

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of

Expanding Flexible Use in Mid-Band  
Spectrum Between 3.7 and 24 GHz

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GN Docket No. 17-183

**REPLY COMMENTS OF GENERAL COMMUNICATION, INC.**

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General Communication, Inc. (“GCI”) submits the following reply in response to the Federal Communications Commission’s (“FCC’s” or the “Commission’s”) Notice of Inquiry (“Notice”) in the above-referenced proceeding.<sup>1</sup> GCI’s reply comments focus on proposals and comments concerning the 3.7-4.2 GHz band (the “3.7 GHz Band” or “C-Band”) and the 5.925-7.125 GHz band (the “6 GHz Band”) – both of which are extensively utilized by GCI. The Commission must not take any actions that would potentially interfere with the critical services offered by GCI within the above-referenced bands.

**I. INTRODUCTION AND SUMMARY**

GCI commends the Commission for electing to initiate this proceeding with a Notice of Inquiry in an effort to invite viable proposals (rather than commencing with a Notice of Proposed Rulemaking). The vast array of interests and proposals represented on the record signifies the need for additional discussion and close investigation of proposals prior to any introduction of new terrestrial fixed, mobile and unlicensed operations into mid-band spectrum.

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<sup>1</sup> *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Inquiry, FCC 17-104 (rel. Aug. 3, 2017) (“Notice”).

As an initial matter, the vast majority of the record agrees that before any proposals are adopted or solutions developed, the Commission must obtain a complete record and accurate understanding of the existing operations throughout the mid-band spectrum; particularly in the C-Band. Although some parties on the record claim that the C-Band spectrum is underutilized and inefficiently used, they fail to provide valid support for such assertions. To the contrary, a substantial number of fixed satellite service (“FSS”) operators, in addition to GCI, have submitted detailed information on the record demonstrating the significant and extensive use of this spectrum via satellite-based services.

This is an important point because the incumbent use of the C-Band is directly tied to the next steps that the Commission may take in this proceeding. Some commenters argue that the entire 500 MHz C-Band should be cleared and either moved to a new band or migrated to a new technology, while other commenters argue that incumbent FSS operations be repacked into a smaller portion of the band. These proposals are premised on an inaccurate understanding of the current incumbent use of the band, and should not be entertained by the Commission for the following reasons:

- Clearing the C-Band and relocating current C-Band FSS operations to the Ku or Ka-Bands is not a suitable solution due to (1) the lower link availability resulting from more challenging propagation conditions and higher link margins required for Ku/Ka-Band fading; (2) the lack of available Ku/Ka-Band satellites having satisfactory coverage of Alaska; and (3) the high cost to replace and upgrade ground segment equipment;
- Similarly, clearing the C-Band and transitioning FSS services to new technologies such as fiber is also not an option for numerous providers, including GCI. GCI relies on fiber where possible, but has explained that is not feasible to bury fiber throughout much of vast, inhospitable, and federally protected areas of western Alaska. While high-capacity fiber is often the technology of choice for core networks or dense urban environments, building fiber to all, or even most, Alaskan locations currently is logistically, technologically, operationally, and economically infeasible.

- Clearing a portion of the C-Band and repacking FSS operations into a constrained amount of spectrum less than 500 MHz would also be problematic, especially since earth station low-noise amplifiers (“LNAs”) are wide open to interference from 3.6 to 4.3 GHz (at least). In addition, such proposals would strand expensive in-orbit satellite resources and investments, especially those satellites designed specifically for Alaska coverage. On a FSS operator level, proposals to clear and repack the C-Band would also further constrain satellite resource availability, forcing operators to seek to acquire space segment capacity on more than one satellite, and may further cause operators to split operations over multiple spacecraft.

Commenters also submit several proposals to accommodate sharing in the C-Band between FSS and broadband operations. Although there may be opportunity for more efficient use (via techniques such as band sharing) of the spectrum, the interference and coordination risks that are inherent in such schemes must be fully and rigorously identified and defined before any plan could be adopted or imposed. While GCI is not encouraged by the current sharing proposals on the record, in the event that the FCC does decide to permit additional terrestrial fixed or mobile broadband services into the C-Band, any sharing scenario must ensure that (1) incumbent FSS operators have primary access to the C-Band spectrum, with terrestrial fixed and mobile wireless services having secondary rights; and (2) suitable exclusion zones will be imposed around the FSS earth stations to prevent interference from the new services.

The C-Band is particularly important to GCI and Alaskan consumers due to the critical and important services provided over this spectrum throughout the state. Many of GCI’s C-Band served customers reside in the most rural and remote areas of the country and rely on satellite technology for the provision of basic telephone service, medical service, and distance-learning. Federal agencies, such as the Federal Aviation Administration (“FAA”), for example, also rely on GCI’s operations in the C-Band to assist pilots throughout the state. In many cases, GCI’s satellite services are the only communications option that Alaskans can rely upon to contact

emergency officials in critical situations, and if interrupted, could result in life-threatening situations.

Finally, with respect to the 6 GHz Band, GCI agrees this band may be more suitable for sharing with licensed services than the 3.7 GHz Band – assuming that incumbent services may be adequately protected from interference – but also agrees that additional investigation is needed. GCI, like many commenters on the record, has significant concerns with allowing unlicensed operations into the 6 GHz Band, even under the Part 15 rules.

