

**STRENGTHENING AMERICAN LEADERSHIP IN
WIRELESS TECHNOLOGY**

HEARING
BEFORE THE
SUBCOMMITTEE ON COMMUNICATIONS AND
TECHNOLOGY
OF THE
COMMITTEE ON ENERGY AND
COMMERCE
HOUSE OF REPRESENTATIVES
ONE HUNDRED NINETEENTH CONGRESS

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STRENGTHENING AMERICAN LEADERSHIP IN WIRELESS TECHNOLOGY

THURSDAY, JANUARY 23, 2025

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:01 a.m., in the John D. Dingell Room 2123, Rayburn House Office Building, Hon. Richard Hudson (chairman of the subcommittee) presiding.

Members present: Representatives Hudson, Allen, Latta, Bilirakis, Carter of Georgia, Dunn, Joyce, Fulcher, Pfluger, Cammack, Obernolte, Houchin, Fry, Kean, Goldman, Fedorchak, Guthrie (ex officio), Matsui (subcommittee ranking member), Soto, Clarke, Ruiz, Peters, Kelly, Barragán, Carter of Louisiana, Menendez, Landsman, McClellan, Castor, Pallone (ex officio), and Hudson.

Staff present: Ansley Boylan, Professional Staff Member; Jessica Donlon, General Counsel; Sydney Greene, Director of Finance and Logistics; Calvin Huggins, Staff Assistant; Megan Jackson, Staff Director; Noah Jackson, Clerk, Communications and Technology; John Lin, Senior Counsel, Communications and Technology; Joel Miller, Chief Counsel; Elaina Murphy, Professional Staff Member, Communications and Technology; Kate Harper, Chief Counsel, Communications and Technology; Jackson Rudden, Staff Assistant; Chris Sarley, Member Services/Stakeholder Director; Hannah Anton, Minority Policy Analyst; Rasheedah Blackwood, Minority Intern; Keegan Cardman, Minority Staff Assistant; Jennifer Epperson, Minority Chief Counsel, Communications and Technology; Waverly Gordon, Minority Deputy Staff Director and General Counsel; Tiffany Guarascio, Minority Staff Director; Perry Hamilton, Minority Member Services and Outreach Manager; Mackenzie Kuhl, Digital Manager; Dan Miller, Minority Professional Staff Member; Michael Scurato, Minority FCC Detailee; Andrew Souvall, Minority Director of Communications, Outreach and Member Services; Johanna Thomas, Minority Counsel, Communications and Technology.

OPENING STATEMENT OF HON. RICHARD HUDSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NORTH CAROLINA

Mr. HUDSON. Good morning, and welcome to the first hearing in the Communications and Technology Subcommittee of the 119th Congress.

I am honored to serve as the chairman of this subcommittee, where there is a rich history of identifying and addressing the most pressing issues raised in the communications and technology sectors. As technology continues to advance, this subcommittee will be at the forefront of solving tough issues.

The subcommittee has historically worked in a bipartisan manner to solve many of the issues before us, and I plan to continue that tradition by working with my ranking member, Representative Matsui, who I respect very much, and have admired her work and accomplishments as a leader in this space. And I look forward to working together and learning from Ms. Matsui.

I am grateful for the work Chairman Latta brought to this subcommittee, and I am looking forward to continuing it and learning from him as well.

I am also excited to work with my vice chairman, Mr. Rick Allen, and all of my colleagues on this subcommittee on both sides of the aisle to advance important legislation in this Congress.

Our Nation is the world's economic powerhouse, and we lead the world in innovation. America is home to the best technology companies, both large and small. These companies lead in everything from next-generation wireless technology to all of the emerging technologies that rely on connectivity, ranging from artificial intelligence and the Internet of Things, to Next Gen 9-1-1 and precision agriculture.

Our country's startup ecosystem is strong and should be fostered. This committee must advance thoughtful policy that continues to grow American innovation and productivity rather than stifle it.

Next-generation wireless technology supports many of these technological advancements. It impacts nearly every sector of our economy, from powering everyday communications networks and advancements in healthcare and manufacturing to being used for our national defense. It is something heavily present in my district at Fort Bragg. We call it the epicenter of the universe, the home of our special forces, and the largest Army base in the world.

But if our wireless networks are going to keep pace with the speed of innovation, we need to make sure they have additional spectrum resources. Spectrum is a crucial element for wireless technology to operate. Americans depend on connected devices in their everyday lives, and the congestion on our networks has skyrocketed. Our wireless networks need to keep up.

As our wireless networks advance from 5G to 6G technology and beyond, the demand for spectrum will only continue to grow. We must remember these important resources are finite. Managing these limited resources is vital to maintaining our economic dominance and protecting our national security.

We will take a balanced approach to making both licensed and unlicensed spectrum available. This includes working with our Federal partners, such as the Department of Defense, which must have enough spectrum to defend the homeland but also be held accountable to use their resources efficiently.

Last Congress, the Federal Communications Commission's spectrum auction authority expired for the first time due to disagreements about how spectrum resources should be allocated. These auctions have historically brought in billions to our national econ-

omy, with the highest spectrum auctions raising over \$80 billion from private companies.

It is simple economics. There is limited supply, unlimited demand, and a willingness to pay. We need to reauthorize the FCC's spectrum auction authority immediately.

We must also continue looking for ways to make unlicensed spectrum available. Unlicensed spectrum unlocks the Internet of Things and the smart-device economy on which Americans rely, providing tremendous economic growth.

Under the first Trump administration, more than 1,200 megahertz of unlicensed spectrum was made available in the 6 gigahertz band, leading to massive opportunities for innovation for our farmers, industrialists, and communities.

These successes are just the start. However, as we progress, our adversaries are constantly trying to undermine our leadership and international standard-setting bodies through IP theft and through cyber attacks. The U.S. must remain resolute in defending our leadership to safeguard democratic values, and this happens by trusting in our private-sector partners to address some of our Nation's most pressing challenges.

We recently learned about Salt Typhoon, which may be the largest Chinese-backed telecommunications hack in our Nation's history. As we deploy advanced networks and connected devices in an environment of great power competition, we have to thoughtfully secure our networks every step of the way.

At the end of last year, I was glad to see Congress fund the removal of the remaining Chinese equipment in our communications networks. China is producing cheap communications equipment at the cost of our national security, and that needs to change. We need trusted alternatives.

Companies are working to develop and deploy Open RAN technology, which is intended to promote an ecosystem of trusted vendors for communication network equipment. And I look forward to hearing an update on its progress today.

The key to our success is working together with our stakeholders to deploy and secure our networks. As our adversaries seek to undermine U.S. leadership, we will continue to build a comprehensive spectrum policy in the United States and a unified position on the international stage.

I look forward to discussing these issues more in depth with our witnesses today and discussing the future spectrum policy in the United States.

[The prepared statement of Mr. Hudson follows:]

**Opening Statement for Chairman Richard Hudson
Subcommittee on Communications and Technology
“Strengthening American Leadership in Wireless Technology”
Thursday, January 23, 2025**

Introduction

Good morning, and welcome to the first hearing in the Communications and Technology subcommittee of the 119th Congress.

I am honored to serve as the Chairman of this subcommittee, where there’s a rich history of identifying and addressing the most pressing issues raised in the communications and technology sectors.

As technology continues to advance, this subcommittee will be at the forefront of solving tough issues.

The subcommittee has historically worked in a bipartisan manner to solve many of the issues before us, and I plan to continue that tradition working with my Ranking Member, Representative Matsui (CA-07).

I have admired and respected her bipartisan work and accomplishments as a leader in this space and look forward to working together and learning from her.

I am grateful for the work Chairman Latta brought to this subcommittee and I'm looking forward to continuing it and learning from him as well.

I'm also excited to work with my Vice Chair Mr. Rick Allen, and all my colleagues on this subcommittee to advance important legislation this Congress.

U.S. Leadership

Our nation is the world's economic powerhouse, and we lead the world in innovation.

America is home to the best technology companies, both large and small. These companies lead in everything from next-generation wireless technology to all the emerging technologies that rely on connectivity, ranging from artificial intelligence and the Internet of Things to NextGen 9-1-1 and precision agriculture.

Our country's startup ecosystem is strong and should be fostered. This Committee must advance thoughtful policy that continues to grow American innovation and productivity rather than stifle it.

Next-generation wireless technology supports many of these technological advancements. It impacts nearly every sector of our economy, from powering everyday communication networks and advancements in healthcare and manufacturing, to being used for our national defense, something heavily present in my district at Fort Bragg, the home of our Special Forces and the largest military base in the world.

But if our wireless networks are going to keep pace with the speed of innovation, we need to make sure they have additional spectrum resources.

Spectrum is a crucial element for wireless technology to operate. Americans depend on connected devices in their everyday lives, and the congestion on our networks has skyrocketed.

Our wireless networks need to keep up.

As our wireless networks advance from 5G to 6G technology and beyond, the demand for spectrum will only continue to grow.

Spectrum Landscape

We must remember these important resources are finite. Managing these limited resources is vital to maintaining our economic dominance and protecting our national security.

We will take a balanced approach to making both licensed and unlicensed spectrum available.

This includes working with our federal partners such as the Department of Defense, which must have enough spectrum to defend the homeland, but also be held accountable to use their resources efficiently.

Last Congress, the Federal Communications Commission, or FCC's, spectrum auction authority expired for the first time due to disagreements about how spectrum resources should be allocated. These auctions have historically brought in **billions** to our national economy, with the highest spectrum auctions raising over \$80 billion from private companies.

It is simple economics: there is limited supply, unlimited demand, and a willingness to pay. We need to reauthorize the FCC's spectrum auction authority immediately.

We must also continue looking for ways to make unlicensed spectrum available. Unlicensed spectrum unlocks the Internet of Things and smart device economy on which Americans rely, providing tremendous economic growth.

Under the first Trump Administration, more than 1,200 megahertz of unlicensed spectrum was made available in the 6 gigahertz band, leading to massive opportunities for innovation for our farmers, industrialists, and communities.

Securing our Networks

These successes are just a start.

However, as we progress, our adversaries are constantly trying to undermine our leadership in international standard setting bodies, through IP theft, and through cyberattacks. The U.S. must remain resolute in defending our leadership to safeguard democratic values, and

this happens by trusting in our private sector partners to address some of our nation's most pressing challenges.

We recently learned about "Salt Typhoon," which may be the largest Chinese-backed telecommunications hack in our nation's history.

As we deploy advanced networks and connected devices in an environment of Great Power Competition, we have to thoughtfully secure our networks every step of the way.

At the end of last year, I was glad to see Congress fund the removal of the remaining Chinese equipment in our communications networks.

China is producing cheap communications equipment at the cost of our national security, and that needs to change. We need trusted alternatives. Companies are working to develop and deploy Open RAN technology, which is intended to promote an ecosystem of trusted vendors for communications network equipment, and I look forward to hearing an update on its progress today.

Conclusion

The key to our success is working together with all stakeholders to deploy and secure our networks.

As our adversaries seek to undermine U.S. leadership, we will continue to build a comprehensive spectrum policy in the United States and a unified position on the international stage.

I look forward to discussing these issues more in depth with our witnesses today and discussing the future of spectrum policy in the United States.

I now yield five minutes to my colleague, Ranking Member Doris Matsui, for her opening statement.

Mr. HUDSON. I will now recognize our ranking member of the subcommittee, the gentlelady from California, Ms. Matsui.

OPENING STATEMENT OF HON. DORIS O. MATSUI, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Ms. MATSUI. Thank you very much, Mr. Chairman. And I want to congratulate you as serving as the new Communications and Technology Subcommittee chair. I look forward to working with you this Congress.

I am glad that we are starting with such a timely issue on which we have a strong bipartisan track record. The last time this subcommittee had a spectrum hearing, the FCC spectrum auction authority had just lapsed for the first time in history. Now nearly 2 years later, the FCC is still deprived of this critical tool to unlock the full potential of the spectrum airwaves, leaving U.S. economic and national security at risk.

Spectrum is a key engine of wireless innovation. It supports a wide range of technologies from remote surgery to autonomous vehicles and broadband. Our consumers, businesses, and Federal agencies all stand to benefit when we maximize our spectrum use. This requires a comprehensive approach that strikes the right balance of licensed, unlicensed, and shared spectrum.

We need a bipartisan solution that not only restores auction authority but also promotes a healthy spectrum pipeline and ensures our Federal Government speaks with one voice on spectrum policy. And we need to be forward looking by promoting technologies that will improve spectrum sharing and efficiency. Equally critical is our obligation to be responsible stewards of spectrum auction revenues.

As a long-time advocate for the FCC's Rip and Replace program, I am proud of our role to use spectrum auction proceeds to remove unsecured Chinese equipment from our communications networks. Spectrum is a public good, and I am dismayed to see prospects floated that would use auction proceeds to provide tax cuts for the wealthy through reconciliation.

Rather, we need to work as a subcommittee to use these funds to close the digital divide, protect national security, and support public safety communications. This includes expanding access to lifesaving technologies such as Next Generation 9-1-1 for faster and more accurate emergency responses.

Last Congress, this committee unanimously passed the Spectrum Auction Reauthorization Act, comprehensive spectrum legislation that would have accomplished these very goals. Disappointingly, the House Republican leadership never brought this bipartisan proposal to the floor for a vote.

This Congress, we must build on our good work. I hope my colleagues will continue our history of bipartisan cooperation on spectrum.

Lastly, I would be remiss if I didn't highlight the important work of the national spectrum strategy. Even amidst an auction authority lapse, the Biden administration answered my call for a unified spectrum plan by launching the first comprehensive U.S. spectrum strategy in 6 years. This strategy offers a roadmap for securing

U.S. leadership and spectrum innovation and ensuring that the Federal Government speaks with one voice.

We can't afford to throw that progress away and return to the disarray that preceded the national spectrum strategy. The U.S. needs a unified spectrum position now more than ever to fight for our interest in international negotiations and to rally other countries to our vision. If we fail to maintain our global leadership on spectrum, we create a vacuum that China will happily fill.

The stakes are high. It is time for all stakeholders to come to the table and for Congress to pass comprehensive spectrum legislation that has substantial bipartisan buy-in.

Clearly, there is a lot of work ahead of us, but I am hopeful. This subcommittee has a proven track record of bipartisan cooperation that keeps America at the forefront of global innovation. Now is not the time to throw that aside. We have a chance to continue our tradition of working across the aisle, and I am committed to advancing solutions that secure economic growth, national security, and bipartisan funding priorities benefiting the American public.

Thank you to our witnesses for appearing before us today, and I look forward to the discussion.

And with that, Mr. Chairman, I yield back the remainder of my time.

[The prepared statement of Ms. Matsui follows:]

Committee on Energy and Commerce
Opening Statement as Prepared for Delivery
of
Subcommittee on Communications and Technology Ranking Member Doris Matsui

Hearing on “Strengthening American Leadership in Wireless Technology”

January 23, 2025

Thank you, Chairman Hudson. I want to congratulate you on serving as the new Communications and Technology Subcommittee chair — and extend my congratulations to Chair Guthrie for heading the full committee. I look forward to working with you this Congress.

I’m glad we are starting with such a timely issue, on which we have a strong bipartisan track record. The last time this Subcommittee had a spectrum hearing, the FCC’s spectrum auction authority had just lapsed for the first time in history. Now, nearly two years later, the FCC is still deprived of this critical tool to unlock the full potential of our spectrum airwaves, leaving U.S. economic and national security at risk.

Spectrum is a key engine of wireless innovation. It supports a wide range of technologies from remote surgery to autonomous vehicles and broadband. Our consumers, businesses, and federal agencies all stand to benefit when we maximize our spectrum use. This requires a comprehensive approach that strikes the right balance of licensed, unlicensed, and shared spectrum.

We need a bipartisan solution that not only restores auction authority but also promotes a healthy spectrum pipeline and ensures our federal government speaks with one voice on spectrum policy. And we need to be forward-looking by promoting technologies that will improve spectrum sharing and efficiency.

Equally critical is our obligation to be responsible stewards of spectrum auction revenues. As a long-time advocate for the FCC’s Rip and Replace program, I’m proud of our work to use spectrum auction proceeds to remove unsecure Chinese equipment from our communications networks.

Spectrum is a public good. I’m dismayed to see proposals floated that would use auction proceeds to provide tax cuts for the wealthy through reconciliation. Rather, we need to work as a Subcommittee to use these funds to close the digital divide, protect national security, and support public safety communications.

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January 23, 2025

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The U.S. needs a unified spectrum position now more than ever to fight for our interests in international negotiations, and to rally other countries to our vision. If we fail to maintain our global leadership on spectrum, we create a vacuum that China will happily fill.

The stakes are high. It is time for all stakeholders to come to the table, and for Congress to pass comprehensive spectrum legislation that has substantial bipartisan buy-in. Clearly, there is a lot of work ahead of us. But I am hopeful. This Subcommittee has a proven track record of bipartisan cooperation that keeps America at the forefront of global innovation.

Now is not the time to throw that aside. We have a chance to continue our tradition of working across the aisle. I am committed to advancing solutions that secure economic growth, national security, and bipartisan funding priorities benefitting the American public.

Thank you to our witnesses for appearing before us today, and I look forward to the discussion.

With that, I yield back the remainder of my time.

Mr. HUDSON. I thank the ranking member for her remarks.

And I now recognize the chairman of the full committee, the gentleman from Kentucky, Mr. Guthrie, for 5 minutes for his opening statement.

OPENING STATEMENT OF HON. BRETT GUTHRIE, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF KENTUCKY

Mr. GUTHRIE. Thank you, Mr. Chairman, and thank you for bringing us together for this important hearing.

And I thank you, to the witnesses, for your participation.

I look forward to the work we will do this Congress to close the digital divide, protect our critical infrastructure, and ensure Americans are prepared to outcompete the Chinese Communist Party.

I have long been an advocate for spectrum policy that serves both our national security and American innovation. I served for many years as the cochair with my good friend from California, Ms. Matsui. I enjoyed, always enjoyed working with you and look forward to continue working with you as we move forward this Congress.

The United States needs a spectrum agenda that enables both big and small American companies to innovate and remain competitive globally. Ensuring that the U.S. continues to be a leader in next-generation wireless communications technology will create jobs and unlock new opportunities here at home, as reliable high-speed connectivity supports a range of cutting-edge applications like artificial intelligence and advanced manufacturing.

We cannot—and we will not—allow our adversaries, like the Chinese Communist Party, to dominate 21st century technological battle. As a first step, we must reauthorize the FCC's spectrum auction authority. Second, we must work together with Federal agencies and stakeholders to reallocate unused spectrum. And third, we need to look at innovative tools to better utilize and manage spectrum resources.

I am looking forward to keeping our promises to Americans across the country that America is open for business, and I eagerly anticipate bold leadership across many industries, ushering in the next great American century.

I will now yield to our vice subcommittee chair, my good friend, Vice Chair Allen, for a few opening remarks. I will yield my time to—the remainder of my time.

[The prepared statement of Mr. Guthrie follows:]

Opening Statement of Chairman Brett Guthrie
Subcommittee on Communications and Technology
Strengthening American Leadership in Wireless Technology

Thank you, Mr. Chairman for bringing us together for this important hearing, and thank you to the witnesses for your participation. I look forward to the work we will do this Congress to close the digital divide, protect our critical infrastructure, and ensure that America is prepared to outcompete the Chinese Communist Party.

I have long been an advocate for a spectrum policy that serves both our national security and American innovation. I served for many years as co-Chair of the Congressional Spectrum Caucus with my good friend, and the subcommittee's Ranking Member, Doris Matsui.

The United States needs a spectrum agenda that enables both big and small American companies to innovate and remain competitive globally. Making more spectrum available for both licensed and unlicensed use is key to achieving that goal and supporting American global leadership. In the United States, private sector innovation in wireless technologies has contributed hundreds of billions of dollars to our economy and has helped connect millions of Americans to reliable, high-speed internet.

Ensuring that the U.S. continues to be a leader in next generation wireless communications technologies will create jobs and unlock new opportunities here at home, as reliable, high-speed connectivity supports a range of cutting-edge applications like artificial intelligence and advanced manufacturing. We cannot, and will not, allow adversaries like

the Chinese Communist Party to dominate the 21st technological battle. As China aims to replace America as the preeminent world power, we must protect against CCP attempts to surveil our citizens and infiltrate our networks. But if we invest in homegrown technology, as President Trump said on inauguration day, we will enter a new American golden age defined by builders, innovators, and entrepreneurs.

As a first step, we must reauthorize the FCC's spectrum auction authority, which has been lapsed for nearly two years, and would allow the FCC to make more spectrum available for commercial use and raise revenue for the federal government.

Our Committee is responsible for ensuring that the FCC has the tools it needs to bolster U.S. wireless leadership, and it is imperative that this Committee reauthorize the FCC's auction

authority so they can get back to their important work of making spectrum available for licensed and unlicensed use. This has been a long-standing priority for me and this Committee. And it's been a **bipartisan** priority. It is unacceptable that the FCC's auction authority has been lapsed for nearly two years. I am open to any path forward and making sure we get this done, because this issue is vital for our global leadership.

Second, we must work together with federal agencies and stakeholders to reallocate unused spectrum. The federal government uses spectrum resources for aviation, national security systems, and other critical operations. While those operations are important to protect, these federal licensees are not operating around the clock and in all parts of the country in every band they occupy. The White House and Congress have a

role to play in pushing federal government users to be more efficient with their spectrum.

Third, we need to look at innovative new tools to better utilize and manage spectrum resources. The promise of new technologies will not only streamline these operations, but also enhance the security of ongoing operations and make them more resilient to adversaries.

I'm looking forward to keeping our promise to Americans across the country that we are open for business, and I eagerly anticipate bold leadership across many industries ushering in the next great American century.

I now yield to our Vice Subcommittee Chairman, Mr. Allen, to make a few opening remarks.

Mr. Chairman, I yield back.

OPENING STATEMENT OF HON. RICK W. ALLEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF GEORGIA

Mr. ALLEN. Thank you, Chairman Guthrie, for yielding. And Chairman Hudson, thank you for holding this important hearing, and I look forward to working with you.

I am looking forward to working with this committee and this Congress to tackle the issues, the critical issues, like closing the digital divides, fighting robocalls, and strengthening our telecommunications infrastructure.

Access to telecommunications isn't just a luxury. It is something Americans depend on every single day. Students need it to finish their homework; folks of all ages, especially in rural communities, rely on it for telehealth visits with their doctors; and small businesses use it to reach customers and keep the doors open. And let's not forget, we all use it to stay in touch with friends and loved ones.

Additionally, when natural disasters strike, access to reliable communication becomes even more critical. Georgia's 12th District saw firsthand just how devastating this can be when Hurricane Helene wreaked havoc in our communities last September. That storm caused significant damage to our communications infrastructure, leaving our residents unable to call for help, check in with family to let them know where they were and that they were safe, and in many cases made it impossible to receive helpful updates about accessible resources.

Thankfully, we had satellite and other resilient emergency systems in place to help fill the gap with recovery efforts and that got underway.

Spectrum is absolutely vital for the wireless services and devices we use today and for the technologies of tomorrow. If we want to maintain our leadership in the world and keep pace with China's advancements, we need to free up more spectrum for both licensed and unlicensed uses. Technology is like precision agriculture. Advanced manufacturing and next-gen wireless services all depend on it.

Again, I look forward to tackling these issues as vice chairman of the C&T Subcommittee.

Thank you, Mr. Chairman. And I yield back.

[The prepared statement of Mr. Allen follows:]

**Opening Statement for Vice Chairman Rick Allen
Subcommittee on Communications and Technology
“Strengthening American Leadership in Wireless
Technology.”**

Thursday, January 23, 2025

Thank you, Chairman Guthrie for yielding and thank you Chairman Hudson for holding this hearing. I am looking forward to working with you both this Congress to help close the digital divide, combat robocalls, and protect our telecommunications infrastructure.

Access to telecommunications is key for Americans in their daily lives. Students need it to do their homework. Americans of all ages need it to connect with their doctors for telehealth appointments. Small businesses rely on it to connect with

returning and new customers. And we all use it to stay connected with our friends and loved ones.

In a natural disaster, the need for access to telecommunications services are even more pronounced. I represent Georgia's 12th Congressional District, which was devastated by the damaging effects of Hurricane Helene last September. Communications services across the region were disrupted due to Helene's impact on the physical infrastructure that helps keep us connected. That means some of my constituents had trouble reaching first responders. It meant they couldn't contact their loved ones to let them know they were safe. Fortunately, some satellite and other resilient emergency wireless communications were able to be established in the area to help supplement these services during the early stages of disaster recovery.

Spectrum is critical to use wireless services and devices. To keep the United States at the cutting edge of technology and stay ahead China advancements, we need to make more spectrum available for both licensed and unlicensed use. Our leadership in new and emerging technologies like precision agriculture, advanced manufacturing, and the next generation wireless technologies depends on it.

Thank you Mr. Chairman. I yield back.

Mr. GUTHRIE. I yield back.

Mr. HUDSON. Thank you, Mr. Chairman.

I now recognize the gentleman from New Jersey, the ranking member of the full committee, Mr. Pallone, for 5 minutes of his opening statement.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman.

And we are here today to discuss spectrum, one of our Nation's most underrated and economically valuable natural resources. Discussion of current spectrum policy debates is important to better understand how our decisions impact America's standing in the world.

But we can't ignore that this hearing comes at a time when House Republicans are considering using spectrum auction proceeds as a piggy bank to fund their costly tax breaks for billionaires and large, wealthy corporations. And I hope they reconsider going down that road because it would be a sharp departure from the way spectrum policy and auction proceeds have been handled by Congress in the past.

Spectrum is such a valuable natural resource because it is an essential building block for connecting family and friends as well as delivering critical services like education and health to people across the country. It is also critical to everyday safety for first responders.

Without spectrum, we would not have radio stations, smart phones, the app economy, or drones. And many of these technological advancements were developed by American innovators pushing the limits on the way spectrum could be used in new and exciting ways. But past performance does not guarantee future results. So America must remain a leader in spectrum policy.

For more than three decades, Congress has granted the FCC the authority to make spectrum available using competitive bidding or auctions, and granting the FCC this authority has served both the public and the Nation well.

Today, the United States is a global leader in delivering 5G, advanced WiFi, Bluetooth, and other next-generation wireless technologies to consumers across the country. At the same time, spectrum auctions, which have raised over \$230 billion to the Federal Government, have helped fund important public communication priorities, including the Rip and Replace reimbursement program, the construction of FirstNet, and broadband infrastructure grants.

And that is why spectrum policy has long been an area of bipartisan agreement. In fact, we have worked closely with the Republicans on this committee for the past 3 years on bills to extend the FCC's auction authority and use spectrum proceeds to pay for bipartisan spending priorities.

And one of the areas of bipartisan agreement was the need to fund Next Generation 9-1-1. This funding would modernize our 9-1-1 networks to allow the public to use modern-day communication tools, like sending text images and videos to first responders and emergency personnel. And this technology will reduce response

times and equip first responders with lifesaving information before they arrive at the scene, which will better assist people in their critical time of need.

The recent devastating wildfires in California are another reminder of how vital seconds can be in an emergency. This program clearly serves the public interest, and proceeds from auction of our public airwaves are ideal to fund it.

Unfortunately, again, it seems that Republicans are now going to abandon this bipartisan work in order to march ahead to give tax breaks to the rich, and this is simply not the way these funds should be used. The auction of public airwaves should fund programs for the public good.

Republicans should keep that in mind and reject proposals that would include spectrum in any reconciliation. Instead, they should work with us to set good spectrum policy and to use auction proceeds to fund vital programs that actually serve the public and not the wealthy few.

And I don't think the stakes could be any higher. Failure to replenish the commercial spectrum pipeline risks our Nation falling behind our counterparts across the globe—of course, particularly China—because we want to produce cutting-edge consumer innovations and enhance our national security capabilities. And we can't allow that to happen.

That is why—I mean, we can't allow to not have spectrum use for these good policy and public purposes, and that is why we should be working together.

We should also work to ensure the advancements made possible by spectrum are delivered to all Americans regardless of their income or ZIP Code. Too often rural, Tribal, and low-income areas are left behind as next-generation technologies are deployed and have to continue to work on making these services more affordable to everyone.

So finally, I want to say, if I could take a minute, Mr. Chairman, I want to bid farewell to Jennifer Epperson, who is our chief counsel on this subcommittee. She is leaving the committee after 6 years of service, and during that time she has played an instrumental role in the historic broadband investments we made in the Bipartisan Infrastructure Law, the creation of the Affordable Connectivity Program, and our bipartisan Rip and Replace legislation that I mentioned.

And we have accomplished a lot in this subcommittee, much of it bipartisan and throughout her time. I want to thank Jennifer for helping to make that happen. So I wish her nothing but the best. Of course, I don't want her to leave, but that is the way it goes. And, you know, I want to thank Jennifer for all her contributions.

[Applause.]

Mr. PALLONE. Thank you, and I yield back the balance of my time.

[The prepared statement of Mr. Pallone follows:]

Committee on Energy and Commerce
Opening Statement as Prepared for Delivery
of
Full Committee Ranking Member Frank Pallone, Jr.

Hearing on “Strengthening American Leadership in Wireless Technology”

January 23, 2025

We are here today to discuss spectrum, one of our nation’s most underrated and economically valuable natural resources. Discussion of current spectrum policy debates is important to better understand how our decisions impact America’s standing in the world. But we cannot ignore that this hearing comes at a time when House Republicans are considering using spectrum auction proceeds as a piggybank to fund their costly tax breaks for billionaires and large wealthy corporations. I hope they reconsider going down this road because it would be a sharp departure from the way spectrum policy and auction proceeds have been handled by Congress in the past.

Spectrum is such a valuable natural resource because it is an essential building block for connecting family and friends as well as delivering critical services like education and health to people across the country. It’s also critical to everyday safety for first responders. Without spectrum, we would not have radio stations, smartphones, the app economy, or drones. Many of these technological advancements were developed by American innovators, pushing the limits on the ways spectrum could be used in new and exciting ways. But past performance does not guarantee future results, so America must remain a leader in spectrum policy.

For more than three decades, Congress has granted the Federal Communications Commission (FCC) the authority to make spectrum available using competitive bidding, or auctions.

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January 23, 2025

Page 2

information before they arrive at the scene, which will better assist people in their critical time of need. The recent devastating wildfires in California are another reminder of how vital seconds can be in an emergency.

This program clearly serves the public interest and proceeds from auction of a public airwaves are ideal to fund it. Unfortunately, it seems that Republicans are now going to abandon this bipartisan work in order to march ahead to give tax breaks to the rich. This is simply not the way these funds should be used. The auction of public airwaves should fund programs for the public good.

Republicans should keep that in mind and reject proposals that would include spectrum in any reconciliation. Instead, they should work with us to set good spectrum policy and to use auction proceeds to fund vital programs that actually serve the public not the wealthy few.

And I don't think the stakes could be any higher. Failure to replenish the commercial spectrum pipeline risks our nation falling behind our counterparts across the globe, particularly China, because we want to produce cutting-edge consumer innovations and enhance our national security capabilities.

We cannot allow that to happen and that's why we should be working together. We should also work to ensure the advancements made possible by spectrum are delivered to all Americans regardless of their income or zip code. Too often rural, tribal, and low-income areas are left behind as next-generation technologies are deployed. We have to continue to work on making these services more affordable to everyone.

Finally, I want to bid farewell to Jennifer Epperson, who is our Chief Counsel on this Subcommittee, who is leaving the Committee after six years of service. During that time, she's played an instrumental role in the historic broadband investments we made in the Bipartisan Infrastructure Law, the creation of the Affordable Connectivity Program, and our bipartisan rip and replace legislation. We've accomplished a lot in the Subcommittee – much of it bipartisan – throughout her time and I thank Jennifer for helping to make it happen. I wish her nothing but the best and thank her for all her contributions.

Mr. HUDSON. I thank the ranking member, and I join him in thanking Ms. Epperson for your service on the committee and wish you all the best in the future.

We have now concluded our Member opening statements. The Chair reminds Members that, pursuant to the committee rules, all Members' opening statements will be made part of the record.

We would like to thank our witnesses for being here today to testify before the subcommittee. Our witnesses will have 5 minutes each to provide an opening statement, which will be followed by a round of questions from Members.

The witnesses here before us today are the Honorable Michael Powell, who is the president and CEO of NCTA, the Internet and Television Association. Thank you for being here.

Mr. Brad Gillen, the executive vice president of CTIA. Thank you for joining us.

Ms. Diane Rinaldo, executive director of Open RAN Policy Coalition. Thank you for being here.

The Chair would also like to recognize Cole Peterman, a special guest joining us in the audience, Ms. Rinaldo's son. Welcome, Cole.

And finally, Mr. Chris Lewis, the president and CEO of Public Knowledge. Thank you for being here today.

