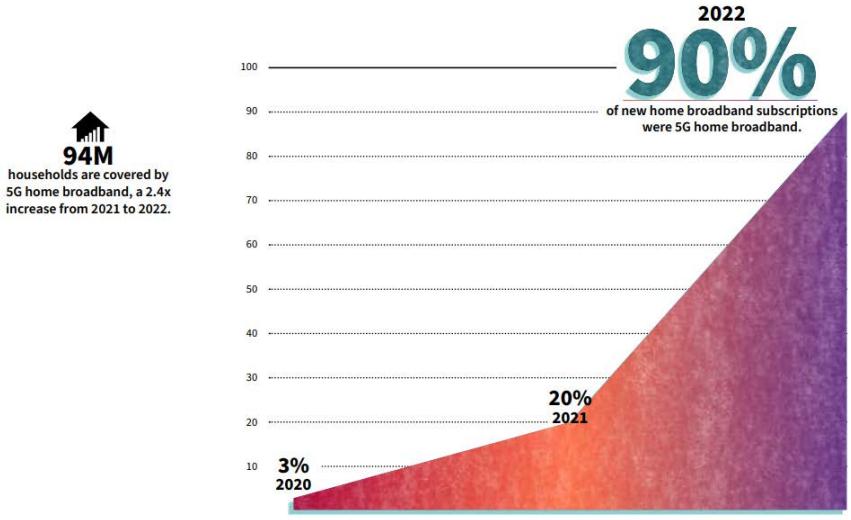
[19] *2024 CTIA 5G Summit: America's Economic Competitiveness Relies on More Full-Power, Licensed Spectrum*, CTIA (May 10, 2024), https://tinyurl.com/2y2nuojl.

[20] *5G in America*.

[21] CTIA, *2023 State of 5G Report*, at 12 (2023), https://tinyurl.com/yltkkefa ("*2023 State of 5G Report*") (citing Isla McKetta, *Stable and Expanding: The State of Worldwide 5G in 2022* (Dec. 18, 2022), https://tinyurl.com/3u38vb5x).

growing type of home broadband service, bringing new competition to that market.[22] In fact, FWA was the connection of choice for 90% of new broadband customers.[23]

*Figure 5: Percentage of New Home Broadband Subscriptions Powered by 5G (2020-2022)*[24]




By 2023, FWA accounted for 104%[25] of the approximately 3,522,000 net broadband additions.[26] As of 2023, more than 94 million U.S. households had access to 5G home broadband service—more than doubling the number of households in just a year.[27]

[22] *5G in America*.

[23] *Id*.

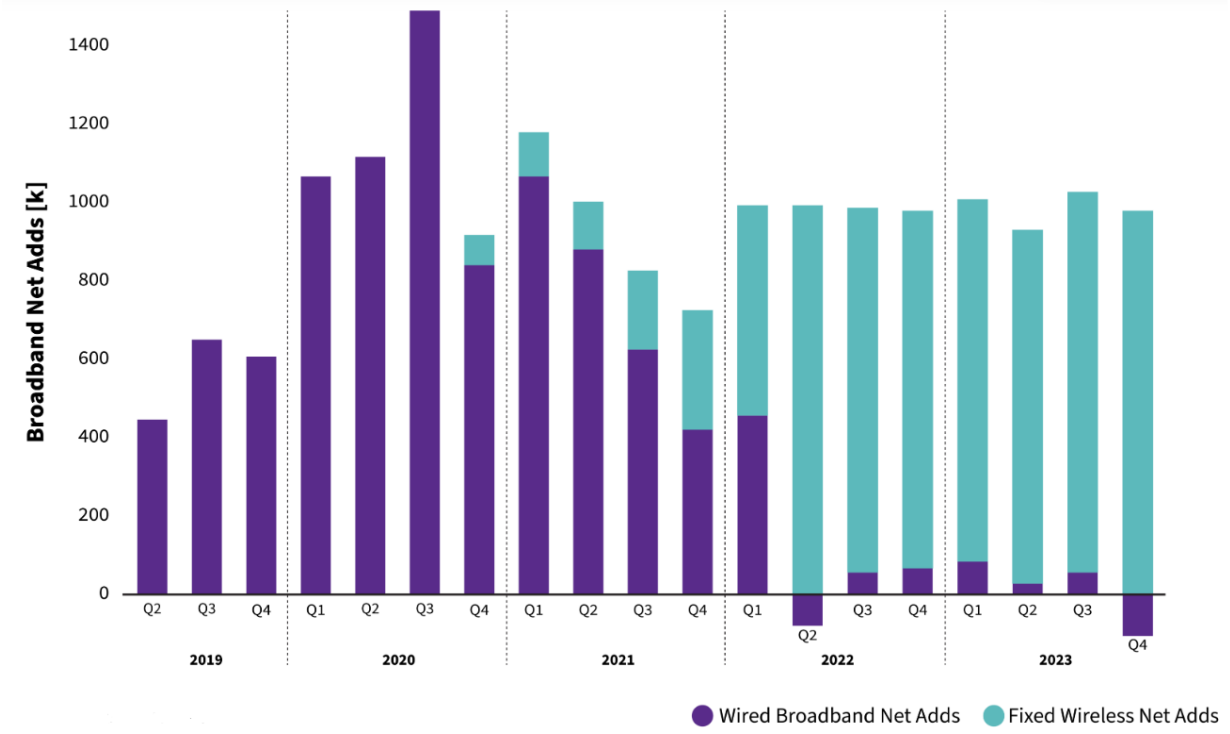
[24] *2023 CTIA Annual Survey Highlights* at 6.

[25] Wireline broadband providers lost more than 140,000 subscribers during 2023, while fixed wireless providers added more than 3,666,000 subscribers over the same period. Leichtman Research Group, *1Q 2024 Research Notes*, at 4 (2024), https://tinyl.io/Ajyn ("*Leichtman Research Notes*").

[26] *Id.*

[27] *2023 CTIA Annual Survey Highlights* at 6.

*Figure 6: Wired and Fixed Wireless Home Broadband Growth (2Q2019-4Q2023)*[28]




5G home broadband is providing consumers across America with an affordable alternative to cable internet. And it is particularly powerful in rural and underserved communities as a resource to close the digital divide. Nearly 20% of new 5G home subscribers are first-time broadband users (and previously relied on wireless only).[29]

5G is also having a transformative impact across industries while driving advances that will shape the way Americans and others around the world live. 5G networks' high capacity enables millions of sensors to simultaneously support innovations like smart cities, advanced manufacturing, precision agriculture, remote patient monitoring, efficient smart energy grids,

[28] *Cable Is Trying to Use Spectrum Policy to Stop 5G Home Competition*, CTIA (Feb. 29, 2024), https://tinyurl.com/28trb7fn.

[29] *5G Home Broadband Continues to Bring Real Competition to Cable*, CTIA (Jan. 31, 2024), https://tinyurl.com/2dckzs3q.

immersive, virtual reality learning experiences, and connected cars.[30] For example, 5G is enabling real-time communication among millions of sensors, devices, and systems within manufacturing facilities to bring next-generation innovations to daily operations.[31] At the same time, 5G-powered smart city solutions are projected to deliver $160 billion in benefits and savings through lower energy use and decreased congestion.[32] These innovations are only the beginning of what 5G connectivity will bring.

### B. Wireless Providers Are Continuing to Invest in and Expand Their Coverage Across the Country, While Also Enhancing Service Quality.

Vigorous and substantial wireless capital investment continues and has resulted in more advanced wireless connectivity. As Commissioner Carr explained, in recent years providers were able to "bring thousands of families across the divide, to keep Americans connected during the pandemic, to outperform dire predictions that the United States would cede leadership in 5G."[33] Competition for the best service and coverage has driven nationwide providers to invest billions into designing and deploying networks to keep and win customers and enable compelling new services.

The United States is a world leader in 5G availability.[34] Even though the United States represents only 4% of the world's population, it invests 19% of the world's total wireless

[30] *2023 CTIA Annual Survey Highlights* at 5.

[31] *2023 State of 5G Report* at 23.

[32] *5G in America*.

[33] Brendan Carr, Commissioner, Testimony before the Subcommittee on Communications and Technology of the U.S. House of Representatives Committee on Energy and Commerce, at 2 (June 21, 2023), https://tinyurl.com/mr23x5rd.

[34] *2023 State of 5G Report* at 5, 12.

capital.[35] By the end of 2022, the United States had outspent most of the world in wireless network investments on an annual per capita basis (over 5.2x more than China, 2.7x more than Italy, and 1.9x more than South Korea).[36] In 2022, the U.S. wireless industry invested a historic $39 billion in wireless-specific capital expenditures to improve and expand their networks.[37] Between 2020 and 2022, the top five wireless providers invested an average of $54 billion annually in the United States, including to deploy next-generation wireless technology and network infrastructure coverage, security, and capability enhancements.[38] Since 2011, the five largest wireless providers' capital expenditures of $591 billion were comparable to the $611 billion capital expenditures of the "Big 5" tech companies.[39] Indeed, in 2022, the U.S. wireless industry invested $63 billion in total capital expenditures, making a major contribution to the U.S. economy.[40]

Americans have experienced many direct benefits from another year of record investment in U.S. wireless networks, the fifth consecutive year of wireless network capital expenditure investment increases.[41]

***Accelerated deployment speed.*** 5G deployment has vastly outpaced 4G deployment. When the nation's first 4G network was launched in December 2010, it took until December

[35] *2023 CTIA Annual Survey Highlights* at 17; *International Database (IDB)*, Census.gov, https://tinyl.io/Aq2x (last visited May 23, 2024); *2023 State of 5G Report* at 16.

[36] *2023 CTIA Annual Survey Highlights* at 4.

[37] *2023 CTIA Annual Survey Highlights* at 4.

[38] Timothy J. Tardiff, *Wireless Investment and Economic Benefits*, Advanced Analytical Consulting Group et al., at 1 (Apr. 2024), https://tinyl.io/Apqc ("*Wireless Investment Report*").

[39] *Id.* at 2.

[40] *Id.* at 1.

[41] *2023 CTIA Annual Survey Highlights* at 4.

2011 for the network to reach 200 million Americans.[42] By comparison, T-Mobile's first-in-the-nation 5G network reached 200 million Americans in only six months after launch (June 2019 to December 2019)[43]—meaning the first 5G network achieved nationwide coverage twice as fast as the first 4G network. Altogether, the three major providers constructed nationwide 5G networks 1.5 times faster than they constructed 4G nationwide networks.[44]

***Improved latency.*** More than 80% of high-band 5G connections are faster than 20 milliseconds ("ms") (an approximately five times improvement over 4G latency) to help empower more real-time applications.[45] With the next generation of wireless, the industry has improved latency dramatically compared to 4G—only about 15% of low-band 4G connections have a latency of under 20 ms.[46]

***Rapid speeds.*** Eighteen months after launch, 5G speeds were approximately 16 times faster than 4G speeds.[47] In the fourth quarter of 2022, the three major wireless providers' 5G networks had average median speeds of 95.32/9.95 Mbps.[48] By the fourth quarter of 2023, these

[42] *2023 State of 5G Report* at 12.

[43] *Id.*

[44] *Id.* Following is the 5G launch to nationwide (200 million pops) coverage timeline—AT&T: about 20 months (Dec. 2018 to July 2020); T-Mobile: about 6 months (June 2019 to Dec. 2019); Verizon: 18 months (Apr. 2019 to Oct. 2020). *Id.* at n.6. Twenty-two months passed between AT&T's Dec. 2018 launch and Verizon's 200 million coverage in Oct. 2020. *Id.* Following is the 4G launch to nationwide (200 million pops) coverage timeline—Verizon: 12 months (Dec. 2010 to Dec. 2011); AT&T: 20 months (Sept. 2011 to May 2013); T-Mobile: 8 months (Mar. 2013 to Nov. 2013). 30 months passed between MetroPCS's Las Vegas LTE launch (Sept. 2010) and T-Mobile's 200 million coverage in Nov. 2013. *Id.*

[45] *Id.* at 14.

[46] *Id.*

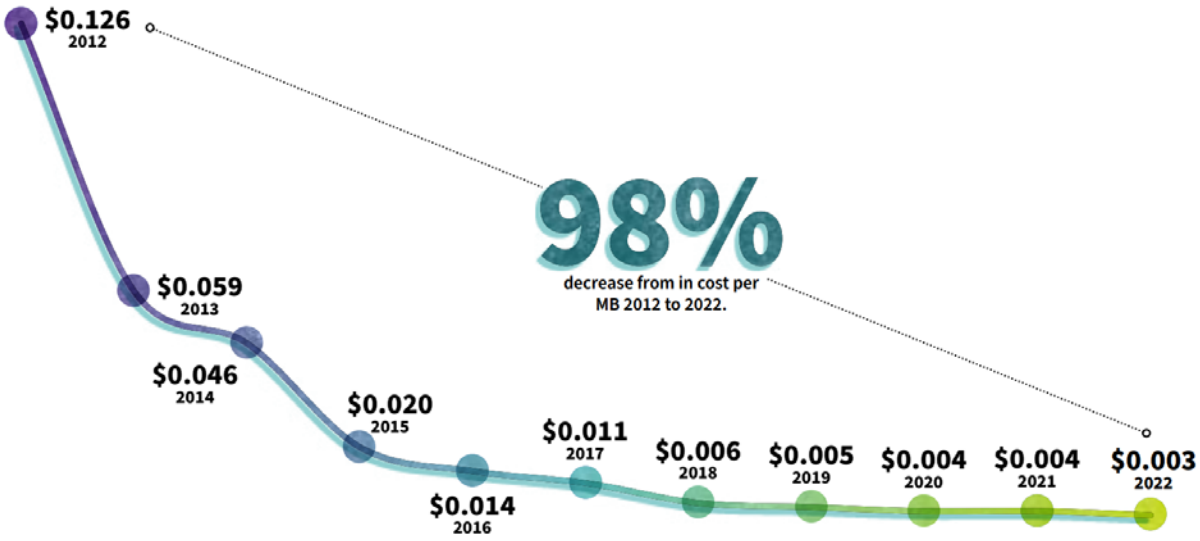
[47] *Id.*

[48] *Speedtest Market Analysis*, Ookla https://tinyl.io/AtC7 (last visited May 31, 2024).

wireless providers' 5G networks had average median speeds of 123.8/10.1 Mbps,[49] far surpassing the throughput-and-speed combination available to Americans just a few years ago.

***Decreased costs.*** Wireless continues to offer consumers more for their dollar in a tightening economy. From 2012 to 2022, the cost per megabyte of wireless data decreased by 98% from $0.126 to $0.003.[50]

*Figure 7: Cost Per Megabyte of Wireless Data (2012-2022)*[51]




Broadband expansion subsidy programs, including at the Commission and NTIA, and public-private partnerships will help accelerate new investment, technology innovation, and expanded broadband access nationwide. The wireless industry is making record 5G nationwide deployment investments, but subsidies will still be necessary to support broadband in some areas with difficult geography or sparse populations. Universal Service Fund ("USF") programs such as the 5G Fund will distribute vital funds to ensure millions of Americans receive mobile

[49] *Id.*

[50] *2023 CTIA Annual Survey Highlights* at 8.

[51] *Id.*

broadband service and to aid mobile network maturation over the next decade. The 5G Fund will distribute approximately $9 billion to bring voice and 5G broadband to hard-to-reach rural areas.[52] The Commission's continued efforts to refine the mobile maps and challenge process[53] can help target the funding where it is needed most.

Additionally, timing the 5G Fund auction to account for important deployment information from the NTIA's BEAD program will further promote the effective use of the funding. While the BEAD program will not directly fund mobile broadband deployment, it is likely to result in the deployment of fiber broadband backhaul facilities and FWA services to expand unsubsidized 5G coverage in unserved and underserved areas.[54] Additionally, in some places, BEAD funding may be used to construct wireless infrastructure such as towers, equipment, backhaul, and related expenditures to help achieve BEAD's network resiliency and digital equity objectives. Understanding where and how BEAD funds will be used will provide wireless stakeholders with better information on 5G availability and, thus, how to maximize limited 5G Fund support.

Because the same networks support both fixed and mobile wireless, BEAD-supported fixed wireless infrastructure deployment will also provide a critical investment in mobile broadband and other wireless solutions that will support the growth of, among other things, smart cities and improved public safety, smart agriculture, advanced manufacturing, and a robust Internet of Things ("IoT") ecosystem. The wireless industry is dedicated to leveraging these

---

[52] Press Release, FCC, *Chairwoman Rosenworcel Calls on Agency to Move Ahead with Rural Wireless Broadband Plan* (Mar. 20, 2024), https://tinyl.io/Aq3e.

