

**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

**REPLY COMMENTS OF  
THE PUBLIC INTEREST SPECTRUM COALITION**

August 14, 2019

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In the Matter of )  
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the entire 3.7-4.2 GHz band as public infrastructure to facilitate the deployment of high-speed point-to-multipoint (P2MP) fixed wireless services in rural, Tribal, and other hard-to-serve areas. Rural broadband ISPs, tier two fixed ISPs, the nation's leading technology companies, broadband equipment makers, consumer and rural broadband advocates all view coordinated access to unused C-Band spectrum as a promising avenue for bridging the rural-urban digital divide where national ISPs have so far failed to make sufficient progress.

The Comments filed in response to the Commission's *Public Notice* demonstrate several key points:

First, the record shows strong support for the Commission's proposal to authorize P2MP services to coordinate into locally-unused spectrum in the ongoing FSS portion of the 3.7-4.2 GHz band. Comments filed by diverse parties agree that P2MP operators have the *technical ability* to coordinate the use of unused C-band spectrum with FSS earth stations without causing harmful interference. Conversely, no filings contain data or evidence that refute the Reed Study's conclusion that coordinated sharing among fixed point-to-multipoint (P2MP) operators and existing earth stations is feasible on *every* megahertz of the ongoing FSS band in a majority of rural, Tribal and small town communities (78% of the U.S. on a co-channel basis where 80 million Americans live) – mostly rural and less densely-populated areas where it's most needed.

Second, although most FSS incumbents oppose coordinated sharing, they provide no actual evidence or data to suggest that the findings of the Reed Study are baseless or unreliable. The C-band Alliance (CBA) and the Satellite Industry Association (SIA) focus instead on either fallacious policy arguments (e.g., that rural areas would not benefit from more mid-band spectrum for high-capacity fixed wireless) or spurious technical arguments that are contradicted by Reed Study findings they do not substantively refute (e.g., that coordinated sharing on a co-

channel basis would complicate or impede earth station repacking). Instead of enlightening the record with engineering data, CBA, SIA and a few other FSS incumbents cut-and-paste the same claims of catastrophe that they have been repeating for two years. Despite physics and math—and a long history of successful coordination among FSS and FS users—self-interested parties haul out a batch of evidence-free assertions as if the Commission does not employ engineers, or as if none of them will actually read the record in this proceeding.

There is no question that even the more challenging scenario of co-channel sharing among directional P2MP deployments and FSS earth stations is technically feasible using geographic separation. The only technical issue is the precise methodology the Commission should approve to determine interference protection on a site-by-site basis. Whether this methodology will result in a protection zone radius for earth stations that is closer to the 10 kilometers estimated by the Reed Study, or closer to the 150 kilometers asserted on an evidence-free basis by CBA, the reality remains that coordinating sharing can unlock enormous capacity for more affordable broadband in most rural and underserved communities.

Third, another canard repeated by CBA, SIA, and some other FSS incumbents is that coordinated sharing by P2MP in the upper FSS portions of the band will impede a repacking of earth stations in the upper portion of the band. In areas where geographic separation and directional antennas permit *co-channel* coordination, 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 nearly 80 percent of the country where 80 million people live.

Some P2MP opponents make the related claim that coordinating P2MP fixed wireless deployments into the repacked portion of the band creates encumbrances that could prevent any future repurposing of the remaining FSS portions of the band. The reality is that the Commission

has many options concerning the *licensing status* of P2MP (or other broadband uses) in different parts of the band and there is no likely scenario that should preclude coordinated sharing by P2MP operators. PISC outlines three different scenarios that would allow coordinated sharing of every unused megahertz across the entire 3.7-4.2 GHz band, each of which could result in different rights for P2MP (and potentially for mobile or LAN) operators.

Finally, we rebut the mobile industry's late-breaking and ill-considered suggestion that the Commission abandon its proposal to authorize coordinated sharing among P2MP and FSS earth stations in the ongoing FSS portion of the band and instead conduct an overlay auction for the right to negotiate payments to FSS incumbents. Among other reasons, the public interest purpose of authorizing coordinated sharing of unused spectrum in the ongoing FSS portion of the band is to encourage more intensive use of spectrum that will not be auctioned or that will not be auctioned or used for many years. Moreover, an overlay auction would effectively make it impossible for the Commission to adopt a nationwide clearing and auction plan at a later date. An overlay auction would guarantee that vacant FSS remains so for many years. And after an overlay auction, the ongoing FSS portion of C-band would be populated not only by more than 10,000 earth stations—which would be authorized to demand payments to vacate the band—but also by a new set of incumbents with cheaply-purchased overlay rights. Both would need to be paid off to clear more spectrum, which after more years drag on would result in a balkanized, wasteful jigsaw of FSS and (presumably) mobile incumbents in the upper portion of the band.

## **II. THE RECORD SHOWS STRONG SUPPORT FOR COORDINATED ACCESS TO UNUSED C-BAND SPECTRUM FOR FIXED WIRELESS P2MP TO NARROW THE RURAL DIGITAL DIVIDE**

There is a significant and persistent rural digital divide in the United States. More than 20 million Americans lack the ability to purchase the broadband services necessary for equal opportunity and a modern lifestyle—an issue this Commission has made a high priority in other proceedings. The record in this proceeding demonstrates the Commission has a unique opportunity to open unused spectrum in the 3.7-4.2 GHz band and provide it as infrastructure to enable high-speed point-to-multipoint (P2MP) fixed wireless services in rural, Tribal, and other hard-to-serve areas. Rural broadband providers, tier two fixed ISPs, the nation’s leading technology companies, broadband equipment makers, and consumer and rural broadband advocates all view coordinated access to unused C-Band spectrum as a promising avenue for bridging the rural-urban digital divide where national ISPs have so far failed to make sufficient progress.

