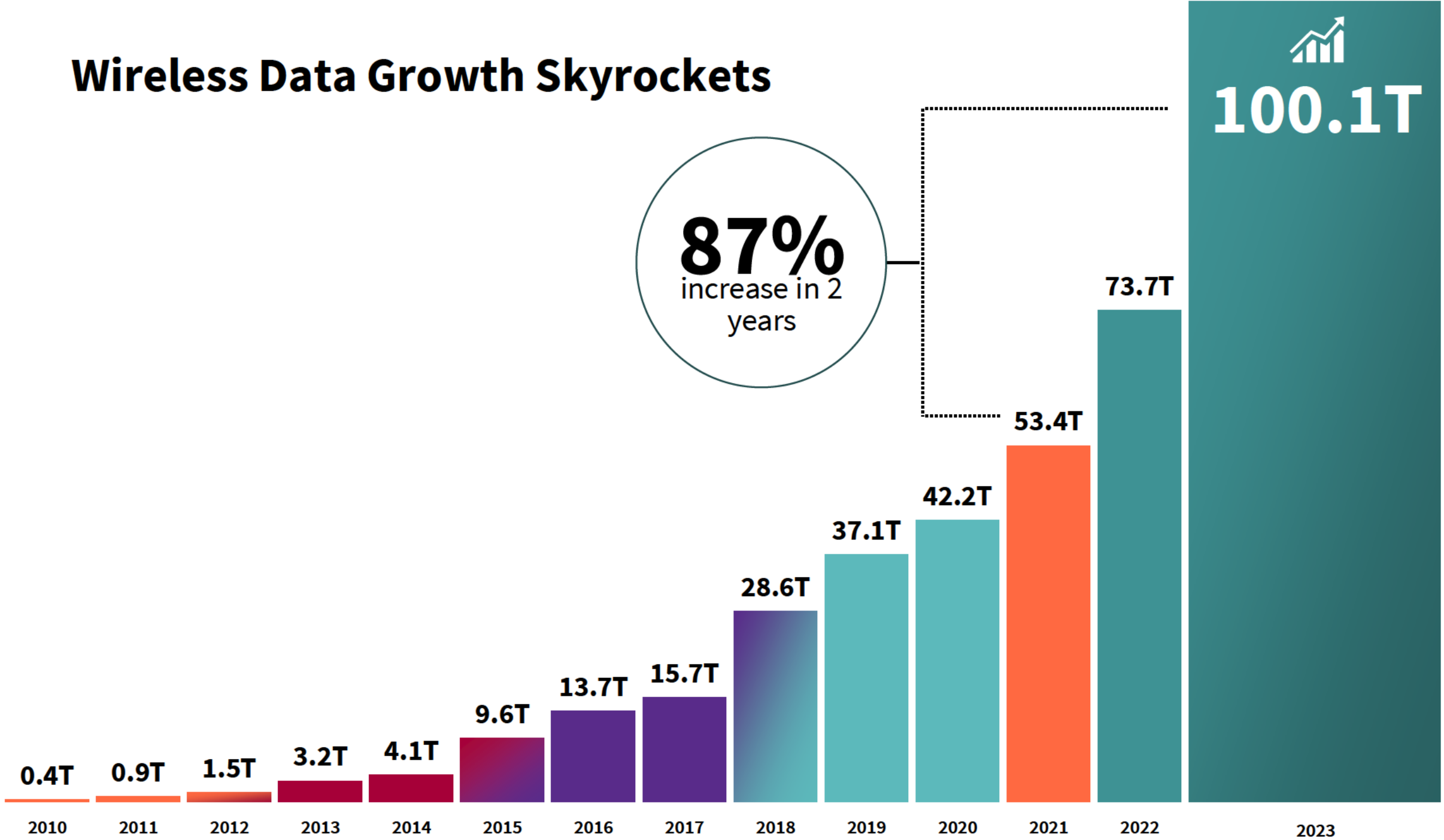
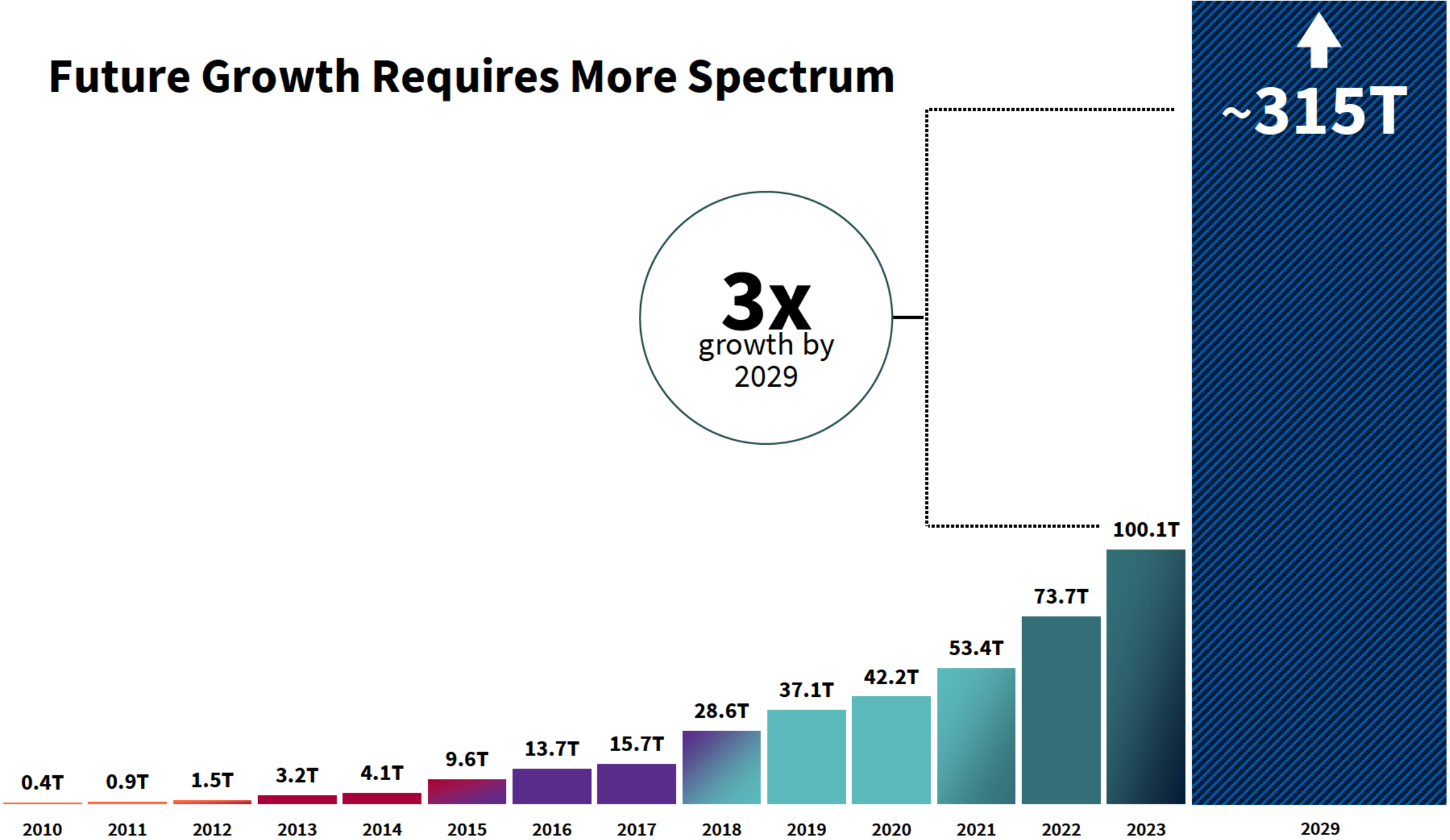
Documents for the Record – 01.23.25

