

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of	)	
	)	
Expanding Flexible Use of the	)	GN Docket No. 18-122
3.7 to 4.2 GHz Band	)	

**REPLY COMMENTS OF MICROSOFT CORPORATION**

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## SUMMARY

Two of the Commission's highest policy priorities are closing the digital divide and winning the race to 5G. Microsoft's proposal promotes both of these priorities by segmenting the 3.7 GHz band to (1) clear the lower 100 megahertz for "flexible use" service optimized for 5G; (2) share the upper 400 megahertz between fixed satellite service ("FSS") downlinks and frequency coordinated, licensed, point-to-multipoint ("P2MP") fixed wireless broadband service; and (3) permit opportunistic sharing by P2MP operators of the flexible use and guard band portions of the band on a "use-or-share" basis. Much work remains to close the digital divide. Without broadband access, individuals and businesses cannot participate in, and benefit from the digital transformation.

At present, C-band downlink spectrum is not being used efficiently, particularly in rural areas where the proposed P2MP fixed service would be highly valuable in helping to close the digital divide. As a result, the Commission should move forward to enable P2MP to share the upper portion of the 3.7 GHz band with FSS, so long as FSS downlinks are protected from harmful interference. In addition, the Commission should permit P2MP in the "flexible use" and guard band portions of the 3.7 GHz band on an opportunistic, "use it or share it" basis, particularly in rural areas.

Opposition to sharing the 3.7 GHz band from satellite operators, and mobile network operators and vendors, is based on their interest in holding open the possibility, no matter how unrealistic or how far in the future, that the entire 3.7 GHz band can be "sold" or otherwise made available for 5G. The satellite operator perspective is quite simple: the more spectrum

that can ultimately be re-purposed through private market transactions, the bigger the multi-billion windfall to satellite operators.

The concerns expressed by satellite content providers regarding sharing with fixed P2MP broadband operations can and will be addressed. These concerns are as follows: (1) there will not be enough spectrum for P2MP service after all receive-only earth station are registered; (2) satellite content providers will be blocked from repacking into the upper portion of the 3.7 GHz band by P2MP operators; (3) eliminating the full-band, full-arc policy will remove the flexibility required by satellite content providers to access different satellites or transponders; (4) providing operational data for each earth station will be unduly burdensome; and (5) fixed P2MP operators will cause interference to C-band downlinks.

First, the assertion by FSS users that new earth station registrations somehow undermine the economic feasibility of P2MP sharing makes no sense. The economic case for sharing is made on a market-by-market basis, not a nationwide basis. Further, it is the P2MP operators, not the FSS users, who are best positioned to assess the market viability of deploying P2MP in any given market. Finally, the geographic and frequency scope of the new registrations remains to be analyzed. The registration of additional earth stations at an existing earth station site does nothing to reduce the opportunities for co-channel P2MP sharing, and the registration of additional earth stations that use only a fraction of the 500 megahertz available in the C-band will have minimal impact on non-co-channel sharing.

Second, FSS users will not be blocked by P2MP operators from repacking into the upper portion of the 3.7 GHz band. P2MP proponents recognize that FSS users will need to clear the portion of the lower 3.7 GHz band set aside for flexible use, and their operations will need to be

re-located to the upper portion of the 3.7 GHz band. These P2MP proponents support rules that will ensure that FSS users will have the flexibility to repack their operations, and access whatever satellites and transponders are necessary to do so, by requiring P2MP operators to accommodate such operational changes.

Third, eliminating the full-band, full-arc policy will maximize sharing of the 3.7 GHz band while retaining the necessary flexibility for FSS users. P2MP operators will be required to rapidly accommodate FSS users who need to change satellites or transponders. The best way to implement comprehensive frequency coordination between FSS earth stations and P2MP operators is to implement an automated coordination mechanism.

Fourth, it is entirely reasonable to require FSS users to provide operational data. FSS users should not be excused from providing this information because it will require some work on their part. All licensed spectrum users have an obligation to provide data on their operations. FSS users should be no different. Microsoft recommends that the Commission require the satellite operators to collect, or arrange for the collection of, the requisite operational data from earth station operators.