Chairman Pai has made the rural digital divide a priority since the start of his tenure, observing that “[T]he digital divide in our country is real and persistent. . . . If you live in rural America, you are much less likely to have high-speed Internet service than if you live in a city.”<sup>4</sup> Just this month, in his statement supporting the adoption of the Rural Digital Opportunity Fund NPRM, Chairman Pai once again reiterated that bringing high-speed broadband to rural areas is a top priority for the Commission. He noted that broadband is essential to “start a business,

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<sup>4</sup> Remarks of FCC Chairman Ajit Pai at the American Enterprise Institute, “The First 100 Days: Bringing the Benefits of the Digital Age to All Americans,” at 2 (May 5, 2017); John Eggerton, “FCC’s Pai Prioritizes Closing Digital Divide,” *Broadcasting & Cable* (Jan. 24, 2017), available at <https://www.broadcastingcable.com/news/fccs-pai-prioritizes-closing-digital-divide-162751> (“In what is a traditional appearance before the massed FCC staff, Pai said: ‘One of the most significant things that I’ve seen during my time here is that there is a digital divide in this country—between those who can use cutting-edge communications services and those who do not. I believe one of our core priorities going forward should be to close that divide.’”).

educate a child, grow crops, raise livestock, get access to telehealth, and do all the other things that the online world allows.”<sup>5</sup> Commissioner Michael O’Rielly likewise noted recently that “[t]here is consensus among FCC Commissioners that all Americans—including those living in areas with challenging topography and sparse populations—should have the opportunity to access broadband Internet, if they wish to do so.”<sup>6</sup>

Fortunately, the comments filed in response to the Commission’s *Public Notice* largely agree that P2MP operators have the *technical ability* to coordinate the use of unused C-band spectrum with FSS earth stations without causing harmful interference. Although most FSS incumbents—particularly the satellite operators who believe American taxpayers should pay them to use the band more efficiently—oppose coordinated sharing, they provide no actual evidence or data to suggest that the findings of the study conducted by Professor Jeffrey Reed and submitted by the Wireless Internet Service Providers Association (WISPA), Google, and Microsoft (“Reed Study”),<sup>7</sup> are baseless or unreliable. Instead, the C-band Alliance (CBA) and the Satellite Industry Association (SIA) focus instead on either fallacious policy arguments (e.g., that rural areas would not benefit from more mid-band spectrum for high-capacity fixed wireless) or spurious technical arguments that are contradicted by Reed Study findings they don’t substantively refute (e.g., that coordinated sharing on a co-channel basis would complicate or impede earth station repacking).

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<sup>5</sup> Statement of Chairman Ajit Pai, WC Docket No. 19-126, at 1 (rel. Aug. 2, 2019).

<sup>6</sup> Statement of Michael O’Rielly, Commissioner, FCC, Hearing on Oversight of the FCC, Senate Committee on Commerce, Science & Transportation, at 3 (Jun. 12, 2019).

<sup>7</sup> See Letter from Wireless Internet Service Providers Association, Google LLC, and Microsoft Corp. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 15, 2019), Attachment (“Reed Study”), available at [https://ecfsapi.fcc.gov/file/10715379201594/Joint%20Ex%20Parte%20Letter%20\(WISPA%20Microsoft%20Google\).pdf](https://ecfsapi.fcc.gov/file/10715379201594/Joint%20Ex%20Parte%20Letter%20(WISPA%20Microsoft%20Google).pdf).



Contrary to the assertions of the satellite industry, the grossly underutilized C-Band is a unique opportunity for the Commission to open access to unused spectrum as infrastructure to better equip regional and rural ISPs to deploy high-speed and more affordable fixed wireless broadband in rural, Tribal, and other underserved communities across nearly 80 percent of the country where 80 million Americans live. The record demonstrates that rural ISPs and a diverse range of other parties view coordinated access to unused C-Band spectrum as a promising avenue for bridging the rural-urban digital divide where national ISPs have so far failed to make sufficient progress.

Frontier and Windstream, both traditional *wireline* ISPs, detail how they are increasingly focused on “deploying wireless broadband, including using mid-band spectrum,” particularly in rural areas.<sup>8</sup> Frontier and Windstream highlight the Reed Study’s “compelling” conclusion that “properly-engineered co-channel point-to-multipoint broadband systems” and exclusion zones of roughly 10 kilometers in radius would be sufficient (subject to site-by-site coordination) to avoid harmful interference FSS earth stations.<sup>9</sup> The companies also note that the Reed Study’s conclusions, based on conservative assumptions of *co-channel* coordination, demonstrate that P2MP services to share the 3.7-4.2 GHz band “has the potential to bring faster broadband to millions more across the country.”<sup>10</sup> The implementation of “smart rules enabling fixed point-to-multipoint deployments would provide another key tool in the toolbox to reach the hardest to serve rural Americans.”<sup>11</sup>

Cambium Networks states it agrees with the conclusions reached in the Reed Study and that the base stations it manufactures can “readily be engineered to support shared, coordinated

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<sup>8</sup> Comments of Frontier Communications Corporation and Windstream Services, LLC, GN Docket No. 18-122, at 2 (Aug. 7, 2019) (“Comments of Frontier and Windstream”).

