



*Hearing on*  
**“The State of U.S. Spectrum Policy”**

*Before the*  
**United States Senate**  
**Committee on Commerce, Science and Transportation**  
**Subcommittee on Communications, Technology, Innovation and**  
**the Internet**

*Testimony of*  
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## **Introduction**

Good morning Chairmen Wicker and Thune, Ranking Members Cantwell and Schatz, and members of the Subcommittee. My name is Michael Calabrese. I direct the Wireless Future Project at New America’s Open Technology Institute (OTI), a nonprofit policy institute based here in Washington, D.C. I have also served since 2009 on the Department of Commerce Spectrum Management Advisory Committee (CSMAC). My organization develops and advocates for policies to promote universal, faster and more affordable wireless broadband connectivity, broadband competition, and more efficient spectrum use with a focus on expanding unlicensed access and dynamic spectrum sharing. OTI is also a member of the broad-based Public Interest Spectrum Coalition (PISC) that includes national consumer, civil rights, education, rural broadband and social justice organizations.

The Subcommittee’s focus on spectrum management comes at a critical time. The pandemic has highlighted how vital it is for every household to have an affordable fixed broadband connection, as well as the higher-capacity Wi-Fi needed to distribute that connectivity to the workers, students and others sharing those connections. At the same time, the nation is beginning a transition to 5G mobile networks and a broader, complementary 5G wireless ecosystem that will include millions of high-capacity and customized networks deployed by individual business firms and households to meet their particular needs at a lower cost.

As the world goes wireless, the demand for wireless connectivity and spectrum continues to increase rapidly. Cisco’s annual report on internet usage projects that mobile data traffic in North America will continue to grow at a compound annual growth rate exceeding 36% through 2022.<sup>1</sup> Wi-Fi data consumption on mobile devices is growing at an even faster 45% annual rate.<sup>2</sup> The demand for spectrum capacity will grow further as the Internet of Things (IoT) emerges and machine-to-machine (M2M) data transfers require more and more capacity. Cisco estimates that as M2M applications develop and grow—through operations including “smart meters, video

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<sup>1</sup> Cisco also projects a global annual compound growth rate of 46%. “Cisco Visual Networking Index (VNI): Global and Americas/EMEAR Mobile Data Traffic Forecast, 2017–2022,” Cisco Knowledge Network Session, at 9 (March 2019). Available: [https://www.cisco.com/c/dam/m/en\\_us/network-intelligence/service-provider/digital-transformation/knowledge-network-webinars/pdfs/190320-mobility-ckn.pdf](https://www.cisco.com/c/dam/m/en_us/network-intelligence/service-provider/digital-transformation/knowledge-network-webinars/pdfs/190320-mobility-ckn.pdf).

<sup>2</sup> *Id.* at 104.

surveillance, healthcare monitoring, transportation, and package or asset tracking.”<sup>3</sup> By 2023, M2M connections are expected to represent 50% of all devices and connections.

This surging demand and several contentious FCC proceedings to allocate more spectrum for 5G has created an impression that spectrum is scarce. It is true that the low- and mid-band spectrum most valuable for wide-area mobile services has become more and more difficult to clear and repurpose for exclusive licensing, as we saw recently with the protracted debate over clearing and auctioning unused C-band spectrum. However, contrary to assumptions of scarcity, smart and forward-looking spectrum policy can unlock an abundance of wireless bandwidth in a larger number of underutilized bands through dynamic spectrum sharing.

The President’s Council of Advisors on Science and Technology (PCAST) forecast this new reality in 2012, concluding that a new paradigm can “unlock the data-carrying capacity of spectrum in an unprecedented way.”<sup>4</sup> The PCAST report concluded: “The essential element of this new Federal spectrum architecture is that the norm for spectrum use should be sharing, not exclusivity.”<sup>5</sup> This “new normal,” as the PCAST report saw it, is a reason the FCC, NTIA and federal users need to collaborate more than ever to unlock unused spectrum capacity in more frequency bands. Their close cooperation is needed to support the nation’s progress in deploying mobile 5G services, high-capacity fixed wireless connections, and next generation Wi-Fi 6 networks that all together will consume exponentially more data over the years ahead.

### **The FCC’s World-Leading Innovation in Spectrum Sharing**

In recent years the FCC has made enormous progress in unleashing underutilized spectrum in occupied bands for both licensed and unlicensed use. Both federal and commercial bands have been opened for more intensive shared use through policy innovations that have put the U.S. on a path to the world’s most robust 5G wireless ecosystem. A leading example is the new Citizens Broadband Radio Service, which began commercial operations earlier this year.