[53] Press Release, FCC, *FCC Makes Updates to Broadband Data Collection Efforts* (May 22, 2024), https://tinyurl.com/249yobv8.

[54] *See generally* Mike Dano, *FWA proponents 'cautiously optimistic' on BEAD*, Light Reading (Mar. 22, 2024), https://tinyl.io/Aq3q.

federal resources to continue to drive investment and deployment in advanced wireless networks throughout the country.

Along with the new support programs, data-intensive services and rapid advances in 5G deployment and 5G-adjacent capabilities have renewed stakeholder interest in partnerships between commercial operators and local, state, and tribal governments for network growth and upgrades.[55] For example, last year, Verizon announced that it was working with the City of Virginia Beach to place small cell sites along the city's popular boardwalk to support 5G service.[56] Also last year, AT&T announced its partnership with Dallas Fort Worth International Airport to expand connectivity across the airport through a new private 5G network.[57] Earlier this year, Governor Jim Justice of West Virginia extolled T-Mobile's $200 million investment in the state that, among other things, expanded T-Mobile's 5G network to 90% of West Virginians and all of West Virginia's interstate highways.[58] Separately, T-Mobile launched a joint project with the City of Bellevue, Washington, using network-based cellular vehicle-to-everything

[55] *See, e.g.*, *Betacom and UScellular Introduce Industry's First Private/Public Hybrid 5G Networks*, BusinessWire (Sept. 19, 2023), https://tinyl.io/Apqi; Josh Davis, *Preserving Cherokee Nation Traditions with AT&T* Connectivity, AT&T Blog (Apr. 12, 2023), https://tinyl.io/Apqj; Chez Oxendine, *New Partnership Will Bring Fixed-Wireless Access to Remote California Tribes*, Tribal Business News (Apr. 9, 2023), https://tinyl.io/Apqk; Carl Weinschenk, *AT&T Gets Set for Another Indiana Public-Private Partnership*, TeleCompetitor (Dec. 5, 2022), https://tinyl.io/Apql.

[56] Press Release, Verizon, *Verizon and the City of Virginia Beach Team Up to Keep People Connected and Safe* (Apr. 12, 2023), https://tinyurl.com/ctcmwvz5.

[57] Press Release, AT&T, *AT&T to Bring Elevated Wireless Experience to DFW Airport* (May 4, 2023), https://tinyurl.com/nn73thn2.

[58] Joey Rather, *$200M+ in T-Mobile Network Upgrades Completed in West Virginia*, 12WBOY (Jan. 19, 2024), https://tinyurl.com/msdft5z5.

("C2VX") technology for near real-time communications between cars, traffic infrastructure, and vulnerable road users—including pedestrians and cyclists.[59]

### C. Fixed Wireless Services Are Powering Additional Broadband Competition Throughout the Country.

As Commissioner Simington noted, "[f]ixed wireless growth is an enormous success story,"[60] and CTIA agrees. FWA broadband offers a fast and reliable solution that is vital to closing the digital divide. With FWA, constructing or upgrading a single cell site or a handful of cell sites can deliver broadband to distant customers while making wireless deployments faster and less expensive than all-fiber solutions. CTIA members like Appalachian Wireless, Carolina West, Cellcom, Cellular One, GCI, Southern Linc, and Union Telephone Company are using FWA solutions to ensure communications services are accessible to consumers in remote areas, including eastern Kentucky, northwestern North Carolina, Michigan's upper peninsula, tribal nations in Arizona, the rural Mountain West, and Alaska.[61]

FWA is cost-effective and can be deployed more rapidly than other technologies. Unlike cable deployments, wireless providers do not have to trench FWA to the home, reducing both last-mile infrastructure expenses and deployment timelines. Lowered costs to deploy and serve are particularly key to bringing high-speed connectivity to more rural areas, especially where fiber may not be economically feasible to deploy. 5G-based FWA, when compared to fiber to the premises, can reduce the initial cost of establishing last-mile connectivity by as much as

[59] Press Release, T-Mobile, *City of Bellevue and T-Mobile Join Forces to Reduce Traffic Related Fatalities* (June 27, 2023), https://tinyurl.com/tsa32evc.

[60] Nathan Simington, Commissioner, FCC, Remarks at the New York State Wireless Association (Oct. 30, 2023), https://tinyurl.com/mry4fv7s.

[61] *Regional Wireless Providers: Closing the Digital Divide & Growing Local Economies Across the U.S.*, CTIA (Mar. 12, 2024), https://tinyurl.com/bdzhzjmp.

40%.[62] And when it comes to home installation, customers can install FWA equipment in only minutes with no need to wait for company installers to arrive.[63]

It is no surprise that more than 90% of net new home broadband subscribers chose FWA over cable in 2022.[64] This trend is especially evident in rural and sparsely populated areas.[65] As of April 2023, rural customers made up about 25% of the FWA market—a relatively high share, given that the country's rural population is about 18%.[66]

The cost savings do not stop at deployment. Current FWA competition with cable broadband providers could generate consumer savings of more than $6.3 billion per year.[67] With more spectrum capacity for wireless operators to compete even more aggressively, FWA would further drive down cable pricing, resulting in $8.1 billion in savings.[68]

Mobile wireless technology advancements have spurred robust FWA growth and enabled consumer benefits and cost-savings. The large 3rd Generation Partnership Project chips and devices ecosystem allows fixed wireless service to leverage 5G capabilities (industry-standard 5G New Radio equipment over prior generation proprietary FWA technologies) to enjoy improved download, upload, and latency capabilities. Using off-the-shelf solutions, a fixed

---

[62] *5G for Home Broadband*, CTIA, https://tinyurl.com/424kh5f9 (last visited May 22, 2024).

[63] *5G Home Broadband Continues to Bring Real Competition to Cable*, CTIA (Jan. 31, 2024), https://tinyurl.com/mvtvjut4.

[64] *5G in America*.

[65] Val Elbert et al., *Accelerating the 5G Economy in the US*, Boston Consulting Group (Apr. 17, 2023), https://tinyurl.com/2bnwoxcz ("*Accelerating the 5G Economy*").

[66] *Accelerating the 5G Economy* at 8.

[67] Hal Singer & Augustus Urschel, *Competitive Effects of Fixed Wireless Access on Wireline Broadband Technologies*, CTIA, at 2 (June 2023), https://tinyurl.com/3n8edapt ("*2023 CTIA FWA Report*").

[68] *2023 CTIA FWA Report* at 2.

wireless provider can cost-effectively leverage diverse spectrum assets and technologies (*e.g.*, frequency-division duplex and time-division duplex) to maximize FWA's efficiency and coverage. Moreover, because these same technologies support mobile broadband networks, FWA providers can realize greater scale economies and future-proof wireless service by offering both mobile and fixed services using the same network resources.

Consumers have reacted favorably. Last year, new 5G FWA subscriptions accounted for most net new broadband subscribers in the United States.[69] T-Mobile and Verizon added more than 3.6 million new FWA subscribers, compared to approximately 3.2 million net additions in 2022.[70] AT&T debuted its FWA solution in August 2023 and doubled its subscriber totals in the first quarter of 2024.[71] As mentioned above, FWA accounted for 104% of the total net broadband additions in 2023, compared to 90% of the net additions in 2022 and 20% of the net additions in 2021.[72] Mobile service operators now compete head to head with cable providers in offering home internet connections in many locales. For example, T-Mobile and Verizon are expected to reach 11 million to 13 million FWA customers by 2025.[73] And by 2025, AT&T is projected to be adding 180,000 subscribers per quarter.[74]

[69] *Leichtman Research Notes* at 4.

[70] *Id*.

[71] Jeff Baumgartner, *AT&T doubles 'Internet Air' subscriber tally in Q1*, Light Reading (Apr. 24, 2024), https://tinyurl.com/5e9wwk42 ("*AT&T doubles 'Internet Air'*").

[72] *Leichtman Research Notes* at 4.

[73] *Accelerating the 5G Economy* at 7.

[74] *AT&T doubles 'Internet Air'*.

This demand is projected to stay strong. FWA's reach is predicted to jump 16 times from 2021 to 2025 for homes with 100+ Mbps 5G access,[75] and 5G FWA connections will experience a compound annual growth rate of almost 88% from now until 2026 globally.[76]

### D. The Wireless Industry Is Competing to Develop and Deploy Advanced Technologies That Optimize Networks and Benefit Businesses and Consumers Alike.

As part of the wireless industry's ongoing efforts to improve network operations and deliver improved services to businesses and consumers, it is developing new technological advancements, leveraging private investments, supporting flexible policies, and helping advance 5G adoption for many use cases. Simultaneously, the industry is developing ways to combat security risks and researching how it can harness emerging technologies such as artificial intelligence ("AI").

#### 1. The U.S. Wireless Industry Is Leveraging Many Technology Advancements to Improve Network Quality and Customer Experience.

Various technologies are enlisting 5G's faster speeds and higher bandwidth, as summarized above,[77] for an ever-expanding variety of use cases:

***5G network slicing*.** Network slicing is a technology that will allow wireless providers to offer a series of logically defined virtual networks over a single physical network for different use cases—including those that benefit from low latency, low jitter, high speeds, and heightened security, as well as those that tolerate low speeds, jitter, and delay.[78]

---

[75] *2023 State of 5G Report* at 19 (citing Wall Street estimates).

[76] Naima Hoque Essing et al., *Fixed wireless access: Gaining ground on wired broadband*, Deloitte (Dec. 1, 2021), https://tinyurl.com/bp5nv8hb.

[77] *See supra* Sections I.A-C.

[78] *See, e.g.*, *Network Slicing*, Ericsson, https://tinyurl.com/529sbumv (last visited June 3, 2024).

Network slicing can help network operators manage spectrum more efficiently through tools like dynamic spectrum sharing.[79] Significant interest exists in a network's ability to slice and link services with the right network resources to make better use of limited spectrum.[80] Network slicing can also improve network security and privacy by isolating traffic in its own network slice so that data and traffic cannot be intercepted or faked by entities of another network slice.[81] And it can mitigate environmental impact, for example, by sharing the same network between private and public users, thereby reducing the overall power, space, and land used, as well as waste generated.[82] Service offerings and use cases based on network slicing are still emerging. Some of the sectors that could leverage the technology include healthcare, mining, utilities, manufacturing, and education.[83]

***Small cells.*** 5G networks need a diverse infrastructure, from thousand-foot towers to backpack-sized small cells. These small cells make up a growing percentage of total cell sites—more than 34% in 2022—helping drive greater wireless capacity and coverage to support our nation's growing data needs.[84] In 2022, there were more than 142,000 small cells operating across the U.S.—a 13% increase over 2021.[85]

---

[79] *See, e.g.*, *Network slicing for 5G success*, Ericsson, https://tinyurl.com/4ys5unj4 (last visited June 3, 2024).

[80] *See, e.g.*, Reply Comments of Nokia, WC Docket No. 23-320, at 1 (filed Jan. 17, 2024).

[81] Gary Hilson, *What is 5G network slicing?*, Verizon Business, https://tinyurl.com/czzn74jj (last visited June 3, 2024).

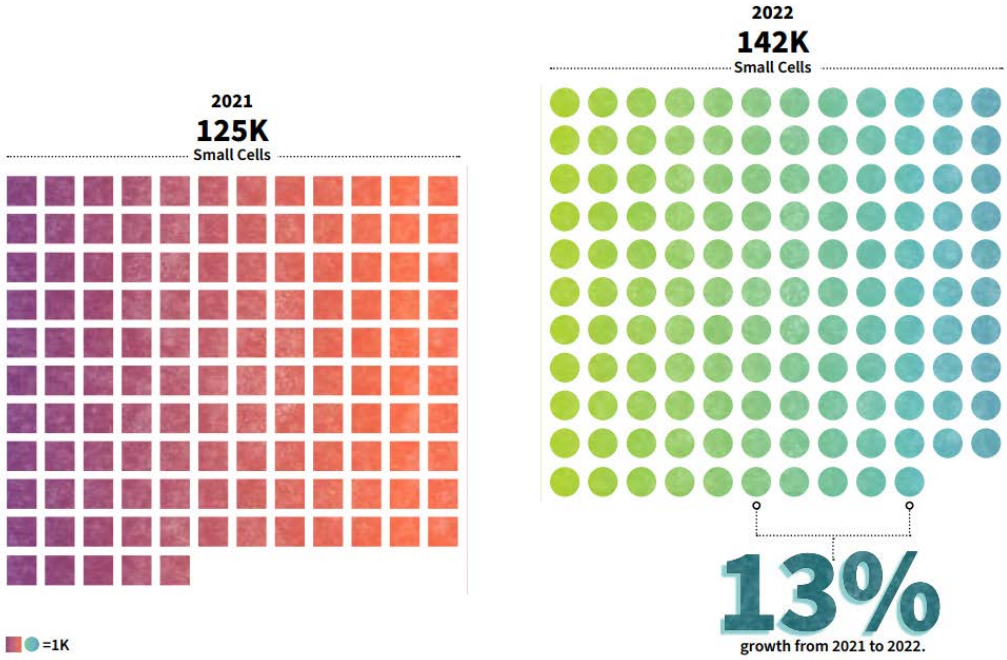
[82] *Network slicing for 5G success*, Ericsson, https://tinyurl.com/4ys5unj4 (last visited June 3, 2024).

[83] *Id.*

[84] *2023 CTIA Annual Survey Highlights* at 7.

[85] *Id.*

*Figure 8: Small Cell Deployments (2021-2022)*[86]




***Massive multiple-input, multiple-output ("MIMO").*** Networks and handsets can use MIMO technology to deliver higher throughput and spectral efficiency by sending and receiving more than one signal simultaneously using groups of antennas at the transmitter and receiver.[87] Massive MIMO, an extension of MIMO and enabled by 5G Radio Access Network ("RAN") technologies, uses an even larger number of transmitters for even higher performance of a single data signal and thus a much bigger boost in capacity and throughput.[88]

***Carrier aggregation.*** 5G Carrier Aggregation ("NR CA") allows a wireless operator to combine multiple 5G channels ("carriers" in this context) to deliver greater speed and

[86] *Id.*

[87] *Meeting 5G Network Requirements with Massive MIMO*, Ericsson, https://tinyurl.com/mr2np2nr (last visited May 21, 2024); Monica Alleven, *AT&T, Nokia fete gains in 5G uplink, distributed massive MIMO*, Fierce Wireless (Feb. 28, 2022), https://tinyurl.com/y3f8fbs2.

[88] *Massive MIMO handbook*, Ericsson, https://tinyurl.com/233gctj6 (last visited May 23, 2024).

performance to users.[89] Verizon achieved 4.2 Gbps in NR CA testing as early as 2020.[90] In 2023, AT&T used NR CA to complete the first 5G standalone data call in the United States.[91] DISH recorded 200 Mbps uplink speeds and 1.3 Gbps downlink speeds using NR CA in recent testing.[92] And, T-Mobile recently demonstrated that it could combine six carriers to reach download speeds above 3.6 Gbps.[93]

***Integrated access and backhaul.*** Integrated Access and Backhaul ("IAB") can reduce acquisition and deployment costs by using wireless spectrum for the backhaul connection of base stations.[94] Enlisting identical channels for coverage and backhaul fosters "greater performance, [ensures] more efficient use of spectrum resources[,] and lowers equipment costs, while also reducing the reliance on the availability of wired backhaul at each access node location."[95] IAB nodes, which use the same spectrum for access and backhaul to create a hierarchical wireless

[89] *Carrier Aggregation in 5G*, Ericsson, https://tinyurl.com/2jubk9wk (last visited May 21, 2024); Monica Alleven, *Mobile Poised to Launch 2.5 GHz 5G Carrier Aggregation*, Fierce Network (Dec. 2, 2021), https://tinyurl.com/2dczyt4e; Monica Alleven, *Dish dials up 5G carrier aggregation tests at 600 MHz*, Fierce Network (Apr. 8, 2022), https://tinyurl.com/mr29285p.

[90] Press Release, Verizon, *Verizon Achieves 4.2 Gbps on its Live 5G Network* (Feb. 25, 2020), https://tinyurl.com/586wzsvx.

[91] Jason Sike, *Taking 5G to the Next Level with Standalone 5G*, AT&T Blog (Apr. 18, 2023), https://tinyurl.com/395jm4ex.

[92] Catherine Sbeglia Nin, *Dish achieves simultaneous 5G uplink and downlink CA for FDD spectrum*, RCR Wireless News (Oct. 16, 2023), https://tinyurl.com/424h7k86.

[93] Monica Alleven, *T-Mobile tops 3.6 Gbps in 6-CA test with Ericsson, Qualcomm*, Fierce Network (Jan. 4, 2024).

[94] Amitabha Ghosh et al., *5G Evolution: View on 5G Cellular Technology Beyond 3GPP Release 15*, IEEE Access, at 127644 (2019), https://tinyurl.com/253aq6rb.