1. Powerpoint presentation from CTIA on spectrum.
2. A 01.23.25 letter from CCA to Subcommittee leadership.
3. A 01.22.25 letter from NENA to Committee leadership.
4. A 01.22.25 letter from Spectrum for the Future to Committee leadership.
5. A 01.22.25 letter from WIFI Forward to Committee leadership.
6. An information packet from WISPA.
7. SIA Spectrum report

Wireless Data Growth Skyrockets



Future Growth Requires More Spectrum



Wireless Will…

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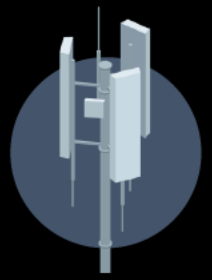
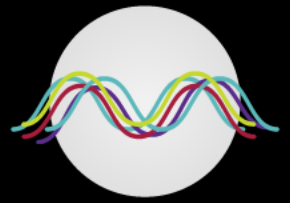
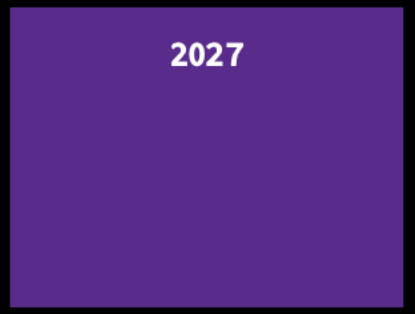
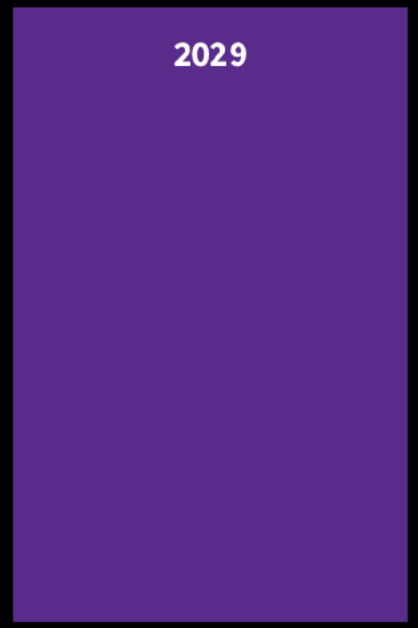




But That's Not Sufficient

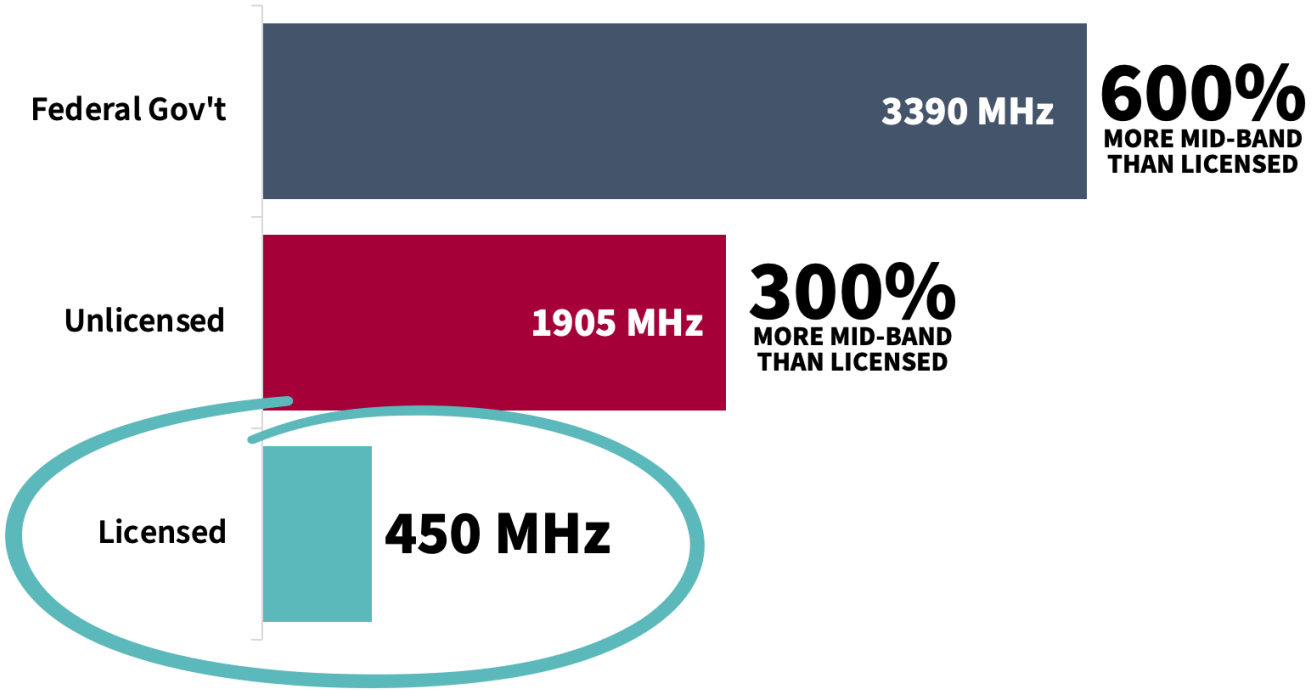
~3.5T



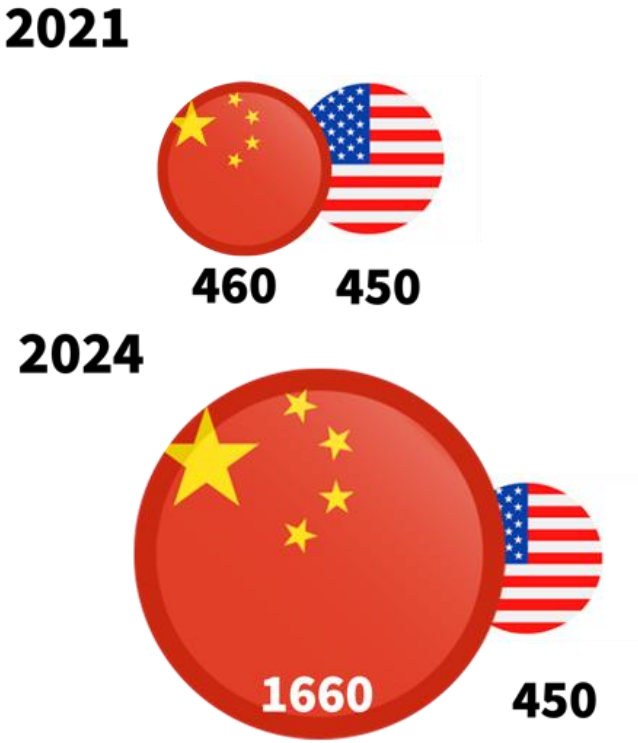


The U.S. Mid-Band Spectrum Problem

U.S. is Out of Balance….



