Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Promoting Investment in the	)	GN Docket No. 17-258
3550-3700 MHz band	)	
	)	
	)	

To: The Commission

COMMENTS OF
PUBLIC INTEREST SPECTRUM COALITION

OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA
PUBLIC KNOWLEDGE
AMERICAN LIBRARY ASSOCIATION
BENTON INSTITUTE FOR BROADBAND & SOCIETY
SCHOOLS HEALTH & LIBRARIES BROADBAND (SHLB) COALITION
CONSORTIUM FOR SCHOOL NETWORKING (COSN)
ACCESS HUMBOLDT
X-LAB

November 6, 2024

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The Open Technology Institute at New America, Public Knowledge, American Library Association, Benton Institute for Broadband & Society, Schools Health & Libraries Broadband (SHLB) Coalition, Consortium for School Networking (CoSN), Access Humboldt, and X-Lab ("Public Interest Spectrum Coalition" or "PISC") hereby submit these Comments in response to the questions and proposals raised in the Notice of Proposed Rulemaking and Declaratory Ruling in the above-captioned proceeding.[1] PISC and many of our public interest group members have participated in this proceeding at every stage since original 2012 Notice of Proposed Rulemaking. We commend the Commission's efforts to facilitate the continued success and evolution of this world-leading innovation in dynamic spectrum sharing.

[1] *Promoting Investment in the 3550-3700 MHz band*, Notice of Proposed Rulemaking and Declaratory ruling, GN Docket NO. 17-258 (rel. Aug. 16, 2024 ("*NPRM*").

I. INTRODUCTION AND SUMMARY

As discussed below, CBRS has been the most successful innovation in wireless technology in the last decade. Whereas 5G and Wi-Fi have advanced incrementally—with each iteration being a "bigger, better, faster" version of the one before—CBRS has introduced a mechanism for achieving two important goals. First, CBRS advances the capacity for shared spectrum beyond the rigid hierarchy of primary/secondary/etc used in exclusive licensing and beyond the fully shared "democracy" of Part 15 unlicensed. CBRS permits tiering of services into primary and secondary, while simultaneously permitting the efficiency of allowing all would-be users to operate where doing so does not threaten harmful interference. In this, CBRS has introduced a genuinely new model for spectrum sharing that has enabled greater spectrum access, efficiency and innovation.

Second, CBRS has found a comfortable level of power between the higher power of exclusive licensing and the low-power of Part 15. Authorizing CBRS as "licensed by rule" under Section 307(e) allowed the Commission to permit higher power-levels than traditional for Part 15 unlicensed devices and to grant users tiered levels of interference protection within the same band and same general rules of operation. It did all of this while maintaining the low cost of entry that has made Part 15 devices so critical to the wireless economy.

As a consequence, CBRS has permitted an entirely new set of use cases and equipment innovation to flourish that have not previously been practical for the low-power, open nature of Part 15 or, conversely, economically attractive to the major carriers who focus their full power licenses on very wide-area coverage and mass-market services. CBRS has encouraged the deployment of "open networks" designed to host users needing greater flexibility and control than that offered by traditional CMRS providers, at higher power and with greater interference protection than possible using unlicensed spectrum. Manufacturing campuses (such as John

Deere and Dow Chemical), transit hubs (Miami International Airport, Port of Los Angeles), supply chain and logistic centers (U.S. Marine Corps), sporting arenas (Philadelphia's Wells Fargo Center), school districts and libraries (Fresno Unified School District, New York Public Library) are all examples of a growing trend toward local spectrum access fueling purpose-built private LTE/5G networks for a wide variety of use cases. Additionally, CBRS provides an essential ingredient in "het nets," where combining exclusively licensed spectrum, unlicensed spectrum, and CBRS allows providers to enhance reach and efficiency by matching the right frequency and service rules to the specific needs of individual users.

The Commission should therefore use this proceeding to build on this success. The Commission must resist the push by some incumbents to remake the band into a traditional band customized for specific purposes like mobile carrier 5G. To do so would be to take a step backward to the old days of "command and control" by effectively limiting use to a single business model through technical rules rather than explicit regulation. Instead, the Commission should take this opportunity to adopt rules that enhance the qualities that make this band different and flexible. It should build on the qualities of this band that have enabled and encouraged hundreds of new users and use cases, not seek to customize the band for a handful of high-power licensees. Both diversity in spectrum access and more dynamic, intensive frameworks for sharing underutilized bands are crucial to the nation's wireless future.

For this reason, PISC strongly opposes the proposal to raise power levels for users in the band. As discussed below, raising power levels to facilitate the business model of the same mobile cellular providers that already use the vast majority of full power spectrum would undermine the purpose of CBRS by severely impacting availability and use. The Commission has sought to customize the rules of virtually every high-power band designated for auction over

the last 15 years to optimize the current 3GPP standard. The proposed power increases would move CBRS from an innovation to a poor clone of every other "mobile broadband" band.

Additionally, adopting such a dramatic change would severely undermine the trust built with the military over the course of the implementation and evolution of this world-leading innovation in dynamic spectrum sharing that culminated in the consensus on "CBRS 2.0" changes announced in June. As the Commission well knows, the loss of trust between the Executive Branch (particularly the military) and the Commission has reached dysfunctional levels, and the Chairwoman has devoted considerable time and energy to rebuilding that trust. Nothing here justifies adopting rule changes that would violate the clear understanding under which the Department of the Navy and the FCC have operated until now.