<sup>9</sup> *Ibid.*

<sup>10</sup> *Id.* at 3.

<sup>11</sup> Comments of Frontier and Windstream at 3.

uses by Part 101 frequency coordinated P2MP operations without causing harmful interference to co-channel Fixed Satellite Service (“FSS”) earth stations.”<sup>12</sup> The company also states that based on their experiences in other spectrum bands, its customers—which include fixed wireless internet service providers, enterprises, government and military agencies, utility providers, and public safety— “could benefit greatly from the introduction of new point-to-multipoint (P2MP) operations in the C Band.”<sup>13</sup>

Airspan Networks is similarly encouraged by the Reed Study’s findings, noting the conclusions reflect that “there may be significant opportunities to bring fixed wireless point to multipoint (P2MP) access to tens of millions of Americans in shared C-band spectrum.”<sup>14</sup> Airspan and Cambium both conclude that the Commission should adopt the Reed Study’s spectrum sharing recommendations.<sup>15</sup> Cumulus Media and Westwood One likewise agree that the digital divide has left rural areas behind, and despite the Commission’s moves to reallocate spectrum to wireless carriers for more than two decades, millions of rural Americans still lack access to broadband.<sup>16</sup>

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<sup>12</sup> Comments of Cambium Networks, GN Docket No. 18-122, at 1 (Aug. 7, 2019) (Comments of Cambium Networks”), (“Based on its customers’ experiences in these other bands, Cambium knows firsthand the need for additional spectrum for fixed wireless uses. And the 3.7-4.2 GHz spectrum (“C-Band”) is particularly well-suited to fill this need.”).

<sup>13</sup> *Ibid.*

<sup>14</sup> Comments of Airspan Networks Inc., GN Docket No. 18-122, at 2 (Aug. 7, 2019).

<sup>15</sup> *Id.* at 3 (“Airspan encourages the Commission to adopt the Reed Engineering study’s spectrum sharing recommendations. We believe this approach strikes a strong balance for rapidly delivering 5G spectrum by clearing a portion of the lower C-band, protecting incumbent Fixed Satellite Services (FSS) use (immediately and during a 5G reallocation process), as well as the rapid creation of an affordable rural P2MP fixed wireless spectrum sharing service that will greatly assist broadband connectivity in rural areas”); Comments of Cambium Networks at 2 (“As the Commission evaluates coexistence in the C-Band among co-channel FSS and P2MP services, Cambium recommends that the Commission rely on the Reed Study’s conclusions on appropriate interference protection for FSS earth stations. In particular, the Reed Study suggests that 10 kilometer exclusion zones would protect most FSS earth stations from harmful interference caused by P2MP services.”).

<sup>16</sup> Comments of Cumulus Media Inc. and Westwood One, LLC, GN Docket No. 18-122, at 4-5 (Aug. 7, 2019) (“Nevertheless, as demonstrated above, wireless operators have yet to provide broadband service to

WISPA similarly describes how current deployments by its members in the adjacent 3650-3700 MHz band suggest that the association's mostly small and rural ISPs will be able to leverage coordinated access to 100 to 300 megahertz of C-Band spectrum to bring affordable high-speed broadband to many of the 80 million Americans living in the 78% of the country where every megahertz of FSS spectrum is available on a co-channel basis.<sup>17</sup>

The economic benefits of bringing affordable, high-speed broadband to a previously unserved or underserved area (or to an area where the only available options have been prohibitively expensive) are well-documented in the U.S. but also among other OECD countries.<sup>18</sup> According to a report from the Joint Economic Committee, highly-educated adults have been leaving rural states to cities that are home to technology companies and a high concentration of venture capitalist investments (what the report calls "winner-take-all" cities) such as San Francisco, New York, Seattle, and Boston.<sup>19</sup> This phenomenon has resulted in states such as Vermont and private organizations attempting to attract technology jobs and remote

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at least 19 million Americans in rural areas across the country, including 12 million school-aged children.”).

<sup>17</sup> Comments of the Wireless Internet Service Providers Association, GN Docket No. 18-122, at 7 (Aug. 7, 2019) (“Comments of WISPA”) (“... the BAC proposal would enable 80 million people to gain access to co-channel spectrum for P2MP in 300 megahertz of shared spectrum – and millions more that can access non-co-channel spectrum for rural broadband services.”).

<sup>18</sup> Comments of Google, LLC, GN Docket No. 18-122 at 3 (Aug. 7, 2019) (“Comments of Google”) (“A recent study of 35 OECD countries, including the United States, over a 15-year period confirmed the link between broadband adoption and gross domestic product (GDP) growth, revealing a GDP increase of 4.34% for the countries studied when broadband penetration increased from 3.8 connections per 100 people to 31.3 connections per 100 people.”); Pantelis Koutroumpis, *The Economic Impact of Broadband: Evidence from OECD Countries*, Apr. 2018, at 8, available at [https://www.ofcom.org.uk/data/assets/pdf\\_file/0025/113299/economic-broadband-oecd-countries.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0025/113299/economic-broadband-oecd-countries.pdf).