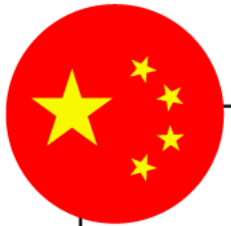
While China Surges Ahead



Projection of amount of mid-band spectrum available in 2027

Wireless Can Help…

Reduce household **everyday costs**



Beat **China**

Create **good paying jobs**

Close the **digital divide**

…If We Get More Spectrum

rural.
regional.
nationwide.®

January 23, 2025

The Honorable Richard Hudson
United States House of Representatives
Chairman, Committee on Energy and Commerce
Subcommittee on Communications and Technology
2125 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Doris Matsui
United States House of Representatives
Ranking Member, Committee on Energy and Commerce
Subcommittee on Communications and Technology
2322A Rayburn House Office Building
Washington, D.C. 20515

The Honorable Rick Allen
United States House of Representatives
Vice Chairman, Committee on Energy and Commerce
Subcommittee on Communications and Technology
2125 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Hudson, Ranking Member Matsui, and Vice Chair Allen:

Competitive Carriers Association (CCA)[1] appreciates the Subcommittee's prioritization of spectrum policy in the first weeks of the 119th Congress with today's hearing on Strengthening American Leadership in Wireless Technology and respectfully submits this letter for the record.

Spectrum access is fundamental for wireless communications providers' growth and innovation. CCA member companies, consumers, and the broader American economy depend on access to spectrum for the connectivity, innovation, and productivity which are needed to maintain America's global technology leadership. Large carriers in major cities and small carriers in rural areas rely equally on access to spectrum.

CCA highlights the following priorities for the Subcommittee's consideration:

Reinstating Spectrum Auction Authority

CCA encourages Congress to reinstate the Federal Communications Commission's (FCC) general spectrum auction authority without delay. The nearly two-year lapse has harmed U.S. wireless competitiveness and technological leadership and has stifled carriers' efforts to improve and expand their services. It has created uncertainty in many aspects of the communications

[1] CCA is the nation's leading association for competitive providers and stakeholders across the United States. Members range from small, rural carriers serving fewer than 5,000 customers to regional and national providers serving millions of customers, as well as vendors and suppliers that provide products and services throughout the communications ecosystem.

ecosystem. Spectrum auctions have historically been resoundingly successful at making this critical resource available for industry innovation and returning value to taxpayers by fueling American competitiveness and leadership in the wireless space while generating over $230 billion in revenue since 1993. This success cannot continue without reinstating auction authority, and the 119th Congress should swiftly remedy this situation.

Long-Term Spectrum Strategy

In addition to reinstating the FCC's spectrum auction authority, it is vital for Congress to ensure that spectrum will be available for the FCC to auction for licensed, full power use. We must have a long-term strategy to identify and reallocate frequencies for commercial use, with an immediate focus on mid-band spectrum. Wireless carriers need a clear understanding of potential spectrum opportunities and timing as they plan their future auction and network strategies. Because spectrum is such a scarce resource, there is hard work ahead for carriers and federal users of spectrum to find workable paths forward. Work should continue to explore opportunities in the lower 3 GHz band and the 7/8 GHz bands currently under consideration as well as additional spectrum opportunities going forward. Congress has a key role to play to ensure that our nation's spectrum strategy enables continued industry innovation and leadership.

As policymakers grapple with the challenge of identifying and making available additional federal spectrum for commercial use, Congress should also consider ways to improve and maximize use of existing commercial bands to help propel America's wireless leadership. For example, supporting higher power use of licensed spectrum in the 3.55-3.7 GHz CBRS band is low-hanging fruit to immediately improve wireless services, especially in rural areas. CCA supports additional consideration of such opportunities.[2] Policymakers should explore opportunities to repurpose additional spectrum in the Upper C-band at 3.98-4.2 GHz for commercial, full-powered, terrestrial wireless use, where current satellite users have identified 100 MHz that could be reallocated.[3] Indeed, all options for spectrum reallocation should be considered, including building on the success of the Broadcast Incentive Auction facilitated by Congress in the 2012 Spectrum Act[4] to examine opportunities for existing broadcast spectrum users to voluntarily relinquish access in exchange for a portion of auction proceeds, replicating the auction design and execution that won the FCC an Emmy award last year.[5]

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[2] *See* Reply Comments of CCA, *Promoting Investment in the 3550-3700 MHz Band*, GN Docket No. 17-258 (filed Dec. 5, 2024), https://www.fcc.gov/ecfs/document/120566678733/1.

[3] *See SES to acquire Intelsat in compelling transaction focused on the future*, SES S.A., (Apr. 30, 2024), https://www.ses.com/press-release/ses-acquire-intelsat-compelling-transaction-focused-future (noting "potential future monetisation of. . . up to 100 MHz of C-band spectrum").

[4] *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, §§ 6402, 6403, 125 Stat. 156 (2012).

[5] *See* Federal Communications Commission Office of Media Relations Release, *FCC Wins an Emmy® Award*, (Feb. 26, 2024), https://docs.fcc.gov/public/attachments/DOC-400749A1.pdf.

Facilitating Meaningful Spectrum Access in Rural America

Congress' mandate to support opportunities for a wide variety of applicants, including rural telephone companies, has been an important pillar for spectrum auctions,[6] and Congress should continue to direct the FCC to create auction rules and frameworks encouraging participation by carriers of all sizes in all areas. Providing a meaningful opportunity for a broad variety of applicants, including rural providers and small businesses, to bid on and to win spectrum licenses directly benefits consumers and enhances competition. Tools to support these outcomes include rural bidding credits, appropriately sized geographic license areas and power levels, reasonable spectrum aggregation limits, opportunities for secondary market spectrum transactions, and supporting interoperability. FCC-led spectrum auctions, along with Congressional guidance and oversight, can ensure all carriers have meaningful opportunities to compete for this valuable resource.

Additionally, as the 119th Congress considers tax issues, including impacts on America's innovators and economic drivers, CCA encourages Congress to avoid policies that punish spectrum licensees, including corporate minimum taxes that include the book value of spectrum. This would effectively result in a tax on 5G and future deployments, harming consumers and industry stakeholders alike, and may hinder the success of future spectrum auctions.

CCA thanks the Subcommittee for its leadership on spectrum policy and supports policies that ensure additional spectrum is made available in ways that support connectivity in rural America. Prioritizing spectrum with characteristics suitable for rural areas, policies that support equitable opportunities for smaller and regional carriers to access and use spectrum, and programs that expand wireless services across the nation will help meet the fundamental connectivity needs of all Americans. CCA looks forward to working with the Subcommittee to advance spectrum policies which will ultimately advance wireless competition and connectivity.