## **II. THE RECORD CONFIRMS THERE IS SIGNIFICANT INCUMBENT USE OF FSS SERVICES IN THE C-BAND TODAY**

The myth of the “underutilized” C-Band is merely a picture being painted by those industry players that want access to the band for their own services.<sup>2</sup> This myth has been dissolved by the robust record in this proceeding. To the contrary, many commenters submitted

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<sup>2</sup> See, e.g., Comments of Broadband Access Coalition at 6, GN Docket No. 17-183 (filed Oct. 2, 2017) (“BAC Comments”) (urging the FCC to authorize licensed P2MP broadband service in the C-Band at pp. 5-7); Comments of CompTIA at 2, GN Docket No. 17-183 (filed Oct. 2, 2017) (“CompTIA Comments”) (encouraging making the C-Band available for next-generation broadband use at p. 2); Comments of CTIA at 8, GN Docket No. 17-183 (filed Oct. 2, 2017) (“CTIA Comments”) (encouraging the FCC to pursue flexible-use terrestrial licensing in the C-Band at pp. 6-15); Comments of Dynamic Spectrum Alliance at 6, GN Docket No. 17-183 (filed Oct. 2, 2017) (“DSA Comments”) (agreeing that the C-Band should be used for flexible use at p. 9); Comments of Google LLC and Alphabet Access at 5, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Google Comments”) (suggesting that the FCC propose rules for shared flexible use of the C-Band at pp. 3-12); Comments of Microsoft Corp. at 6, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Microsoft Comments”) (supporting extending CBRS to 3.8 GHz and authorizing a new licensed P2MP wireless service in 3.8-4.2 GHz at pp. 6-10); Comments of Nokia at 7-8, GN Docket No. 17-183 (“Nokia Comments”) (urging the FCC to utilize the C-Band for exclusive flexible terrestrial uses at pp. 13-15); Comments of T-Mobile USA, Inc., at 13-14, GN Docket No. 17-183 (“T-Mobile Comments”) (urging the FCC to utilize the C-Band for licensed wireless broadband use at pp. 7-8); Comments of Utilities Technology Council and the Edison Electric Institute at 13-14, GN Docket No. 17-183 (filed Oct. 2, 2017) (“UTC and EEI Comments”) (supporting expanding the use of terrestrial fixed services in the C-Band at p. 5); Comments of Verizon at p. 12, GN Docket No. 17-183 (“Verizon Comments”) (supporting opening the C-Band for mobile use at p. 16).

information on the record describing how important the C-Band is to their everyday operations.

For example:

- The American Cable Association (“ACA”) “dispel[s] the myth that much of the C-Band spectrum lies fallow, or is treated as a cushion to fall back on by the satellite operators”<sup>3</sup> by demonstrating that “the video programming carried by C-Band satellites comprises an astonishing number of channels – almost 2,000 – and takes 308 transponders on 24 satellites.”<sup>4</sup> For many of ACA’s members, the C-Band is the only method by which they receive cable programming.<sup>5</sup>
- AT&T makes extensive use of the C-Band for both video distribution and long-haul telephone service throughout the country. Specifically in Alaska, “AT&T Alascom has a mix of 183 fixed and transportable earth stations to provide basic PSTN telecommunications for remote villages . . . [t]he interconnectivity provided by these facilities is essential for the safety and well-being of residents at these locations because it is often the only communication infrastructure available to the local communities.”<sup>6</sup>
- Charter relies on more than 700 receive earth stations in the C-Band, which are “crucial to Charter’s core video business.”<sup>7</sup>
- The Content Companies rely on the C-Band as “the backbone of the entire infrastructure for delivering” FSS transmissions and ensuring the reliable distribution of programming to more than 100 million American households.<sup>8</sup>
- The Eternal Word Television Network (“EWTN”) relies on the C-Band as a vital part of its television and radio distribution system: signals are delivered to approximately 1,423 rural MVPDs which provide service to approximately 1.8 million subscribers.<sup>9</sup>

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<sup>3</sup> Comments of American Cable Association at 1, GN Docket No. 17-183 (filed Oct. 2, 2017) (“ACA Comments”).

<sup>4</sup> *Id.* at 2.

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

<sup>6</sup> Comments of AT&T Services, Inc. at 9, GN Docket No. 17-183 (filed Oct. 2, 2017) (“AT&T Comments”).

<sup>7</sup> Comments of Charter Communications at 1, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Charter Comments”).

<sup>8</sup> Comments of the Content Companies at 2, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Content Companies Comments”).

<sup>9</sup> Comments of the Eternal Word Television Network, Inc., at 4, GN Docket No. 17-183 (filed Oct. 2, 2017) (“EWTN Comments”).

- iHeartMedia relies on over 260 receive-only earth stations in the C-Band, and its syndicated programs are captured by its 5,000 radio affiliates via their receive-only earth stations operating in the C-Band.<sup>10</sup>
- The National Association of Broadcasters (“NAB”) estimates that “there are thousands of unregistered earth stations operating in the C-Band” and explains that “[h]undreds of broadcast television stations and thousands of radio stations in the U.S. rely on [FSS] earth stations [and] C-Band operators also distribute programming to several thousand cable, DBS and telecommunications service provider headends” among other services.<sup>11</sup> NAB also finds that 54% of all satellites use the C-Band, “representing an investment of several tens of billions of dollars or more.”<sup>12</sup>
- National Public Radio (“NPR”) explains that the Public Radio Satellite System (“PRSS”) “annually delivers more than 450,000 hours of news, music, cultural programming to 1,278 public radio stations throughout the United States, reaching 95% of the U.S. population.”<sup>13</sup> Satellite technology is the primary delivery platform of PRSS and these stations maintain and operate 475 receive-only earth stations to broadcast programming “to millions of listeners, including many in rural and other underserved areas of the country.”<sup>14</sup> NPR recognizes that the “PRSS’s efficiency and reach are possible only because of the C-Band satellite spectrum’s ability to serve rural and remote locations, where cost-effectiveness is a necessary requirement for providing service.”<sup>15</sup> The PRSS also plays an important role in the Emergency Alert System.<sup>16</sup>
- NCTA explained that for many of its members, C-Band satellite services remain critical to the delivery of “high-quality television services to tens of millions of cable customers.”<sup>17</sup> NCTA further recognizes that “[i]f our members’ practices reflect the registration practices of other C-Band users, relying on data only for registered earth

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<sup>10</sup> Comments of iHeartMedia + Entertainment, Inc. at 2, GN Docket No. 17-183 (filed Oct. 2, 2017) (“iHeartMedia Comments”).

<sup>11</sup> Comments of the National Association of Broadcasters at 2, 3, GN Docket No. 17-183 (filed Oct. 2, 2017) (“NAB Comments”).

<sup>12</sup> *Id.* at 4.