I would like to note for our witnesses that the timer light on the table will turn yellow when you have 1 minute remaining and will turn red when your time has expired, and then I will start tapping up here and then eventually banging, but hopefully we won't get to that point. Thank you.

Mr. Powell, you are recognized for 5 minutes for an opening statement.

STATEMENTS OF MICHAEL K. POWELL, PRESIDENT AND CHIEF EXECUTIVE OFFICER, NCTA-THE INTERNET AND TELEVISION ASSOCIATION; BRAD GILLEN, EXECUTIVE VICE PRESIDENT, CTIA; DIANE RINALDO, EXECUTIVE DIRECTOR, OPEN RAN POLICY COALITION; AND CHRIS LEWIS, PRESIDENT AND CHIEF EXECUTIVE OFFICER, PUBLIC KNOWLEDGE

STATEMENT OF MICHAEL K. POWELL

Mr. POWELL. Thank you, sir.

Good morning, Chairman Hudson, Ranking Member Matsui, Chairman Guthrie, and Mr. Pallone and other distinguished members of this committee.

I am Michael Powell, president and CEO of NCTA, The Internet and Television Association. I thank you for the opportunity to testify today.

I am going to discuss two topics central to America's leadership in wireless technology, WiFi and shared spectrum, which is an innovative way to get more spectrum more quickly to more users.

WiFi has become the backbone of America's internet experience. It powers our homes, workplaces, schools, and public spaces, enabling nearly all modern digital interactions. WiFi allows multiple users to share a single connection and has democratized access to the internet, making connectivity more affordable and widely available.

WiFi also drives innovation. By offering open, unlicensed access, it enables entrepreneurs to create smart devices and technology, from thermostats to virtual reality. Today, the average U.S. home has 17 connected devices and is projected to have 24 by 2027. Moreover, WiFi supports critical technologies like the Internet of Things, generating \$2.4 trillion in annual economic value.

The U.S. has led in WiFi innovation, creating systems that enable universal access without heavy regulation. However, to sustain this leadership, we must ensure enough spectrum for WiFi's continued growth, particularly as demand surges with emerging technologies like artificial intelligence and virtual reality.

WiFi, effectively, is the internet. It carries nearly 60 percent of all the world's data traffic. It carries 10 times more data than all other wireless networks combined, and when using our smart phones, 80 to 90 percent of our data goes over WiFi and not the cellular network.

And the best part is that WiFi is an American-led innovation. WiFi allows innovators to make devices that connect to the internet for free and without a license from the government. We, in America, harness the power of our citizens to publish, to produce, and to invent. This contrasts starkly with China, who prefers to spy on its citizens rather than empower them.

WiFi brought us the future, and it will carry us into the AI intelligence age. America's spectrum policy should embrace our leadership and continue to furnish WiFi with the spectrum it needs to continue its explosive growth and meet consumers' high expectations.

Now, it goes without saying America has a spectrum problem. Put simply, demand for it is shooting up, and supply of it is falling. Nearly all midband spectrum that we all want to use is used by critical mission government systems, most of it in the hands of our warfighters.

Traditional approaches clearing government health spectrum for auctions are increasingly unsustainable. We can't compromise our combat capability in the face of a dangerous world. There are fewer places to move these critical systems, and moving them is costly and time consuming.

For example, just clearing the lower 30 gigahertz band for exclusive use would take 20 years and cost \$120 billion. We need a better way out of this problem. Shared spectrum is the solution. Advances in dynamic spectrum management allow government and commercial users to coexist, resolving conflicts and reducing delays.

The success of Citizens Band Radio Service, CBRS, proves this approach works. It supports a diverse range of users, including schools, factories, and even disaster recovery efforts, while fostering competition and innovation.

To maintain U.S. leadership, we must prioritize coexistence in shared spectrum models. Congress should extend the FCC's auction authority while embracing both shared licensed auctions and unlicensed WiFi designations. This includes allocating more spectrum for WiFi and exploring shared models in critical midband ranges like the 3 gigahertz and 7 gigahertz bands.

By adopting forward-looking spectrum policies, we can accelerate deployment of technologies like 5G, 6G, WiFi 7 and 8, strengthen

national security, and sustain our global wireless leadership and our innovation.

This committee has always embraced innovation, and we are on the cusp of a great innovation revolution, and we need an innovative spectrum policy to meet the moment.

Thank you for the opportunity to speak today.

[The prepared statement of Mr. Powell follows:]

TESTIMONY OF MICHAEL K. POWELL

**PRESIDENT & CEO
NCTA – THE INTERNET & TELEVISION ASSOCIATION**

**before the
United States House of Representatives
Committee on Energy and Commerce**

“Strengthening American Leadership in Wireless Technology”

January 23, 2025

Introduction

Good morning, Subcommittee Chairman Hudson and Ranking Member Matsui, full Committee Chairman Guthrie and Ranking Member Pallone, and Members of the Committee. My name is Michael Powell, and I am the President and CEO of NCTA – The Internet & Television Association. Thank you for the opportunity to testify today.

NCTA is a trade association of American innovators. We represent an industry building the most powerful broadband platform in the United States as well as those companies creating video programming that entertains, informs, and inspires. Our broadband networks reach 87 percent of all U.S. homes, offering gigabit and higher speeds to millions of Americans in a highly competitive marketplace. Cable operators lead the broadband market because we have invested heavily in wireline and wireless networks—\$330 billion over the last two decades and over \$23 billion in 2023 alone. We serve every region of the country: rural, suburban, and urban.

Wireless technologies are central to bringing high-speed internet to our customers and have allowed us to enter the competitive mobile broadband market. As a relatively new entrant, we have quickly become the Nation's fourth largest wireless carrier. This success is a result of being innovative and flexible in our use of spectrum. We utilize a mix of unlicensed Wi-Fi spectrum, shared-licensed microcell spectrum, and exclusively licensed spectrum to offer a competitive, lower-priced choice for consumers. Our experience has taught us that an innovative market demands innovative spectrum policy.

Today I will discuss two topics. First, I want to share the great American success story of Wi-Fi (utilizing shared, unlicensed spectrum), and highlight the critical importance of continuing to invest in that technology for the benefit of consumers, entrepreneurs, and American

leadership. Second, I want to make the case that the only realistic hope for getting advanced wireless services to the market quickly and at reasonable cost demands the government lean more aggressively on using shared spectrum, rather than clinging to yesteryear's "clear 'em out and auction" exclusive-license approach.

Wi-Fi: America's Wireless Workhorse

To most people, Wi-Fi is the internet. It is like an information wall outlet we plug our devices into to check our email, watch videos, post on social media, read the news, and communicate with friends and relatives—but even better because Wi-Fi lets us get rid of the plug and go wireless. And it is ubiquitous. It is at home, at work, at the coffee shop, on planes, in stadiums, in museums, in libraries and in hospitals. It is everywhere, and we expect it to be everywhere. In my experience, the first question a house guest will ask is, "What is your Wi-Fi password?"

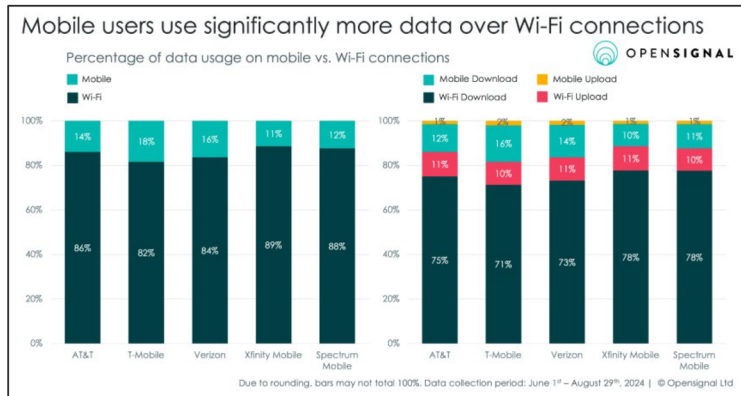
Wi-Fi lets anyone share a single fixed internet connection. In the early dial-up days, consumers would buy one internet connection that would let them connect only one computer. Wi-Fi came along and let everyone in the home get online, without paying for additional connections from your provider. That development made internet service significantly more valuable, and more affordable. And it kept your kids from fighting over the computer. It is hard to imagine how the country would have survived staying at home during the pandemic in a world before Wi-Fi.

Wi-Fi also is rocket fuel for the Internet of Things. With the rise of Wi-Fi, innovators and entrepreneurs can confidently assume that they can connect to a Wi-Fi network for free and without having to acquire a license. This has allowed a new world of *permissionless innovation*. Creative companies can suddenly turn any appliance, speaker, thermostat, camera, baby monitor,

or TV into a smart device—one that can access the internet. Our homes today have, on average, roughly 17 connected devices and are projected to have 24 by 2027.

Steve Jobs’ unprecedented decision to put Wi-Fi into the iPhone in 2007 was one of the most pivotal decisions in communication’s history. This transformed the phone from a device primarily designed to make calls into the most important internet access tool in the world. It opened up the app ecosystem, and everything that has sailed in its wake. If there is any doubt of the monumental significance of this unlicensed shared wireless workhorse, just look at the numbers.

- **Wi-Fi carries the world’s internet data:** Ten times more data transits over Wi-Fi networks than all other wireless networks combined, including 5G networks.
- **Mobile phones are effectively Wi-Fi devices:** According to an OpenSignal study, 80-90% of data traffic on mobile phones goes over Wi-Fi. Wireless carriers depend on Wi-Fi to manage capacity on their cellular networks. Indeed, if you’re indoors, you’re more likely than not starting your phone call on Wi-Fi.
- **America has profited:** Wi-Fi has translated into hundreds of billions of dollars added to the U.S. economy annually—by 2027, the annual economic value of Wi-Fi is projected to reach \$2.4 trillion. The U.S. decision to open the 6 GHz band to Wi-Fi is projected to generate \$1.2 trillion annually by 2027, and opening the 7 GHz band is estimated to add at least \$79 billion to the economy between 2025 and 2027 alone.



These extraordinary figures are not a result of luck, but instead the result of enlightened policy. The FCC first recognized in the 1980s that a band of spectrum characterized by most as “junk spectrum” held the promise of carrying data on a shared, unlicensed basis. And subsequent Commissions further embraced and advanced this forward-looking shared model. The novel approach made spectrum available to an infinite number of users at no cost and without undue regulation. The spectrum was free for consumers to use. A swarm of new devices, unimaginable at the time, flooded the market, and the torrent continues to accelerate unabated. New advanced generations of Wi-Fi, such as Wi-Fi 7 and 8, promise a whole new universe of things in the home including smart glasses, VR/AR devices, robots, and AI systems.

And the best part of the story is that Wi-Fi is an American-led innovation. Wi-Fi is based largely on American intellectual property. It employs an approach that harnesses the input and innovation of our citizens, acting freely to publish, produce, and invent. This is a stark contrast to the central command approach of autocratic societies that do not trust their own citizens, preferring to spy on them rather than empower them. On the international level, America is championing the use of Wi-Fi by other countries, to the consternation of the Chinese Government, which seeks exclusive 5G bands to drive the sale of Chinese hardware around the world, as part of its digital silk road initiative.

Wi-Fi ushered in the future, and it will remain the indispensable technology for the foreseeable future. American spectrum policy should recognize this and continue to support Wi-Fi with the spectrum it needs to continue its explosive growth and preserve the high-quality experiences consumers have come to expect. We are grateful that the FCC made additional spectrum available in the 6 GHz band, but more is needed based on rapidly rising demand and innovative new services that will rely on wider spectrum channels. We need a spectrum

roadmap that recognizes and takes account of our dependency on Wi-Fi and does not neglect it in the fervor to support the 5G cellular transition.

Shared Spectrum: The Key to 5G and Beyond

There is one simple truth that should animate any discussion about future approaches to spectrum policy. It is that while demand for spectrum is accelerating, the supply has dried up. Nearly all mid-band spectrum that carriers seek for 5G is currently being used by mission-critical government systems, most of which are with our warfighters at DOD. There seemingly is a Hobson's choice between degrading our national security capability in favor of commercial interests, or not risking harm to the national security but crippling our economic and technological superiority versus our global adversaries.

The approach we have used historically will not resolve this perennial conflict. In the past, we relied on a clear-and-auction approach. Government officials would identify bands held by government users that were underutilized or that could be relocated at reasonable cost. We would auction that spectrum to commercial interests, and the government users would be cleared from the band. The winning bidders typically would pay for the relocation costs out of the auction proceeds—assuming a suitable place to move had been found.

But today, several critical things have changed, complicating this approach. First, most spectrum incumbered by government today is being used for mission critical systems (Naval and airborne radar, space exploration, FAA air safety, etc.). The low-hanging fruit has been eaten. Second, there are fewer and fewer suitable places to move government users and greater security risks attendant to forced relocation. And third, relocation costs are skyrocketing, in many cases exceeding any reasonable expectation that an auction would produce enough money to even cover our costs. The battle between government users trying to keep control of their spectrum

versus commercial players trying to take it away is boiling over, spilling into the political arena for a resolution. This is a painful and dangerous path that pits commercial wireless against national security and leads to endless cycles of political conflict.

Even where a consensus is reached to clear national security systems from a spectrum band and offer it at auction to commercial interests, the time and cost are increasingly astronomical. These costs and delays reduce auction revenue, keep spectrum from consumers for years, and jeopardize military readiness and national security. In fact, DOD has projected that clearing just the Lower 3 GHz band for exclusive use would take 20 years and cost at least \$120 billion—which is roughly 50% *more* than any exclusive-use spectrum auction has yielded in revenues. We are not going to win a race against China or anyone else if we are this slow getting spectrum to market and this weighed down by the exorbitant cost. And a series of brutal political fights will not open a smooth pipeline for future spectrum.

Shared spectrum models are the key to meeting our growing wireless needs. New advances in technology, such as dynamic spectrum management and sensing technology, have made it possible to effectively coordinate and manage a collection of different users, offering different services in the same spectrum band. If government and commercial users can share spectrum, then both sides win, and our policy leaders don't have to referee pitched spectrum battles constantly. Sharing spectrum has several exceptional advantages:

- It “expands the pie,” bringing new commercial spectrum to market that otherwise would not be available for use.
- It resolves the conflict between competing federal and commercial interests.
- It allows hundreds of companies to use the spectrum, rather than just one. This increases competition and invites a wider range of diverse uses.
- It can still support the offering of 5G and 6G services from terrestrial wireless providers.

- Non-traditional providers can use spectrum to set up their own networks. Manufacturing plants can have a private network, as can hospitals, schools, farms, airports, and utility services.
- And importantly, the lower cost of entry allows wireless providers to better reach and serve rural communities.

We have had proven success with sharing spectrum. The two leading examples of shared spectrum both arose from American innovation. The first is Wi-Fi, which we all know and value. Wi-Fi operates at far lower power levels than cellular macrocells. It was designed from the beginning to share spectrum among multiple users on a non-prioritized, “listen-before-talk” basis, relying on technical rules and sensing technologies to support the shared use of frequencies.

The second innovation is the rise of shared-licensed technologies. These technologies allow spectrum to be licensed for commercial use, but require such licenses to operate under rules involving databases or sensing systems that ensure compatibility with government and defense systems. These shared-spectrum approaches make it possible for commercial operations to coexist not only with government systems, but also with other commercial operations, adding even more value.

One very successful example of shared licensing is the deployment of commercial Citizens Broadband Radio Service (CBRS) systems that harmoniously operate alongside the U.S. Navy today. The FCC’s shared-licensed CBRS auction produced more auction bidders and winners than any other auction. There were 228 winning bidders—almost ten times the number of winning bidders than in the exclusive-use, cellular macrocell 3.45 GHz band auction. Today, the CBRS band is used by the big cell phone companies and by cable companies offering competitive wireless services. In addition, a host of non-traditional users are operating in the

band, including manufacturers like John Deere, airports and seaports, including the Newark Liberty Airport, educational institutions, including Sacramento City Unified School District, smart factories, stadiums, agriculture, the U.S. military, and it was even used to restore connectivity in North Carolina after Hurricane Helene. There are already more than 400,000 CBRS base station devices around the country, more base stations than in the traditional cell phone bands.

Moving Forward on Spectrum Policy

The steady growth of America's reliance on technology and the incredible new power of converged wireline and wireless have created a new spectrum era. This committee has always supported American ingenuity in meeting these needs, and the future of spectrum management is no different. In a time of spectrum scarcity, we must meet these needs while recognizing our obligation to protect critical government and national security capabilities and operations.

The answer is coexistence through spectrum sharing. Wi-Fi and shared-licensed technologies can operate successfully and efficiently in the same band as other commercial or national security operations without causing harmful interference, all without requiring lengthy and costly relocations. That's revolutionary, and it opens a path to a sustainable and scalable spectrum pipeline. Without embracing shared spectrum, we risk slower deployment of critical technologies like 5G and 6G, undermining our global leadership. And if we fail to act now, the U.S. risks falling behind not only in economic growth, but also in national security and technological innovation.

It goes without saying that any auction needs an auctioneer. NCTA supports the extension of the FCC's auction authority, so that it has all the tools necessary to ensure that new spectrum is made available. At the same time, however, we urge Congress not to favor exclusive

license auctions over shared-license auctions and unlicensed Wi-Fi designations. Instead, as the country explores opening mid-band spectrum, we should be sure to study a shared-license auction in the Lower 3 GHz band and Wi-Fi in the 7 GHz band and, in general, establish policies that allow the country to harness these two technologies to find win-win solutions in future bands.

Conclusion

Thank you again for inviting me here to speak with you today. Spectrum is at the center of NCTA's members' efforts to bring the best broadband to the country. Our businesses have adapted to massive changes in the wireless environment and are therefore investing in Wi-Fi and 5G shared-spectrum technologies, alongside traditional cellular networks. We encourage Congress to do the same to ensure that the U.S. industry and military continue to lead the world in the wireless space.

Mr. HUDSON. Thank you.

Mr. Gillen, you are recognized for 5 minutes for an opening statement.

STATEMENT OF BRAD GILLEN

Mr. GILLEN. Good morning. Thank you and congratulations, Mr. Chairman. Ranking Member Matsui, members of this subcommittee, it is a privilege to be with you.

Mr. HUDSON. Is your microphone on? I want to make sure.

Mr. GILLEN. It is a privilege to be with you, a privilege to be here on behalf of the wireless industry, 4.58 million jobs strong across this country. We invest \$30 billion a year to make this and so much more better.

And I really want to echo your opening comments. This is a conversation around spectrum, but it is a lot more than that. It is about economic opportunity for all. It is about our national security. It is about our global competitiveness. And it really comes back to connectivity drives so much of this conversation, particularly 5G connectivity. And spectrum, at its core, is our oxygen.

I was here 2 years ago asking for more spectrum. I am back today and that ask is more urgent because we have stood still as a country the last 2 years. The rest of the world is moving forward aggressively, and so too are our American consumers, who use more and more of this each and every day, and we want to make sure we continue to meet that demand.

Now, our screens today aren't 5G enabled, so we are going old school with pictures, but it is easier to explain through pictures. So if you think about how much traffic has been on wireless networks the last few years, this is where we have been.

[Shows chart.]

When I was here last time, we were in the orange. I actually bragged about just how much traffic was being carried on these 5G networks. We are now just 2 years later here, 100 trillion megabits of traffic on these networks, almost doubling in only 2 years of time. I think the economists call that kind of growth bananas.

We just don't see that kind of growth, and we were able to do that only thanks to the leadership of this committee. It was the auctions that you directed in 2020 and 2021 that gave us the oxygen in spectrum to actually meet that moment.

So when you look forward to the next couple years, by the end of the generation, by the end of the decade, we are going to have almost three times more traffic on our networks than we do today. And the challenge we face right now is we don't have new auctions right now. The FCC doesn't have auction authority to meet that moment.

So how do you actually meet that consumer demand? Part of it is our responsibility. We need to invest, and we do, each and every 20 or 30 billion dollars, to make our networks denser, to have more facilities throughout the country. We have 40 percent more than we did a generation ago.

We also, all of us, need to be more efficient with this finite resource. We are very proud of our record in doing that. We are 42 times more efficient with the technology we use on a per-megahertz

basis than we were a generation ago. All of that is necessary, but it is not sufficient.

If you plug that all in the traffic models, it reveals that we need roughly 400 more megahertz of spectrum by 2027 and over 800 by 2029. Where does that spectrum come from? The Federal Government today reserves roughly two-thirds of this asset, the midband spectrum we are talking a lot about today, for their own use.

So if you look at the slide in terms of who has midband right today [shows chart], the Federal Government has 600 percent more than we do today. We are in the teal on the bottom, 450 megahertz. Unlicensed WiFi has 300 percent more than we do, thanks to the 6 gigahertz decision you alluded to.

What is happening in the rest of the world? They see this same type of growth curve that we see, and they are building—they are getting access to spectrum more quickly. Nowhere is that more true than with respect to China. In 2023, we were roughly even with China in terms of midband access. Looking forward now to where we will be in 2027, they will be in a position to have four times more than us. That is untenable from a global-competitiveness standpoint.

So what do we need? We would love this committee's help. Over the last 30 years, the committee, on a bipartisan basis, has provided FCC auction authority, and each time you do that, you provide a plan, a roadmap of what you expect them to do with that authority, and that is critical.

And now, this conversation gets very jargony fast. I am extremely guilty of that. But at its core, what this conversation is about, why we really care about spectrum, why we are excited about what wireless could be is because we have a role to play in almost everything you came to Washington to work on. Everyday household costs, we can help. Beating China, creating jobs.

A new study just released this morning from NERA said for every 100 megahertz of midband spectrum released for 5G creates 1.5 million jobs rippling throughout the economy, both those building those networks all across the country but also those innovating on top of that.

And we also just want to close with there is a huge role here for the digital divide and the role of spectrum to play, both connecting Americans on the mobile and the home broadband side. This is too important technology for not everyone to be involved. So we want to partner with you to make sure that this resource is available to all Americans, that everyone has a fair shot at this.

Greatly appreciate you including us, and I look forward to your questions.

[The prepared statement of Mr. Gillen follows:]

Testimony of

Brad Gillen
Executive Vice President
CTIA
on

Strengthening American Leadership in Wireless Technology

before the U.S. House
Committee on Energy & Commerce
Subcommittee on Communications and Technology

January 23, 2025



Chairman Hudson, Ranking Member Matsui, members of the Subcommittee, on behalf of CTIA and the wireless industry, thank you for the opportunity to testify today.

CTIA thanks this Subcommittee for its bipartisan commitment to crafting sound spectrum policy for our nation’s future. I last testified on this topic before the Subcommittee in early 2023 in the midst of the debate around renewing FCC auction authority and identifying more spectrum to meet the needs of American households. Fast forward to today, and we remain in that same place. In the interim, we have lost two critical years to move our country forward.

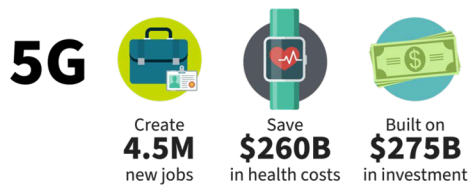
This Committee has played a unique role in previously driving U.S. wireless leadership and innovation. We need your collective leadership again. And we need it urgently. The wireless industry can play a key role in addressing many of the core challenges facing our country today—from helping families with everyday household costs and creating more good paying jobs to competing more effectively against China and connecting all Americans. All of this is dependent upon access to more spectrum, specifically full-power licensed 5G mid-band spectrum. We urge you to swiftly restore FCC auction authority with a clearly defined pipeline of future auctions for our nation’s economic and national security.

Wireless Creates Opportunity Across America.

Wireless is a uniquely American industry that has helped reshape our economy and U.S. global leadership. The first phone, the first call, and countless other firsts happened in the U.S. because of the close partnership—and commitment—of the U.S. government and wireless industry to lead. Today, 5G wireless networks blanket the nation covering over 330 million Americans who benefit from multiple competitive options offered by national operators, regional providers, and resellers.

The wide availability of 5G is the result of record-breaking investment. Wireless providers—including AT&T, EchoStar, T-Mobile, UScellular, and Verizon—invested more than \$30 billion in 2023 alone, and over \$215 billion since 2016. In this, we lead the world: U.S. wireless network investment accounted for 23 percent of the world’s total wireless capital expenditures even though the U.S. has just 4 percent of the world’s population. The wireless industry is proud to be one of the two largest investors in America’s economy.

And we are just getting started: this platform is driving new investment and innovation. Boston Consulting Group projects 5G will be a powerful engine for our nation’s future



economic growth by adding \$1.5 trillion to our economy and 4.5 million new American jobs this decade. The benefits are more than economic. PwC projects over \$260 billion in health savings thanks to 5G adoption and innovation. We already see 5G unlocking new innovations in agriculture, defense,

transportation, manufacturing, and so much more. Smart manufacturing is increasing employee output by 120 percent, helping pave the way for a U.S. manufacturing renaissance. We also see entrepreneurs starting new companies leveraging the power of 5G to improve their communities.

All of this is dependent upon spectrum policy keeping pace with the needs of consumers and enterprise. Wireless networks rely on licensed spectrum sold at auction by the FCC to deliver the reliable services Americans demand. Since Congress first authorized the FCC to conduct spectrum auctions back in 1993, the United States has led the world in spectrum policy and exported that policy across the globe. Those auctions have also raised over \$233 billion for the U.S. Treasury and helped fund key Congressional priorities. They have also helped launch massive cycles of U.S. investment and innovation to the benefit of U.S. consumers.



5G Home Broadband Drives Consumer Value and Closes The Digital Divide.

The advanced capabilities and speeds of 5G unlock the ability of the wireless industry to provide new services, including a real competitive alternative in the home broadband market. 5G home broadband is a plug-and-play connection with 15-minute self-installation that delivers home broadband available in your house. This new service is having profound positive effects across the country.

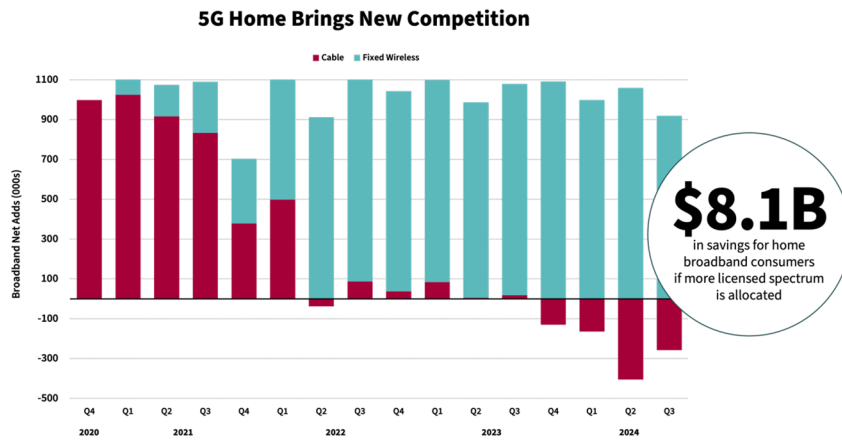
First, the ability of 5G home to be deployed quickly in remote and rural areas has made a real impact in closing the digital divide. The wireless industry has long been proud to be the onramp to the Internet for millions of households, and, today, for 24% of non-college educated Americans, their smartphone is their only connection to the Internet. 5G home has only amplified and expanded those efforts. Almost one-fifth of 5G home broadband subscribers are new to broadband altogether and one provider reports a third of their customers are coming



~20% of new 5G home subscriptions are new to broadband altogether

from rural America. Because of the ease of deployment for both consumers and operators, 5G is making a real impact in creating connectivity options in unserved and remote areas.

Second, 5G home is bringing the competitive American spirit of the mobile market to the home broadband market, and this service will only get more powerful with access to more spectrum. For years, cable companies dominated the home broadband market (in red below). The introduction of 5G home broadband offerings (in teal) is changing that. 5G home is the fastest growing broadband connection in the nation. 5G home supports consumers' speed needs, is cost effective, and is easy to install. Indeed, CNET noted that "the affordable, straightforward pricing is vastly appealing and it's what jumps off the page." Over the past three years, 5G home accounts for 99% of all broadband net adds.



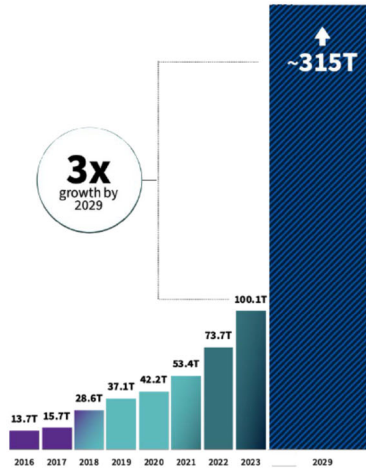
The challenge that 5G home broadband faces today is the limited supply of available spectrum, which is constraining this service's full impact; one operator already reports a 1 million customer waiting list. A recent report estimates more spectrum could expand the service and help save consumers \$8.1 billion annually.

America’s Exploding Demand for Wireless

New 5G uses cases—as well as America’s ever increasing reliance on smartphones and other wireless devices—are driving extraordinary traffic growth on wireless networks. When I last testified, I noted a then-record of 53 trillion MBs carried on mobile networks. Today, just two years later, that number has almost doubled to over 100 trillion MBs, and we have had to meet that record growth without the benefit of any new spectrum. Looking ahead, consumer usage will drive continued record growth with **over 3 times the traffic** carried on wireless networks by the end of the decade.

To keep up with the needs of American consumers, the wireless industry will continue to invest tens of billions of dollars every year building denser networks in more communities with a mix of traditional cell towers and new small cell technologies. We will also use more efficient technology to be good stewards of the spectrum available to our industry today. The wireless industry is 42 times more efficient as a spectral user than we were just a generation ago. Absent an infusion of new spectrum into our industry, network investment and spectral efficiency alone will not be sufficient. We will see the impact first in high-traffic areas in as little as two years as our spectrum deficit will reach 400 megahertz in 2027 and grow to over 800 megahertz in 2029. By acting now, Congress can prevent any consumer disruption and ensure future innovation is supported. For so many enterprise connectivity solutions reliability in terms of connection, speed, and latency is critical, and soon at risk.

Wireless Growth Skyrocketing

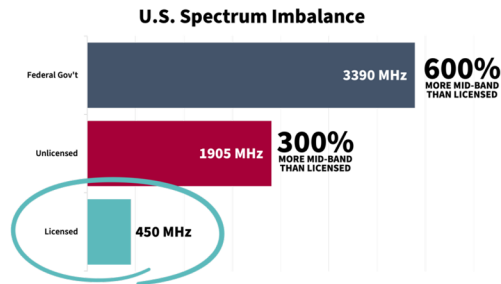


The Mid-Band Access Dilemma: Today’s Unbalanced U.S. Policy

The key spectrum being used for 5G around the world is mid-band spectrum, roughly 3 to 8.5 GHz, and the United States currently is falling short in terms of access. As new FCC Chairman Brendan Carr has warned “[t]he U.S. sorely needs more licensed mid-band spectrum now for commercial use to keep pace with consumer demand and our geopolitical rivals.” This is an area of long-standing bipartisan agreement. Former FCC Chairwoman Jessica Rosenworcel similarly championed the need for more U.S. mid-band access because it is the “ideal blend of capacity and coverage ... key to delivering on the promise of 5G services and ... reach[ing] as many people as possible.”

Congress in bipartisan fashion took significant steps in 2018 and 2021 to jumpstart commercial access to full-power mid-band spectrum resulting in the C-Band and 3.45 GHz auctions. The first Trump Administration worked across agencies on a system-by-system basis to identify the government-held 3.45 GHz band for future wireless use. Together, these two auctions raised over \$100 billion in winning bids from a wide array of national and regional providers as well as new entrants. This reflects the extraordinary need for mid-band spectrum, and that spectrum was quickly put to use to serve Americans.

Despite those initial efforts, however, there is a significant imbalance today in U.S. spectrum policy with respect to how mid-band spectrum is allocated between different types of users. Federal government agencies today have 600% more spectrum than 5G. There is also 300% more spectrum dedicated to unlicensed/Wi-Fi use than 5G, including 1,200 megahertz of spectrum given to Big Tech, cable companies and other users in 2020. Together, we can find a better balance that enables government agencies to meet their missions—including national defense—while enhancing and expanding commercial access. The challenge we face today is the FCC does not have the tools to address this disparity. There are no auctions of new nationwide spectrum planned, and the FCC has even lacked the general authority to auction spectrum since 2023.



U.S. Economic and National Security at Risk Without Mid-Band Spectrum

Our global rivals have seen decades of U.S. wireless leadership and are aggressively moving to meet their own domestic demand and take the lead in the development of the industries of the future. They are taking action now to get ahead of skyrocketing wireless use by freeing up more 5G spectrum.