PISC also opposes proposals to increase the CBRS in-band OOBE limit from -25 dBm/MHz to -13 dBm/MHz. A substantially higher in-band OOBE limit will increase interference in the band for GAA users and others who have deployed in reliance on the existing technical rules.

Finally, concerning CBSD information and reporting, our groups believe that both SAS administrators and CBRS operators need additional information to enhance GAA coexistence and service quality. Much of this is already available and should be transparent; the rest should be relatively easy to collect. The utility and efficiency of the band for GAA users could be increased enormously by allowing Spectrum Access Systems to collect, use and share with operators—and regulators—three types of information that are currently either obscured or not provided. Accordingly, we propose three improvements in transparency and CBSD reporting requirements that include: first, allowing band users to know where nearby CBSDs are located, their technical characteristic, and what frequencies they have been granted to use (and, ideally,

what channels they actually are using). Second, the SAS administrators should be allowed (and possibly required) to disclose the boundaries of PAL Protection Areas to facilitate GAA-PAL coexistence. And finally, CBSDs should be required to report their actual channel use back to the SAS, as well as possibly other readily collected data about the interference environment.

II. THE FCC SHOULD NOT INCREASE POWER LEVELS

A. Higher Power Would Undermine the Stated Purpose of CBRS as a Low-Power Band for Innovation and Local Access by Non-Traditional Operators

Direct local access to spectrum, the promotion of diverse use cases and innovation, and efficient spectrum re-use—all predicated on power levels and dynamic coordination necessary to coexist with U.S. military operations—have always been the founding goals and presumptions of the CBRS three-tier sharing framework. From the outset, the Report and Order adopted in 2015 emphasized the importance of crafting regulations that made the "3.5 GHz Band hospitable to a wide variety of users, deployment models, and business cases, including some solutions to market needs not adequately served by our conventional licensed or unlicensed rules."[2] The Commission also made explicit its "desire to promote innovative, low power uses in [the] band."[3] Indeed, the Commission continues to acknowledge these overarching goals today by recognizing the band as "a success in making additional mid-band spectrum available for a variety of novel and important uses… [and] a model for spectrum sharing."[4]

[2] *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order And Second Further Notice Of Proposed Rulemaking, GN Docket No. 12-354, at ¶ 6 (rel. April 21, 2015) ("2015 CBRS Order").

[3] *Id*. at ¶ 100.

[4] Promoting Investment in the 3550-3700 MHz band, Notice of Proposed Rulemaking and Declaratory Ruling, GN Docket No. 17-258, at ¶ 17 (rel. August 16, 2024) (*NPRM*).

In adopting its CBRS rules, the Commission carefully considered and rejected proposals for higher power limits. The Commission found that lower power limits would enable a more efficient use of this spectrum by (1) allowing greater spatial reuse of the band; (2) reducing coexistence challenges; and (3) increasing network capacity.[5] On reconsideration, the Commission again expressly rejected calls for higher power in order to "create a flexible regime suitable for a wide variety of use cases."[6]

Spectrum sharing that enables public/private coexistence was first recommended over a decade ago by the President's Council of Advisors on Science and Technology (PCAST), which posited that "the essential element of this new Federal spectrum architecture is that the norm for spectrum use should be sharing, not exclusivity."[7] From its beginning, the contribution of the then-nascent CBRS framework has been to create a three-tier sharing framework that facilitates the unprecedented combination of priority access licenses (PALs) and General Authorized Access (GAA) under common technical rules predicated on relatively low power. PALs, which comprise roughly half the band (70 megahertz), were assigned by auction and ensure a high degree of certainty despite the occasional need for channel moves. And GAA, which is not auctioned and is open for free use by any operator, facilitates direct local access to spectrum for the widest possible number of users. All users must register and receive channel grants from the

[5] *2015 CBRS Order* at 3961 ¶ 214 (2015).

[6] In re Amendment to the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, Order on Reconsideration and Second Report and Order, 31 FCC Rcd 5011, 5032 ¶ 76 (2016) ("CBRS Reconsideration Order").

[7] *See* Comments of the Public Interest Spectrum Coalition to NTIA, *Development of a National Spectrum Strategy*, Docket No. 230308-0068, at 16 (April 17, 2023), *citing* President's Council of Advisors on Science and Technology, *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, at 11 (July 2012), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf.

certified Spectrum Access Systems (SAS) that coordinate private sector access to protect incumbent U.S. Navy and certain other incumbent systems.

As dynamic sharing and other shared spectrum approaches become increasingly necessary, CBRS is critical as a model and proving ground. Indeed, the National Spectrum Strategy is explicit that "dynamic spectrum sharing is one key to meet [the] growing demands" for spectrum access, which is driven by wireless innovation and advances in technologies such as Wi-Fi networks, LEO satellite, 5G broadband and the Internet of Things.[8] This is particularly true for sharing additional military and other federal spectrum bands where high-power and contiguous use over very large areas is not possible. Accordingly, NTIA has just begun a two-year study of bands in the lower 3 GHz and 7 – 8 GHz frequencies that, like CBRS, will continue to be essential to military operations for the indefinite future. CBRS is an evolving model for an alternative to clearing the military off bands—and is therefore critical given the reality that military systems have few places to move, making more dynamic forms of sharing essential.