<sup>13</sup> Comments of National Public Radio, Inc., at 4, GN Docket No. 17-183 (filed Oct. 2, 2017) (“NPR Comments”).

<sup>14</sup> *Id.* at 4, 6.

<sup>15</sup> *Id.* at 7.

<sup>16</sup> *Id.* at 9.

<sup>17</sup> Comments of NCTA – The Internet & Television Association at 2, GN Docket No. 17-183 (filed Oct. 2, 2017) (“NCTA Comments”).



stations would significantly underrepresent how heavily the band is currently used by C-Band satellite incumbents.”<sup>18</sup>

- The North American Broadcasters Association (“NABA”) estimates that there are thousands of additional C-Band earth stations in addition to the approximately 4,700 IBFS-registered earth stations.<sup>19</sup>
- The Satellite Industry Association (“SIA”) highlights that the C-Band is used by its members to “deliver essential services to every part of the nation with extremely high reliability.”<sup>20</sup> SIA’s members rely on unfettered access to the C-Band for numerous services, including: primary distribution and contribution of video and audio content; the provision of essential communications in remote areas; National Security and Public Safety services; the provision of vital information in emergencies as well as crucial restoration and redundancy services; and supply significant maritime services.<sup>21</sup>
- SES Americom explains that in addition to video programming delivery, SES C-Band capacity enables a range of other commercial and government services, including audio content distribution such as real-time weather data and forecasts. SES also highlights that “OptimEra in Alaska has purchased a full 72 MHz transponder on NSS-9 to enable a 10-fold speed increase in broadband connectivity available in the remote port city of Unalaska and neighboring towns and islands across the southwest part of the state.”<sup>22</sup>

In addition, GCI’s initial comments provided detailed information regarding its current uses of the C-Band, including the provision of critical services that, if interrupted, could result in life-threatening situations.<sup>23</sup> As noted, many of GCI’s C-Band sites serve customers residing in the most rural and remote areas of the country that cannot receive terrestrial services and/or backhaul and, thus, must rely exclusively on satellite technology for the provision of basic telephone service, medical service, and distance-learning. Federal agencies, such as the FAA, for example,

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<sup>18</sup> *Id.* at 3.

<sup>19</sup> Comments of the North American Broadcasting Association at 2, GN Docket No. 17-183 (filed Oct. 2, 2017) (“NABA Comments”).

<sup>20</sup> Comments of Satellite Industry Association at 5, GN Docket No. 17-183 (filed Oct. 2, 2017) (“SIA Comments”).

<sup>21</sup> *Id.* at 5-22.

<sup>22</sup> Comments of SES Americom, Inc., at 4-5, GN Docket No. 17-183 (filed Oct. 2, 2017) (“SES Americom Comments”).

<sup>23</sup> *See* Comments of General Communication, Inc., at 4-11, GN Docket No. 17-183 (filed Oct 2, 2017) (“GCI Comments”).

also depend on GCI's operations in this spectrum to assist pilots in determining local weather conditions throughout the state.<sup>24</sup> In many cases, GCI's satellite services are the only communications option that Alaskans can rely upon to contact emergency officials in critical situations.

Moreover, GCI's reliance on the C-Band has not decreased, despite unsupported assertions by others about the state of the band. In fact, GCI has several recently constructed sites: in 2017, GCI constructed (but did not register in accordance with the Commission's rules), a new 4.5m C-Band receive-only earth station in Tanana; in 2016, GCI built and registered a C-Band 3.6m earth station at the St. Paul Southcentral Foundation ("SCF") health clinic on St. Paul Island, Alaska.<sup>25</sup> Prior to the St. Paul SCF earth station, GCI's recently-registered earth stations included a Sitka 9m earth station in 2014,<sup>26</sup> another C-Band earth station in 2013<sup>27</sup> and nine C-Band earth stations in 2012.<sup>28</sup>

Claims that use of the C-Band is "overstated" based on the International Bureau Filing System ("IBFS") data should be dismissed by the Commission. For instance, T-Mobile argues that existing operations in this band are "limited and declining"<sup>29</sup> and that "applications for FSS

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<sup>24</sup> GCI was recently awarded the 2017 CCA Industry Innovation Award for "its life-saving work improving aviation safety in Alaska" under this partnership with the FAA. Press Release, Competitive Carriers Association, GCI Awarded 2017 CCA Industry Innovation Award for FAA Partnership (Nov. 1, 2017) <http://ccamobile.org/press/member-press/gci-awarded-2017-cca-industry-innovation-award-for-faa-partnership/9124883>.

<sup>25</sup> See FCC Call Sign E160156.

<sup>26</sup> See FCC Call Sign E140073.

<sup>27</sup> See FCC Call Sign E130146.

<sup>28</sup> See FCC Call Signs E120021; E120184; E120185; E120186; E120187; E120192; E120193; E120235; E120237.

<sup>29</sup> T-Mobile Comments at 3.

C-Band licenses have significantly decreased for nearly three decades.”<sup>30</sup> The FCC should not give weight to such arguments because many sites simply are not required to be registered. As discussed at length herein, GCI agrees that the current registration scheme “vastly undercount[s]” incumbent use of the C-Band because it does not consider the numerous receive-only (“Rx-only”) earth stations, and should not be relied upon by the Commission to assess the current state of the C-Band. Rather, at this stage of the process, the Commission must look to the information presented in the record to begin to understand the level of incumbent use of the C-Band.

The record demonstrates that the C-Band continues to be heavily used by incumbent FSS operations and in many cases, the C-Band is the only option to deliver critical communications services to the country’s most rural and remote areas. The Commission should reject arguments claiming otherwise and developed by parties with conflicting interests.

