April 17, 2023

Information Technology Industry Council
700 K St NW
Washington, DC 200001

Via Electronic Submission

Ms. Stephanie Weiner
Acting Chief Counsel
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Ave NW
Washington, DC 20230

Re: ITI Comment in Response to National Telecommunications and Information Administration Request for Public Comment on Development of a National Spectrum Strategy (88 FR 16244, March 16, 2023)

Dear Ms. Weiner:

The Information Technology Industry Council (ITI) appreciates the opportunity to submit our response to National Telecommunications and Information Administration's (NTIA) request for comment (RFC) on Developing National Spectrum Strategy (NSS).

ITI represents the world's leading information and communications technology (ICT) companies. We promote innovation worldwide, serving as the ICT industry's premier advocate and thought leader in the United States and around the globe. ITI's membership comprises companies that operate in almost every layer of the wireless ecosystem stack that depends on spectrum allocation, including semiconductor and network equipment designers and manufacturers, software, and digital services companies, as well as those that will harness wireless technologies to evolve their businesses.

We support the USG's goal of identifying at least 1,500 megahertz of spectrum for in-depth study to determine whether that spectrum can be repurposed to allow more intensive use to satisfy a multitude of spectrum needs. The next generation of wireless technology will be transformative for our society, offering opportunities to U.S. companies, consumers, and innovators to expand connectivity and transform sectors across our economy. Rapidly increasing the availability of a robust amount of spectrum in various ranges is vital for the United States' continued technological leadership. Federal policymakers have a critical role to play in achieving this vision.

We appreciate the comprehensive nature of the NSS and that NTIA is seeking to engage the private sector and other key stakeholders in the development of the strategy. We urge NTIA to move this process forward expeditiously and work towards quickly identifying new and expanded spectrum opportunities.

Below we offer some observations on each of the three Pillars outlined in the RFC.

Pillar #1 – A Spectrum Pipeline to Ensure U.S. Leadership in Spectrum-Based Technologies

Economic Competitiveness

The use of spectrum has been and will remain a significant catalyst for economic growth and job creation, offering new possibilities for businesses and individuals. U.S. leadership in wireless innovation has been fueled by the availability of licensed, unlicensed, and shared spectrum, which has spurred innovation and investment across the ICT industry. Consumption of existing allocations are increasing in velocity and are expected to shortly be consumed by enterprises seeking to grow their spectrum use.

Being the first mover in deploying 4G technology had a substantial positive impact on the U.S. economy and job market; it was the technological impetus for many of the platforms, products, services, and applications that we use today. 5G technology is expected to enable $13.2 trillion in economic output by 2035. In the United States alone, 5G is expected to generate up to $275 billion in infrastructure investment, creating approximately three million new jobs and boosting GDP by $500 billion annually.[1]

The United States has also led the world in harnessing technology that relies on unlicensed spectrum. Wi-Fi was developed in the U.S. and is relied upon throughout the world and has been a key driver for economic growth and innovation. The current annual global economic value of Wi-Fi was estimated to reach $3.3 trillion in 2021 and is projected to reach $4.9 trillion by 2025. The economic value of Wi-Fi in the United States is predicted to increase from $1 trillion in 2021 to $1.6 trillion by 2025. Forecasts also suggest an increase of value generated by Wi-Fi globally of nearly $3 trillion in the period from 2018 to 2025, demonstrating Wi-Fi's significance as a worldwide economic engine.[2] Wi-Fi's importance will certainly increase as subsequent generations of Wi-Fi technology, Wi-Fi 6, Wi-Fi 7 & Wi-Fi 8, are able to utilize the full 6 GHz band.

[1] https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/the_ihs_5g_economy_-_2019.pdf

[2] https://www.Wi-FiWi-Fi.org/download.php?file=/sites/default/files/private/Global_Economic_Value_of_Wi-FiWi-Fi_2021-2025_202109.pdf

Future Technologies

The progression from 4G to 5G brought us the Internet of Things (IoT), increased mobile broadband capacity, and data-intensive applications like video chat. As we move into 5G Advanced and 6G technologies, new applications that are heavily reliant on radio sensing that requires massive data streams and continued latency reductions, such as the Internet of Senses, cobots, and Digital Twins, are expected to gain prominence.