Fifth, C-band FSS earth stations can be protected from harmful interference from terrestrial Fixed Service links. The Commission has long-since adopted rules for wireless broadband service in the 3.65 – 3.70 GHz band so that fixed links could share the band on a secondary basis with FSS C-band earth stations.

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Microsoft Corporation (“Microsoft”) hereby submits its Reply Comments in response to Comments filed in the above-captioned Order and Notice of Proposed Rulemaking (“NPRM”).<sup>1</sup>

**I. Microsoft’s Proposal for Segmenting the 3.7 GHz Band Strikes the Appropriate Balance Between Different Commission Priorities**

Two of the Commission’s highest policy priorities are closing the digital divide and winning the race to 5G. Microsoft’s proposal promotes both of these priorities by segmenting the 3.7 GHz band to (1) clear the lower 100 megahertz for “flexible use” service optimized for 5G; (2) share the upper 400 megahertz between fixed satellite service (“FSS”) downlinks and frequency coordinated, licensed, point-to-multipoint (“P2MP”) fixed wireless broadband service; and (3) permit opportunistic sharing by P2MP operators of the flexible use and guard band portions of the band on a “use-or-share” basis. As widely recognized, the propagation characteristics of, and available bandwidth in, mid-band spectrum, including the 3.7 GHz band, make it the “sweet spot” for balancing broadband coverage and broadband capacity.<sup>2</sup>

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<sup>1</sup> *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 (rel. July 13, 2018) (the 3.7 – 4.2 GHz band will be referred to in these Comments as the “3.7 GHz band” or “C-band”). Unless otherwise noted, all Comments referenced herein were filed on or about October 29, 2018 in response to the NPRM.

<sup>2</sup> See, e.g., Comments of Starry, Inc. at 2 (“The 3.7 GHz band ... is a spectral sweet spot .... On the fixed side, the possibility of wide bandwidths, spectral re-use, and propagation through physical obstacles makes the band incredibly useful as a layer in site-based licensed, gigabit capable, fixed point-to-multipoint networks.”)

We commend Commission Chairman Ajit Pai for clearly recognizing the need to close the digital divide.

On my first day as FCC Chairman in January 2017, I said that the number one priority was closing the digital divide and bringing the benefits of the Internet age to all Americans.<sup>3</sup>

In this and other proceedings, many commenters, including Microsoft, have described the broadband gap in rural America, and the resulting social and economic harms to these communities.<sup>4</sup> Reducing this divide drives Microsoft as we work with wireless internet service providers across the country under our Airband initiative to utilize unassigned and unused spectrum in the TV White Spaces to provide fixed wireless broadband access to unserved and underserved communities. Microsoft submits that the Commission's proposal to authorize fixed P2MP operations to share the upper portion of the 3.7 GHz band with FSS downlink users would be another important policy tool to help close the digital divide.

Microsoft also recognizes that another of the Chairman's priorities is to make spectrum available for 5G services. "Pushing more 5G spectrum into the marketplace," including spectrum in the 3.7 GHz band, is cited as the first component of the Chairman's Facilitate America's Superiority in 5G Technology (the 5G Fast Plan).<sup>5</sup> In general, Microsoft supports making more spectrum available for 5G services.

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<sup>3</sup> See Remarks of FCC Chairman Ajit Pai at the Farm Foundation/U.S. Department of Agriculture Summit, April 18, 2018 at 1.

<sup>4</sup> See Comments of Broadband Connects America Coalition at 5 – 16; Comments of the Public Interest Spectrum Coalition ("PISC") at 5 – 8; and Comments of the Broadband Access Coalition ("BAC") at 8 – 11.

<sup>5</sup> See "The FCC's 5G FAST Plan," rel. Sept. 28, 2018, <https://docs.fcc.gov/public/attachments/DOC-354326A1.pdf>. The Chairman's strategy includes three key components: (1) pushing more spectrum into the marketplace; (2) updating infrastructure policy; and (3) modernizing outdated regulations.