### **III. THE FCC MUST DEVELOP AN ACCURATE ASSESSMENT OF CURRENTLY UNREGULATED OPERATIONS IN THE C-BAND BEFORE ANY NEW REGULATIONS ARE ADOPTED**

GCI, in addition to being a FSS operator, is also the largest wireless provider in Alaska, and recognizes the need for additional mobile spectrum to be made available in the near term. However, GCI urges the Commission to continue to develop a complete and accurate understanding of the current C-Band landscape prior to developing or adopting any changes to the operating or service rules in this band. Indeed, “[w]ithout a current, accurate assessment of the widespread, but unregistered, use of the 3.7-4.2 GHz band, any decisions by the Commission as to the feasibility of additional uses of this spectrum will risk serious disruption to the

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<sup>30</sup> *Id.* at 13-14.

country's communications infrastructure.”<sup>31</sup> As Commissioner O’Rielly explained, “[a]t a minimum, the Commission needs a better understanding of the current number of C-Band earth stations in existence. This is the only means for the Commission to truly evaluate current use and protection mechanisms, to the extent they are needed.”<sup>32</sup> In addition, all interested parties – including parties that support introducing new C-Band services, as well as those that oppose introducing such services – agree that the Commission must develop an accurate assessment of incumbent operations prior to making the band available for wireless broadband or other use. For instance, Charter Communications supports the introduction of new services into the 3.7 GHz Band but also recognizes that before doing so, “the Commission should compile a complete record to demonstrate that new operations will fully protect existing satellite and CARS users from harmful interference.”<sup>33</sup> The Commission has already taken the important first step of seeking information about the current uses of the band, but as the record recommends, there are additional actions that the Commission could take in an effort to gain a more complete assessment of incumbent use in the C-Band.

The overwhelming majority of commenters recognizes that the current registration requirements for the C-Band, which do not require registration of Rx-only antennas, and the resulting information made available via IBFS, do not allow for an accurate assessment of current incumbent operations.<sup>34</sup> GCI agrees that “relying on data only for registered earth

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<sup>31</sup> iHeartMedia Comments at 4.

<sup>32</sup> Remarks of FCC Commissioner Michael O’Rielly Before the 6<sup>th</sup> Annual Americas Spectrum Management Conference, at 3 (Oct. 13, 2017) *available at* [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2017/db1013/DOC-347222A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db1013/DOC-347222A1.pdf).

<sup>33</sup> Charter Comments at 2.

<sup>34</sup> *See, e.g.*, ACA Comments at 20; AT&T Comments at 10; BAC Comments at 8-9; DSA Comments at 6; Google Comments at 5-6; iHeartMedia Comments at 1-2; Joint Comments of Intelsat License LLC and Intel Corp., at 10-11, GN Docket No. 17-183 (filed Oct. 2, 2017)

stations would significantly underrepresent how heavily the band is currently used by C-Band satellite incumbents.”<sup>35</sup> In order to mitigate this inaccurate representation, many parties have called on the FCC to revise its registration rules to require registration of *all* C-Band earth stations, including Rx-only stations. Although GCI has concerns about the heavy administrative and financial burdens that would be associated with such a modification to the FCC’s rules, GCI agrees that registering these stations will allow for a more accurate assessment of current C-Band services. To alleviate some of the burdens of this proposal, GCI supports SIA’s suggestions that the Commission could take additional action to “streamline the registration procedures and waive the registration fee, in part or in whole” for incumbents in order to “encourage the development of a complete and accurate record regarding the number and positions of receive-only earth stations” in the C-Band.<sup>36</sup> GCI also urges the Commission to “ensure that there is adequate time for receive-only antenna owners to complete the registration process” before any potential sharing solutions are introduced into the band.<sup>37</sup>

The record has illustrated that the IBFS database does not portray an accurate picture of the C-Band FSS landscape and therefore, at this time, the Commission should refer to the comments filed in this proceeding by incumbent operators in the band to develop a better understanding of the services being offered in this band.

#### **IV. PROPOSALS TO CLEAR OR REPACK THE C-BAND FSS SERVICES ARE NOT SUITABLE OPTIONS FOR GCI’S CRITICAL C-BAND SERVICES**

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(“Intelsat/Intel Comments”); Microsoft Comments at 3; Comments of Motorola Solutions, Inc., at 2, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Motorola Solutions Comments”); NAB Comments at 3; NCTA Comments at 3; NABA Comments at 3; SIA Comments at 22-24.

<sup>35</sup> NCTA Comments at 3.

<sup>36</sup> SIA Comments at 23.

<sup>37</sup> *Id.* at 24.

The extensive use of the C-Band by FSS operators demonstrates just how highly valued this spectrum is to such services. Commenters highlight the favorable propagation characteristics and flexible operating rules such as full-band, full-arc coordination that allow FSS services to flourish in this spectrum. Notably, the unique propagation characteristics of the C-Band allow for “coverage of rural areas at a cost comparable to that of service in the most densely populated city centers.”<sup>38</sup> This is crucial for an extremely rural state like Alaska, as other FSS bands do not share these propagation characteristics.<sup>39</sup> Despite the significant use of this band, as well as the limited alternatives for FSS operators, a number of non-incumbent commenters have proposed that the FCC seek to (1) clear the C-Band entirely and relocate incumbent FSS users to another band; (2) clear the C-Band entirely and encourage the transition of FSS services to new technologies such as fiber; and/or (3) repack FSS operations into a smaller portion of the C-Band. None of these proposals are suitable options for GCI’s critical FSS operations.

*Clearing the C-Band and Relocating Incumbent FSS Operations.* Parties on the record suggest that the Commission clear the C-Band in its entirety and relocate incumbent FSS operations to the Ku- or Ka-Bands.<sup>40</sup> Such relocation is not an acceptable solution for GCI due to (a) the limited lower link availability resulting from more challenging propagation conditions and higher link margins required for Ku or Ka-Band fading;<sup>41</sup> (b) the prohibitively high cost

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<sup>38</sup> *Id.* at 6.

<sup>39</sup> *Id.* at 15.

<sup>40</sup> *See, e.g.*, CTIA Comments at 10; Comments of Ericsson at 7, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Ericsson Comments”); Nokia Comments at 12; Comments of Qualcomm Inc., at 5, GN Docket No. 17-183 (filed Oct. 2, 2017) (“Qualcomm Comments”); T-Mobile Comments at 15; Verizon Comments at 17.