The "Internet of Senses" describes a potential evolution of IoT that involves incorporating sensory feedback and interaction into connected devices. This would allow users to experience a virtual environment by using different senses such as sight, sound, touch, taste, and smell, in addition to the traditional visual and auditory interfaces of the internet, enabling a more immersive and intuitive experience. One example, telepresence, where users feel as if they are physically present in another location, is the evolution of virtual communication from 2D video to 3D interactivity. This requires massive amounts of data to move wirelessly for an immersive experience without motion sickness.

Cobots, short for collaborative robots, are robots designed to work alongside humans in a shared workspace. Cobots can be programmed to perform a wide range of tasks, including assembly, pick and place, packaging, and quality control. They are designed to augment human labor rather than replace it, and can help improve productivity, quality, and safety in various industries, including manufacturing, healthcare, and logistics. Because of their collaborative nature, cobots can also be easily reprogrammed and redeployed for different tasks, making them a flexible and cost-effective automation solution for businesses of all sizes. Vision-based perception and control of cobots in industrial and enterprises settings will require both low latency and high throughput.

A digital twin is a virtual model or replica of a physical object, process, system, or environment created using data collected from sensors, cameras, and other sources that capture real-time information about the physical object or system. A digital twin can be used to simulate, analyze, and optimize the performance of the physical object or system in a virtual environment, allowing for testing and refinement without the risk or cost of experimenting with the physical object or system itself. Digital twins are used in various fields, including manufacturing, construction, aerospace, healthcare, and transportation, to improve efficiency, reduce costs, and enhance performance.

Digital twins require significant amounts of data to be collected and processed in real-time. This data is typically transmitted wirelessly over radio spectrum. To support the growing demand for massive digital twins, there will likely be a need for additional spectrum capacity, as well as improvements in spectrum efficiency and management.

Each of these applications is heavily reliant on radio-based sensing, which involves using wireless signals to detect and analyze physical objects and environments, and has diverse applications in various fields such as healthcare, robotics, security, and environmental monitoring. Spectrum needs for radio-based sensing depend on the specific sensing technology used, the frequency range of the wireless signals, and the amount and complexity of data transmitted.

One of the main challenges in radio-based sensing is the need for sufficient bandwidth to capture and transmit accurate and detailed data. This requires allocating and managing adequate spectrum resources, which may vary depending on the application. For example, sensing applications that require high-resolution images or video data may require access to higher frequency bands with wider bandwidths, while applications that require low-power, low-data rate sensing may use lower frequency bands.

Another consideration for radio-based sensing is interference from other wireless devices or networks that operate in the same frequency range. This can affect the reliability and accuracy of the sensing data and pose potential safety risks in critical applications including healthcare and security.

Addressing the spectrum needs for radio-based sensing requires coordinated efforts among industry stakeholders, regulatory bodies, and academia. This includes developing standardized protocols for spectrum sharing, spectrum-efficient sensing technologies, and policies that balance spectrum allocation between different applications and users. Ongoing research and development are also necessary to ensure that spectrum policies and technologies continue to evolve to meet the changing needs of radio-based sensing applications.

Spectrum Pipeline

ITI supports increasing both commercial and private access to licensed, unlicensed, and shared spectrum for wireless technologies.

There is a need for better coordination and management of spectrum use. This includes improving spectrum efficiency by utilizing existing and new wireless technologies that can transmit data more efficiently and securely, developing standardized protocols for sharing spectrum among different applications and users, and establishing effective mechanisms for resolving conflicts and managing interference. There remains a need for ongoing research and development to ensure that spectrum policies and technologies continue to evolve to meet the changing needs of the wireless ecosystem.

Rather than make direct recommendations, in the context of various needs for commercial users, ITI has identified some band ranges to consider for commercial deployments:

- Between 95 GHz and 300 GHz (sub-terahertz) can provide extreme performance in very local areas.
- Between 24 GHz and 47 GHz (mmWave) offers high-speeds and very low latency in local areas, including opening the lower 37 GHz band for commercial uses.
- Between 7 GHz and 18 GHz (centimetric waves) offers coverage and capacity.
- Between 3.1 GHz to 7 GHz (mid-band) covers a wide area and has good capacity.

- Between 1 GHz and 3 GHz~~,~~ provides good wide-area coverage and good building penetration allowing good outdoor-to-indoor services and vice versa.

While allocations in all these bands are targeted and often hotly contested by various industries, we note some of the requirements and preferences expressed for both 6G and Wi-Fi technologies. However, we urge NTIA to reevaluate federal use in these bands because of the significant opportunities for a variety of commercial technologies.