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<sup>3</sup> Cisco Annual Internet Report (2018–2023), Cisco Systems Inc. (March 2020). Available: <https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.pdf>.

<sup>4</sup> *Report to the President Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, President’s Council of Advisors on Science and Technology (July 2012), at 11. Available: [https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast\\_spectrum\\_report\\_final\\_july\\_20\\_2012.pdf](https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf).

<sup>5</sup> *Id.* at vi.

CBRS is doubly innovative as a framework that can be tailored to additional occupied but underutilized bands to unlock low-cost capacity. CBRS authorizes both licensed and opportunistic (lightly-licensed) access to unused spectrum in the 3550-3700 MHz band long used for U.S. Navy radar systems. The CBRS rules authorize the certification of multiple frequency coordination systems – called Spectrum Access Systems (SAS) – to govern a dynamic framework for spectrum sharing among a three-tier hierarchy of users: incumbent licensees (primarily U.S. Navy radar), Priority Access Licenses (PALs), and opportunistic (effectively unlicensed) General Authorized Access (GAA) users. Multiple, competing SASs are responsible for ensuring incumbent services are fully protected from harmful interference and that PAL operators are protected from each other and from GAA users.

In addition, the rules for CBRS include a use-it-or-share-it provision that authorize any operator to coordinate access to unused PAL spectrum on an opportunistic basis – both now and indefinitely following the PAL auctions that began today. The automated frequency coordinator (SAS) ensures that opportunistic GAA use of unused PAL spectrum in a local area will not interfere with the priority access licensee. The SAS database thereby facilitates – on an automated basis at low cost – intensive spectrum sharing that both protects U.S. Navy systems and ensures that all the spectrum in the 3.5 GHz band is available for use. In short, spectrum not actually being used by the U.S. Navy or by the post-auction PAL licensee is available to enhance the capacity of other operators on an opportunistic, use-it-or-share-it basis. One sign of the band's success is that tens of thousands of CBRS base stations have been deployed since the band opened up just a few months ago, pre-auction and despite the pandemic.

Another world-leading example of the FCC's innovative leadership in spectrum policy is the Commission's unanimous vote in April to authorize unlicensed use of unused spectrum capacity across the entire 6 GHz band – a total of 1,200 megahertz that begins just above the portion of the 5 GHz band most used today for Wi-Fi, but which is increasingly congested. Chairman Pai and his colleagues deserve enormous credit for recognizing that with access to the 6 GHz band, next generation Wi-Fi 6 can almost immediately support 5G-quality applications and services in any home, business, school or library that has access to a high-capacity fixed broadband connection. With access to the 6 GHz band, Wi-Fi 6 will accelerate mobile 5G services both by providing complementary offload capacity indoors and by facilitating early adoption of 5G-quality applications, such as augmented and virtual reality.

Indoor-only use is authorized across all 1,200 megahertz at a low power level that the FCC's Office of Engineering and Technology determined will not cause harmful interference to band incumbents. This decision will both secure U.S. dominance in Wi-Fi and fuel innovation in augmented reality and other applications. While Europe is far along in authorizing the lower portion of the band for indoor-only use, the FCC's experience with spectrum sharing coordinated by geolocation databases led it to "go big" and authorize standard-power operations outdoors in 850 megahertz of the band where incumbent point-to-point links can be protected by an Automated Frequency Coordination (AFC) system. This will prove hugely beneficial to rural, tribal, small town, and other less-densely populated areas that may not see true 5G mobile carrier services for many years.

OTI believes that a general authorization for opportunistic access on a use-it-or-share-it basis should be a central piece of any effort aimed at expanding spectrum access for small and non-traditional ISPs in rural, tribal and other underserved areas, as well as for enterprise and institutional use. A version of the CBRS framework should be tailored to promote more efficient and intensive use of both federal and commercially licensed bands with substantial unused capacity. Opportunistic access policed by an automated AFC database could empower a wide variety of small and alternative providers to use fallow spectrum in local areas to provide high-speed broadband and other services, while retaining the licensee's right to exclusive use of that spectrum whenever the carrier commences service. Unleashing opportunistic, shared access to fallow spectrum creates a general incentive for licensees to build out services more quickly, or to make greater efforts to partition or lease their spectrum. This will reduce spectrum warehousing and increase access to operators ready to deploy, but who lack spectrum access in a local area.