Today, the U.S. has a global deficit of almost 200 megahertz of licensed mid-band spectrum (twice the size of the most recent 3.45 GHz auction) compared to our key allies and rivals. Japan today has over 1,100 megahertz assigned, and the United Kingdom almost 800 megahertz.

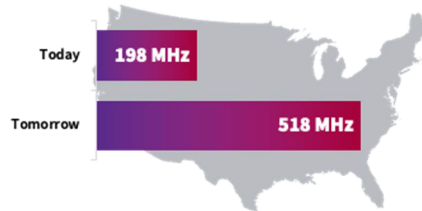
This global dynamic is further complicated by our rivals' plan for even greater access by 2027 when our deficit is estimated to exceed 500 megahertz. To close that gap (and meet the needs of U.S. consumers), the U.S. will need to roughly double the amount of commercial mid-band spectrum it has available today. FCC Chairman Carr has cautioned that “while America is standing still, our global competitors and adversaries are passing us by.”

China is a prime example. A few years ago, the efforts by Congress brought the U.S. roughly even with Chinese operators in terms of spectrum access. Since then, however, China has continued to move aggressively and is poised to have as much as 1,600 megahertz of licensed mid-band spectrum by 2027. That spectrum advantage can be marshalled to drive new innovation and use cases across the Chinese economy. For example, China today has 14x more 5G-enabled factories than the U.S.

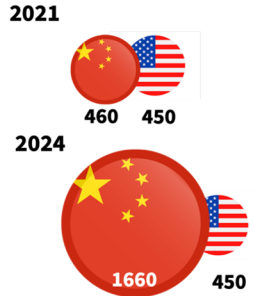
The Center for Strategic and International Studies (CSIS) warned that “the mid-band spectrum gap is a significant national security problem ... facilitat[ing] China’s ambitions to shape twenty-first century technologies.”

We see the same trend in terms of 5G availability. The U.S. was an early leader in getting 5G in the hands of U.S. consumers, but the last few years of

U.S. Spectrum Deficit



China’s Mid-Band Advantage



Projection of amount of mid-band spectrum available in 2027

governmental inaction have given China an opening. China has now overtaken the U.S. in terms of 5G availability providing their own domestic advantage.

China is also seeking to export their advantage and build new wireless ecosystems with Chinese equipment around the globe in Africa, Asia, and elsewhere in bands currently unavailable in the U.S. The U.S. so far has been unable to offer a competing global vision for spectrum policy or successfully link its spectrum policies with its allies. This risks a divide in terms of our country's global influence over future technologies, and the benefit of globally scaled solutions. Accenture projects \$200 billion in U.S. economic growth is at risk if the U.S. is unable to build global ecosystems around spectrum and network equipment. The Atlantic Council warns of a "bifurcated 5G world" where China "set[s] the global standard." This Committee is best positioned to address this global deficit now and provide our allies a U.S.-backed vision to counter China's plan.

Congress Can Replicate Its Past Success

Reauthorization of the FCC's auction authority is key to maintaining America's wireless leadership. The lessons of the 1997, 2006, and 2012 FCC auction authority extensions demonstrate the critical role of Congress directing spectrum policy through packaging extensions of authority with designated future FCC auctions. In each of those instances, Congress mandated specific auctions along with extending the FCC's authority. Congress' last extension directed the FCC to hold the then-record breaking AWS-3 auction, the 600 MHz broadcast incentive auction, and the H Block auction. Depriving the FCC of auction authority will stunt 5G growth, impede U.S. investment and innovation, and send our international rivals a dangerous message about U.S. wireless leadership.



It is in our nation's economic and national security interest to identify a pipeline of bands to be auctioned for licensed wireless use. The Committee is uniquely situated to address this shortfall, and this effort should focus on our licensed mid-band deficit in a manner that ensures key government spectrum-based services are preserved, if not enhanced, with new more efficient state-of-the-art technologies and systems. The Department of Defense and other agencies are important users of spectrum, and must continue to have access to sufficient spectrum to deliver mission critical services. But

as with any scarce resource, there is a good-government obligation to use that spectrum efficiently. We are confident that with this Subcommittee's direction, we can identify opportunities for win-win scenarios benefiting both commercial and government spectrum users.

The good news is there are a number of solutions available for Congress, the Administration, and the FCC to meet the projected 400 megahertz deficit by 2027. Specifically, the Biden Administration identified the lower 3 GHz band (3.1-3.45 GHz) and the 7/8 GHz band (7.125-8.4 GHz) as the two most promising global bands for future commercial use. Congress previously identified the lower 3 GHz band as well. The U.N. has also identified two additional bands for future global 5G use including the 4 GHz band (4.4-4.94 GHz) and the upper half of the 6 GHz band (5.925-7.125 GHz). While the U.S. has dedicated the entire 6 GHz band for unlicensed use today, Accenture identified those other three bands—the lower 3 GHz, 4 GHz, and 7/8 GHz bands—as underutilized federal bands available for potential reallocation. Yet another mid-band option is the C-Band, where the U.S. was among the first movers globally with its 2021 auction of lower C-Band spectrum. We could follow a similar approach to auction up to an additional 220 megahertz of C-Band spectrum to meet future U.S. consumer and enterprise needs.



Ultimately, Congress and the Administration have multiple spectrum solutions to meet consumer demand, beat China, and also provide our allies with a roadmap for U.S.-led global ecosystems. The key is to act, and act now.

* * *

Thank you for this opportunity to testify, and I look forward to your questions.

Mr. HUDSON. Thank you.

Ms. Rinaldo, you are recognized for 5 minutes for an opening statement.

STATEMENT OF DIANE RINALDO

Ms. RINALDO. Thank you.

Chairman Hudson, Ranking Member Matsui, and esteemed members of the committee, thank you very much for the opportunity to testify on America's leadership in wireless innovation. This hearing and topic are vital to the national and economic security importance to the United States, and I welcome the committee's interest on this subject.

And also, thank you for recognizing my 10-year-old son, Cole. He is a budding telecom engineer. We take workforce development very serious at the coalition.

So I have had the distinct pleasure of serving this body in a couple of different capacities. I was the lead cybersecurity and tech telecom staffer at the House Intelligence Committee. I was also the Acting Administrator of NTIA in the Executive branch.

Today, I serve as the executive director of the Open RAN Policy Coalition, a coalition that promotes to drive the adoption of open and interoperable solutions in the radio access network. Our coalition represents a diverse group of communication and technology companies unified under a common goal: policy that can help dismantle technological and market barriers to cultivate a competitive, secure, and resilient marketplace.

Since the launch of the Open RAN Policy Coalition, ORAN has experienced tremendous growth, with more than 100 global deployments. From the world's largest right here in the United States with 100 percent Open RAN 5G network that Dish's Boost Mobile has deployed nationwide, Open RAN has achieved its initial goal of providing additional vendor choice for mobile operators.

This Congress and the new administration assume office at a pivotal time in the wireless communication space. The next 2 to 4 years are critical to ensuring our country's continued leadership and competitiveness in the global contest with the People's Republic of China.

Beijing's efforts to dominate the wireless space are simultaneously wide-ranging, prolific, and focused. The PRC seeks to supplant the United States as the world's leader in wireless innovation and market leadership. This is not about free market competition, but about state-sponsored market manipulation. Put simply, the PRC does not want to compete. It wants to rig the game to win.

Throughout my testimony today, I will return to three critical themes. First is the pivotal role of U.S. in pioneering wireless innovation. The second is the necessity of leadership in spectrum policy. And lastly is the importance of public-private policies. We truly do need to work together.

The United States has had a proud legacy of leadership in wireless technology, from the groundbreaking development of 4 and 5G networks to the creation of global positioning systems, an innovation that transferred global navigation and timing. Our country has consistently been at the forefront of wireless advancements.

These technologies have driven economic growth and job creation, contributing billions of dollars annually to our economy. Industries such as healthcare, transportation, and manufacturing have been revolutionized by wireless innovation, enabling new applications for remote surgery, autonomous vehicles, and smart factories. For example, estimates indicate that 5G alone will create millions of jobs and contribute over \$1.5 trillion to global GDP by 2035.

Looking ahead, the opportunities are boundless. However, achieving these advancements depend on one critical factor: secure and efficient access to spectrum.

Now, the PRC's ascendancy is by no means destined for success. The strengths of America remain and have the potential to grow, provided they are carefully stewarded, encouraged, and, indeed, unleashed. It is Silicon Valley, not Shenzhen, to which innovators and industry flock.

How can Congress and the Federal Government help maintain this edge? By fostering an environment conducive to innovation, removing roadblocks for growth, and aligning policies to facilitate the expansion. One fundamental element underpins all our aims, and that is spectrum leadership. Spectrum is the lifeblood of wireless communications driving innovation and economic growth and national security.

In closing, the United States is at a pivotal moment. We are the world's leader in wireless innovation, but maintaining this position requires sustained effort, investment, and collaboration. By prioritizing superiority in optimizing spectrum, strengthening partnerships, and enhancing our participation in global forums, we can ensure that American innovation continues to define the future of connectivity.

Thank you for the opportunity to testify today, and I look forward to your questions.

[The prepared statement of Ms. Rinaldo follows:]

**Diane Rinaldo, Executive Director
Open RAN Policy Coalition**

Strengthening American Leadership in Wireless Technolog
January 23, 2025

House Energy and Commerce Committee

Testimony for Congressional Hearing on U.S. Leadership in Wireless Innovation

Chairman Hudson, Ranking Member Matsui, and esteemed Members of the Committee, thank you very much for the opportunity to testify on America's leadership in wireless innovation. This hearing and topic are of vital national and economic security importance to the United States, and I welcome the Committee's interest.

Before I begin, I'd like to introduce myself. My name is Diane Rinaldo. I have had the distinct pleasure and opportunity to serve this body, as well as the Executive Branch as the lead cybersecurity and technology staffer on the House Permanent Select Committee on Intelligence, and as acting NTIA administrator. Now in the private sector, I serve as the Executive Director of the Open RAN Policy Coalition (ORPC).

The importance of secure and resilient wireless communications has been and still is central to my career. Wireless technology is vital to our country's economic growth, its national security, and its global leadership – the recognition of its importance, and indeed its complexity, is something I have seen grow firsthand, and have had the privilege of advancing in the public and private sectors, with academia, and beyond.

About the ORPC

The ORPC promotes policies to drive the adoption of open and interoperable solutions in Radio Access Networks (RAN). Our coalition represents a diverse group of communication and technology companies unified under a common goal: policies that can help dismantle technological and market barriers to cultivate a competitive, secure, and resilient wireless market. Our members include carriers, vendors, cybersecurity and cloud service providers, innovators, startups, and established technology companies, all committed to the collective health of the competitive and diverse mobile ecosystem. This initiative transcends technological advancement; it represents a strategic shift towards fostering innovation, stimulating competition, and broadening the supply chain for next-generation wireless technologies, including 5G.

The deployment of advanced mobile networks like 5G is at a pivotal moment, not only for technology policy but for economic security and global connectivity. Open RAN is at the heart of this transformation, influencing how we approach economic and security challenges. A robust and diverse supply chain is critical, and international cooperation on wireless technology is now more vital than ever.

Since the launch of ORPC, Open RAN has experienced tremendous growth with more than 100 global deployments. From the world's largest right here in the U.S. with Boost Mobile, to placements in the South Pacific, Open RAN has achieved its initial goal of providing additional vendor choice for mobile operators.

Wireless Communications & Strategic Competition

This Congress and the new administration assume office at a pivotal time in the wireless communications space – the next two to four years are critical to ensuring our country’s continued leadership and competitiveness in the global contest with the People’s Republic of China. Beijing’s efforts to dominate the wireless space are simultaneously wide-ranging, prolific, and focused. The PRC aims to control the entire wireless eco-system from hardware and software through to global standard-setting and governance. Through state-sponsored corporate theft and security service intelligence collection efforts, as well as predatory market manipulation accompanied by aggressive and coercive “we have an offer you can’t refuse” style “diplomacy,” the PRC seeks to supplant the United States as the world leader in wireless innovation and market leadership. This is not about free market competition, but state-sponsored market manipulation and usurpation.

Put simply, the PRC does not want to compete, it wants to rig the game to win.

Throughout my testimony today, I will return to three critical themes, and our recognition of – and progress on – each of them is vital to strategic competition and American prosperity.

1. The pivotal role of the U.S. in pioneering wireless innovation;
2. The necessity of spectrum leadership; and,
3. The importance of public-private partnerships in international development, standards setting, and cybersecurity.

U.S. Leadership in Wireless Technology Innovation

The United States has a proud legacy of leadership in wireless technology. From the groundbreaking development of 4G and 5G networks to the creation of the Global Positioning System (GPS) – an innovation that transformed global navigation and timing – our country has consistently been at the forefront of wireless advancements.

These technologies have driven economic growth and job creation, contributing billions of dollars annually to our economy. Industries such as healthcare, transportation, and manufacturing have been revolutionized by wireless innovation, enabling new applications from remote surgery to autonomous vehicles and smart factories. For example, estimates indicate that 5G alone will create millions of jobs and contribute over \$1.5 trillion to global GDP by 2035.

Looking ahead, the opportunities are boundless. Emerging technologies like 6G, artificial intelligence (AI)-driven network management, and the Internet of Things (IoT) promise to redefine connectivity and unlock new industries. However, achieving these advancements depends on one critical factor: secure and efficient access to spectrum.

That position of leadership is, however, under threat. The PRC is no longer merely a factory for the world but is becoming a larger and increasingly dominant player in the field of wireless communications. From companies like Huawei and ZTE – both of which were demonstrated to be national security threats by the House Permanent Select Committee on Intelligence during my

time there – to the proliferation of the app economy, the PRC is looking to capture increasing market share for its company and the interests of Beijing. While Congress has taken action to control the flow of advanced semiconductors and limit the flow of Americans' data to the PRC, the United States is playing on an uneven field, one that Beijing is aggressively tilting through market manipulation and non-market means toward its favor.

The Importance of a Coordinated Long-Term Plan for Spectrum Allocation

The PRC's ascendancy is by no means destined for success. The strengths of America remain and have the potential to grow, provided they are carefully stewarded, encouraged, and indeed unleashed. The innovation economy which birthed wireless communications and GPS, remains strong, well-invested, and globally sought-after. It is Silicon Valley, not Shenzhen, to which innovators and industry leaders flock.

How can Congress and the federal government help maintain this edge? By fostering and environment conducive to innovation, removing roadblocks to growth, and aligning policies to facilitate expansion. One fundamental element underpins all our aims: spectrum leadership. Spectrum is the lifeblood of wireless communication, driving innovation, economic growth, and national security. Maintaining leadership in this critical area is not optional; it is essential for ensuring that America continues to set the pace for technological progress and global standards.

An effective spectrum management plan requires collaboration among federal agencies and private industry. Historically, fragmented approaches to spectrum allocation have resulted in inefficiencies and missed opportunities. For example, delays in freeing up spectrum for commercial use can hinder investments in innovation, thereby giving our global competitors an edge. Similarly, for federal users, such delays can disrupt acquisition timelines, causing further setbacks and inefficiencies. A clear, unified strategy to optimize spectrum allocation and use in both commercial and government settings can mitigate these risks and ensure that spectrum resources are allocated to maximize economic and national security benefits.

Equally important is the need for spectrum-sharing frameworks that balance the requirements of federal and commercial stakeholders. Investments in advanced technologies, such as dynamic spectrum sharing, could enable more efficient use of existing resources while fostering innovation. The U.S. government should prioritize working with federal and private users alike to develop pilot use cases that may provide breakthroughs in dynamic spectrum sharing.

Moreover, a long-term plan must prioritize investments in research and development to explore new ways of utilizing spectrum, such as millimeter-wave and terahertz bands, which are critical for future applications. It should also address resiliency concerns, including the protection of critical infrastructure like GPS, which remains vulnerable to interference and disruption.

Finally, a coordinated plan ensures the U.S. remains competitive in global forums. By aligning domestic policies with international standards development processes, we can lead the development of global spectrum frameworks and counter the influence of nations like the PRC that seek to undermine fair and transparent practices.

A robust, forward-thinking spectrum allocation strategy is essential to preserving America's leadership in wireless innovation. By prioritizing efficiency, collaboration, and resiliency, we can maintain our position at the forefront of technological advancement. Indeed, in many ways we are our own worst enemy – fragmented, though well-intentioned, approaches across competing agencies introduce friction into the system. This friction slows decision-making and innovation and allows space for the PRC to expand.

The Role of Standards Bodies in Sustaining U.S. Leadership

International standards bodies, such as 3GPP, and the ITU's , World Radiocommunication Conference (WRC), play a decisive role in shaping the global wireless technology landscape. The U.S. has historically been a leader in these forums, ensuring that our technological innovations set the benchmarks for global standards. However, competition has intensified, particularly from the PRC, which seeks to dominate these arenas to advance its geopolitical, security, and economic interests.

To safeguard our leadership, it is imperative that we enhance coordination among federal agencies and the private sector to ensure robust representation in standards bodies. Streamlined policies to support participation in these forums are essential. We must also prioritize a unified national strategy to counter foreign influence and promote fair, transparent standards that reflect U.S. values and technological leadership.

We must be unafraid to call out the PRC's behavior and use of lawfare to manipulate these global fora. The PRC's coercive diplomacy and bravado is not always linear, aimed at achieving a specific outcome, but seeks to bully nation-states to accede to their demands and create frameworks that favor Beijing – not the rules-based international order.

Strengthening the Innovation Ecosystem and Partnerships

Our leadership in wireless innovation hinges on fostering a robust ecosystem of collaboration between public and private sectors. There is and remains a long history of cooperation between and amongst the government and industry, but it is now more important than ever. The PRC is actively engaged in supporting companies overtly and covertly, giving preferential loans, market access, and using the authority of the state to advantage Chinese companies over its American competitors. This is not 'industrial policy' – this is wholesale market manipulation. The United States does not need to act in a similar manner; in fact, it would be counterproductive. What Washington can and should do is use the power of the purse to encourage smart cooperation, to use the authority of Congress to craft smart legislation and use the executive branch to encourage smart competition.

Federal investment in research and development is critical to sustaining U.S. innovation. Targeted investment from the federal government can help bring technologies through the 'valley of death' and to market. This is not about picking winners or losers, but creating additional competition, from which the government and country benefit. By streamlining regulatory frameworks, we can empower the private sector to continue leading in this domain.

Cybersecurity as a Pillar of U.S. Wireless Leadership

As we advance our wireless capabilities, cybersecurity must remain a cornerstone of our strategy. The increasing sophistication of adversarial threats to wireless networks and spectrum assets demands a proactive approach. The revelations of PRC penetration of America's communication infrastructure through advanced persistent threats like "Salt Typhoon" are frightening reminders of the intention and capabilities of our central adversary.

The GPS system, a quintessential example of American ingenuity, remains a critical asset but faces vulnerabilities due to its lack of resiliency. As Russia's GPS jamming, spoofing, and denial over Ukraine and Eastern Europe demonstrate, a resilient PNT system is vital. Ensuring its security and reliability is paramount to maintaining our leadership and global trust in U.S. technologies.

Additionally, the Cybersecurity Information Sharing Act of 2015, while an important step forward, requires reauthorization and strengthening to fulfill its original intent of facilitating effective information sharing between the government and private industry. Improved collaboration in this area will bolster our collective ability to address evolving cyber threats.

Conclusion

The telecommunications market is undeniably cyclical, with its periods of high peaks and low troughs. In recent years, the U.S. has faced significant challenges exacerbated by the expiration of spectrum auction authority, a critical tool for efficient spectrum management. Without the ability to hold auctions, uncertainty grows among private and federal stakeholders, threatening innovation and slowing the deployment of critical technologies.

Were market-based and regulatory challenges the only issue facing American leadership and innovation in the wireless space, progress would remain vital, but decidedly less urgent. Strategic competition with the PRC is taking a 3G problem to 6G speeds, and Washington must act with similar alacrity. We are witnessing an aggressive ramp-up by Beijing in advancing its "Digital Silk Road" initiative, its subsidization of state-owned and state-backed companies, and use of the tools of state diplomatically and beyond to distort the market in its favor. The PRC is not and will not play on a level field now or in the future. This strategy not only aims to expand its influence globally but also seeks to dominate telecommunications infrastructure, standards bodies, and markets in developing nations. The PRC's efforts to recruit allies and dominate critical technology ecosystems pose a direct challenge to U.S. leadership in wireless innovation.

To navigate these challenges, the U.S. must reassert its leadership by restoring spectrum auction authority, strengthening collaboration across sectors, and advancing a clear, coordinated national strategy for telecommunications with competition and cybersecurity at its heart.

In closing, the United States stands at a pivotal moment. We are the world's leader in wireless innovation, but maintaining this position requires sustained effort, investment, and collaboration. By prioritizing superiority in optimizing spectrum, strengthening partnerships, and enhancing our

participation in standards bodies, we can ensure that American innovation continues to define the future of connectivity.

I urge Congress to act decisively to support these priorities and safeguard our technological leadership. Thank you for the opportunity to testify today, and I look forward to answering your questions.

Mr. HUDSON. Thank you.

Mr. Lewis, you are recognized for 5 minutes for an opening statement.

STATEMENT OF CHRIS LEWIS

Mr. LEWIS. Thank you, Mr. Chairman. Ranking Member Matsui, I appreciate you inviting me here today representing Public Knowledge on a topic that I agree is jargony but wonderfully nerdy, and in Public Knowledge, that is always a compliment, so thank you.

Over the last 30 years, the United States has led the world in wireless technology, and this leadership is no small measure due to the innovative and bound spectrum policies that have carried out a bipartisan basis—on a bipartisan basis over these decades. I will highlight three key factors from my written testimony that have led to this success, and then I look forward to the discussion.

First, our system has managed spectrum, the public airwaves, as a public asset and in the public interest all while encouraging private investment and innovation. Other governments effectively nationalize their spectrum. Only the government could operate broadcast radio or authorize new uses of spectrum. These governments acted through ministries under the direct control of the country's chief executive.

The United States, we went a different way. We created an independent agency to oversee spectrum use designed to strike the right balance between the many users of spectrum, such as public safety, local governments, broadcasters, to encourage innovation and private investment. Most importantly, Congress recognized that spectrum represents a unique, nonrenewable public resource.

Congress enshrined the Communications Act, but the FCC managed the public airwaves for the public interest. This means that no one can own the public airwaves, policy on licensees are balanced with public needs and come with public interest obligations, and that spectrum policy, including auction design and proceeds, should make efficient use of the spectrum allocations and benefit the needs of the public under the FCC mandate to connect all Americans.

Today's public needs to connect all Americans include deploying Next Gen 9–1–1, supporting infrastructure needs, and especially supporting digital inclusion funding needs in local communities. Local digital inclusion efforts actually lower the cost of deployment for broadband providers while giving communities, large and small, the support to realize the full potential of those infrastructure deployments.

Second, the FCC has, with congressional authority, experimented with new regulatory models to create competitive opportunities in the market and foster innovation. There is no greater example of regulatory innovation than the success of WiFi.

WiFi technology was invented in the 1980s, when the FCC opened unlicensed spectrum for experimentation by engineers and inventors. These unlicensed spectrum bands allow anyone to use any device for any purpose under rules authorized by the FCC to avoid interference with licensed services.

WiFi carries 53 percent of all internet traffic and almost 90 percent of wireless internet traffic. Without supporting WiFi and unli-

censed spectrum innovation, we would not have the mobile communications revolution we now enjoy.

In this century, newer regulatory models for spectrum access, like CBRS sharing models, are increasing access for small community institutions, rural and Tribal communities, and other private industry outside of the big wireless carriers.

Third and finally, Congress has carefully divided spectrum between Federal and non-Federal users at NTIA and the FCC, respectively, requiring cooperation between agencies and between Federal and non-Federal users.

The public may not follow the day-to-day operation of NTIA and the FCC, but they do put their trust in government to make sure this resource and the technologies that use it work efficiently. Thankfully, NTIA and FCC have worked to develop more than one MOU to support cooperation between agencies and, therefore, processes the balance Federal and commercial use needs. Without this coordination, we would return to chaos and governmental infighting.

If America is going to continue its leadership in wireless technologies, we must continue to follow these proven principles that led to our success to date. Congress can lead in this direction by permanently restoring auction authority at the FCC. This is critical for enabling effective coordination between Federal and commercial users, driving efficient use of the public airwaves, and delivering public-interest benefits that connect all Americans to secure, reliable, and affordable communications.

Thank you, and I look forward to your questions.
[The prepared statement of Mr. Lewis follows:]



**Testimony of Chris Lewis
President and CEO, Public Knowledge**

**Before the
House Committee on Energy and Commerce
Subcommittee on Communications and Technology**

Strengthening America's Leadership in Wireless Technology

January 23, 2025

Chairman Hudson, Ranking Member Matsui, Chairman Guthrie, Ranking Member Pallone, and members of the Communications and Technology Subcommittee: Thank you for inviting Public Knowledge here today to testify on this vitally important topic – strengthening American leadership in wireless technology. My name is Chris Lewis and I am the President and CEO of Public Knowledge. Our organization is dedicated to promoting freedom of expression, an open internet, and access to affordable communications tools and creative works.

I. Why America Leads the World in Wireless Tech, and Has for the Last 30 Years.

The major wireless innovations of the last 30 years – mobile telephony, Wi-Fi, advanced navigation systems – all began in the United States. Not only were they invented here, but they also quickly spread and created entire new sections of our economy. This is astounding, when one thinks about it. How has the United States maintained such dominance?

Three factors give the United States its unprecedented staying power as the leader in wireless.

(A) Our system that manages spectrum as a *public asset* in the *public interest*, while encouraging

private investment and innovation in wireless technology; (B) The willingness of the Federal Communications Commission (FCC) to experiment with new regulatory models that create new opportunities for private innovation; and (C) Our careful division of spectrum between federal and non-federal users – with the FCC as sole authority over non-federal users, but required to respect and cooperate with federal users.

Let me explain why each contributes critically to our long-standing success.

II. The Public Airwaves and Private Investment.

When widespread use of radio for communications and broadcasting began in the early 20th century, the government did little to oversee its use. We treated radio essentially as private property. This soon proved unworkable. As commercial broadcasting became both economically lucrative and politically powerful, many more people wanted to use the spectrum than the technology of the time could support.

Other governments effectively nationalized their spectrum. Only the government could operate broadcast radio or authorize new uses of spectrum. These governments acted through ministries under the direct control of the country's chief executive.

The United States went a very different way. It created an independent agency to oversee spectrum use, designed to strike the right balance between the many users of spectrum – such as public safety, local governments, and broadcasters – to encourage innovation and private

investment. Most importantly, Congress recognized that spectrum represented a unique, non-renewable public resource. It determined to protect and manage the “public airwaves” for the public interest by enshrining the following into law:

- ***No one may own the public airwaves.*** The Communications Act allows the FCC to authorize access to spectrum in a variety of ways. The most common approach is issuing licenses for exclusive use of particular frequencies in specific geographic areas. But these licenses do not convey any ownership, even if the licensee won the licenses through an auction or acquired them from others. This allows the FCC to update the rules governing the license when needed, and to revoke the licenses if the licensee fails to comply with its responsibilities.¹
- ***Licensees must serve the public interest, not only their private interest.*** Licensees are trustees of their licenses to use the public airwaves for the benefit of their community of service – the geographic area covered by their license. In the age of broadcasting, this meant (and still means) a responsibility to provide local communities with news and information necessary for an informed democracy. In the world of mobile services, this usually means bringing service to everyone – not just the most densely populated and most profitable urban areas.
- ***Spectrum policy, including auctions, is not about raising revenue.*** Since 1993, the FCC has used auctions to distribute exclusive use spectrum licenses. The FCC uses auctions

¹ 47 U.S.C. § 304.

because auctions have proven to be the most effective way to distribute exclusive licenses. Critically, nothing about using auctions changes the fundamentals of licensing and FCC authority.² Auctions, and FCC spectrum policy broadly, are about efficient use of the public airwaves to benefit the public interest.

Congress made clear when it adopted auctions as a means of distribution that it intended the FCC – and licensees – to use auctions to serve the public interest rather than to maximize revenue. Congress instructed that the FCC design auctions to promote competition, to “safeguard the public interest,” to promote innovation and ensure that these innovations’ benefits are “readily accessible” to all Americans.³ Revenues from auctions are not simply for the purpose of reducing deficits and funding tax cuts, but for “recovery for the public of a portion of the value of the public spectrum resource made available for commercial use.”⁴

This combination of private management in the public interest, carefully overseen by an independent FCC, laid the foundation for our wireless economy and long-standing U.S. dominance of wireless innovation. The private sector, driven by profit motive, provides the capital investment. Management in the public interest ensures that these networks include all Americans.

III. Managing the Public Airwaves for Innovation.

² 47 U.S.C. § 309(j)(6).

³ 47 U.S.C. § 309(j)(3)-(4).

⁴ 47 U.S.C. § 309(j)(3)(C).

The United States has introduced virtually every innovation in spectrum regulation globally. When we develop innovative spectrum policy, we also create opportunities for innovation in both technology and business, including by launching entire new sectors of our economy worth billions of dollars annually. Because we lead and innovate, the rest of the world finds it easier to follow along by adopting our rules -- even when we cannot predict precisely what technological or policy change will happen next.

To take one critical, well-known example, the FCC's creation of "unlicensed spectrum" that gave birth to Wi-Fi, Bluetooth, and countless other wireless technologies. In the 1980s, the FCC became the first regulatory agency in the world to authorize "unlicensed" spectrum. This allows anyone to use any device for any purpose under rules authorized by the FCC to avoid interference with any licensed service. At the time, the FCC primarily envisioned this for garage door openers, baby monitors, and random consumer toys such as remote control cars. But by unleashing the creative power of the private sector with innovative new rules, the FCC permitted the creation of so much more.

Similarly, the FCC has innovated in the regulation of spectrum licenses. The FCC was the first regulator to allow "flexible use." Rather than assigning licenses for a specific purpose, such as broadcasting, the FCC began permitting licensees to use licenses in whatever way they saw fit -- subject to the FCC's technical oversight to ensure they would not create harmful interference. The FCC became the first regulator to distribute licenses by auction, and then the first agency to use incentive auctions to persuade licensees to return unneeded spectrum to repurpose.

At the moment, the FCC continues to innovate, fostering economic growth through the creation of new technologies and new business models. The development of Citizens Broadband Radio Service (CBRS), a hybrid of licensed spectrum and unlicensed spectrum, is already generating enormous investment in private 5G and LTE networks, and acting as a critical supplement for Tribal providers and other rural ISPs. Proposed new example: The FCC recently authorized outdoor use of unlicensed in the 6 GHz band, giving outdoor stadiums and other users of Wi-Fi the ability to upgrade to Wi-Fi 6e with dramatic increase in throughput.⁵

It is critically important to remember that the wireless economy, with its countless connected devices and applications, could not have happened without the willingness of the FCC to innovate the rules and regulations governing spectrum access and use. Congress should continue to encourage this innovation if we wish to maintain our international wireless leadership.

IV. Balancing the Needs of All Federal and Commercial Stakeholders.

The importance of spectrum access has grown exponentially over time. In the past few years, we have seen upgrades to 5G and Wi-Fi 6, with 6G and Wi-Fi 7 already in development.

Additionally, federal agencies – particularly the military – must keep constant pace with the evolution of wireless technology. It is far more important that our military not lose the “race with China” (or any other nation) than to worry about whether China has allocated more frequencies for 5G. First responders, medical providers, manufacturing – virtually every sector needs more access to spectrum to meet its unique needs. But few people consider the difficulty in

⁵ See Notre Dame News, “Notre Dame Stadium Becomes First Outdoor University Venue to Move to Wi-Fi 6e Standard,” (December 10, 2024).

maintaining this growth as a win-win for multiple sectors of American industry. On the one hand, spectrum sharing offers the tantalizing vision of a world without spectrum scarcity, permitting unlimited innovation. On the other hand, we rely on exclusive licensing to provide the incentive for wireless providers to build nationwide networks. Simultaneously, we must provide enough spectrum for classified military operations, sensitive weather radar, GPS, and other non-commercial uses that require exclusive use.

In addition to high-profile stakeholders, such as the wireless industry, broadcasters, and the military, the FCC has an obligation to consider the needs of countless others. This includes Tribal governments, who are typically unserved by commercial licensees and remain among the most unconnected regions in the United States. It includes non-commercial users, legacy users, and the rising demands of satellite users. It includes rural communities and those in the urban core. As the Communications Act repeatedly instructs the Commission, the FCC has a responsibility to ensure the blessings of our wireless future to *all* Americans.⁶

Unsurprisingly, the FCC finds itself caught between different stakeholder groups wanting very different things. Our continued leadership in wireless depends on effectively managing these often contradictory stakeholder demands.

V. Recommendations for Continued American Leadership in Wireless.

A. Stop Playing Revenue Games With Spectrum

⁶ See, e.g., 47 U.S.C. §§ 151, 309(j)(3)(B), 309(j)(4)(C), 1507.