Separate from these general observations, ITI recommends that the development of a spectrum pipeline focus on bands outside of the current core allocations for private narrowband systems operating at 900 MHz and below. These bands are already heavily shared and densely populated and satisfy highly valued public safety, critical infrastructure and related public health and security requirements. Given the limited quantity of spectrum allocated for these services, any repurposing or further sharing would not add significantly to the Administration's goal of identifying 1500 MHz for repurposing in the near and medium term. There is more opportunity for commercial deployments in bands above and beyond 1 GHz.

6G Observations

For technologies like the Internet of Senses, Digital Twins, cobots, and other 6G use cases to come to fruition, suitable spectrum for wide-area coverage must be available that can support these uncoordinated use cases by different users. Developers estimate that they will need around 3 GHz of wide area coverage that can be supplemented with local area coverage to create the 6G networks of tomorrow.[3]

By 2030, the United States will have 450 MHz of licensed mid-band spectrum available to mobile network operators to support the 6G evolution. This includes the 70 MHz of licensed spectrum in the Citizens Broadband Radio Service (CBRS) band at 3.55-3.7 GHz and the recently auctioned 280 MHz of C-band spectrum at 3.7-3.98 GHz.

With the potential for these bands to become constrained as 6G evolves, select mid-band frequencies are a key target for study. However, 6G developers note that there are differences in signal propagation within the range. Choosing frequencies nearer to the mid-band range allows for greater reuse of existing infrastructure, leading to lower costs, power consumption, and the need for new sites. For 6G use cases, the 4 GHz band (4.4-4.94), the 7 GHz band (7.125-8.4), bands ranging between 10.7-15.35 GHz, and the 18 GHz band (18.1-19.7 GHz) have been identified as potential areas for further study.

Wi-Fi Observations

Wi-Fi networks are an important part of broadband delivery for both consumers and enterprise. Wi-Fi's wide availability, low cost, and reliability have made it the predominant technology for indoor traffic.

[3] https://www.ericsson.com/assets/local/reports-papers/white-papers/6g-spectrum.pdf

Wi-Fi currently delivers multigigabit data rates and carries approximately 70% of data used on consumer devices, an amount that will only increase. Moreover, Wi-Fi performs an important role for offloading mobile wireless traffic from service provider networks. Thus, Wi-Fi must have adequate spectrum available for consumers and businesses to realize the benefits of their other broadband connections.

Until relatively recently, Wi-Fi operations were limited to unlicensed spectrum bands in the 2.4 GHz and 5 GHz frequency ranges. As Wi-Fi exploded in popularity, competition for spectrum resources between networks and applications began to affect quality of service, leading to variable and inconsistent latencies. However, with the FCC's 2020 decision to allocate 1200 MHz of the 6 GHz (5925-7125 MHz) band spectrum for unlicensed use, this congestion is expected to decrease substantially. By 2030, the United States will have more than 1400 MHz of unlicensed mid-band spectrum available.

Within the 6 GHz band, three non-overlapping 320 MHz channels will be capable of supporting Wi-Fi 7 and Wi-Fi 8 technologies that will reduce latency and allow for the simultaneous use of multiple high-bandwidth technologies like augmented reality and 8K video. These applications are essential for new use cases in fields like education, telemedicine, warehouse administration, and smart cities. For example, AR/VR applications generally require end-to-end latencies below 10 ms, with 99.9% reliability and single-stream throughput of around 100 Mbit/s. If only the lower 500 MHz of the 6 GHz band had been authorized for unlicensed use, then only a single 320 MHz channel would be available, disallowing low-latency, high-usage future applications that must operate simultaneously on multiple streams to function as intended.

Wi-Fi looks to the 7 GHz band as the next step for future unlicensed technologies and evolutions, such as Wi-Fi 8, due to its proximity to the 6 GHz band and its similar international allocation. The sub-THz range of 95-300 GHz has also been identified for Wi-Fi due to the high-capacity transmissions over short ranges for indoor uses and wearables.

Sharing Observations

Coexistence and innovative licensing regimes are viable options when access to exclusive spectrum is too difficult. Spectrum sharing or collocation has allowed non-federal users to operate in frequency bands that were previously reserved exclusively for use by federal agencies. The FCC, in collaboration with government agencies like NTIA and DoD, has developed dynamic, multi-tiered sharing models, such as in the CBRS band, which allows commercial operations to dynamically reconfigure their transmission parameters to avoid interference with other users. CBRS provides a working example of how public/unlicensed spectrum can be managed. Sharing can result in benefits for both government and commercial users, as it can enable cost savings and increased efficiency by allowing civil users to share federal spectrum.