[95] Peter Cohen, *What is 5G Integrated Access and Backhaul (IAB)?*, RCR Wireless News (Mar. 25, 2022), https://tinyurl.com/4v7wz9p9.

multi-hop network between sites, can be deployed to resolve coverage gaps and provide backhaul where fiber deployment would be cost prohibitive.[96]

***Radiofrequency ("RF") front-end architecture and filters*.** An RF receiver includes various circuitry, typically made from silicon, to convert a received RF signal into one that is more easily processed. Improving the efficiency of RF front-end designs can reduce the power consumed by handsets and base station equipment. Swapping silicon to gallium nitride and silicon carbide in radiofrequency front-end designs improves power efficiency.[97]

In addition, RF front-end architecture also includes filters that protect the receiver from out-of-band signals. Adequate filter design is increasingly important as demand for spectrum requires dissimilar systems to coexist with little frequency separation between them. Receiver linearity and third-order intercept are also important considerations for the wireless industry to use in making the receiver more robust in a congested spectrum environment.[98]

***Other technology improvements***. Other innovations will also augment the wireless experience, including software-defined radios, embedded wireless sensors, and backscatter networking.[99]

---

[96] *Id.*

[97] David Hall, *5 Wireless Technology Trends to Keep On Your Radar in 2022 (Reader Forum)*, RCR Wireless News (Jan. 5, 2022), https://tinyurl.com/tb64j7tv ("*5 Wireless Technology Trends*").

[98] Receiver linearity defines the ability to provide an output signal that is directly proportional to the input within its defined range. *Radio Frequency Receiver Performance*, 5G Americas, at 11 (Feb. 2023), https://tinyurl.com/yzdw5ha4. Third order intercept is a measurement of receiver linearity. *See* Robert Watson, *Receiver Dynamic Range: Part 1*, The Communications Edge, at 1 (1987), https://tinyurl.com/my7mn6w4.

[99] Cabe Atwell, *What is Backscatter Technology?*, Fierce Electronics (Jan. 29, 2024), https://tinyurl.com/4muek26j ("Backscatter is the term for a system that can harvest energy from a wireless signal, modulate the received RF signal, and reflect it back toward the source it originally came from. It is similar to RFID (radio frequency identification) in many ways used

### 2. Open Radio Access Network Technology Can Help Maintain U.S. 5G Leadership.

Open RAN technology offers great opportunities to ensure the United States remains a leader in 5G. The global market and technical standards processes are driving advances in Open RAN, and this progress is accelerating in the broader context of 5G network deployments.[100] CTIA supports industry leadership, provider choice, and competition as the best way to promote a future of secure and innovative networks. Further, CTIA generally supports flexible policies and public-private initiatives that enable technologies, including open RAN, that leverage market competition, technical standards, and interoperability developments.[101] And by virtualizing RAN functionality and utilizing the latest AI and machine learning, as discussed later in these comments, companies will have new and enhanced roles to play in the communications marketplace.

Along with 5G technology's capacity, lower latency, and higher throughput generally, the modularity afforded by this openness and virtualization will enable providers to tailor networks to fit their customers' needs to support future use cases. As network functions are virtualized, 5G's virtual and cloud-based network systems will allow for more adaptable security because they can be quickly adjusted, removed, or replaced using software. Doing so reduces the

---

in transportation, asset management, animal tracking, and work badges used to access office buildings.").

[100] *See* Comments of CTIA, Docket No. NTIA-2022-0003 (filed Jan. 27, 2023), https://tinyurl.com/2bsoejny.

[101] *See, e.g.*, Press Release, NTIA, *Public Wireless Supply Chain Innovation Fund*, https://tinyl.io/AjsD (last visited May 21, 2024); Mary Lennighan, *US tries to boost Open RAN with $42 million given to AT&T and Verizon-led group* (Feb. 13, 2024), https://tinyurl.com/2majnppd/; Press Release, DISH, *DISH Wireless Awarded $50 Million NTIA Grant for 5G Open RAN Integration and Deployment Center* (Jan. 10, 2024), https://tinyl.io/AjsE.

likelihood that a cyberattack can impede an entire network. These advancements show the long-term value of U.S. wireless investments and the ongoing potential to benefit all users.

### 3. The Wireless Industry Is Focused on Maximizing the Benefits of Emerging Technologies and Protecting Against Evolving Security Threats.

The deployment and adoption of technologies can carry immense opportunity, but may also pose security risks as well, and the wireless industry is working tirelessly to address an evolving threat landscape. Accordingly, wireless providers, equipment manufacturers, cybersecurity experts, and academia collaborated to launch the 5G Security Test Bed.[102] The 5G Security Test Bed tests and validates how 5G security recommendations work in practical, real-world conditions using commercial-grade equipment. The system also assesses potential security vulnerabilities consistent with recommendations from bodies such as the FCC Communications Security, Reliability, and Interoperability Council.[103] The 5G Security Test Bed was developed largely due to CTIA's partnership with industry leaders like AT&T, Ericsson, T-Mobile, UScellular, MITRE, and Syniverse, as well as academic institutions like the Virginia Tech-Applied Research Corporation.[104]

In addition to 5G's rapid growth and positive impacts, recent advances in AI research and products can further benefit the American wireless industry and consumers by enabling automation, optimized cloud architectures, increased security, and energy consumption

[102] Home Page, 5G Security Test Bed, https://tinyurl.com/4mtkfyvp (last visited May 21, 2024) ("5G Security Test Bed Home Page").

[103] *Cybersecurity*, CTIA, https://tinyurl.com/4ujw2cn5 (last visited May 21, 2024).

[104] 5G Security Test Bed Home Page; Press Release, Syniverse, *CTIA Announces Expansion of 5G Security Test Bed with Addition of Syniverse* (Jan. 9, 2024), https://tinyurl.com/mr26c9zk.

reduction.[105] The wireless industry has used AI for years to enhance products and service offerings, and will continue to harness AI's power to advance 5G leadership.

## II. VIGOROUS COMPETITION AND INNOVATION IN THE WIRELESS SECTOR ARE CREATING IMMENSE OPPORTUNITY AND PROMOTING U.S. LEADERSHIP IN THE NEW 5G ECONOMY.

America leads the world in 5G thanks to historic investment from America's competitive wireless providers who challenge each other every day to build the world's biggest, broadest, and most secure 5G networks. The ubiquitous use of wireless across the country has sparked increased activity in the wireless sector, which in turn is driving economic opportunity across nearly every U.S. industry. 5G is connecting kids to learning opportunities, making farms more sustainable, fighting wildfires, making manufacturing smart, and driverless cars a reality.

Wireless is not only creating business opportunities; it is increasingly a core platform for U.S. businesses themselves. Across the country, companies rely on wireless services and products such as IoT-connected devices and autonomous vehicles to improve performance and streamline operations. Wireless broadband, especially 5G, will continue to create new opportunities for digital transformation across all sectors, enabling an array of industries to deliver new products, services, and greater value to customers, expand to new markets, cut costs, and ensure greater agility and flexibility for employees and customers.

### A. 5G Is Driving Substantial Benefits for the U.S. Economy.

The wireless industry's world-leading investments generate a tremendous economic impact. During the 2010s, economic activity facilitated by wireless providers accounted for more than a $500 billion increase in annual Gross Domestic Product (9% of the total increase in

[105] *5 Wireless Technology Trends*.

annual U.S. GDP) and 10 million additional jobs (25% of the increase in U.S. employment).[106] Researchers now estimate that the wireless industry contributes more than $825 billion to the U.S. GDP *every year*—equivalent to the 20th largest economy in the world.[107] 5G-powered connected devices are enabling new innovations such as remote patient monitoring, efficient smart energy grids, immersive virtual reality learning experiences, and connected cars that reduce congestion and increase safety. Thanks to significant wireless industry investment, 5G is projected to create between $1.4 trillion to $1.7 trillion in economic growth and 3.8 million to 4.5 million new jobs in the United States this decade.[108] These amounts do not even capture the additional $233 billion paid to the U.S. government for the critical licensed spectrum to deliver wireless broadband throughout America (nearly half of that in the last five years alone).[109]

Wireless investments have produced substantial economic benefits in recent years. Growth in wireless services stimulates growth in related industries, including those that supply inputs for wireless infrastructure and create complementary products, such as wireless devices. Similarly, improvements in the quality and capacity of wireless networks facilitate demand for

---

[106] Timothy J. Tardiff, *Wireless Investment and Economic Benefits*, Advanced Analytical Consulting Group, at 1 (Apr. 2024), https://tinyurl.com/27b34maf.

[107] Aren Megerdichian, *The Importance of Licensed Spectrum and Wireless Telecommunications to the American Economy*, Compass Lexecon, at 35 (Dec. 7, 2022), https://tinyurl.com/2ac4v9nf ("*The Importance of Licensed Spectrum and Wireless Telecommunications to the American Economy*"). This analysis only considers the direct impact of the wireless industry value chain and adjacent markets. It does not factor in the contributions made by other sectors that also depend on and use wireless services, which could well represent hundreds of billions in additional gross output and GDP, as well as millions of jobs. *See also GDP (current US$)*, The World Bank, https://tinyurl.com/y43mmmhv (last visited May 31, 2024).

[108] *See* Enrique Duarte Melo et al., *5G Promises Massive Job and GDP Growth in the US*, Boston Consulting Group, at 2 (Feb. 2021), https://tinyurl.com/yrdwrm62 ("5G deployment will contribute $1.4 trillion to $1.7 trillion to US GDP, and create 3.8 million to 4.6 million jobs.").

[109] Press Release, FCC, *Chairwoman Rosenworcel Statement on the Expiration of FCC Spectrum Auction Authority* (Mar. 10, 2023), https://tinyurl.com/9ruws78r; *Auctions Summary*, FCC, https://tinyurl.com/mwt8ybp6 (last visited June 3, 2024).

new and improved products and services that run on these networks, such as video streaming and social networking.

U.S. wireless infrastructure investments present a virtuous circle in which expanding wireless network capacity stimulates growth and investment in other sectors and incentivizes wireless network upgrades and expansion. Today, 5G is contributing to economic activity directly through network infrastructure deployment. And as 5G networks continue to roll out and improve, an even greater wave of economic activity will occur indirectly as the networks enable new and improved use cases across industries.[110]

These use cases will deliver significant socioeconomic benefits through higher productivity, improved cost competitiveness, and better health and safety. By delivering faster speeds, lower latency, and higher reliability, 5G will spur additional activity across consumer, industrial, and public domains.

IoT use cases such as connected vehicles, smart cities, consumer wearables, virtual reality ("VR") and augmented reality ("AR") gaming, e-health, and Industry 4.0,[111] could fundamentally transform industries and drive the U.S. competitive advantage. In fact, analysts estimate that wireless-powered smart city solutions will add $1.8 trillion to the U.S. economy and deliver $160 billion in benefits and savings through efficiencies like lower energy use and reduced congestion.[112] New technologies and consumer products will provide a massive boost

[110] *See The Importance of Licensed Spectrum and Wireless Telecommunications to the American Economy* at 19.

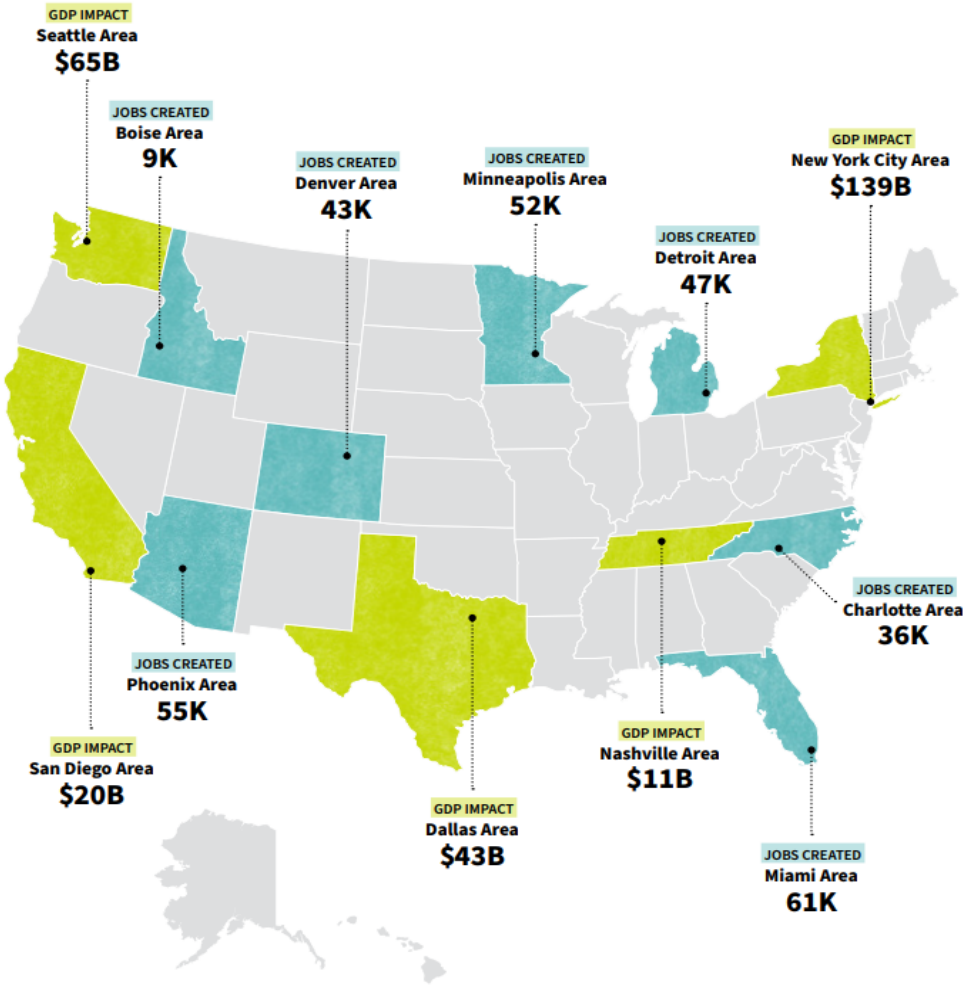
[111] Industry 4.0 refers to the digital transformation of manufacturing. *See What is Industry 4.0?*, IBM, https://tinyurl.com/2v6nk8cm (last visited June 5, 2024).

[112] *See 2023 State of 5G Report* at 10-11.

as well. For example, drone commerce is expected to add more than $80 billion to the economy and create 100,000 new jobs as 5G helps unlock this technology's full potential.[113]

This 5G-powered transformation of our economy is happening in both big cities and smaller communities. As illustrated in Figure 9, this means tens of thousands of new jobs in places like Nashville and Charlotte and tens of billions in GDP growth in places like Boise and Seattle.

*Figure 9: Jobs Created by 5G in Various Regions of the United States*[114]




[113] *Id.* at 11.

[114] *Id.* at 21.

In summary, 5G is poised to revolutionize and enhance virtually every aspect of our economy. It will significantly boost productivity, creating a wealth of new job opportunities. Moreover, the economic benefits of 5G will be widespread, driving growth and prosperity across the entire nation.

### B. 5G Is Powering Innovation in Nearly Every Industry Vertical.

The wireless industry is a tremendous engine of innovation, advancing productivity and making key sectors more competitive on the global stage. The advanced capabilities of 5G (especially in the enterprise space) promise a deepening integration of wireless networks with production processes throughout the economy, enabling a flywheel of innovation that will boost productivity and growth. With the growing digitization of economic production over recent decades, the connectivity that enables the flow of large amounts of information has an outsized role in advancing cutting-edge innovation. 5G continues to transform industries, including transportation, manufacturing, agriculture, education, retail, healthcare, energy, and more.

***Public safety*.** When it comes to keeping people safe, speed and access to key data are critical. 5G delivers both, exponentially increasing access to video, data, and virtual worlds and accelerating the ability to respond. For example, T-Mobile is connecting emergency responders to 5G-enabled AI solutions to speed up detection and response times for wildfires. T-Mobile partnered with Pano AI to create 5G-connected, AI-powered cameras that identify the first signs of wildfires.[115] This technology provides emergency crews with immediate, actionable intelligence, allowing them to respond quickly and effectively before the fire has a chance to grow out of control. Verizon Frontline is developing new 5G-supported technologies for public

[115] Press Release, T-Mobile, *T-Mobile US Enables Advanced Wildfire Detection with 5G, Takes Home Innovation Award* (Feb. 28, 2023), https://tinyurl.com/24w9zk7u.

safety use, including autonomous mobile robots, unmanned aircraft systems, rapid response connectivity unites, and team awareness kits.[116] AT&T recently announced an $8 billion investment to upgrade FirstNet with a 5G standalone core that can support more data and devices to enhance situational awareness and improve emergency patient care.[117]

***Transportation and logistics.*** Innovators across America are using 5G to help make cars driverless and roads more efficient. It's making travel 40% faster, cutting transportation costs by $450 billion each year, and could even reduce up to 90% of transportation emissions.[118] Qualcomm is helping drive 5G innovation for next-generation connected cars and mobility solutions. Partnering with companies like Volvo and Ford, Qualcomm is demonstrating how 5G is enabling a diverse ecosystem of C2VX technologies that can securely connect cars to the cloud, each other, and the environment while supporting next-level intelligence for enhanced in-vehicle experiences, new connected-car services, higher levels of safety, and autonomy. Nokia is improving the efficiency of our global supply chain by enabling the digital transformation of shipping and warehousing operations. 5G is enabling previously unseen applications for remote machine control and robotics, increasing speed, safety, and efficiency across a range of environments. 5G allows human operators to remotely steer drones, cranes, and other large equipment with precision and ease through complex settings from the production facility to seaports and rail transfer stations to warehouses.