<sup>19</sup> *Losing Our Minds: Brain Drain across the United States*, United States Congress Joint Economic Committee (April 24, 2019), available at <https://www.jec.senate.gov/public/index.cfm/republicans/2019/4/losing-our-minds-brain-drain-across-the-united-states>; Daniel Oberhaus, “How Smaller Cities are Trying to Plug America’s Brain Drain,” *Wired* (Aug. 12, 2019), [https://www.wired.com/story/how-smaller-cities-trying-plug-brain-drain/?mbid=social\\_twitter\\_onsiteshare](https://www.wired.com/story/how-smaller-cities-trying-plug-brain-drain/?mbid=social_twitter_onsiteshare) (“Oberhaus Wired Article”).

workers back to states that have seen large their best-educated youth depart in the past.<sup>20</sup> Efforts from states, localities, and nonprofits to bring people back to smaller cities and rural areas will rely on the availability of strong, fast, and affordable broadband services in those areas.

Among opponents of P2MP, GCI Communication Corp. is a good example of an evidence-free Comments that ignore not only the findings of the Reed Study, but also the needs of the unconnected communities in Alaska that the company is failing to serve. GCI requests that the Commission not permit P2MP fixed services in Alaska because of the potential for harmful interference to FSS.<sup>21</sup> GCI bases its position on an assertion that that earth station exclusion zones would need to be extremely large in Alaska and because the received signal level at the satellite antenna is “extremely small.”<sup>22</sup> Even assuming that Alaska’s topography would require protection zones for most earth stations in Alaska to be far larger than the typical earth station in other states, that would be factored into the site-by-site coordination required by the Commission. Again, this should be a matter of physics and math – not unthinking nimbyism. One clear implication of the Reed Study (and its conservative assumption that sharing is *co-channel*) is that in states with a low population density, such as Alaska, every megahertz of FSS spectrum can be employed for fixed wireless P2MP services in most small towns and villages without the risk of harmful interference to earth stations.<sup>23</sup>

Further, GCI’s request also ignores a more pressing reality: the digital divide in Alaska is particularly severe and persistent. The Commission’s latest Broadband Deployment Report

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<sup>20</sup> Oberhaus Wired Article (“In an effort to reverse this trend, policymakers in Vermont and elsewhere are betting on programs that tap digital technologies to entice skilled workers to relocate. Last year, Vermont governor Phil Scott signed into law a measure designed to attract full-time remote workers to the Green Mountain State. The Remote Workers Grant reimburses employees up to \$10,000 for relocation costs, office equipment, and other expenses, as well as in-kind perks like a membership to a coworking space.”).

<sup>21</sup> Comments of GCI Communication Corp., GN Docket No 18-122 at 12 (Aug. 7, 2019) (“Comments of GCI Communication”).

<sup>22</sup> *Id.* at 12-13.

<sup>23</sup> Reed Study at 19.

found that only 57% of the population of Alaskan villages have access to fixed broadband services at 25/3 Mbps and to mobile LTE services with 5/1Mbps.<sup>24</sup> Overall, roughly 20% of the Alaskan population lacks access to fixed broadband at 25 /3 Mbps.<sup>25</sup> The only data on adoption of fixed broadband services for Alaska that the Commission has made available to the public is for the 10/1 Mbps tier, to which 65.8 percent of Alaskans subscribe.<sup>26</sup>

Further, there is very limited competition in the high-speed broadband market in rural areas, including Alaska. Contrary to GCI's position, allowing ISPs to utilize C-Band spectrum-as-infrastructure could spur deployment that will not only extend coverage to unserved areas, but also provide needed competition in other rural areas where residents have a choice of at most one provider for adequate broadband. This competition—by a fixed wireless provider with lower costs than a fixed wireline ISP—can also help to make broadband more affordable in these areas. Rural Americans have fewer options for high-speed broadband—24.3% of Americans living in rural areas have zero options for a fixed broadband provider at 25/3 Mbps service and 38.4% have only one option for a provider at those speeds.<sup>27</sup> Exempting Alaska from access to unused FSS spectrum for fixed wireless P2MP will only perpetuate the connectivity divide in rural Alaska.

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<sup>24</sup> 2019 Broadband Deployment Report, GN Docket No. 18-238 at 27, Fig. 10 (Rel. May 29, 2019) (“2019 Broadband Deployment Report”).

<sup>25</sup> *Id.* at 45, Appendix 1.

<sup>26</sup> *Id.* at 318, Appendix 8.

<sup>27</sup> Communications Marketplace Report, GN Docket No. 18-231, at 97 Fig. D-3 (Rel. Dec. 26, 2018).

### **III. COORDINATED SHARING BY P2MP IS TECHNICALLY FEASIBLE, WILL NOT IMPEDE EARTH STATION REPACKING, AND NEED NOT ENCUMBER FUTURE REALLOCATIONS IN THE UPPER PORTIONS OF THE BAND**

The Reed Study conclusively demonstrates the feasibility of coordinated sharing between fixed point-to-multipoint (P2MP) operators and existing earth stations on *every megahertz* of the ongoing FSS band in a majority of rural, Tribal and small town communities where it's most needed. Although the C-Band Alliance (CBA), the Satellite Industry Association (SIA), and a few other FSS incumbents cut-and-paste the same evidence-free claims of catastrophe that they've been repeating for two years, no party has submitted actual engineering evidence that rebuts or even seriously questions the findings of the Reed Study concerning the feasibility of co-channel sharing. Despite physics and math—and a long history of successful coordination among FSS and FS users—self-interested parties haul out a batch of evidence-free assertions as if the Commission does not employ engineers, or that none of them will actually read the record in this proceeding.

