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

In the Matter of	)	
	)	
Expanding Flexible Use of the	)	GN Docket No. 18-122
3.7 GHz Band	)	

To: Chief, Wireless Telecommunications Bureau
Chief, International Bureau
Chief, Office of Engineering and Technology
Chief, Office of Economics and Analytics

COMMENTS OF THE BROADBAND CONNECTS AMERICA COALITION

Center for Rural Strategies
Tribal Digital Village Network
California Center for Rural Policy
Schools, Health & Libraries Broadband Coalition (SHLB)
National Digital Inclusion Alliance
Institute for Local Self-Reliance
American Library Association
Public Knowledge
New America's Open Technology Institute
Access Humboldt
X-Lab

August 7, 2019

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The Broadband Connects America coalition ("BCA" or "Coalition")[1] hereby submits these comments in response to the Federal Communications Commission's Public Notice ("*Public Notice*" or "*PN*") in the above-captioned proceeding.[2]

I. Introduction and Summary

Americans living in rural, Tribal and small town communities currently have lower rates of broadband access, few competitive choices, and often pay more money for worse service despite earning less on average than Americans in well-connected urban and suburban areas. The grossly underutilized 3.7-4.2 GHz C-Band can provide critical spectrum both for 5G (to enhance mobile network capacity) and for more immediate efforts to bridge the rural digital divide with high-speed and affordable fixed wireless broadband. Accordingly, the BCA coalition strongly

[1] Broadband Connects America (BCA) is a coalition of national, state-based and local nonprofits that advocate for policies to promote broadband deployment and adoption in rural and underserved areas. The member groups signing specifically onto this filing are listed on the cover sheet.

[2] Public Notice, *Wireless Telecommunications Bureau, International Bureau, Office of Engineering and Technology, and Office of Economics and Analytics Seek Focused Additional Comment in 3.7-4.2 GHz Band Proceeding*, GN Docket No. 18-122, RM-11791, RM-11778, DA 19-678 (rel. July 19, 2019) ("*Public Notice*").

supports the Commission's proposal to open unused spectrum in the 3.7-4.2 GHz band for coordinated sharing by fixed wireless providers to extend high-speed broadband to underserved areas. Coordinated, shared use of unused spectrum in the Fixed Satellite Service (FSS) portion of the band by fixed wireless providers can make a major difference in bringing connectivity to areas where the business case has been lacking for fiber-to-the-home connections.

Fixed wireless point-to-multipoint (P2MP) deployments represent the most cost-effective option for high-capacity broadband in rural and other less densely-populated areas *if* sufficient mid-band spectrum can be made available on a very localized basis. The introduction of high-speed broadband access has been well-documented as a catalyst to local economies. Equipping thousands of local wireless internet service providers (WISPs), local communities, and other local and regional operators with otherwise unused C-Band spectrum capacity can immediately narrow the rural digital divide and boost the economies in those areas.

The Reed Engineering Study filed by WISPA, Microsoft and Google demonstrates that a combination of geographic protection zones and directional antennas allow the Commission to authorize localized high-speed P2MP fixed wireless broadband service in areas covering nearly 80 percent of the United States – mostly rural and less densely populated areas where 80 million Americans live. BCA agrees that the study establishes a strict frequency coordination requirement should remove any concern about harmful interference to FSS incumbents.

The Reed study reconfirms what the record and earlier filings already showed: that like the currently co-primary Fixed Service, P2MP fixed wireless operators can effectively use directional antennas and coordinate sectors of coverage with no risk of harmful interference to FSS earth stations. A strict coordination requirement should remove any concern about harmful

interference from P2MP to FSS earth stations, a concern that is already mitigated by the static nature of FSS and the very directional nature of P2MP fixed wireless operations.

It's also critical to understand that the Reed study focused on the more challenging and limited option for sharing FSS spectrum: Co-channel sharing. It did not consider the less challenging scenario – which is adjacent channel sharing, enabled by frequency separation – in large part because the overall size of the ongoing FSS band remains undecided. By making such conservative assumptions (e.g., that all earth stations are operating on every transponder across the entire 500 megahertz), if anything the Reed study *greatly underestimates* the potential for coordinated P2MP access to C-band to rapidly and affordably narrow the rural digital divide.