Sincerely,

Tim Donovan
President and CEO
Competitive Carriers Association

cc:
The Honorable Brett Guthrie, Chairman, Committee on Energy and Commerce
The Honorable Frank Pallone, Ranking Member, Committee on Energy and Commerce

[6] *See* 47 U.S.C. § 309(j) (requiring spectrum auctions to provide meaningful opportunities to small and rural entities).

NENA
The 9-1-1 Association
1700 Diagonal Road | Suite 500 | Alexandria, VA 22314

January 22, 2025

The Honorable Brett Guthrie
Chair
House Committee on Energy & Commerce

The Honorable Richard Hudson
Chair
Subcommittee on Communications & Technology

The Honorable Frank Pallone
Ranking Member
House Committee on Energy & Commerce

The Honorable Doris Matsui
Ranking Member
Subcommittee on Communications & Technology

Dear Leadership of the House Committee on Energy and Commerce,

On behalf of the National Emergency Number Association (NENA), I write to express our support for the Committee's efforts to drive continued technological innovation, including through the development of effective spectrum policies. U.S. leadership in wireless communications is critical to our nation's global competitiveness, national security, and ability to protect the public. The wide availability of advanced wireless services allows the public to contact emergency services, and Congress must act to ensure sufficient spectrum resources are available to support and enhance the growth of advanced public safety wireless services.

Unfortunately, while the public has widely adopted advanced communications technologies, our nation's 9-1-1 systems are ill-equipped to meet the emergency-response needs of the future. These antiquated systems are increasingly unreliable during natural disasters and other major emergencies. Moreover, they offer insufficient protection against cyberattacks and other threats from bad actors, both foreign and domestic. Investments in new technologies are critically needed to modernize our 9-1-1 systems and to ensure the public and the nation are protected.

Next Generation 9-1-1 (NG9-1-1) standards and technologies have been developed to address these critical needs. They promise increased resiliency, reliability, and interoperability; decreased response times; enhanced cybersecurity and data sharing; and improved access for persons with disabilities. Some investments in NG9-1-1 have already been made, but states and localities lack the resources to fully invest in complete, end-to-end NG9-1-1 systems. Full, nationwide implementation of NG9-1-1 must be a national priority if public safety and national security are to be assured. Our 9-1-1 system is only as strong as its weakest link.

In the last Congress, a bipartisan consensus agreed to use Federal Communications Commission spectrum auction revenues for investment in Next Generation 9-1-1. By using spectrum revenues, this investment would be fully paid for and at a scale that would enable ubiquitous deployment across the nation. This legislation was unanimously approved by the full House Energy and Commerce Committee in June of 2023, and it had widespread approval from the public safety and first responder communities. Later, in 2024, nine former FCC Chairs (who served both Democratic and Republican administrations) wrote a letter to Congress urging the swift adoption of this legislation and funding for

this critical piece of public-safety infrastructure. However, the full House never voted on this legislation due to unrelated spectrum issues.

As the 119th Congress convenes, NENA urges the Committee to support efforts to invest in the safety and security of our communities by providing the funds needed for the full nationwide deployment of NG9-1-1. NENA stands ready to collaborate with Congress to ensure that our nation's emergency response infrastructure is modernized to meet the evolving needs of the public and first responders. The time to act is now—our communities cannot afford further delay in building a safer, more resilient 9-1-1 system.

Sincerely,

Brian Fontes, CEO

CC. Speaker Mik Johnson
CC. Minority Leader Hakeem Jeffries

SPECTRUM
FOR THE FUTURE

January 22, 2025

Rep. Brett Guthrie
Chairman
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2125 Rayburn House Office Building
Washington DC 20515

Rep. Frank Pallone
Ranking Member
House Committee on Energy and Commerce
2125 Rayburn House Office Building
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Rep. Richard Hudson
Chairman
Communications and Technology Subcommittee
House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington DC 20515

Rep. Doris Matsui
Ranking Member
Communications and Technology Subcommittee
House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington DC 20515

Re: "Strengthening American Leadership in Wireless Technology", Hearing Before the Communications and Technology Subcommittee, January 23, 2025

Dear Chairman Guthrie, Chairman Hudson, Ranking Member Pallone and Ranking Member Matsui:

Spectrum for the Future is a diverse coalition of innovators, anchor institutions, and technology companies using shared and locally licensed spectrum such as the 3.5 GHz Citizens Broadband Radio Service ("CBRS") to further America's wireless technology leadership. Manufacturing, automotive, agricultural, energy, retail, commercial real estate, communications, media, and supply chain industries, as well as schools, libraries, and civil society groups are all part of this diverse group that have embraced a next generation, broadly available, local approach to spectrum policy. We submit this letter to augment the hearing record on the role dynamic spectrum sharing, exemplified by CBRS, has played in strengthening America's wireless leadership, and to make a recommendation to the committee for extending this leadership.

Dynamic Spectrum Sharing

As the subcommittee evaluates spectrum use and availability, we urge you to put the concept of dynamic spectrum sharing at the forefront of your analysis. Spectrum sharing has already shown its ability to make frequencies available for new and economically viable non-federal use, without undermining national security or other similarly important federal uses. These new and revolutionary techniques stand in stark contrast to the aging clear and auction model, which has contributed to the political stalemate that has frustrated Congress's ability to reauthorize spectrum auction authority.

Dynamic Spectrum Sharing represents a uniquely American innovation, combining advanced digital spectrum coordination with equipment designed to optimize the use of spectrum by all users. This approach harnesses the best of American ingenuity, leveraging our leadership in AI and machine learning to dynamically manage spectrum resources in real time. Here's how it works today:

- Spectrum coordination systems operate with a comprehensive awareness of who is operating in the band (often military radar), protecting these critical services while dynamically making spectrum available to new users without the need to pay to clear current users.
- User and network devices communicate directly with these coordination systems, ensuring users can access the spectrum without interfering with one another.
- Spectrum rules can be updated instantly via the cloud, ensuring the United States remains agile in adapting to emerging needs and threats.

Key benefits of dynamic spectrum sharing include:

- Enabling Federal and private sector spectrum sharing without displacing users that are already in the band, keeping America's national security and domestic economic interests aligned.
- Accelerating spectrum access for new commercial services since incumbent operations (especially by Federal agencies) don't have to first be cleared and relocated as a precondition to making the spectrum available. Such clearing and relocation is costly, inefficient and time consuming.
- Spurring American job creation across a range of industries as cellular technology and wireless automation are no longer the sole purview of the mobile operators but are relevant to virtually every sector of the economy, while lowering costs for mobile consumers by spurring competition.
- Promoting spectrum policies and technologies that empower U.S. industry and leadership, and undermine the dominance of Chinese Communist Party ("CCP")-backed equipment vendors, like Huawei, in the global marketplace.

Dynamic Spectrum Sharing is a testament to the United States' leadership, reinforcing our position as the global leader in wireless innovation. By prioritizing homegrown policies and technologies, we ensure that America's communications infrastructure continues to serve the needs of its citizens, businesses, and government, keeping our nation secure and competitive in the 21st century.

The Citizens Broadband Radio Service (CBRS)

CBRS in the 3550-3700 MHz band stands as a testament to American innovation and leadership, establishing the United States as the global standard-bearer for efficient and collaborative use of limited and critical wireless resources. This groundbreaking framework was developed specifically to coexist with vital national security and other systems in the band, without the delay and high costs required to clear federal users (when that may even be possible), all while ensuring America's technological dominance.