Microsoft also recognizes the value that C-band FSS downlinks provide for the distribution of audio and video programming, including sports and news programming.<sup>6</sup> And as an active participant in the Citizens Broadband Radio Service (“CBRS”) proceeding, Microsoft knows that the Commission seeks to ensure that existing C-band users are protected from harmful interference.

Microsoft’s proposal allows the Commission to balance its priorities. An additional 100 megahertz of mid-band spectrum, from 3.7 – 3.8 GHz, would be made available for mobile services. In many countries, the 3.4 – 3.8 GHz band is being re-purposed for small cell operations and will be the first spectrum in which mobile 5G is rolled out. Re-purposing the lowest 100 megahertz in the 3.7 GHz band for 5G mobile supports global harmonization. Finally, based on the Commission’s extensive experience crafting technical rules for the CBRS band, Microsoft is more than confident that the Commission can again fashion technical and service rules to protect C-band downlinks from fixed P2MP links.

## **II. Spectrum in the 3.7 GHz Band is Not Being Used Efficiently**

C-band downlink spectrum is not being used efficiently, particularly in rural areas where the proposed P2MP fixed service would be highly valuable in helping to close the digital divide. As a result, the Commission should move forward to enable P2MP to share the upper portion of the 3.7 GHz band with FSS, so long as FSS downlinks are protected from harmful interference.

Market indicators are the strongest signal that spectrum in the 3.7 GHz band is not being used efficiently. There could be no better indicator regarding the inefficient use of the

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<sup>6</sup> See, e.g. Comments of the Content Companies at 1 (discussing the value of satellite distribution of content to over 100 million American households).

3.7 GHz band than the willingness, indeed eagerness, of the C-band operators to “sell” 200 megahertz of the 500 megahertz available for their use, in a secondary market through private transactions. Even assuming that the lower 200 megahertz of the 3.7 GHz band is cleared for mobile service, and existing FSS downlinks must be repacked into the upper 300 megahertz, Microsoft is confident that there will remain enormous opportunities for P2MP to share with incumbent FSS downlinks in rural areas.

As PISC points out:

Although FSS incumbents opine that they *may* need access to currently unused portions of the band in the future, there is little dispute that currently more than 90 percent of the band’s spectral capacity lies fallow. For example, the BAC Petition noted that while 975 receive-only C-Band earth stations licensed to the Associated Press (as of 2017) reserve the entire 3700-4200 MHz range of spectrum, AP’s website stated that the service uses only a single, 23-megahertz satellite transponder for each of these earth stations. This means that as much as 477 megahertz of spectrum may not be in use in the area around AP’s earth stations. Another example is National Public Radio, which reports that its 475 radio earth stations use four FSS transponders that transmit between 3702 – 3858 MHz. That means NPR is using a maximum of 160 MHz (including guard bands) in each of the 475 communities where it has registered a FSS earth station.<sup>7</sup>

If the 10 percent spectrum utilization number is accurate, even after accounting for new registrations in the past several months, overall utilization of satellite spectrum will still be quite low, because such usage started from a very low base. And, as noted above, spectrum utilization is likely to be less intense in rural areas.

### **III. There is Broad Support for P2MP Operations in the 3.7 GHz Band from Those Seeking to Close the Rural Digital Divide**

Companies and consumer groups seeking to close the rural digital divide strongly support deployment of P2MP operations in the 3.7 GHz band. For example, Frontier is both a

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<sup>7</sup> Comments of PISC at 14 (emphasis in original, internal citations omitted).

rural broadband provider as well as a large FSS C-band downlink user.<sup>8</sup> Frontier believes that the Commission can work towards rules that protect existing users, including its own C-band downlinks, while allowing for new uses such as P2MP.<sup>9</sup>

Google observes that “the C-band represents an unparalleled opportunity to bring 5G fixed [P2MP] service rapidly to Americans, particularly those in traditionally unserved areas.”<sup>10</sup>