The Content Companies brazenly claim that a “repacked C-band could not, as a matter of physics, accommodate new fixed wireless broadband uses.”<sup>28</sup> In similar fashion, T-Mobile vaguely claims, without evidence or even explanation, that coordinated sharing “would create interference risks and technical impediments that limit the use of the spectrum.”<sup>29</sup> The Church of Jesus Christ of Latter Day Saints simply ignores the Reed Study in its non-responsive comments, simply declaring that P2MP use of unused spectrum is “not a workable or efficient use of C-band.”<sup>30</sup> Not to be outdone, CBA remains in its own evidence-free zone by claiming there is

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<sup>28</sup> Comments of Content Companies, GN Docket No. 18-122 at 14 (Aug. 7, 2019).

<sup>29</sup> Comments of T-Mobile, GN Docket No. 18-122 at 21 (Aug. 7, 2019) (“Comments of T-Mobile”); Comments of Verizon, GN Docket No. 18-122 at 17 (Aug. 7, 2019) (“Comments of Verizon”).

<sup>30</sup> Comments of the Church of Jesus Christ of Latter Day Saints, GN Docket No. 18-122 at 5 (Aug. 7, 2019).

“overwhelming record evidence from diverse industries agree that allowing new, standalone P2MP service in the C-Band would encumber future terrestrial mobile deployments and unnecessarily complicate and impede the repacking of satellite services.”<sup>31</sup> However, all of its citations are self-referential and evidence-free.

The Reed Study relies on the same physics and math that manual Part 101 coordination among FSS and FS operators have relied on for decades. As the Broadband Access Coalition (BCA) initially demonstrated, in a presentation based in part on a pilot deployment in the Monterey Peninsula, the directional nature of *fixed* wireless P2MP permits the local coordination of sectors even where earth stations are in the area, but located outside the beam of the base station and the client device return path.<sup>32</sup> There is no question that even the more challenging scenario of co-channel sharing among directional P2MP deployments and FSS earth stations is technically feasible using geographic separation. The only technical issue is the precise methodology the Commission should approve to determine interference protection on a site-by-site basis. Whether this methodology (and whether it is implemented manually or more efficiently and cost-effectively) by an automated frequency coordination system will result in a protection zone radius for earth stations that is closer to the 10 kilometers estimated by the Reed Study, or closer to the 150 kilometers asserted on an evidence-free basis by CBA.

Thus far the record in this proceeding suggests that the Reed Study’s findings are a likely approximation of reality and that indeed *every* megahertz of FSS spectrum can be put to use to serve rural and other underserved areas in roughly 80% of the U.S. landmass where 80 million Americans reside (and need better broadband). One corroborating proof point, which PISC noted

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<sup>31</sup> Comments of the C-Band Alliance, GN Docket No. 18-122 at 3 (Aug. 7, 2019) (“Comments of CBA”).

<sup>32</sup> See Broadband Access Coalition, Notice of Oral *Ex Parte* Presentation, GN Docket 17-183 and RM-11791 (March 29, 2018) (“Google/BAC Technical Presentation”). The technical analysis and presentation to FCC staff can be found at: <https://tinyurl.com/y3gix9cu>.

in its initial comments, is that 10 kilometers is the separation distance that FSS earth stations in Los Angeles have recently and voluntarily agreed is adequate protection in the immediately adjacent 3650-3700 MHz band.<sup>33</sup> AT&T, which controls one of these earth stations (Call Sign KA91), apparently didn't hear in time that its Washington lobbyists would be claiming that P2MP coordination is virtually impossible. As Google observed: "This example proves the fundamental assertion of the Reed Study: When taking all factors into account, fixed broadband systems can (and already do) co-exist with co-channel earth stations over distances that are a small fraction of the 150-km radius."<sup>34</sup>

Another canard repeated by CBA, SIA, and some other FSS incumbents is that coordinated sharing by P2MP in the upper FSS portions of the band will impede a repacking of earth stations in the upper portion of the band. For example, CBA claims that this sharing would "unnecessarily complicate and impede the repacking of satellite services."<sup>35</sup> CTIA similarly asserts that P2MP operations would "make it more difficult to repack."<sup>36</sup> Of course, these claims completely ignore the Reed Study, which is premised on *co-channel* sharing.

In areas where geographic separation and directional antennas permit coordination, 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. Although the extent of feasible *adjacent-channel* sharing (enabled primarily by frequency separation) will not be known until the Commission decides the size of the ongoing

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<sup>33</sup> See Comments of PISC at 7-8, citing *Ex Parte* Letter from Louis Peraertz, WISPA, and Andrew Clegg, Google, GN Docket 18-122, at 2 (August 6, 2019) ("WISPA/Google *Ex Parte*"). The Reed Study notes that the 10 km range is based on a statistical average and is intended for estimating aggregate national coverage. In practice, each P2MP system would be designed and coordinated on a site-specific basis, taking all surrounding earth stations into account, and fully protecting those operations. *Ibid.*

<sup>34</sup> Comments of Google at 17.