The ever-increasing demand for spectrum is not the only thing that makes it difficult to maintain balance between the demands of stakeholders. The fact that auctions produce revenue warps spectrum policy. The temptation to auction spectrum solely to produce revenue creates a zero-sum game where stakeholders must fight one another rather than cooperate to develop the most beneficial spectrum policies. This is particularly true for federal users – notably the military.

The constant push to grab more and more commercially licensed spectrum from federal users has alienated federal users generally, and the Department of Defense (DoD) specifically. This, in turn, has created resistance between the DoD and the FCC, and between their committees of jurisdiction. The practical consequence of this has been a legislative and agency stalemate that has frozen the development of new spectrum for commercial purposes – on either a licensed or shared basis. The FCC auction authority expired in March 2023 and, despite the bipartisan efforts of this committee, has faced consistent opposition to renewal from those concerned that the FCC will move too aggressively to auction spectrum without concern for federal users or other stakeholders generally.

Indeed, the fact that Congress continues to put an expiration date on FCC auction authority stems entirely from the desire to keep using spectrum auction revenue as a perpetually available “pay for.” Congress should stop holding sound spectrum policy hostage to the misguided belief that spectrum is a piggy bank rather than a vital public resource.

As an initial matter, Congress would do well to recall that when auctioned for exclusive use, spectrum changes from a potentially abundant reusable resource to a scarce resource that must eventually fail to support our ever growing wireless economy and cease to become a source of technological innovation. There is no such thing as spectrum mining or spectrum fracking. Once the public airwaves are divided and auctioned for exclusive use, they are gone for decades, if not longer.⁷ Furthermore, predicting the actual revenue from auctions is very difficult and rarely accurate. Unsurprisingly, those advocating for auctions take an extremely optimistic view of potential revenue, frequently resulting in severe disappointment and a funding gap that only serves to increase the deficit.⁸

Finally, the cost of clearing federal users to auction spectrum continues to increase exponentially – reducing the actual revenue available for deficit reduction well below the projected gross revenues of the auction. For example, the auction of the 100 MHz of 3.45-3.55 military spectrum (over the objections of the DoD) earned \$22.5 billion, but clearing federal users cost over \$14 billion.⁹ As federal users are increasingly forced to cram more and more functionality into less and less spectrum, the cost of federal clearance increases, creating a vicious cycle of diminishing returns.

Congress should therefore make FCC spectrum auction authority permanent. The FCC has lacked this important tool for distributing spectrum licenses for nearly two years. Had Congress

⁷ It is possible to share spectrum access on an unlicensed basis with high power licenses. This “underlay” approach was the first type of unlicensed use authorized by the FCC. But exclusive licensees fiercely resist any such sharing rules.

⁸ For example, some experts estimated that the broadcast incentive auction would potentially earn \$100 bn. Actual gross revenues were \$19.8 bn.

⁹ See generally FCC Auction 110 webpage, <https://www.fcc.gov/auction/110>.

made FCC auction authority permanent at any point in the last 30 years since Congress first authorized auctions to distribute licenses, the FCC would still have this important tool available. Instead, because of the effort to use auctions to maximize pay for revenue, the future of FCC auctions – and American leadership in wireless – remains uncertain.

B. Reinvest Auction Proceeds in Communications Infrastructure

As discussed above, we use auctions to distribute high-power, exclusive use licenses for access to the public airwaves because that proved the most efficient way to do it. After decades of trying alternate methods, and relying on the economic theories of Nobel prize-winning economists such as Ronald Coase, Congress and the FCC concluded that using auctions to distribute exclusive licenses was most likely to encourage the licensees to invest in new networks and new technologies.¹⁰ But the fact remains these are still the public airwaves, and the money should be reinvested to fulfill the purposes of the Communications Act generally and the auction statute specifically – to ensure that the benefits of wireless technology are “readily accessible to all Americans” and to “recover for the public a portion of the value of the public spectrum resource made available for private use.”¹¹

¹⁰ As always, there are problems between theory and practice. Without safeguards, auctions create a concentrated wireless industry to the detriment of consumers and innovation. But the question of auctions v. other means of distribution and how to construct auctions that affirmatively promote competition and digital inclusion is beyond the scope of this testimony. See generally, Kathleen Burke, *Back to the Spectrum Future: The 20th Anniversary of the Spectrum Task Force*, Public Knowledge (2023). <https://publicknowledge.org/policy/back-to-the-spectrum-future-the-20th-anniversary-of-the-spectrum-policy-task-force/>

¹¹ 47 U.S.C. § 309(j)(3)(C).

Accordingly, net proceeds¹² from the auction of spectrum should not simply be used for deficit reduction or to offset general spending. Instead, the revenue should fund infrastructure development and affordability programs directly related to broadband access, or to public safety investment. In the past, Congress has mandated that auction revenues fund such communications related programs as the converter box program during the DTV transition to prevent Americans from losing free over-the-air television,¹³ the construction of FirstNet,¹⁴ and, most recently, “rip and replace.”¹⁵ In 2022, Public Knowledge, in coalition with other advocates for closing the digital divide, urged that Congress create a permanent digital equity foundation funded through spectrum auction revenue.¹⁶

C. Continued Regulatory Innovation

Congress should continue to support the FCC in its mission to foster technological innovation through regulatory innovation.¹⁷ In particular, Congress should invest in the FCC’s regulatory

¹² It is again worth noting that those who urge using spectrum proceeds as a pay for for tax cuts or deficit reduction generally typically cite the gross proceeds of auctions. But the net proceeds are far smaller. Under the statute, the FCC is required to retain sufficient revenue to pay the salaries, equipment cost, and other expenses associated with developing and running a spectrum auction. In the event that federal spectrum is auctioned, the auction is required to pay for relocation of federal users to new spectrum capable of supporting their previous functions. Where non-federal spectrum is reclaimed, the Commission is required to reimburse the existing licensees to relocate (on occasion, a bonus is offered to speed clearing the spectrum for the new licensees). These associated costs reduce the total net proceeds by billions of dollars.

¹³ See Digital Transition and Public Safety Act of 2005.

¹⁴ See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96 § 6207.

¹⁵ See Brad Randall, “Spectrum Auction to Fund ‘Rip & Replace’ Program,” *Broadband Communities* (Jan 8, 2025). <https://bbcmag.com/spectrum-auction-to-fund-rip-and-replace-program/>

¹⁶ See *Airwaves For Equity* Press Release (Dec. 13, 2022). https://newamericadotorg.s3.amazonaws.com/documents/Airwaves4Equity_Press_Statement_Commerce_Hearing_v4_121322_1.pdf

¹⁷ See 47 U.S.C. §§ 157, 303(g), 309(j)(3)(B).

innovation supporting new forms of shared access such as CBRS, access to the broadcast bands via TV white spaces, and the use of cognitive radios and sensing technologies. As with the original development of rules for unlicensed spectrum and ultra-wide band frequency hopping, innovation in these regulatory models is spurring the development of new technologies and new business cases.

Incumbents exist to advocate existing technologies, and their advocacy inevitably boils down to “more of the same.” Unfortunately, there are no lobbyists for future technologies or trade associations for businesses that do not yet exist. In the 1980s, the FCC took a risk on authorizing unlicensed spectrum access. This is why Wi-Fi and Bluetooth devices began in the United States and launched the United States to wireless prominence. In the 1990s, the FCC created spectrum auctions, which is why the United States became the leader in cell phone deployment and innovation worldwide. Continued leadership means continuing to innovate at the regulatory level.¹⁸

D. Careful Management of Spectrum for All Stakeholders

Finally, our continued leadership in wireless depends on careful management of spectrum that respects the needs of all stakeholders – not only the largest commercial providers with the most powerful trade associations. We have seen that when cooperation between federal users and the FCC breaks down, spectrum policy stalls and the world stops regarding us as reliable leaders.

¹⁸ A cautionary note that “innovation” should not be mistaken for deregulation for its own sake. The success of these innovations depended on the ongoing supervision by the FCC.

We have seen that public safety and educational providers need access to spectrum, as do industries that cannot hope to spend billions of dollars in spectrum auctions.

Over the last three years, the FCC and the National Telecommunications and Information Administration (NTIA) have worked to develop interagency agreements to avoid friction between commercial and federal spectrum users, including a National Spectrum Strategy.¹⁹ In 2023, the FCC issued a policy statement on the need for incumbents and new entrants to jointly share responsibility for reducing harmful interference in an increasingly crowded wireless world.²⁰ Not only are these good policies in and of themselves, but also our ability to maintain wireless leadership in the global economy depends on maintaining continuity over the long-term. Congress should encourage both the FCC and NTIA to build on existing policies of careful spectrum management and stakeholder inclusion.

CONCLUSION

To maintain U.S. leadership in wireless innovation, spectrum management must balance the needs of all stakeholders – commercial, federal, and underserved communities – while prioritizing the public interest. The FCC’s role in regulating the public airwaves has fostered global leadership in technologies like Wi-Fi and 5G, but this success depends on continued regulatory innovation and careful management. Congress should avoid using spectrum auctions solely for revenue generation, instead reinvesting proceeds into broadband expansion, public

¹⁹ See NTIA, Office of Spectrum Management, “National Spectrum Strategy.” <https://www.ntia.gov/programs-and-initiatives/national-spectrum-strategy>

²⁰ Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services, 38 FCCRcd 3682 (2023).

safety, and closing the digital divide. By promoting competition, encouraging new business models, and fostering collaboration between federal and commercial users, the U.S. can ensure ongoing wireless innovation and equitable access for all Americans, securing its position at the forefront of the global wireless economy.

Mr. HUDSON. Thank you, Mr. Lewis.

We will now begin questioning, and I will recognize myself for 5 minutes.

Listen, economic security is national security, and to lead in technology as a nation, I believe we need a balanced spectrum policy that benefits both licensed and unlicensed use of spectrum. Making licensed spectrum available is more difficult, but I don't think we should resort to making everything unlicensed just because of the challenges associated with it.

Mr. Powell, recognizing that your companies primarily utilize unlicensed spectrum, would you talk a little bit about what advancements in technology happening in your industry that might increase a demand for unlicensed spectrum?

Mr. POWELL. Thank you for the question.

It is interesting to note that the cable industry pursued the convergence that we all dreamed of in the '96 Act. It uses all forms of spectrum to compete. It uses WiFi, it uses shared licensed spectrum, and we also use exclusive licensed spectrum, which has allowed us to become the fifth—fourth most significant mobile service provider in the country offering competition.

So we believe that going forward, you have to be creative in using all forms of spectrum allocation in order to be effective. And we look forward—we see a continuing conflict with what is available for the market to use quickly and the processes we are using to allocate that spectrum, which is why we are committed to advancing and advocating shared-spectrum models.

Those models now use very sophisticated, dynamic spectrum technology in order to coordinate and manage among uses and competing uses, and it works quite effectively.

Mr. HUDSON. Thank you.

Artificial intelligence has been a topic receiving a lot of attention recently because it is revolutionizing so many of our industries. As a result, it is also putting significant demand on our Nation's resources.

Mr. Gillen, does artificial intelligence require more bandwidth? And if so, will it need to be licensed spectrum?

Mr. GILLEN. We are going to need more bandwidth, period. When you think about what AI promises, it really is a good frame for this entire conversation, the ability of AI to help all sectors, much like 5G can help all sectors. But they really need to work together.

When you think about—the Vodafone CEO of Europe talks about the risk in Europe of AI bottleneck because there is not enough cellular capacity to meet the data needs of AI.

So absolutely, when you talk about the growth curves we are talking about, AI growth, we need to make sure our networks are strong enough to carry that, to drive that innovation. We want that innovation to happen here. And if that innovation is going to happen globally, who has the best networks? That has always been us, and we are in a great place on WiFi to continue to be the best. We need to do the same in 5G as well.

Mr. HUDSON. Thank you.

Congress and the White House need to take a leadership role in repurposing Federal spectrum for commercial use. Access to spectrum by Federal and commercial users is necessary to protect our

national security, but Federal agencies are not actively looking for ways to be more efficient with their spectrum.

Ms. Rinaldo, as a former Acting Administrator of NTIA and in your current role, you were responsible for managing spectrum used by Federal agencies while also looking for opportunities to repurpose spectrum for commercial use.

What are the biggest challenges presented by agencies when trying to make spectrum available?

Ms. RINALDO. Thank you, sir.

Yes. So as an example, when I was at NTIA in August of 2019, I sent a memo to all of the Federal agencies asking them to do an assessment of their spectrum needs. And just today in 2025 are those bands finally being studied. So I would say it is just time. We need to make decisions a lot sooner in order to deploy.

Mr. HUDSON. Thank you.

I will pose this question to everybody. So we will go down the line. But how does spectrum policy disputes domestically affect America's leadership on the global stage? And let's go in reverse order. Mr. Lewis, I will start with you.

Mr. LEWIS. I am sorry. How does spectrum policy what?

Mr. HUDSON. So disputes that we have here domestically, how does that impact our leadership on the global stage?

Mr. LEWIS. You know, I think history has proven that when we chart a path, that promotes innovation and promotes meeting a variety of needs with our spectrum policies that the world follows us. And so, you know, debate might be good, but I think disputes that frees us picking a direction that continues to promote those values in our balanced spectrum policy can hold up our opportunity for leadership as we look at the next generation of wireless technologies like WiFi 7 and 6G.

Mr. HUDSON. Thank you.

I am about to run out of time here.

Ms. RINALDO. He is absolutely right. Debate has a type of purpose, but we need to be decisive when we go into standards bodies. We need to speak with one voice.

Mr. HUDSON. Thank you.

Well, my time has expired. Mr. Gillen and Mr. Powell, if you all want to submit something.

Mr. GILLEN. I just think our adversaries are unified. Their government, military, and industry are working together. We need to be, too, to compete.

Mr. HUDSON. Good point.

All right. Thank you all.

Mr. POWELL. I just think it was delay.

Mr. HUDSON. Thank you.

My time has expired, and I can't hold my committee members accountable if I don't hold myself accountable. So I will stop.

At this point, I will recognize Ms. Matsui for 5 minutes of questions.

Ms. MATSUI. Thank you, Mr. Chairman.

Before the Biden administration's national spectrum strategy, the United States went 6 years without any comprehensive spectrum strategy. During those 6 years, drawn-out spectrum disputes compromised our ability to maximize our use of this vital resource.

If America is to remain the pace-setter for global innovation, we need to maintain consistency in our spectrum policy.

Mr. Lewis, how is the national spectrum strategy keeping the U.S. on track to lead on their wireless technologies? And why is it important, critical, to continue its work?

Mr. LEWIS. Yes, Congresswoman. The spectrum strategy was an important step forward. It laid a path for us to follow in studying five spectrum bands that could create a pipeline in the future. It talked about long-term planning and research into technological developments like dynamic spectrum sharing that could make the use of those bands more efficient and hopefully also points in the direction of continued cooperation between Federal and non-Federal users.

Ms. MATSUI. OK. Thank you.

Mr. LEWIS. So it is an important step forward. We need to continue to move on.

Ms. MATSUI. Continue it. Thank you.

Mr. Gillen and Mr. Powell, can the United States afford to delay studies of spectrum bands and undo the national spectrum strategy's progress in increasing spectrum access?

Mr. GILLEN. Absolutely no.

Ms. MATSUI. OK.

Mr. POWELL. I agree with Mr. Gillen. It is important to quickly study these bands and get them into the market.

Ms. MATSUI. OK. Thank you.

I have been a strong advocate for modernizing our telecommunications network through open interoperable solutions that diversify our supply chains and create new opportunities for American innovators to compete in the market.

Ms. Rinaldo, the DoD has partnered with members of the Open RAN coalition to leverage commercial wireless technologies for secure, resilient networks. What next steps should U.S. spectrum policy take to ensure we can continue to enhance national security through commercial innovation?

Ms. RINALDO. Yes. Thank you. Absolutely.

The DoD has been incredibly bullish on Open RAN, interactively working with my member companies to deploy 5G around the world. Unfortunately, their budgets continue to get cut. So in 2025, I think people would be shocked how little 5G is deployed at our DoD bases around the world.

So I would say continued funding, continued partnership. And it is great to see the two sides, the commercial side and the public side, working together to deploy commercial technologies.

Ms. MATSUI. Certainly. Thank you.

Spectrum demands continue to grow, and there is no more easy spectrum to access. We must have a unified Federal spectrum policy to continue the work towards sustainable spectrum pipeline that benefits the American people.

Mr. Lewis, how have American consumers and innovators been harmed in the past when the Federal Government fails to speak with a unified voice on spectrum policy?

Mr. LEWIS. I think our innovators are looking for reliability on where they can design, and so, the national spectrum strategy that you mentioned and setting up a clear path forward on what bands

can be used in the future is important for providing that certainty for innovators.

Ms. MATSUI. OK. Thank you.

Mr. Gillen, I have worked collaboratively across the government for years to advance America's spectrum policy. Can you tell me why it matters that the government speaks with one voice, and why it matters what other nations do with spectrum?

Mr. GILLEN. For us to succeed, we need one voice. And I really appreciate your leadership, really pushing NTIA to be at the forefront. We need the experts making these calls and to get rid of some of the turf wars we are fighting.

When you think about it, the U.S. is a big market, but we are only 4 percent of all the global wireless connections in the world. So in order to succeed, we need to amplify our voice. We need to make sure other countries are using our equipment, are using our spectrum, like Ms. Rinaldo said. So it is critical that we lead and we lead first.

Ms. MATSUI. Thank you.

Cutting-edge technologies like dynamic spectrum sharing hold great promise in efficiently using our finite spectrum resources. There are a number of possibilities to leverage emerging technologies like artificial intelligence to better manage spectrum, as published in the National Spectrum Research and Development plan.

Mr. Powell and Ms. Rinaldo, how can—quickly answer—investments in emerging technologies like AI improve spectrum efficiency and management? Mr. Powell?

Mr. POWELL. I think it is critical. I mean, you can bet on technological innovation to resolve conflict, or you can rely on political regulatory conflict to resolve conflict. We think there's stunning advances in the ability to use spectrum more efficiently and, more importantly, to allow multiple users to use the same bands simultaneously without interference, allowing greater competition and greater innovation.

Ms. MATSUI. Ms. Rinaldo, you have got 7 minutes—7 seconds.

Ms. RINALDO. Absolutely. I think with Open RAN, the use of AI, you are going to see a lot of use cases, especially in spectrum management.

Ms. MATSUI. OK. Thank you very much.

Mr. HUDSON. The gentlelady yields back.

The Chair will recognize the chairman of the full committee, Mr. Guthrie, for 5 minutes to ask your questions.

Mr. GUTHRIE. Thanks, Mr. Chair, for the recognition.

And Ms. Rinaldo, it is great to see Cole here. Not many of us on this committee remember when you used to work for a member of this committee, and it is hard to believe I have been here that long, because he is 10 years old now. I remember when you were having him.

So my question is—I know we have newer Members, and some of us need a refresher as well. So NTIA, which you were leading in the previous administration—well, now, I don't even know if it is still previous—45—it manages the Federal spectrum, but a lot of agencies try to manage their own Federal spectrum.

Can you explain how that is not supposed to work and the problems of how it—what that causes when that happens?

Ms. RINALDO. Absolutely.

So fragmentation is one of the worst things that we could do to move things forward. You would lose everything from the efficiencies that you gave through the IRAC, where all the Federal agencies come together and discuss management of spectrum, to national security concerns. Can you imagine if each agency was responsible for cybersecurity of their individual bands? It would be disastrous.

Mr. GUTHRIE. But some agencies try to do that, right?

Ms. RINALDO. Some would like to use, yes.

Mr. GUTHRIE. OK. So all right.

So we heard Chair Hudson and Ranking Member Matsui talk about disputes going into these international bodies. And just kind of a refresher for some, and some are new to the committee. So we were at the 2023 World of Radio Communication Conference. There were disputes that went in that made us less effective.

So if you would talk about what those—I know there were several, but kind of highlight a couple of the disputes, why that made us ineffective or less effective, and if we go into those international groups less effective, how China will take advantage of that.

Ms. RINALDO. Absolutely.

So there is a lot of prep work that goes into these events years ahead of time. We work with others around the world to ensure that we can have a unified response, not just the U.S. but our partners as well. And so, if we are still arguing over policy decisions as we go into the standards bodies, then we are not able to speak with a unified voice.

Mr. GUTHRIE. So what kind of policy discussions were happening? What were we arguing over?

Ms. RINALDO. Spectrum bands.

Mr. GUTHRIE. Spectrum bands?

Ms. RINALDO. Yes. So the adversary wants the chaos because if there is chaos internal amongst us, that means we are not fighting them for our strongest hand and our position.

Mr. GUTHRIE. So these international standard-setting bodies that the standard—because, obviously, spectrum knows no border because it is physics, in the air only. I know Mr. Obernolte can explain it. I can't.

But we do know that it crosses borders. And so, what advantage does China have if they get the leverage? What could they do with having the leverage? What kind of standards could they influence that is negative to us and positive to them?

Ms. RINALDO. So it does advantage their vendor community a great deal. It is incredibly expensive to put together a radio. And so, if you are walking in and if you are standards-accepted, you are going to have the first movers advantage, and that is what we want.

Mr. GUTHRIE. So like what kind of standards? I mean, just kind of more details.

Ms. RINALDO. Yes. So whatever bands. So you are going to have transistors in all of your radios, and so that becomes incredibly expensive. You are going to want to ensure that you have—so other

countries around the world are on the same bands that China is, and so that is what their aim is, is just to coalesce everyone together.

Mr. GUTHRIE. So it is kind of like if they become the dominant player, then everybody else has to play. If you want to be interoperable, most people want to be interoperable with the dominant player.

Ms. RINALDO. Correct. You want to be the leader.

Mr. GUTHRIE. And so, if they become the dominant player, then we have to follow them instead of them follow us?

Ms. RINALDO. Correct.

Mr. GUTHRIE. Well, thank you very much. I appreciate that.

I do have another minute if anybody wants the time. If not, I will yield back.

I will yield back.

Mr. HUDSON. Thank you, Mr. Chairman.

The Chair will recognize the ranking member of the full committee, Mr. Pallone, for 5 minutes to ask your questions.

Mr. PALLONE. Thank you. Thank you, Mr. Chairman.

I am concerned by reports suggesting that Republicans would rather spend \$70 billion in spectrum auction proceeds on tax cuts for the rich instead of investing this money in bipartisan public safety priorities, such as Next Generation 9–1–1, which is going to save the lives of a lot of Americans, including first responders.

But let me go to Mr. Lewis. To the best of your knowledge, has Congress ever directed spectrum auction proceeds to pay for tax cuts for billionaires?

Mr. LEWIS. Not to my knowledge.

Mr. PALLONE. All right.

And why is using spectrum auction proceeds to deploy NG 9–1–1 networks a worthwhile investment, if you would?

Mr. LEWIS. I view NG 9–1–1 as an important public interest need that makes all Americans benefit from secure networks, faster emergency services, and it matches the mandate of the Communications Act that says that we should push to have all Americans connected to reliable, secure, affordable communications.

Mr. PALLONE. Well, thank you.

I mean, obviously, I am very proud of the fact that we have used spectrum in the past for public purposes and don't want it to be just used for tax cuts for, you know, corporate or billionaires.

You know, we are debating spectrum policy, but—here in this committee, but as far as the people in my district are concerned, they just want to know what we are doing to make their monthly bills more affordable. That is what they care about, you know, the bottom line, You know, they can't afford things. They want us to bring prices down.

So, Mr. Lewis, do you think that the FCC should require through licensing or other means wireless service providers to offer an affordable service option, that we should require that, if you will?

Mr. LEWIS. I think that would be OK. I don't think it would be a substitute for restoring the low-income subsidy for broadband that we lost last year. Even with a low-income option, there is a cost to low-income people in every State and every district. So, yes, but it is not all we would need.

Mr. PALLONE. You think some of those other things are just as important, certainly?

Mr. LEWIS. I think the subsidies are very important. It was proven. You know, over 20 million people signed up for it before it went away, and folks are making difficult budgetary choices without it.

Mr. PALLONE. Yes. I certainly agree with you that that was a major accomplishment, and we should try to continue or expand it.

The last question I wanted to ask, and I could ask it to both Mr. Lewis and Mr. Powell possibly too, if you would like. The Biden administration made great strides in advancing the U.S. spectrum policies by adopting the national spectrum strategy, which got bipartisan support in this committee. And this strategy requires the Federal Government to undertake studies of certain spectrum bands before making any final decisions on whether or how they should be made commercially available.

So let me start with Mr. Lewis and then Mr. Powell. We have got a couple minutes. Will completing these studies allow us to more effectively compete against China and other countries, and if so, how?

If you could take a minute and we will ask Mr. Powell.

Mr. LEWIS. I would say yes, actually, for some of the reasons that Ms. Rinaldo was talking about, to point in a unified direction instead of the disputes we had between different agencies in the past. The studies can really set what the scientific facts are about how different bands will work and the technologies using it and then, hopefully, coordination can be built off of those scientific facts.

Mr. PALLONE. OK.

Mr. Powell?

Mr. POWELL. I would just quickly say that the bands that were being evaluated are the very bands that all of us are sitting here asking for the government to get into the market. We all have acknowledged those bands are heavily encumbered, and so there are complex questions associated with the current users and potential commercial use.

So at some level, no matter what form it takes, there has to be continued evaluation of the viability of doing that and the appropriate approach to doing that.

Mr. PALLONE. All right. Thank you both.

Thank you, Mr. Chairman. I yield back.

Mr. HUDSON. Thank you, Mr. Pallone.

The Chair now recognizes the vice chair of the subcommittee, Mr. Allen. You are recognized for 5 minutes.

Mr. ALLEN. Thank you, Chairman Hudson, for yielding, and now we will get back to the subject we came to talk about.

Mr. Powell, can you explain why it is important to our strategic competition with China for your members to have more spectrum made available for their use?

Mr. POWELL. Yes, sir. You know, I think attacking China is a multifront war, and I think, you know, to follow the advice of Sun Tzu, don't attack where they are strong, attack where they are weak. Our innovations in WiFi are unprecedented in the world. China does not appreciate or embrace that technology or approach, because it would empower their citizens in a way that they are unwilling to do in their Communist system. And this gives America

an enormous competitive advantage because we harness the innovation potential of every one of our citizens, and they don't. They have a command-and-control, exclusive license regime because they want to maintain control—

Mr. ALLEN. Right.

Mr. POWELL [continuing]. Of that regime. And they want the world to use their approach as well.

Mr. ALLEN. Good. Thank you. Ms. Rinaldo, what—can you give me an answer to that question about why it is important for your members to have more spectrum to compete with China?

Ms. RINALDO. Absolutely. So if you want to get Open RAN, deployed, we would need new spectrum to bring online. It is updating networks. It is U.S. and our allied friends around the world, innovation that is coming to bear.

Mr. ALLEN. OK. Today, I will be introducing the Spectrum Pipeline Act, which was originally co-led last Congress by Senators Cruz and Thune. This bill is designed to ensure the efficient allocation of midband spectrum, a resource critical for the advancement of 5G and next-generation technologies.

While this communications technology is a cornerstone of our strategic competition with China, this bill lays out a path for us to promote wireless innovation while protecting national security interests.

Mr. Gillen, can you explain why the Spectrum Pipeline Act is needed and how it would benefit the Nation's economic and national security interests?

Mr. GILLEN. Absolutely. And thank you for your leadership and for the bill. It is a really important thing to address a lot of the challenges we are talking about, that we—we need to move quickly, we need to move decisively, and it is Congress' role to set that direction.

And that structure you propose is flexible. It allows the agencies to actually determine which bands are right, that we need to do together. But ultimately, when we are trying to talk about China, in our view, we need to be the best in the world in our license, and we are today. We also need to be the best in the world in 5G. We shouldn't be choosing. We need to do both, and we need to have the innovation available on both of those platforms.

And so your bill would help equalize that imbalance we have right now on the 5G side to put us in a position. We lead the world today in unlicensed spectrum. We can again in 5G with this kind of bill. Thank you.

Mr. ALLEN. Thank you. Mr. Gillen, my rural district still does not have consistent mobile phone service.

What assurances can you give me that your member companies are making the necessary investments in upgrading their cell towers and building new ones as necessary?

Mr. GILLEN. Absolutely. It is a project every day that we continue to build. It is one of the things why it is important when we talk about what kind of spectrum is available, why full-power spectrum matters. If you think about some of the models, the sharing models we are using, you need seven times more the facilities to cover this in geography.

So when we are trying to get out beyond Augusta, what are we trying to do? How far that signal goes matters. There is also a role for the government, the 5G fund at the SEC, to help supplement and complement those places to help us push out faster.

But absolutely, we need to get further than we are today.

Mr. ALLEN. Is there anything Congress can do to help us—help companies build more towers in the rural areas of the country?

Mr. GILLEN. Certainly continued work on permitting reform would help, to help cut down—modernize that process to let us build faster and get to more places and more full-power spectrum. It would be both.

Mr. ALLEN. And then finally—I have got about a minute—can you explain the difference in the approach of a spectrum policy between the first Trump administration and the recent Biden administration, and what exactly needs to happen to get spectrum policy out of the gutter and back on track, and how long will it take?

Mr. GILLEN. We saw great success. The first Trump administration released more spectrum than any other administration, particularly some of the midband spectrum we are talking about under the Trump direction and Ms. Rinaldo's leadership. We saw 380 megahertz of spectrum—midband spectrum auction for over \$100 billion.

The spectrum directly adjacent to both of those is prime spectrum for that same opportunity again. So it came down to—we had a lot of—we were speaking with one voice, and the White House pushed us all forward with a good plan.

Mr. ALLEN. So it is important that this committee understand that we have got to move quickly with this, and we need to move in a bipartisan way and quit talking about political issues, and let's get this done and so we can lead—lead the world in communications technology.

And I want to thank each one of you for your being here today and for your input on this important subject, and please help us get this done. Thank you.

Mr. HUDSON. I thank the gentleman for yielding back.

I will now recognize the Representative from Florida, Mr. Soto, for 5 minutes to ask your questions.

Mr. SOTO. Thank you, Mr. Chairman. Spectrum is one of our most valuable commodities, our information superhighway. When I think about all the uses from cell phones and getting to 6G to AI and commercial rockets in Central Florida, by the way, telehealth streaming, gaming, internet, e-commerce, one of the greatest economic inefficiencies we have is buffering, the dreaded spinning wheel. I even remember when it used to be an hourglass. A lot of you may remember that.

And so, it is critical for us to ensure access to spectrum for these commercial and technical uses. Unfortunately, Congress allowed the SEC's auction authority to lapse back nearly 2 years ago. And we saw, you know, the Department of Defense, our military, they need to defend the Nation. But with nearly 2 years of this lapsing authority, we need to work out these differences.

There has been a history of using this funding for public safety, for national security that is communications-related, whether it is FirstNet, Rip and Replace broadband, and the new infrastructure

law. I could tell you, in rural places in my district, like South Osceola and East Orange, where they have ranches and farms and groves, using this funding in a related way to communications not only makes sense, but it is the just thing to do.

Communications are only going to require more investment as technology and competition advance, especially making our telecom system more resilient to cybersecurity hacks, like Salt Typhoon, which has been mentioned a bunch of times here.

So we need to make sure we are reinvesting these in the telecom system and not seeing tax cuts for billionaires that will siphon this off.

Most Americans and American small businesses will suffer identity theft, ransomware, spying, if we don't continue to reinvest.

So first, Mr. Gillen, I was shocked to see—we would see—China, over the last 3 years nearly 4 times the amount of midband spectrum for commercial use unleashed. And just so we are clear, there has been a bipartisan opposition in the Senate, through DoD, through Senator Rounds, I see Senator Hirono, too, who helped slow this down.

How do we—what are the consequences if this continues to happen?

Mr. GILLEN. Thank you for the question. I thought the consequences is where you started. It is the buffering hourglass. And when we talk about what these networks can do, it is inconvenient on a phone call when we want—with 5G, and we want connectivity to do in manufacturing and healthcare and transportation. We need these to be heavily reliable and resilient networks. So it has to work.

And so, ultimately, at its core, that advantage in China is giving them a leg's up in their ability to innovate. There are 14 times more 5G-connected factories in China than are in the U.S. You can draw a direct line back to our spectrum policy. They are continuing to move forward. There's forward global bands for 5G right now. They support three. We support zero.

We need to get on the playing field. We need to start competing again.

Mr. SOTO. Ms. Rinaldo, you were head of NTIA. When you worked with the DoD on these issues, What was their hesitancy? I feel like there is—I get it. There is national security implications to this.

But what are some of the things you can disclose of why there is still that tension there that is blocking a lot of this from coming forward?