<sup>41</sup> As AT&T has explained, “weather impacts, such as fog, particles and rain, cause signal fade in the Ku-Band, and make the C-Band a better choice” for FSS services. AT&T Comments at 7.

associated with replacing or upgrading ground segment equipment; and (c) the lack of available Ku or Ka- Band satellites having satisfactory coverage over the state of Alaska; specifically, there is not enough capacity and coverage of Ku-Band satellites to move all of the C-Band services and there is minimal, if any, Ka-Band coverage in Alaska.<sup>42</sup>

Historically, GCI has expended significant time and resources to have satisfactory C-Band satellite coverage for Alaska designed into satellites. For instance, GCI was able to get an “Alaska Enhanced Beam” mode designed into the Galaxy 9 (G9) spacecraft circa 1995. This “Alaska Enhanced Beam” yielded better coverage (higher EIRP and G/T performance) over Alaska at that time, but was only available on 6 of 24 transponders on one polarization of the satellite. Then, with the Panamsat Galaxy 10/10R satellite (to which GCI moved its C-Band network operation from G9), a design that afforded enhanced coverage of Alaska was designed into both polarizations on all transponders. The same enhanced coverage concepts have also extended onto GCI’s current services over the Intelsat G18 satellite and other Intelsat satellites such as the G13 satellite. It was these enhanced coverage improvements to the satellites that permitted GCI to buildout its rural C-Band earth station network across the state and offer its critical services for distance learning, telemedicine, improved telephony, Internet, and wireless services. Accordingly, if C-Band satellite operators (and their customers) were forced to clear the spectrum between 3.7 – 4.2 GHz, many of these satellites and satellite earth stations would lose nearly all of their value, and many residents would be without relied-upon communications services, as there are no suitable replacements for these services.

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<sup>42</sup> Capacity on the C-Band is also already coming under increasing strain due to the magnitude of services; accordingly relocating to a band with less capacity is not an option. *See* ACA Comments at 10-11.

*Clearing the C-Band and Transitioning Incumbent FSS Operations to New Technologies.*

Several commenters also assert that FSS services can be cleared from the C-Band and replaced in their entirety by fiber-optic based deployments.<sup>43</sup> Realistically, however, for GCI and many other FSS operators, fiber is not a reasonable alternative for FSS services.<sup>44</sup> For instance, AT&T recognizes that “[w]hile fiber is highly reliable, fiber systems can be subject to cable cuts – or ‘backhoe fade’ – and AT&T has found that C-Band availability therefore often exceeds that of fiber.”<sup>45</sup> In addition, ACA explains that forcing the migration of satellite services into an entirely new technological platform would be cost-prohibitive for many of its members due to necessary equipment procurement, network migration and leasing arrangements to name a few.<sup>46</sup>

As GCI has explained to the Commission on several occasions, switching to fiber is not a suitable alternative in Alaska.<sup>47</sup> Much of the land in rural Alaska is protected by numerous federal and state laws that limit human activity, including the Alaska National Interest Lands Conservation Act, the National Wildlife Refuge System Administration Act, the National Wildlife Refuge System Improvement Act of 1997, the Wilderness Act, the Wild and Scenic Rivers Act, the Marine Mammal Protection Act, and the Arctic Refuge Comprehensive Conservation Plan.<sup>48</sup> Even absent federal land regulations, long fiber runs over the Arctic tundra

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<sup>43</sup> See, e.g., CTIA Comments at 11; Ericsson Comments at 7; Nokia Comments at 12; T-Mobile Comments at 14; Verizon Comments at 18. See also Qualcomm Comments at 5.

<sup>44</sup> Google also recognizes that there are “places where laying fiber or cable is not economically or physically feasible, such as in rural areas, historic districts or areas with significant water features or rugged terrain.” Google Comments at 6.

<sup>45</sup> AT&T Comments at 7.

<sup>46</sup> ACA Comments at 16-18.

<sup>47</sup> See Amended Petition of GCI for Waiver of Certain Channelization and Other Restrictions on Common Carrier Fixed Point-to-Point Operations Between 6425 and 7125 MHz, WT Docket No. 16-209, at p. 6 (filed May 3, 2016).

<sup>48</sup> *Id.* at 6.



would need to be safeguarded against damage caused by the complex and changing structure of permafrost, which can range in thickness from a single meter to many hundreds of meters.

Uneven freezing and thawing at or near the surface can result in dramatic changes to landforms, such as ice wedges (i.e., growing cracks in the ground) and pingos (i.e., small hills that arise quickly due to subsurface pressures), which can damage buried fiber optic cable.<sup>49</sup> In short, if it was feasible to install fiber to serve these rural Alaskan communities, then GCI would have already done so. However, it is not feasible to serve large, remote areas of Alaska with fiber infrastructure. Moreover, a business case for fiber is challenging, if not impossible, due to the costs associated not just with deployment and repairs in difficult to access areas, but with the hardening required to make fiber a reliable telecommunications option in such areas.<sup>50</sup> Indeed, that is a large reason why GCI utilizes geostationary satellites that do an extremely effective job covering large geographic areas. Accordingly, suggestions that fiber can effectively replace all FSS operations should be rejected.

*Repacking Incumbent FSS Operations to a Portion of the C-Band.* Some commenters suggest that the FCC explore market-based solutions – such as an incentive auction – to repack incumbent operations into a portion of the C-Band (e.g., the upper edges of the band or to more remote locations).<sup>51</sup> Opponents to this proposal express concerns over the implementation of

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<sup>49</sup> U.S. Fish & Wildlife Serv., *Ice Wedges, Polygons, and Pingos*, <https://www.fws.gov/refuge/arctic/permcycle.html> (last visited Nov. 14, 2017) (describing the process by which the permafrost cycles through these changes); Nat'l Snow & Ice Data Ctr., *All About Frozen Ground – How Does Frozen Ground Affect Land?* [https://nsidc.org/cryosphere/frozenground/how\\_fg\\_affects\\_land.html](https://nsidc.org/cryosphere/frozenground/how_fg_affects_land.html) (last visited Nov. 14, 2017) (describing how freezing and thawing in the Arctic can change the shape of the land).