As the NPRM acknowledges, the scope, diversity and value of the use cases enabled by CBRS have greatly exceeded expectations. Since the birth of CBRS, "a wide variety of new entrants—including mobile network operators, Wireless Internet Service Providers (WISPs), cable operators, utilities, private enterprise network operators, educational institutions, and others—have employed this "innovation band" to provide next generation wireless services to users across the country, including many in rural and underserved areas."[9] CBRS supports

[8] National Telecommunications and Information Administration (NTIA), National Spectrum Strategy, at 1 (rel. Nov. 13, 2023), https://www.ntia.gov/sites/default/files/publications/national_spectrum_strategy_final.pdf.

[9] *NPRM* at ¶ 1.

security cameras, building management sensors, smartphones, and barcode scanners.[10] It is improving the function of supply chains and warehousing, advancing manufacturing, increasing efficiency and yield on farms, and helping support various industries such as hospitality, sports, and entertainment venues.[11] Indeed, in less than five years, the more than 1,000 active operators and more than 400,000 access points (CBSDs) deployed in the band offer incontrovertible evidence that CBRS is fulfilling beyond expectations its goals of innovation, local spectrum access and the sort of wide ranging public benefits that the Commission highlighted in the *2015 CBRS Report & Order*.

B. GAA Users Will Suffer a Tragedy of the Commons, Undermining the Diversity of Use Cases and Inefficiently Reducing Spectrum Re-Use

PISC strongly opposes the mobile industry's proposals to authorize one or more additional classes or categories of CBSDs allowed to operate at a far higher maximum power than current limits. A substantial increase in CBSD power limits will be most disruptive, inefficient and harmful if it applies to the GAA portion of the band. Current GAA users would suffer a classic tragedy of the commons as more and more operators turn up their power levels either to expand coverage or, more likely, to preemptively defend themselves against other GAA users who have increased their power or could be expected to do so in the future. Our groups believe the Commission risks snatching defeat from the jaws of victory if CBRS becomes

[10] *See* Industry letter to Jessica Rosenworcel, Chairwoman, Federal Communications Commission, and Alan Davidson, Assistant Secretary and Administrator, National Telecommunications and Information Administration, at 2 (Nov. 17, 2022), https://airspan.com/wp-content/uploads/2022/11/Broad-Industry-Letter-on-CBRS-5G-Success.pdf ("Industry Letter 2022").

[11] *Id.*; *see also* OnGo Alliance, "Industry Success Stories: How CBRS is Driving Wireless Innovation for Enterprises and Service Providers" (April 2024), https://ongoalliance.org/wp-content/uploads/2024/04/OnGo-eBook-April-2024.pdf ("OnGo Alliance 2024").

inhospitable to the majority of GAA users and use cases, turning it into just another high-power band configured for the use of three or four big mobile carriers.

The harmful impacts of higher power limits are certain: Fewer GAA channel assignments will be available as coverage areas grow and overlap, and as aggregate interference is magnified. GAA channels will be used less efficiently as spectrum re-use diminishes. Anywhere near the U.S. coastline—where the majority of Americans live—the dynamic protection areas (DPAs) and the frequency of intermittent loss of channel availability will almost certainly increase enormously as the Navy and NTIA demand more restrictions to account for high power. Mutual interference will substantially increase among GAA users on both a co-channel and adjacent channel basis. There will be fewer GAA users as available channel assignments shrink and channel move list interruptions increase again. Many GAA users will abandon the band as conflicts and harmful interference from other users become steadily more common, or because they cannot afford to replace the CBSDs they purchased in reliance on the Commission's current rules. New entrants and innovation in the band will be deterred, particularly among less sophisticated and less deep-pocketed users seeking direct local access for private networks, including especially schools, hospitals, libraries, college campuses and other public sector uses.

These harms will be compounded by the fact that contrary to the expectations set by the original 2015 *CBRS Report & Order*, existing Spectrum Access Systems do nothing to coordinate or optimize GAA use. Because SAS administrators simply grant requested channels—and do not inform which are in use or propose which channels would avoid conflicts with other users in the vicinity—raising the power levels would only increase potentially avoidable conflicts and interference. Worse, because there is no transparency about actual channel use or deployment locations, GAA users cannot even use self-help to discern where in

the band they could operate to minimize conflicts and interference. In short, the FCC's delegation of the rulemaking process for coordination to an industry group interested primarily in PAL operations—together with a lack of CBSD reporting and transparency—has left GAA users flying blind and far more vulnerable to an increase in power.

The CBRS band is already a challenging environment to share among so many disparate users and use cases, all of which need to both coexist while avoiding any harmful interference to Navy radar and some other incumbents. Raising the maximum CBSD power level would substantially increase mutual interference among GAA users operating nearby on both the same channel and even on adjacent channels. Mutual interference between GAA and PAL users on adjacent channels would also become more common, especially if the SAS moves a PAL user above 3620 MHz. The narrow 10 megahertz channel assignments in CBRS make it even more difficult for GAA users—using a variety of technologies to deliver a variety of use cases—to mitigate interference.