Ms. RINALDO. Yes. I feel that there is a lack of trust. They, of course, have national security aims that they need to protect, and the industry wants those protected too. But there's so many efficiencies coming online. How can we ensure all users, public and private, are taking advantage of these efficiencies?

And so I think that is what we really need to get back into this conversation, is how do we get the trust back? We are all one country.

Mr. SOTO. Thank you. Mr. Lewis, if you could have a top three reinvestment in a telecom and in communications systems with the proceeds of spectrum sales, what would it be?

Mr. LEWIS. Top three. Definitely NG 9-1-1, which we have talked about. Number 2 would be digital inclusion efforts on the ground, Congress' investment in the Bipartisan Infrastructure Law. And digital inclusion efforts on the ground was a first of its kind, but it is not permanent. Spectrum auction authority could create a permanent fund.

And then other infrastructure needs: resiliency, there may be others. But spectrum auction proceeds are hard to predict as well. Those auctions, no greenfield space come with costs as well, so it would—prioritizing would make sense.

Mr. SOTO. Thanks. And I yield back.

Mr. HUDSON. I thank the gentleman.

The Chair now recognizes Mr. Latta for 5 minutes to ask your questions.

Mr. LATTI. Well, thank you, Mr. Chairman, and thanks to our witnesses for being with us today. This is really a great conversation.

Our national security depends on the United States maintaining an edge in advanced technologies. This committee has acted decisively over the years to meet this goal. At times, the legislation securing Americans' data from Communist Chinese collection and advancing spectrum policies like the Beat China for 5G Act of 2020.

The expiration of the FCC spectrum auction authority is not something I take lightly. An auction authority remains crucial for wireless technologies to have the ecosystem developed and thrive in the United States.

If I could start my questioning with Mr. Powell. And there has been a lot of discussion back and forth, but I am going to get your—get your thoughts on this. In your testimony, you speak to the American innovations that have come to—thanks to unlicensed spectrum availability.

Do you expect that, as technology continues to develop, coexistence of some sort of sharing in a band will be easier or have less interference?

And before you answer—you really went in-depth in your testimony on shared spectrum. And—but the question—we have been going around and around on this for—oh, since I have been on this committee, for almost 15 years, especially with DoD. And we just heard from Ms. Rinaldo talking about, you know, having some kind of working relationship back and forth and having that trust. But how do we get there? Because we can do a lot of talking, but how are we going to get that? Because we are going to have to have this spectrum.

Mr. POWELL. Yes. I think if you look at the examples of WiFi and the CBRS spectrum, you will look at dramatic increases in our ability to utilize advanced technologies to allow conflicting uses to coexist cooperatively. That allows you to get the spectrum out, have all users who need it have access to it, and be able to provide services in new and innovative ways.

I think one of the trust problems is that the Defense Department and others believe—I have worked with them for many years, including when I was Chair of the FCC. They lose trust when they feel like people are hunting to take the spectrum completely away from them and not offer them an alternative. They are charged

constitutionally with protecting our borders, protecting United States national security.

And I can tell you, a cash—a flipping hourglass while you are watching a video is one thing. A loss of 3 milliseconds on a missile intercept means you miss. That is a very fundamental loss of capability. So you can understand the conflict. It takes talented leaders and policymakers to bring that trust back.

But I would argue, looking more fully at shared spectrum models would allow them to see a future which they can continue to operate while coexisting with commercial users.

Mr. LATTA. Thank you very much.

Ms. Rinaldo, similar to conversations we have had in the past related to the benefits of ORAN networks, how does having a diverse spectrum ecosystem strengthen our national security and protect against foreign cyber attacks?

Ms. RINALDO. You never want an overreliance on a single band. That is why it is important to diversify. I think all you have to do is look to GPS, where it is incredibly vulnerable because all of our eggs are in one basket. You don't want to create a high-value target.

Mr. LATTA. Thank you.

In your testimony, you mentioned that the United States cannot and should not try to act more like China when it comes to spectrum management. What are some of the areas we should be looking at to encourage that innovation here while spreading American wireless values abroad?

Ms. RINALDO. So they operate by fiat. They have a handful of companies as opposed to us. We have hundreds of companies in this space, so it is important to bring them together to collaborate, multistakeholder through government, public/private partnerships. And so that is where we do have the innovative edge.

Mr. LATTA. Thank you.

Mr. Gillen, are there bands that have already been studied by NTIA that should be part of the spectrum pipeline?

Mr. GILLEN. Our studies have studies. Absolutely. When you—the structure really—there's many different ways you can structure the bill. You can direct—in the past, you have directed, you must auction this particular band. Sometimes it is a matter of spectrum within a range.

The clear priority for us is that—that you include a plan with auction authority, and there's lots of different ways it can do it. In terms of specific bands, absolutely. The 3 gigahertz band and the 7, 8 gigahertz band are two global bands that are both identified by the national spectrum strategy. We think those are key parts of the roadmap going forward.

Mr. LATTA. Well, thank you very much. And in this Congress, we have got to do, as I mentioned a little bit earlier, on our spectrum auction authority, to get this done, you know. It is just not for making sure that we have dollars coming in to the—on the Federal side, but it is also absolutely essential that we get the spectrum out there.

So, Mr. Chairman, I hope we can get this done this Congress. And I yield back the balance of my time.

Mr. HUDSON. I thank the gentleman.

I will now recognize the Representative from California, Mr. Ruiz, for 5 minutes to ask your questions.

Mr. RUIZ. Thank you, Mr. Chairman. It is an honor to serve on this subcommittee. I represent California's 25th District, the southeast corner of California, where far too many of my constituents are dealing with persistent issues of limited broadband access, inadequate cell coverage, and aging infrastructure. It is one of the most underresourced rural communities in the State of California.

And in communities like mine, the lack of reliable high-speed internet creates obstacles. Students are unable to fully engage in online education, small business struggles to remain competitive, and families are disconnected from critical services. The need to expand broadband access to Tribal Nations is particularly pressing because they face some of the lowest connectivity rates in the Nation.

And addressing this digital divide will not only ensure equitable access to education and economic opportunity, it would also provide essential services, like telehealth, to communities that need it most. And especially our vulnerable communities during the pandemic, we saw that the lack of access made them even more vulnerable.

And we must prioritize modernizing our telecommunications infrastructures to close this gap and build a stronger, more connected future for all Americans.

Mr. Lewis, could you speak to how the absence of broadband access affects the community and, in particular, what the national security implications might be?

Mr. LEWIS. I think you started with some great explanations. I saw some of those examples firsthand. I served on the school board in Alexandria for 6 years and saw students who did not have connectivity and how it impacted their ability to—to compete and to get a full education.

Broadband connectivity promotes economic development and the opportunities to reach a global marketplace for adults as well, and is incredibly important for communities.

Mr. RUIZ. Thank you.

Mr. LEWIS. And, you know, we are here talking about spectrum policies. There are so many different ways to serve rural communities like yours. And certainly the investments in the BEAD program that get fiber hopefully out to as many communities as possible is important for wireless because you can't have wireless connectivity and towers without the fiber backbone that those towers connect to.

And then finding other ways to use different sort of spectrum deployments, whether it is licensed spectrum, whether it is shared spectrum, whether it is WiFi, like unlicensed spectrum, like TV white spaces, the spaces between the channels—the TV channels is used for broadband performance. So there is so many different ways to—

Mr. RUIZ. And we need those during disasters for—

Mr. LEWIS. Yes.

Mr. RUIZ [continuing]. One of the critical things that we need them for.

So these connectivity gaps also pose critical risks during emergencies, where reliable communication networks are essential for delivering timely information, ensuring the safety of all Americans.

Last week, on January 10, 2025, due to various reasons, 9-1-1 outages were reported in the Coachella Valley where I represent, particularly in Cathedral City and Indio. Residents who relied on AT&T and Frontier Services were unable to reach 9-1-1 for several hours.

First responders directed people to call alternate numbers or text 9-1-1, which are not always available or reliable options. And this is not the first time people in my district have experienced this.

As an emergency physician, I have witnessed firsthand how every second counts during an emergency. Not being able to reach first responders is simply unacceptable.

In the 118th Congress, this subcommittee, on a bipartisan basis, made significant strides towards providing Federal and State governments with the resources necessary to transition to nationwide, IP-based Next Generation 9-1-1 systems. This technology will modernize our outdated 9-1-1 infrastructure and will allow texts, photos, and videos to be sent to 9-1-1, improving communication during emergencies, and location tracking, and ensuring better coordination during natural disasters like the ones we experienced, Tropical Storm Hilary and then also the L.A. wildfires.

So could you elaborate, Mr. Lewis, on the specific benefits, investments NG 9-1-1 will bring to our communities?

Mr. LEWIS. I think it starts with the idea that when an emergency happens, what do a lot of us do? We grab our phone, we take it with us. It is our—it is our lifeline to emergency services and our families.

Mr. RUIZ. People are more likely to die when they are having a cardiac arrest and they can't get the paramedics to their home to help them because of lack of N11.

So I think when we are looking at spectrum option, we should be using the funds to expand NG 9-1-1 and help save everyday American lives rather than trying to use those funds to give millionaires and billionaires more tax breaks, people that need it the least. We should be serving the American people who need it the most: everyday, middle-class, hard-working Americans who rely on 9-1-1 systems to save lives.

Thank you. I yield back.

Mr. HUDSON. Thank the gentleman for yielding back.

I now recognize the Representative from Florida, Mr. Bilirakis, for 5 minutes to ask your questions.

Mr. BILIRAKIS. Thank you, Mr. Chairman. I appreciate it very much, and congratulations. You are going to make a great chairman.

I have to admit, though, I was surprised that Congress let spectrum auction authority lapse, let alone for 2 years. At least we can say that the House did its job in trying to reauthorize spectrum auctions last Congress.

But this clearly remains a top priority for members of this committee on both sides. As we move forward, we shouldn't just be simply thinking about reinstating auctions but also consider process reforms. In the past, Federal agencies have attempted to stymie

auctions, sometimes even after an auction is held and bidders have won provisional licenses.

Mr. Gillen, how does the uncertainty of post-auction agency meddling impact the value of a spectrum license, and what can Congress do to address these problems in the future?

Mr. GILLEN. Thank you for the question. You are exactly right. Bidders hate uncertainty. Capital hates uncertainty. And therefore, asking companies to spend tens of billions of dollars on an asset, there is expectation that they are going to be able to quickly then use that to deliver service to consumers. Unfortunately, that has not always been the case recently.

I think it comes back to some of what Ms. Rinaldo said about the need for one voice at NTIA to make those calls. And ultimately, agencies and industry and everyone needs to live by that decision, and we need to get back to that place that you can help empower the spectrum experts at the FCC, at NTIA to be the ones that have to make the hard choices, how all of us want spectrum to be used.

Mr. BILIRAKIS. Thank you very much.

Mr. Powell, in the aftermath of the historic double hurricanes that slammed Florida and North Carolina and other parts of the south and the wildfires that destroyed cities in California, these communities need to rebuild from scratch. How will permitting policies impact rebuilding efforts, and what can Congress do to more quickly and cost-effectively rebuild robust networks in these areas, potentially allowing them to achieve a citywide network like Charter has done in Charlotte, North Carolina? If you could answer that, I would appreciate it.

Mr. POWELL. Yes. I think you mentioned most importantly that efficient receipt of permitting is essential. Our members often, in communities, run into situations which they are ready to lay fiber across an enormous expanse of rural and you have been waiting for a permit for 2 years. This happens at both the Federal and the State level.

I think there are other things about recovering infrastructure in disasters, like in Florida and North Carolina. For example, how do we get poles back up, and what quality poles do we put? Are we just going to put the same poles that blew down and broke, or are we going to improve those? Not only for withstanding the elements, but also being able to handle the expansion of broadband that we are all looking for in the BEAD program.

We have had companies like Charter who have been on the ground in—both in L.A. and North Carolina who have learned a lot about how we improve coordination with power companies and utilities to avoid infrastructure being cut after it has been restored, which is something we run into a lot in these situations.

So I think Congress and local governments can play a major role in improving the way we recover from these disasters.

Mr. BILIRAKIS. Thank you very much.

During his first term, President Trump signed an Executive order that streamlined environmental permitting processes for infrastructure projects, particularly highlighting projects that increase public safety. Due to this Executive order, Pasco County, Florida, which is in my congressional district, was able to finally

get a project shovel-ready after nearly 25 years of bureaucratic red tape, if you can believe it.

This streamlining was eventually rolled back by President Biden. On Tuesday, President Trump once again signed an Executive order significantly streamlining the environmental permitting process for infrastructure projects. Some experts are even suggesting this order could cut down permitting timelines from the better part of a decade down to 1 year, or under 1 year.

Mr. Gillen, historically, about how much time and money is spent on the environmental review process as opposed to physically building the networks to reach new customers and/or improve service for existing customers?

Mr. GILLEN. According to the Commerce Department stats, it can take well over 2 years, which an often case is a decision of whether or not we are going to build or not. Particularly when we have the conversation, you dovetail spectrum policy, we are not getting spectrum out quickly and then how quickly can we actually deploy it on the permitting side to get sites built to build networks further out. And then oftentimes the cost is considerable, but the time is really what hurts and our ability to actually build out those facilities as quickly as we want to.

So I think any steps to modernize those permitting programs to allow us to do that more quickly with more certainty, transparency, can be a game changer in terms of how quickly we can amplify what you do on spectrum.

Mr. BILIRAKIS. Very good. Thank you.

I yield back, Mr. Chairman.

Mr. HUDSON. Thank the gentleman for yielding back.

I now recognize the Representative from California, Mr. Peters, for 5 minutes to ask your questions.

Mr. PETERS. Thank you, Mr. Chairman. I am looking forward to working with you on this subcommittee.

It is the first time I have been on this subcommittee. One of the benefits of seniority—besides creaky knees—is, when the third committee comes around, you can choose—choose a new one. So I am happy to be here.

And throughout my time in Congress, I have prioritized some of the main pillars of our economy in San Diego, two of which I think are directly implicated here, just science and innovation, and also our military presence.

In San Diego we take pride that our industries are at the forefront of innovation. Qualcomm is headquartered at my district. It plays a pivotal role in the progress of 5G and 6G technologies and what we can achieve with a balanced spectrum policy.

Common complaint I hear from innovators like Qualcomm is that more spectrum is needed to meet demand from an increasingly on-line population and to be able to compete with competitors abroad, and we have already talked extensively about that in some ways.

Mr. Gillen, can you describe a little bit about the increasing demand for low cost—low-cost, high-quality broadband services and how that relates to the need to make spectrum more commercially available?

Mr. GILLEN. Absolutely. One of the exciting things 5G has created is our ability to compete in the home broadband market. So

we can now provide an option in both rural areas and areas where we have not had as much competition as you have, traditional mobile space. But we have seen that to be a greatly attractive product. Ten million households have signed up to that product.

But ultimately, at the end of the day, the ability to deliver that service, the promise of \$8 billion by one study is savings to households if we could roll that out. We don't have enough spectrum to actually keep delivering that everywhere. We already have a company with a million-person waiting list. More spectrum means that person has broadband.

Mr. PETERS. Right. How efficient would you say the wireless industry is with the current spectrum holdings and what opportunities are there for the Federal Government to be more efficient with the spectrum that it uses?

Mr. GILLEN. It is a critical question. We all need to be more efficient. I think, if you think about it from our perspective, 20 years ago, this was cutting-edge wireless technology. We reinvent every 10 years. Our network gets created. We get more efficient. We are 42 times more efficient. We have government systems from the 1970s still out there.

So it really is a matter for all of us to be in a position to make sure that those equipment—that we get the government better resources, better tools to be as efficient as we can be as well.

Mr. PETERS. I used to carry around a slide rule. That is really going back.

The IJJA, the Infrastructure Investment and Jobs Act, directed the Department of Defense to study and plan for making specific segments of spectrum available for shared Federal and non-Federal use to potentially identify frequencies for auction.

Mr. Powell, given your service in the military and as a former Chairman of the FCC, can you tell me why it is important for the Federal Government to take a comprehensive approach, including national security implications, when studying spectrum currently used by DoD for potential commercial use?

Mr. POWELL. Yes. I think we have all celebrated the value of spectrum, but we need to understand it is valuable for multiple important public uses. Not only commercial uses for consumers and businesses, but critical systems this Nation relies on, everything from NASA to OSHA to—the Oceanographic isn't what I meant—and our national security.

I was a soldier in the field. I was a cavalry scout, and you know what I was trained to do when the Russians come through the gap? Find the antennas. I mean, it is critical to shut down command-and-control systems in the military because that spectrum is essential to their ability to operate. Similarly, that spectrum is essential to intercepting intercontinental ballistic missiles like the dome over Israel, for example. You imagine if they didn't have the effective spectrum for that system, things would be very, very different in that community.

So it is essential with the military, and we have to work it out. There is no "just take it from them and we will be fine," right? We have to have a public answer to how we replicate anything we compromise.

And so the EMBRSS process in which—the EMBRSS report, in which the DoD studied the feasibility of sharing, came to the conclusion that it was possible to share.

And, frankly, if we had accepted that recommendation then, we would be well on our way to providing a spectrum to market under a shared-spectrum model. But for whatever reason, including opposition by the wireless industry, it got restudied by the NTIA because somehow people didn't like the answer. But if we really wanted the spectrum, we could have moved off of that report.

Mr. PETERS. Well, I am looking forward to talking more about this with you. I have the military in my ear and Qualcomm in my ear—

Mr. POWELL. Yes.

Mr. PETERS [continuing]. And I think the people do send us here to work things out. And so that is what I like to do, and look forward to working with you all.

I yield back.

Mr. HUDSON. Thank the gentleman for yielding back.

I will now recognize the Representative from Florida, Mr. Dunn, for 5 minutes to ask your questions.

Mr. DUNN. Thank you very much, Mr. Chairman. As a returning member of the subcommittee, I want to remind my colleagues, what we map out for national spectrum usage sets the stage for all telecommunications nationally and, importantly, for the entire world.

I would like to emphasize the advantages that we enjoy in this particular Congress. We not only have Republican control of the House, Senate, and the administration, but we have a President who actually understands spectrum policy and was very successful in spearheading some innovative and competitive policies in his first term.

I am going to read a statement from Brendan Carr, Chairman Carr, that highlights the successes. From '17 through '20, the FCC freed up roughly 6,000 megahertz of spectrum for licensed use alone, plus thousands of additional megahertz for spectrum for unlicensed use. The Trump administration put four times as much spectrum into the commercial marketplace for consumer use in one term than the last administration studied to put into use.

Two years ago, Congress allowed spectrum auction authority to lapse for the first time in three decades. This is while China edges into the lead on spectrum occupation and the offerings of its associated technologies. It is on the members of this committee in this room to lead on spectrum policy, to direct or authorize the FCC to enact authorization to auction these critical and finite resources.

And it starts by asking one general question: How much spectrum does the—America need for commercial use, and how much do we need for government use, and can they share the resource? And next: What are our licensed versus unlicensed needs for the commercial sector to innovate and grow? Can we strengthen sustained U.S. leadership in the field, or will we continue to lose ground in China?

Three years ago—several years ago, the U.S. lagged as a country in adopting 3G technology. Europe got ahead of us. The tables turned when we switched from 3G to 4G, and America was ahead.

So now as we get to 5G and 6G, we are competing with a cutthroat adversary, China.

And I want to caution us that, as Americans, we may feel entitled to win every big tech race and advancement, but that is by no means guaranteed unless we protect the telecommunications infrastructure wireless ecosystem. And that includes working with the ITU and the World Radio Conference. It also includes addressing priorities like diversifying spectrum uses for streamlining, for satellites, space, AI, et cetera.

All of this, you know, to keep foreign adversaries out of our telecom. And I believe, by the way, our adversaries have proven their hostile intentions by disrupting at least six submarine cables in the last few months alone.

With my esteemed colleagues on this subcommittee enjoying bipartisan, pro-American approach to technological innovation, which is fundamental in finding solutions to inner-agency debates and political disputes standing in the way of America's global competitiveness, and I look forward to finding solutions. And I trust this panel to help us.

Ms. Rinaldo, I was fascinated by your testimony. In your opinion, what is the safest and most secure path for the expansion of commercial use of spectrum bands, and given your expertise in Open RAN space, can you tell us what you see in the future for that technology, how we're expanding the usage of Open RAN, and where we go from here?

Ms. RINALDO. Well, if I could give you one little quick vignette to really get your mind wrapped around it. Canada in 2022 banned Huawei. They are going to be replaced just like we are. One of the executives at Telus has publicly said by 2029, they are going to be 100 percent Open RAN because he never wants to be in this position ever again.

Vendor lock is such a big part of this. So we talk about vendor diversity, but it is also about the vendor lock. It is going to allow you to be nimble, make updates as needed. So it really does have the power of national security concerns, as well as commercial connectivity.

Mr. DUNN. Thank you very much for that. You know, I am looking at a list of questions here. I know I am going to run out of time before I get there, but I am going to submit questions to everyone on the panel. And all too often, we do not get responses—I will say that—when we ask for written responses.

This is not a gotcha moment. This is a chance for you to educate Congress, improve your government, and I am sure you recognize the need for that. So please think of us as a receiving antenna and not a—not a nosey, imposing government.

And so with that, Mr. Chairman, I will yield back.

Mr. HUDSON. Thank the gentleman for yielding back.

I will now recognize the Representative from Illinois, Ms. Kelly, for 5 minutes to ask your questions.

Ms. KELLY. Thank you, Chair Hudson—and thank you for the peanuts—and Ranking Member Matsui for holding this morning's hearing, and thanks to all of our witnesses for participating.

You have heard some concerns already about how spectrum auction proceeds will be spent. I think Congress should invest its

money in ways that benefit local communities and public interest objectives. For instance, last Congress in our bipartisan spectrum bill, some auction revenues were directed towards HBCUs and other MSIs to help them increase broadband adoption in their local communities.

As one of the cochairs of the Predominantly Black Institution or PBI Caucus, I know such funding would have enormous benefits, as these communities are too often underresourced and lack affordable, reliable internet connectivity.

Mr. Lewis, do you agree that directing revenues towards expanding broadband adoption in communities served by HBCUs and MSIs is a worthwhile investment, and if so, why?

Mr. LEWIS. I would say yes. When I talked about digital inclusion efforts on the ground, many of them are being led by folks in and of specific communities, whether it is the Black community or Hispanic community, at HBCUs or MSIs. And so, yes, I think those dollars are incredibly important to—to support folks who know the local community well in getting people connected.

Ms. KELLY. And my district is urban, suburban, and rural, and I have 4,500 farms in my district. So I can relate to what my colleagues on both sides have been saying about their constituents.

The expiration of the Affordable Connectivity Program, or the ACP, poses a significant challenge for low-income households that depended on it to afford internet services. Unlicensed spectrum technology such as WiFi has provided connectivity across all income levels due to its wide distribution and deployment. We have seen schools and libraries utilize WiFi to help connect their students and patrons.

Mr. Lewis, can you talk about the role WiFi can play in connecting the unconnected, particularly with the expiration of ACP?

Mr. LEWIS. It is a powerful tool. You see libraries and schools loaning out WiFi hotspots for students who don't have connectivity at home. I know we did that years ago in Alexandria when I was on the school board.

The unlicensed is also important for continuing to support the next generation of diverse scientists and engineers. You talk about HBCUs. They are generating the vast majority of Black scientists and engineers in this country. If those schools don't have access to unlicensed spectrum to—to study new innovations and develop new devices and new innovations, then they miss out on those opportunities.

Ms. KELLY. Thank you. Mr. Powell, your written testimony notes that shared spectrum models are the key to meeting our growing wireless needs, and you go on to list some of the advantages of shared spectrum.

What is it about these shared spectrum bands that make them attractive to a wide range of different entities, including ISPs, schools, libraries, and manufacturers?

Mr. POWELL. I think the important thing to emphasize is when you do shared spectrum like we did in CBRS, you attract a whole bunch of bidders who win licenses, not just a single company or couple of companies.

So, for example, in CBRS, 228 companies or entities won licenses. And when you use those licenses, they are lower-power,

smaller geography, so it allows innovation in communities to set up their own wireless networks.

For example, you referenced HBCUs. Howard University is using shared CBRS spectrum on its campus today as a consequence of the shared-spectrum policy and the CBRS option. You mentioned agriculture. There are places all over the country that are using CBRS to manage moisture control, automatic temperatures.

These are bands that they would have never had access to but for the shared model.

Ms. KELLY. You kind of—my next question was, How has the development of CBR service or CBRS advanced precision agriculture—you know, how has that been affected?

Mr. POWELL. Yes. As I mentioned, you know, there is a company called Hurst Greenery in Missouri that has 600 acres of greenhouses, and they use CBRS shared spectrum in order to control fertilizer feeds in order to check moisture of—moisture in the soil as well as to automatically control temperature control. And they were able to access that as a consequence of that FCC auction.

Ms. KELLY. My increase in farms join me to join my colleague, Rep Latta, in leading the House-passed Precision Agriculture Satellite Connectivity Act, which asks the FCC to review its rules for certain satellite services to see if there are rule changes that can be made to promote precision agriculture.

So thank you, Mr. Chair, and I yield back.

Mr. HUDSON. Thank the gentlelady for yielding back.

The Chair now recognizes the Representative from Pennsylvania, Mr. Joyce, for 5 minutes to ask your questions.

Mr. JOYCE. Thank you, Chairman Hudson and Ranking Member Matsui, for holding this hearing and to our witnesses for testifying.

I appreciate that this subcommittee is starting with a topic that is clearly at the top of everyone's mind, and that is spectrum. The Energy and Commerce Committee has a long-standing commitment to smart, bipartisan policies that both modernize and govern spectrum use. Our jurisdiction is on the issue, and it has a storied history. And I am looking forward to working with my colleagues on both sides of the aisle on this issue.

Spectrum is a finite resource, and we must ensure that we are being innovative and thoughtful when forming any spectrum legislation moving forward. Solving this spectrum auction authority lapse and generating new spectrum policy is my top priority on this subcommittee, and I look forward to working with Chairman Hudson on getting this across the finish line.

Mr. Powell, speaking of innovation, your members have leveraged spectrum and its high-speed broadband networks in many groundbreaking ways and are becoming fast-growing mobile providers. Can you describe this incredible growth and competition and the role that unlicensed and shared spectrum have been playing?

Mr. POWELL. Yes. You can look at how we innovatively use the spectrum that was available to enter the mobile telephone market as the fourth major player. So we use WiFi where 80 to 90 percent of our traffic goes over that infrastructure. We should remember, 90 percent of the time human beings are indoors, and so they have access to that spectrum.

And then we use shared spectrum and we use exclusive license spectrum. And by doing that, we have been able to create a service that is dramatically cheaper than other wireless plans. Plans from the cable companies on mobile services, on average, save consumers up to \$700 a year on their mobile wireless services being offered by cable companies.

Mr. JOYCE. Mr. Gillen, can you speak to the ways in which your members have utilized licensed spectrum to innovate in the wireless space, and to what extent that—has the lapse in auction authority affected your ability to innovate?

Mr. GILLEN. It is a great question. I think we talked a little bit about 5G home, an example of providing the second or third choice in home broadband right now, thanks to the power of 5G home. The 20 percent of those subscribers are new to broadband altogether as an ability of wireless to get deeper in those communities makes a big difference, and the differences can be stark. It is up to \$8 billion in savings to consumers thanks to that competition.

As a practical matter, we already have companies out there that have waiting lists because there is not enough spectrum to continue to feed that competitive spirit. And so across the board, the more spectrum we have, the better we can compete both in the mobile space and in the fixed space.

Mr. JOYCE. And continuing, Mr. Gillen, during the first Trump administration, 100 megahertz of prime midband spectrum was auctioned in the 3.45-into-3.55 gigahertz band for \$22 billion. Estimated relocation costs by DoD were over \$13 billion, but according to NTIA, less than \$300 million have been spent.

Is that band currently operational by commercial users, and if so, are they currently operating with incumbent DoD operations?

Mr. GILLEN. Absolutely. I think when we talk about shared spectrum, there's different types of shared spectrum. There is dynamic sharing, where it is actually real time and preemptible. That makes it hard for us to be used reliably.

There is other spectrum like you are alluding to. Some systems are moving out their government system, some stay. And the best thing we can do is get engineer to engineer together as to which systems belong here, which systems can be used more smartly elsewhere.

I think one of the auctions you just referred to is one of those places that the money that is left over right now is earmarked for the Navy to design a better radar that could help in the drone environment. And so, part of the magic of auctions is the Spectrum Relocation Fund Congress created creates win-win opportunities that we can actually help the government get the tools they need for the modern warfare environment that we have now.

So how do we get smarter? How do we share better? And we have a lot of tools available that we actually know can work, both the military radars can work, and we can coexist with 5G.

Mr. JOYCE. Do you think, Mr. Gillen, that the innovation that can occur with the United States Navy and other military is a by-product of the additional funds that occur through spectrum auction?

Mr. GILLEN. Absolutely. This is a key piece of the puzzle to help them continue to advance and improve what they need us—what we all need them to do: keep us safe.

Mr. JOYCE. Ms. Rinaldo, what policy priorities should Congress have when addressing development spectrum policies in this Congress? Are there issues in spectrum—with your experience, what you bring to the table—that have not been addressed and you want to be seeing in this Congress occurring?

Ms. RINALDO. So I would say, first and foremost, good oversight. We need a plan, we need to implement that plan, and we need to make sure that we have oversight to hold everyone's feet to the fire.

Mr. JOYCE. Thank you.

Mr. Chairman, again, thank you for holding this important spectrum hearing today.

Mr. ALLEN [presiding]. Thank you, Dr. Joyce.

And now I recognize Representative Barragán from California for 5 minutes for questioning.

Ms. BARRAGÁN. Thank you, Mr. Chairman, for holding this hearing on American Leadership in Wireless Technology. I would love to hear about the bipartisanship, and there is bipartisan agreement on the importance of extending spectrum auction authority to support our wireless networks and further innovation.

However, I think it is critical the American people know how we plan to use tens of billions of dollars that will be raised from the spectrum auction, and I also have concerns about reports that Republicans may propose to use the revenue from spectrum auctions to give out tax cuts to billionaires and corporations. Instead, I believe that we should be using those dollars, investing in things to benefit all Americans such as through broadband and through public safety initiatives.

Mr. Lewis, I am going to start with you. After witnessing firsthand the devastating impacts of the recent wildfires in the Los Angeles area, it is clear how important it is to have a strong emergency communication when disasters strike. We often hear about people on the wrong side of the digital divide and how they miss out on essential education, health, and commerce opportunities, and you touched upon this topic briefly, but you kind of ran out of time. So I want to follow up.

If you could talk more about what it means when entire communities still have old, out-of-date 9-1-1 systems.

Mr. LEWIS. I think without NG 9-1-1 you have less—you have slower responses. You have missed opportunities to get location information from people's mobile devices, other communication beyond phones, like texting, that help people reach emergency services faster.

And so it is incredibly important that we continue to deploy NG 9-1-1 everywhere.

Ms. BARRAGÁN. Thank you. I think that is one of the reasons we should invest money from things like spectrum auctions and important communications priority like the Next Gen 9-1-1.

Mr. Gillen, I want to follow up with you. How do wireless networks support public safety communications and emergency alerts, and are there any additional measures we should consider to en-

sure people in emergencies receive timely, life-saving information to improve response efforts?

Mr. GILLEN. Thank you for the question. And I think the last few weeks have reinforced the importance of that program.

The wireless emergency alerts, we have sent over 84,000 during that program. And one of the things we have learned recently is we have continued to add more functionality to that program. So before it went out through a broad area, we increasingly allow smaller geographic areas to go out, we give options as to how often a message is broadcast in your community in case your phone is off or other things.

I think some of the challenges we saw the last few weeks underscores that we need to partner with those public safety originators who actually start the alert process as to how the tools work and what actually happens. But I think at its core, it is a critical functionality that we are proud to be able to help.

We need to always continue to work to make that program stronger both in terms of how the originators add to it and the functionality we create both for consumers and for the public safety.

Ms. BARRAGÁN. Thank you.

Mr. Powell, there is a significant workforce shortage across the telecommunications sector, with tens of thousands of skilled workers needed to meet current and future demands. What steps are the companies you represent taking to address the shortage, and particularly through workforce development and engagement with underrepresented communities?

Mr. POWELL. Yes. This actually is a very serious problem. It is one of the big problems with the BEAD infrastructure program. Our expectations of what we are going to be able to build falls short of the amount of workforce available to build it.

Consequently, our companies have focused on a number of significant workforce training programs. Some of them include particularly programs targeted at veterans. We have some programs targeted at young people to help them learn the skills and develop engineering talents that allow them to move into the cable industry. And we have very ongoing efforts daily in order to bring people into a company and train them.

This is not simple cut-and-paste work. It is important, high-quality work, and we are committed to continuing to build a workforce that can allow us to bring broadband to every corner of the country.