<sup>50</sup> Other unique challenges concerning fiber deployment in Alaska include consideration of bird and animal migration and birthing schedules, as well as shorter construction periods due to severe weather and lack of light during winter months.

<sup>51</sup> See, e.g., CTIA Comments at 13; Intelsat/Intel Comments at 6-7; Verizon Comments at 18-19.

another incentive auction and repack before the Broadcast Incentive Auction has proven to be a success for both mobile wireless providers and broadcasters. These commenters also recognize that repacking would subject incumbent FSS operators to astronomical costs and/or operating constraints.<sup>52</sup> GCI agrees with the opposition, as such action would be devastating for GCI's FSS operations. GCI already occupies a substantial portion of the 500 MHz band on the G18 satellite. If the Commission were to force FSS operators to vacate to even a relatively small portion of the band, GCI would be forced to relocate the affected transponders to another (or multiple) spacecraft (assuming that such resources with the necessary Alaska coverage/performance were available).

As part of the repacking proposal, many commenters argue that the full-band, full-arc coordination policy that FSS services rely upon for day-to-day operations must also be eliminated. These commenters (blinded by self-interest, since they want access to the C-Band) argue that the full-band, full-arc policy is overprotective and contributes to the inefficient use of the C-Band.<sup>53</sup> For instance, Nokia claims that "it is typical for each earth station to access just one transponder on one satellite at any given time" and "many dishes stay pointed at the same satellite for years. Many dishes are even bolted in place and cannot be easily repointed."<sup>54</sup> This is simply not true for GCI. GCI's Fairbanks Earth Station and Eagle River Earth Station are two

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<sup>52</sup> See, e.g., Comments of Comsearch at 1-2, GN Docket No. 17-183 (filed Oct. 2, 2017) ("Comsearch Comments"); NAB Comments at 8.

<sup>53</sup> See, e.g., BAC Comments at 8; CTIA Comments at 13; DSA Comments at 6; Nokia Comments at 9; T-Mobile Comments at 13-14; UTC and EEI Comments at 14; Verizon Comments at 12.

<sup>54</sup> Nokia Comments at 9. Nokia cites to the Associated Press ("AP") to support this assertion. As GCI has explained previously, AP has been the "go-to" entity used by BAC and other opponents of the full-band, full-arc policy to support inaccurate conclusions about the current use of the C-Band. AP has specific, limited, uses for the C-Band, and should not be viewed as representative of FSS C-Band operations. See Comments of GCI at 12, RM-11791 (filed Aug. 7, 2017) ("GCI BAC Petition Comments").

examples of teleports that access the majority of the C-Band in order to provide hub connectivity for remote stations throughout the C-Band. GCI currently uses 21 of 24 transponders on the Galaxy 18 satellite. The Fairbanks Earth Station handles GCI's odd-numbered transponders (1,3,5...) while Eagle River handles GCI's even-numbered transponders. While it is true that these earth stations focus on the Galaxy 18 satellite, that does not obviate the need for the full-band, full-arc coordination as Nokia suggests. While GCI has operated on various spacecraft throughout the entire arc accessible to Alaskan services, there is a significant azimuth difference between the satellite that the noted earth stations currently operate on (Galaxy 18) and other potential C-Band satellites (e.g., Satmex-7 and the upcoming Horizons 3E). Therefore, if the "full-arc" that GCI relies upon was restricted, there would be a significant limitation of the available satellites in the domestic (and international) geostationary arc for which GCI would have access/the ability on which to operate in the future.<sup>55</sup> In other words, if GCI was restricted to a limited section of the C-Band, with no opportunity for full-band, full-arc coordination, it would not have any guarantee that future spacecraft would be placed in the orbital slots currently utilized by GCI, nor would there be any guarantee that such spacecraft would have adequate satellite performance qualities to provide service in Alaska. In these instances, GCI wouldn't be able to offer its current services across rural Alaska, and it would be extremely difficult, if not impossible for GCI to find an adequate timely substitution.

Indeed, in adopting the full-band, full-arc regime, the Commission recognized "the strong public interest benefits of allowing earth stations to access the full band and full arc, 'without

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<sup>55</sup> GCI's operations occur throughout the entire satellite arc that is accessible for Alaskan services.

having to be re-licensed by the Commission, to meet changing operational requirements.”<sup>56</sup>

SES Americom outlines a similar real-world experience where a C-Band customer had been relying on a satellite that went down to distribute video programming to more than one hundred affiliates. Part of the service restoration required repointing each of those affiliates’ receive antennas, which was possible due to the full-band, full-arc coordination; “absent the regulatory flexibility to use the full C-Band spectrum and reorient the antennas as needed toward the designated follow-on satellite, reestablishing service to that customer on a timely basis would have been impossible.”<sup>57</sup> In sum, eliminating the full-band, full-arc coordination policy ignores the very-real fact that changes in frequency are an integral part of the day-to-day operations of FSS operators, including GCI, and no party has developed a compelling case to the contrary.

## **V. ANY SHARING PROPOSALS FOR THE C-BAND MUST ENSURE EFFECTIVE PROTECTION OF INCUMBENT C-BAND FSS OPERATIONS**

The record indicates a general willingness of industry stakeholders with varying interests to work together to develop a suitable sharing solution – but only if incumbent services can be adequately protected. GCI agrees that sharing in the C-Band will be “extremely difficult”<sup>58</sup> and based on the proposals submitted in the record thus far, it is unclear whether it will be feasible to protect incumbent FSS services from the proposed new terrestrial and mobile wireless interference.

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<sup>56</sup> SIA Comments at 3 (quoting *FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations in the Fixed-Satellite Service*, Notice of Proposed Rulemaking, 15 FCC Rcd 23127, 23145-46, ¶ 40 (2000)).

<sup>57</sup> SES Americom Comments at 4.

<sup>58</sup> SIA Comments at 5.