In addition, the Commission can do even more to enable higher-capacity and more affordable broadband services in rural, tribal, and other less-densely-populated areas by making unused spectrum available as public infrastructure for P2MP services *across the entire 3.7 GHz band*. While the Reed engineering study demonstrates that every megahertz of the ongoing FSS band can be used to deploy P2MP fixed wireless services on a licensed basis in 80 percent of the country, this "rural dividend" can be hugely amplified if the Commission authorizes an automated frequency coordination (AFC) system to manage opportunistic access to the future flexible-use portion of the band, on a use-it-or-share-it basis, for as long as it remains unused. Just as the Spectrum Access Systems in CBRS will soon allow immediate, opportunistic use of Priority Access License spectrum until licensees commence service, an AFC can likewise absolutely avoid harmful interference to primary licensees across the 3.7 GHz band. And although coordinated sharing between P2MP and FSS can begin immediately, using traditional manual coordination, certification of an AFC will lower the cost and improve the reliability of shared access to unused spectrum across the entire band.

II. The 3.7-4.2 GHz Band is a Unique Opportunity to Narrow the Rural Digital Divide by Unleashing Unused Spectrum for Local Fixed Wireless Broadband Services

The grossly underutilized C-band (3.7 – 4.2 GHz) presents the Commission with a prime opportunity to address the digital divide that leaves rural, tribal and other underserved areas with inadequate or nonexistent broadband service. As our groups did in BCA's initial comments,[3] we again urge the Commission to authorize coordinated, shared access to unused spectrum across the entire band for both licensed (Part 101) and opportunistic use by small rural operators and others for point-to-multipoint (P2MP) fixed wireless services. Rural Americans currently suffer from substantially lower rates of broadband access and adoption, fewer competitive choices, and the need to pay more money for worse service despite earning less on average than Americans in well-connected urban and suburban areas. Making unused spectrum available across the entire band can enable high-speed broadband services to rural, tribal, and other hard-to-serve areas where fiber or other wireline service is too costly or will take too long to deploy.

The Commission need not rely entirely on the Connect America Fund and other public subsidy programs to bring high-throughput fixed broadband to rural and small towns in the country. Although the business case for building out fixed wireline networks in rural and less densely-populated areas has been challenging, localized access to unused spectrum in the 3.7-4.2 GHz band can serve as the *public infrastructure* that enables fixed wireless providers to deploy at affordable rates in unserved and underserved areas. The Commission can employ unused "spectrum as infrastructure" through the authorization of coordinated and shared use by point-to-multipoint (P2MP) fixed wireless services to catalyze high-speed broadband access in rural areas

[3] Comments of the Broadband Connects America Coalition, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, FCC 18-91 (October 29, 2019) ("BCA Comments").

without the Treasury incurring any costs.[4] Authorizing coordinated, shared-use of vacant C-band spectrum on a localized basis will enable WISPs and others to deploy higher-speed broadband in rural and unserved areas more quickly and at lower cost, leading to faster and less expensive service for consumers, small businesses and community anchor institutions at no cost to taxpayers.

Both major recipients of CAF subsidies and the trade associations representing most companies that have obtained CAF II funding have supported the proposal to authorize coordinated access to the 3.7-4.2 GHz band for P2MP fixed wireless service because it lowers deployment costs and build-out timelines, particularly in geographically remote or topographically challenging locations. Smaller rural operators (such as hundreds of internet service providers represented by WISPA, NTCA—The Rural Wireless Association, and the Rural Wireless Association) and larger incumbent rural carriers (including Frontier, Windstream and Consolidated) all supported the Broadband Access Coalition's initial proposal as well.[5]

The cost-effective nature of fixed wireless, compared to laying fiber, is well-documented. Fixed wireless broadband access can be deployed at a seventh of the capital expense needed for fiber-to-the-home and roughly one-fourth the capital expense of cable broadband, according to a

[4] *See* Doug Brake, "A Policymaker's Guide to Rural Broadband Infrastructure," Information Technology & Innovation Foundation, at 7 (April 2017) ("Spectrum is in a sense a type of infrastructure: Congressional desire to expand broadband deployment should include efforts to provide additional spectrum for commercial uses through a variety of license types.").