### **Reforming the Governance of Spectrum**

Not surprisingly, the FCC's efforts to open underutilized bands for sharing and to reallocate bands to facilitate emerging services, particularly mobile 5G, has met with stiff resistance from incumbent users. Whether incumbents are commercial licensees or federal agencies, they inevitably resist on the grounds that authorizing new or more efficient use of a band will create an unacceptable risk of harmful interference. Because every valuable band of frequencies is occupied by some set of incumbents, the FCC now faces the obstacle of rampant NIMBYism in virtually every proceeding aimed at opening the spectrum capacity needed to

facilitate new technologies and services. On the commercial side, we see this in the 6 GHz band, where incumbent licensees are mounting or threatening litigation. And we see it on the federal side as agencies oppose FCC proposals and even seek to overturn or undermine final orders through legislation.

These spectrum “turf wars” and tensions are particularly discouraging on the federal side for two key reasons:

First, and most importantly, the FCC is the expert agency in the best position to evaluate competing technical studies related to the risk of truly harmful interference. The FCC has accumulated unparalleled engineering expertise in wireless technologies. All decisions follow not only public notice and comment, but also a separate consultation process with NTIA and any impacted federal agency. It’s also crucial that the FCC determine and follow consistent definitions and standards concerning what is or isn’t an unacceptable risk of harmful interference. In my experience, which covers nearly two decades of spectrum proceedings, the FCC and its Office of Engineering and Technology are objective, thorough and, if anything, decidedly on the conservative side when it comes to minimizing the risk of interference or disruption to incumbents, particularly federal users. Deference to the FCC as the expert agency should be beyond dispute concerning non-federal bands in particular, since Congress gave the FCC exclusive jurisdiction over commercial spectrum decisions.

Second, the number and intensity of recent disputes between federal agencies and the FCC suggest a lack of effective consultation and coordination. I’m not in a position to know where the process is breaking down, although it seems likely that the combination of a very activist FCC and the lack of a coherent federal spectrum policy mediated by White House oversight has proven to be a toxic combination. As I explain further below, because the NTIA is primarily an advocate for federal spectrum users, and the FCC is focused primarily on promoting private industry and the economy, in our split system of spectrum governance it is imperative that White House officials play a guiding and mediating role in defining the balance that best serves the broader national interest.

Spectrum “turf wars” and conflicts between the FCC and incumbent users of spectrum, both private licensees and federal users, are likely to worsen as sharing or consolidating long-occupied bands becomes the “new normal.” On the federal side, this has created a recognition that our split system for spectrum allocation will require reform. Last fall NTIA asked the

CSMAC, on which I've served since 2009, to study whether a new approach or structure for spectrum governance would better optimize U.S. spectrum management “for the implementation of a 21<sup>st</sup> century national spectrum strategy.” After discussions that involved most members, the Working Group reported at CSMAC’s January public meeting that:

There is general agreement among [CSMAC] members that the United States’ current approach for managing the use of spectrum is no longer effectively serving the needs of the entire stakeholder community and would benefit from reform. Moreover, with the increased use of spectrum by all stakeholders, we agree that issues around allocations, spectrum-sharing and band adjacencies will need to be handled with both speed and skill to ensure that the US is making the most of its critical national resources.

The divided responsibility for spectrum governance might ultimately be an issue only this Committee can resolve, since the origins are statutory. Long before the FCC’s creation, the Radio Act of 1912 provided that certain frequencies belong exclusively to the government as a matter of national security. A decade later, the Inter-Departmental Radio Advisory Committee (IRAC) was established as a coordinating body for federal departments and agencies with an interest in radio communications. The Radio Act of 1927, followed by the Communications Act of 1934, formalized the dual structure, giving the FCC exclusive authority to license non-governmental spectrum, but exempting radio operations owned by the federal government.<sup>6</sup>

At its April public meeting, the CSMAC Working Group previewed a range of options for alternative spectrum governance models. One general option is to integrate all authority over spectrum allocation into one existing agency or the other, creating a “new” FCC or a “new” NTIA. Another general option is to create a new independent agency to assume this role, either as a “full service spectrum agency” that assumes all spectrum-related functions, or possibly as a more limited “spectrum resource agency” that assumes responsibility for all “top-level spectrum governance and policy decisions” while leaving implementation to the FCC and NTIA. A final category described more incremental changes, including, most notably, updating and enhancing