5G innovations also allow for traditional network operators to offer niche use cases via innovations like network slicing and virtualization. Network slicing can help improve spectrum access and enable new business models for spectrum management. By creating dedicated slices for different customers or applications, operators can offer more flexible and customized services, and monetize the spectrum more efficiently. They can also collaborate with other stakeholders, such as enterprises, governments, or vertical industries, to create specialized slices that meet their specific needs. Many enterprises are in the process of deploying private cellular networks to enable high-reliability and secure wireless connectivity within warehouses, factories, ports, higher education campuses, and other similar “contained” facilities. This flexibility is also key to making it possible to roll out mission-critical, wireless-enabled solutions such as connected robots, reconfigurable plant automation, and other demanding applications.

Cultivating an ecosystem for innovation to thrive requires building technologies and networks capable of supporting the performance necessary for next generation use cases and applications. The United States can establish itself as a leader in innovation by deploying or supporting these technologies and applications, shaping how they are utilized to advance productivity and investment, and ultimately improving the lives of Americans while promoting important national interests.

This is by no means an exhaustive list of the possible unlicensed, shared, and licensed technologies that utilize spectrum for commercial deployments, but an illustration of the various spectrum needs and opportunities that would benefit from NTIA reevaluating federal use in the various bands.

Pillar #2 –Long-Term Spectrum Planning

Reaffirming the role of the NTIA & FCC in Spectrum Management

The NSS should reaffirm NTIA’s authority over federal spectrum matters and the FCC’s complementary jurisdiction over commercial spectrum. It is crucial that NTIA be able to speak as the one voice on behalf of federal spectrum users, rather than having individual agencies pursue their own interests at the expense of the broader federal enterprise or policy objectives.

ITI commends the recent updates to the MOU between the NTIA and FCC and suggests further action to enhance domestic spectrum management. ITI also appreciates the Memorandum of Agreement among the NTIA, FCC and National Science Foundation to support NSF’s Spectrum Innovation Initiative, which is researching and developing dynamic and agile spectrum utilization technologies for active and passive users. We expect that NTIA can leverage this research as it examines spectrum for more intensive use along with results from work flowing out of the National Strategy to Secure 5G and the Public Wireless Supply Chain Innovation Fund.

Workforce Development

In addition to the known needs for tower technicians and telecom crews servicing wireless and backhaul infrastructure, future networks will also require more datacenter technicians, cloud systems administrators, cybersecurity experts and other workers with the skills to advance virtualization. We also need more engineers that understand RF and can engage in the studies and development of solutions that allow the introduction of new commercial services while ensuring incumbent missions are sustained. Governments should prioritize funding training and retraining for workers to prepare for and meet these workforce needs. This training and retraining should be conducted in conjunction with industry to ensure support for required skillsets. Policymakers should consider providing incentives to industry to support training.

Standards Organizations

ITI believes that policymakers should pursue opportunities for global harmonization of spectrum bands, while maintaining individual countries' sovereignty to allocate spectrum for domestic use. Harmonization of spectrum bands and the intention of an identification of a frequency band provides a critical message to the ICT industry equipment manufacturers with guidance on which spectrum may be made available for the various spectrum-enabled ICT services.

To further these goals, USG should seek to support U.S. industry participation in standards bodies working on 5G and 6G specifications, through (a) supporting open, inclusive, and industry-led standardization bodies with transparent, due process and rules-based processes and policies, and (b) making the United States a more attractive meeting location for standards development organizations (SDOs) to host meetings. These and other collaborative efforts with U.S. stakeholders can help ensure that current and future standardization-related policies, laws, and regulations do not unintentionally or unfairly inhibit U.S. stakeholders' participation in international and other relevant standards bodies.

Standards are essential to wireless deployment in that they facilitate interoperability of devices and solutions. For example, the fundamental promise of future wireless applications is that any wireless device can speak to any other wireless device over any network, which will help to realize economies of scale and bring ease of use to end users. Wireless standards, specifications and guidelines are being driven and developed by a variety of globally recognized standards development organizations with participation from thousands of experts from industry, government, academia, research organizations and other backgrounds. USG, industry, and other U.S. stakeholders' participation in these standardization environments is important for US to effectively contribute to and help shape spectrum policy and relevant information and communications technology standards. One area of note is continuing to pursue unlicensed access in the full 6Ghz band around the world.