Ms. BARRAGÁN. Thank you.

Mr. Gillen, is there anything you want to add about what—the companies you represent, what they may be doing, any policy recommendations, how Congress can help fill the gaps?

Mr. GILLEN. I echo everything that Chairman Powell said. We need to be in a position to have the workforce ready. I think the Wireless Industry Association is a great apprenticeship program. I think we are all working together to get people into this. These are good-paying jobs. These are good opportunities.

I think one of the things Congress can do is if we know over the next 5 to 10 years when spectrum is coming—those tower companies know when the work is coming. So right now when you talk

about gaps in time between auctions and everything else, we don't know when the next one is coming. And so I think when you are looking at companies with tower builders across this ecosystem, the more certainty we can provide is a roadmap to, like, I can hire because I know the work is going to be there.

So I think the more certainty you can provide, but we would welcome your support because the workforce is critical to achieving everything we are doing.

Ms. BARRAGÁN. Great. Thank you.

I yield back.

Mr. ALLEN. Thank you, Representative Barragán.

Now, I recognize Representative Fulcher from Idaho for 5 minutes for questioning.

Mr. FULCHER. Thank you, Mr. Chairman. To the panel, thank you for being here today. We always learn something, and every time I listen to you all talk, I realize that I know about a fraction of what I need to know about some of these things. And so thank you for being here.

A couple of questions just for clarification. Mr. Gillen, I come from a State with a lot of space. There is a lot of rural area in Idaho, but it is growing. And the needs are growing rapidly. It is a fast-growing State, a lot of open space, a lot of Federal land, all that.

We have touched on some of this, but just for clarification purposes, would you just share, what is the cost of us doing nothing? What if we do nothing in regard to licensed spectrum shortage, identifying that? What is the cost of that?

Mr. GILLEN. The cost of it is, at its core, at some point this is going to stop working the way that you expect it to work. A lot of the innovation and expectations we want to talk about, whether it is AI or anything else, isn't going to have that platform to ride on. So that we are going to need to make sure from a licensed perspective and an unlicensed perspective, we have enough spectrum to actually meet our daily needs.

The first thing you notice in high-traffic areas, you are going to see slowing down. And that is going to get progressively worse. But what it really is, we are accustomed to our wireless service getting better each and every year. Without more spectrum, that can't happen.

Mr. FULCHER. Thank you for that. So that just shows the urgency that we are under here. I wanted to clarify that.

Mr. POWELL, good to see you again. Thanks for joining us here today. On a similar topic, let's go to WiFi just for a moment. I would like to get your input. WiFi handles, as we have talked about, a lot more traffic than any other wireless technology. WiFi 7 is coming. Can you touch on that and just tell us what—what from your vantage point, what is that going to bring, and what does this mean for spectrum policies as we advance WiFi?

Mr. POWELL. Yes. If you had walked the floor of the Consumer Electronics Show this past January, you would have seen a ton of emphasis on WiFi 7. WiFi 7 is a next-generation technology that, in short, allows faster—faster use, faster data rates and wider channels.

One of the things we are having to manage in the home is an explosion of devices that need to be utilized on the same network. So when you get wider channels, you are able to get applications that require lower latency. So, for example, 4K or 8K video, or another example would be virtual reality systems of any type, and gaming.

So WiFi 7 is essentially critical to the kind of devices that are coming into the home and coming into the market as we continue to innovate.

Mr. FULCHER. And also important for research, research development, being unlicensed spectrum?

Mr. POWELL. Oh, 100 percent. You know, we continue to use WiFi in research environments, medical environments, environments that have heavy reliance on it. And the more we have these advanced systems, the better we will be.

Mr. FULCHER. Thank you for that.

Ms. Rinaldo, I would like to steer a question to you. The Open RAN situation is an exciting one. Personally, as I hear you talk and as I just think through some of the things we have been through, I am concerned about equipment made by some of our adversaries. You mentioned the Huawei and some of that, some of those things that, quite frankly, at least some of us don't think can be trusted.

What steps, if any, do you think that we should be taking in a leadership role to encourage trusted equipment, American equipment—whether it is American or anybody else, but trusted equipment? What steps should we be taking?

Ms. RINALDO. So the two biggest things that we face right now is lack of the deployable spectrum here in the United States—how do we get spectrum authority back up and going, how can we make more spectrum available?

Also, as we look internationally, I would say how we use our investments, our international assistance programs. For instance, EXIM Bank, they have risk caps associated with, and telecom is such an infrastructure-heavy industry, we always bump up against those caps, and so no telecom projects are able to get funded.

So we are currently working with Congress on legislation that would allow EXIM to waive risk if we are going up against a Huawei or a ZTE. So those are a handful of items that could really help make a difference in getting Open RAN deployed around the world.

Mr. FULCHER. Great. Thank you for that.

Mr. Chairman, I do have more questions but not enough time to ask them, so I am going to put those in written form. With that, Mr. Chairman, I yield back.

Mr. ALLEN. Thank you, Representative Fulcher, for yielding.

Next is Representative Menendez from New Jersey.

You have 5 minutes for questioning, sir.

Mr. MENENDEZ. Thank you, Mr. Chairman.

Spectrum is one of our most valuable public resources. It has become a cornerstone of modern life for American families, enabling smartphones, navigation systems, telehealth services, emergency alerts, aviation systems like air traffic control, and the list goes on.

How we manage our radio airwaves has a profound impact on access to and affordability of essential services, technological innovation, and digital inclusion, so it is vital that Federal spectrum policy is designed to support and benefit all Americans. This requires a range of spectrum access regimes that include both exclusive and shared-use licenses for reliable networks and access to unlicensed spectrum that supports innovation. Achieving the right balance is critical.

Mr. Lewis, would you agree that if we use auction proceeds to invest in our digital infrastructure and programs that serve the public interest, we can further unlock the next generation of American innovation and close the digital divide?

Mr. LEWIS. Yes. I think it meets the mission of the Communications Act to do so and fills the gaps that we have in making sure that everyone is connected.

Mr. MENENDEZ. Great. And I agree. That is why I join Ranking Member Pallone in his concern of reports that our Republican colleagues are instead preparing to use reconciliation to put spectrum auction proceeds towards funding tax breaks for corporations and wealthy Americans.

This is while we have heard a lot of talk from Republicans about affordability and putting America first. And here we are with a clear opportunity to invest in the public good in a way that will have a real impact on our constituents' access to affordable wireless services and on our Nation's ability to lead the world in wireless innovation.

So this is a moment of truth, and I invite my colleagues across the aisle to make good on their promises and join us in making life more affordable for American families, to make our communities safer by improving FirstNet, and to maintain America's leadership in technological innovation.

Mr. Lewis, I believe Federal spectrum policies must serve the public interest first and foremost. As we discuss extending the FCC's auction authority, we must be intentional about how licenses can provide the maximum benefit to our constituents.

How should the FCC design spectrum licenses to ensure that wireless services are more accessible and affordable for our constituents?

Mr. LEWIS. I think it starts by using the new spectrum access models that have been studied to get the greatest benefit and the greatest efficiency of the use. We have heard at this hearing just how different bands can be used for multiple uses at the same time, including the military, while the mobile license carriers are using it, as well as unlicensed smaller power uses, all at the same time and managed through dynamic spectrum sharing.

So finding the most efficient uses, I think, is incredibly important and then, after that, running auctions with the authority from Congress, hopefully, that produce additional public-interest benefits like NG 9-1-1.

Mr. MENENDEZ. That is great.

And, building on that, how can licenses be structured to ensure that communities that tend to be underserved by commercial licenses are not deprived of digital opportunity?

Mr. LEWIS. I think the opportunity comes from those sharing examples. We have already seen some of this happen. You know, in the CBRS band, there are great opportunities for some of the most unconnected communities in rural areas—Tribal areas, especially, are our most unconnected—to use spectrum that is not being used, that may have licenses, but—prioritized, but creates opportunities for them to have community-owned built networks. And I think that is in the spirit of some of the relationships we have with our Tribal communities.

So that is one example. There are many others.

Mr. MENENDEZ. Yes. That is great. And I would love to continue the conversation, but I am down to the last minute.

In your past testimony, you noted that auctions, if designed correctly, have the potential to reshape the workforce. How can licenses be structured to promote a robust and diverse spectrum workforce and increase supplier diversity?

Mr. LEWIS. We have seen the FCC meet their statutory mandate to promote vendor diversity.

They have the Office of Communications Business Opportunities that helps connect women and minority vendors to opportunities to work with larger carriers and big providers.

They have created the ECIP program, which promotes taking licensed spectrum but creating a secondary market so that, if it is not being used by the large carriers, other groups can come and get access to that spectrum.

So there are great opportunities if we design it and continue those programs.

Mr. MENENDEZ. That is great.

I appreciate you all so much for being here.

And I yield back.

Mr. HUDSON [presiding]. I thank the gentleman for yielding back.

I now recognize the Representative from Texas, Mr. Pfluger, for 5 minutes to ask your questions.

Mr. PFLUGER. Yes, thank you, Mr. Chairman. And I appreciate the opportunity to have this hearing.

I will start with Mr. Gillen.

I would like to talk about the EMBRSS report. And, basically, DoD, NTIA concluded that the 3 gigahertz band couldn't be cleared for exclusive use. So I kind of want to talk through a sharing model or a segment model.

And, really, what I want to hear is what needs to happen, especially from DoD. What do we need DoD to come back with? How do we need to work together? What settings are we expecting that to happen in?

I am familiar with this band, I have used it in my professional career, and kind of want to get to the bottom of where we need to go processwise.

Mr. GILLEN. Absolutely. And I think there has just been a misunderstanding amongst everybody as to what our goal here is.

You think about the lower 3 gigahertz spectrum. It is 350 megahertz. That is almost as much spectrum as 5G has available for it. No one thinks all those radars should go away. That is a bad idea. And too much of this conversation is, "Oh, we need \$200 billion and 20 years" to do something that no one is asking them to do. Ulti-

mately, we need to get to a place that we have engineer-to-engineer.

We think segmentation makes the most sense around what is happening globally. So, if you look at just the top 150, and then in that top 150, what are those systems? There are systems—there is a missile defense facility in Alaska. No one should move that. There is no need to move that. There is AWACS, there is the airborne system out there that is going to get replaced by Wedgetail in 2032. So let's talk about what is available in 2032.

There are other systems—let's say it is using Channel 5. It is like an old TV. Can it work on Channel 3? Other systems, can we talk about—can we use it, smaller channels, if we actually invest? Some of the money from the last auction is going to the Navy to move S radars to X radars that are actually better in a drone environment.

So we think that we have to get away from a binary choice, it is either the military or wireless. We need both. We just need to be smarter and more efficient.

Mr. PFLUGER. Yes.

Mr. GILLEN. And we need to start with getting engineers talking on a system-by-system basis, understanding your needs, understanding our needs, and making everybody stronger.

Mr. PFLUGER. Well, I couldn't agree more. And I think, working together—and I used those AI radars. I flew those aircraft. I used the services of aircraft like AWACS. And I think the time and geographic—the ability to bifurcate those and to separate—so I want to explore more on the segmentation process.

Mr. POWELL. I will let you answer there, and I have a question for Ms. Rinaldo after that.

Mr. POWELL. Well, I think I can only incrementally add that, I mean, the answer we just heard sounded a little bit like finding ways to share. And that is exactly what we are supporting.

I think the big conflict is, are we going to move forcefully in that direction, following the examples and precedents we have had in the past to do so, or are we going to continue to fight over how much we can actually take away for full power and exclusive use by the commercial industry?

I mean, I appreciate that you could go through system by system, but I think we also have to respect the military experts' judgments on what they need and how they need it. Those of us in industry, engineers or otherwise, aren't necessarily the best people to make those national security decisions.

Mr. PFLUGER. Do you feel like that we have been together in the right rooms at the right classification level to understand each other?

Mr. POWELL. I probably don't have enough direct experience to answer that question, but I would say, look, there is a component of what happens on the military side that stays behind the confidential curtain. You have to trust that people are protecting things that must be protected. But, typically, we learn enough about what they are doing to have a pretty good appreciation of what the sort of range of possibilities is.

Mr. PFLUGER. I am convinced that we can share. I am convinced that there is a plan that we can make work. And, actually, the ben-

efit will be innovation, and that will benefit DoD as well. It is a finite band.

Ms. Rinaldo, I will come to you. In your testimony, you talk about the role of standard-setting bodies, such as the World Radio Conference—Radio Communications Conference, and what that plays in shaping technology.

I think there are some concerns about that process and concerns about getting to that conference and having the U.S. take a leadership role. What needs to change in that process? And how do we affect it better beforehand?

Ms. RINALDO. So I think there has been a lot of chaos going into the WRC. And it is so incredibly important that we go in and we have debate, right, we have the fight in the room. That is where great ideas happen.

But then when we leave that room, we need to have a decisive decision, and people need to stick to that decision. And that has been the breakdown. So, if we are at WRC and we are still fighting, then our adversary is winning.

Mr. PFLUGER. Mr. Chairman, great hearing today. Our national security depends on this. I am convinced that innovation will result from moving forward with an auction.

I yield back.

Mr. HUDSON. I appreciate the gentleman yielding back. And I appreciate your perspective on this. I think your experience in the military uniquely qualifies you to help us figure this out. And I think this committee is determined, on both sides of the aisle, to figure this out. So thank you.

The Chair now recognizes the Representative from Virginia, Ms. McClellan, for 5 minutes to ask your questions.

Ms. MCCLELLAN. Thank you, Chairman Hudson and Ranking Member Matsui, for convening today's hearing.

As many of you know, I began my legal career a little over a year after the Telecommunications Act of 1996 passed. That is how I started as a lawyer. I ended as a lawyer, right before coming here 2 years ago, figuring out how to implement the BEAD program and to expand broadband.

I have witnessed first—I had a front-row seat at the table, witnessing the transition of the telecom industry from regulated monopoly, where mainly landline was the form of communication, to now a WiFi-based, wireless-based, data-based industry. And I have seen firsthand the explosion in the use of and the demand for more bandwidth, for more and more data, growing at an explosive rate.

So I am very excited that my first hearing as a member of this committee has brought me back home, dealing with issues that I have dealt with since I was a baby lawyer.

And, with that, I would like to first focus on the discussion we have had about spectrum being a finite natural resource that does form the foundation for technical innovation in our dramatically increasing digital world. Its allocation and utilization carries significant potential to either bridge or widen the digital divide, particularly for our rural, underrepresented, and marginalized communities.

And so, for Mr. Powell and Mr. Lewis, could you elaborate on the benefits of unlicensed spectrum, including how it has historically

driven innovation and expanded connectivity, especially in underserved, rural, and Tribal communities?

Mr. POWELL. Thanks. I am happy to go first.

I would say a couple things real quickly.

First of all, it is important to understand how much value WiFi brought to the typical American family over the way the internet first unfolded. When I was first at the FCC, you paid \$60, you got a single connection, and you got one computer to operate on that connection. Today, that price is about the same and every single person in the house can use it. So you have dramatically increased the value and the affordability of the service for all communities.

Secondly, the thing that we are learning is WiFi is very effective as a public resource. Anybody can get on it—in the airport, in the public park, in the library, in the famed McDonald's parking lots where students have studied at times. During the pandemic, we wouldn't have survived without WiFi being able to allow us to operate at home.

The other thing is, as we move to share models, we are learning that people can take matters into their own hands. I have a great respect for the wireless industry. They are great, but they have challenges in building out infrastructure. But we, with CBRS, we empower local communities to set up their own wireless networks. We have small utilities who are able to use CBRS and provide services to their communities. We have small wireless internet service providers who use these bands that they are able to get at low cost to provide services to rural communities.

So one thing to remember in the models that we are championing is that you allow anybody to take delivering wireless service into their own hands and use it privately—in manufacturing facilities, in stadiums, in football fields. The NFL is going to use it for all of their 24 stadiums. So it is a democratizing approach. And I think we think we see a lot of benefits that come from that.

Mr. LEWIS. Just to add on, it is democratizing in how it impacts folks who then get to innovate on unlicensed spectrum. We talked earlier about, you know, the important research that can be done to build new devices, and we want to see that happen everywhere, whether it is, you know, on HBCU campuses or in high schools around the country.

It is benefiting in both rural and urban areas. You see WiFi create local networks in urban areas, like Harlem, and the most remote rural areas. Tribal communities are building on multiple bands. There is, in California, the EnerTribe, serving the Yurok and Karuk and Hoopa Tribes—"Hopa" Tribes, I might have mispronounced it—where they have built their own networks using the shared CBRS structure but on the unlicensed level.

Ms. MCCLELLAN. Thank you, Mr. Chair.

In my last 10 seconds, I would just like to ask, for Mr. Powell and Mr. Gillen, if you could share in written response back what steps Congress can take to ensure that vital programs like the now-expired Affordable Connectivity Program can foster greater competition in the wireless market and to drive down prices, while also ensuring providers have the resources necessary to deploy and maintain the networks that are necessary to provide those services.

And, with that, I yield back.

Mr. GILLEN. We will do that. Thank you.

Mr. HUDSON. Thank you.

The gentlewoman yields back.

The Chair now recognizes the Representative from Georgia, Mr. Carter, for 5 minutes to ask your questions.

Mr. CARTER OF GEORGIA. Thank you, Mr. Chair.

And congratulations to you, Mr. Chair, on your chairmanship of this subcommittee. It is a great subcommittee, and I served as vice chair for a while last session. I will tell you, they have a great team too. So you have surrounded—they have surrounded yourself with good people. And we appreciate it, because it is extremely important. This area, as we all know, is extremely important.

Mr. Gillen, I want to start with you. You said today that we, as the U.S., are watching other countries, whether it is allies or rivals, make more 5G spectrum available for their 5G networks than it is in the U.S.

Can you talk more about that and why other countries are doing—what they are doing with spectrum, why it matters? And specifically about China.

Mr. GILLEN. Absolutely. Thank you for the question, Congressman.

You go around the world: England has twice as much of the spectrum that we do, Japan has three times as much. There has just been a recognition when you look at these demand curves, what are we going to need to actually meet that moment and also to create innovation?

If you think about all the innovation in the sharing economy, all those apps, they happened in the United States because 4G was the best in the world in the United States. And we need to get back to that place in 5G.

What we see in China is, both domestically they want to be able to deliver innovation, manufacturing—their pushing forward of the smart manufacturing—leveraging that spectrum. They also want to—as Ms. Rinaldo has talked about, they want to export their values, their equipment through spectrum policy.

So, right now, globally, there are four 5G spectrum bands out there for the globe to use. China supports three of them. We support zero of them for 5G. We are not in the game right now to be able to help shape where our allies—where we go, which impacts our manufacturing base to have someone to sell equipment to. It impacts our ability to innovate. So—

Mr. CARTER OF GEORGIA. OK.

Mr. GILLEN [continuing]. The faster we get back to more spectrum, the better off we will be.

Mr. CARTER OF GEORGIA. Great. Thank you for that explanation.

Mr. Powell, how will the unlicensed and the shared community help us address the China threat as it was just explained?

Mr. POWELL. Thank you for the question.

One example I would like to share, which is Georgia-based, is the United States Marine Corps at the Logistics Base in Albany, Georgia, is using CBRS shared spectrum right now to advance our warfighters' abilities to use robotics on the battlefield.

I think it is important to remember that, you know, China is a threat on multiple fronts, and if they invade Taiwan, we are going

to find out the most important one is whether we are able to meet that threat. So CBRS shared spectrum has been a solution on a number of military bases to allow them to set up their own private networks in order to train and operate equipment.

Mr. CARTER OF GEORGIA. Good. Thank you for that.

Mr. Gillen, I want to go back to you. As you know, I introduced the American Broadband Deployment Act that takes steps to eliminate the bureaucracy and the red tape.

And I will tell you, that is one thing we are—the Trump administration is going to address, is just all the permitting, all the regulations that go throughout all of our economy. I don't care if you are talking about healthcare, if you are talking about technology or energy—everywhere I go, everybody is telling me permitting, regulation is crushing us, crushing us.

So, obviously, in the previous Trump FCC, they made great strides in this area, and Chairman Carr's leadership has been needed. I am wondering, do you think it is important to codify those changes, and should we go even further?

Mr. GILLEN. Yes. I think your bill is a key companion to this conversation around spectrum, that in order—particularly as we are waiting years to get spectrum access, we need to hit the ground running. And I think what Chairman Carr did previously on permitting reform, we need to do more. We need to go beyond small cells to macro cells, how do we get to Federal land.

So I think your legislation is a key piece of how do we actually codify that commonsense modernization that we need to actually get people out building again.

Mr. CARTER OF GEORGIA. Do you think spectrum would be more valuable if broadband permitting was faster and more transparent at the local and the State level?

Mr. GILLEN. Yes. It gives us a roadmap to how quickly we can build; if you buy that asset, how quickly can you put it on the towers across the country, actually delivering service to consumers.

Mr. CARTER OF GEORGIA. I think that is very important, and I hear it all the time as well, about problems not only at the Federal level but at the State and local level as well, and we need to be assisting them in that as well.

Mr. GILLEN. Absolutely.

Mr. CARTER OF GEORGIA. Mr. Chairman, thank you very much.

And thank all of you for being here. Again, this is extremely important. We all know that, and we recognize that. So your input is very valuable, and we appreciate you taking time out to spend with us.

Thank you, Mr. Chairman. I yield back.

Mr. HUDSON. The gentleman yields back.

The Chair now recognizes the Representative from New York, Ms. Clarke, for 5 minutes to ask your questions.

Ms. CLARKE. Thank you.

Good afternoon, everyone.

And thank you, Chairman Hudson, and thank you, Ranking Member Matsui, for convening this important hearing.

Let me also thank our panel of experts for joining us this afternoon.

Finally, my warmest regards and welcome to all of my new colleagues on the subcommittee and the Energy and Commerce Committee.

Spectrum policy is such an important part of this committee's jurisdiction and a fitting topic for our first subcommittee hearing of the 119th Congress, particularly given the continued lapse in the FCC's spectrum auction authority.

While I am disappointed the Senate was unable to follow our lead in the 118th Congress on auction authority, I am proud of the work this committee has done in recent years on spectrum policy.

The need to advance and enact legislation that reinstates auction authority and thoughtful spectrum policy is more important than ever, given the multiyear lapse, but it is equally important that we get it right.

Spectrum is a public resource and must be treated as such. Our spectrum policies must carefully balance the needs of both Federal and non-Federal users while fostering new innovations that maintain our global leadership. Spectrum auction proceeds must also be reinvested for the public good and not as a pay-for for additional tax cuts for billionaires.

This committee has historically shown an ability to work in a bipartisan manner to establish a creative regulatory framework that fosters the kind of innovation and competition that made us global leaders in the first place. CBRS is a prime example of the kind of creativity that we can achieve when we work together. And I believe that, together, we can break this logjam and advance innovative spectrum policies that serve the public interest.

At the heart of this impasse is the fundamental tension between critical national security needs and the priorities of wireless carriers. Reauthorizing spectrum auction authority requires addressing this tension head-on. And a successful framework must enable technologies to coexist, ensuring that neither side feels the need to obstruct future attempts to reauthorize the authority.

Having said that, Chairman Powell, in light of your response to Rep. Pfluger, what are your thoughts on spectrum-sharing frameworks like CBRS? And how can this help us chart a path forward?

Mr. POWELL. Yes. Thank you.

Think about just the number of top-line benefits when you pursue spectrum in this way. Number 1, you help resolve the conflicts we have all been talking about. Rather than having a tug of war between two different important interests, we find a way to have them share.

Secondly, it tracks a lot more investment. So, you know, when you had CBRS, you had 228 winners, not 1 or 2. They are all able, then, to provide a whole range of diverse services. You could provide wireless high-speed service, precision agriculture—

Ms. CLARKE. Uh-huh.

Mr. POWELL [continuing]. New networks for your school. And you allow people to do that without further permission from the government. These are enormous benefits.

So, you know, I think, when you add that all up, it is a very important tool in the quiver of Congress and the United States Government as it tries to think about a forward-looking spectrum policy.

Because, no matter what, when we resolve this band, we are going to be here next year and the year after talking about wanting more, and it is going to get harder and harder. The more we squeeze, the more we try to get more juice out of the lemon, you know, we are going to get to the pit. And we are going to have to find some new, creative way to continue to have spectrum roll off the assembly line and into the market.

Ms. CLARKE. Very well. Thank you very much.

As we all know, different communities have different needs when it comes to connectivity.

Mr. Lewis, can you discuss whether and how different spectrum access models affect the ability of people from different backgrounds, regardless of socioeconomic status, to access the latest wireless technology?

Mr. LEWIS. Each community can use unlicensed spectrum in different ways. And we are seeing some of those different access models allow for that flexibility.

In rural areas, we have seen the use of TV white spaces to get broadband deployment out to communities that don't have it. We have seen—I have talked about the Tribal communities, but also we have seen in urban areas folks build co-ops using unlicensed spectrum because of both sharing models as well as broad unlicensed bands that the FCC has reserved. We need to continue to do that.

I can't overexaggerate, I think, the importance of WiFi 7 that was talked about earlier, the broad channels that are needed to make that happen so that, when we get 6G, when we get, you know, gigabit broadband to a lot of places, you don't want to have that slowdown when you get to the modem inside the building. WiFi 7 allows for that.

So all these different sorts of access models are just critically important to keep everyone connected, whether you live in urban areas, densely populated areas with co-ops and mesh networks, or rural areas with white spaces and community-built networks.

Ms. CLARKE. Very well.

I yield back. Thank you, Mr. Chairman.

Mr. HUDSON. Thanks.

Ms. Clarke yields back.

The Chair now recognizes the Representative from Florida, Mrs. Cammack, for 5 minutes to ask your questions.

Mrs. CAMMACK. Well, thank you, Mr. Chairman. And congratulations on the new role. It is so great to be back at work on so many important issues with our colleagues.

And, of course, spectrum, as we know, is critical to our economic and national security. And it has never been a partisan issue, which is honestly why I was so disappointed to hear the ranking member and several of my colleagues on the other side of the aisle attempt to assert that spectrum auction authority will be used as a means, in his words, to quote/unquote "give tax cuts to billionaires" by extending the tax cuts from the Trump tax cut plan.

Now, that is clearly a hyperpartisan and false attack, and I highly doubt that the constituents of the ranking member's district in New Jersey 6 would appreciate the 19 percent annual tax increase across the board on working-class families, nor would the 98,800

families in his district appreciate their family's Child Tax Credit getting cut in half if we do not, in fact, extend the Trump tax cuts.

A similar comment was echoed by my Democratic colleague from California, Ms. Barragán—which, again, I don't think that her constituents in California's 44th District would appreciate a tax increase, on average, of \$1,621 annually.

So, Mr. Chairman, I felt it appropriate to set the record straight, seeing as how we are only a few hours into the first hearing of the 119th, and attempts are already being made to turn this vital issue of both economic and national importance into a political wedge.

So I am sure their constituents, just like mine, care deeply about the national and economic security and would appreciate folks staying focused on the primary mission here rather than partisan attacks.

So, Ms. Rinaldo, you had started down a line of answering Representative Joyce's questions, and you had mentioned oversight, talking about what you would like to see Congress do more of in this space. Please elaborate on the oversight elements that you were alluding to.

Ms. RINALDO. Yes. So sometimes through—we have seen in the past, through an interagency process, the failure to come to a decision, and then you just get to a stalemate. I think when you are talking about these issues, it is so incredibly important to continue to move the ball forward. You, as Members of Congress, can provide that oversight to hold feet to the fire to make sure that we are able to move forward.

Mrs. CAMMACK. Can you give any examples of a particular stalemate where a decision has kind of lingered?

Ms. RINALDO. Yes. So I think somebody else asked about—oh, actually, it was Chairman Guthrie—asked about other agencies looking to separate out of the IRAC system, which is the management of all spectrum management. That is so incredibly important, to keep that group together. You lose all efficiencies—and it does have national security implications—if agencies are protecting on their own terms and not through the collective good of the entire ecosystem.

Mrs. CAMMACK. So, a little bit in that same vein, you started discussing—I think it was Representative Fulcher who started talking about this—you started talking about the risk caps and how telecommunications infrastructure typically gets excluded, because it is so capital intensive, from funding opportunities.

Obviously, that hinders our ability to compete with China, as you started talking about. Can you continue down that line for me?

Ms. RINALDO. Sure. So EXIM Bank—we have the tools. They already exist. We don't need to recreate the wheel. We just need to retool them to ensure that we are able to get capital out.

So, again, the legislation would just allow—it doesn't require—would allow them to waive the risk caps if a company was up against Huawei.

Mrs. CAMMACK. Now, let's say beyond EXIM, I mean, is the Development Finance Corporation also an area where this is a problem?

Ms. RINALDO. Correct. Absolutely.

Mrs. CAMMACK. OK.

Now, talking a little bit more in the Department of Defense realm, how can we—I know, obviously, you talked about the risk caps. What other ways can DoD and others—can we be competitive and support operations abroad?

Ms. RINALDO. Yes. So, again, I would say that DoD needs to be fully funded at their 5G department. The Open RAN Coalition, we have an excellent relationship with the 5G office and the FutureG office, but their budgets continue to be cut in half so they are unable to deploy 5G around the world.

Mrs. CAMMACK. Do you feel that in the previous radio conference the United States was adequately represented?

Ms. RINALDO. I think there are lots of leadership changes that led to disorganization.

Mrs. CAMMACK. And how would we address that disorganization going forward?

Ms. RINALDO. Again, it is ensuring that we get people identified and in position earlier.

China has an advantage. They rule by fiat. But we go in through a multistakeholder process. Our process, at the end of the day, is going to create a broader, more impactful decision, but it does mean that we have to start earlier and we have to work harder.

Mrs. CAMMACK. Excellent.

My time has almost expired. I will submit the rest of my questions in writing.

Thank you to all our witnesses for appearing before us.

And I am so sorry, it is freaking freezing in here.

Mr. LANDSMAN. It really is. Amen.

Mrs. CAMMACK. Can we do something about that?

Mr. LANDSMAN. So cold.

Mrs. CAMMACK. It is freezing.

Mr. HUDSON. Well, the gentlelady has—

Mrs. CAMMACK. I yield.

Mr. HUDSON [continuing]. Yielded back.

I will assure you, it is colder outside than it is inside.

The Chair now recognizes the Representative from Florida, Ms. Castor, for 5 minutes to ask your questions.

Ms. CASTOR. Well, thank you, Mr. Chairman. I am so looking forward to working with you and Ranking Member Matsui on this important subcommittee. It is really critical to innovation, keeping WiFi and the internet affordable for our families and small businesses, and to our national security.

And I know this subcommittee did a lot of good bipartisan work last year, and you passed a spectrum auction bill unanimously out of committee.

Why didn't it—why wasn't it brought to the floor? I would ask—I am just curious. What is your view on that, Mr. Powell?

Mr. POWELL [to Mr. Gillen]. What is your view of that?

Ms. CASTOR. Mr. Gillen?

Just quickly.

Mr. POWELL. You know, I think I would stand with our—we have been—we have all so forcefully seen the value of the FCC spectrum auction. I stewarded that responsibility at the FCC. I think it was a tragedy that we lost it.

It is important to remember, when the FCC has auction authority, it is not just that they can move forward with an auction. They are empowered to find bands and spectrum to bring to auction. So they are stalemated in playing the leading role that they have always played.

I think, unfortunately, we get back to this issue: There is a lot of conflict about how these bands should be used and who should be using them. And if people believe it is a political opportunity to bias the outcome of that study in a way that they might want or to protect constituencies, even those protecting the Defense Department, it can lead to political stalemate.

Which is why we continue to believe that we have to start looking toward technological solutions like CBRN and shared spectrum to try to resolve those conflicts, as opposed to have them always thrown at your doorstep and ask lobbying and advocacy to produce spectrum policy.

Ms. CASTOR. And you all have talked about it before, on the lack of trust. Is there something else that I was missing on all that, why it didn't—broadly bipartisan.

Just quickly. Just quickly.

Mr. GILLEN. No, I think Chairman Powell covered it.

Ms. CASTOR. OK.

Mr. GILLEN. A lot of the conversation right now is—we are having conversations around winners or losers, and we need to get to a place that these are win-win opportunities.

Ms. CASTOR. Yes. I agree with that.

Mr. GILLEN. And so I—

Ms. CASTOR. And that is one reason why we are concerned that spectrum proceeds could be used to fund tax cuts, whereas—Mr. Lewis started off, this is in the public interest. You use those proceeds in the public interest.

And why we are bringing it up is, now, the chairman of the Budget Committee—there is a list and a paper out on the street that has it pegged, spectrum proceeds, as a possible pay-for. And that is why we are very concerned. It shouldn't go to fund tax cuts for big corporations and millionaires and billionaires. It needs to stay in the public realm.