---

[116] Press Release, Verizon, *Verizon Frontline showcases Public Safety Solutions at Border Security Expo* (May 21, 2024), https://tinyurl.com/tprp3jsv.

[117] Press Release, AT&T, *FirstNet Authority, AT&T Announce 10-Year Investment to Transform America's Public Safety Broadband Network* (Feb. 13, 2024), https://tinyurl.com/2b5ej9nc.

[118] *5G in America*.

***Manufacturing.*** Increasing U.S. manufacturing productivity—squeezing more from each dollar invested—is essential to making American manufacturing more globally competitive. Wireless networks are helping these efforts by connecting all elements of the manufacturing process, making production lines more responsive to demand and allowing manufacturers to start and stop production quickly, scale it up or down, and use machinery and factory space more efficiently and safely. Across the country, companies like Samsung, General Motors, and Ericsson Factory ZERO are leveraging 5G to improve their manufacturing processes. In Austin, Samsung is using 5G to test and evaluate industrial use cases like AR and VR for employee training, 4K video-as-a-sensor to improve plant security, and enhanced location services for plant safety.[119] In Detroit, General Motors Factory ZERO is using 5G to support their plant's ongoing transformation to produce electric vehicles.[120] Meanwhile, in Lewisville, Texas, Ericsson's USA 5G Smart Factory is exploring the future of manufacturing for 5G radios and other network elements.[121] This production facility is demonstrating capabilities like augmented reality for remote support, digital materials tracking, automated plant procedures, and environmental monitoring.

***Agriculture.*** 5G's fast speeds, high capacity, and low latency help reimagine food production throughout its life cycle. EarthSense's 5G-powered TerraSentia autonomous robot can scan up to 10 plants per second. 5G, with fast speeds and low latency, enables data to be

[119] *Samsung and AT&T 5G Innovation Zone*, Samsung (July 8, 2019), https://tinyurl.com/2chuw8lw.

[120] *Factory ZERO, Our First Fully Dedicated EV Assembly Plant*, General Motors, https://tinyurl.com/2baqfbsj.

[121] Mike Robuck, *Ericsson puts $50M more into US 5G smart factory*, Mobile World Live (May 21, 2024), https://tinyurl.com/25wvl4xr.

sent in real time— allowing farmers to manage crops more efficiently.[122] Chiawana Orchards is using 5G-enabled sensors from innov8.ag to process instant information on their trees' density, as well as the moisture in the soil and weather conditions, to improve tree health and increase yields.[123]

***Education.*** 5G is helping America's teachers and students stay ahead of the curve, increasing engagement, leveraging real-time data, and sparking imaginations. For example, AT&T is connecting students with 5G-enabled immersive, interactive learning experiences. It has partnered with Boddle to develop 5G immersive technologies, like augmented reality, to bring math lessons to life for students and create rich, interactive learning experiences that help remove barriers to quality education.[124]

***Office and retail.*** Businesses are using 5G to reimagine the future with virtual experiences, real-time data, and anytime, anywhere convenience. Seattle-based Forma Vision is using 5G to power holographic video calls, moving holograms from film and television screens to everyday life. Badger Technologies' autonomous robots are testing the power of 5G to help retailers improve operational efficiencies and customer experiences. These advanced mobile data collection systems identify out-of-stock, mispriced, or misplaced inventory and store hazards, filling major gaps in the collection and sharing of vital in-store data.

***Healthcare.*** By powering innovative healthcare applications, 5G is redefining what's possible in the field: making organizations more efficient, complex procedures more precise, and

---

[122] EarthSense, *Unprecedented Under-canopy Field Data and Trait Analysis*, https://tinyurl.com/2cpguzns (last visited June 3, 2024).

[123] CTIA, *The 5G Innovators*, at 4 (Feb. 2, 2023), https://tinyurl.com/2bzhrqxl ("*5G Innovators*").

[124] *AT&T Works with Startups to Unlock Innovation*, AT&T (Oct. 18, 2022), https://tinyurl.com/22mw3m34.

life-enhancing care available in real time, from anywhere. For instance, Verizon is helping improve the future of veteran care through 5G-enabled hospitals. It is partnering with the VA Palo Alto Health System, the first 5G-connected veteran's hospital in the United States,[125] and exploring how 5G-connected VR and AR solutions can enhance surgical navigation systems and medical training to advance veteran care throughout the United States.

***Smart cities, buildings, and energy.*** 5G is the engine of smart cities innovation, connecting people, data, and new ideas in creative ways. Intel is building smart city solutions that are helping communities everywhere deliver smarter services, safer streets, and a healthier, more sustainable environment for every resident.[126] 5G is enabling an ecosystem of next-generation technologies, including sensors, cameras, and edge computing, that can provide near real-time awareness of issues requiring attention.[127] Data collected and analyzed from these 5G-enabled devices can be used to optimize city operations, improve basic services, enhance public safety, increase sustainability, and inform planning and policy making. These devices can also be used to enhance public experiences and optimize operational efficiency at local sports stadiums, theme parks, and resorts or improve parking and safety on university campuses.

***Sports.*** From professional leagues to wearables, sports executives are leveraging 5G's faster speed, high capacity, and low latency to reimagine performance, the fan experience, and even the very nature of sports itself. As 5G network connectivity arrives in arenas across the country, the NBA and WNBA are using 5G immersive technology to provide more unique

[125] News Release, Verizon, *5G hospital at VA Palo Alto Health Care System will empower unprecedented care for veterans* (July 24, 2023), https://tinyurl.com/26tgbr5q.

[126] *Smart City Solutions for Safer, More Resilient Communities*, Intel, https://tinyurl.com/2bm9pm6p (last visited May 23, 2024).

[127] Suman A. Sehra et al., *5G Networks: Enabling Digital Transformation of Smart Cities and Intelligent Transportation*, Intel (Mar. 5, 2024), https://tinyurl.com/29jv752f.

camera angles for broadcast; AT&T's 5G Holovision is making holographic telepresence interviews possible; Boingo Wireless's private 5G network at Gallagher Park is facilitating the San Diego Padres' sale of apparel, merchandise, food, and beverage;[128] and augmented reality is bringing player biographies and statistics to life.[129] 5G is changing the game for athletes too. AT&T and Gallaudet University collaborated to create the first 5G-connected football helmet—making the game more inclusive by enhancing on-field communication for student-athletes who use American Sign Language.[130] Verizon is offering sports fans better connectivity in packed stadiums, and its Multi-View experience allows fans in certain stadiums to view different camera angles and replay key moments so they can catch all the action.[131] Verizon also collaborates with stadium facilities to monitor crowd flow to improve efficiency and safety.[132] And T-Mobile will use its 5G Advanced Network Solutions to provide golf fans enhanced views and more content at the 2024 PGA Championship.[133]

***Entertainment and gaming.*** Consumers today expect more and more from their entertainment experiences, and 5G is helping companies deliver in new and creative ways. Helios uses volumetric video, modern 3D holograms, AR, VR, and more, powered by 5G, to deliver a fully interactive narrative gaming experience. Dignitas launched the nation's first 5G

[128] *Wireless Spotlight: Talking with Mike Finley, CEO of Boingo Wireless*, CTIA (Mar. 28, 2023), https://tinyurl.com/2jztdjr7.

[129] *5G Innovators* at 12.

[130] Press Release, AT&T, *AT&T and Gallaudet University Collaborate to Make Football More Inclusive with First 5G-Connected Helmet* (Oct. 5, 2023), https://tinyurl.com/yw2pos39.

[131] Press Release, Verizon, *Your "live" sports experience redefined with 5G* (Feb. 9, 2022), https://tinyurl.com/4vc4etm2.

[132] *5G Edge Crowd Analytics*, Verizon Business, https://tinyurl.com/5n7pb525 (last visited May 31, 2024).

[133] Press Release, T-Mobile, *T-Mobile Brings Major 5G Firsts to the PGA Championship* (May 13, 2024), https://tinyurl.com/yr6dz5ba.

esports training facility in Los Angeles. 5G connectivity enables players with Dignitas' League of Legends team to stream high-quality games in real time, stay connected with fans on the go, and experience console-quality multiplayer gaming on their phones.

These new services and applications built on the secure and reliable 5G platform are already transforming communities, industries, and America's economy. CTIA is excited to see innovation grow day by day as entrepreneurs from coast to coast leverage 5G's remarkable capabilities.

## III. THE WIRELESS INDUSTRY IS FOCUSED ON BROADER EFFORTS FOR SOCIETAL GOOD.

The wireless industry is at the forefront of bridging the digital divide, ensuring all communities have access to critical connectivity. It is championing DEI, fostering a more inclusive workforce and customer base. In the fight against climate change, wireless companies are implementing sustainable practices and advancing green technologies. The wireless industry is also committed to developing and deploying innovative solutions that enhance accessibility for individuals with disabilities. Furthermore, the industry supports Americans' mental health by providing tools and resources that promote well-being and connectivity. Through these efforts, the wireless industry is driving positive change and supporting a more connected and equitable society.

### A. The Wireless Industry Has Stepped Up to Meet Demand for Broadband Connectivity.

The wireless industry's investments have undeniably benefitted consumers as competition-driven investment "has normalized advances in wireless technologies."[134]

[134] John Mayo, *The Evolution of Consumer Welfare in the Mobile Wireless Service Industry*, at 6 (Jan. 9, 2024), https://tinyurl.com/26dzxejz.

Consumers receive better service quality and lower prices, and as technology advances, investment and innovation increase wireless devices' and networks' capabilities, which in turn leads to more varied service offerings.[135] Expanding connectivity options—including mobile handsets, tablets, vehicles, and other connected devices—provide consumers with diverse portfolios of devices to tailor connectivity options that best satisfy their specific needs, with corresponding gains in consumer welfare.[136]

The wireless industry plays a key role in connecting communities of color, low-income communities, and rural populations. Nationwide providers[137] and rural wireless providers, like Appalachian Wireless,[138] Carolina West,[139] Nsight,[140] Cellular One,[141] Cellcom,[142] and more, are working to make 5G available to harder-to-reach areas of the country—bringing advanced wireless services, including video communications, to more Americans. Wireless technology reduces barriers to broadband adoption by providing these communities access to affordable,

---

[135] *See id.* at 2, 6.

[136] *Id.* at 6, 19.

[137] *See, e.g.*, *Coverage and Value with No Trade-offs*, T-Mobile, https://tinyurl.com/2353367n (last visited June 4, 2024); *AT&T Expands 5G and Fiber to Connect Rural, Urban and Tribal Communities*, AT&T (Mar. 22, 2023), https://tinyurl.com/2yuljxkt; *5G in Rural Areas*, Verizon, https://tinyurl.com/296pohrc (last visited June 4, 2024).

[138] *See* Press Release, Ericsson, *Appalachian Wireless brings 5G to eastern Kentucky with Ericsson* (Sept. 27, 2022), https://tinyurl.com/2bomylub.

[139] *See Welcome to Carolina West 5G*, Carolina West Wireless, https://tinyurl.com/22thafye (last visited June 4, 2024); *Frequently Asked Questions*, Carolina West Wireless, https://tinyurl.com/2bjzcxhb (last visited June 4, 2024).

[140] *See The 5G Experience*, Cellcom, https://tinyurl.com/29azwqpx (last visited June 4, 2024); Bevin Fletcher, *Nsight Execs Detail Cellcom's 5G rollout*, Fierce Network (Feb. 18, 2022), https://tinyurl.com/25kfhj75.

[141] *How Cellular One is Connecting Rural Communities and Tribal Lands*, CTIA (Mar. 11, 2022), https://tinyurl.com/25wutoxx.

[142] *A Strong and Always Growing Network*, Cellcom, https://tinyurl.com/s97635hy (last visited June 6, 2024).

flexible connectivity solutions.[143] Wireless competition is bringing faster speeds, more coverage, new services, and lower prices to communities across the country.[144] In 2022, the wireless industry invested $39 billion to extend networks and connect more communities and consumers.[145] The 5G rollout occurred more than 40% faster than the 4G rollout, with 330 million Americans already covered.[146] Given these efforts, wireless networks have rightly been identified as a significant factor in bridging the digital divide and providing underserved communities with the tools they need for advancement in the twenty-first century.[147]

Wireless providers have long been the backbone of the Commission's efforts to connect low-income consumers by participating in programs that provide free and subsidized high-speed broadband. Even as wireless prices in the United States have decreased by more than 40% since 2010,[148] wireless providers have worked to further increase broadband adoption through USF programs such as Lifeline.[149] In fact, over 95% of Lifeline customers have elected to use their subsidy for mobile wireless.[150] Wireless providers also worked with the Commission to

---

[143] *See Wireless in Communities of Color: Bridging the Digital Divide*, Multicultural Media, Telecom, & Internet Council, at 7-9 (July 2022), https://tinyurl.com/ykxy9tf7 ("*Wireless in Communities of Color: Bridging the Digital Divide*").

[144] *5G Summit: How Wireless Is Helping Close the Digital Divide*, CTIA (May 18, 2022), https://tinyurl.com/25oljyms.

[145] *Wireless Investment Report* at 1.

[146] *5G in America*.

[147] Comments of CTIA, GN Docket No. 20-32, at 4 (filed Oct. 23, 2023) (*citing Wireless in Communities of Color: Bridging the Digital Divide* at 6).

[148] *Competition*, CTIA, https://tinyurl.com/yn9c5jb2 (last visited May 31, 2024).

[149] *Lifeline Support for Affordable Communications*, FCC, https://tinyurl.com/2nb9xej2 (last visited May 3, 2024).

[150] *See* Comments of CTIA, GN Docket No. 22-69, at 2 (filed Mar. 4, 2024) (*citing Universal Service Monitoring Report 2022*, Federal-State Joint Board on Universal Service, at 33 tbl. 2.4 (Feb. 13, 2023), https://tinyurl.com/23lta8uj).

establish the Emergency Broadband Benefit program[151] and Affordable Connectivity Program[152] to help families struggling to afford internet service.[153] And some companies, such as TruConnect, continue to broaden Lifeline offerings,[154] while others, such as Standup Wireless, are forging new partnerships.[155]

Importantly, wireless providers are also helping to ensure that students stay connected. 5G technology can revolutionize how children learn and connect them with entirely new experiences. Many children of color and those from low-income families often lack the opportunity to travel far beyond their own neighborhoods and hometowns. But with 5G, classrooms can use an array of technologies to visually immerse students in new environments.[156] For example, CTIA's Wireless Foundation's Catalyst Winners Kai XR and

---

[151] *Emergency Broadband Benefit*, FCC, https://tinyurl.com/yjhrcr9t (last visited May 3, 2024).

[152] *Affordable Connectivity Program*, FCC, https://tinyurl.com/4npmu8kx (last visited May 20, 2024). More than half of Affordable Connectivity Program enrollees use the program for wireless broadband. *CTIA Statement on the Affordable Connectivity Program Extension Act of 2024*, CTIA (Jan. 10, 2024), https://tinyurl.com/mr4bch4s.

[153] With the wind-down of the ACP, wireless providers are stepping in to help keep ACP customers connected. *See Helping Customers Adjust to the End of ACP*, AT&T Connects (Apr. 25, 2024), https://tinyurl.com/254lmq28 ; *Verizon Provides Accessible, Affordable, and Reliable Connectivity Options for Those Who Need It Most*, Verizon News Center (Apr. 15, 2024), https://tinyurl.com/24vgpd4b; *The Affordable Connectivity Program is winding down, but Metro has you covered*, Metro by T-Mobile, https://tinyurl.com/2oegxxfd (last visited May 31, 2024). CTIA continues to support efforts to secure additional funding for ACP. *See, e.g.*, *CTIA Statement on the Affordable Connectivity Program Extension Act of 2024*, CTIA (Jan. 10, 2024), https://tinyurl.com/274cvbbc.