CBRS uniquely combines the safeguarding of critical national defense systems—such as the Navy's extensive and critical operations—with spectrum access for the private sector to use the band when and where the Navy is not. This approach fortifies national security

and empowers American businesses, industries, and communities with unprecedented connectivity.

CBRS' success is reflected in the deployment of over 400,000 base stations and the certification of more than 840 CBRS device models by the Federal Communications Commission ("FCC"). These CBRS deployments cover a range of use cases, including manufacturing and industry 4.0, national defense, rural connectivity, critical infrastructure, traditional mobile operators, competitive mobile operators, education, and agriculture.

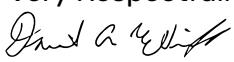
<u>The Lower 3 GHz Band (3100-3450 MHz)</u>

Following the enactment of the Infrastructure Investment and Jobs Act of 2021, the Department of Defense ("DoD") initiated a process to assess how to make the lower 3 GHz band available for private sector use. DoD is the primary user in that band. This process produced the Emerging Mid-band Radar Spectrum Study, which demonstrated that spectrum sharing in the 3.1-3.45 GHz band is achievable with cutting-edge American-led interference mitigation and coordination frameworks.

DoD has consistently maintained a position that clearing their operations from Lower 3 GHz is "absolutely untenable", while noting that dynamic sharing and coordination with lower power commercial systems may be feasible. DoD was already required to compress its operations out of the 3.45-3.55 GHz band. Given these realities, Congress should encourage shared federal / commercial outcomes in the band, extending American wireless leadership while protecting vital national defense systems.

Spectrum for the Future looks forward to working with the committee going forward. We are pleased to see spectrum policy as an early focus for this session. Please let us know how we may be of service to you and your staffs.

Very Respectfully,



David A. Wright
Policy Director
Spectrum for the Future
spectrumfuture.com

WIFIFORWARD

January 22, 2025

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Rep. Doris Matsui
Ranking Member
Communications and Technology Subcommittee
House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington DC 20515

Re: "Strengthening American Leadership in Wireless Technology" Hearing Before the Communications and Technology Subcommittee, January 23, 2025

Dear Chairman Guthrie, Chairman Hudson, Ranking Member Pallone and Ranking Member Matsui:

WifiForward is a broad coalition of entities that innovate, use and deliver services over Wi-Fi, and other, unlicensed spectrum technologies. WifiForward provides expert studies and comments to relevant federal agencies, and advocates for public policies supporting Wi-Fi. We write in support of the above-captioned hearing, and to amplify the hearing record to explain why unlicensed technologies, and the U.S.-led Wi-Fi industry in particular, have shaped American wireless leadership. As the Committee evaluates how to reauthorize spectrum auction authority this Congress, the ability of Wi-Fi to coexist in the same spectrum bands with other systems presents a compelling path forward for breaking through the impasse that has continued to obstruct the Congress's ability to reauthorize auction authority while pursuing the type of modern spectrum policy that can ensure the U.S. continues to lead the world in wireless technologies.

Wi-Fi is best known for enabling consumers to connect multiple devices wirelessly in their homes (e.g., TVs, smartphones, home security systems) to a broadband connection. Wi-Fi uses unlicensed spectrum bands established by the Federal Communications Commission (FCC). Wi-Fi technology is also widely deployed in enterprises of all types – schools, libraries, government offices, in manufacturing, offices, logistics and more. It can be deployed alongside, and even integrated with, "private 5G" networks including Citizens Band Radio Services (CBRS). Wi-Fi is the most widely-used wireless technology in the U.S. and the world – it has freed consumers from the inconvenience of needing wires to get devices connected to the internet. The FCC's bipartisan vote in 2020 to enable Wi-Fi systems to coexist with the energy, public safety, and other systems that previously operated, and continue to operate, in the 6 GHz band was a prescient decision and has been an overwhelming success. ABI Research recently noted that annual shipments of 6 Gigahertz (GHz) enabled consumer devices shipping to North America will grow from 95 million in 2024 to an estimated 367 million in 2029—an increase of 288%. While most of these devices utilize Wi-Fi exclusively, smartphones that connect both to mobile networks and Wi-Fi are connecting via Wi-Fi for up to 89% of their data requirements, according to a recent report from OpenSignal.

The ubiquitous availability of Wi-Fi, using unlicensed spectrum that is not subject to auction because unlicensed users must share the spectrum on a non-interference basis, makes it all the more important to understand the actual economic impacts of Wi-Fi on the U.S. economy. The economic value of Wi-Fi was measured in 2024 by Telecom Research Associates, concluding that in 2027, the annual economic value of Wi-Fi will reach $2.4 trillion, including an estimated $514 billion in consumer benefit, $624 billion in producer surplus, and $1.286 trillion in GDP contribution.

Wi-Fi technology is also American technology. The biggest chipset companies and modular radio providers are US-based, as are the largest enterprise vendors and several of the largest device manufacturers. The US has the strongest position in Wi-Fi intellectual property. Our service providers have been the first in the world to implement the latest generations of technology, known as Wi-Fi 7 (i.e., the seventh generation). U.S. manufacturers ship Wi-Fi devices all over the world. The Texas-based Wi-Fi Alliance estimates that, globally, the industry ships 3.8 billion Wi-Fi devices each year. Had policymakers only considered auction revenue in determining spectrum allocation decisions, these benefits to the American economy and jobs would not have happened.

Leadership in wireless technology, therefore, cannot be fully understood without considering the role that Wi-Fi plays, including how public policy can support Wi-Fi on behalf of American consumers. For that reason, WifiForward advocates that as the federal government considers how to introduce commercial wireless into federal spectrum bands, the 7 GHz band should be made available for Wi-Fi devices to operate indoors while retaining incumbent federal spectrum-based systems. As the Wi-Fi industry has demonstrated in 6 GHz and other unlicensed bands, low-power indoor Wi-Fi enables coexistence with incumbent systems. Incumbent relocation or operational changes are not required. Moreover, 7 GHz would enable Wi-Fi networks to take advantage of very wide channels already engineered into equipment to accommodate a growing

number of high-bandwidth use cases, and increase the reliability of Wi-Fi networks to consumers.

We look forward to working with the Committee on these issues. Please consider WifiForward as an expert resource for you and your staffs. Finally, we congratulate you for considering spectrum policy early in this Congress.

Yours truly,

Mary L. Brown
Executive Director
WifiForward
Wififorward.org

WISPA – *Broadband Without Boundaries* thanks the Subcommittee on Communications and Technology for holding today's hearing, "Strengthening American Leadership in Wireless Technology."

WISPA represents the interests of hundreds of small and medium-sized fixed wireless internet service providers. WISPA members deliver broadband connectivity to approximately 10 million consumers, businesses and industrial users, first responders, and community institutions, often in areas of the country where other providers have declined to invest. To provide their reliable broadband services, fixed wireless providers frequently use unlicensed, shared and exclusive-use licensed spectrum at low-band, mid-band and high-band frequencies, predominantly in rural, unserved, and underserved areas. In many rural and remote areas, these providers offer the only terrestrial source of fixed broadband access. In areas with other broadband options, they provide a community-based alternative that benefits customers by fostering competition, thereby lowering costs and improving the quality of broadband services.