And I can tell you, back home in the Tampa Bay area, as we recover from the most damaging and costly hurricane season and we look out at the other damage across North Carolina, to our neighbors across—fellow Americans in southern California, no place has been immune to these extreme climate catastrophes. But, you know, we are learning a lot in the aftermath. In the aftermath, we learn how to better prepare and respond.

And the Florida Department of Emergency Management and the University of Florida piloted a new tool to provide emergency responders and local governments with a dependable means to share alerts. I mean, information is critical during emergencies. They have the new Broadcast Emergency Alerting and Communication Operational Network, BEACON, that uses AI to quickly convert text into speech for AM radio broadcast, and it has the ability to translate into different languages.

Automating these kind of critical safety broadcasts before, during, and after a disaster, they really help the first responders. They

help get critical information to neighbors at a time of need. Cell phones go down, you lose the internet. And this is the kind of critical infrastructure that spectrum supports and that Congress should be encouraging.

Mr. Lewis, in your written testimony, you say that spectrum policy is about innovation and connectivity and that revenue raised should serve the public interest. Is this the kind of thing you were talking about?

Mr. LEWIS. It is.

You know, just with the public safety and emergency alert systems, when I was growing up—I am 45 years old. When I was growing up, emergency alerts came over the television. Now they come over your phone. And so, whether you are in your home or you are on the move, receiving those is critical, and so we want to support those and continue to build them.

NG 9-1-1 is a part of that—

Ms. CASTOR. Right.

Mr. LEWIS [continuing]. As well as other resiliency and infrastructure supports that we have talked about as public-interest needs.

Ms. CASTOR. Good. And I hope that is the tack we can take.

Thank you, Mr. Chairman. I yield back.

Mr. HUDSON. The gentlelady yields back.

The Chair now recognizes the Representative from South Carolina, Mr. Fry, for 5 minutes to ask your questions.

Mr. FRY. Thank you, Chairman. And congratulations on your chairmanship.

I will note just for the record that I appreciate North Carolina peanuts, and they are good, but South Carolina peanuts might just be a little bit better.

But thank you.

This is a crash course, as a new Member, into spectrum and what that means for the country, and I really appreciate the discussion today. I am glad that this is a largely bipartisan affair.

Mr. Gillen, earlier you talked about China a little bit and the risks that they pose in this space of spectrum. What are the consequences of China taking a lead in making 5G spectrum available to their carriers?

Mr. GILLEN. Thank you for the question.

As someone with teenagers, I spend my weekend talking about TikTok. And, ultimately, at the core, that is China exporting technology. You know, if you go back to 4G, 3G, that was the U.S. in that position. That is TikTok.

Now, imagine, extrapolate from that impacts on manufacturing, on ports, on how we are doing so many other different things. It is that innovation runs to connectivity, it runs to capacity. And so, really, it is, all the things we want to lead in going forward is going to go where the capacity and the connectivity are.

Mr. FRY. Thank you for that.

Chairman Powell, obviously, the internet economy has drastically changed over the last 12 years. Everything is different. The way we communicate is different. The amount of video content that we absorb is different. The way consumers use wireless technology is vastly different.

How might our—other than—I think we have talked about auctions a lot. How might our policies change as well, given how the world is changing?

Mr. POWELL. Yes, I think one of the things that I would recommend to the committee is to keep the consumer at the center of the focus of the policy. How do Americans really use spectrum? What do they most depend on?

I think one of the reasons we celebrate the WiFi story is that the vast majority of Americans' interaction with the internet goes over that infrastructure. We spend 90 percent of our days indoors, and when we are indoors, we are utilizing those services. If you are watching Netflix tonight, you are on WiFi. Frankly, if you are using your cell phone, 80 to 90 percent of the time you are also using WiFi, not even the cellular network. It is the sort of workhorse of the entire internet economy.

So, as you focus and align your spectrum policies, I think just keeping in mind the rapid innovation, the way consumers are evolving. You mentioned 12 years ago. The stuff in my house today, as opposed to 12 years ago, that expects to find and utilize my network is stunning compared to 12 years ago.

Mr. FRY. Thank you for that.

Ms. Rinaldo, how does access to spectrum allow innovative companies like those in the Open RAN Policy Coalition to continue to lead on the design of the next-generation networks?

And, as a followup, as the spectrum environment gets more congested, could new technologies like AI-driven network management help manage the spectrum issues and lead us to more commercial spectrum on the market?

Ms. RINALDO. So I would say that Open RAN is a nascent concept, really first rolled out by Rakuten and Japan in 2017. So we kind of missed the 5G wave. And so, as new spectrum bands come on line, we are able to build out using Open RAN. I would say, other than Dish, who has deployed 20-plus-thousand—AT&T has made an investment of \$14 billion in Open RAN—we are really focused internationally at this point. So more bands, more Open RAN.

And, as far as AI, it has been a great story for the telecommunications industry. We can use it for everything from management of spectrum, energy efficiency. And there is a lot of talk these days, as you can imagine, with concerns around drones, can we do detection using AI.

Mr. FRY. Thank you for that.

And this is a broader question, I think, for the panel, but we will just go down.

What specific actions would you recommend for us, as Congress, to take? I mean, obviously, we talked about some of the legal problems, some of the regulatory hurdles, some of the outdated regulations that may exist. What would you share with Congress about ways that we can modernize our system?

We will start with you, sir.

Mr. LEWIS. I think we all agree, I hope auction authority is where you start.

Mr. FRY. Correct.

Mr. LEWIS. And I would say, make it permanent. Provide the reliability that the FCC has the power to do it. And then how that then impacts band planning in the future.

Mr. FRY. OK.

Ms. RINALDO. Auction authority, RNG, and then just working with our allies around the world to deploy safe and secure networks globally.

Mr. FRY. OK.

Mr. GILLEN. Same. Auction authority with a plan associated with it, and permitting reform.

Mr. FRY. Permitting reform. OK.

Mr. GILLEN. Yes.

Mr. POWELL. I would agree with that. I think auction authority, improvement in the interagency coordination process with appropriate congressional oversight, and assistance to the administration on developing uniform and single-voice policies when we appear at the next WRC in 2027.

Mr. FRY. Thank you for that.

Mr. Chairman, I yield back.

Mr. HUDSON. The gentleman yields back.

The Chair now recognizes the Representative from Ohio, Mr. Landsman, for 5 minutes to ask your questions.

Mr. LANDSMAN. Thank you, Mr. Chair and Ranking Member, for this incredibly important hearing.

The broadband/WiFi work that we do, probably one of the most important things we have to get right nationally. And, obviously, Congress has to play a big leadership role in that. And this has been, as one of my colleagues said, largely a bipartisan discussion, because it is a bipartisan issue.

I mean, there are two pieces that are really important, that stand out for me.

One is just the relevancy, the impact it has on our economy. I mean, growing economies are economies where there are massive investments in infrastructure and education. And broadband is obviously a huge, huge piece of the infrastructure, and it is core to our global competitiveness.

The second is just the impact it has on our daily lives, which, Chairman Powell, you have talked a lot about. I represent southwest Ohio. It is a city, suburbs, rural Ohio. And it is one of the most important things that we do, to make sure that everyone has access, because of how important it is to their healthcare, to their education, to their connection to the world and to each other.

Two big questions have emerged here for me. One has to do with reauthorization and, you know, how we divvy up the spectrum capacity. And the second has to do with what we do with that revenue, right? Those are two big questions that I think we will sort out in a bipartisan way.

Let me start on the reauthorization question. Maybe each one of you could just talk a little bit about—give one big—I have heard a little bit from each of you about priorities, but one big priority. You know, I am new. So, if there is one thing you want us to really nail as we work on reauthorization, what would it be?

Mr. GILLEN. For us, it is key, when you go back, each time Congress has done this—1997, 2005, 2012—it has always been authority-plus.

Sometimes you direct specific auctions. Sometimes you say, “You need to auction a certain amount.” But particularly because the government controls so much of this, if you give the FCC, an independent agency, authority to auction without something to sell, it can be an empty tool.

Mr. LANDSMAN. Got it.

Mr. GILLEN. And so, for us, it really is that connection.

Mr. POWELL. I think the authority is important, but I would slightly disagree with Mr. Gillen. You know, the FCC, when it has plenary auction authority, it has the authority to find an auction spectrum without further direction from Congress. So I wouldn’t want to leave you with the impression that you have to tell them what spectrum to authorize. They have been doing that for the better part of this century. So I think that is important.

And I also think that if you entertain the idea of assigning specific spectrum bands, then you have to wrestle with the conflict we have spent all morning talking about. You have to figure out how you are going to resolve the complexity of the Defense Department systems. That needs to be done by experts down at the agency—

Mr. LANDSMAN. Yes.

Ms. RINALDO. So I would say that the NTIA Administrator needs to be an Under Secretary. And government titles matter, and it makes a huge difference. If you are the NTIA Administrator, you are having to brief the Deputy Secretary to talk to—

Mr. LANDSMAN. Yes.

Ms. RINALDO [continuing]. You know, an agency about an issue that they know nothing about.

Mr. LANDSMAN. Mr. Lewis?

Thank you.

Mr. LEWIS. I would agree with that.

Mr. LANDSMAN. Yes.

Mr. LEWIS. And with auction authority, I would say—I would agree with the former Chairman. You don’t have to be prescriptive, because there is not a lot of new spectrum bands out there. Letting Ms. Rinaldo’s old agency, the NTIA, and the FCC do the studies that point in the right direction is important. And preserving the balance of licensed, unlicensed, and sharing, WiFi 7, is a great opportunity but requires 360 megahertz of spectrum band. Yes.

Mr. LANDSMAN. And then the second piece is on the revenue. Obviously, there is some consternation, some worry, because of a document that came out that maybe these dollars could be used for pay-fors.

And on the tax piece, you know, I think there is broad support for tax relief for working folks, middle class, small businesses. It is the top 1 percent that I think folks like me struggle with.

The revenue, assuming it stays here—and anyone, but, Mr. Lewis, start with you. Just—you mentioned a few big things. I mean, again, if you had to pick one major investment, I am assuming it is the expansion and then the inclusion, but I am curious what piece—where do those dollars need to go?

Mr. LEWIS. I usually highlight two. Definitely digital inclusion work on the ground needs long-term funding, as do other broadband—other—

Mr. LANDSMAN. That is really just making sure that more people have it.

Mr. LEWIS. Yes, addressing all three drivers of the digital divide—not just infrastructure, not just affordability, but adoption and helping people get it.

But if I picked a second, NG 9–1–1. I mean, kudos to the chairman and former Congresswoman Eshoo for leading on the NG 9–1–1 bill last year.

Mr. LANDSMAN. Thank you.

I yield back.

Mr. HUDSON. I thank the gentleman for yielding back.

The Chair now recognizes the Representative from New Jersey, Mr. Kean.

You are recognized for 5 minutes to ask your questions.

Mr. KEAN. Thank you, Mr. Chairman.

And thank you to all of our witnesses for being here today.

Mr. Powell and Mr. Gillen, my district boasts some of the most capable innovators in the world. It also has areas that still face gaps in connectivity.

How can technologies using licensed and unlicensed spectrum both supercharge our existing industries and generate growth in more rural areas?

Whichever one of you would like to go first.

Mr. GILLEN. Thank you for the question.

The power of wireless, particularly full-power 5G wireless, gives you the opportunity to push out broadband to other places.

Rappahannock County, Virginia, rural Virginia, there is no terrestrial fiber cable services. Right now, because of broadband auctions you made possible, there is now 5G home service available. So roughly 20 percent of those new customers had never had broadband before, because that is an ability to scale and move quickly.

So I would offer, it is one of the places that you can push out beyond where we are today.

Mr. KEAN. Thank you. Thank you.

Mr. Powell?

Mr. POWELL. I think one of the challenges in rural is always infrastructure. One of the challenges the wireless companies have is, in order to serve those communities effectively, you have to densify the network. You have to go out there and spend the money to put up towers to concentrate. That is expensive. That is a big capital expense for them. And so that has been slow.

If you look at shared spectrum on CBRS, it covers 70 percent of all unserved rural areas. That is why you are seeing projects that allow communities to take matters into their own hands. And in your own State, CBRS spectrum is being used at Newark International Airport without having to await the use from a commercial service.

Mr. KEAN. Thank you.

Ms. Rinaldo, can you speak to the effect that adoption of Open RAN technologies could have on our supply chain and strength-

ening American wireless competitiveness globally? And can you also provide an update on where the development and deployment of these technologies now stand?

Ms. RINALDO. Absolutely.

I think one of the biggest concerns is that we wake up one day and there is only one vendor for the entire world. So the concept of Open RAN, I believe, has been so successful because we have gone from a handful of vendors now to hundreds—a lot here in the United States, but also Japan, Taiwan, and Europe.

So, since we launched this coalition, there are now over 100 global deployments. I mentioned Tellis earlier. Tellis, they are going to deploy 100 percent by 2029. Viettel in Vietnam is deploying using Qualcomm and DeepSig to ORPC members.

Palau, a small island in the South Pacific, they just put out an RFP, and the number of proposals they received were astonishing, because the competitiveness of Open RAN does allow more vendors to participate in the market. So it is really a win-win.

Mr. KEAN. Thank you.

And then, Mr. Powell and Mr. Gillen, can you both speak to how licensed and unlicensed spectrum are used in emergency response in cooperation with first responders? And what needs to be done to make sure that spectrum is used as effectively as possible to keep Americans safe in the event of an emergency or a disaster?

Mr. POWELL. I think both are critical. I want to say that.

I have been involved in these situations. I will give you an example just in the L.A. wildfire situation. Charter was able to open 35,000 WiFi hotspots immediately to try to improve communications when other infrastructure had been devastated.

You know, that is really important, to be able to use every technological resource to get a network up quickly in these communities, often ones that are suffering without power as well as communications infrastructure.

Mr. KEAN. Thank you.

Mr. Gillen?

Mr. GILLEN. I agree with the chairman. This is a disaster. We all need to be working together, and all these technologies can complement each other.

In terms of wireless, we are proud that 80 percent of 9-1-1 calls are made on a smartphone today. The amount that we have invested to make sure that first responders can find you when you make that call with location accuracy. And the power of wireless emergency alerts to be an amplifier to voice—and Mr. Lewis talked about how far we have come in that program.

And then in terms of the disaster recovery themselves, the technologies that we are leveraging now, there are COWs and COLTs—we put cell phones on wheels, we put cell phones on trucks—to go into an area to immediately have coverage. Because it is so critical. You have lost everything. You need that connectivity.

And so we take that responsibility very seriously. And that situation—you know, we can disagree on a lot of things. When it comes to disaster relief, we all come together to serve customers.

Mr. KEAN. Thank you to all of our witnesses.

And I will yield back.

Mr. HUDSON. I thank the gentleman for yielding back.

The Chair now recognizes the Representative from Indiana, Mrs. Houchin, for 5 minutes to ask your questions.

Mrs. HOUCHIN. Thank you, Chairman Hudson and Ranking Member Matsui.

And thanks to the witnesses for your testimony and for speaking with us today.

I want to start my remarks first by saying how excited I am to be here as a member of the Energy and Commerce Committee. This is my first hearing as a member of E&C, and I look forward to working on the issues under this committee's jurisdiction.

Back home, as a State senator, I worked on expanding broadband access, particularly in rural areas. I was proud to lead that fight, and it is a fight that I am excited to continue at the Federal level.

I look forward to certainly working with each member of the committee, Mr. Chairman, on our shared priorities and hope that we can find some common ground to bring real and positive results for the American people.

And I am glad we are starting this work this Congress on this issue of importance of both national security and global competitiveness, and that is spectrum.

While we may not realize it, spectrum directly impacts the ways in which millions of Americans go about their daily lives, both at home and at work. From listening to the radio to watching television, to using cell phones and browsing the internet, spectrum determines how these devices carry data.

That said, it is a limited resource. And I recognize that the United States must play a leading role in innovation relative to spectrum to maintain our position as the world's leader in new technology.

So my first question is for Mr. Gillen.

My district in southern Indiana is largely rural, made up of small towns and cities. And I am certainly proud of the work that we did in the State senate to level the playing field for rural parts of the State, but the truth is, we continue to lag behind the coasts and urban areas in access to the internet and the tools that spectrum can provide.

How can your company's use of spectrum help with closing the digital divide for rural America?

Mr. GILLEN. Thank you for the question.

NERA, earlier today, released a report that said, for every 100 megahertz of new spectrum available, it can help create access for 275,000 households that don't have it today. And so the opportunity, particularly with the 5G home product, to get to places that home broadband hasn't gotten to yet—that the benefit of that opportunity, we can see that happen in real time.

Accenture says that we can get to roughly 40 percent of houses without any help. And then the question is, Where does the help come, whether it is the 5G fund at the FCC or the BEAD fund at NTIA? We are going to need the government's help. But with spectrum, we can continually provide more and more coverage throughout the area.

Mrs. HOUCHIN. Great.

Mr. Powell, do you have anything in addition to that to add about how the company's use of spectrum can help close the digital divide?

Mr. POWELL. Yes. As we talked about earlier, when you use some of the CBRS shared spectrum, you are allowed to let communities take matters into their own hands and build networks while they are awaiting commercial systems to come and densify their network.

I also want to put a plug in—because it is equally in this committee's jurisdiction—it is getting the fixed infrastructure out there too. A lot of wireless needs fixed infrastructure in order to put those signals into the ground pretty quickly.

So, with the BEAD investments that we are making, and the companies that I represent are deepening their penetration into rural America, these things have to be seen as complements. One will not survive without the other.

Mrs. HOUCHIN. Thank you.

We have talked a little bit—my colleague from New Jersey talked about Open RAN. So I want to ask a few questions about that.

I am excited by the prospects there to potentially increase vendor diversity, both in the United States and with our trusted partners around the globe, to open the door for new entrants into radio access and to the network marketplace.

So, Ms. Rinaldo, how can ORAN technology help us stay competitive with China?

Ms. RINALDO. So, for so long, especially—so I used to work for the House Intelligence Committee when they wrote the Huawei report and then at NTIA. And it was the policy of the United States to go around the world and say, "Don't use Huawei. It is a security concern."

Open RAN is the "If not them, then who?" We give people something to run to, as opposed to run away from. And I believe that is why it has been so incredibly successful.

So, as we have 5G and as we look to 6G, it is software-defined networks and virtualization.

I will use an example about Tellis. Tellis is ripping and replacing right now, and an executive said they are going to move to Open RAN because he never wants to be in a position of vendor lock ever again. So we are bringing that national security, supplier diversity, as well as the opportunity that Open RAN can bring.

Mrs. HOUCHIN. Well, that lends particularly to my next question. Does the deployment of 5-to-6G help with deployment of Open RAN? I think the answer to that is yes.

Are there any barriers that do stand in the way of deploying the networks currently? And when do you believe we might expect more widespread development?

Ms. RINALDO. Yes, so the inability to auction new spectrum and make new spectrum bands available, that is going to impact deployment.

As well as, as we look internationally. I think it is important that we use diplomacy as much as possible to ensure that we are getting a supplied telecommunications chain out there.

Mrs. HOUCHIN. Thank you.

Thank you for your testimony.

I yield back.

Mr. HUDSON. The gentlelady yields back.

The Chair now recognizes the Representatives from Texas, Mr. Goldman.

You are recognized for 5 minutes to ask your questions.

Mr. GOLDMAN. Thank you, Mr. Chairman. Thank you very much.

I had about 100 questions that have all been asked already. But I do appreciate you all's time today and for being here today. I will ask a couple of quick questions, and we will move on to my colleague from North Dakota.

This is both for Ms. Rinaldo and Mr. Powell.

Ms. Rinaldo, if you will go first.

How can we protect important national security missions while also fostering innovation? And how do shared spectrum approaches help us avoid those national security risks while still helping us find new spectrum for commercial use?

Ms. RINALDO. Yes. So there is currently an ongoing multistakeholder process that I am participating in that brings the private sector as well as the public sector together. They are going to start classified sessions soon.

And so I think, as has been mentioned, you bring the engineers in the room, and then we can get things moving a little faster. So it is, how do we take the emotion, take the policy out of it, and get the engineers to, you know, pave the path forward?

Mr. GOLDMAN. Understood. Thank you.

Mr. Powell?

Mr. POWELL. I think the quick answer is coexistence. How do you allow people to live together and both be able to do and operate and provide the services that are critical, whether they are military/national security services or commercial services?

Many of the bands we have had in the past have pioneered approaches to sharing. There are a lot of bands. Even in the CBRS band, we have protection of incumbent military systems, particularly naval, coastal systems. And it allows them to operate effectively while we are able to offer a commercial service.

Mr. GOLDMAN. Great. Thank you very much.

And, Mr. Gillen, your testimony notes that significant demand for wireless networks and more commercial licensed spectrum is necessary to keep pace with that demand.

Can you explain how the various types of spectrum auctions the FCC has used over the last decade work and how those address the American consumer needs?

Mr. GILLEN. Absolutely.

The FCC has auctioned both commercial spectrum and government spectrum over the last 10 years, particularly in the 3 gigahertz range. A lot of the spectrum we are talking about is midband spectrum today. We were able to work through a process with the military to auction 100 megahertz for \$22 billion in 3.45. And then C-band was satellite spectrum that we were able to repurpose for 5G.

And that is the—you know, we have had 87 percent growth at our networks over the last 2 years. It was those spectrum bands that made it possible for us to have the capacity to meet that de-

mand. And so, when we look at what is coming next, it is: How do we replicate the successes of those, and where do we find that spectrum? And we think both of those bands adjacent to it, we can run that same playbook in an effective way.

Mr. GOLDMAN. Interesting.

Thank you all again very much.

Mr. Chairman, I yield back the rest of my time.

Mr. HUDSON. Thank you.

The Representative yields back.

The Chair now recognizes the Representative from North Dakota, Mrs. Fedorchak.

You are recognized for 5 minutes to ask your questions.

Mrs. FEDORCHAK. Thank you, Mr. Chairman. Thank you for organizing this great hearing today.

As a Representative from North Dakota, I am big into natural resources and resources. And spectrum is a very important national resource. So I appreciate the opportunity this hearing has to talk about how to best manage this resource for the benefit of American citizens.

I will have to say that, you know, to the extent that managing this resource results in additional funding for the Federal Government, I am really confident that my host colleagues, especially in this committee and on the Republican side of things, are committed to putting any additional revenues that might be generated from the sale of those to the benefit of everyday Americans—the farmers, the ranchers, the coal miners, the oil field workers, teachers, nurses, those folks from North Dakota and throughout the country who are hard at work. I know that we will be very diligent to use those resources appropriately.

So, for all of you, thank you for your time. You have been sitting here a long time now. You probably are thinking about lunch and bathrooms and other things, so I promise I will be—I just have two questions. But your expertise is really vital to helping us make the best decision on how to use these resources.

So, quickly, I wanted to ask Mr. Gillen: Help me understand the need for the dedicated spectrum and what sort of uses you use in that space that can't be done in the open, the unlicensed spectrum, and what the interference is that is created in the unlicensed that causes problems for you.

Mr. GILLEN. Yes. Thank you for the question.

I think, when we pick up our phones, we want that reliability. And what interference protection gives you is the security that you know that when we are going to build out that spectrum—\$30 billion last year—we know that we control that spectrum and that our neighbors or others can't use that same spectrum. And so the certainty or reliability that you rely on every day comes from that licensed spectrum.

And I think a lot of the conversation today—all spectrum is shared at some core. There is no cleared spectrum, really. It is just a matter of what different tools of shared spectrum you are using and whether or not government has preemptable rights, whether or not you have full-power ability to do it.

So, for a lot of these conversations, it is, how do we work around the government, how do we work with systems to make sure that

it is something that works for us to be able to compete against China but also safeguard incumbent users as well.

Mrs. FEDORCHAK. OK. Thank you. That is helpful.

And then the second question is to both you and Mr. Powell: If you were designing the proper mix between licensed and unlicensed, how would you do that? How would you separate it out?

Mr. POWELL. For my mind, as a former policymaker, I would evaluate the demand uses that American citizens make of the spectrum.

It is not a simple matter of comparing who has how many megahertz versus who else has how many megahertz. You have to assign weights to that. You know, if 60 percent of all data is going over unlicensed networks and WiFi, if 80 to 90 percent of that cell phone data is going over WiFi, then it is a false equivalency to say they have exactly the same amount. You need to allocate more toward the highest and greatest demands.

Now, I think there is a—just so I am not misunderstood—there is a place for exclusive licensing and high-powered spectrum. It is about getting that right. But I think that we have underappreciated the significant uses that Americans make, and I would focus more on how to find shared solutions.

Mrs. FEDORCHAK. OK.

Mr. GILLEN. You will be surprised to know I have a slightly different take.

So, for our perspective—

Mr. POWELL. Really?

Mr. GILLEN [continuing]. We absolutely need both. And we lead the world today in WiFi access, and I think we need to get back to there on 5G.

And so I think, in our minds, you look at where the data growth is on our networks, what the congestion is. I think the congestion and how much actual capacity challenges should dictate a lot of this conversation.

And I think, absolutely, we use WiFi a lot on this device. Because when we are at home, we love these devices. You are not plugging into a desktop. So a lot of these statistics, no matter—you know, when you are out of your house, it is not on WiFi; you are on this. And we need both of them to work.

So I think we need to work towards a policy that we are the best at both of these things.

Mrs. FEDORCHAK. Awesome. Thank you.

Mr. Chairman, I yield.

Mr. HUDSON I thank the gentlelady for yielding back.

And I want to welcome Representative Miller-MEEKS from Iowa to the subcommittee.

And you are going to bring us home here. I recognize you for 5 minutes for your questions.

Mrs. MILLER-MEEKS. Thank you, Mr. Chairman. Thank you, Chairman Hudson. It is wonderful to be back on this committee—and Ranking Member Matsui, as well, for allowing me to waive on to this critically important hearing today—critically important because, as the chairman said, I am from Iowa, and I also happen to be a military veteran. So, both from the national security and the connectivity viewpoint, this is an important hearing today.

And I also want to thank our witnesses for testifying before the subcommittee. You have been here a long time, so I will try to be brief.

I am just going to make a mention of something Mr. Gillen just said. We don't want you to work around the government. That has a different context, when we say that. We want you to work with the government. Because we know that the DoD needs access to this spectrum and they may need to preempt other uses.

In Iowa, our farmers depend on the latest technology to make their operations more efficient. Think precision ag, and I think you mentioned that, Mr. Powell. Our schools, our healthcare facilities rely on strong connectivity for educational tools and telemedicine. And businesses across the State need access to cutting-edge communication systems to remain competitive in the global market.

When as a State senator in Iowa I passed broadband bills, I lovingly named these "Please get Dr. Miller-Meeks better internet connection so her children will come home for more than a day." That is how bad it was. And I cannot tell you how many WiFi providers I switched, so—or satellite providers.

Spectrum, which makes all of this possible, is a finite resource that must be responsibly managed.

Mr. Powell, in your testimony you point out that the U.S. could potentially fall behind in 5G and 6G deployment. And when I have traveled overseas, I would echo that sentiment.

Without embracing shared spectrum policies, what safeguards do you propose to ensure that critical national security infrastructure and government operations are not jeopardized in the process?

Mr. POWELL. Yes, I think the whole predicate, why we are champions of this spectrum policy approach, is that it fundamentally presumes that we will work together and share with those systems, as opposed to displace them or to minimize them.

That doesn't mean that is always possible, but we think that is the going and effective approach when we know both have equally compelling uses. You should try to figure out if there is a way for them to coexist first.

Mrs. MILLER-MEEKS. Mr. Gillen, you noted that 5G is helping to create high-paying jobs and economic opportunities in manufacturing and agriculture.

And as an advocate for U.S. industry, as we both are, can you explain how 5G is specifically contributing to the growth of these sectors—you might have in your posters—

Mr. GILLEN. Yes.

Mrs. MILLER-MEEKS [continuing]. Particularly in the context of rural economies like Iowa's, and what additional spectrum could do to accelerate these benefits?

Mr. GILLEN. So, on the first piece, I think manufacturing is one of the places that we really feel opportunity. How do you bring manufacturing back? And you look at—Ericsson has a plant in Texas that has 120 percent employee productivity improvement. So it is one of those opportunities that is a roadmap for how we can do this.

In terms of a rural, it really is a matter of the 5G home product is beginning to make a dent to the challenges that you faced in the State legislature. And the more spectrum gives us the ability—it is

a capacity-starved service, and so you need to have—like, more capacity lets us do it for more people. So one provider has a million people on the waiting list right now. We could make those subscribers with more spectrum.

Mrs. MILLER-MEEKS. Ms. Rinaldo, in your testimony, you mention the PRC's aggressive efforts to dominate wireless technologies and markets through state-sponsored corporate theft and market manipulation.

How do you propose the U.S. respond to these efforts? And what role can American companies and policymakers play in countering this state-driven competition?

Ms. RINALDO. Help support vendor diversity, and work with our partners around the world to do the same.

Mrs. MILLER-MEEKS. And given the ongoing cybersecurity threats from adversaries such as the PRC, what specific policies or investments would you recommend to enhance the security and resilience of the U.S. wireless network, particularly in protecting our vital communications infrastructure?

Ms. RINALDO. So Congress needs to reauthorize the Cybersecurity Act of 2015, which allows information sharing. It needs teeth.

Mrs. MILLER-MEEKS. I was plugging that for you.

Ms. RINALDO. Thank you.

Mrs. MILLER-MEEKS. Thank you very much, Mr. Chair. I yield back.

Mr. HUDSON. I thank the Representative for yielding back.

Seeing that there are no further Members wishing to be recognized, I would like to thank our witnesses for being here today and staying for over 3 hours.

I ask unanimous consent to insert in the record the documents included on the staff hearing document list.

Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. HUDSON. I will remind Members that they have 10 business days to submit questions for the record, and I ask the witnesses to respond to the questions promptly. Members should submit their questions by the close of business on Wednesday, February 6th.

Without objection, the subcommittee is adjourned.

[Whereupon, at 1:10 p.m., the subcommittee was adjourned.]