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<sup>6</sup> Communications Act of 1934, 47 U.S.C. § 151. See GAO, *Information on Management and Use of the Radio Frequency Spectrum – A Little-Understood Resource*, B-159895 (1974).

the current Memorandum of Understanding (MOU) between NTIA and the FCC, signed in 2003, to expedite and strengthen coordination and decision-making.<sup>7</sup>

The CSMAC's work on this topic is ongoing. A more detailed report on these alternatives will be discussed at the July 30 public meeting, so I will not venture an opinion now. However, I do believe a few changes can and should be made that do not require legislation:

First, the White House needs to drive and finalize a National Spectrum Strategy that outlines a coherent set of priorities and strategies that can help shape a consensus among the FCC, NTIA, and federal users represented on the IRAC. As President Trump set forth in his 2017 Presidential Memorandum, "the Nation requires a balanced, forward-looking, flexible, and sustainable approach to spectrum management."<sup>8</sup> Building on the PCAST recommendations, President Obama set his administration on a new path that favored unlocking exclusive but underutilized federal bands, such as the 3.5 GHz band where CBRS now operates, but the current path and plan are not clearly in sight.

Second, the current MOU that governs coordination on spectrum matters between the NTIA and FCC should be updated and enhanced. As the CSMAC Working Group reported at its April public meeting, the 15-day coordination period for routine items leaves gaps and potential discord on non-routine items. The group suggested that for "non-routine FCC items, [the MOU should] create an agreed escalation process and include specific time frames for resolution." The two agencies should strive to agree on a common set of metrics and methodologies to determine when a band is underutilized and, critically, to predict potentially harmful interference. A joint test bed and annual joint workshop could "explore novel spectrum sharing, management techniques, and approaches." The MOU should also provide for an annual report to Congress that describes the agencies' "joint spectrum planning activities, future spectrum requirements, spectrum allocation actions necessary to accommodate those uses," including any significant areas of disagreement.

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<sup>7</sup> "Memorandum of Understanding between the Federal Communications Commission and the National Telecommunications and Information Administration." Available: <https://docs.fcc.gov/public/attachments/DOC-230835A2.pdf>.

<sup>8</sup> White House, "Presidential Memorandum on Developing a Sustainable Spectrum Strategy for America's Future," 25 October 2018. Available: <https://www.whitehouse.gov/presidential-actions/presidential-memorandum-developing-sustainable-spectrum-strategy-americas-future/>.



Third, the coordination and consultation process itself needs to be more transparent to stakeholders. It is typically not clear outside the FCC and NTIA to what degree there are concerns about a proposed policy or what technical information is being exchanged. As part of this, the MOU should require that federal agencies – or NTIA on their behalf – monitor and file comments and technical studies in the FCC’s notice and comment docket in a timely manner (in redacted form, if necessary). Too often federal agency concerns come to light at the 11<sup>th</sup> hour, after the FCC and the private sector have finished building a public record. While these early filings should not replace the requirement for consultation with NTIA after the FCC evaluates the record and reaches a tentative conclusion, it does ensure that agencies, industry and other stakeholders are not blindsided by last-minute objections never fully or publicly documented.

Fourth, and most importantly, the Executive Office of the President needs to engage directly in guiding and mediating disputes that arise when the FCC and NTIA cannot reach a consensus. As noted above, while both the FCC and NTIA are to a significant degree ‘captured’ by their role as advocates for the private sector and federal spectrum users, respectively, the right combination of officials in the White House should be in the best position to discern the overall national interest. The “Spectrum Management Team” recommended in the PCAST Report is an example.<sup>9</sup> Only the EOP has the clout to enforce a government-wide strategic direction and to push back against individual departments or agencies that diverge. A deeper engagement in spectrum policy by at least OSTP and NEC can also assist the FCC at critical times when it faces opposition to proposals for spectrum sharing (e.g., 6 GHz) or consolidation and clearing (e.g., C-band) from powerful incumbent licensees in commercial bands.