The Subcommittee notes in its hearing memo that "*Spectrum is a finite resource, meaning we cannot create more spectrum in the atmosphere. As technology advances, however, spectrum frequencies can be utilized more efficiently and effectively."* WISPA could not agree more. To that end, WISPA offers the following statement to help the Subcommittee understand the importance of maintaining a proper balance of exclusively licensed, licensed-by-rule and unlicensed spectrum to strengthen America's leadership in wireless technology.

WISPA members use every tool to deliver internet access, including fixed wireless over licensed and unlicensed spectrum, fiber and LEOs. With respect to wireless spectrum, WISPA policy priorities have centered on the following goals:

- Ensuring a balanced spectrum approach that makes spectrum available on a licensed, unlicensed, and shared approach, with an increasing emphasis on shared spectrum managed by databases or dynamic spectrum coordination systems to ensure incumbents are protected from harmful interference.
- Where licenses are exclusive via auction, making spectrum available in smaller geographic lots and smaller spectrum segments to provide meaningful opportunities for smaller companies to acquire spectrum.
- Fostering opportunistic use when and where spectrum is not being used.

Fixed Wireless Access (FWA) networks create broadband connectivity via radio spectrum. A provider places a radio/transceiver, which is connected to the internet, on a tower or other elevated infrastructure, and then directs it to a residence or group of residences that are fitted with small transceivers to complete the two-way connection. Spectrum carries data traffic to and from customers, avoiding significant cost, time to deployment and complexity associated with

wiring each residence individually. In fact, the capital cost to deploy FWA networks can be as little as one-tenth of the cost of fiber and be deployed in a matter of weeks to months, instead of years for fiber networks.

FCC data show that there are approximately 1,200 WISPs delivering reliable broadband service to rural, under-resourced and Tribal parts of the country. Core tools in their arsenal include unlicensed fixed wireless access (ULFW) – largely operated in the 900 MHz, 2.4 GHz, 5 GHz, 6 GHz and 60 GHz bands – and licensed-by-rule/shared spectrum in the Citizens Broadband Radio Service (CBRS)/3.5 GHz band and 6 GHz band. Reliable fixed wireless broadband connectivity – from 100/20 Mbps to symmetric gigabit speeds – is widely available and in everyday use throughout America's WISP networks.

The following are key points for policymakers to consider regarding ULFW and licensed-by-use (such as CBRS):

1. Unlicensed spectrum can be more reliable than licensed spectrum

The fact that the FCC has allocated a license to a provider does not mean that the provider will have unfettered and continuous access to the spectrum band during the license term. Frequency agility across a large amount of spectrum enables providers to find "clean" channels, which is not possible with licensed channels that have more limited channel sizes bounded by specified upper and lower frequency edges.

Furthermore, licensed and unlicensed equipment often use the same Software Defined Radio. Broadband service using entirely unlicensed spectrum has the flexibility to move to other channels/frequencies, whereas broadband service using licensed spectrum has very little flexibility. If there is clutter, terrain, environmental or other noise issues, licensed service cannot freely move to "clean" frequencies. Lastly, several effective mitigation techniques used by unlicensed spectrum have not been incorporated into licensed bands.

2. Reliability is a function of network design, not whether spectrum is licensed or unlicensed

Ten million Americans obtain broadband service over FWA. Low churn rates in FWA networks – both licensed and unlicensed illustrate reliability and is a key performance indicator for the unprecedented amount of private capital that has fueled FWA expansion in the several years. The FCC has made, and will continue to make, unlicensed spectrum available for fixed wireless service, creating "cleaner" spectrum to meet present and future demand.

In addition, rural areas are less "noisy" and thus less susceptible to harmful interference. When interference to and from unlicensed networks exists, providers employ a toolbox of solutions for management, including frequency agility, which enables providers to find "clean" open

channels; network densification, in which the provider uses all or almost all the unlicensed spectrum in a given market; antenna use and directionality, noise cancellation, among others.

3. A CBRS-like spectrum sharing model/automated sharing techniques should be used to free up limited spectrum elsewhere

The CBRS model shares limited spectrum with incumbents already in the band through a three-tiered operation scheme that protects incumbents while opening the band to other commercial uses. CBRS is technology neutral, allowing for the right solution for each unique environment.

CBRS is designated by the FCC as:

- Priority Access Licensee (PAL) licensed in frequencies 3550-3650 MHz
- Generally Authorized Access (GAA), licensed by rule in frequencies 3550-3700 MHz (with 3650-3700 MHz exclusively GAA).

Sharing is achieved through Shared Access System (SAS) technology. The SAS manages spectrum allocation and interference protection dynamically, assigning spectrum based on priority and availability.

- Ensures that Tier 1 incumbents are protected and coordinate between PAL and GAA users.
- Continuously monitors and adjusts spectrum usage based on real-time conditions.
- SAS systems interact with Environmental Sensing Capability (ESC) sensors, which detect incumbent activity (e.g., Navy radar) and notify the SAS.
- The SAS reassigns frequencies or adjusts power levels for other users to prevent interference.

4. Smaller Spectrum Blocks and License Areas Are Key to the Successful CBRS Model

Without access to additional spectrum, small-to-medium sized businesses – like WISPs – may be precluded from bridging the digital divide. The CBRS model provides a foundation for smaller-sized auction areas, such as counties or census tracts, but preserves license-like attributes.

The CBRS auction design brought more than 270 applicants, with 228 winning bidders, 70 of which were WISPA members. Exclusive licenses were auctioned in 10-megahertz spectrum blocks by county. This contrasts with typical spectrum auctions, which are much larger and more expensive – such as 20-megahertz spectrum blocks covering Partial Economic Areas or larger – which favor large, national providers who serve primarily dense urban-to-exurban marketplaces.

In addition, allowing for true spectrum sharing between federal and non-federal users empowers small broadband providers to deploy robust services to unserved and underserved areas. It also demonstrates the ability to fully utilize spectrum rather than leave much of it lying fallow – as has occurred in many prior spectrum allocations.

Americans have become safer, more prosperous and more deeply connected to each other from the benefits of commercially available spectrum. With little useable greenfield spectrum available, it is incumbent on Congress to guide policy which identifies new spectrum and/or avenues to access fallow spectrum, and then expeditiously work with all public and private stakeholders to unleash its full potential.

WISPs have played an inestimable role in bringing reliable broadband to millions of Americans in, or adjacent to, the digital divide. Meaningful access to more spectrum puts more tools in the hands of WISPs and the communities they serve. Congress can achieve this through a proper balance between exclusively licensed, licensed-by-rule and unlicensed spectrum regimes. WISPA appreciates the opportunity to provide this statement to the Subcommittee and looks forward to working with Congress to ensure that all Americans have access to fast, reliable broadband, no matter where they live.