Starry notes that 3.7 GHz band spectrum, when combined with other bands, will provide “a robust set of spectrum tools to deploy a highly-competitive and agile fixed network that can scale economically across geographies and household densities, bringing new access and competition to consumers across the country.”<sup>11</sup> The Public Interest Spectrum Coalition “strongly supports the Commission’s proposal ... for a [P2MP] fixed wireless service that empowers providers to extend high-speed broadband to rural, tribal, small town and other underserved areas.”<sup>12</sup> The Dynamic Spectrum Alliance (“DSA”) supports fixed P2MP operations throughout the 3.7 GHz band.<sup>13</sup>

#### **IV. Satellite Operators, and Mobile Network Operators and Vendors, Oppose P2MP Because They Seek to Make the Entire 3.7 GHz Band Available to Mobile 5G**

Much of the opposition to sharing the upper portion of the C-band, particularly the opposition from satellite operators, as well as mobile network operators and vendors, is based on their interest in holding open the possibility, no matter how unrealistic or how far in the future, that the entire 3.7 GHz band can be “sold” (the view of the satellite operators) or

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<sup>8</sup> Comments of Frontier Communications Corporation and Windstream Services, LLC at 4.

<sup>9</sup> *Id.*

<sup>10</sup> Comments of Google LLC at 1.

<sup>11</sup> Comments of Starry, Inc. at 5.

<sup>12</sup> Comments of PISC at 2. *See, also*, Comments of the Broadband Connects America Coalition at 2 (supporting the use of unused spectrum in the 3.7 GHz band to provide high-speed broadband to rural areas).

<sup>13</sup> Comments of DSA at 5.

otherwise made available for 5G. For example, the C-Band Alliance made quite clear its longer-term interest in “selling” more spectrum:

The [P2MP] proposal also creates a longer-term detriment to efficient spectrum use. \*\*\* If this proposal is implemented, satellite operators will lose the ability to use the C-Band more intensively. *This will negatively impact the ability to repurpose spectrum to support 5G in the future ....*<sup>14</sup>

The satellite operator perspective is quite simple: the more spectrum that can ultimately be repurposed through private market transactions, the bigger their windfall. And who can blame them, when estimates of the value of the spectrum are in the tens of billions of dollars.<sup>15</sup>

From the vantage point of mobile network operators, more spectrum is always better than less spectrum. And particularly where the spectrum will be auctioned in some form, whether by private transactions or a Commission auction, the more spectrum available, the lower the price per megahertz. From the vantage point of mobile network vendors, 5G has the potential to generate substantial revenue, and the more operators that build out 5G, the more opportunities to sell equipment.

These views are made crystal clear in the Comments. For example:

- T-Mobile: “The first phase of the T-Mobile market plan would be a forward auction for licenses for all 500 megahertz of spectrum in each geographic area.”<sup>16</sup>
- Ericsson: “Authorizing a dedicated P2MP service in the 3.7-4.2 GHz band would add encumbrances and, even if limited to the repacked band, would restrict the Commission’s ability to repurpose that spectrum if necessary at a later juncture for mobile broadband use.”<sup>17</sup>
- Nokia: “The highest and best use of the 3.7 GHz band is for licensed 5G terrestrial services. Ideally, over time, the entire 500 MHz would be reallocated for intensive 5G

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<sup>14</sup> Comments of the C-Band Alliance, Appendix A, Maximizing the Value of the C-Band, at 34 (emphasis added).

<sup>15</sup> See, e.g., Kerrisdale Capital, June 2018, <https://www.kerrisdalecap.com/wp-content/uploads/2018/06/Intelsat-and-SES.pdf> (estimating the market value of 400 megahertz of C-band spectrum at approximately \$60 billion).

<sup>16</sup> Comments of T-Mobile at 5.

<sup>17</sup> Comments of Ericsson at 17.

use .... Introduction, and proliferation, of point-to-multi-point services as a special class of service licensed outside of the flexible use framework, in any part of the band, would complicate the expansion of 5G services, including mobile 5G, throughout the band.”<sup>18</sup>

- Intel/Intelsat/SES: “Simply put, the P2MP proposal is incompatible with expanded terrestrial mobile 5G use of the band.”<sup>19</sup>
- Qualcomm: “Opening this band for such Part 101 operations at this point in time would prejudice the potential uses for this band and curtail the full use of the 3.7-4.2 GHz band for mobile services.”<sup>20</sup>
- CTIA: “Any proposal to allow use of even some portion of the band for P2MP is at odds with the goal of clearing existing uses and maximizing the amount of spectrum to be repurposed for 5G .... Further encumbering the band at this point is not prudent, as it will only complicate repacking and further repurposing.”<sup>21</sup>