### **Next Generation Wi-Fi: Accelerating Affordable 5G Services for All Americans**

The 5.9 and 6 GHz proceedings pending at the FCC exemplify both the promise and peril of the current imperative to share or reallocate spectrum to advance America’s 5G future. Unlicensed spectrum is what ultimately makes both mobile and fixed broadband service more available, fast and affordable to consumers and businesses nationwide. Far more unlicensed

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<sup>9</sup> The *PCAST Report* made a specific recommendation along these lines. *See PCAST Report* at ix (“Specifically, we recommend that that the White House Chief Technology Officer (CTO), with equivalent level representatives from the National Security Staff (NSS), the Office of Management and Budget (OMB), and National Economic Council (NEC) formalize a Spectrum Management Team (SMT) to work with the NTIA to carry out the President’s directive.”).

spectrum is needed to distribute a gigabit or more of bandwidth to all the users and devices in our nation’s homes, offices, schools and other venues. But because every band of very useful spectrum is occupied by one or more incumbent uses, adding even a very low power “underlay” of unlicensed use on vacant portions of underutilized bands – such as the 6 GHz band – entails overcoming the inevitable opposition of incumbent users and their NIMBY claims of imminent disruption. Our public interest coalition believes that Chairman Pai and his colleagues displayed both remarkable vision and care in crafting balanced and innovative proposals for 5.9 and 6 GHz that will ultimately fuel not only the world’s most robust 5G wireless ecosystem, but one that is more available and affordable in rural, small town and low-income areas across the entire nation.

Wi-Fi is the workhorse of the Internet because low-cost, off-the-shelf routers and devices easily and affordably offer access to unlicensed spectrum that provides high-capacity connectivity in homes, at work, at school, in libraries, restaurants, retailers, and virtually every public place. The vast majority of data consumed on smartphones and other mobile devices flows over Wi-Fi networks, never touching mobile carrier spectrum or infrastructure. The share of data traffic offloaded via Wi-Fi is expected to increase sharply as mobile technology upgrades from 4G to 5G, since high-bandwidth applications are typically used at home, work and other indoor locations. Cisco projects that 76% of all data traffic on smartphone and other mobile devices will be offloaded onto Wi-Fi in North America by 2022.<sup>10</sup> The U.S. alone will have an estimated 77 million Wi-Fi hotspots by then.<sup>11</sup> Providers acknowledge Wi-Fi’s central role. For example, Verizon’s Executive VP and Consumer Group CEO told an investor conference in January that between 70% and 75% of mobile device data traffic is offloaded onto Wi-Fi.<sup>12</sup>

### ***6 GHz Band: Unlicensed Sharing Across 1200 MHz Will Benefit All Americans***

Unlicensed Access 1200 contiguous megahertz at 6 GHz – from 5925 to 7125 MHz – is the fuel necessary to power gigabit-fast and affordable Wi-Fi 6 and other unlicensed innovations of greatest benefit to consumers and the overall economy. Consumer and digital inclusion advocates strongly supported the FCC’s decision to authorize low-power and indoor-only use of

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<sup>10</sup> *Cisco 2019 VNI Report* at 104.

<sup>11</sup> *Id.* at 111.

<sup>12</sup> Verizon, Citi 2020 Global TMT West Conference, Webcast (Jan. 7, 2020). Available: <https://www.verizon.com/about/investors/citi-2020-global-tmt-west-conference>.

unlicensed devices across all four band segments (a total of 1200 megahertz). We likewise supported the FCC's proposal to allow outdoor unlicensed operations at a higher ("standard") power in two band segments that total 850 megahertz subject to registration and recurring authorization by an Automated Frequency Coordination (AFC) system.

While consumer and digital inclusion advocates celebrated the FCC's April Order, the still-pending Further Notice of Proposed Rulemaking addresses two critical shortcomings that threaten to diminish the value of Wi-Fi 6 for the vast majority of Americans at home and at work.

First, the enormous consumer benefits of authorizing low-power, indoor-only ("LPI") devices across the entire 6 GHz band will be undermined if the power levels are restricted to a level below what's needed to protect high-power fixed links outdoors. The maximum power adopted in April (5 dBm/MHz power spectral density) might be justified as a "compromise" with powerful incumbents, but in practice it makes Wi-Fi routers far more costly, complex, and less useful for the average household or small business. In the context of the current pandemic, because Wi-Fi 6 routers and devices can come to market as soon as the end of this year, OTI believes it is critical that consumers and businesses have the indoor coverage they need to function reliably and affordably. The Commission should not pull the technical rug out from under ordinary consumers, schools, and small businesses unless the engineering evidence in the record clearly establishes that LPI at up to 8 dBm/MHz PSD will measurably and substantially increase the risk of harmful interference to incumbent users. As the Commission acknowledged in its April Order, reliable engineering studies in the record show that this modest power increase is extremely unlikely to cause actual harmful interference to any band incumbents.