Given the breadth and complexity of the work, it is important that companies and other stakeholders be able to choose the most appropriate body in which to participate to advance their work. There are a wide variety of SDOs and consortia, each with their own procedures and governance processes, to develop relevant standards and specifications. Market forces enable companies to coalesce around the most relevant and effective standards bodies for the relevant work. The non-exhaustive list below highlights several SDOs that are contributing to various aspects of spectrum standardization.

- Third Generation Partnership Project (3GPP) is, by and large, the focal point of development for 5G, 5G Advanced and 6G specifications and standards. 3GPP is a consortium made up of seven of the regional telecommunications standards development bodies. 3GPP has hundreds of

technical specifications under development for mobile wireless communications. 3GPP is also developing standards for networks to interconnect with one another. For example, 3GPP's non-public network support would allow private networks optimized for a specific purpose (e.g., an automated manufacturing facility) to co-exist with public carrier networks.
- **GSMA** is an industry association representing the interests of mobile operators worldwide, including more than 750 operators and almost 400 companies in the broader mobile ecosystem.
- **International Telecommunications Union Radiocommunication Sector (ITU-R)** carries out the work of obtaining spectrum within the centimetric frequency and other ranges to support NextG networks and technologies. As such, 2023 is an important year to define an agenda item for WRC-27 (via WRC-23), including frequency ranges to be studied, and to make further progress on understanding the use cases and their spectrum requirements. The effort required for the 6G spectrum must be shared by different stakeholders, including regulators, service providers, and vendors.
- The **O-RAN Alliance** is working to build specifications and standards for 5G networks, focused on open and interoperable interfaces for radio access networks.
- I**nternet Engineering Taskforce (IETF)** covers specifications related to 5G non-radio network segments.
- **Institute for Electrical and Electronics Engineers (IEEE)** is involved in the creation of many standards, including Wi-Fi and WiMAX standards, as well as other machine communications standards that will change with 5G.
- **Wi-Fi Alliance (WFA**) engages in the development of innovative technologies, requirements, and test programs on Wi-Fi, as well as the certification of products that comply with its specifications for Wi-Fi interoperability, security, and application-specific protocols.

We appreciate that the USG recognizes the importance of standards development and is considering how to encourage and support USG and private sector participation in standards development, consistent with longstanding US government policy and related law. Below are recommendations that the USG can undertake to best incentivize and support U.S. industry participation:

- **Support open, consensus-based, rules-based, and industry-led bodies.** Companies that seek to compete in wireless technologies need to participate in international standards development processes, and they must not face arguably unfair restrictions (especially those that would effectively limit their ability to participate fully and meaningfully in such standardization efforts) when choosing which bodies are best suited for their specific work and needs. The USG should also encourage other nations to rely on and reference international standards in relevant policies and regulations.
- **Make the United States a more attractive meeting location for SDOs to host meetings.** Attending standards meetings typically requires a significant amount of travel and time commitments. Accordingly, the U.S. Government should help ensure that the U.S is viewed as an attractive and effective venue for standardization-related meetings and related activities. The USG can provide effective assistance in this regard by, among other things, facilitating visa applications for foreign standards experts to routinely attend meetings in the United States. The

inability of these standardization participants to obtain timely U.S. visas has often proved to be an impediment to hosting meetings in the United States.

- **Engage in regular communications with U.S. stakeholders.** The USG and the private sector should regularly consult outside of standards development activities. Consistent engagement will help ensure that all relevant USG and U.S. private sector stakeholders are aware of standards-related activities, issues, and priorities. This exchange will help facilitate an effective, mutual understanding of progress, concerns, obstacles, and strategies, along with clarifying any misunderstandings about ongoing efforts. ITI has periodically sought to convene public-private sector standards roundtables to bring relevant stakeholders together and would be eager to work with the USG to regularize such meetings and frame relevant and appropriate discussions. For example, industry stakeholders must have an effective means of collaborating with relevant USG officials regarding spectrum-related policies. This public-private partnership will help drive efficiency and support effective and innovative results.

Pillar #3 – Unprecedented Spectrum Access and Management through Technology Development

There are several innovations and next-generation capabilities for spectrum management models being explored today that could expand and improve spectrum access.