As an initial matter, if a sharing system is adopted, incumbent FSS operators must have primary access to the C-Band spectrum.<sup>59</sup> Terrestrial fixed and mobile wireless operations should only have secondary rights to the spectrum. The significant under-registration of Rx-only earth stations, as discussed herein, further demonstrates that the extent of harm from depriving FSS of its primary protection status would be far more sweeping than IBFS suggests.<sup>60</sup> GCI also agrees that prospective new entrants should bear the burden of demonstrating that their operations will not result in harmful interference or other interruptions to C-Band FSS services, before they may introduce new operations into the band.<sup>61</sup>

As GCI explained in its initial comments – and as further confirmed in the record – introducing broadband services into the C-Band will cause harmful interference to FSS operations. Proponents of various sharing proposals on the record, including Intelsat and Intel Corp., Verizon, T-Mobile and CTIA all recognize this problem and offer possible solutions for interference in the event that the services share the band.<sup>62</sup> Specifically, commenters suggest that the Commission explore the use of exclusion or protection zones and a Spectrum Access System (“SAS”) database similar to that adopted for the 3.5 GHz Band. While these commenters cite to previously-addressed sharing scenarios, such as those involving PCS, AWS, CBRS and mmW services to support their proposed interference mitigation techniques, they fail to recognize that the C-Band cannot be compared to these other bands due to the unique technical considerations associated with the FSS operations. For instance, AT&T notes that

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<sup>59</sup> This primary access should apply to incumbent FSS operators’ existing and future facilities. GCI urges the Commission to reject proposals to place moratoria on new earth stations and on earth station renewals. *See* Nokia Comments at 12.

<sup>60</sup> ACA Comments at 20.

<sup>61</sup> *See* Content Companies Comments at 5-6; SIA Comments at 5.

<sup>62</sup> *See, e.g.*, CTIA Comments at 12; Intelsat/Intel Comments at 12; T-Mobile Comments at 15; Verizon Comments at 19.

[t]he millimeter wave bands involve a very stable or just emerging environment, a very small number of existing FSS users, and coordination with FSS in uplink—Earth-to-space—bands. By contrast, the Lower C-Band not only involves many more earth station facilities, including earth stations located proximate to very densely populated areas, but it also involves a requirement to accommodating new facilities, including earth stations that may have to be rapidly deployed at temporary locations to support restoration after natural disasters or transient broadcast events.<sup>63</sup>

Accordingly, GCI does not believe that its uses in C-Band are well-situated for sharing proposals currently on the record. Nevertheless, GCI briefly addresses certain proposals on the record aimed at mitigating interference in the event that the FCC elects to further explore a sharing arrangement in the C-Band:

*Exclusion or Protection Zones.* Verizon recognizes that the use of exclusion or protection zones would be a “complicated solution”<sup>64</sup> but could be achievable, and suggests that the FCC couple the IBFS database with exclusion zones to prevent interference.<sup>65</sup> ACA agrees that the FCC should consider exclusion zones, power limits and timely enforcement of restrictions to eliminate the source of interference immediately in the event such a situation occurs.<sup>66</sup> While GCI is still examining the necessary parameters surrounding whether a protection zone may be successful in the 3.7 GHz Band, it agrees that there would need to be significant separation distances from terrestrial and mobile transmitters<sup>67</sup> and, at this initial stage, suggests that the means of determining the extent of these zones would likely be similar to the

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<sup>63</sup> AT&T Comments at 9. In addition, the 3.7 – 4.2 GHz band is a downlink band, which further “complicates sharing because of the broad spot beams and large coverage areas used by geosynchronous satellites in the band.” *Id.*

<sup>64</sup> Verizon Comments at 19.

<sup>65</sup> *Id.*

<sup>66</sup> ACA Comments at 19-20.

<sup>67</sup> See NAB Comments at 6-7; Comsearch Comments at 3-4; SIA Comments at 37-39; see also Nokia Comments at 11.

methods used to previously determine band-sharing between C-Band FSS receive operations and C-Band FS (microwave) transmit/receive operations at 3.7-4.2 GHz.

*Spectrum Access Database.* Commenters suggest that the FCC utilize a database-supported authorization framework for sharing in the 3.7 GHz band, similar to that adopted (but not yet implemented) for the 3.5 GHz CBRS band.<sup>68</sup> GCI reiterates its concerns with adopting an untested method for the C-Band at this time,<sup>69</sup> and many commenters on the record echo these concerns.<sup>70</sup> While GCI remains concerned with relying on a SAS or other untested database coordination policy for interference prevention, in the event the FCC elects to implement such an approach, GCI submits that no wireless base station and/or fixed or mobile end user device should be permitted to access any of the shared C-Band spectrum without first assuring the SAS that it is operating outside of a set exclusion zone and/or continuously communicating with the SAS with the understanding that service shall be immediately terminated with the loss of SAS connectivity.

## **VI. SHARING PROPOSALS FOR THE 6 GHZ BAND MUST PROTECT INCUMBENT MICROWAVE OPERATIONS FROM INTERFERENCE**

In addition to its FSS uplink operations at 5.925-6.425 GHz, GCI also uses the 6 GHz Band for fixed point-to-point microwave service.<sup>71</sup> Notably, GCI relies on microwave access to the 6 GHz Band for its Terrestrial for Every Rural Region in Alaska (“TERRA”) network. The

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<sup>68</sup> See, e.g., Comsearch Comments at 3-4; Motorola Solutions Comments at 3.

<sup>69</sup> See GCI Comments at 15-16.

<sup>70</sup> See, e.g., Ericsson Comments at 6-7 (determining that such a database approach would not be advisable since they are still in development and have not yet been tested); SIA Comments at 40-41 (recognizing that the untested 3.5 GHz approach is not suited for the 3.7 GHz Band).

<sup>71</sup> GCI uses the 6 GHz Band in conjunction with the 3.7 GHz band, and utilizes 93 Tx/Rx satellite earth stations with 88 discrete locations for its FSS uplink operations.