<sup>35</sup> Comments of CBA at 3.

<sup>36</sup> Comments of AT&T, GN Docket No. 18-122, at 14 (Aug. 7, 2019) ("Comments of AT&T").



FSS portion of the band, the number of transponders in use is irrelevant in areas where co-channel coordination of FSS spectrum is feasible.

Because the ability of P2MP operators and FSS earth stations to share C-band spectrum is independent of the amount of spectrum the Commission leaves available for FSS operations in any repacking process, the Commission can move quickly with its proposal to redefine the Fixed Service as P2MP, and authorize coordinated *co-channel* deployments without concerns that a subsequent earth station repack would reduce the spectrum available to fixed wireless operators. Google similarly explains that “[b]ecause co-channel sharing with FSS has been assumed from the outset, retuning will not create any additional coordination problems.”<sup>37</sup>

Finally, some P2MP opponents make the related claim, as CTIA does, that “adding new P2MP fixed operations into the repacked portion of the band creates further encumbrances to any future repurposing of the band.”<sup>38</sup> Although opponents assert this as a black-and-white fact, the reality is that the Commission has many options depending on how much of C-band is cleared, in how many stages, over what time frame, and with due consideration of the benefits of licensed P2MP deployments for improving the coverage, speed and affordability of fixed broadband in rural America. There are admittedly a number of different possible outcomes that could impact the *licensing status* of P2MP, but no likely scenarios that should preclude coordinated sharing by P2MP operators.

Generally speaking, as Google has suggested, “[t]he Commission could further ensure its freedom to clear more C-band spectrum in the future, if warranted, by requiring in Part 101 that P2MP devices be capable of operating across the full 500 MHz of the C-band (or whatever

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<sup>37</sup> Comments of Google, LLC, GN Docket No. 18-122, at 8 (Aug. 7, 2019) (“Comments of Google”).

<sup>38</sup> Comments of CTIA, GN Docket No. 18-122, at 14 (Aug. 7, 2019) (“Comments of CTIA”); Comments of T-Mobile at 20-21; CBA Comments at 3 (“standalone P2MP service in the C-Band would encumber future terrestrial mobile deployments”).

portion of the C-band remains usable by FSS after this proceeding is completed).”<sup>39</sup> More specifically, PISC has outlined three different scenarios that would allow coordinated sharing of every unused megahertz across the entire 3.7-4.2 GHz band, but could result in different rights for P2MP (and potentially for mobile or LAN) operators.<sup>40</sup>

**Upper Ongoing FSS Segment:** First, as the Commission suggested in the *NPRM*, authorizing P2MP operators to coordinate use of an upper portion of C-band that will continue to be available for FSS incumbents indefinitely should raise no barrier at all to Part 101 licensing of P2MP entrants that successfully coordinate into locally-unused spectrum and deploy service. Even under the ACA Connects Proposal, there would be 130 megahertz of FSS spectrum indefinitely dedicated to video and radio distribution and, as the Reed Study establishes, all 130 megahertz could be put to work for P2MP in 78% of the country where 80 million Americans live. And even if the Commission decided that it wanted to leave open the possibility that the last remaining FSS portion of the band will be cleared for auction at some unknowable future time, the Part 101 licenses could be non-renewable and/or issued for shorter increments of time (e.g., five years) and subject to a condition that the Commission may well reallocate the spectrum.

**Lower Flexible-Use Segment:** Second, as PISC and the Broadband Connects America coalition have repeatedly proposed in this proceeding,<sup>41</sup> the Commission should authorize P2MP operations to coordinate use of the future ‘flexible use’ portion of the band on an *opportunistic basis* (e.g., licensed by rule), subject to AFC control and revocable permission to continue

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<sup>39</sup> Comments of Google at 6-7; *see also* *NPRM*; Comments of Google, GN Docket No. 18-122, RM-11791, RM-11778, at 4 (Oct. 29, 2018) (suggesting rule changes to Rule 101.103).

<sup>40</sup> *See* *NPRM Reply Comments of the Public Interest Spectrum Coalition* at 11-14 (Dec. 11, 2018) (“*NPRM Reply Comments of PISC*”).

<sup>41</sup> *See, e.g., NPRM Comments of the Public Interest Spectrum Coalition*, GN Docket No. 18-122, at 13, 19-22 (Oct. 29, 2018); *NPRM Reply Comments of PISC* at 14-21; *NPRM Comments of the Broadband Connects America Coalition*, GN Docket No. 18-122 at 21-23 (Oct. 29, 2018); *NPRM Comments of Broadband Access Coalition*, GN Docket No. 18-122 at 30, 34 (Oct. 29, 2018).

operating.<sup>42</sup> Like General Authorized Access to locally-unused Priority Access License spectrum in the 3.5 GHz Citizens Broadband Radio Service (CBRS) band, terrestrial users – whether PTMP, mobile carriers, or small cell LANs – should be able to make temporary (opportunistic) use of the cleared and auctioned lower portions of C-band until such time as the primary licensee commences service. Whether the Commission consolidates FSS incumbents onto 300 megahertz or 130 megahertz, 5G mobile services will not be built out in rural and other less-densely-populated areas for many years. These opportunistic users would be secondary – and the Commission can, as in CBRS, adopt a band-wide operability requirement and certify an AFC to ensure seamless compliance.

