November 17, 2022

The Honorable Jessica Rosenworcel
Chairwoman
Federal Communications Commission
45 L Street, NE
Washington, D.C. 20230

The Honorable Alan Davidson
Assistant Secretary and Administrator
National Telecommunications and Information Administration
1401 Constitution Avenue, NW
Washington, D.C. 20230

Dear Chairwoman Rosenworcel and Administrator Davidson,

Wireless spectrum is essential to America's future technology leadership, industrial might, and global competitiveness. That's why a remarkably broad swath of companies and organizations – representing manufacturing, automotive, agriculture, energy, retail, commercial real estate, communications, media, and supply chain industries, as well as schools, libraries, and civil society groups – support an inclusive approach to spectrum policy. America needs a balanced policy that considers the needs of an extraordinarily diverse range of spectrum stakeholders who are investing in advanced networks to power the "5G economy".

As we consider new spectrum options that can be made available to serve the American people, we urge you to build on the demonstrated success of the Citizens Broadband Radio Service (CBRS) spectrum sharing model. The innovative CBRS licensing framework has driven innovation in the next generation of wireless networks. These networks advance investment, protect critical U.S. leadership and security by enabling ongoing Department of Defense (DoD) and Federal missions in shared bands, drive innovation and competition, and maximize efficient use of the limited yet essential spectrum resource. Every day, more devices, services, and organizations require access to a wider array of spectrum resources. Implementing approaches that promote a wide variety of advanced communications applications will powerfully advance the public good.

Spectrum Sharing Advances Investment

The Federal Communications Commission (FCC) first authorized commercial equipment in the CBRS band just three years ago and completed its auction of shared licenses just two years ago. In that short timeframe, CBRS is now being used throughout the country with over 285,000 CBRS base station devices (CBSDs) already deployed in under three years. For comparison, the commercial wireless industry has built 418,887 cell sites *over its entire 40-year history*. (During the same three-year period that CBRS has been active, cellular providers built 69,543 cell sites – of which more than 10,000 use CBRS.) As further evidence of a dynamic equipment ecosystem, the FCC has certified 187 different CBRS base station models and 496 different end user client devices, ranging from traditional smartphones and IoT modules and gateways to security cameras, barcode scanners, and building management sensors. Use of the CBRS band is vibrant and growing at an impressive pace.

Spectrum Sharing Drives Innovation

The CBRS framework provides users with flexibility to choose from the broadest range of technologies and service models, driving innovation and competition in the private wireless market. Because CBRS spectrum is accessible to a wide variety of operators, it provides options for operators in suburban, rural and remote areas

that are not adequately served by traditional carriers, while also enabling private network users to customize networks to meet their needs.

CBRS is emerging as the home spectrum band for a myriad of advanced wireless use cases. For example:

- CBRS-powered networks are improving the efficiency of supply chains, warehouses, and critical seaports.
- CBRS is enabling advanced manufacturing techniques that enhance worker productivity and safety, helping American firms maintain their competitive edge.
- Farms are using CBRS to increase efficiency, yields, and cost savings.
- Transportation and shipping hubs are using private networks to support automated-guided vehicles moving cargo and to improve real-time logistics through faster wireless communications.
- Schools and libraries are using CBRS to close the digital divide and homework gap for underserved communities.
- Hospitals are using CBRS to triage and monitor patients, including by connecting outdoor hotspots to indoor networks, so nurses can test and triage patients outside the hospital setting.
- Airports, entertainment venues, and stadiums are using private CBRS networks to improve the guest experience by providing additional and dedicated bandwidth for venue operations.

These and many other use cases demonstrate that CBRS networks – along with complementary technologies like industrial automation, artificial intelligence, precision agriculture, and edge computing providers – are essential to enabling an enterprise technology stack that propels American innovation and advanced industrial practices.

Spectrum Sharing Spurs Competition

CBRS enables "converged" delivery models that both compete with and bolster traditional wireless network services provided over exclusively licensed spectrum. It is also proving complementary to Wi-Fi. No single private entity or industry should hold the key to an enterprise, university, or other entity's ability to access the public airwaves needed to deploy an innovative, purpose-built network. The CBRS framework helps ensure that does not happen. This competition drives still more innovation, creating a virtuous cycle.