[5] *See, e.g.*, Comments of Frontier Communications Corporation, Windstream Services, LLC, and Consolidated Communications; Comments of Rise Broadband, RM11791 (filed Aug. 3, 2017); Comments of Cal.net, Inc., RM-11791 (filed Aug. 7, 2017) ; Comments of All Points Broadband, RM11791 (filed Aug. 7, 2017); Comments of Hudson Valley Wireless, RM-11791 (filed Aug. 7, 2017); Comments of Highspeedlink, RM-11791 (filed Aug. 3, 2017); Comments of Southern Ohio Communication Services, Inc., RM-11791 (filed Aug. 2, 2017); Comments of Slopeside Internet, RM11791 (filed Aug. 7, 2017); Comments of NGL Connection, RM-11791 (filed Aug. 7, 2017), at 2 ("the larger companies will continue to offer their services to the urban and suburban areas, continuing to ignore the much needed access to wireless services in rural areas"). *See also* Comments of the National Spectrum Managers Association, RM-11791 (filed Aug. 7, 2017), at 5; Comments of the Fixed Wireless Communications Coalition, RM-11791 (filed Aug. 7, 2017), at 2; Comments of the Utilities Telecom Council, RM-11791 (filed Aug. 7, 2017), at 2, 5.

2017 study published by the Carmel Group.[6] Jeff Kohler, co-founder of Rise Broadband, the nation's largest WISP, reports that the network cost per subscriber for his company is about $250, far less than the "couple thousand" dollars associated with fiber-to-the-home deployment.[7] Fixed wireless does not require digging up streets or burying fiber in terrain that could include natural obstacles such as hills or forests, which makes it faster and more cost-effective.[8]

A study from OVUM corroborated this view, stating, "Fixed wireless has a much lower upfront cost to build than fiber. This lower cost makes reaching certain locations more economically feasible."[9] Allowing providers to use the 3.7-4.2 GHz band for P2MP fixed wireless services will lower deployment costs and could ease pressure on subsidy programs such as the Connect America Fund. Less expensive high-speed broadband will enable more consumers and institutions to adopt these services, which will catalyze private sector investment and build opportunity and greater economic activity in rural areas.

The BCA coalition concurs with the Commission's assertion that "frequency coordination allows FSS and terrestrial fixed microwave to share the band on a co-primary basis, but coordination of mobile systems would be more complicated because [of] the movement of devices …"[10] The record has long shown that fixed wireless P2MP systems have the capability

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[6] *See* Carmel Group, *Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless*, at 12, Fig. 6 (2017).

[7] Sarah Barry James, "Fixed wireless to shine in 2018 thanks to 5G, cost savings," *S&P Market Intelligence* (April 6, 2018), available https://platform.mi.spglobal.com/web/client?auth=inherit#news/article?id=44144018&cdid=A-44144018-13616.

[8] *Ibid*. ("'It's more economical because you're not digging up streets, you're not burying cable or burying fiber,' Rise Broadband co-founder and Chief Development Officer Jeff Kohler said, noting, 'The cost to outfit a tower to provide service to 50, 100, 200 households is not very expensive.'").

[9] "OVUM White Paper Reveals Growth in Fixed Wireless as an Alternative to Fiber for Enterprise-Class Services," *Business Wire* (March 15, 2018), https://www.businesswire.com/news/home/20180315005732/en/OVUM-White-Paper-Reveals-GrowthFixed-Wireless.