#### **V. The Concerns Expressed by Satellite Content Providers Regarding Sharing with Fixed P2MP Broadband Operations Can and Will Be Addressed**

The Broadband Access Coalition and Google, among others, have repeatedly demonstrated that P2MP can successfully share the 3.7 GHz band with incumbent satellite content providers using well-established frequency coordination procedures.<sup>22</sup> Nonetheless, satellite content providers have expressed the following concerns: (1) there will not be enough spectrum for P2MP service after all receive-only earth stations are registered; (2) satellite content providers will be blocked from repacking into the upper portion of the 3.7 GHz band by P2MP operators; (3) eliminating the full-band, full-arc policy will remove the flexibility required by satellite content providers to access different satellites or transponders; (4) providing

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<sup>18</sup> Comments of Nokia at 9.

<sup>19</sup> Comments of Intel Corporation, Intelsat License LLC, and SES Americom at 8-9.

<sup>20</sup> Comments of Qualcomm at 7.

<sup>21</sup> Comments of CTIA at 26.

<sup>22</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 can be found at: <https://ecfsapi.fcc.gov/file/10329174176162/Notice%20of%20Ex%20Parte%20Meetings%20-%20Broadband%20Access%20Coalition%20and%20Google%20LLC.pdf>.

operational data for each earth station will be unduly burdensome; and (5) fixed P2MP operators will cause interference to C-band downlinks. Microsoft will address each of these concerns.

**A. C-Band FSS Users Should be Indifferent to the Scope of P2MP Sharing Opportunities After All Receive-Only Earth Stations Have Been Registered**

Purported concerns expressed by C-band FSS users about the availability of spectrum for P2MP services are a red herring. FSS users assert that new earth station registrations, bringing the total number of registered earth stations to at least 16,500, somehow undermine the economic feasibility of P2MP sharing. This assertion makes no sense. First, the geographic and frequency scope of the new registrations remains to be analyzed. The registration of additional earth stations at an existing earth station site does nothing to reduce the opportunities for co-channel P2MP sharing, because that site is already protected. Further, the registration of additional earth stations that use only a fraction of the 500 megahertz available in the C-band will have minimal impact on non-co-channel sharing. In all events, Microsoft believes that there will be large swaths of rural America that will remain wide open for P2MP sharing.

More fundamentally, Microsoft submits that the economic case for sharing is made on a market-by-market basis, not a nationwide basis. Thus, even if fewer markets are available nationwide, the economic case for all of the remaining markets remains unchanged. Further, it is the P2MP operators, not the FSS users, who are best positioned to assess the market viability of deploying P2MP in any given market. Given the persistent digital divide in rural areas, Microsoft believes that P2MP fixed wireless broadband in the 3.7 GHz band will be an invaluable tool in helping to close this divide.

**B. FSS Users Will Not be Blocked by P2MP Operators from Repacking into the Upper Portion of the 3.7 GHz Band**

Microsoft recognizes the FSS users will need to clear the portion of the lower 3.7 GHz band set aside for flexible use, and their operations will need to be re-located to the upper portion of the 3.7 GHz band. To accommodate this re-location, Microsoft supports a requirement that all P2MP devices be frequency agile, and capable of operating on any 20 megahertz channel in the 3.7 GHz band. Further, Microsoft supports the Commission's proposal to authorize P2MP to "operate on a secondary basis vis-à-vis FSS in any part of the band in which FSS continues to operate during a transition period to accommodate repacking and thereafter, on a frequency-coordinated basis to protect actual FSS operations."<sup>23</sup> Simply put, FSS users will have the flexibility to repack their operations and access whatever satellites and transponders are necessary to do so; P2MP operators will be required to accommodate such operational changes.