[154] Press Release, TruConnect, *TruConnect Expands its Lifeline Benefit Services to the State of Virginia*, PR Newswire (May 1, 2023), https://tinyurl.com/3mahufk5; Press Release, TruConnect, *TruConnect Expands its Lifeline Services to the State of Florida* (Apr. 18, 2024), https://tinyurl.com/28vcvvxw.

[155] Standup Wireless joined with Disabled American Veterans to help close the digital divide for veterans on government assistance programs. *StandUp Wireless Helps Bridge the Digital Divide with DAV*, GlobeNewswire (Sept. 1, 2023), https://tinyurl.com/47mrvv95.

[156] *Wireless in Communities of Color: Bridging the Digital Divide* at 11.

DopeNerds use VR, AR, and extended reality technologies to enable students to learn and explore beyond classroom walls.[157]

Wireless providers also significantly participated in the Commission's Emergency Connectivity Fund ("ECF"), which has successfully helped students and library patrons who otherwise would have been negatively affected by the homework gap or digital divide get online.[158] ECF has provided funding for nearly 13 million connected devices and over 8 million broadband connections, benefitting 18 million students, 11,500 schools, and over 1,000 libraries.[159] As the Commission evolves past ECF, the E-Rate program can advance the Commission's digital equity and inclusion goals by helping students—particularly, disadvantaged students—obtain digital literacy skills and experience that will be indispensable for their future educations and career prospects.[160] For this reason, CTIA has supported Commission proposals to build on the success of ECF by using E-Rate funding to support Wi-Fi hotspots for educational purposes.[161]

### B. The Wireless Industry Is Promoting Diversity, Equity, and Inclusion.

Companies throughout the wireless industry have made outstanding progress in promoting DEI and are committed to achieving more. CTIA members are building more diverse, equitable, and inclusive workforces, preparing tomorrow's leaders, and laying the foundation for all communities to thrive.

---

[157] *Why Catalyst 2024? Hear from 2022 Winner Kai XR*, CTIA (Jan. 18, 2024), https://tinyurl.com/2ac7t8s6.

[158] Reply Comments of CTIA, WC Docket No. 21-31, at 2 (filed Jan. 29, 2024).

[159] *Id.*

[160] *Id.* at 4.

[161] *Id.* at 2.

DEI initiatives across the wireless industry are ensuring that everyone feels welcome and valued at work. For example, conversations regarding DEI—and opportunities to share different experiences—are happening within ERGs nationwide. At AT&T, DISH, T-Mobile, Verizon, and UScellular, at least 56 ERGs connect more than 100,000 employees, including women, people of color, veterans, people with disabilities, various faiths, and LGBTQ+ employees.[162] The DISH Disability Advocates Network is an ERG that encourages understanding and support for employees who live with a disability or are caregivers and aims to positively impact customers and the community.[163] Nokia has collaborated with the United Nations Educational, Scientific, and Cultural Organization ("UNESCO") to promote gender diversity through universities, social networks, and corporate partnerships. UNESCO used best practices developed by Nokia's StrongHer ERG to increase the representation and participation of women across all industries.[164] Qualcomm has collaborated with the National Foundation for Autism Research to launch an internship program to welcome individuals with autism into the company.[165] These initiatives have made the wireless industry drivers of inclusion, with AT&T, T-Mobile, Verizon, UScellular, Assurant, Ericsson, Intel, Nokia, and Samsung achieving perfect scores on the Human Rights Campaign Foundation's Corporate Equality Index.[166] Carolina

[162] *Answering the Call: Wireless for Good*, CTIA, at 9 (2023), https://tinyurl.com/22437d2p ("*Wireless for Good*").

[163] *About Us*, Disability Advocates Network, https://tinyurl.com/2cezzqww (last visited May 25, 2024).

[164] *StrongHer*, Nokia, https://tinyurl.com/2cavemfg; *StrongHer: Closing the gender gap in Technology*, Nokia, https://tinyurl.com/23o2fuwe.

[165] *Diversity, Equity, and Inclusion*, Qualcomm, https://tinyurl.com/24gmhw8l.

[166] *Wireless for Good* at 9.

West Wireless is proud to be a certified Great Place to Work, with 93% of employees reporting feeling welcomed when they joined the company.[167]

The wireless industry's DEI commitment extends to preparing the next generation of talent and leaders and investing in their communities. Through 2023, Verizon, T-Mobile, and AT&T spent more than $50 million in tuition assistance for over 10,000 employees and more than $300 million in training for over 200,000 employees.[168] T-Mobile's Apprenticeship Program assists workers who may not have advanced degrees or work experience, placing participants in roles within the company after a year in the classroom and on the job.[169] Similarly, at Ericsson, 97% of employees take advantage of the company's *Degreed* learning program; last year, the company trained over 19,000 employees in critical AI and automation skills, helping prepare its teams for the digital future.[170] Additionally, King Street Wireless contributes to local charities that support youth and nonprofits in its community.[171] And Attentive is partnering with Historically Black Colleges and Universities to help advance diversity throughout the company and establish career paths for recruits.[172]

DEI efforts go beyond assisting with advanced degrees, as the wireless industry is working to support students and teachers across the globe. Qualcomm achieved its goal of engaging 1.5 million students and teachers across the globe by 2025, three years earlier than

---

[167] *Great Place to Work*, Carolina West Wireless (Nov. 2022), https://tinyurl.com/27lzhot4.

[168] *Wireless for Good*.

[169] *Id*.

[170] *Sustainability and Corporate Responsibility Report*, Ericsson (2022), https://tinyurl.com/22eusvuh.

[171] *King Street Wireless in the Community*, King Street Wireless, https://tinyurl.com/4ckmrykk.

[172] *Attentive's Commitment to Diversity & Inclusion*, Attentive (Feb. 4, 2021), https://tinyurl.com/2sxacv5b.

anticipated,[173] and the company has grown its Thinkabit Lab sites and collaborations with Million Girls Moonshot and FIRST Robotics, which aim to encourage students from different backgrounds to learn about STEM.[174] Ericsson aims to empower 1 million young people with digital tools, educational content, and skills by 2025 through its flagship Connect to Learn nonprofit education program, which is delivered in collaboration with governments, communications service providers, non-governmental organizations, and international agencies like the United Nations.[175]

CTIA's member companies are also promoting DEI throughout the broader wireless ecosystem. Verizon, T-Mobile, and AT&T spent more than $27 billion with diverse suppliers last year—a 25% increase year-over-year—placing them on the National Minority Supplier Diversity Council, which also includes UScellular, American Tower, Assurant, Ericsson, Intel, and Samsung.[176] Qualcomm directed more than one-third of its spending for U.S. government subcontract work toward diverse businesses, and the company worked with nearly 1,000 diverse suppliers last year.[177] AT&T conducts 26.3% of its procurement expenditures with companies owned by minorities, women, veterans, LGBTQ+ persons, and people with disabilities, surpassing the company's target of 21.5%.[178] Assurant surpassed its goal to spend $90 million

[173] *Qualcomm Corporate Responsibility Report*, Qualcomm (2022), https://tinyurl.com/23pswjdw.

[174] *See, e.g., thinkabit lab*, Qualcomm, https://tinyurl.com/2cgbfh98.

[175] *Sustainability and Corporate Responsibility Report*, Ericsson (2022), https://tinyurl.com/22eusvuh.

[176] *Corporate Member Directory*, National Minority Supplier Development Council, https://tinyurl.com/29gxqy6u.

[177] *Qualcomm Corporate Responsibility Report*, Qualcomm (2022) https://tinyurl.com/23pswjdw.

[178] *Responsible Supply Chain*, AT&T, https://tinyurl.com/26attxb3.

on diverse-owned businesses three years early, spending nearly $100 million with diverse-owned businesses in 2022, doubling its prior rate.[179] Intel aimed to double its annual diverse supplier spending from 2020 to 2030 and achieved that goal eight years early with a $2.2 billion spend in 2022, including $800 million spent with minority-owned suppliers globally and $250 million spent with African American suppliers in the United States.[180]

### C. The Wireless Industry Is Contributing to the Fight Against Climate Change.

The wireless industry's competitive dynamic—which made 5G the fastest wireless rollout ever and drove down wireless prices by more than 40% since 2010[181]—is now a major tool in the fight against climate change. The U.S. wireless industry is reducing carbon emissions, embracing more sustainable practices, and constructing more resilient and energy-efficient networks. For example, compared to 2014, Qualcomm is shrinking its global emissions by reducing Scope 1 and Scope 2 greenhouse gas emissions by 30% from global operations.[182] Sinch strives to achieve net-zero greenhouse gas emissions across its value chain,[183] and Ericsson aims to reduce the energy consumption of its new base stations by roughly 40% from 2021 to 2025.[184] Samsung is fine-tuning the technical elements of 5G delivery, refining its "system-on-a-chip" to minimize power consumption and optimize the transmit paths of its

---

[179] *Celebrating Diversity, Equity & Inclusion at Assurant*, Assurant, https://tinyurl.com/2dhfh989.

[180] *Intel Surpasses First 2030 Goal: $2 Billion in Diverse Supplier Spending*, Intel, https://tinyurl.com/27azyahp.

[181] *Building the 5G Economy*, CTIA, at 14 (2021), https://tinyurl.com/27hhwp6g.

[182] *Environmental Responsibility*, Qualcomm, https://tinyurl.com/264ea47b (last visited June 3, 2024). Scope 1 greenhouse gas emissions come from the energy sources that providers operate, while Scope 2 emissions come from the electricity, steam, heating, and cooling power that providers purchase.

[183] *Annual Report*, Sinch (2023), https://tinyurl.com/2928nxz5.

[184] *Wireless for Good*.

MIMO system with bias control and dynamic download.[185] Verizon is installing energy-efficient systems that include IoT sensor networks to more intelligently manage its facility controls.[186] As a result of Verizon's efforts, the Environmental Protection Agency named Verizon an Energy Star Partner of the Year for the 11th consecutive year.[187]

The wireless industry is also designing and building with the future in mind by prioritizing device and equipment recycling, resale, and reuse. For example, CTIA member companies like Asurion are aiming to repair and reuse their devices, pursuant to CTIA's Reverse Logistics and Service Quality program.[188] Further, new device packaging meets sustainable guidelines and eliminates plastic trays and inserts.[189]

Across industries and through commercial use, 5G networks will enable more downstream use cases because these advanced networks can support more devices, which will create a multiplier effect when the network is used at scale. These innovations will help materially reduce the U.S. carbon footprint, enabling an approximated 20% contribution towards U.S. emission reduction targets by 2025.[190] As Commissioner Starks explained, 5G provides "[m]ore efficient power routing, more opportunities to tap renewable energy, greater resilience as products like [electric vehicles] and heat pumps add electrical load, and ultimately less carbon

---

[185] *Id*.

[186] *Verizon ESG Report 2023*, Verizon, at 45 (2023), https://tinyurl.com/2ylrw2cp.

[187] *Id*.

[188] *Wireless Spotlight: Talking with Cindy Christy, President of Asurion*, CTIA (Oct. 11, 2023), https://tinyurl.com/mubc3d98.

[189] *5G Connectivity: A Key Enabling Technology to meet America's Climate Change Goals*, Accenture, at 24 (2022), https://tinyurl.com/2akbmhbt ("*5G Connectivity: A Key Enabling Technology to meet America's Climate Change Goals*").

[190] *Id.* at 4.

and lower utility bills."[191] Further, 5G allows 100 times more simultaneous connections, provides up to 100 times faster connectivity, and enables over five times lower latency, which is key for innovations like autonomous vehicles.[192] A single route by an autonomous shuttle can eliminate up to eight private car trips, thereby decreasing congestion, improving transportation equity and access, and reducing transportation-related carbon emissions by up to 70%.[193] 5G use cases in transportation could help abate an estimated 86.5 million metric tons of carbon dioxide equivalents ("$MMTCO_2e$") annually in the United States by 2025, the equivalent of removing 19 million passenger vehicles off the road for a year.[194]

As the United States contemplates the exciting possibilities of smart city technologies, CTIA and the wireless industry are committed to helping communities of all sizes become cities of the future.[195] Through efficient energy use, data collection, and multiplied communications connectivity capabilities, 5G technology can enable smart grids and smart buildings to cumulatively abate an estimated 67.9 $MMTCO_2e$ of emissions in the United States by 2025, which is equivalent to the $CO_2$ emissions from the electricity that is generated to power 12 million homes in a year.[196] 5G can do this, in part, by helping all renewable energy resources on the grid talk to each other and maintain the quality of service that society requires.[197]

---

[191] Geoffrey Starks, Commissioner, FCC, Remarks at the 2023 U.S. Tech for Climate Action Conference (Mar. 17, 2023), https://tinyurl.com/48pe222r.

[192] *Collaborating for Innovation: A Smart Cities Playbook*, CTIA at 2, https://tinyurl.com/2bpzhjr3 ("*A Smart Cities Playbook*").

[193] *Wireless for Good* at 5.

[194] *5G Connectivity: A Key Enabling Technology to meet America's Climate Change Goals*.

[195] *A Smart Cities Playbook* at 2.

[196] *5G Connectivity: A Key Enabling Technology to meet America's Climate Change Goals* at 5.

[197] *5G in America*.

Smart cities enabled by 5G technology will also help communities deliver smarter services, safer streets, and a healthier, more sustainable environment. For example, Intel is building a 5G-enabled ecosystem of next-generation technologies, including sensors, cameras, and edge computing, that can provide near real-time awareness of issues requiring attention. The data collected and analyzed from these devices can be used to optimize city operations, enhance public safety, increase sustainability, and inform planning and policy making.[198] Similarly, Ericsson's 5G Smart Factory in Lewisville, Texas, is building vital network infrastructure in a way that both strengthens America's supply chain and is energy smart, running on 100% renewable energy with 5G-powered smart buildings that consume 24% less energy and 75% less indoor water than similar non-smart facilities.[199]

The Commission can leverage the industry's advancements to help achieve the nation's sustainability goals by supporting innovative, energy-efficient technology, such as the equipment in Samsung's waiver request for composite 5G radios that support operations using the 3.7 GHz Service and Citizens Broadband Radio Service bands.[200] The composite radio will reduce environmental waste and increase energy efficiency by approximately 30-45% when compared to two standalone units.[201] Requiring operators to deploy two separate radios—one in the C-Band and one in the CBRS band—when one multiband device could be used produces more electronic waste, uses more power, and takes up more space on cell towers, without any material

[198] *2023 State of 5G Report* at 24.

[199] *Wireless for Good* at 5.

[200] Petition for Waiver of Samsung Electronics America, Inc., WT Docket No. 23-93 (filed Aug. 23, 2022).

[201] *Id.* at 11.

benefits to the radiofrequency environment.[202] CTIA strongly urges the Commission to approve the request to enable the licensing of Samsung's environmentally friendly and innovative technology.

### D. The Wireless Industry Is Developing and Deploying Technologies and Services That Increase Communications Access for People with Disabilities.

The wireless industry has continued to increase the accessibility of its products and services, reinforcing the industry's commitment to meeting the ever-growing demand for wireless data, upgrading networks, and offering new and affordable services. In particular, the last two years have seen significant advances in technology and user options available to all consumers, including people with disabilities.

The wireless industry not only prioritizes providing high-quality products and services to its customers, but it also promotes the accessibility of consumer offerings, from product design to front-line assistance. For example, T-Mobile created a publicly available (open-source) accessibility tool, MagentaA11y, that serves as an online guidance resource to help promote the accessibility and usability of certain digital platforms.[203] Consumer Cellular provides customers with information about accessibility features and makes its support team available for assistance.[204] Verizon's Accessibility Leadership team and Disability Advisory Board, an external board of trusted leaders from disability organizations, provide expert advice on key strategic relationships and initiatives to advance Verizon's overall accessibility program.[205]

---

[202] Letter from Michael Mullinix, Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 23-93, at 2 (filed Jan. 19, 2024).

[203] Accessibility Acceptance Criteria, MagentaA11y, https://tinyurl.com/2xtykh9c.

[204] *The Easy Guide on Smartphone Accessibility for the Visually Impaired*, Consumer Cellular (Apr. 24, 2023), https://tinyurl.com/bdh828xs.

[205] *Environmental, Social and Governance (ESG) Report 2022*, Verizon (2023), https://tinyurl.com/2mekokuw.