Spectrum Sharing Maximizes Efficiency of a Limited Resource

CBRS uniquely combines auctioned and non-auctioned authorizations into a single frequency band, maximizing the scale of the equipment ecosystem to the benefit of many different types of users. The FCC conceived of the CBRS shared-license model to allow the DoD to avoid band clearing (and its associated costs) and continue its critical operations while also allowing a wide variety of commercial operators to use spectrum in the same band. This tiered spectrum sharing model ensures the protection of America's national security interests while allowing other users to make the most of a critical resource.

Both the auctioned (Priority Access License, or PAL) and non-auctioned or licensed-by-rule (General Authorized Access, or GAA) portions of the CBRS bands have demonstrated substantial success. The PAL auction resulted in 228 diverse winning bidders – almost *10 times the number of winning bidders in the exclusive-use 3.45 GHz band*. PAL winners included wireless internet service providers and electric utilities, cable operators, and

nationwide and regional mobile network operators. The GAA portion of the band hosts nearly 900 different users, including factories, cities, school districts, hospitals, research centers, schools, public libraries, utilities, and other critical infrastructure. Most importantly, unused PAL spectrum does not lie fallow, and can be efficiently put to use by GAA spectrum users.

That all of these different user types can "cohabitate" in a single spectrum band is an achievement to be celebrated and replicated. At the same time, as new technologies and techniques become available to make the CBRS automated dynamic sharing regime even more efficient, it provides a framework for iterative improvement over time.

Spectrum Sharing Is Internationally Recognized

CBRS has become a model for spectrum sharing around the world. Recognizing the value of midband private 5G networks, other countries are also working to make spectrum available in new ways for new users and uses. For example, Germany, France, the United Kingdom, Japan, Brazil, Sweden, and other countries have all designated substantial amounts of shared midband spectrum for private and local networks.

- In Germany, the Frankfurt Airport is working toward deploying a private 5G network to "control data and voice communication autonomously."
- In Japan, Sony is working to deploy internet service that will minimize "service disruptions caused by heavy traffic" in certain residential complexes.
- In the U.K., Verizon is using shared midband spectrum to develop a private 5G wireless network for the Associated British Ports.
- In Europe, CEPT is studying CBRS-like dynamic sharing of low/medium power networks with satellite systems in the 3.8-4.2 GHz band.

With CBRS, the United States has shown the world that spectrum can be made available without requiring inefficient allocations for a wide variety of different uses. In light of other countries' moves toward greater spectrum sharing, the United States should extend its leadership by nurturing and growing CBRS.

Conclusion

The undersigned parties believe that the CBRS allocation has fulfilled its promise as the "innovation band" in an incredibly short period of time. The framework should be advanced for future spectrum allocations, including in the lower 3 GHz band, to enable greater competition, innovation, efficiency and American leadership. Thank you for continuing to support a spectrum policy that demonstrates America's inventive spirit at its finest.

Sincerely,

Airspan Networks	Amazon.com Services LLC
American Library Association	CalChip Connect
Celona Inc.	Charter Communications, Inc.
Comcast Corporation	Cox Communications, Inc.
Deere & Company	Dynamic Spectrum Alliance

Federated Wireless	Hewlett Packard Enterprise Company (HPE)
HRMavenir Systems, Inc.	JBG SMITH Properties
Midcontinent Communications	Motorola Solutions, Inc.
NCTA – The Internet & Television Association	Open Technology Institute at New America
Pollen Mobile LLC	Public Knowledge
Purdue Research Foundation	Shure Incorporated
The Schools, Health & Libraries Broadband Coalition (SHLB)	US Ignite
Weavix	WISPA – Broadband Without Boundaries

CC: The Honorable Brendan Carr, Commissioner, Federal Communications Commission
The Honorable Geoffrey Starks, Commissioner, Federal Communications Commission
The Honorable Nathan Simington, Commissioner, Federal Communications Commission

SPECTRUM SHARING IS DRIVING INNOVATION IN INDUSTRY AND MANUFACTURING

Industrial and manufacturing environments have unique needs that can be well-served by private 5G networks. CBRS spectrum provides flexibility for private networks to use licensed shared spectrum (Priority Access Licenses), opportunistic use spectrum (General Authorized Access), or a combination of both – *without* the enormous and prohibitively expensive costs required by traditional carriers attempting to recoup the expense of exclusive spectrum and proprietary solutions.