While higher power will definitely reduce co-channel sharing, it can adversely impact adjacent channel users as well. Today, fixed wireless operators can be relatively close and mitigate interference through careful antenna placement. But a substantial increase in power levels is far more likely to overload and desensitize adjacent channel receivers. This issue would be exacerbated by the proposal to increase the CBRS in-band OOBE limit from −25 dBm/MHz to −13 dBm/MHz.[12] This is discussed further in the next section.

Allowing higher power would increase coverage areas and thus immediately shrink the number of channel assignments available. This would be true even if high power were restricted to the seven PAL channels at the bottom of the band, since particularly in less populated portions

[12] *See NPRM* at ¶¶ 46, 49.

of counties, WISPs and many other GAA operators currently use vacant PAL spectrum to enhance their capacity and service quality. Since PAL operators are likely to increase power even if they don't intend to increase their geographic footprint, the PAL spectrum that would remain effectively fallow (but withheld from GAA users) would increase.

The mobile industry's proposal to greatly increase power levels may enhance capacity for their very wide-area business model, but it would disrupt and diminish the expanding diversity of GAA users and use cases that represent the central purpose of CBRS's innovative three-tier, low-power and coordinated sharing framework. This threat may be most salient for the small business WISPs and other broadband providers in rural and Tribal areas that have played a leading role in bridging the digital divide in unserved and underserved communities.

According to an NTIA study, as of January 2023 more than 70% of all active CBSDs were deployed in rural census blocks, and rural deployment outpaced urban deployments by nearly two to one.[13] NTIA reported that 85% of active grants were for GAA use and that during the two years following the auction of PALs, "GAA-only CBSDs make up more than 80% of all CBSDs every quarter."[14] The NTIA report also confirmed that "the GAA tier has been a popular supplement to PALs, with approximately two-thirds of active CBSDs with a PAL grant using at least one GAA grant."[15] While the vast majority of WISPs operating in CBRS rely entirely on

[13] *See* Technical Report, *An Analysis of Aggregate CBRS SAS Data from April 2021 to January 2023*, NTIA Report 23-567, at xi (May 2023) ("NTIA Report"), available at https://its.ntia.gov/umbraco/surface/download/publication?reportNumber=TR-23-567.pdf. Urban deployments significantly increased toward the end of the study period as PAL holders accelerated their deployments.

[14] *Id.* at 9.

[15] *Id.*

GAA grants, those able to purchase PALs to ensure a minimum quality of service also use GAA to expand network capacity, which increases broadband speeds and relieves congestion.

Despite the enormous public interest benefits that WISPs leveraging CBRS bring to rural, Tribal and other less-densely-populated communities, an increase in allowed transmit power to anything close to Part 27 levels could be catastrophic. Like individual enterprise users, rural WISPs are typically not in a position to purchase multiple county-sized PALs that might insulate them from the harmful impact of the mobile industry's proposal to raise power levels. Moreover, like other local CBRS operators, WISPs are in a poor position to "rip and replace" recently purchased CBSDs and end user devices (EUDs) designed in reliance on the Commission's rules and current power levels. WISPs and private CBRS network operators are also typically not in a position to use TDD synchronization to coexist well with full power mobile base stations even if they had the information. A consequence of all of this is that if mobile carriers can operate on GAA channels—or even adjacent to GAA channels—with high-power 5G mobile base stations, local and smaller ISPs in rural and Tribal areas will both experience fewer channels available and suffer an overall degradation of service due to asymmetrical, and potentially severe, increases in noise and even direct interference.

At bottom, the posture of the three big mobile carriers concerning CBRS will inevitably undermine competition in both fixed and mobile broadband services. It is perhaps no coincidence that just as the cable industry is emerging as a fourth competitor in the mobile market—and as mobile carriers are putting their surplus spectrum to use to compete with WISPs and wireline providers for home fixed broadband customers—the mobile industry is seeking to cripple CBRS as a band that promotes not only innovation, but also competition.

Moreover, the direct local access to shared spectrum made possible by dynamic spectrum sharing of underutilized federal bands—and by CBRS in particular—is also seen as a competitive threat to the long-promised 5G mobile network slicing service that the mobile industry once claimed they would be selling to factories, ports, campuses, universities and other enterprises. Instead, most of these same business and institutional users are choosing to customize and control their own private 5G networks over CBRS (or using the very high-capacity Wi-Fi 6E and Wi-Fi 7 technology leveraging 6 GHz unlicensed spectrum).

C. High Power in CBRS Would Upend the Collaboration and Trust Established Among the Department of Defense, FCC, NTIA and Industry—and Set Back Progress in Sharing Underutilized Federal Spectrum

The explosion of commercial deployments in CBRS in just over four years—more than 1,000 operators deploying more than 400,000 active CBSDs—sometimes obscures the fact that the Commission designed the band's uniquely innovative three-tier sharing framework to overcome a fundamental challenge: The band is occupied by the U.S. Navy and sensitive radar operations vital to national security. Although NTIA identified the band in its 2010 *Fast Track Report* as a potential candidate for sharing,[16] NTIA evaluated the band assuming high-power commercial mobile use and concluded that the exclusion zones necessary to protect military operations would necessarily exclude a majority of the U.S. population, "with the largest over-land protection zone distance from the shoreline averaging approximately 450 km," as illustrated in the exclusion zone map just below, which the Commission included in its original NPRM.[17]