**C. Eliminating the Full-Band, Full-Arc Policy Will Maximize Sharing of the 3.7 GHz Band While Retaining the Necessary Flexibility for FSS Users**

Microsoft agrees with the many commenters who support elimination of the antiquated full-band, full-arc policy. The concerns expressed by FSS users regarding elimination of the full-band, full-arc policy are misplaced. FSS users will continue to have the necessary flexibility to respond to transponder outages, or to enter into new contracts, without the need for the full-band, full-arc policy. P2MP operators will be required to rapidly accommodate FSS users who need to change transponders or satellites.

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<sup>23</sup> NPRM at ¶ 116.

Satellite transponder outages were never common. To the credit of the satellite industry, FSS satellites are now more reliable than ever.<sup>24</sup> It makes no sense to exclude P2MP services from a wide swath of mid-band spectrum because of the rare event of a satellite transponder outage. The better, and more spectrally efficient approach, is to implement a system that rapidly addresses these anomalous situations when they occur.

An essential element to determining how to address these situations is to assess the time frame needed for FSS users to make the necessary changes to access a different satellite or transponder. From the Comments, it is not clear whether the time scale for FSS users to make such changes is on the order of minutes or hours. For example:

- GCI: “GCI ... requires the ability to operate on other western arc satellites with very little notice (*i.e.*, less than four hours) in order to provide restoration of terrestrial networks that service rural Alaska.”<sup>25</sup>
- Luken Communications: “[Satellite] failure required all Luken related earth stations to re-orient to alternate positions and frequencies. The transition to the new satellite coordinates by Luken was able to be performed in less than 12 hours, in some cases it took more than a week for some of Luken’s three hundred affiliates to make the necessary changes.”<sup>26</sup>
- NPR: “To operate effectively, earth stations must have the ability to reorient within minutes to different frequencies or different satellites in case of a disruptive event.”<sup>27</sup>

The key to sharing the 3.7 GHz band is the establishment of a database with the operating parameters of all FSS earth stations. If an FSS operator needs to change satellites or transponders, and it seeks interference protection, it would be required to provide notification

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<sup>24</sup> Comments of NCTA at 26 (“Although frequency and antenna angle changes may not occur frequently today, the occurrence of such changes will likely increase if the Commission reduces the amount of spectrum available to accommodate C-band services”).

<sup>25</sup> Comments of GCI at 13.

<sup>26</sup> Comments of Luken Communications, LLC at 5.

<sup>27</sup> Comments of NPR at 8. NPR does not provide any indication of how many minutes it requires.

to that database. In turn, P2MP operators must be required to “poll” the database at frequent enough intervals to “recognize” when and where FSS operators need operational flexibility. Microsoft recommends that the polling interval be 60 minutes. If the FSS user requires an operational change outside the scope of the prior frequency coordination, the P2MP operator would be required to vacate the impacted frequencies almost immediately.

The best way to implement comprehensive frequency coordination between FSS earth stations and P2MP operators is to implement an automated coordination mechanism. Several commenters agreed with Microsoft that automation of the frequency coordination process should occur as soon as practicable.<sup>28</sup> Furthermore, the automated coordination mechanism should be developed by a multi-stakeholder group, including representatives of the satellite service providers, satellite users (including the cable and broadcast industries), and fixed wireless broadband providers.<sup>29</sup> An automated coordination mechanism will accelerate the initial frequency coordination process. In addition, an automated coordination mechanism will facilitate the process of P2MP operators clearing spectrum, on very short notice, when FSS users need to make operational changes. Finally, an automated coordination mechanism will increase the reliability and real-world accuracy of the frequency coordination process, thereby maximizing sharing opportunities while minimizing the possibility of interference to C-band

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<sup>28</sup> See, e.g., Comments of DSA at 6 (“[t]he Commission should act rapidly to replace the system of manual expedited coordination ... with a fully automated dynamic spectrum management database system”); Comments of PISC at 17 (“the existing Part 101 frequency coordination process should be automated as soon as possible”). See, also, Comments of the Broadband Access Coalition at 32 (proposing a transition over time to an automated frequency coordination process); Comments of Google at 5 (observing that “automated systems employing industry-specified interference criteria and propagation models could support rapid notification, coordination, and authorization”).