[10] Notice of Proposed Rulemaking, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band, Order and Notice of Proposed Rulemaking,* GN Docket No. 18-122, FCC 18-91, at ¶ 50 (rel. July 13, 2018) ("NPRM").

of operating in the 3.7-4.2 GHz band without causing interference to co-channel FSS systems in most rural areas across the United States.[11] Fixed wireless P2MP operators can use directional antennas to coordinate sectors of coverage (e.g., a cluster of homes on a hillside) even in locations with nearby earth stations provided that the earth stations are outside the beam of the base station and of the clients' return path. The ability of fixed P2MP operators to coordinate around FSS incumbents is most promising in rural areas where earth stations are less prevalent.

Rural Americans lack high-speed broadband at much higher rates compared to those who live in urban areas. This digital divide has left millions of Americans without the connectivity needed to access all of the opportunities that come with broadband services. According to the Pew Research Center, 63% of adults in rural areas say they have home broadband compared to 75% of adults in urban areas and 79% of adults in suburban areas.[12] The Commission's 2019 Broadband Deployment Report, which relies on Form 477 data that has been suspected of drastically overstating broadband deployment, said that "the gap in rural and Tribal America remains notable: over 26% of Americans in rural areas and 32% of Americans in Tribal lands lack coverage from fixed terrestrial 25 Mbps/3 Mbps broadband, as compared to only 1.7% of Americans in urban areas."[13]

This lack of access has profound harms for rural Americans. Twenty-four percent of rural adults said that a lack of high-speed internet access is a "major problem" in their community in a

[11] *See* Broadband Access Coalition, Notice of Oral Ex Parte Presentation, GN Docket 17-183 and RM11791 (March 29, 2018) ("Google/BAC Technical Presentation"). The technical analysis and presentation to FCC staff can be found at: https://newamericadotorg.s3.amazonaws.com/documents/BAC_Google_FCC_Technical_Preso_P2MPFSS_Coex_FINAL_032718_1.pdf.

[12] Andrew Perrin, "Digital gap between rural and nonrural America persists," The Pew Research Center (May 31, 2019), https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural-and-nonrural-america-persists/.

[13] FCC, 2019 Broadband Deployment Report, ("2019 Broadband Deployment Report"), GN Docket No. 18-238, ¶ 33, Figure 1 (May 29, 2019).

Pew Research Center study.[14] When rural consumers do have the ability to purchase broadband, they often pay more expensive fees for lower quality service even though on average they earn less money than those living in urban areas.[15] More than half of all rural households had at most one choice for an internet service providers that offered broadband service at the minimum adequate level of 25 Mbps/3 Mbps in their area as of year-end 2017, according to the Commission's December 2018 Communications Marketplace Report.[16]

This digital divide leaves rural areas at a distinct disadvantage, though the reverse is also true: the introduction of high-speed broadband access in rural areas can boost rural economies in significant ways. According to a study from the Hudson Institute, the rural broadband industry supported 69,595 jobs in 2015 through both "its own employment and the employment that its purchases of goods and services generated."[17] Rural broadband supported over $100 billion in e-commerce the same year according to that same report, and $8.2 billion earned through the economic activity stimulated by the rural broadband industry went back to rural areas.[18]

Opening unused spectrum as public infrastructure can spur deployment and innovation by other providers as well. The introduction of municipal broadband networks in areas insufficiently served by private companies has also shown how high-speed broadband can boost an economy. For example, the municipal power company in Chattanooga, Tennessee, spent roughly $220 million building its municipal fiber-optic system, which later brought in over $865 million in

[14] Monica Anderson, "About a quarter of rural Americans say access to high-speed internet is a major problem," The Pew Research Center (Sep. 10, 2018), available https://tinyurl.com/y6c6uqcl.
[15] Sharon Strover, "Reaching rural America with broadband internet service," *PhysOrg* (Jan. 17, 2018), available https://phys.org/news/2018-01-rural-america-broadband-internet.html#jCp.
[16] FCC, *Communications Marketplace Report* (rel. Dec. 26, 2018), available https://www.fcc.gov/document/fcc-adopts-first-consolidated-communications-marketplace-report-0.
[17] Hanns Kuttner, "The Economic Impact of Rural Broadband," The Hudson Institute, at 4 (April 2016), available https://www.frs.org/sites/default/files/documents/2017-12/Hudson%202016%20The%20Economic%20Impact%20of%20Rural%20Broadband.pdf.
[18] *Ibid.*