**Middle/Reserved Segment:** Third, if the Commission decides that FSS will be cleared from the bottom of the band in two stages – with FSS continuing to operate in a portion of the band that is designated for future reallocation to flexible use (e.g., 3900-4070 MHz) – this middle segment can similarly be authorized for *opportunistic* (e.g., licensed by rule) coordination between PTMP and the remaining FSS incumbents. The coordination process would be no different than in the upper band segment, except that—as in the lower segment—the AFC system would be able to revoke the permission to operate or require a change in operating conditions as needed to protect and ultimately transition from FSS to the deployments of a future flexible use licensee. Opportunistic access controlled by an automated AFC database would empower a wide variety of small and alternative providers to use fallow spectrum in local areas to provide high-speed broadband, enterprise LANs and other services, while retaining the primary licensee’s right to exclusive use of that spectrum whenever the carrier is ready to commence service.<sup>43</sup>

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<sup>42</sup> Comments of PISC at 17-21.

<sup>43</sup> See generally Michael A. Calabrese, “Use it or Share it: Unlocking the Vast Wasteland of Fallow Spectrum,” New America Foundation, presented at 39<sup>th</sup> Research Conference on Communication, Information and Information Policy (TPRC) (Sep. 23, 2011).

#### **IV. AN OVERLAY AUCTION OF THE REMAINING FSS PORTION OF C-BAND IS A RECIPE FOR WAREHOUSING UNUSED SPECTRUM AND ENSURING THE COMMISSION COULD NEVER CLEAR AND AUCTION IT NATIONWIDE IN THE FUTURE**

Several commenters from the mobile industry argue that the Commission should abandon its proposal to authorize coordinated sharing among P2MP services and FSS earth stations in the ongoing FSS portion of the band and instead conduct an overlay auction for the right to negotiate access with FSS incumbents.<sup>44</sup> For example, Verizon argues: “The market, not Commission rules, should determine whether new entrants choose to offer mobile or fixed service (including point-to-multipoint).”<sup>45</sup> AT&T suggests that P2MP operators “could secure spectrum in [the reallocated portion] of this band at auction or through secondary market mechanisms. By the same token, to the extent that terrestrial wireless services, fixed or otherwise, could coexist with satellite use in the portion of the C-band reserved for FSS, the FCC should auction those valuable rights, not give them away.”<sup>46</sup>

PISC agrees with the mobile carriers that any C-band auction should make flexible-use spectrum fairly available for mobile and fixed deployments. WISPs and other fixed wireless ISPs should not be excluded. This is one reason why PISC, WISPs and regional ISPs oppose a private sale or auction. An auction for flexible-use spectrum should be transparent and available to *all* ISPs. To achieve these goals, the license areas for at least half the cleared band should be small enough (such as census tracts or counties) to make it plausible for small and rural wireless ISPs to bid on and win areas where they operate and bring high-speed broadband to their local communities. Regardless of the nature of the auction for the lower portion of the band, the mobile industry argument is completely irrelevant to coordinated access to unused *Fixed Satellite*

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<sup>44</sup> Comments of Verizon at 17; Comments of CTIA at 11; Comments of T-Mobile at 20; Comments of AT&T at 12.

<sup>45</sup> Comments of Verizon at 17.

<sup>46</sup> Comments of AT&T at 12-13.

*Services (FSS)* spectrum in local areas where incumbents will continue to have primary licensing rights.

PISC further agrees with the mobile carriers that coordinated sharing should be open to not only fixed PTMP operations, but also to mobile small cell and enterprise LAN deployments that can satisfy the coordination requirements and avoid interference with FSS earth stations. The problem is that the big mobile carriers go further and claim that equity somehow suggests that the *unused* spectrum in the ongoing FSS portion of C-band should not be coordinated for shared use on a local basis, but should instead be subject to an overlay auction that would (in practice) guarantee that it remains unused in most rural and other underserved areas. Although we suspect the mobile industry ‘proposal’ is not much more than a debating point, several considerations are relevant if the Commission considers it:

**First**, the public interest purpose of authorizing coordinated sharing of unused spectrum in the ongoing FSS portion of the band is to encourage more intensive use of spectrum that will not be auctioned or that will not be auctioned or used for many years. As the Reed Study shows, the co-channel coordination of unused FSS spectrum is feasible primarily in low-density rural, exurban and other areas that are the least desirable and profitable for mobile 5G. Unused spectrum should not lie fallow when it could be used to help narrow the rural divide. An overlay auction is a recipe for leaving unused FSS spectrum fallow in precisely the communities (low population density, high cost, low ARPU) that need spectrum for high-speed fixed wireless broadband deployments.

**Second**, coordinated sharing among FSS and Fixed Service operators is the status quo across the entire 1,000 megahertz of the downlink and uplink C-band segments. The 3.7-4.2 GHz is currently allocated for co-primary, coordinated use by FSS and FS operators. This framework

is how Verizon and AT&T obtained and currently enjoy “free” coordinated use of C-band for thousands of fixed point-to-point links. Through this NPRM, the Commission has simply proposed to redefine the FS in the C-Band to include P2MP as one of the uses that shares the spectrum on a coordinated basis. This sharing is now both technically feasible and far more important to the public interest because of its potential to serve rural and other low-density areas where Verizon, AT&T, and cable companies have declined to deploy high-speed broadband—not because it’s unprofitable to serve these areas, but because the margins are not high enough to meet their standards. This lack of deployment has left these communities at a severe socioeconomic disadvantage.