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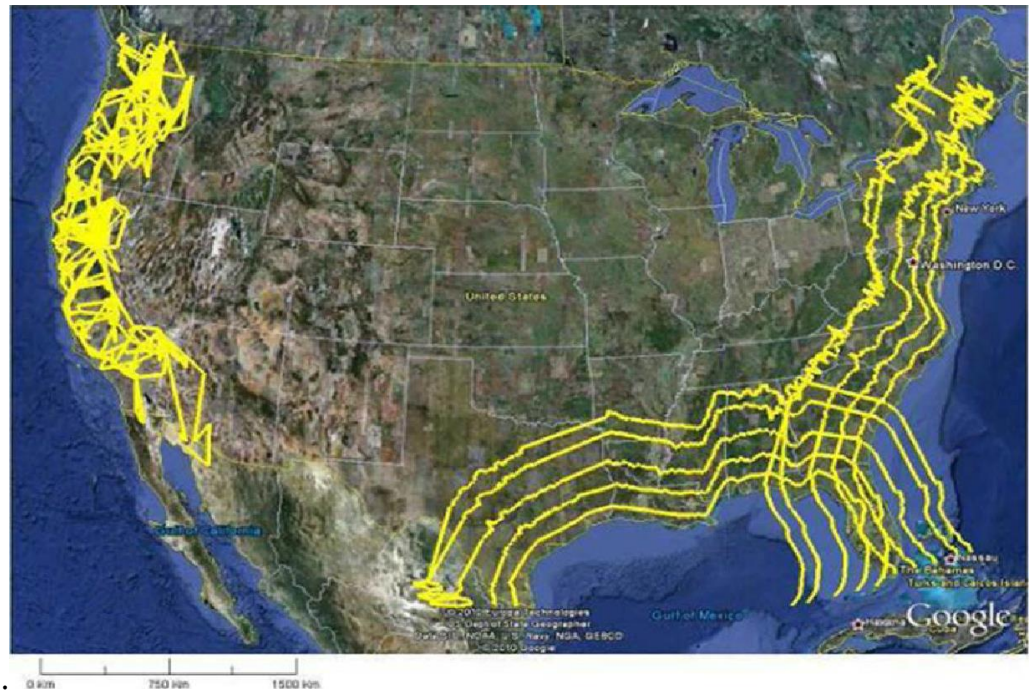
[16] *See* NTIA, An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, 4200-4220 MHz, and 4380-4400 MHz Bands (rel. October 2010) ("Fast Track Report"), *available at* http://www.ntia.doc.gov/files/ntia/publications/fasttrackevaluation_11152010.pdf.

[17] *2012 3.5 GHz NPRM* at ¶ 117, citing NTIA Fast Track Report at 5-7, Table 5-3.

Accordingly, NTIA "recommended . . . that new commercial uses of the band occur outside of large 'exclusion zones,' which we estimate to cover approximately 60 percent of the U.S. population, to protect government operations."[18]



NTIA map depicting a composite view of the exclusion zone distances for different shipborne radar systems, as set forth in the NTIA's 2010 Fast Track Report.[19]

For that reason, the original 2015 *CBRS Report & Order* adopted "small cells" (low power) and other very conservative restrictions to safeguard Naval operations.[20] The

[18] *2012 3.5 GHz NPRM* at ¶ 7, citing Fast Track Report at 1-6 – 1-7 and Appendix D.

[19] *Id*. at ¶¶ 113-117. NTIA's map is based on the electromagnetic compatibility analysis documented in the Fast Track Report for Radar to high-power wireless broadband system interaction. *See* Fast Track Report at Figure 5-3.

[20] *See, e.g.*, FCC Technological Advisory Council, "Recommendations to the Federal Communications Commission Based on Lessons Learned from CBRS," at 2 (Dec. 2022) ("a large number of conservative assumptions are built into the CBRS protection framework (propagation parameters, interference protection criteria, etc.) to the extent that optimal shared spectrum efficiency may not have yet been achieved."), available at https://www.fcc.gov/sites/default/files/recommendations_to_the_federal_communications_commission_based_on_lessons_learned_from_cbrs.pdf.

combination of lower power, automated frequency coordination, a coastal sensing system, and professional installation of CBSDs ensured that Navy radar and other incumbents could be fully protected. DoD officials have stated publicly that the rules enforced by the Spectrum Access Systems are fully protecting U.S. Navy operations. DoD official Vernita Harris called CBRS a "win-win situation" since "the U.S. military can continue to use critical radars systems while commercial users have leveraged CBRS in a variety of sectors, ranging from real estate to health care to utilities . . . enabl[ing] over 228,000 CBRS devices (as of May 2022) to operate in the band and not interfere with DoD operations."[21]

Having established this experience and trust, the federal agencies (NTIA, DOD, FCC) engaged in an unprecedented collaboration with industry stakeholders to reach an agreement to dramatically shrink the dynamic protection area (DPA) neighborhoods subject to interruption and channel loss if Navy radar is detected. NTIA announced this agreement on what it called "CBRS 2.0" in June, stating: "SAS administrators that successfully implement these changes should be able to authorize service to approximately 72 million more people (for a total of approximately 240 million) nationwide without periodic service interruptions to protect federal operations, while also providing greater spectrum access within DPA neighborhoods due to fewer and less frequent grant suspensions."[22] This was accomplished because, at current power levels, the Navy agreed that the SASs could use propagation models that account for the impact of clutter (i.e., buildings and foliage), as well as more refined considerations about typical power

[21] Vernita D. Harris, "A Spectrum Sharing Success Story: Citizens Broadband Radio Service," Electromagnetic Spectrum Enterprise Policy & Programs, Department of Defense, LinkedIn Blog (Nov. 14, 2022), available at https://www.linkedin.com/pulse/spectrum-sharing-success-story-citizens-broadband-radio-harris/.