TERRA Network is a 3,300-mile rural high-speed broadband network that launched in 2009 (and was completed recently in October 2017):

TERRA delivers high-speed broadband access to 45,000 Alaskans in 84 communities that are spread across an area the size of Texas. The network serves more than 160 schools and medical clinics throughout Western Alaska, a region where the average community has a population of less than 1,000 people and the rugged terrain makes snowmachines (known as “snowmobiles” to non-Alaskans) and small planes the most practical mode of transportation.<sup>72</sup>

GCI’s TERRA services support critical communications in Alaska in areas where GCI found that FSS operations were unable to provide the speed and capacity needed by customers. Doing so was no small feat. Because of the impediments to an extensive, reliable fiber optic solution described herein, most of the TERRA network relies on microwave technology. Like the areas where GCI uses C-Band to provide critical telecommunications services, most of the communities that TERRA serves are not accessible by road, and often require construction of mountaintop repeater sites in areas where few or no people reside in order to reach consumers in the most remote areas of the country, requiring parts, equipment, and supplies to be delivered by helicopter. GCI undertook all of this effort and expense because TERRA has modernized and advanced broadband connectivity in certain areas of rural Alaska by providing high speed, low latency terrestrial service that supports not only consumer Internet service in rural communities, but also the bandwidth-hungry, latency-sensitive services like interactive distance learning and telemedicine.<sup>73</sup> GCI would not have been able to develop this network without interference-free

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<sup>72</sup> Ron Duncan, *The Digital Divide in Rural America*, The Hill, Nov. 5, 2017, available at <http://thehill.com/opinion/technology/358839-the-digital-divide-in-rural-america>.

<sup>73</sup> Unfortunately, the areas still served by the C-Band FSS exclusively are unable to be reached by TERRA or a TERRA-like solution due to large inter-village distances, low population



access to the 6 GHz Band. And GCI is not alone in this recognition; AT&T also recognizes the importance of 6 GHz microwave services, demonstrating that this band “remains a critical component of the Nation’s communications networks.”<sup>74</sup>

The Notice seeks comment on the mid-range bands “with the most potential to support increased flexible uses, including wireless broadband services.”<sup>75</sup> GCI’s experience with the 6 GHz Band demonstrates that this band may have the potential to be more suitable for sharing with licensed services than the 3.7 GHz Band – assuming that incumbent services are adequately protected from interference. Notably, the 6 GHz Band already has a band sharing system in place between Part 101 microwave radio services and Part 25 satellite services. Part of the reason that this sharing arrangement works in this band, rather than in the 3.7 GHz Band, is due to the fact that the transmitted signal levels of both systems are of the same relative magnitude in the 6 GHz Band (when accounting for the fact that the FSS earth station cannot operate below a 5 degree antenna elevation angle thus reducing its interference levels toward 6 GHz Part 101 receivers to similar levels as other microwave interferers). This effectively limits interference to terrestrial microwave receivers and does not cause perceivable interference on the satellite uplink.

Nevertheless, GCI recognizes that successful coordination with licensed mobile wireless services may be more difficult to achieve because “the intermittent nature of [mobile] devices would make it extremely difficult to isolate, identify, or locate them. And, the mobile nature of these devices and the nearly random direction of transmission of their antennas would exacerbate

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density, federally preserved land, or other access and serviceability factors that make the already marginal business case and physical realities simply extremely difficult to overcome.

<sup>74</sup> AT&T Comments at 14 (noting that the 6 GHz bands “are densely populated and serve societally beneficial requirements that cannot technically be satisfied using other microwave bands or alternative transmission technologies.” *Id.* at 4.

<sup>75</sup> Notice ¶ 12.

the problem further.”<sup>76</sup> However, GCI agrees that the further examination of additional sharing opportunities that would protect incumbent microwave services from licensed mobile operations in the 6 GHz Band should be explored.

On the other hand, GCI has serious concerns about the introduction of unlicensed broadband operations into the 6 GHz Band as the risk of interference would be high, and any interference would be effectively untraceable and irremediable.<sup>77</sup> Although unlicensed proponents argue that Part 15 rules will allow Wi-Fi and other unlicensed operations to safely coexist with 6 GHz Band incumbents, GCI disagrees.<sup>78</sup> The Part 15 rules require that unlicensed services not cause harmful interference to licensed operations, and accept harmful interference from licensed operations.<sup>79</sup> The real world application of these rules can still result in the occurrence of interference, and “the itinerant nature of most unlicensed activity, even if it was identified as causing interference, means that the device may never be located, since it may be transmitting only intermittently and is likely to be in motion.”<sup>80</sup> In addition, while it may be possible to design wireless devices that could “detect” energy in the 6 GHz Band before transmitting; such devices may not be able to correctly characterize this detected energy as being another unlicensed device/base station versus an operational FS (microwave) system. Accordingly, the FCC should reject proposals seeking to introduce unlicensed services into the 6

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<sup>76</sup> Comments of CenturyLink at 6, GN Docket No. 17-183 (filed Oct. 2, 2017).

<sup>77</sup> AT&T Comments at 17.

<sup>78</sup> *See, e.g.*, Comments of Cisco Systems, Inc. at 5, GN Docket No. 17-183 (filed Oct. 2, 2017); DSA Comments at 13-4; Comments of Hewlett Packard Enterprise Company at 11, GN Docket No. 17-183 (filed Oct. 2, 2017) (“HP Comments”); Comments of Intel Corp. at 5, GN Docket No. 17-183 (filed Oct. 2, 2017); Comments of Wi-Fi Alliance at 8, GN Docket No. 17-183 (filed Oct. 2, 2017).

<sup>79</sup> 47 C.F.R. § 15.5(b).

<sup>80</sup> AT&T Comments at 17.

GHz band, and request proposals for sharing with licensed mobile services that protect incumbent users in the 6 GHz band.

## **VII. CONCLUSION**

The record in this proceeding demonstrates significant incumbent FSS operations over the entire 500 MHz of the C-Band. Many of these operations do not have alternative options, such as switching to a fiber platform or operating over a limited portion of the band, and therefore the Commission should reject proposals seeking to clear the C-Band. In the event that sharing solutions are further contemplated for the 3.7 GHz or 6 GHz Bands, the Commission must be cognizant of the significant, critical, incumbent uses in these bands, and should incorporate suitable protections for these services in any sharing framework going forward.

Respectfully submitted,

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