**Third**, the suggestion of an overlay auction completely contradicts the argument that the ongoing FSS portion of the band should remain available for potential clearing and exclusive, flexible-use licensing in the future. Under the proposals put forth by both CBA and ACA Connects, the vast majority of earth stations (certainly more than 10,000) would be consolidated into as much as 300 megahertz or as little as 130 megahertz. Either way, an overlay auction would effectively make it impossible for the Commission to adopt a nationwide clearing and auction plan at a later date. The ongoing FSS portion of C-band would be populated not only by more than 10,000 earth stations, but also by a new set of incumbents with cheaply-purchased overlay rights. Both would need to be paid off to clear more spectrum. Although the new overlay license holders might be willing to pay earth stations to clear spectrum in targeted urban markets, those licensees would be even more likely than usual to let the unused FSS spectrum lie fallow indefinitely in rural, other less densely-populated, and lower ARPU communities.

A better policy is PISC’s proposal that if the Commission decides it wants to preserve the option to clear and auction a second segment of the band in the future, it should at least authorize

*opportunistic* sharing in the meantime, controlled by automated frequency coordination.<sup>47</sup>

Opportunistic sharing of this spectrum is possible thanks to advances in dynamic spectrum sharing databases, as the Dynamic Spectrum Alliance argues, these databases can allow “coordination for both licensed and opportunistic sharing, as well as ensuring the most efficient use of the band in favor of rural and underserved communities that stand to benefit the most if the FCC authorizes coordinated P2MP sharing.”<sup>48</sup> Google similarly posits that even if the Commission were to adopt the argument put forward by the satellite companies that only 200 megahertz can be freed up and that only the upper 300 megahertz of the 3.7-4.2 GHz band would be home to FSS, fixed point-to-multipoint providers would still be able to deploy high-speed broadband to more than 80 million Americans.<sup>49</sup>

**Fourth**, AT&T’s contention that the Commission should auction and “not give [licenses] away”<sup>50</sup> in regards to local access to unused FSS spectrum is both the height of hypocrisy and a thinly-veiled continuation of the mobile industry crusade to deny rural ISPs and any other potential wireless operator with the mid-band spectrum needed to deploy and compete. Since auctions began in 1994, they have been limited to *exclusive* flexible-use licenses specifically fashioned to promote ubiquitous, wide-area mobile coverage. That industrial policy has generally served the public interest. But the fact remains that most spectrum bands are allocated for coordinated, shared use—a method that is both spectrum efficient and serves the public interest by facilitating other services (e.g., FS and FSS) that do not require exclusive control of a

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<sup>47</sup> Comments of PISC at 4 (“Whether the Commission consolidates FSS earth stations onto 300 megahertz or 130 megahertz, 5G mobile services will not be built out in rural and other less-densely-populated areas for many years. As PISC recommended in its initial Comments, we urge the Commission to authorize P2MP operations to coordinate use of the future ‘flexible use’ portion of the band on an opportunistic basis (e.g., licensed by rule), subject to AFC control and revocable permission to continue operating.”).

<sup>48</sup> Comments of the Dynamic Spectrum Alliance, GN Docket No. 18-122, at 3 (Aug. 7, 2019).

<sup>49</sup> Comments of Google at 4 (citing the Reed Study).

<sup>50</sup> Comments of AT&T at 13.

frequency band. Coordinated and shared use policies have helped AT&T, Verizon and other carriers gain their “free” access to huge tracts of prime spectrum—tens of billions of dollars worth of uplink C-band and other spectrum—for their tens of thousands of FS links. That spectrum has not been auctioned. It is coordinated for sharing, a long-established FCC policy that is clearly in the public interest due to the fact that it enables more efficient, flexible, and intensive coordination of shared use without paying anything beyond a nominal processing fee.

**Finally**, if the mobile carriers’ real complaint is that fixed wireless operators are in a unique position to coordinate into unused FSS spectrum (due to directional antennas and sectorization), the alternative that best serves the public interest is to authorize “flexible use coordination,” including by mobile carriers for small cells in highly-localized areas. As PISC explained in its Comments, the authorization of coordinated access to unused spectrum across the entire 3.7 GHz band can also benefit enterprise and institutional networks deployed in discrete local areas where they will not interfere with FSS or, in the flexible-use portion of the band, where new mobile licensees have not deployed.<sup>51</sup>

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<sup>51</sup> Comments of PISC at 14 (“Opportunistic access controlled by an automated AFC database would 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 with its own operations in the licensed band.”).



## V. CONCLUSION

PISC urges the Commission to take full advantage of this unique opportunity to ensure that *all 500 megahertz* of today's grossly underutilized C-band are put to work to boost both America's 5G future as well as to close the rural broadband divide. The clearing and sharing proposals in the *NPRM* each represent a potential win-win-win outcome: more flexible-use spectrum for 5G; coordinated access to unused mid-band spectrum to fuel more affordable, high-capacity fixed wireless deployments in rural and underserved areas; and both full cost reimbursements and protection from harmful interference for existing FSS incumbents.

Respectfully submitted,

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