Verizon's Forward for Good Accelerator supports disability innovation technology from startups, including Waymap, WearWorks, AppTek, Imanyco, Cognixion, Puffin Innovations, and Evolution Devices.[206] For example, Waymap's navigation app guides visually impaired users with step-by-step audio instructions, and Verizon has partnered with Loyola Marymount University and others to sponsor a trial deployment.[207] Samsung's Accessibility Council brings planners, designers, and developers together to work on improving accessibility for all customers using its products and services. The Council focuses on enhancing usability for customers with disabilities and advancing technological competitiveness.[208] Additionally, at the AT&T Disability & Aging Center in Tustin, California, agents trained to support customers with hearing loss, vision loss, or aging-related needs answer questions and direct callers to helpful products and services, including large-print and braille bills, reduced rates for 4-1-1 dialing, and low- or no-cost special equipment.[209]

The industry's commitment to accessibility extends beyond traditional wireless providers into the broader wireless ecosystem. In early 2023, Apple, Mozilla, Igalia, Bocoup, Adobe, Hilton, Microsoft, Google, and many more collaborated to kickstart an interoperable accessibility testing project on all major Internet web browsers.[210] In February 2024, Amazon sponsored #HackDisability: AI for Accessibility—a "hackathon" that brought together diverse teams with a

---

[206] Zachary Bastian, *Celebrating the Forward for Good Disability Innovation Showcase*, Verizon News Center (May 18, 2022), https://tinyurl.com/27pwkhlu.

[207] *See* Donna Epps, *Waymap: leveraging technology to build an inclusive, accessible future*, Verizon (Oct. 12, 2022), https://tinyurl.com/28bden9a.

[208] *Wireless for Good* at 16; *A Journey Towards a Sustainable Future: Samsung Electronics Sustainability Report 2023*, Samsung, at 64 (2023), https://tinyurl.com/yr5rnbn7.

[209] *Customer Service with Heart*, AT&T (Jan. 22, 2020), https://tinyurl.com/2y2f5d8c.

[210] *See James Craig, Accessibility Testing for WPT Interop 2024*, GITHUB, https://tinyurl.com/27bo5ufs (last updated Feb. 2024).

goal of developing innovative AI solutions to enhance accessibility for people with disabilities.[211] Finally, Amazon, Apple, Google, Meta, and Microsoft are supporting the University of Illinois at Urbana-Champaign's Speech Accessibility Project, which aims to make voice recognition technology more useful for people with a range of diverse speech patterns and disabilities.[212]

As wireless providers and equipment manufacturers continue to develop products and services with a wide range of accessibility features and customizable options to meet consumers' unique needs, recently introduced accessibility features are providing a more comfortable user experience for consumers with certain disabilities. For example, visually impaired Android users can benefit from TalkBack, which uses spoken word, vibration, and other audible feedback to inform users about the image and options on a screen.[213] Similarly, visually impaired Apple iOS users benefit from VoiceOver, which tells users what is happening on their devices. Over the last two years, Apple has updated VoiceOver so that it can describe people, objects, text, and graphs using Bluetooth wireless braille displays.[214] Samsung phones' High Contrast mode activates an opaque black background, high contrast fonts, and a high contrast keyboard while also removing animations to aid users with vision and motion-related impairments.[215]

---

[211] *See #HackDisability: AI for Accessibility*, Perkins School for the Blind (Feb. 23, 2024), https://tinyurl.com/27tlfr9c.

[212] *See, e.g.*, Abrar Al-Heeti, *Speech Accessibility Project Aims to Make Voice Recognition More Inclusive*, CNET (Oct. 3, 2022), https://tinyurl.com/2ptjuf6z.

[213] *See Get Started on Android with TalkBack, Android Accessibility Help*, Google, https://tinyurl.com/2c32bqyy (last visited May 6, 2024).

[214] *See Use a Braille Display with VoiceOver on iPhone, iPhone User Guide*, Apple, https://tinyurl.com/2y7ef7mm (last visited May 23, 2024).

[215] *A Journey Towards a Sustainable Future: Samsung Electronics Sustainability Report 2023*, Samsung (2023), https://tinyurl.com/yr5rnbn7.

Wireless equipment manufacturers have similarly developed technologies to assist consumers with speech-related disabilities. For instance, Samsung's Bixby digital assistant app supports the creation of a personal voice for answering phone calls by typing instead of speaking.[216] Apple's new Live Speech feature, which also turns typed text into spoken words, can be paired with Apple's Personal Voice tool to enable people to create a voice that sounds like them.[217] In 2022, Amazon released Tap to Alexa, allowing customers to interact with Alexa using on-screen menus and commands instead of their voices.[218] In 2023, Amazon released Eye Gaze, which allows customers to gaze at their tablet to perform pre-set Alexa actions.[219]

Consumers with certain hearing and mobility needs also benefit from accessibility features powered by wireless devices. For example, Apple introduced AssistiveTouch on the Apple Watch, which allows users to navigate the watch via hand gestures.[220] Updates to Samsung Galaxy Watch One UI 5 allow Samsung Galaxy smartwatches to recognize universal gestures that enable a touch-free experience.[221] Additionally, Samsung updated its Galaxy

---

[216] *See* Artie Beaty, *This New Samsung Galaxy Feature Lets You Clone Your Own Voice (Sort Of)*, ZDNet (Aug. 24, 2023), https://tinyurl.com/2chbhyux.

[217] Press Release, Apple, *Apple Introduces New Features For Cognitive Accessibility, Along with Live Speech, Personal Voice, and Point and Speak in Magnifier* (May 16, 2023), https://tinyurl.com/2o674fyp.

[218] *See Alexa Accessibility Features Extend To Fire Tables*, Amazon (Sept. 21, 2022), https://tinyurl.com/27nup3lb.

[219] *See* Steven Aquino, *Amazon Announces Eye Gaze, Call Translation Accessibility Features At Annual Fall Event*, Forbes (Sept. 22, 2023), https://tinyurl.com/2bz9jcb8.

[220] *See Use AssistiveTouch on your Apple Watch*, Apple (Mar. 7, 2024), https://tinyurl.com/2bw6frtw.

[221] *See* News Release, Samsung, *More Than a Gesture: How Galaxy Watch's Universal Gestures Feature Enhances Accessibility* (Dec. 3, 2023), https://tinyurl.com/25ysefyo.

Buds2 Pro wireless earbuds to enhance ambient sound for people who are hard of hearing.[222] In late 2023, Google expanded accessibility tools for its Google Maps app by offering wheelchair-accessible walking routes.[223]

Through participation in FCC-organized activities, partnerships, and its own efforts, the wireless industry is advancing the accessibility of its products and services by maintaining close contact with the accessibility community, thereby addressing the needs and interests of people with disabilities while promoting innovation to the benefit of all consumers. This includes providing opportunities that help users optimize the benefits of accessible features.

For example, CTIA developed the industry-leading resource for accessible communications, AccessWireless.org, over a decade ago to help consumers learn more about accessible products and services.[224] AccessWireless.org provides information about wireless resources and tools to help people with disabilities, seniors, veterans, and their families and caretakers find accessible wireless devices, services, and apps that meet users' needs.[225] This effort is aided by the Global Accessibility Reporting Initiative ("GARI") tool, which is embedded into AccessWireless.org and allows users to search the most complete database of accessible services, devices, and mobile applications and compare products and services.[226]

---

[222] *See* News Release, Samsung, *[Global Accessibility Awareness Day] Galaxy Buds2 Pro Brings Enhanced Ambient Sound for People Who Are Hard of Hearing* (May 16, 2023), https://tinyurl.com/255daenz.

[223] *See, e.g.*, Eve Andersson, *8 Ways We're Making Daily Tasks More Accessible*, Google Blog (Oct. 17, 2023), https://tinyurl.com/2btz4vcv.

[224] *See Wireless for All*, Access Wireless, https://tinyurl.com/2xgvjylx (last visited June 4, 2024).

[225] *Id*.

[226] Global Accessibility Reporting Initiative, https://tinyurl.com/22kjhx3r (last visited May 23, 2024).

Additionally, for over a decade, CTIA has hosted an annual Accessibility Outreach Initiative ("AOI") Forum celebrating key wireless innovations for people with disabilities as well as policy updates. The 2023 AOI Forum brought together wireless industry leaders, policymakers, and representatives from the accessibility community to discuss a broad range of topics, including the CVAA, recommendations from the Hearing Aid Compatibility ("HAC") Task Force related to the path to achieving 100% hearing aid compatible handsets, and implementation of the 988 Suicide Prevention Lifeline. The AOI Forum also offered a technology showcase featuring accessible innovations.[227]

Finally, as part of the wireless industry's commitment to ensuring that wireless devices are compatible with hearing aids, CTIA collaborated with the accessibility community in a years-long effort to develop and release the HAC Task Force Report—a landmark, consensus-based agreement establishing a path to 100% HAC.[228] The Commission should adopt the consensus recommendations in the HAC Task Force Report, which would enable a solid and achievable path to 100% HAC with four- and five-year compliance timelines that would meet the needs of consumers with hearing loss, while also promoting innovation in HAC technologies.[229]

[227] *See CTIA Hosts 10th Annual Accessibility Outreach Initiative (AOI) Forum*, Access Wireless (Sept. 5, 2023), https://tinyurl.com/25lryc8e.

[228] *See* Hearing Aid Compatibility Task Force Final Report and Recommendation, WT Docket No. 15-285 (filed Dec. 16, 2022); Press Room: *ATIS Hearing Aid Compatibility Task Force Recommends a Path to 100% Compatibility for Wireless Handsets*, ATIS, (Dec. 16, 2022) https://atis.org/press-releases/atis-hearing-aid-compatibility-task-force-recommends-a-path-to-100-compatibility-for-wireless-handsets/.

[229] *See* Comments of CTIA, WT Docket Nos. 23-388; 15-285 (filed Feb. 26, 2024).

### E. Wireless Providers Continue to Play a Vital Role in Connecting Those in Crisis to Life-Saving Resources.

With approximately 80% of calls to 911 made via wireless every year, CTIA and its members know that mobile phones are an important lifeline in an emergency.[230] For more than a decade, the wireless industry has worked collaboratively with smartphone providers, technology companies, and public safety groups to enhance the technology used to locate wireless 911 callers. In June 2022, the 911 Location Technologies Test Bed announced that Device-Based Hybrid ("DBH") technologies met the Commission's vertical location accuracy metric, and wireless providers have started to implement these technologies into their networks.[231] Using DBH solutions, along with other network information, 911 operators can now receive more precise caller locations in times of crisis. Wireless providers are also using DBH to route calls based on the location of the device, which will help decrease the rate of misdirected 911 calls.[232]

The wireless industry also shares the Commission's and Congress's goal of ensuring that Americans in need can access life-saving mental health services.[233] To make it easier for Americans to access the National Suicide Prevention Lifeline's mental health support in times of crisis, the wireless industry launched call- and text-to-988.[234] CTIA commends the Commission's efforts to improve the service through its recent adoption of the Second Further

---

[230] *See 9-1-1 Statistics*, NENA The 9-1-1 Association, https://tinyurl.com/2d3ngpow (last visited May 30, 2024).

[231] *See* Letter from Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA and Thomas K. Sawanobori, Senior Vice President & Chief Technology Officer, CTIA, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114 (June 2, 2022).

[232] *Location-Based Routing for Wireless 911 Calls*, PS Docket No. 18-64, Report and Order, FCC 24-4, ¶ 15 (rel. Jan. 26, 2024).

[233] *CTIA Statement on Georouting for the 988 Suicide & Crisis Lifeline*, CTIA (Apr. 25, 2024), https://tinyurl.com/2bwjmmug.

[234] *Public Safety*, CTIA, https://tinyurl.com/2ykal43t (last visited June 3, 2024).

Notice of Proposed Rulemaking ("*Second FNPRM*"), which will require wireless providers to implement georouting solutions for calls to 988.[235] The *Second FNPRM* builds on CTIA members' collective work to identify ways to provide georouting information that will enable the routing of wireless calls to the preferred call centers of the Substance Abuse and Mental Health Services Administration (*i.e.*, the federal agency leading public health efforts to advance the country's behavioral health) and Vibrant Emotional Health (*i.e.*, the 988 Lifeline administrator).[236] CTIA further commends Congress for introducing bipartisan legislation to help ensure that those in crisis can access the 988 Lifeline.[237] CTIA and its members are committed to continuing to support the Commission's and Congress's work in identifying and implementing improvements to provide access to life-saving emergency services.[238]

The wireless industry also strongly supports efforts to expand the use of wireless technology to ensure safety for victims of domestic and sexual violence. CTIA and its members are strong supporters of the Safe Connections Act and are committed partners with the National

---

[235] *See Implementation of the National Suicide Hotline Act of 2018*, WC Docket No. 18-336, Second Further Notice of Proposed Rulemaking, FCC 24-45(rel. April 26, 2024).

[236] *CTIA Statement on Georouting for the 988 Suicide & Crisis Lifeline*, CTIA (Apr. 25, 2024), https://tinyurl.com/2bwjmmug; *see SAMHSA Awards Vibrant Emotional Health the Grant to Administer 988 Dialing Code for the National Suicide Prevention Lifeline,* Substance Abuse and Mental Health Services Administration (June 16, 2021), https://tinyurl.com/2bw4llvw.

[237] *CTIA Statement on the 988 Lifeline Location Improvement Act of 2023*, CTIA (Dec. 13, 2023), https://tinyurl.com/26r5n96c. *See H.R.6763 - 988 Lifeline Location Improvement Act of 2023*, 118th Congress of the United States, https://tinyurl.com/29dxycba (introduced Dec. 13, 2023). "This bipartisan bill will advance an effort Rep. Molinaro jumpstarted [in 2023] to get the Federal Communications Commission (FCC) to implement technology that reroutes calls to the National 988 Crisis Lifeline to local call centers." *See Molinaro Builds on 988 Crisis Lifeline Advocacy, Introduces Bipartisan Bill To Get Calls Routed to Local Call Centers*, Office of Congressman Marc Molinaro (Dec. 19, 2023), https://tinyurl.com/2dj7zzol.

[238] Press Release, FCC, *FCC Proposes Improvements for Wireless Call Routing to 988 Lifeline* (Apr. 25, 2024), https://tinyurl.com/28fu39e9.

Domestic Violence Hotline.[239] Further, CTIA members like Intrado are pioneering text-to-911 solutions, permitting consumers to reach emergency services via text, which is especially valuable in domestic violence situations where calling may be dangerous.[240] CTIA commends Chairwoman Rosenworcel and the Commission for their work to ensure that survivors of domestic and sexual violence—and those in their care—can continue relying on wireless services and devices to establish independence from their abusers and regain a sense of safety. CTIA looks forward to working with the Commission and the Hotline to implement the Safe Connections Act and advance our shared goal of protecting and empowering survivors.

## IV. THE WIRELESS INDUSTRY CONTINUES TO EARN CONSUMERS' TRUST BY CONSTRUCTING RELIABLE AND RESILIENT NETWORKS, PROTECTING CONSUMERS AND THE MESSAGING PLATFORM, AND PREVENTING UNWANTED AND ILLEGAL ROBOCALLS.

The wireless industry continues to invest in resilient networks, ensuring robust and reliable connectivity for all users. Leading efforts to maintain consumer trust in messaging services, the industry actively works to protect the integrity of these platforms. Additionally, the wireless sector is dedicated to developing and implementing security-related standards aimed at safeguarding consumers from unwanted and illegal robocalls. Through these initiatives, the wireless industry remains committed to enhancing the security and reliability of its services for everyone.

---

[239] *H.R. 7132 – Safe Connections Act of 2022*, 117th Congress of the United States, https://tinyurl.com/25u5torw (signed into law Dec. 7, 2022); Press Release, National Domestic Violence Hotline, *National Domestic Violence Hotline and Wireless Industry Enter Into Multi-Year Partnership to Support Survivors* (Feb. 16, 2023), https://tinyurl.com/22rvpp9y.

[240] *Wireless Spotlight: Talking with Jeff Robertson, CEO of Intrado*, CTIA (June 13, 2023), https://tinyurl.com/ycke52uu.

### A. The Wireless Industry Continues to Invest in Resilient Networks.

America's wireless providers have led the world in building robust, reliable communications networks, and they continue to invest substantially in infrastructure, employees, tools, and improved coordination to ensure that wireless services remain stable during emergencies and natural disasters. These investments in time, material, and people are paying dividends, as wireless infrastructure has proven remarkably resilient through catastrophic weather and climate disasters.

The wireless industry's response during the 2023 disaster season demonstrates the benefits of these investments in resiliency. After Hurricane Idalia made landfall in Florida as a high-end Category 3 storm last year, only 10 out of 6,313 base stations in the affected area were reported offline due to damage within the first 36 hours after impact.[241] Furthermore, advance preparations enabled engineering and restoration teams to quickly deploy once Hurricane Idalia passed. Wireless providers reported networks operating at more than 99% of their normal capacity the day after the hurricane made landfall.[242] This success was not a one-off. Following Tropical Storm Hilary, only 0.6% of 13,733 cell sites reported in the affected area were impacted.[243]

The wireless industry's proactive and effective response to natural disasters was not limited to hurricanes and tropical storms. The catastrophic wildfires that devastated West Maui killed 101 people and destroyed nearly all infrastructure, including fiber, especially in

[241] *The Wireless Industry Responds to 2023 Disaster Season*, CTIA (Aug. 18, 2023), https://tinyurl.com/2d9kj6c9.