SIA Spectrum Report

National Policy Must Prioritize More Spectrum for the U.S. Commercial Space Industry or the United States Will Lose the Space Race

Prepared By:

SIA The voice of the satellite industry | Satellite Industry Association

September 2023 (Updated January 2025)

For more information regarding this report, please visit

Further reference materials:

SIA Spectrum Policy Webpage, click HERE

Spectrum and the Technological Transformation of the Satellite Industry

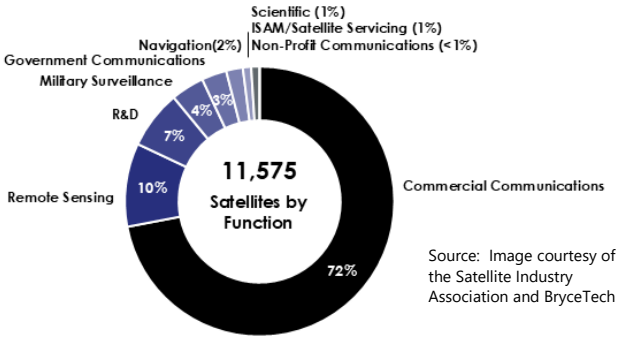
National Policy Must Prioritize More Spectrum for the U.S. Commercial Space Industry or the United States Will Lose the Space Race

The space industry's massive surge in technology is being led by U.S. innovation. Satellite and space services are touching the lives of every citizen directly and indirectly. Further, these services are becoming increasingly integrated in 5G and will be more so in 6G. In addition, the U.S. government, including the U.S. Department of Defense and NASA, is relying increasingly on commercial satellites and space services. As recognized in the National Space Policy, this means making more megahertz of spectrum available for commercial satellite and space services is critical. For the U.S. government to lead the world in the new space race and compete with global adversaries, it must have a coherent multi-agency policy that ensures that the spectrum needs of the commercial satellite and space community are met. To meet the significant increasing demands of users, whether government, consumer or enterprise, not only must the U.S. provide continued access to existing allocations, but additional spectrum is required in the low, mid and high bands.

The need for access to additional spectrum is further demonstrated by the significant growth of the U.S. commercial satellite and space industry. The U.S. commercial satellite and space industry have made and are continuing make hundreds of billions of dollars in investment.

For example, the number of operational satellites has grown from approximately 1000 in 2013 to over 11,500 as of the end of 2024 (right). The number of annual space launches also continues to grow at an unprecedented rate with another 2,500+ satellites launched in 2024[2]. Applications for tens of thousands of commercial satellites have also been approved.

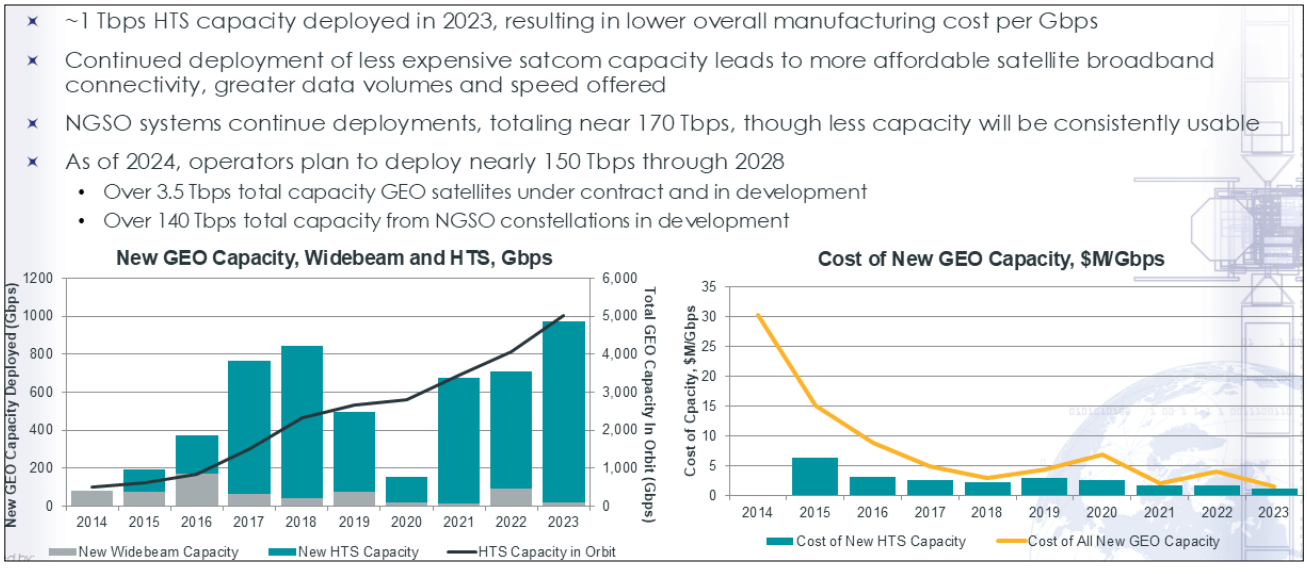
Unprecedented Growth—Approximately 1000 Satellites Orbited the Earth in 2013 - At the End of 2024, More Than 11500 Satellites Were Operating In Earth Orbit



Source: Image courtesy of the Satellite Industry Association and BryceTech

It is not just the number of satellites that is growing. The capacity of those satellites deployed also has increased significantly. As of mid-2024, operators have announced plans to deploy an additional 150 Tbps of capacity through 2028 with over 3.5 Tbps total capacity GEO satellites under contract and in development and over 140 Tbps total capacity from NGSO constellations in development. One example of the impact this has had is there has been a tremendous increase in satellite broadband subscribers, now estimated at nearly 5 million subscribers. Similarly, commercial Earth Observation (EO) satellites collect and download more than 100 terabytes of satellite imagery data per day with all EO satellites collectively forecasted to collect 230 petabytes of data daily by 2032.[1,3]

New Satellite Data Capacity Deployment and Cost Trends



Satellite capacity cost estimated based on satellite manufacturing prices.
Future capacity estimates reflect publicly announced plans and manufacturing contracts; some systems may not deploy.

1. Source: https://www.datacenterfrontier.com/internet-of-things/article/11429032/terabytes-from-space-satellite-imaging-is-filling-data-centers
2. Source: Gunter's Space Page—www.space.rocket.de
3. Source: https://interactive.satellitetoday.com/via/january-february-2025/how-space-based-data-will-drive-the-digital-economy

The time is Now for U.S Policy Makers to Prioritize the Growing Spectrum Needs of the Space Industry

U.S. spectrum policy makers have in recent years elevated the spectrum needs of commercial wireless over those of the satellite and space industry. Because of this approach, there has been a lack of recognition in making spectrum decisions about spectrum policy concerning the incredible growth and importance to the U.S. economy of the U.S. space industry. The time is now for U.S policy makers to prioritize the growing spectrum needs of the space industry to ensure we can meet the needs for the United States, as well ensure U.S. space leadership globally.

If the United States is to lead in space globally, as well as address digital divide issues, it is critical that the United States government lead domestically and internationally in ensuring that there is adequate spectrum to support the rapid growth of the new space industry and the applications their customers rely upon. The objective must be to make new spectrum available no later than 2027 to ensure the United States' competitive edge in the rapidly evolving space industry including for 5G and 6G. This requires at least 15 GHz of spectrum of low, mid and high band spectrum to accommodate the growing number of applications in the 390 MHz to the 60 GHz band nationally and globally.