economic growth for the city.[19] The University of Tennessee found that the Chattanooga municipal broadband network was directly connected to the creation of between 2,800 and 5,200 new jobs, and roughly $1 billion of the economic benefits for the city from the years of 2011-2015 were the result of the network.[20] Chattanooga then experienced the third highest wage growth of all American mid-sized cities in 2014.[21] Chattanooga's unemployment rate has fallen to around 3% in 2019 after being at over 10% following the 2008 economic crash.[22] The city of Lafayette, Louisiana, experienced a similar improvement to its economy with the introduction of a high-speed municipal broadband network as well. The network, LUS Fiber, created around 2,000 jobs with average salaries of $60,000 in about one year and a half.[23]

III. The Reed Engineering Study Confirms that Coordinated Access to Unused C-Band Spectrum Can Enable High-Capacity Fixed Wireless Broadband in Most Rural and Underserved Areas with No Harmful Interference to FSS Licensees

The BCA Coalition fully supports the Commission's proposal in the NPRM to authorize P2MP in ongoing FSS spectrum in the upper portion of the band, as previously stated in BCA's initial comments.[24] The feasibility of authorizing coordinated sharing between fixed P2MP operators and FSS incumbents is reinforced by the study conducted by Professor Jeff Reed, the Willis G. Worcester Professor of Electrical and Computer Engineering at Virginia Tech, and

[19] Peter Moskowitz, "Chattanooga Was a Typical Postindustrial City. Then It Began Offering Municipal Broadband," *The Nation* (June 3, 2016), https://www.thenation.com/article/chattanooga-was-a-typicalpost-industrial-city-then-it-began-offering-municipal-broadband/.
[20] Jason Koebler, "The City That Was Saved by the Internet," *Vice Motherboard* (Oct. 27, 2016), https://motherboard.vice.com/en_us/article/ezpk77/chattanooga-gigabit-fiber-network.
[21] *Ibid.*
[22] *Ibid;* "Economy at a Glance," Bureau of Labor Statistics, accessed on July 31, 2019, https://www.bls.gov/eag/eag.tn_chattanooga_msa.htm.
[23] "Transcript: Community Broadband Bits Episode 144," Community Networks (April 10, 2015), https://muninetworks.org/content/transcript-community-broadband-bits-episode-144.
[24] Comments of the Broadband Connects America Coalition, GN Docket No. 18-122, at 16 (Oct. 29, 2018), available at https://ecfsapi.fcc.gov/file/1030290296636/BCA%20Rural%20Comments_C-Band_FINAL_AsFiled_102918.pdf.

filed in the record by WISPA, Microsoft and Google.[25] The Reed Study conclusively demonstrates that coordinated access to unused spectrum in the 3.7-4.2 GHz band can serve as the foundation for high-capacity fixed wireless broadband services in most rural and underserved areas with no harmful interference to incumbent FSS licensees.

The Reed study used very conservative assumptions (e.g., co-channel sharing, generalized propagation modeling, high CPE height) and still found that every megahertz of FSS spectrum can be coordinated for P2MP deployments in a majority of local communities without causing harmful interference to incumbent earth stations or TV/radio consumers.[26] That is a win-win for rural America. As the study states, "P2MP systems can operate co-channel with all existing C-band earth stations (including the ~14,000 additional earth stations that were recently registered), without causing harmful interference."[27]

More specifically, the Reed Study concludes that a combination of geographic protection zones and directional antennas allow the Commission to authorize high-speed P2MP fixed wireless broadband service in areas covering nearly 80 percent of the U.S. landmass – mostly rural and less densely populated areas – where 80 million Americans live. BCA agrees that the Reed Study demonstrates there should be no concern about harmful interference to FSS

[25] *Ex Parte* Letter from Wireless Internet Service Providers Association, Microsoft, Google and *Ex Parte* Presentation by Prof. Jeffrey H. Reed et al., "3.7-4.2 GHz FSS and Fixed Wireless Access Co-channel Coexistence Study," GN Docket No. 18-122 (July 15, 2019) ("Reed Study" and "WISPA, Microsoft, Google Ex Parte"), available at https://tinyurl.com/yxejzq84.