<sup>29</sup> See, e.g., Comments of the Broadband Access Coalition at 32 (“the automated frequency coordination standards would be developed over time by industry stakeholders, including the satellite industry”).

earth stations. Microsoft reiterates, however, that nothing as complex as the Spectrum Access System (“SAS”) will be needed for frequency coordination in the 3.7 GHz band. Unlike the Citizens Broadband Radio Service (“CBRS”) band where there are three levels of prioritization for access, and new and incumbent *mobile* users, the 3.7 GHz band will be used only by fixed users at known locations operating on known frequencies, and, in the case of P2MP operators, with sectorized (rather than omnidirectional) antennas.

#### **D. Requiring FSS Users to Provide Operational Data is Entirely Reasonable**

There was strong support for the Commission’s proposal to “develop a more complete record on existing FSS operations in the [3.7 GHz] band [by requiring] earth station operators to file additional information on their existing facilities.”<sup>30</sup> For example, T-Mobile states that “[t]he additional proposed information collection is necessary . . . to show exactly how the band is used.”<sup>31</sup> Starry, Inc. urges the Commission to “exercise its authority to gain as much detail about the incumbents’ *actual* use of the band to make an informed decision about how best to increase the intensity of terrestrial operations,”<sup>32</sup> and thus, Starry “support[s] the Commission’s collection of both earth station information (fixed and transportable) and space station information ....”<sup>33</sup> It is widely recognized that operational information, particularly the frequencies being used, is essential to maximize sharing of the 3.7 GHz band.

FSS users should not be excused from providing this information because it will require some work on their part. All licensed spectrum users have an obligation to provide data on

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<sup>30</sup> NPRM at ¶ 41.

<sup>31</sup> Comments of T-Mobile at 18 – 19.

<sup>32</sup> Comments of Starry, Inc. at 4 (emphasis in original).

<sup>33</sup> *Id.*

their operations. FSS users should be no different. Verizon proposes that satellite operators be required to verify the information submitted by earth station operators.<sup>34</sup> Microsoft recommends instead that the Commission require the satellite operators to collect, or arrange for the collection of, the requisite operational data from earth station operators. As Verizon notes “satellite operators are in the best position to determine whether the information the Commission receives is accurate. Earth station users have no independent ability to use satellite capacity – those rights are based solely on agreements with satellite operators.”<sup>35</sup> Requiring satellite operators to be responsible for the collection of the requisite earth station operational data is consistent with the proposal of the C-Band Alliance to provide an “on-line customer portal ... to manage customer and earth station transitions ... accurate data is key to protecting all sites.”<sup>36</sup>

#### **E. C-Band FSS Earth Stations Can be Protected from Harmful Interference**

Protecting FSS C-band earth stations from terrestrial Fixed Service links is a well understood problem. In fact, more than a decade ago, the Commission adopted rules for wireless broadband service in the 3.65 – 3.70 GHz band so that fixed links could share the band on a secondary basis with FSS C-band earth stations. Specifically, § 90.1321(b) addresses point-to-multipoint fixed links.<sup>37</sup> Under the Commission’s Part 96 rules, “grandfathered wireless broadband licensees” must protect authorized grandfathered FSS earth stations in the 3.65 – 3.70 GHz band, consistent with the existing protection criteria in 47 CFR part 90 subpart Z.

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<sup>34</sup> See Comments of Verizon at 19 – 20.

<sup>35</sup> *Id.* at 20.

<sup>36</sup> Comments of the C-Band Alliance, Exhibit 2 – C-Band Transition Plan Presentation, at 14.

<sup>37</sup> 47 C.F.R. § 96.1321(b).

Once the grandfathered wireless broadband licensees transition to either Priority Access License (“PAL”) or General Authorized Access (“GAA”) use, the protection criteria in § 96.17 applicable to FSS earth stations in the 3.6 - 3.7 GHz band shall apply.<sup>38</sup> As several commenters noted, the Part 96 CBRS rules to protect FSS C-band earth stations from P2MP links in the 3.6 - 3.7 GHz band can be readily applied to the 3.7 - 4.2 GHz band.