Second, to its credit the FCC recognizes in the FNPRM that Wi-Fi 6 and other unlicensed technologies will not deliver the potential benefits of new applications, such as augmented and virtual reality, without authorizing an additional class of Very Low Power (VLP) devices. OTI and PISC strongly support the Commission's proposal to authorize VLP devices to operate both indoors and outdoors across the band's entire 1200 megahertz unburdened by any requirement to be under the control of an Automated Frequency Control ("AFC") system. It is crucial that the Commission authorize VLP devices to operate at power levels up to 14 dBm EIRP, which is the minimum power level needed to achieve the enormous potential consumer and economic benefits of VLP, while also fully protecting band incumbents from harmful interference.

## ***The Vacant 5.9 GHz Band is a Roadblock to a Potential Wi-Fi Superhighway***

OTI strongly supports the Commission’s pending proposal to reallocate *at least* 45 megahertz of the virtually unused 5.9 GHz band for unlicensed use. The 5.9 GHz band lies directly between the upper portion of the 5 GHz band, currently the most heavily-used Wi-Fi spectrum, and the 6 GHz band that will soon become the go-to band for next generation Wi-Fi 6. As Commissioner Mike O’Rielly so aptly put it, the 5.9 GHz band is “the missing link between the 5 GHz and 6 GHz bands.” Reallocating the 5.9 GHz band for unlicensed use would create an immensely productive Wi-Fi Superhighway, enabling contiguous channels of multi-gigabit-fast connectivity in every home and business. Contiguous wide channels of unlicensed spectrum with mid-band propagation is essential for accelerating the next-generation of 5G-capable Wi-Fi services nationwide, including for fixed wireless broadband in rural areas.

Back in 1999, the FCC allocated this 75 megahertz (5850 to 5925 MHz) for auto safety signaling using a specific technology called Dedicated Short-Range Communications (“DSRC”). For two decades the band has gone almost completely unused, making the 5.9 GHz band a telling experiment in market forces and innovation. Wi-Fi also emerged in 1999. Over that time, unlicensed innovation and Wi-Fi use has surged, saturating both the 2.4 GHz band and two segments of the 5 GHz band with intensive spectrum re-use that generates hundreds of billions of dollars annually in consumer surplus.<sup>13</sup> The ‘car band,’ meanwhile, sits idling and empty. The band is so empty that the FCC recently authorized more than 100 rural wireless internet providers (WISPs) to use it to enhance the capacity of fixed wireless networks in rural areas.

Currently the auto and mobile industries are developing Cellular V2X as an alternative to DSRC. Since C-V2X is in its infancy and is likely to thrive, if at all, as an application on general purpose mobile 5G networks, OTI believes it would be a “win-win” for consumers to relocate V2X safety signaling. We believe Congress should urge the FCC and DOT to work together to explore all alternatives, including whether an alternative band, such as the nearly vacant 4.9 GHz public safety band, could be equally or *more* useful for vehicle safety applications that are integrated with 5G mobile networks. We recently released a paper making the case for relocating at least the future Cellular V2X safety applications to 4.9 GHz, or to another dedicated band that

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<sup>13</sup> See Diana Gehlhaus Carew, et al., “The Potential Economic Value of Unlicensed Spectrum in the 5.9 GHz Frequency Band,” RAND Corporation (2018). Available: <https://www.rand.org/news/press/2018/11/29.html>.

is not wedged between what will be the two most intensively used Wi-Fi bands.<sup>14</sup> The Dynamic Spectrum Alliance, a high-tech industry coalition, recently made a similar proposal.<sup>15</sup> Consumers will benefit most if the allocations for both auto safety and next generation Wi-Fi are optimized.

### **The Lower 3 GHz band: Expedite Shared Access to Unused Military Radar Spectrum**

As requested by Congress, earlier this month NTIA released a report on the military radar bands at 3100-3550 MHz that “focuses on creating opportunities for commercial use by sharing rather than by clearing the spectrum” and “under the assumption of no changes in incumbent operations.” The report concludes that “the 3450-3550 MHz portion of this band is a good candidate for potential spectrum sharing” and that “ultimately some sharing of spectrum below 3450 MHz may be possible as well.”<sup>16</sup>

OTI encourages this Committee to examine whether the 3 GHz spectrum immediately below the CBRS band – and currently used extensively for Department of Defense radar systems – could, like the 3550-3650 MHz band, be opened for dynamic sharing under the control of a Spectrum Access System (SAS) and as an expansion of CBRS. Like the grossly underutilized 3.5 GHz band, there is every indication that the 3300-3550 MHz band can be successfully shared with military radar systems that currently occupy the band.