[26] WISPA, Microsoft, Google Ex Parte Letter at 3. ("The study utilizes conservative assumptions. In addition to the assumption of co-channel operations and the protection of all earth stations currently in IBFS regardless of protection status, the study includes additional conservative assumptions. These include, but are not limited to, a propagation model that takes clutter and terrain into account on a statistical basis rather than the use of actual buildings, trees, berms, hills, and mountains that afford greater protection; using a height for Customer Premise Equipment (CPE) of 7-10 m, which exceeds typical CPE height of ~5-7 m for actual installations; and assuming 100% duty cycle of P2MP transmissions in both directions.").

[27] *Id.* at 2.

incumbents in these areas provided that a modernized version of Part 101 frequency coordination is required, as it has been for decades in bands shared between the Fixed Service (FS) and FSS.

The Reed Study simply reconfirms what earlier filings have already shown: Like the currently co-primary Fixed Service, P2MP fixed wireless operators can effectively use directional antennas to coordinate sectors of coverage with no risk of harmful interference to FSS earth stations. "This is the result of employing reasonably-sized exclusion zones surrounding earth stations, combined with siting and pointing of P2MP nodes such that no signals exceeding Commission-declared interference criteria are received at any FSS earth station."[28] The directional nature of fixed wireless P2MP services allows sectors to be coordinated even when earth stations exist in that area but are located outside the beam of the base station and the client device return path.[29] As a result, a strict coordination requirement should remove any concern about harmful interference from P2MP to FSS earth stations, a risk that is already mitigated by the static nature of FSS and the very directional nature of P2MP fixed wireless operations.

Further, the Reed Study demonstrates that *every megahertz* of the ongoing FSS portion of the 3.7-4.2 GHz band is currently available today and will continue to be regardless of an earth station repack in the 80 percent of the country where 80 million people live. As the study states:

> "Assuming a conservative overall average of 4 bits/second/hertz spectral efficiency, 300 megahertz of C-band spectrum would allow gross throughput rates of approximately 1.2 gigabits per second for P2MP systems. For comparison, 300 megahertz of spectrum is some six times greater than the maximum amount of spectrum currently available for wireless ISPs in the 3.65 GHz band today, and twice as much spectrum than is available in the entire CBRS band."[30]

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[28] WISPA, Microsoft, Google Ex Parte Letter at 2.
[29] *See* Broadband Access Coalition, Notice of Oral *Ex Parte* Presentation, GN Docket 17-183 and RM11791 (March 29, 2018) ("Google/BAC Technical Presentation"). The technical analysis and presentation to FCC staff can be found at: https://newamericadotorg.s3.amazonaws.com/documents/BAC_Google_FCC_Technical_Preso_P2MPFSS_Coex_FINAL_032718_1.pdf.
[30] *Ibid.*

It's also critical to understand that the Reed study focused on the more challenging and limited option for sharing FSS spectrum: Co-channel sharing. It did not consider the less challenging scenario – which is adjacent channel sharing, enabled by frequency separation – in part because the overall size of the ongoing FSS band remains undecided. By making such conservative assumptions (e.g., that all earth stations are operating on every transponder across the entire 500 megahertz), the Reed study *greatly underestimates* the potential for coordinated P2MP access to C-band to rapidly and affordably narrow the rural digital divide.

While the Commission can immediately authorize co-channel coordination in all FSS C-band spectrum, BCA also urges the Commission to adopt rules for the coordinated sharing of unused adjacent channel FSS spectrum in additional geographic areas where co-channel sharing is not feasible. This will be particularly relevant if substantially more than 200 megahertz of C-band is not immediately cleared (within 18 to 36 months). Because as many as 90 percent of earth stations operate on only a single transponder (36 megahertz), frequency separation could unlock a similar amount of spectral capacity for P2MP in many of the rural, underserved and other communities that are within the 20 percent of the U.S. where co-channel coordination is infeasible. In addition, as the next section explains, the Commission should also authorize opportunistic, temporary access to the lower portion of C-band that is cleared of FSS and designated for auction.