[22] Letter from Charles Cooper, NTIA Office of Spectrum Management, to Ronald Repasi and Joel Taubenblatt, FCC (June 11, 2024), available at https://www.fcc.gov/ecfs/document/1061155768162/1.

output from CBRS devices that take into account the average activity factor rather than assuming maximum power output.[23]

Considering the extensive collaboration and effort that went into forging CBRS 2.0—changes that became operational after the FCC and NTIA approved the test reports and certification by each of the SASs—it would be particularly disruptive to radically change the rules governing the band by introducing any new category or class of high-power devices. The expanded commercial access at the center of CBRS 2.0 is premised on the current, relatively low power levels and emission limits. The Navy and NTIA would need to assume that allowing higher power on 3550 – 3650 MHz would greatly increase calculations of aggregate interference. As a result, the DPA neighborhoods would, presumably, need to be greatly expanded again, perhaps interrupting service and triggering channel moves in even larger areas and further inland than prior to the implementation of CBRS 2.0. This would diminish access for everyone else. And, as importantly, it would undermine the trust and collaboration established over the years if the FCC unilaterally seeks to impose the risk of high power levels in CBRS that DOD would certainly have opposed in the initial rules (and may again).

D. Higher Power Would Undermine Schools, Libraries, Hospitals, Rural Broadband and Other Use Cases Important to Addressing the Digital Divide

The proliferation of private networks that CBRS has enabled support connectivity and productivity for an increasingly diverse range of users, from factory complexes and high-traffic entertainment venues to airports, school districts, libraries and military bases.[24] Transportation and shipping hubs, for example, are benefiting from faster wireless communication and

[23] *See* Andrew Clegg, "CBRS 2.0: Frequently Asked Questions" (June 18, 2024), available at https://d1y8sb8igg2f8e.cloudfront.net/documents/CBRS_2.0_FAQ.pdf. The FAQ includes before and after maps showing the reductions in the DPA neighborhoods.

[24] OnGo Alliance 2024; Industry Letter 2022.

automatically-guided vehicles powered by private networks.[25] At airports, private mobile networks deployed using CBRS provide additional security for staff communications and connected devices and support operations ranging from check-in to baggage tracking to video surveillance.[26]

Notably, CBRS is becoming increasingly integrated into our basic social support structures: For example, it enhances hospital services and increases their capabilities by enabling medical staff to triage and test patients using outdoor hotspots connected to the hospital network.[27] CBRS has also been used to help schools and libraries in their efforts to address the digital divide. In the wake of the COVID-19-precipitated school shutdowns and widespread awareness that modern-day education is contingent on internet access, many school districts and communities have piloted innovative wireless networks leveraging CBRS to help close the Homework Gap by connecting students directly to a school or library network.[28]

A series of case studies conducted in 2022 by OTI and the Schools, Health and Libraries Broadband (SHLB) Coalition examined ten of these networks that were deployed in Texas, Colorado, California and other states using CBRS spectrum. In many cases, CBRS spectrum was chosen explicitly because it is the most accessible and cost-effective spectrum to connect students away from school. For example, the Fresno United School District in California constructed a private LTE network using "schools as towers" and CBRS spectrum to provide

[25] Industry Letter 2022 at 2.

[26] OnGo Alliance 2024 at 7.

[27] Industry Letter 2022 at 2.

[28] Matthew Marcus and Michael Calabrese, "Case Studies of School and Community Networks Able to Close the Homework Gap for Good," Open Technology Institute at New America (August 2022), https://newamericadotorg.s3.amazonaws.com/documents/Anchor-Nets-Case-Studies-revisedFINAL_091422.pdf.

low-income students with internet access. CBRS was selected as the best available option due to its propagation characteristics and end-user speeds, as well as the characteristics of the population to be connected (lower-density, flat topography, no access to city infrastructure).[29]

Lindsay Unified School District, a low-income farmworker community in California's Central Valley, deployed a hybrid network that relies on Wi-Fi (in town areas), CBRS (in lower-density areas), and Educational Broadband Service licenses (in rural areas) to completely close its homework gap and bring its lower-income students online.[30] With operating costs of only $17 per connected student, the district has completely closed its Homework Gap and dramatically improved educational metrics such as high school graduation rates and standardized test scores.[31] Similarly, the New York Public Library system mounted antennas on local libraries to pilot a successful CBRS-powered hotspot-lending program for low-income patrons.[32] All of these creative and innovative approaches to closing the homework gap are predicated on the same access to CBRS spectrum that was provided for, and that could reasonably have been expected to continue, in the initial regulatory framework.

CBRS is also pivotal in efforts to close the digital divide more broadly. In remote areas, Tribal lands, or those otherwise inadequately served by traditional broadband providers, Wireless Internet Service Providers (WISPs) have been building out fixed wireless (FWA) networks reliant on CBRS. The recent proliferation of fixed wireless home access has both made

[29] *Id*. at 25.