CBRS-powered private 5G networks offer advanced features to industrial operators, including: the ability to customize their network's security protocols, data capabilities, capacity, and Quality of Service for different users and devices.

ADVANCED MANUFACTURING

JOHN DEERE USES CBRS IN ITS FACTORIES TO:

- Analyze data on welding patterns to train an algorithm on the best welds for future fabrications
- Measure torque using sensors on handheld power drills to ensure bolts are optimally tightened
- Enable private LTE networks that will allow for more flexible, nimble and connected facilities, transforming the manufacturing process with a safer, more efficient workspace
- Develop predictive maintenance services using the collected sound and vibration data from machines and applying AI algorithms
- Track equipment location and utilization throughout the factory to make operations more efficient
- Implement 5G technologies to turn its factories into smart and connected manufacturing facilities

WAREHOUSING AND LOGISTICS

THE UNITED STATES MARINE CORPS USES 5G IN SUPPORT OF THEIR SMART WAREHOUSE TO:

- Improve supply receipt, storage, issuance, auditability, and inventory control
- Support augmented reality, virtual reality, and holographic warehouse applications
- Meet U.S. Military security and privacy requirements
- Foster robotic/automated functions in the warehouse

WORKER SAFETY

A FURNITURE FACTORY IN MICHIGAN USES A PRIVATE WIRELESS NETWORK – POWERED BY CBRS – TO:

- Monitor and track employee compliance with safety protocols, including confirming that workers are wearing safety gear (i.e. goggles, gloves, headwear, etc.) and automatically shutting off machinery if they are not
- Detect abnormal behavior in close proximity to machinery
- Enforce COVID-19 safety protocols, such as social

TRANSPORTATION AND SHIPPING HUBS

TRANSPORTATION AND SHIPPING HUBS – SUCH AS THE PORT OF LONG BEACH – USE PRIVATE WIRELESS TO:

- Support automated guided vehicles moving cargo without a human driver
- Improve real-time logistics through faster and rich wireless communications services, such as push-to-talk/video
- Monitor inventory in real time using CBRS-enabled wireless sensors
- Track and route equipment, vehicles, and cargo to improve speeds and workplace safety

SMART CITIES

PURDUE RESEARCH FOUNDATION'S "DISCOVERY PARK" IS BUILDING A CBRS-POWERED NETWORK TO:

- Provide dedicated wireless connectivity to manufacturers, researchers, businesses, retailers, and residents across a 400-acre parcel of land on Purdue University's campus
- Experiment with next-generation smart city technologies, such as smart sensors and AI-based applications
- Support other 5G use cases that require network slicing, such as semiconductor fabrication, health care, and aviation

AGRICULTURE

TRILOGY'S RURAL CLOUD INITIATIVE IS USING CBRS TO POWER IOT DEVICES THAT:

- Support digital sensors that monitor temperature and soil moisture in greenhouses to improve crop yield
- Improve herbicide usage by identifying weeds in fields with a drone-mounted camera
- Track crop growth and monitor inventory to identify efficiencies and reduce costs

EDUCATION

SCHOOLS AND LIBRARIES – LIKE SALT LAKE CITY'S MURRAY CITY SCHOOL DISTRICT – ARE IMPLEMENTING PRIVATE CBRS NETWORKS TO:

- Close the "homework gap" by providing internet to students at home
- Improve school safety with wireless cameras, sensors, alarms, emergency phones, and more
- Support the implementation of new technology in classrooms, such as AR/VR, smart boards, and video streaming

HEALTH CARE

MEMORIAL HEALTH SYSTEM CLINIC IN SPRINGFIELD, ILLINOIS LAUNCHED A PRIVATE 5G NETWORK TO:

- Provide connectivity to a makeshift triage tent during the peak of the COVID-19 pandemic
- Track mobile diagnostic equipment, surgery tools, and other medical equipment throughout the hospital complex
- Provide a dedicated channel for critical communication between doctors, nurses, and other hospital staff