IV. Automated Frequency Coordination Can Facilitate Opportunistic Access to Unused Spectrum Across the Flexible Use Portion of the 3.7-4.2 GHz Band with No Harmful Interference to Post-Auction Licensees

While the Reed Study establishes that every megahertz of the ongoing FSS band can be coordinated for local P2MP deployments in rural and other areas where 80 million Americans reside, the Commission's unique opportunity to leverage unused C-band capacity to narrow the rural digital divide is far greater. The "rural dividend" quantified by the Reed Study can be enormously extended if the Commission authorizes an automated frequency coordination (AFC) system to manage opportunistic access to the future flexible-use portion of the band for as long as it remains unused in a local area. Just as FCC-certified Spectrum Access Systems will soon allow immediate, opportunistic use of Priority Access License (PAL) spectrum until licensees commence service in the adjacent 3.5 GHz band, an AFC can likewise absolutely avoid harmful interference to primary licensees across the 3.7 GHz band.

An AFC system can facilitate the coordinated use of unused spectrum capacity across the entire 3.7 GHz band, including on a use-it-or-share-it basis in any lower segments of the band that are reassigned or reserved for flexible use licensing. It is likely that 5G mobile services will not be built out in many if not most rural and other less-densely-populated areas for many years. BCA therefore recommends that the Commission authorize P2MP operations to coordinate use of the middle and lower portions of the band on an *opportunistic basis* (e.g., licensed by rule), subject to AFC control and revocable permission to continue operating.

Use-it-or-share-it rules have been adopted by the Commission in relation to two significant flexible-use bands in recent years and should be a central part of any effort aimed at expanding spectrum access for rural and non-traditional ISPs, as well as for enterprise and

institutional use.[31] Conceptually, use-it-or-share-it rules authorize opportunistic access to licensed spectrum that is unused or underutilized in a specific area. An authorization for opportunistic, shared use can (and should) gives licensees a guarantee that opportunistic users will vacate the spectrum once notified that the licensee is ready to commence service in that local area and that it will never result in harmful interference to the primary licensee's operations.[32]

The Commission has recently set two important precedents for use-it-or-share-it rules that suggest this approach can promote spectrum access, efficiency and use in underserved areas more generally. In adopting the new Citizens Broadband Radio Service Rules (CBRS) for the 3.5 GHz band, the Commission stated: "We believe that the 'use it or share it' approach of our rules for this unique band also thus more reasonably accommodates the goals of Section 309(j) of the Act, including 'to prevent stockpiling or warehousing of spectrum.'"[33] The use-it-or-share-it rules for CBRS authorize any operator to coordinate access to unused PAL spectrum on an opportunistic basis. Permission to make General Authorized Access (GAA) use of unused PAL spectrum in a local area must be granted by a certified Spectrum Access System (SAS) that ensures the PAL spectrum is not in use and will not interfere with licensee operations. The SAS database thereby facilitates – on an automated basis at low cost – the spectrum sharing needed to ensure that all unused spectrum in the 3.5 GHz band is available for use.

More recently, the Commission adopted a use-it-or-share-it approach to unlicensed use of the 600 MHz band following the TV incentive auction. The Commission authorized the

[31] *See Generally* Comments of Open Technology Institute at New America and Public Knowledge, *Partitioning, Disaggregation, and Leasing of Spectrum*, WT Docket No. 19-38 (June 3, 2019).
[32] *See* Michael A. Calabrese, "Use it or Share it: Unlocking the Vast Wasteland of Fallow Spectrum," New America Foundation, presented at 39th Research Conference on Communication, Information and Information Policy (TPRC) (Sep. 23, 2011).
[33] Order on Reconsideration and Second Report and Order, *Amendment of the Commission's Rules in Regard to Commercial Operations in the 3550-3650 Band*, GN Docket No. 12-354, at ¶ 177 (April 28, 2016).