- **Dynamic Spectrum Access (DSA)** enables spectrum sharing among multiple users by allowing them to access spectrum bands dynamically, depending on their needs and requirements. This approach improves spectrum utilization and enables more efficient use of spectrum resources. The FCC has already implemented DSA in several spectrum bands, and other countries are also exploring this approach.
- **Network Slicing** is a technique used in 5G networks to create multiple virtual networks that can be tailored to meet the specific needs of different use cases, applications, or customers. Each network slice can have its own set of characteristics, such as bandwidth, latency, security, and reliability, which can be optimized to support diverse communication requirements.
- **Cognitive Radio (CR)** is a type of wireless communication system that uses machine learning algorithms to dynamically allocate and use spectrum resources. CR can adapt to changing environments and conditions, making it more resilient and efficient than traditional wireless systems. Several companies and researchers are exploring CR for various applications, including military, commercial, and public safety.
- **Artificial Intelligence (AI)** can be used to optimize spectrum utilization and improve the efficiency of spectrum management. For example, AI algorithms can be used to predict spectrum usage patterns, identify underutilized bands, and optimize spectrum sharing arrangements.

Overall, these innovations and next-generation capabilities have the potential to expand and improve spectrum access and utilization, making it possible to support new and emerging wireless applications and services.

To enable advanced modeling and more robust and quicker implementation of spectrum sharing to satisfy non-federal interests while maintaining spectrum access necessary to satisfy current and future federal mission requirements and operations of federal entities, several spectrum management capabilities and tools are available:

- Spectrum Sharing Databases can be used to track spectrum usage and availability in real-time. By integrating data from multiple sources, including federal and non-federal entities, these databases can provide a comprehensive view of spectrum usage and enable more efficient spectrum sharing arrangements.
- Spectrum Access Systems (SAS) are automated systems that manage spectrum access and enable dynamic sharing among multiple users. These systems use real-time data to dynamically allocate spectrum resources, considering the needs and requirements of both federal and non-federal users. SASs can enable more efficient use of spectrum resources and reduce the potential for interference.
- Spectrum Modeling and Simulation Tools can predict and analyze spectrum usage and interference in complex environments. By modeling different scenarios and configurations, these tools can help identify potential sources of interference and optimize spectrum sharing arrangements.
- Machine Learning Algorithms can be used to analyze and predict spectrum usage patterns and optimize spectrum sharing arrangements. These algorithms can adapt to changing conditions and help identify new opportunities for spectrum sharing.
- Spectrum Coordination Centers can be used to facilitate coordination and communication among federal and non-federal entities. These centers can provide a centralized point of contact for spectrum management activities and enable more efficient coordination among stakeholders.

Overall, these spectrum management capabilities and tools can enable more efficient and effective spectrum sharing arrangements that satisfy the needs of both federal and non-federal interests. By leveraging these tools, it is possible to achieve a better balance between spectrum access and spectrum sharing, which can support the growth of new and innovative wireless applications and services.

Research & Development

The above-mentioned innovations are all opportunities for USG to participate in R&D, of which the NSF Spectrum Innovation Initiative is one example.

To foster innovation in wireless technologies, the USG should consider opportunities for public-private partnerships, cooperative agreements, and grant agreements to support ongoing R&D. Public-private partnerships are an important tool for the USG to facilitate not only the technical investment in wireless, but also the legal and policy framework to support and govern the technology long-term. Historically, public-private partnerships have helped bring to fruition large-scale projects by combining private sector technology and innovation with public sector oversight and buy-in; both are critical requirements for advancing a cohesive national spectrum strategy.

Cooperative agreements and federal grants are two other mechanisms to channel federal funding toward spectrum technology research, development, and testing in a streamlined manner. These flexible instruments are not subject to Federal Acquisition Regulation (FAR) and can potentially expand the universe of private companies willing to partner with the federal government for R&D activities.

ITI supports the continued prioritization by the USG of R&D into areas foundational to next generation wireless technologies. We advocate for increased R&D in areas including increased funding for the highly technical USG labs, such as those at the DoD, DoE, NIST, etc. into key foundational and applied research areas. This work can bring USG R&D spending closer to par with the wireless technology investments made by global competitors, as well as with other important telecommunications R&D efforts, such as in the area of broadband funding.

Conclusion

Thank you for the opportunity to provide comments on NTIA's development of a National Spectrum Strategy. ITI looks forward to working with you throughout this process. Should you have any questions or we can be helpful in anyway, please reach out to Katie McAuliffe, Senior Director of Telecommunications Policy, kmcauliffe@itic.org.

Sincerely,

The Information Technology Industry Council