The NTIA’s separate technical report on the 3450-3550 MHz sub-band found that a dynamic, time-based sharing mechanism “present[s] a potentially attractive approach to both protecting federal systems and providing viable commercial operations.”<sup>17</sup> Such a dynamic sharing arrangement could be enabled by having federal incumbents dynamically inform a SAS when and where they are operating rather than having Spectrum Access Systems rely on spectrum sensing systems, which can be problematic for a number of reasons. Conversely, NTIA’s technical report concluded that the static geographic- and/or frequency-based approaches

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<sup>14</sup> Michael Calabrese and Amir Nasr, “The 5.9 GHz Band: Removing the Roadblock to Gigabit Wi-Fi,” Open Technology Institute at New America (July 2020). Available: [https://d1y8sb8igg2f8e.cloudfront.net/documents/The\\_5.9\\_GHz\\_Band\\_.pdf](https://d1y8sb8igg2f8e.cloudfront.net/documents/The_5.9_GHz_Band_.pdf).

<sup>15</sup> Ex Parte Filing of the Dynamic Spectrum Alliance, Amendment of Part 90 of the Commission’s Rules, WP Docket No. 07-100, ET Docket No. 19-138 (June 11, 2020).

<sup>16</sup> U.S. Department of Commerce, *Feasibility of Commercial Wireless Services Sharing with Federal Operations in the 3100-3550 MHz Band*, at 1 (July 2020).

<sup>17</sup> Edward Drocella, Robert Sole, Nickolas LaSorte, *Technical Feasibility of Sharing Federal Spectrum with Future Commercial Operations in the 3450-3550 MHz Band*, NTIA Technical Report 20-546, at ix (rel. Jan. 2020).

more conducive to exclusive, very wide-area licensing is problematic. Such a static sharing approach would “result in significant restrictions on commercial services, in terms of emitter power limits and exclusion zones, making sufficient access for viable commercial applications unlikely.”<sup>18</sup>

The 2012 PCAST report concluded that often the “clearing and reallocation of Federal spectrum is not a sustainable basis for spectrum policy due to the high cost, lengthy time to implement, and disruption to the Federal mission.” DoD’s Defense Innovation Board (DIB) report last year similarly concluded that within a reasonable time frame, dynamic sharing would be far more feasible and acceptable from the military’s perspective.<sup>19</sup> OTI fully agrees with the DIB. The report’s co-authors wrote separately that clearing DoD spectrum for exclusive-use licensing is “impractical” given the need to find and clear substitute bands for military radar.<sup>20</sup> Even if possible, the delay would be self-defeating if the goal is to win a global race to 5G. OTI agrees that shared access can open the 3450-3550 MHz band for 5G-quality networks years sooner by leveraging the coordination capabilities of FCC-certified SAS databases.

### **The 12 GHz Band can Provide Shared Spectrum for 5G and Rural Broadband**

The 12 GHz Band provides an opportunity to adopt a sharing framework that greatly expands the availability of spectrum for both fixed and mobile broadband deployments with mid-band propagation characteristics significantly better than the millimeter wave bands at 24 GHz and beyond. By adding the 12 GHz Band to the Commission’s 5G FAST Plan, the FCC can make an additional 500 megahertz of contiguous spectrum available for two-way fixed and mobile 5G wireless broadband services, while protecting incumbent satellite uses (including satellite broadband) from harmful interference. This will promote competition, innovation and improve services to underserved communities.

OTI, as well as the Competitive Carriers Association, INCOMPAS and other parties have urged the FCC to launch a NPRM to consider the petition filed four years ago by DISH and other

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<sup>18</sup> *Id.* at ix.

<sup>19</sup> See Defense Innovation Board, *The 5G Ecosystem: Risks and Opportunities for DoD*, Recommendation #1, at 28 (April 2019). Available at [https://media.defense.gov/2019/Apr/04/2002109654/-1/-1/0/DIB\\_5G\\_STUDY\\_04.04.19.PDF](https://media.defense.gov/2019/Apr/04/2002109654/-1/-1/0/DIB_5G_STUDY_04.04.19.PDF).