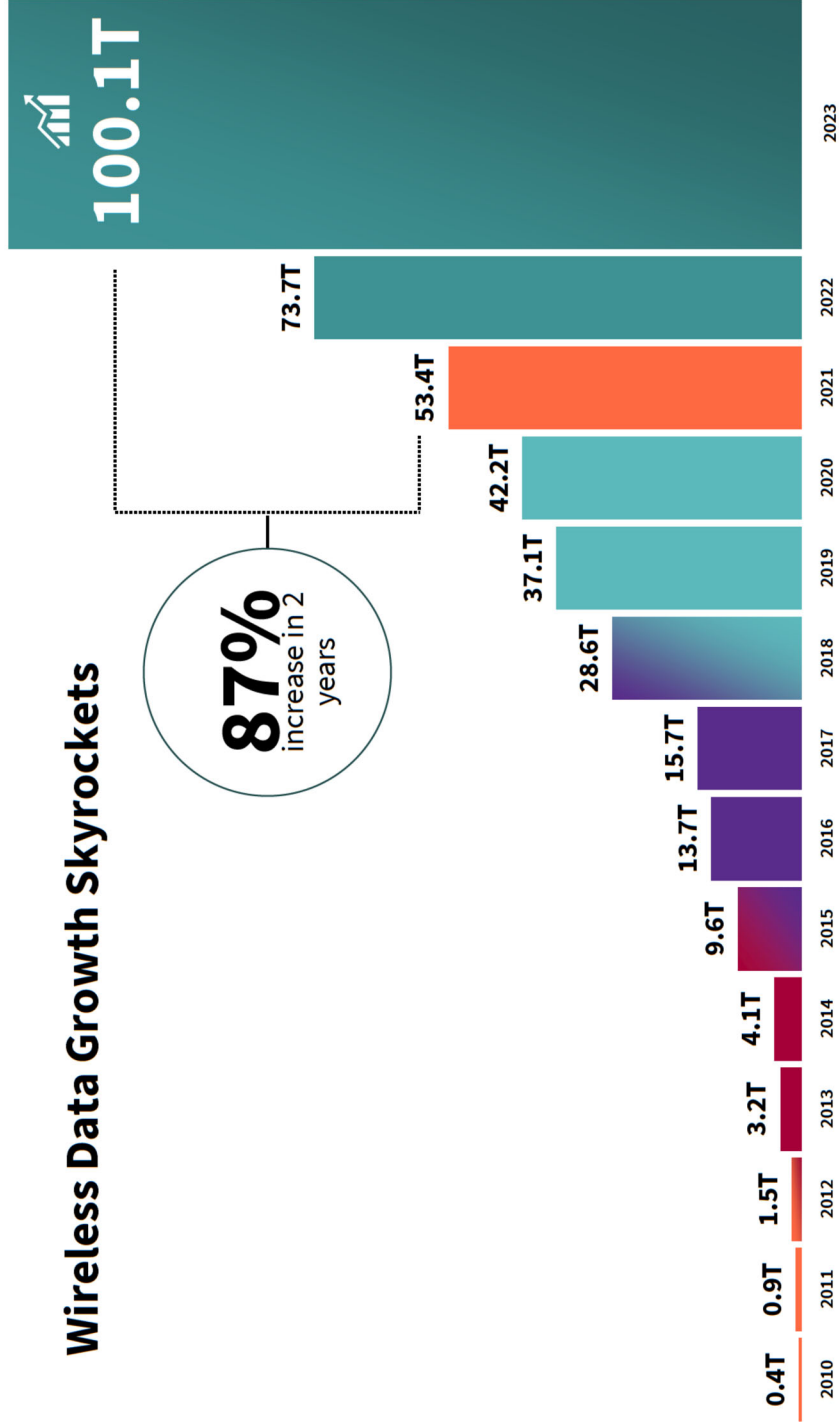
[Material submitted for inclusion in the record follows:]

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

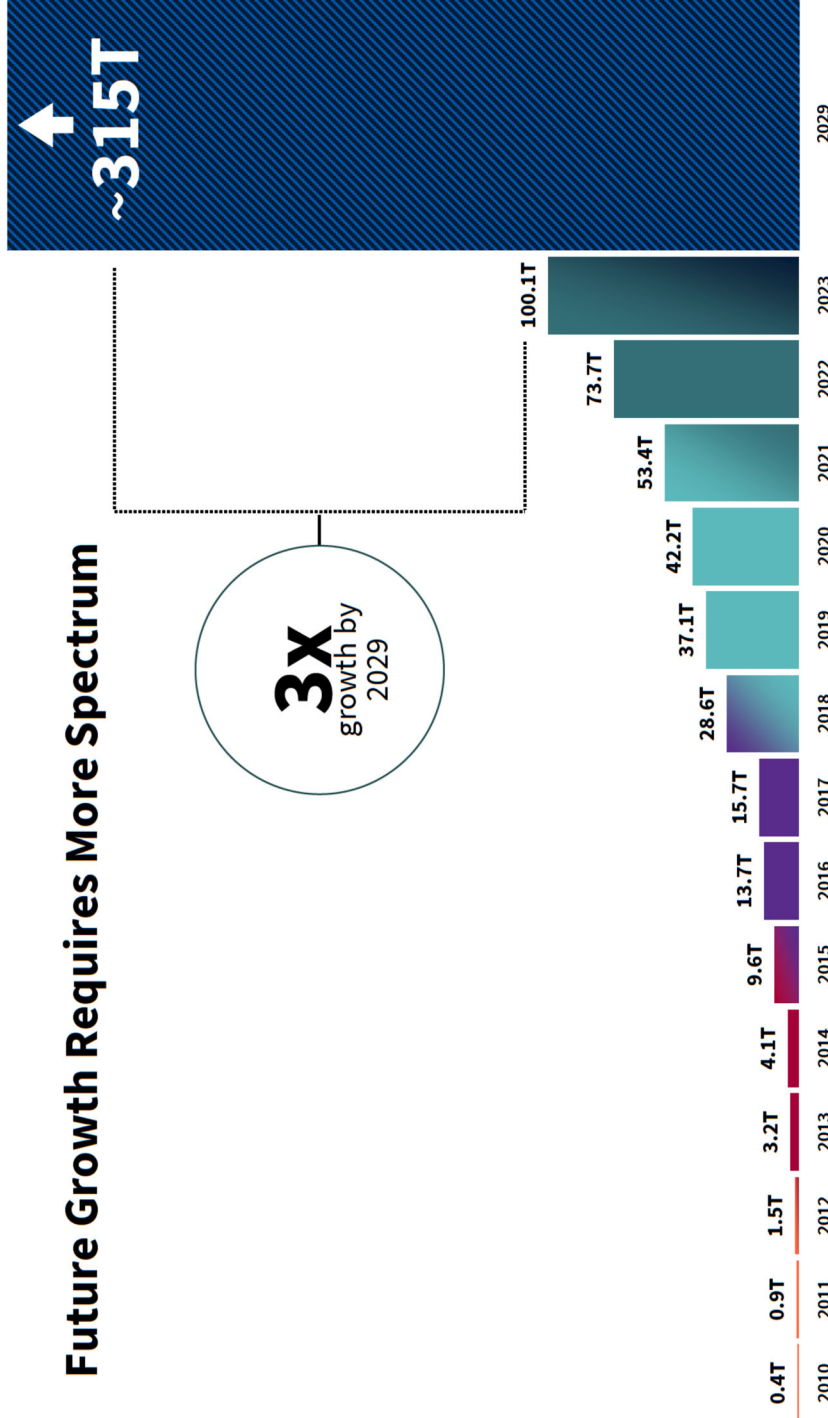
Wireless Data Growth Skyrockets

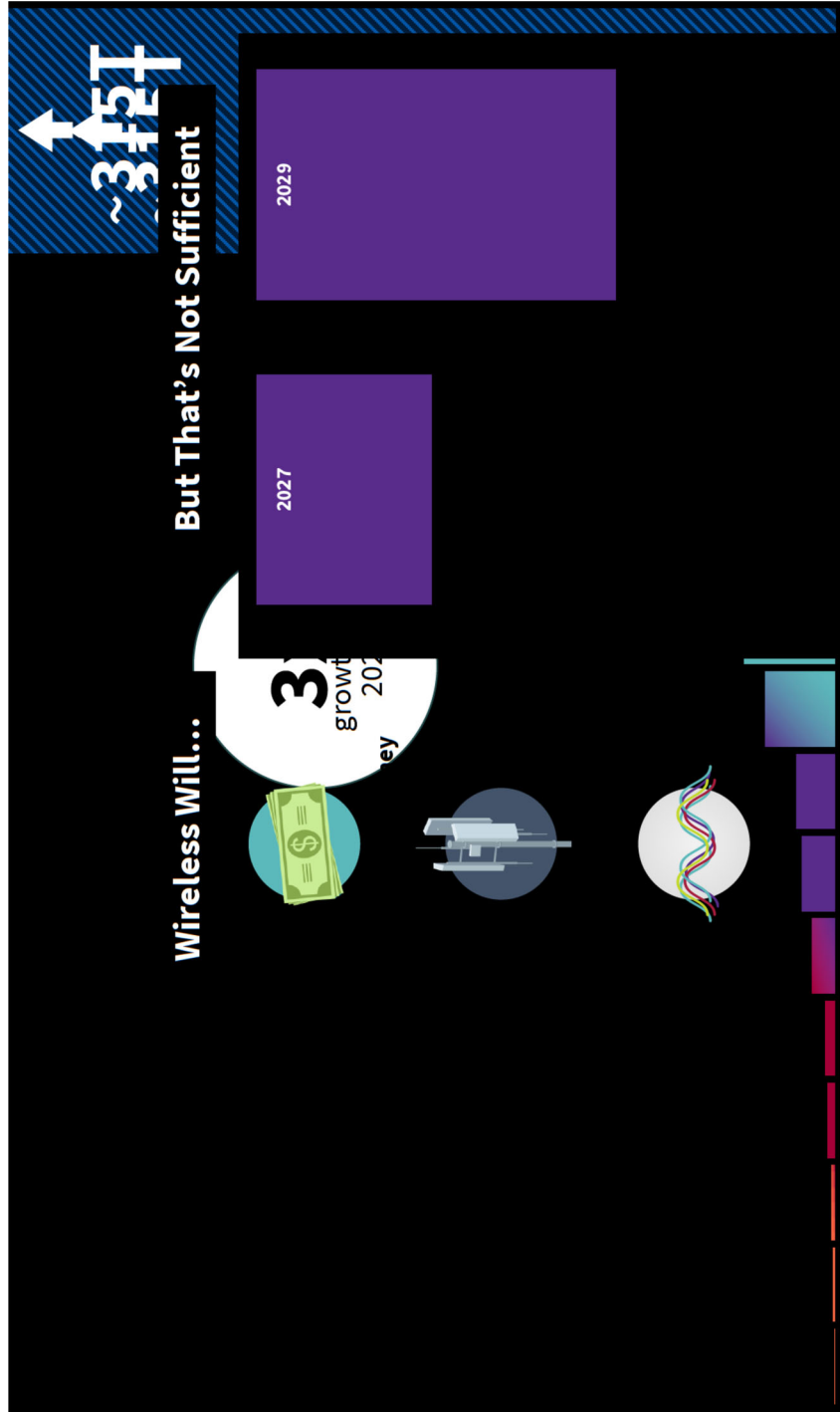
87%
increase in 2
years



Future Growth Requires More Spectrum

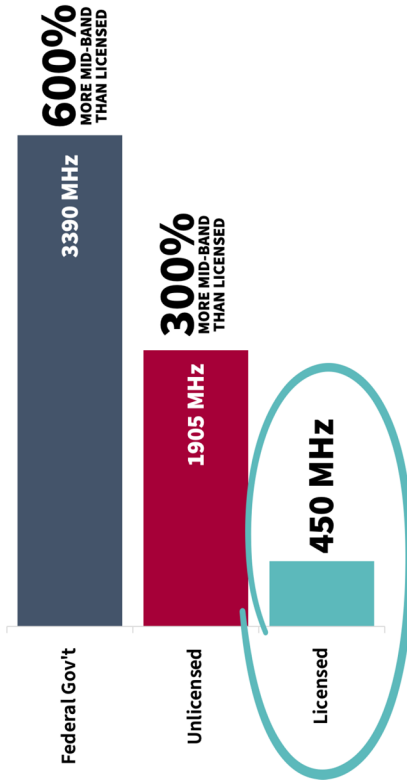
3X
growth by
2029



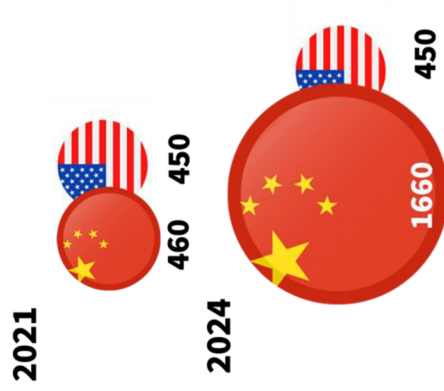


The U.S. Mid-Band Spectrum Problem

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



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 Act⁴ 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

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



January 22, 2025

Rep. Brett Guthrie
Chairman
House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington DC 20515

Rep. Frank Pallone
Ranking Member
House Committee on Energy and Commerce
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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.

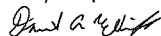
The Lower 3 GHz Band (3100-3450 MHz)

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



January 22, 2025

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

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Rep. Richard Hudson
Chairman
Communications and Technology Subcommittee
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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:

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**



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](#)

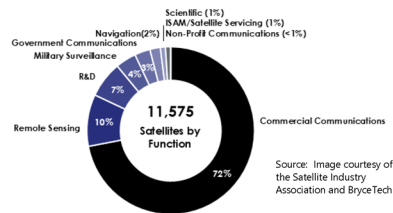
National Policy Must Prioritize More Spectrum for the U.S. Commercial Space Industry or the United States Will Lose the Space Race

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.

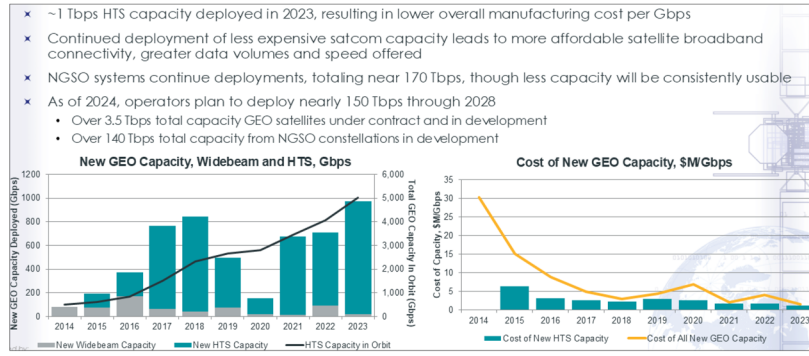
For example, the number of operational satellites has grown from approximately 1000 in 2013 to over 11,500 as of the end of 2024 (right). The number of annual space launches also continues to grow at an unprecedented rate with another 2,500+ satellites launched in 2024¹. Applications for tens of thousands of commercial satellites have also been approved.

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



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 million⁴ 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 iPhone, 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 2032⁵) 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://dataintel.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

| | | |
|--|---|--|
| | <p>SIA Satellite Industry Association</p> | <p>For more information, please contact the Satellite Industry Association via email at info@sia.org</p> |
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Attachment—Additional Questions for the Record for Michael Powell**1. The Honorable Russ Fulcher**

1. My concern is the critical need for broadband in rural areas that are experiencing rapid population growth and demand from heavy data throughput services. Can you provide me with an update on progress you have made toward your strategy to bridge the digital divide in rural areas and how spectrum access can help?

Response:

The cable broadband industry is making progress in bridging the digital divide in rural areas through infrastructure investments and low-cost internet programs. These programs help bring network facilities, affordable broadband, and digital literacy resources to unserved and underserved communities — powered by the shared, unlicensed spectrum that makes Wi-Fi the ubiquitous entry point to the internet.

According to the latest FCC data, broadband providers connected over 2.6 million locations between June 2023 and June 2024, with 2.1 million in rural areas. Cable broadband accounted for 1.1 million of those locations, including 700,000 in rural communities, with nearly all receiving gigabit speeds. In addition to massive infrastructure investments, cable providers continue to close the digital divide through low-cost adoption programs, helping connect over 14 million Americans, offering free digital literacy training, and distributing more than 220,000 devices to low-income households.

Spectrum access is vital to expanding broadband, especially in rural areas. Unlicensed and shared spectrum enable Wi-Fi and private networks, which are the foundation of connectivity inside homes and businesses and often the fastest, most cost-effective solution for extending broadband to hard-to-reach areas. Enabling additional unlicensed and shared licensed spectrum will ensure that a broader range of providers can meet growing data demands and deploy innovative wireless solutions. Moving away from the traditional “clear and auction” model for exclusive licenses toward flexible spectrum-sharing approaches will help deliver faster, more affordable broadband while spurring innovation and expanding coverage to more rural communities.

2. I appreciated hearing the connection you made between the potential of Wi-Fi 7 and the demand coming with VR, new video, and other wider channel applications for quick data flows. This is on top of the mix of new devices bringing heavier bandwidth requirements. I wanted to give you the opportunity to build out where you see R&D applications here? You mentioned some medical research, which likely has heavy data requirements. Can you speak to infrastructure needs and any coordination improvements we can do when it comes to land management agencies that manage federal lands?

NCTA RESPONSE

1/23/25 C&T Subcommittee Hearing on “American Wireless Leadership”

Response:

Demand for next-generation consumer applications requiring 320 megahertz channels for delivering high throughputs and low latencies (the kind enabled by Wi-Fi 7 technology) is set to grow exponentially over the coming years as consumers increasingly adopt Wi-Fi 7 devices and consumer demand for advanced applications continues to grow. For example, in North America, between 2024 and 2030, smart glasses shipments will expand at a 74.4% Compound Annual Growth Rate (CAGR) and Virtual Reality (VR) Head-Mounted Displays (HMDs) will see a 17.2% CAGR.

The latest Wi-Fi standards are used to support data-intensive applications outside of the home, including healthcare and clinical environments. In dense networking environments and congested settings such as hospitals, Wi-Fi networks enable a proliferating number of wireless devices to provide advanced patient care through patient monitors, imaging systems, telemedicine appointments, and remote video surgery. These use cases require robust and reliable connections, often with high data throughput. The improved data transfer speeds and lower latency offered by the latest Wi-Fi standards, coupled with wider channels, can allow healthcare organizations to deploy more advanced applications such as robotics and augmented reality (AR) and virtual reality (VR) solutions. These offerings will power remote surgical procedures and medical training, Ultra HD video for real-time assistance from remote medical specialists, and high-speed transfers of 3D images for real-time analysis.

It remains challenging for broadband providers to deploy new network facilities to unserved areas or to upgrade existing facilities when that work requires access to lands owned or controlled by the federal government. There are many different federal agencies responsible for land management, not all of which prioritize requests by broadband providers. It is important that not just the Bureau of Land Management and U.S. Forest Service, but also other agencies like the Bureau of Reclamation, Bureau of Indian Affairs, National Park Service, and Corps of Engineers, assist where necessary. In order for our collective efforts to finally close the digital divide throughout the country to succeed, all federal agencies must act promptly on permitting applications and any fees charged must be competitively and technology neutral, non-discriminatory, and objectively based on actual and direct costs. Without a whole-of-government effort, broadband deployment will get mired in bureaucratic delays and excessive charges, preventing all Americans from being able to take advantage of those new applications with heavier bandwidth requirements.

The Honorable Kathy Castor (DRAFT)

Question: *Mr. Powell, what can we be doing as a country to hold our competitive advantage against China?*

Response:

NCTA RESPONSE

1/23/25 C&T Subcommittee Hearing on “American Wireless Leadership”

Maintaining the United States’s competitive advantage against China requires a strategic, innovation-driven approach to connectivity that leverages the strengths of our open, market-driven economy. Unlike China, which advances a government-controlled model, the U.S. has led the world in broadband deployment, wireless innovation, and internet technology by fostering competition, investing in advanced infrastructure, and pursuing balanced spectrum policies. Wi-Fi is an inherently open technology, allowing for user-directed communications, which is consistent with U.S. values and anathema to the People’s Republic of China. To continue our leadership, we must focus on three key areas.

1. Protecting National Security While Expanding Commercial Spectrum Access

We must not compromise U.S. national defense by reallocating critical spectrum from the U.S. military. The military relies on its spectrum for mission-critical operations, intelligence, and defense systems, and weakening our national security will not help us compete with China—it will weaken us when it counts.

A shared spectrum model allows for coexistence between military, commercial, and private networks, ensuring that spectrum is used efficiently without undermining national security or necessitating long and costly relocations. CBRS is a proven example of how spectrum sharing works—preserving military access while enabling commercial innovation.

A broad coalition of industry leaders, including broadband providers, public interest groups, and tech innovators, has urged policymakers to support spectrum-sharing solutions rather than forcing costly and disruptive exclusive use spectrum clearings that could jeopardize national security ([Industry Coalition Letter to FCC](#)).

2. Prioritizing a Balanced Spectrum Policy that Maximizes Innovation

The U.S. must continue expanding access to unlicensed and shared spectrum, which have driven American technological leadership, particularly in Wi-Fi, IoT, and private 5G deployments. Wi-Fi is a major American success story, generating more than \$1.6 trillion in economic value by 2028 and carrying over 80% of mobile data traffic ([Wi-Fi Forward ABI Report](#)). Ensuring sufficient spectrum for Wi-Fi 6E and Wi-Fi 7 is critical to sustaining U.S. leadership.

A shared spectrum approach—such as that employed by CBRS —ensures the efficient use of finite resources, allowing federal, commercial, and private networks to coexist and maximize spectrum availability.

3. Ensuring Technological Leadership and a Secure Supply Chain

The U.S. must promote domestic innovation in networking technology. Supporting U.S.-based companies developing Wi-Fi, broadband, and wireless equipment is key to maintaining global leadership in digital infrastructure. A continued focus on cybersecurity and secure network infrastructure will ensure that U.S. broadband and wireless networks remain resilient and globally trusted.

Conclusion

NCTA RESPONSE

1/23/25 C&T Subcommittee Hearing on “American Wireless Leadership”

The U.S. has maintained its leadership in broadband and wireless technology by pursuing market-driven policies, private investment, and a multifaceted approach to spectrum allocation that fosters innovation. To stay ahead of China, we must protect our national security spectrum, embrace shared and unlicensed spectrum, and encourage continued broadband investment and U.S.-led technology development.

Brad Gillen Responses to Questions for the Record

House Energy & Commerce Communications and Technology Subcommittee Hearing:
“Strengthening American Leadership in Wireless Technology”

The Honorable Russ Fulcher

1. Can you build on your points about the impact on rural areas from a lack of additional wireless spectrum? Specifically, those areas with remote populations and the added challenge of heavy early investment requirements due to federal and other public lands?

The skyrocketing growth in wireless data traffic—with 2023 representing the largest single-year increase in wireless data ever—demonstrates the importance of wireless broadband to U.S. consumers. This is especially true for the 15 percent of adults nationwide and the 18 percent of adults in rural areas who rely on wireless as their sole or primary broadband connection. Given the essential nature of wireless to Americans, nationwide, regional, and rural wireless providers alike continue to invest billions of dollars annually to bring faster speeds, more coverage, new services, and lower prices to communities across the country. This includes areas where economic and physical challenges can make it markedly more difficult to serve customers. As a result of industry’s investments, approximately 88 percent of the U.S. rural population had access to 5G at minimum speeds of 7/1 Mbps as of the end of 2023, roughly five years after initial launch, and 71 percent of rural Americans had access to 5G at minimum speeds of 35/3 Mbps.

The wireless industry is playing a significant role in expanding home broadband access in unserved and underserved parts of the country as well. Fixed wireless home broadband offers a fast and reliable solution that is vital to closing the digital divide: 95 percent of net new fixed broadband subscribers since 2022 chose 5G home service, one out of every five of net 5G home adds were entirely new home broadband subscribers, and fixed wireless has brought broadband choice to 23 percent of rural households. Importantly, constructing or upgrading cell sites to enable fixed wireless broadband is cost-effective and can enable more rapid connectivity than may be available with other technologies. Less expensive and faster deployments are particularly key to bringing high-speed connectivity to rural areas, where fiber may not be economically feasible to deploy.

Each of these benefits turns on the availability of licensed spectrum, which is the essential input for wireless networks. Licensed spectrum allows the holder to manage interference to its network and provide a high and consistent level of service, and it enables secure connectivity that is necessary to support mission- and safety-critical operations. Moreover, licensed spectrum offers certainty of access, which is necessary to promote investment and buildout decisions. In rural areas, small population densities and challenging terrain can make it difficult to reconcile the costs of siting additional infrastructure and installing new equipment. And in rural areas that include federally managed lands, these costs can be compounded by the need to engage with additional regulators. Where every dollar and every extra day to deploy impacts service, it is essential that providers know when they will have access to secure, exclusive airwaves for deployment—and only licensed spectrum can do that.

To ensure continued deployment of wireless solutions to support businesses and consumers in all parts of the country, including rural areas, additional full-power spectrum must be made available in the mid-band frequency range for commercial licensed wireless use. Mid-band spectrum properties promote both coverage and capacity for wireless services. Without additional mid-band spectrum, U.S. networks will invariably struggle to meet growing demands for advanced connectivity. In fact, providers are already facing a 400-megahertz spectrum deficit in the next two years, which will expand to a more than 1,400-megahertz deficit by 2032 absent decisive action by Congress and the Administration.

2. I am also concerned about the lack of new innovations you raised. Can you expound upon that when it comes to AI and any wireless technology to support UAVs or other aerial vehicles?

Wireless innovation is driving enterprise, industrial, and consumer developments across the country today, and these technology advancements are set to benefit our economy and national security beyond 5G. Spectrum is critical to all of the innovations that 5G and beyond can enable for our economy and industries, whether to advance Artificial Intelligence (“AI”) and machine learning (“ML”), enhance telemedicine and other healthcare access opportunities, make manufacturing, agriculture, and critical infrastructure industries more efficient, or expand connectivity for aerial and roadway vehicles. The wireless industry invests billions of dollars annually to operate and expand commercial mobile wireless networks that support safe, reliable, and secure nationwide operations to advance each of these uses.

Among other benefits, these networks provide the coverage, redundancy, and interoperability necessary for safe and secure unmanned aerial vehicles operations. As a result, commercial wireless networks can support high-bandwidth and high-quality drone video streams, for example, enabling first responders to share critical information and improve decision-making in the field. Providers are also deploying drones to advance efficient cellular network infrastructure monitoring and rolling out drone offerings that can provide cellular coverage where cell towers may be knocked out during a storm or disaster. Wireless providers are also leveraging AI and ML technologies on their networks to optimize deployments and operations, strengthen cybersecurity and national security, and mitigate spam and scam robocalls and robotexts.

5G’s powerful network capabilities are enabling integrated wireless connectivity in key sectors of our economy, and flexible and forward-looking spectrum policies will remain critical to supporting these use cases in the future using licensed commercial wireless networks.

3. Given the lack of spectrum authorization, what kinds of problems are we going to see on the international and domestic stages? This is in part based on your testimony where you noted demand for data in the wireless space has grown by 87% in just the past two years. But that three times the amount of spectrum will be needed by 2029. Meanwhile, China has four times the spectrum we do.

The linchpin for U.S. wireless leadership is a pipeline for secure, reliable, full-power licensed spectrum in globally harmonized frequency ranges. This roadmap led to U.S. wireless leadership in the 4G decade, prompted nationwide 5G deployment faster than any other generation of wireless, and is foundational to further success in 5G and beyond. At the heart of this tried-and-

true approach is a spectrum framework grounded in competitive auctions. Some 30 years ago, the U.S. set itself on a path to becoming the global leader in wireless when Congress authorized the FCC to conduct auctions to assign spectrum licenses. Since then, the FCC has conducted 100 auctions and raised more than \$230 billion for deficit reduction and to support essential national priorities such as broadband deployment and modernization of national defense systems. That does not include the additional \$705 billion the wireless industry has invested in their networks over the lifetime of the industry. With the nearly two-year lapse in FCC spectrum auction authority, however, the U.S. is at a standstill in terms of making new spectrum available for licensed commercial use. While wireless providers have increased their ability to efficiently use spectrum with every generation of technology, efficiencies are not enough to support the skyrocketing demand for wireless services. Meanwhile, as the U.S. faces a more than 1,400-megahertz spectrum deficit in the next seven years, other nations are not slowing down. This puts other nations at a competitive advantage in terms of the innovation and economic benefits that wireless connectivity brings—not to mention the wide array of benefits for consumers and businesses.

Moreover, where the U.S. leaves a vacuum, other nations are happy to fill the void. This, in turn, risks putting nations like China at the helm when it comes to spectrum harmonization and technology advancements that they can then export across the globe—to the benefit of state-backed industries. This is both an economic and national security risk that the U.S. can address by renewing the FCC's general auction authority and creating a pipeline of additional licensed, mid-band spectrum.

4. My takeaway from your testimony is that we need to extend the FCC's auction authority so that there is more clarity for the wireless industry to identify and access new bands of the spectrum. Thinking of the investments required for adequate data throughput needs in areas like Telehealth, and other services, what suggestions do you have to identify the bands to help address these market needs – both in 5G and preparing for 6G?

Licensed spectrum fuels wireless networks, and to keep up with data demands, more licensed spectrum is needed. To ensure the wireless industry has the spectrum it needs to remain globally competitive, advance secure, reliable connectivity, and promote innovations across industries, the U.S. must focus on three key elements in its spectrum policies.

First, the need for new 5G spectrum is undebated, and the U.S. must make hundreds of megahertz of spectrum available in the near term. The demand curve for wireless data continues to accelerate, and even with densified networks, current spectrum holdings are not physically capable of satisfying that consumer growth.

Second, we must focus on making mid-band spectrum available for licensed use, as it is fundamental to 5G and next-generation wireless growth. There are a number of potential candidates for meeting the needs of 5G and beyond. The lower 3 GHz band (3.3-3.45 GHz) holds potential for a substantial swath to be made available for commercial use while providing funding to upgrade federal military systems. The upper C-band (3.98-4.2 GHz) can be made available through auction, once the FCC's auction authority is restored, for expanded operations alongside record-setting spectrum that is already available in the marketplace. And the 4 GHz and 7/8 GHz bands account for more than 1,800 megahertz of spectrum that should be explored

for repurposing for commercial licensed wireless use. Every 100 megahertz of mid-band spectrum licensed for wireless networks can bring \$260 billion in benefits to our economy and support 1.5 million new jobs. These benefits are substantial and should be a primary driver of mid-band reallocation efforts.

Third, the U.S. must ensure wireless providers and equipment manufacturers have certainty and predictability as to when new spectrum will be made available for licensed use. As operators and vendors plan for future U.S. networks and equipment, they need to know what spectrum bands will be available to support innovation and connectivity, and when that spectrum will be available for use. This creates investment certainty for our wireless future.

The Honorable Kathy Castor

1. Mr. Gillen, over recent years how has the race to 5G between the U.S. and China developed?

The United States has been a global leader in wireless and we can continue that position – with the right policies. With 5G, the U.S. was the first large country to have three nationwide 5G networks, fostering investment, innovation, and deployment in a robustly competitive marketplace. The linchpin for continued wireless leadership is a pipeline for secure, reliable, full-power licensed spectrum in globally used frequency tuning ranges. However, the standstill in our national spectrum policy and pause in the FCC’s spectrum auction authority has put the U.S. behind other nations in making spectrum available for wireless growth. Already, the U.S. trails peer and rival nations by an average of more than 200 megahertz of mid-band spectrum for commercial wireless use—a figure that could grow to roughly 520 megahertz relative to five leading nations in the next few years. We strongly encourage Congress and the Administration to swiftly correct course if U.S. economic and national security interests are to be advanced in our wireless future.

China, meanwhile, has accelerated efforts to open new airwaves for next-generation wireless use and increased its presence in the supply chain. Spectrum is a key aspect of China’s initiative, and it is using the international spectrum allocation process to advance its interests and undermine U.S. capabilities and leadership. Indeed, China is already on pace to have more than 2.5x the amount of licensed mid-band spectrum than the U.S. in the next two years. With its spectrum position clear, China is expanding its global presence in harmonized spectrum and international standards setting bodies. China is also executing a comprehensive initiative that assists recipient nations in improving their telecommunications networks and digital capabilities, which in turn gamers allies for China’s effort to align global technology standards with its own interest. Put simply, these efforts give Chinese firms an advantage over trusted suppliers and puts the global ecosystem at risk.

The U.S. cannot lead in standards-setting bodies and ensure a trusted supply chain for wireless networks at home and abroad if it is not present in global wireless spectrum bands. It is therefore critical that the U.S. implement a comprehensive spectrum policy, with directed auctions for new licensed, full-power and internationally used mid-band spectrum, to advance these efforts.



Noah Jackson
Legislative Clerk
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

Hearing: "Strengthening American Leadership in Wireless Technology"
January 23, 2025
Questions for the Record

Rep. Castor:

Mr. Lewis, in an environment where natural disasters fueled by the climate crisis are happening from coast to coast, why is it so important to invest in network resiliency?

With each passing year, broadband becomes more essential to our economy, healthcare system, and daily communications. At the same time, natural disasters fueled by climate change are growing more frequent and severe. These conditions demand investments in resilient communications networks that can ensure public safety, economic stability, and connectivity when it matters most.

Network resiliency isn't just about hardening infrastructure — it's about ensuring redundancy and flexibility in broadband and wireless service delivery. That's why advancing spectrum policy that supports enhanced spectrum sharing, unlicensed spectrum, and open-access infrastructure is so critical. More importantly, we must make sustained, proactive investments in network resilience rather than waiting until disaster strikes.

Unlicensed spectrum plays a key role in disaster response because it enables decentralized, adaptable, and community-driven solutions. Wi-Fi, CBRS, and other shared spectrum tools provide critical backup when traditional networks fail—allowing first responders, businesses, and residents to stay connected. History has shown that when cellular networks go down, Wi-Fi and community broadband networks often remain operational, filling in crucial gaps. For example, during the recent Southern California wildfires, Spectrum opened more than 35,000 free Wi-Fi access points in public parks, marinas, city streets, and other public areas to ensure ongoing connectivity.¹ Expanding access to unlicensed and shared spectrum strengthens network resilience and fosters innovation, enabling rapid deployment of emergency networks through solutions like mesh networks, private 5G, and satellite backhaul.

Resilience also means fostering redundant, *competitive* networks where no single provider or technology dominates the market, thus creating a single point of failure. By prioritizing competition, shared access, and diverse deployment models, we can build a broadband infrastructure that withstands disasters while

¹ "Spectrum Opens Wi-Fi Hotspots Across Los Angeles to Aid Wildfire Survivors." *CNET*, 11 Nov. 2018, <https://www.cnet.com/tech/mobile/spectrum-opens-wi-fi-hotspots-across-los-angeles-to-aid-wildfire-survivors/>.



ensuring that all communities — rural and urban alike — stay connected.

However, resiliency planning must go beyond disaster response. Network hardening is a long-term process, and even without full-blown outages, degraded broadband performance can disrupt critical functions. A forward-looking approach to network resilience could include establishing a dedicated Universal Service Fund (USF) program for network resilience and restoration, or committing a portion of spectrum auction revenues to these efforts. Public Knowledge has long advocated for stronger policies — such as on-site backup power requirements, mandatory emergency sharing and roaming agreements, and improved data collection — to enhance network resilience. Now is the time to act, before the economic and human costs of inaction become even greater.