[242] *Id*.

[243] *Id*.

Lahaina.[244] Despite this challenging situation, wireless providers worked quickly to restore services to the impacted areas by deploying critical response assets. Wireless providers deployed satellite-based backhaul solutions, supplied mobile hotspots in community support and evacuation centers, repositioned Cells on Light Trucks and Cells on Wheels, set up free broadband access points (including at the airport, medical centers, and American Red Cross housing locations), and flew drones with cameras to assess cell site damages, among other measures.[245] Wireless providers also offered relief for customers in the impacted area and worked with the Red Cross, Salvation Army, and other verified organizations to support their text-to-donate efforts. Mobile providers collaborated with local emergency response officials and each other to support residents' access to communications and Maui's recovery.[246]

On top of ensuring the resiliency of their networks, CTIA members coordinate with federal agencies and the critical infrastructure industry to enhance disaster preparedness and streamline disaster response. CTIA members coordinate with the Commission, the Cybersecurity & Infrastructure Security Agency, the Department of Homeland Security, the Federal Emergency Management Agency, as well as Emergency Operations Centers at the state and federal level. For example, CTIA, in consultation with representatives from local government public safety, developed its voluntary Wireless Network Resiliency Framework to provide a blueprint for how wireless providers can best coordinate with local officials.[247]

---

[244] *Id.*; *see* Jacey Fortin and Adeel Hassan, *Death Toll of Maui Wildfire Rises to 101*, The New York Times(Feb. 13, 2024), https://tinyurl.com/29fjnmhh.

[245] *The Wireless Industry Responds to 2023 Disaster Season*, CTIA (Aug. 18, 2023), https://tinyurl.com/2d9kj6c9.

[246] *Id.*

[247] *Best Practices for Enhancing Emergency and Disaster Preparedness and Restoration*, CTIA, https://tinyurl.com/yjhahbtn (last visited May 21, 2024).

The wireless industry also works with companies that operate our nation's electric grid, another critical sector often impacted by adverse weather events. The Cross-Sector Resiliency Forum provides the nation's leading communications providers, electric companies, and their major trade associations with an effective venue to collaborate on resiliency. Having just finished its fourth year, the Cross-Sector Resiliency Forum has given participants opportunities to improve and refine cross-sector initiatives and further advance resiliency in the planning, response, and recovery phases of a disaster.[248]

These investments in time, material, and people are paying dividends—wireless networks are stronger today than ever before. In January 2023, over 40 member companies in the Cross-Sector Resiliency Forum convened to review communications providers' and electric companies' successful efforts to respond to disaster events in 2022, including wildfires and hurricanes, as well as opportunities to enhance their coordination and collaborative efforts in future disaster events.[249] Looking ahead, the Cross-Sector Resiliency Forum continues to identify opportunities to enhance collaboration.[250]

### B. The Wireless Industry Is Dedicated to Protecting Consumers and the Messaging Platform and to Maintaining Consumer Trust.

For decades, CTIA and its member companies have been focused on supporting the development and growth of wireless messaging services while building in defenses that have "gone a long way to protect consumers."[251] As the use of SMS/MMS has exploded in popularity

[248] Letter from Michael Mullinix, Assistant Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 11-60 et al. (filed Jan. 25, 2023).

[249] *Id.*

[250] *Id.*

[251] *Targeting and Eliminating Unlawful Text Messages et al.*, CG Docket No. 21-402 et al., Second Report and Order et al., FCC 23-107, ¶ 15 (rel. Dec. 18, 2023).

since messaging launched in the 1990s—for context, 2.1 *trillion* SMS/MMS were exchanged in 2022—the wireless industry has supported innovative uses of the platform while employing safeguards to maintain consumers' confidence in messaging.[252] As a result, text messaging remains one of the most trusted and widely used forms of communication among consumers. And wireless providers and their messaging partners constantly evolve their approaches, working with industry and consumer stakeholders, policymakers, and enforcement entities to enhance their efforts to crack down on bad actors and protect consumers. To continue facilitating this trust, the wireless industry is actively working with the Commission and other entities through CTIA's Secure Messaging Initiative to focus on enforcement against bad actors. In addition to this collaboration, by maintaining its flexible regulatory framework, the Commission can help ensure the industry can continue protecting consumers with multi-layered, sophisticated tools and processes purpose-built for the text platform.

Today, Americans consider messaging to be one of the most trusted forms of communication compared to other popular alternatives, such as email and voice calling. A coalition of six national consumer advocate organizations recently observed:

> [T]exting currently remains a valuable and trusted method of communication in the United States, largely because of the best practices developed by CTIA and adopted by its members and their partners. . . . [T]he entire texting ecosystem would be a disaster if fewer industry-developed restrictions against unwanted texts were applied.[253]

CTIA's 2024 survey data shows that consumers prefer texting over voice calling when talking to family and friends nearly 3 to 1, and more than half of all consumers text every single

[252] *2023 Annual Survey Highlights* at 9.

[253] Letter from Margot Saunders, Senior Counsel, National Consumer Law Center, to Marlene Dortch, Secretary, FCC, CG Docket No. 21-402 et al., at 2 (filed Mar. 6, 2024).

day, which is more than the use of any other communications medium.[254] The consumer trust that the wireless industry has built and protected is why messaging boasts a 98% "open rate."[255]

CTIA and its member companies are striving to maintain this trust, using a multi-layered approach that includes sophisticated tools, industry best practices, and public-private partnerships to focus on enforcement against bad actors. Wireless providers and their messaging partners employ a variety of spam mitigation tools, including up-front vetting and registration processes, spam filtering and blocking technologies, and consumer reporting capabilities. In 2023 alone, wireless providers blocked more than 47.5 billion spam messages from reaching consumers, dramatically improving the consumer experience—more than double the number blocked just two years before.[256] And blocking is just one line of defense. Thanks to the robust tools and the multi-layered approach of the messaging ecosystem, there has been a nearly 40% drop in consumer complaints about text messages to the Commission and the Federal Trade Commission ("FTC") between 2021 and 2023.

For years, CTIA's *Messaging Principles and Best Practices* have promoted innovation and growth of the messaging platform while preventing consumers from receiving unwanted messages.[257] The *Messaging Principles and Best Practices* are meant to apply broadly to encourage businesses, non-profits, political campaigns, and other non-consumer message senders to obtain opt-in consent before sending text messages to consumers, among many other

[254] Emma Fletcher, *IYKYK: The top text scams of 2022*, Federal Trade Commission (June 8, 2023), https://tinyurl.com/25desf3a.

[255] *Retail Strategy Trends*, Short Code Registry, https://tinyurl.com/2874bgoz.

[256] Reply Comments of CTIA, CG Docket No. 21-402 et al., at 1 (filed Mar. 11, 2024).

[257] *Messaging Principles & Best Practices*, CTIA, https://tinyurl.com/2d5orztk (last visited June 4, 2024).

recommended steps related to security, privacy, and consumer protection.[258] The Commission itself recently recognized that the *Messaging Principles and Best Practices* have "gone a long way to protect consumers" from spam and scam text messages.[259]

CTIA continues to update the *Messaging Principles and Best Practices* to ensure that they reflect consumers' evolving needs and marketplace realities. Last year, CTIA announced updates to clarify expectations for entities by specifying who qualifies as a non-consumer message sender who should obtain consent before sending texts, versus a consumer message sender who does not.[260] The revised version also adds a new best practice: message senders should offer points of contact for redress, reflecting the Messaging Principles and Best Practices' focus on protecting legitimate messages while stakeholders work to protect consumers.[261]

The wireless industry is consistently reinforcing its efforts to improve consumer protections and address bad actors' evolving tactics. Building on its decades-long efforts, CTIA launched the Secure Messaging Initiative ("SMI") to enhance efforts to protect consumers by building public-private partnerships that focus on enforcement against bad actors.[262] Recognizing that text messaging differs significantly from voice telephony—from policy to ecosystem considerations—a framework built specifically for messaging was needed. Through

---

[258] *CTIA Updates Messaging Principles and Best Practices to Further Protect Consumers From Unwanted Messages While Supporting the Growth of Messaging*, CTIA (May 25, 2023), https://tinyurl.com/22wg6jnm ("*CTIA Updates Messaging Principles and Best Practices*").

[259] Reply Comments of CTIA, CG Docket No. 21-402 et al. (filed Mar. 11, 2024) (quoting *Targeting and Eliminating Unlawful Text Messages et al.*, CG Docket Nos. 21-402 et al., Second Report and Order et al., FCC 23-107, ¶ 15 (rel. Dec. 18, 2023).

[260] *CTIA Updates Messaging Principles and Best Practices*.

[261] *Id.*

[262] Press Release, CTIA, *CTIA Announces Secure Messaging Initiative to Fight Spam Text Messages* (June 29, 2022), https://tinyurl.com/26opvqpf.

the SMI, CTIA is leveraging the tools developed over the last 30 years to help identify bad actors—and to make that intelligence actionable through referrals to law enforcement.

As part of the SMI, CTIA and industry stakeholders assessed the leading sources of unwanted messaging in the ecosystem and developed the *Messaging Security Best Practices* to address them. The SMI leverages more detailed information available in the texting ecosystem (*i.e.*, not just phone number and provider name) and works with many ecosystem partners, not just voice service providers, to help the Commission and other law enforcement agencies identify and target bad actors.[263] The SMI includes a central clearinghouse that participants use to share suspected spam messages and techniques to more rapidly and effectively shut down spam activity, while targeting the senders of unwanted or fraudulent messages. These steps include employing tools like up-front registration and vetting processes, volumetric filters that are triggered when a sender sends more than the number of messages per period they are permitted, and more, to help ensure that message senders are who they say they are and are using the platform to send messages at the volume and cadence that consumers want.[264]

Despite these actions, there is still more work to be done, and stakeholders in the ecosystem have developed unique tools to fight bad actors head-on. For example, wireless providers are using the latest technology to protect consumers, incorporating AI and machine learning to enhance the tools that stop unwanted messages.[265] Additionally, the wireless industry collaborates with law enforcement, including the FTC, other agencies that the Commission partners with, and state attorneys general, by sharing reports on suspected scam texts to help stop

[263] *See* Comments of CTIA, CG Docket No. 21-402 et al., at 20 (filed Feb. 26, 2024).

[264] Press Release, CTIA, *CTIA Announces Secure Messaging Initiative to Fight Spam Text Messages* (June 29, 2022), https://tinyurl.com/26opvqpf.

[265] *See* Comments of CTIA, CG Docket No. 23-362 (filed Dec. 18, 2023).

bad actors at the source. CTIA encourages the Commission to continue enhancing its partnership with the SMI to share information and collaborate on enforcement against the bad actors behind scam and spam text messages.

Going forward, CTIA and its member companies encourage the Commission to maintain a flexible policy approach, which has enabled the wireless industry to act in real-time to protect consumers from spam and scam messages and maintain trust in the wireless messaging services platform for all users for decades. As technology evolves and challenges change, CTIA's members will continue to find solutions that protect consumers, as the industry has done for decades under the Commission's appropriately flexible framework.

### C. The Wireless Industry Is Continuing to Protect Consumers from Unwanted and Illegal Robocalls.

CTIA and its member companies throughout the wireless industry are dedicated to protecting consumers from illegal and unwanted robocalls while ensuring that legitimate texts and calls reach consumers. Wireless providers support the Commission's efforts to give the ecosystem even more tools to achieve these goals.

Wireless providers and their partners have unleashed a wide range of powerful tools to fight illegal and unwanted robocalls, including—but not limited to—developing robust know-your-customer practices, deploying innovative call-blocking services, tracing back illegal robocalls to identify bad actors, and establishing and implementing robust robocall mitigation programs.[266] The wireless industry has also led the way in developing and deploying STIR/SHAKEN call-authentication technology and targeted call-blocking programs.[267] To further leverage call authentication tools and help consumers make more informed choices about

[266] Comments of CTIA, CG Docket No. 17-59, WC Docket No. 17-97, at 2 (filed Aug. 9, 2023).
[267] *Id.*

whether to pick up the phone, CTIA collaborated with member companies to develop best practices for CTIA's Branded Calling ID —"BCID"—that enable businesses to deliver verified calls that include an easily recognizable caller ID display.[268]

The wireless industry also actively participates in tracebacks to stop bad actors at the source. For example, using call analytics to target bad actors and AI-based solutions to protect consumers, CTIA members collaborate with USTelecom's Industry Traceback Group, the Commission, FTC, the Department of Justice, and state attorneys general to trace illegal calls and identify the callers.[269] CTIA members also offer consumer-facing solutions to robocalls. For example, major wireless providers offer tools that consumers can tailor to protect themselves against unwanted calls.[270] CTIA's member companies and their partners across the voice ecosystem continue to work on multiple fronts to ensure that their overseas partners are also taking effective, appropriate measures to mitigate foreign-originated illegal robocalls.[271]

Providers balance these steps with efforts to ensure that legitimate calls, including public safety calls, are protected. For example, CTIA's member companies protect 911 calls, such as by disabling blocking features for inbound calls after a subscriber calls 911, that ensure consumers do not miss any call-backs from emergency services providers.[272]

---

[268] *See Branded Calling ID Best Practices*, CTIA, https://tinyurl.com/2b9ebhz8 (last visited June 4, 2024).

[269] *Fighting Robocalls*, CTIA, https://tinyurl.com/28982ut2 (last visited May 1, 2024).

[270] Tools include AT&T's Call Protect, Verizon's Call Filter, UScellular's Call Guardian and T-Mobile's Scam ID and Scam Block. *See id*.

[271] *See* Comments of CTIA, CG Docket No. 17-59, WC Docket No. 17-97, at 4-6 (filed Dec. 10, 2021).

[272] *See* Reply Comments of CTIA, CG Docket No. 17-59, WT Docket No. 17-97, at 8-9 and n.30 (filed May 21, 2021).

The wireless industry's extensive efforts to combat robocalls are working. Robocall complaints have decreased steadily, reaching a five-year low in 2023.[273] CTIA supports the Commission's continued focus on protecting consumers from illegal and unwanted robocalls through aggressive enforcement against bad actors, and the wireless industry remains dedicated to partnering with the Commission in this effort.

## V. THE COMMISSION CAN FOSTER ADDITIONAL COMPETITION IN THE WIRELESS SECTOR BY ADOPTING AND SUPPORTING POLICIES THAT PROMOTE SPECTRUM AVAILABILITY AND INFRASTRUCTURE DEPLOYMENT.

CTIA's members agree with Commissioner Gomez that competition has the power "to drive innovation that improves services and lowers prices for consumers."[274] Competition is flourishing in the wireless marketplace, and the Commission can do even more to foster that competitive landscape. CTIA urges the Commission to adopt and support policies that increase access to spectrum resources, particularly mid-band spectrum, for full-power, exclusive licensed use. In addition, CTIA applauds the actions that the Commission has already taken to reduce barriers to wireless deployment and encourages the Commission to protect those gains by preserving its existing policies.

### A. The Commission Can Promote U.S. 5G Leadership by Ensuring Wireless Service Providers Have Access to Sufficient Full-Power, Exclusive-Use Spectrum.

Licensed, exclusive-use spectrum is the lifeblood of mobile communications, and more of it is necessary to meet increasing demand. For 5G to reach its full potential, it is imperative

[273] Press Release, FTC, *FTC Releases Annual Do Not Call Registry Data Book Showing Consumer Complaints Continued to Decrease in Fiscal Year 2023* (Nov. 3, 2023), https://tinyurl.com/35cc7fvw.