<sup>20</sup> Milo Medin and Gilman Louie, “Clearing the Air on 5G,” *Texas National Security Review* (March 13, 2020). Available at <https://warontherocks.com/2020/03/clearing-the-air-on-5g/>.

terrestrial licensees in the 12 GHz band who are currently restricted to one-way and very low-power transmissions under outdated rules. Although OTI and most consumer advocates opposed the merger of Sprint and T-Mobile, now that there are only three national mobile broadband providers it is imperative that the FCC ensure that DISH has access to sufficient spectrum to compete aggressively with the incumbent providers. In doing so, we also have urged the FCC to protect the operations of Space-X and other potential satellite broadband competitors that have co-primary rights in the 12 GHz band.

In addition, OTI, Public Knowledge and other public interest groups have urged the FCC to seek comment on the authorization of coordinated, shared use of the band for high-capacity fixed wireless services on an opportunistic unlicensed or licensed-by-rule basis. Authorizing coordinated access to vacant 12 GHz spectrum on a secondary basis would be particularly beneficial for rural, tribal and other underserved communities.

If the FCC grants terrestrial MVDDS licensees more flexible use rights, the shared nature of the band makes it likely that power limits will be lower than in bands that mobile operators will rely upon for wide-area 5G coverage. As a result, mobile 5G deployments are likely to be limited for years to urban, inner-suburban and other higher-traffic areas where an investment in greater capacity justifies the cost. Rather than leave as much as 500 megahertz in the band fallow in underserved rural and other less-densely-populated areas, the Commission – and this Subcommittee – should consider a “use it or share it” approach that allows at least secondary, coordinated access for fixed broadband uses.

### **Unused C-band Spectrum Can Spur Rural Wireless Broadband**

OTI and multiple public interest, high-tech and rural broadband provider coalitions supported two proposals that would put *all 500 megahertz* of today’s grossly underutilized C-band to work to fuel America’s 5G future and to close the rural broadband divide. First, we strongly supported the FCC’s pivot late last year to a public auction for 280 megahertz in the lower portion of C-band. Although OTI and our broader Public Interest Spectrum Coalition continue to oppose the \$9.7 billion giveaway to foreign satellite companies adopted by the FCC as unlawful and unnecessary, we do believe that consolidating fixed satellite services and reallocating 280 megahertz for public auction will hasten a more widespread deployment of mobile 5G services.

In addition, those same rural broadband, high-tech and public interest coalitions supported a proposal to authorize coordinated, shared access to unused spectrum across the entire C-band to the extent it would not cause harmful interference to registered earth stations or to future licensed mobile services. A study by wireless engineers at Virginia Tech showed that even after incumbent earth stations are consolidated into the upper 200 megahertz of the band, every megahertz could be used in roughly 80 percent of the U.S. to provide gigabit-fast fixed wireless broadband service to more than 80 million Americans, mostly in rural and underserved areas.<sup>21</sup> By requiring rural ISPs and other operators to rely on an automated coordination system, the FCC can fully protect earth stations (and thereby TV and radio consumers) in the same way that FCC-certified Spectrum Access Systems are now protecting the U.S. Navy and satellite earth stations in the immediately adjacent 3550-3700 MHz band.

Unfortunately, although the FCC included this proposal in its Notice of Proposed Rulemaking, it did not adopt it. We believe that any Congressional action on C-band should require the FCC to authorize coordinated, shared access to unused spectrum across the entire band to the extent it does not cause harmful interference to registered earth stations or to future licensed mobile services. Spectrum itself is public infrastructure that can be used to help close the digital divide. OTI strongly supports the SMART Act, which would minimize the unnecessary pay-off to band incumbents and designate a substantial share of auction proceeds for a Digital Divide Trust Fund. We urge the leadership of this Committee to prioritize a compromise that both earmarks proceeds to promote broadband access in rural, tribal, low-income and other underserved areas and also requires the FCC to authorize coordinated, shared access to unused spectrum across the entire 500 megahertz conditioned on protecting the primary licensees from harmful interference.

Thank you for this opportunity to share our views with the Committee on these critical spectrum management issues and proceedings.

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<sup>21</sup> Monica Allevan, "Google, WISPA Tout Results of Study on Sharing in C-band," *Fierce Wireless* (July 2, 2019). Available: <https://www.fiercewireless.com/wireless/google-wispa-tout-results-study-sharing-c-band>.