U.S. Innovation of New and Novel Services is Leading to Exponential Increase in Demand for Satellite and Space Radiocommunications Services

An important part of this innovation includes the development of non-terrestrial network standards (NTN) in 3GPP and the increasing integration of terrestrial and satellite communications services. The inclusion of non-terrestrial technologies in 5G and soon to be 6G standards, including 3GPP, means that satellite communications is becoming and will continue to become more pervasive including for direct to device, cellular backhaul, IoT and other widespread uses.

The integration of sensing and communication is a key enabler for a wide range of use cases, such as cellular backhaul and satellite direct connectivity to devices. Moreover, sensing the physical surroundings together with AI will further enhance situational awareness. Sensing supports various innovative applications such as high precision positioning and localization of devices and objects, high resolution and real-time 3D-mapping for automated and safe driving/transport, digital twins, and industrial automation.

Because of this increasing innovation, the satellite and space industry are supporting:

- **Inclusivity and Ubiquitous Connectivity:** Commercial satellite broadband and narrowband services are able to address the digital divide so that all users have access to critical communications services. Today, there are over 2 million[4] satellite broadband subscribers across the United States, satellite is providing critical backhaul services for 5G cellular networks, and there are deployed satellite-enabled direct to device (D2D) services, such as the Apple I-Phone, the Bullitt device, plus several others. With the dramatic increases we are seeing (for instance, the global satellite broadband market size is projected by some to reach around USD 14.7 billion by 2032[5])additional spectrum for these uses must be available now.
- **Communications on the Move:** The increasing reliance of users on communications services on the move including in land, air and water require significant additional capacity to meet demand. These services include everything from supporting smart roads, autonomous transportation, the needs of crew, and safety-of-life to entertainment.
- **Enhanced security, privacy and resilience:** By monitoring, encrypting, and managing data, as well as providing secure storage, satellite technology helps to ensure citizens' data is safe and secure. Satellite data, combined with geospatial datasets and machine learning will enhance security, resiliency and efficiency in smart grid implementation and management. Satellites will also provide increasing situational and security data for pipelines, offshore rigs and storage facilities. As satellites provide a comprehensive view of the world from above, satellites will increasingly be used to detect and prevent threats to a nation's security including monitoring borders, detecting suspicious activity, and providing intelligence on potential threats.

4. Source: S&P Global Market Intelligence—The History of U.S. Broadband 2023
5. Source: https://dataintelo.com/report/global-satellite-broadband-market

- **Emergency and Disaster Preparedness Communications:** Satellite services provide reliable, uninterrupted communication during crisis situations, enabling efficient emergency responses, predictive capabilities, and support during recovery phases. Earth observation satellites likewise can enable monitoring and early warning of natural disasters such as wildfires and also aid in recovery efforts. To ensure that the United States has the available capacity to meet the anticipated growth in need for these communications, additional spectrum must be made available.

- **D2D Communications:** With billions of smartphones being used worldwide, leaps in technological innovation have enabled companies to develop the capability for mobile phones to communicate directly with satellite networks. Voice, text and/or data services would be available even when the handset is operating far beyond the coverage range of terrestrial mobile networks or if such networks were damaged or not operational due to a natural disaster such as a hurricane or wildfire.

- **Ubiquitous computing:** Satellites are critical to support the ubiquitous use of data computing resources. Emerging trends in this regard include expansion of data processing in the network infrastructure to the network cloud and devices that are closer to the origin of the data and support for proliferation of ubiquitous intelligence globally. One facet of ubiquitous computing is that equipping smart objects with appropriate transmitters and receivers enables precise localization. Satellite supported localization technology is an absolute necessity.[6]

- **Smart industrial applications:** Through the leveraging of real-time intelligence and its ability to facilitate interactions between machines and citizens, satellite technology can scale to meet the performance of smart industrial applications. As these needs continue to grow, satellite capacity will have to scale up to meet these demands.

- **Lunar:** Human exploration missions to the Moon are set to occur as early as 2026. Lunar equipment includes spacesuits, handhelds, habitation, other lunar assets and other communication stations, landers, rovers, and extravehicular activity. All lunar equipment will require connectivity on the moon as well as ultimately, back to earth. It is critical that the U.S. government make available spectrum to support these expected needs.

- **Digital health and well-being:** Through the leveraging of AI, edge computing, ubiquitous connectivity, multi-sensory communication, positioning and sensing related capabilities, satellite technology is facilitating digital health services including interactive and remote monitoring, telediagnosis, remote tele-medical assistance (including tele-connected ambulances), tele-rehabilitation, digital clinical trials and telemedicine. As the medical community and patients become increasingly reliant on digital health, including in rural and remote areas, having sufficient satellite capacity will be key to its success.

- **Environmental Applications:** Satellite services enable critical environmental monitoring that terrestrial networks cannot do. This includes climate change surveillance, energy management, animal tracking, and support for polar expeditions. Leveraging satellite technology facilitates a broader understanding of our planet, supports sustainable practices, and aids in the conservation of biodiversity. As these applications increase in importance to the health of our planet, there needs to be sufficient spectrum to support this demand.

- **Sustainability:** Satellite technology is addressing the need for increased environmental, agricultural, social, and economic sustainability, and also supports the goals of the Paris Agreement of the United Nations Framework Convention on Climate Change. Leveraging circular economy principles helps retain and recover value from resources and extend lifetime through such important considerations as reusing, repairing, repurposing or recycling. To meet the growing need of sustainability applications, there must be adequate spectrum for satellite services to meet this demand.

- **Space-to-Space Communications:** Intersatellite links (ISLs) provide a real-time connectivity solution by allowing satellites to communicate with each other or with third-party satellites to relay data when outside the range of an Earth station. Recognizing the value of next-generation ISLs for a variety of satellite missions that require two-way, higher capacity capabilities, it is critical that additional spectrum is allocated for this use.

6. Source: Proceedings of the International Conference on Trends & Advances in Computation & Engineering (TRACE).

Additional Capacity is Required for the United States to Win the Space Race

The importance of the U.S. satellite and space industry cannot be overstated. Satellite and space radiocommunications services are crucial for a myriad of applications that affect economics, health, education and U.S. national security, and more. By addressing these pressing needs through leveraging space, we can continue to drive our nation's progress, innovate, and lead in the space sector. It's time for our national policy to recognize this urgency and act now to secure our future in the space race. Failure to do so now and into the future will allow our adversaries to take the lead and jeopardize the United States' ability to win the space race.

To meet the myriad use cases addressed here, and the increasing use cases as we head to a 6G world, it is critical that space-based communications have access to the spectrum requirements it needs (both existing and new allocations). Because of the varied needs, the satellite and space industry must have made available (in addition to the existing allocations) by 2027 at least 15 GHz more of spectrum available globally within a wide variety of frequency bands from 390 MHz to 60 GHz.

**Image credits: U.S. Coast Guard photo by Petty Officer 3rd Class Eric D. Woodall and J Lamar/Cubic

SIA Satellite Industry Association

For more information, please contact the Satellite Industry Association via email at info@sia.org