[30] *Id*. at 52.

[31] *Id*. at 57.

[32] Comments of the Schools, Health & Libraries Broadband Coalition and the Open Technology Institute at New America, *Addressing the Homework Gap Through the E-Rate Program*, WC Docket No. 21-31, at 18 (Jan. 17, 2024), https://www.newamerica.org/oti/wireless-future-project/legislativeregulatory-filings/117-fcc-comments-with-shlb-coalition-supporting-e-rate-funding-to-help-close-the-broadband-homework-gap/.

significant headway in narrowing the remaining digital divide and provided new competition to existing fixed providers, a boon to the traditionally under-competitive U.S. broadband space. With forthcoming deployment funding from the Broadband Equity, Access and Deployment (BEAD) aiming to fulfill a stated policy agenda to complete coverage across the country, the availability of more cost-effective solutions—like FWA—in very expensive-to-serve areas will increase the likelihood of program success and potentially allow more funding to be partitioned off for digital inclusion-based solutions.

Ex-post changes to the availability of CBRS spectrum caused by a sudden influx of higher-power users would set back digital equity efforts in at least two ways. First, the new landscape of spectrum availability would undermine the continued success of these innovative connectivity approaches and certainly deter additional schools, libraries, hospitals, community centers, transportation hubs and other public institutions from adopting the models blazed by CBRS pioneers over the past several years. In addition to endangering the internet access of those reliant on them, this disruption also would risk wasting the money and resources already put into building these networks, costs generally shouldered by institutions without resources to spare. And in the face of a louder spectral environment, currently low-power networks built to conform to the previous limitations would be incapable of even defending themselves in this unnecessary tragedy of the commons by incurring the additional costs of buying new higher-power technology—again, imposing unexpected costs on entities like school districts and libraries that have been tasked with finding the lowest-cost solution to close digital gaps with limited funds.

III. OUT OF BAND EMISSIONS

PISC also has concerns about the proposal to increase the CBRS in-band OOBE limit from -25 dBm/MHz to -13 dBm/MHz.[33] It seems inevitable that such an increase in-band will increase interference for CBRS operators who have deployed based on the existing technical rules. The CBRS three-tier sharing framework and technical parameters, particularly power levels and out of band emissions (OOBE) limits, were specifically selected to protect U.S. Navy operations while also making the most efficient use of this spectrum through dynamic spectrum sharing. Existing CBRS deployments were planned based on the current rules—and the interference environment created by the in-band out of band emissions limits of -25 dBm. Raising OOBE limits will by itself increase harmful interference in the CBRS band—an adverse impact to GAA users in particular that will be magnified if maximum transmit power limits are also increased. The Commission should not disrupt the careful balance of technical parameters in the rules, which are enabling growth of new services in the band without doing harm to important national security incumbent systems.

The concept of operating with relaxed OOBE limits within the CBRS band was first proposed as part of Samsung's request for a waiver to enable use of a dual-band CBRS/C-band radio.[34] A study done as part of the Commission's consideration of the waiver demonstrated that this change would result in an increase in the median noise of approximately 11 dB, resulting in a 6 percent reduction in the capacity of CBRS small cell networks and an 11 percent reduction in capacity for macrocell networks. Currently operating and future deployments would need to

[33] *See NPRM* at ¶¶ 46, 49.

[34] *See* Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on Samsung's Waiver Request to Enable Multiband Radios for the 3.5 GHz and 3.7 GHz Bands, Public Notice, DA 23-195 (Mar. 10, 2023); Samsung Electronics America, Inc. Petition for Waiver, WT Docket No. 23-93 (Aug. 23, 2022) ("Samsung Petition").

increase their deployment costs to overcome the reduced capacity, imposing unexpected costs on operators who planned and deployed their CBRS networks based on the existing technical rules.[35] The disruption and harm to band users from this change would, of course, be further exacerbated by any increase in the maximum power levels allowed in the band, as discussed in the preceding section above.

IV. CBSD INFORMATION AND REPORTING

The *NPRM* requests comment on "whether to make changes to the Commission's rules governing the breadth and scope of CBSD information provided to SASs and CBSD information availability."[36] Our groups strongly believe that both the SAS administrators and CBRS operators would greatly benefit from additional information, some of which is already at hand, and some of which should be relatively easy to collect. The utility and efficiency of the band for GAA users could be increased enormously by allowing the Spectrum Access Systems to collect, use and share with operators—and regulators—three types of information that are currently either obscured or not provided. Accordingly, we propose three improvements in transparency and CBSD reporting requirements that our groups believe will greatly enhance GAA coexistence, service quality and overall CBRS spectrum efficiency.

First, with respect to SAS transparency, we believe network planning and coexistence among GAA users can be enhanced by allowing operators to know where nearby CBSDs are located, their technical characteristic, and what frequencies they have been granted to use (and, ideally, what channels they actually are using). The SASs have this information and yet, unlike

[35] *See* NCTA, "Simulations on Multi-Band BS Waiver Impacts to CBRS," at 31 (February 2024), attached to Letter from Traci Biswese, Vice President & Associate General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 23-93 (Mar. 6, 2024).

[36] *NPRM* at ¶ 39.

the Universal Licensing System, this information is not transparent to users.[37] The original 2015 rules permitted the sharing of this information, with the questionable caveat that the names of the registered operators be withheld. The Commission's 2018 order modified the disclosure rules to provide that SAS entries can no longer be queried. The SAS can only provide heat maps that are at best a crude representation of the interference environment and do not facilitate network planning or operator coordination.