continued operation of unlicensed devices on unused licensed spectrum following the auction. The Commission authorized unlicensed TV White Space devices to operate indefinitely in unused portions of the exclusively-licensed 600 MHz band until the licensee notifies a certified TV Bands Database that it is ready to commence service in that specific area. In adopting local, opportunistic access to unused 600 MHz spectrum post-auction, the Commission declared: "Since TVWS devices can operate only on channels identified in the TV bands databases, these databases can serve to ensure that unlicensed operations will no longer occur on a channel on which a licensee has commenced service. When a 600 MHz Band licensee plans to commence operations on frequencies that include channels available for unlicensed operations under the rules for TVWS devices, that licensee can notify any of the TV bands database administrators when and where it plans to commence operations."[34]

The Commission should certify one or more AFC systems to ensure that permission to continue operating on a particular channel, in a particular area, is immediately denied when a future flexible-use licensee reports it is ready to commence service. An AFC mechanism for the 3.7-4.2 GHz band will not need to be as sophisticated or complicated as the SAS in the adjacent 3.5 GHz band, since there will be no mobile incumbent to protect (i.e., U.S. Navy ships) and no need for the AFC to coordinate among licensed users. A simple, static database can verify that a proposed deployment will not interfere with incumbent operations. And even a relatively simple AFC databases can take real-world details on terrain, clutter (trees, buildings) and other GIS data sets into account to ensure both optimal spectrum re-use and that the primary flexible-use

[34] Report and Order, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, at ¶ 680 (May 15, 2014).

licensees have absolute protection when they are ready to commence service in a rural or other area.[35]

Several commenters have highlighted the benefits of an AFC and its ability to coordinate P2MP fixed wireless services in the 3.7-4.2 GHz band to prevent harmful interference to other licensees. Microsoft and the Dynamic Spectrum Alliance (DSA) have likewise noted that the coordination system required for the C-Band would not be as sophisticated as the SAS databases employed for the CBRS framework in the 3.5 GHz CBRS band.[36] Google has elaborated on the point that the AFC that would be used for the C-Band would be easier to orchestrate than that used in the CBRS band: "As in the adjacent CBRS band, database management techniques, relatively low transmit power limits, and band-wide operability requirements can be quickly employed to unleash C-band spectrum for high-capacity fixed wireless or capacity-enhancing mobile access points."[37]

DSA has further noted that "the same automated frequency management database system that could facilitate faster, more efficient, and lower cost coordination between fixed service and FSS in the upper segment of the band could be used to govern opportunistic access, on at least a temporary basis, by fixed services in vacant lower band frequencies until future licensees commence service."[38]

[35] *See* Monica Alleven, "Google and other databases likely to make spectrum sharing easier," Fierce Wireless (Oct. 12, 2017), available at https://www.fiercewireless.com/wireless/google-and-otherdatabases-likely-to-make-spectrum-sharing-easier.
[36] Dynamic Spectrum Alliance Comments, GN Docket No. 18-122, at 7 (Oct. 29, 2018) ("DSA Comments"); Microsoft Comments, GN Docket No. 18-122, at 8-9 (Oct. 29, 2018).
[37] Google Comments, GN Docket No. 18-122, at 8 (Oct. 29, 2018).
[38] DSA Comments at 12.

V. Conclusion

The Reed Study conclusively demonstrates that coordinated access to unused spectrum in the 3.7-4.2 GHz band can serve as the foundation for high-capacity fixed wireless broadband services in most rural, Tribal and underserved areas with no harmful interference to incumbent FSS licensees. The Commission should move forward with the proposal to make unused spectrum across the entire 3.7-4.2 GHz band available for coordinated P2MP fixed wireless services so that ISPs in rural, Tribal, and other underserved communities have access to the mid-band spectrum they need to bring affordable high-speed broadband to these areas as quickly as possible.

Respectfully submitted,

/s/ Amir Nasr
Michael Calabrese
Open Technology Institute at New America
740 15th Street, NW Suite 900
Washington, DC 20005

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