As soon as feasible, however, the Commission should adopt, and require the implementation of, interference protection rules based on “propagation modeling informed by real-world GIS datasets that do not need to make generic, worst-case assumptions about interference.”<sup>39</sup> PISC further observed that “sharing of unused spectrum in this band is ... unnecessarily constrained by ... excessive ITU protection distances that have governed coordination.”<sup>40</sup> Microsoft agrees with Federated Wireless that when the Commission considered the appropriate protection for earth stations in the context of its CBRS Order, the agency found those protection zones to be “excessively large, overly simplistic, and inefficient given the capabilities of SASs to predict realistic path loss.”<sup>41</sup> Microsoft agrees with PISC that “the Commission should reconsider what protection zones are necessary and take into consideration actual terrain and other local features (e.g. buildings) that operate to shield earth stations from terrestrial access points.”<sup>42</sup>

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<sup>38</sup> 47 C.F.R § 96.21(c).

<sup>39</sup> Comments of PISC at 16.

<sup>40</sup> *Id.*

<sup>41</sup> Comments of Federated Wireless at 6, citing *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550 – 3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, FCC 15-47 at ¶ 288 (2015).

<sup>42</sup> Comments of PISC at 16 – 17.

## **VI. The Commission Should Authorize Opportunistic Access by P2MP Providers to the Flexible Use and Guard Band Portions of the 3.7 GHz Band**

In its Comments, Microsoft recommended that the Commission authorize opportunistic use by P2MP providers from 3700 MHz to the top of the guard band.<sup>43</sup>

In particular, if the Commission decides to pursue the private market mechanism as the means for repurposing the lower part of the 3.7 GHz band, it should permit P2MP on an opportunistic, use-or-share basis, particularly in rural areas

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The Commission has implemented a similar “use it or share it” regime for CBRS.<sup>45</sup> Unlicensed use of TV white space operates under a similar regulatory model that permits continued opportunistic use of the 600 MHz band post-auction in areas where the new flexible use licensee has not commenced service.<sup>46</sup>

There was broad support for Microsoft’s proposal. For example, Starry encourages the Commission “to create a shared underlay in the flexible-use portion of the band . . . on a non-interference basis and only in the frequencies or geographies unoccupied by a flexible-use licensee.”<sup>47</sup> The Public Interest Spectrum Coalition “urges the Commission to authorize opportunistic access ... by P2MP providers to any unused frequencies in the lower portion of the band until such time as future “flexible use” licensees notify the agency or a frequency coordinator that they are deployed and ready to commence service in a local area.”<sup>48</sup> The Broadband Connects America Coalition similarly advocates for the temporary, opportunistic use

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<sup>43</sup> Comments of Microsoft at 10.

<sup>44</sup> *Id.*

<sup>45</sup> See Section 96.25(c)(1) (opportunistic use is permitted in areas where a PAL is not in use or where a CBSD does not contact the SAS for seven days within a default protection contour).

<sup>46</sup> See 47 C.F.R. § 15.712.

<sup>47</sup> Comments of Starry at 6.

<sup>48</sup> Comments of PISC at 13.

of the flexible use portion of the band until such time as licensees deploy service.<sup>49</sup> Finally, the Dynamic Spectrum Alliance suggests that fixed users be required to periodically query a database to determine whether new flexible use operations have commenced in the area and, if so, to reduce power or cease operating if necessary to protect the licensee's operations.<sup>50</sup>

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<sup>49</sup> See Broadband Connects America Comments at 4.

<sup>50</sup> See DSA Comments at 13. DSA also recommended that “the Commission should delegate development of the database to a representative group of industry stakeholders, such as the WinnForum, which has hosted the private sector process of developing the technical implementation of automated coordination and interference avoidance for the CBRS band.” See *id.* at 6-7.

## **VII. Conclusion**

For the reasons set forth above, Microsoft urges the Commission to make available 400 megahertz of spectrum in the upper portion of the 3.7 GHz band for licensed P2MP wireless broadband services. In addition, Microsoft urges the Commission to permit opportunistic access in the lower portion of the band for P2MP services.

Respectfully submitted,

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