Our groups propose that the Commission revert to the 2015 rules and allow CBRS operators to query a SAS with respect to a census of CBSD grants and locations in a particular geographic area. In addition, SAS administrators should be authorized to share the contact information of any willing GAA user upon request. For example, both a school district and a nearby factory complex may be perfectly willing to cooperate in coordinating their siting, height, antenna pointing and power levels for mutual benefit. The fact that the Commission is blocking coordination and coexistence among GAA users in CBRS is particularly unjustifiable when this same type of information about deployments in most fixed wireless, fixed satellite and many other bands is publicly available to anyone in the world through the Universal Licensing System. In fact, prior to CBRS, this information was available for deployments in the former 3650 – 3700 MHz lightly-licensed band. Not only were base stations locations, technical parameters and licensees listed in ULS, the rules actually required operators to engage in good faith coordination.

[37] *See Id*. at ¶ 38, n. 112: "CBSD registrations must include detailed information specifying the location and technical characteristics of the CBSD. CBSDs are also required to send an update to the SAS within 60 seconds of any change in its registration information," citing 47 CFR § 96.39(c); see also id. § 96.43(b) (Category A CBSDs must indicate if operations are indoors or outdoors); Id. § 96.45(d) (Category B CBSDs must report "antenna gain, beamwidth, azimuth, downtilt angle, and antenna height above ground level.").

Even if this is a value-added service, for which operators pay an extra fee to a SAS, it would pay large dividends by enabling users operating on GAA spectrum (including PAL holders, since they also leverage GAA) to select locations and channels that minimize potential interference with other users. It is bad enough that the Commission has not required SASs to pro-actively coordinate and optimize the utility of the GAA portion of CBRS. At a minimum, the Commission should give operators the information they need to self-coordinate.

Second, the SAS administrators should be allowed (and possibly required) to disclose the boundaries of PAL Protection Areas in order to facilitate GAA-PAL coexistence. The Commission should facilitate and not obfuscate the precise location of available GAA spectrum. Just like the location and technical parameters of CBSDs discussed just above, GAA users should be able to query their SAS to find out what additional channels are not in use and available for an assignment at a location. This "use-it-or-share-it" innovation in the CBRS rules fully protects PAL operations, but it will not serve the public interest fully unless GAA users (and potentially channel-adjacent or geographically-adjacent PAL users) have the information to request the frequencies and geographies that optimize their service.

Finally, the *NPRM* asks if "different information or a broader set of information about the Citizens Broadband Radio Service radiofrequency environment support improvements in the 3.5 GHz band?"[38] Our groups suggest that CBSDs should be required to report their actual channel use back to the SAS, as well as possibly other readily collected data about the interference environment. Currently SAS administrators give channel *assignments*, but they don't know what channels are actually in use. This is a problem for GAA coexistence. Because SAS administrators have neither the authority nor the information to coordinate coexistence—and

[38] *NPRM* at ¶ 39.

because GAA grants are not exclusive if there is a conflict—band use is not optimized. Two GAA operators can, unwittingly, request the same channels between 3650 and 3700 MHz, for example, not knowing which channels another operator is already using or not using. Like greater transparency for CBSD location and technical information suggested above, we believe that this "additional real world data about Citizens Broadband Radio Service operations would enable the SAS administrators to more effectively manage spectrum access within the band."[39]

In addition, both actual channel use and interference environment data could be extremely useful to the Commission and NTIA for the purpose of studying and measuring the reality of aggregate interference in various geographies and over time. NTIA and DoD agreed to the dramatic improvements in CBRS 2.0 because they could measure and test the implications of allowing SAS administrators to employ clutter models in calculating aggregate interference, which is the primary metric relied upon to protect U.S. Navy radars. Similarly, it could greatly help NTIA and DoD get to improvements we may dub "CBRS 3.0" if they had larger collections of more specific data on actual use of the band in different geographies and by different types of users. At a minimum, we believe this data on the interference environment should be collected and made available to federal agencies and trusted researchers. This can be done without disclosing the specific identity of particular CBRS operators.

V. CONCLUSION

CBRS has been the source of a groundswell of innovative new use cases and diverse users due to its unique regulatory and technical rules. It represents a success story that directly aligns with the Commission's original intent in designing the band's novel sharing framework.

[39] *Id.*

For this reason, our groups strongly oppose any substantial increase in the maximum allowable power levels. That is virtually certain to undermine the actual purpose of CBRS—diverse local, low-power uses—by severely impacting the spectrum's availability and use, especially by GAA users such as schools, libraries, hospitals and other public purposes. It will similarly risk the disruption or even loss of the enormous public interest benefits that WISPs leveraging CBRS bring to rural, Tribal and other less-densely-populated communities.

The success of our wireless future is increasingly contingent on both increased diversity in spectrum access and new dynamic, intensive frameworks for sharing underutilized bands. Raising power levels in CBRS now will hamstring innovative uses, deter future ones, and breach the fragile trust that has been built between the Commission and U.S. military users of the band at exactly the moment we need it most. For these reasons, PISC urges the Commission to prioritize preserving the band as an evolving bastion of innovation in spectrum sharing.

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