[274] Anna Gomez, Commissioner, FCC, Remarks at the Congressional Hispanic Caucus Institute: Celebrating Latina Excelling Series (Dec. 12, 2023), https://tinyurl.com/2t7m3w8k.

for policymakers to allocate more spectrum for 5G innovation domestically and for the United States to remain internationally competitive. Allocating spectrum "could connect millions of Americans to new 5G services."[275]

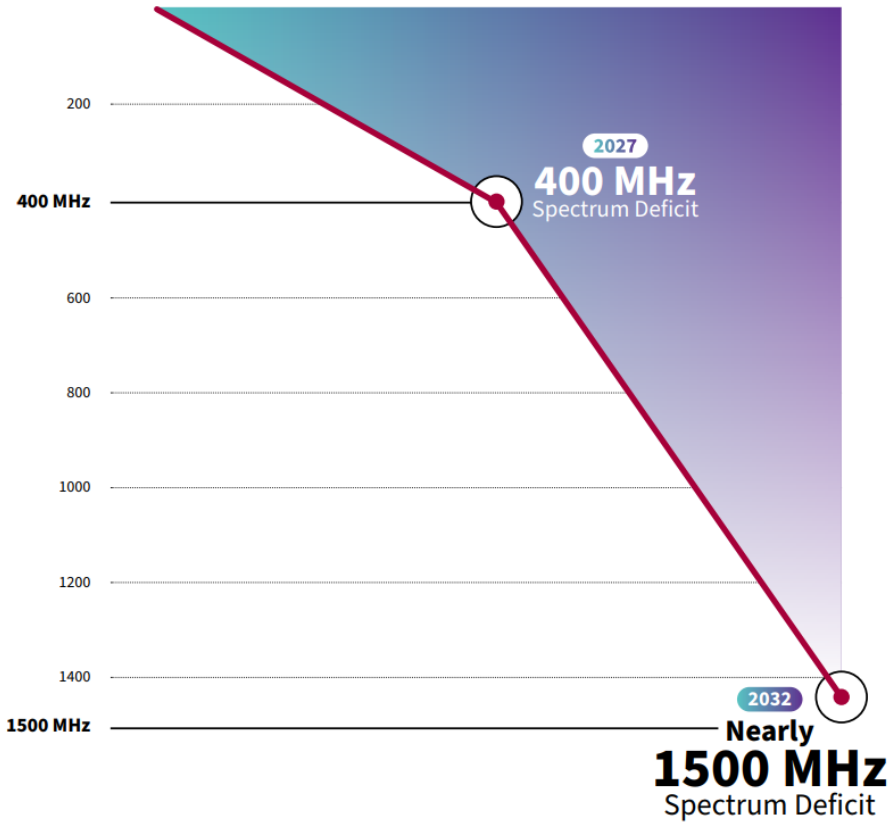
Without a real pipeline of full-power, licensed mid-band spectrum, the United States is at a significant strategic disadvantage when it comes to developing cutting-edge wireless-enabled technologies. A recent study from The Brattle Group finds that even improvements in technological efficiency and added cellular infrastructure will not be nearly enough to meet projected spectrum demand.[276] As illustrated in Figure 10, The Brattle Group's analysis determined that, based on projected demand for data, the United States will need at least an additional 400 megahertz of full-power, licensed, mid-band spectrum in five years, and nearly 1,500 megahertz by 2032.[277]

[275] Press Release, Office of Commissioner Brendan Carr, Carr Opposes President Biden's Plan to Give the Administrative State Effective Control of all Internet Services and Infrastructure in the U.S. (Nov. 6, 2023), https://tinyurl.com/4743tdy2.

[276] Coleman Bazelon & Paroma Sanyal, *How Much Licensed Spectrum is Needed to Meet Future Demands for Network Capacity?*, The Brattle Group (Apr. 17, 2023), https://tinyurl.com/2at7ktru.

[277] *Id.* at 3-4 ("Extrapolating from historical trends, we project that data traffic on the macro network is expected to increase by over 250% in the next 5 years and by over 500% in the next 10 years. If no new spectrum bands are allocated for wireless use in the next 5-10 years, we estimate that by 2027, the U.S. could face a spectrum deficit of approximately 400 megahertz, and by 2032, this deficit will have more than tripled to over 1,400 megahertz, normalized to lower mid-band equivalent spectrum, licensed at full power.").

*Figure 10: Projected U.S. Spectrum Deficit if Additional Full-Power, Exclusive-Use Spectrum Is Not Auctioned (2027-2032)*[278]

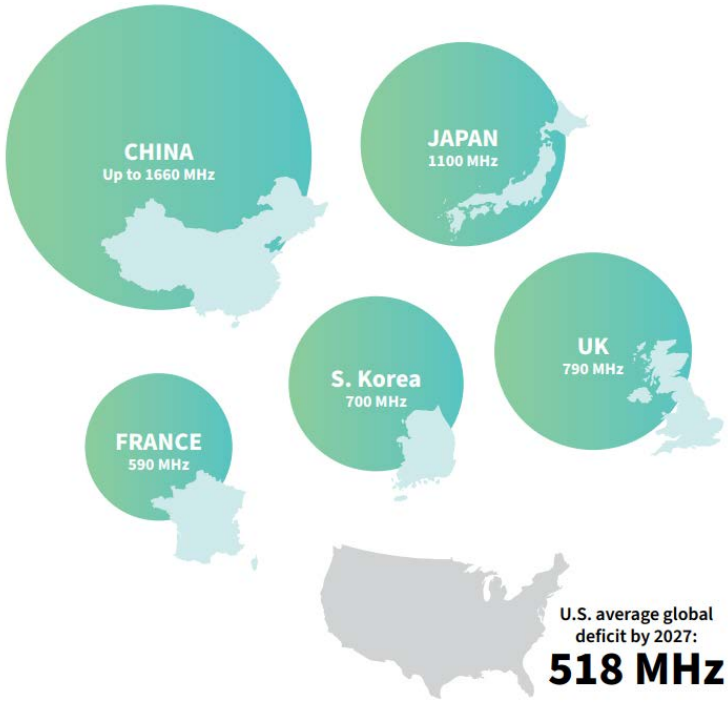



National competitiveness has increased in importance in recent years, as China intensifies its economic rivalry. U.S. global competitiveness going forward will rely on a thriving wireless industry, which starts with thoughtful spectrum policy. China is allocating far more spectrum for 5G, giving it a potential edge. Indeed, China has already allocated 1,460 megahertz of mid-band spectrum for 5G, 3.2 times more than the United States, and China made clear at the recent World Radiocommunication Conference ("WRC-23") that they aren't stopping there. Researchers estimate that China may dedicate up to 1,660 megahertz of mid-band spectrum for 5G in the coming years.

[278] *How Licensed Spectrum Fuels U.S. Competitiveness* at 5.

Other countries have recognized the need to make more full-power, licensed mid-band spectrum available and are quickly allocating resources to unlock additional capacity for 5G networks. For example, Japan currently allocates 1,100 megahertz of mid-band licensed spectrum for 5G. The UK allocates 790 megahertz today. South Korea allocates 380 megahertz today and is estimated to assign another 700 megahertz by 2027. As a result, the United States, with its 450 megahertz of mid-band spectrum, is at a deficit that could rise to 518 megahertz by 2027, absent immediate action when we look at peer nations Japan, the UK, China, South Korea, and France.[279]

*Figure 11: Projected U.S. Spectrum Deficit Relative to Several Peer/Competitor Nations (2027)*[280]




[279] *2023 State of 5G Report* at 33 (citing Janette Stewart et al., *Comparison of Total Mobile Spectrum in Different Markets*, Analysys Mason (Sept. 2022), https://tinyurl.com/26el975q).

[280] *How Licensed Spectrum Fuels U.S. Competitiveness* at 17.

And as evidenced at WRC-23, in the absence of concrete proposals from the United States, China is ready to forge global harmonization of 5G. Recent studies by Accenture noted harmonizing mid-band spectrum for 5G will add up to $200 billion to America's economy over the next 10 years, while failing to harmonize 5G spectrum allocations puts these benefits at risk, including limiting America's leadership in standards development and the global wireless ecosystem.[281]

Over the past year, America's spectrum policy faced unprecedented challenges that jeopardized America's 5G leadership and Americans' ability to reap all of the economic and geopolitical benefits of dynamic mobile broadband networks and the ecosystems it supports. To overcome those challenges, 2024 must be a year of action for U.S. policymakers if we are to maintain our global competitiveness, meet rapidly increasing consumer demand, and drive the innovation and growth we all want in the United States. Specifically, America's wireless future hinges on:

- Congress restoring FCC auction authority with a forward-looking and comprehensive pipeline of future auctions for 5G and beyond;
- NTIA and other federal stakeholders steadfastly implementing the NSS, including meeting the two-year deadline for study of priority bands established by NTIA in the NSS Implementation Plan;
- The United States resolving the current spectrum imbalance and quickly providing licensed commercial access to the lower 3 GHz band (3.10-3.45 GHz), correcting the faulty assumptions and incomplete scope of the prior government study; and
- The United States reasserting its lead on the global stage in driving 5G-friendly access to the 7/8 GHz band (7.125-8.500 GHz) to help close our nation's widening deficit of licensed spectrum compared to other countries, creating economies of scale with upper 6 GHz licensed wireless deployments around the world, and ensuring that the United States leads in wireless technologies.

[281] Accenture, *Advancing US Wireless Excellence: The Case for Global Spectrum Harmonization*, at 2 (Jan. 2024), https://tinyurl.com/2bmbnqm5.

Last year was the first year since 2016 that the United States did not have a spectrum auction, and there are no auctions planned for the foreseeable future. Each year without an auction, or even an auction on the horizon, digs the United States deeper into a hole. Given the massive growth in consumer use, the wireless industry continues to invest, innovate, and compete to close the digital divide, but that will not be enough. Wireless leadership is key to our global competitiveness, and there are aggressive efforts to allocate spectrum overseas by both allies and adversaries. We need to catch up, and there is unanimous and bipartisan support for restoring FCC auction authority. Combined with the implementation of the National Spectrum Strategy to develop a spectrum pipeline of full-power, exclusive-use spectrum, including in the 3.10-3.45 GHz and 7.125-8.500 GHz bands, it is critical that U.S. policymakers develop the momentum needed to assure America's wireless leadership.

### B. Informed 5G Fund Policies Will Maximize the Utility of Each Dollar of Support for Those Areas of the Country Where Deployment Barriers Still Exist.

The wireless industry invested a record $39 billion in 2022 alone to extend networks and connect more communities and consumers. In certain parts of the country, however, subsidies are still needed to support mobile broadband deployment due to the sparse population and difficult terrain. A well-designed 5G Fund will help meet the Commission's goal of connecting all Americans to mobile broadband.

To maximize the utility of 5G Fund support, the Commission will need to account for important deployment information from the BEAD program, as described above.[282] Additionally, the Commission will need to leverage the best available data for determining eligible areas. This includes the use of outdoor, stationary mobile broadband maps,

[282] Reply Comments of CTIA, GN Docket No. 20-32, at 2-3 (filed Nov. 21, 2023).

as opposed to in-vehicle maps, because they provide the most stable and consistent coverage data.[283] The Commission should use an iteration of the mobile broadband map that has been properly vetted through the challenge process, and should establish a deadline for challenges to be submitted that is sufficiently far in advance of the start of bidding to ensure that potential bidders in the auction have an adequate opportunity to evaluate the updated coverage data and its impact on their participation in the auction.[284] The Commission should also consider CTIA's suggested improvements to the mobile challenge process to help prepare for an expected increase in challenges related to the 5G Fund.[285]

A successful 5G Fund auction will depend on participation by a wide range of providers, so the Commission should avoid unclear and unnecessary requirements that increase costs and complexity for providers seeking to connect parts of the country that are already challenging to serve. If the Commission still decides to condition 5G Fund support on the adoption of cyber-related requirements, it should adopt CTIA's proposal that 5G Fund support recipients align their cybersecurity risk management plans with Tier 2 of the National Institute of Standards and Technology's Cybersecurity Framework.[286]

[283] Comments of CTIA, GN Docket No. 20-32, at 5 (filed Oct. 23, 2023).

[284] *Id.* at 6.

[285] Comments of CTIA, WC Docket Nos. 11-10, 19-195 (filed Feb. 20, 2024); Reply Comments of CTIA, WC Docket Nos. 11-10, 19-195 (filed Mar. 5, 2024).

[286] *See* Letter from Amy Bender, CTIA, to Marlene Dortch, FCC, GN Docket No. 20-32 et al. (filed Mar. 22, 2024) (suggesting adoption of this approach in the 5G Fund proceeding and other relevant proceedings to promote harmonization).

Finally, the Commission should also seek additional public input on any post-auction Open RAN incentives[287] and continue to ensure that universal service, including the 5G Fund, rests on a broad, stable, long-term funding base.[288]

### C. The Commission Should Continue to Support Reducing Barriers to Wireless Infrastructure Deployment.

America's 5G progress—fueled by this remarkable run of private investment—has been aided by key infrastructure policy actions by the federal government and nearly two-thirds of states across the country. There is still work to be done on the legislative and regulatory fronts to further expedite the rollout of 5G and create lawful policies that work for all stakeholders.

CTIA has actively advocated for further streamlining of the pole attachment process, which will better enable wireless providers to deploy their networks and secure necessary attachments to poles.[289] For example, it is vital that pole owners provide a substantive, fact-based reason for denying approved alternative attachment methods.[290] Ensuring fair and efficient efforts by pole owners and pole attachers and removing barriers to deployment benefits all parties involved by increasing the speed of network expansion. And this outcome benefits the public by adding necessary network coverage and density.

Additional important infrastructure issues that government and industry must continue to address, at least at the state level, include: reasonable, cost-based fees for siting; reduced utility delays during the siting process through shot clocks, one-touch-make-ready policies, rapid

---

[287] Press Release, FCC, *Chairwoman Rosenworcel Calls on Agency to Move Ahead with Rural Wireless Broadband Plan* (Mar. 20, 2024).

[288] Comments of CTIA, GN Docket No. 20-32, at 13-14 (filed Oct. 23, 2023).

[289] *See, e.g.*, Comments of CTIA, NY Public Service Commission Proceeding to Review Certain Pole Attachment Rules, Case 22-M-0101, at 1-2 (Mar. 4, 2024).

[290] Reply Comments of CTIA to NY Public Service Commission Proceeding to Review Certain Pole Attachment Rules, Case 22-M-0101, at 2 (Apr. 5, 2024).

dispute resolution, and other regulatory protections; access to pole-tops and prohibiting categorical bans on deployment; timely energization for telecommunications installations; and transparency in pole owners' safety guidelines.

Progress can still also be made at the federal level. The deployments enabled by FCC siting reforms are crucial to meeting consumers' growing need for wireless data and developing innovative technologies. CTIA strongly urges other federal agencies to streamline their policies to further enable wireless deployment and help connect Americans to vital resources. For example, CTIA supported the Advisory Council on Historic Preservation ("ACHP") in extending its 2017 Program Comment ("PC") to more federal agencies that impact communications projects and to more lands and properties used for communications deployments. This PC amendment will speed the deployment of the wireless network infrastructure needed to achieve the national priority of expanding broadband access to all Americans,[291] and CTIA encourages all federal agencies to consider adopting the PC for their Section 106 reviews.[292] Additionally, the Council on Environmental Quality ("CEQ") recently published Final Rules on the National Environmental Policy Act ("NEPA") to promote effective reviews while facilitating network deployment to connect more communities.[293] As the Commission updates its NEPA procedures

[291] *See* CTIA, Comments to ACHP, Proposed Amendment to the Program Comment for Communications Projects on Federal Lands and Property, at 1-2 (Jan. 12, 2024), https://tinyurl.com/28a93g46.

[292] CTIA also supported the Bureau of Land Management in updating its rules and processes for deployment on federal lands and the final rules adopted earlier this year should encourage more timely deployment.

[293] *Update of the Communications Uses Program, Cost Recovery Fee Schedules, and Section 512 of FLPMA for Rights-of-Way*, 89 Fed. Reg. 25,922 (Apr. 12, 2024); *National Environmental Policy Act Implementing Regulations Revisions Phase 2*, 89 Fed. Reg. 35,442 (May 1, 2024).

to reflect the new CEQ rules, the Commission should look for additional opportunities to reduce barriers and promote timely broadband deployment.

The Commission should stand by these effective and proven reforms, and states, local governments, and wireless providers should continue to work together to implement siting policies consistent with the Commission's reforms and applicable laws.

## VI. CONCLUSION.

Robust competition in the wireless industry is clear through metrics such as groundbreaking wireless investment, deployment, pricing, usage, and connections, benefiting consumers and the broader U.S. economy. 5G is driving significant opportunities and promising innovations across the wireless industry and to various sectors beyond wireless, including transportation, manufacturing, agriculture, education, retail, healthcare, and energy. To continue supporting this competitive landscape, CTIA urges the Commission to help ensure that the spectrum resources and deployment policies are in place so that the wireless industry can continue to drive costs down for consumers, grow jobs, and create a stronger, more competitive American economy. CTIA and its members are committed to collaborating with the Commission to maintain a highly competitive communications marketplace for the wireless future.

Respectfully submitted,

*/s/ Sarah Leggin*

Sarah Leggin
Assistant Vice President, Regulatory Affairs

Thomas C. Power
Senior Vice President & General Counsel

Scott K. Bergmann
Senior Vice President, Regulatory Affairs

Dr. Robert Roche
Vice President, Research

**CTIA**
1400 16th Street, NW Suite 600
Washington, DC 20036
(202) 736-3200

Date: June 6, 2024