

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

In the Matter of	)	
	)	
Expanding Flexible Use of the 3.7 to 4.2 GHz Band	)	GN Docket No. 18-122
	)	
Expanding Flexible Use in Mid-Band Spectrum	)	GN Docket No. 17-183
Between 3.7 and 24 GHz	)	(Inquiry Terminated as to 3.7-4.2 GHz)
	)	
Petition for Rulemaking to Amend and Modernize	)	RM-11791
Parts 25 and 101 of the Commission's Rules to	)	
Authorize and Facilitate the Deployment of	)	
Licensed Point-to-Multipoint Fixed Wireless	)	
Broadband Service in the 3.7-4.2 GHz Band	)	
	)	
Fixed Wireless Communications Coalition, Inc.,	)	RM-11778
Request for Modified Coordination Procedures in	)	
Bands Shared Between the Fixed Service and the	)	
Fixed Satellite Service	)	

**COMMENTS OF THE SATELLITE INDUSTRY ASSOCIATION**

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## SUMMARY

SIA fully supports the Commission’s commitment to driving U.S. 5G leadership by seeking opportunities to make more spectrum available for terrestrial wireless broadband networks. But in that effort, the Commission must not sacrifice established, vitally important C-band fixed-satellite service (“FSS”) operations that benefit every American. Any action pursuant to the Notice must recognize and safeguard the pivotal role C-band networks play in the nation’s communications infrastructure, from supplying video and audio programming enjoyed by virtually all U.S. consumers, to providing basic, lifeline connectivity in remote regions that lack terrestrial alternatives, to enabling government services critical to public safety and national security. The tens of billions of dollars that satellite operators and their customers have invested in dozens of C-band space stations and thousands of C-band earth stations have a ripple effect that extends much further, supporting other industries that are major engines of the U.S. economy. To ensure that U.S. users have ongoing access to these integral and necessary services, the Commission must maintain policies that enable flexible, efficient, high-quality satellite offerings in response to customer demand.

Although the statistics of C-band FSS reliance are impressive – C-band satellites carry round-the clock news, sports, and entertainment content to more than 100 million U.S. television households and tens of millions of terrestrial and satellite radio listeners – these numbers do not tell the whole story. Equally important are the unquantifiable benefits of the C-band FSS network, which provides nationwide distribution for the Emergency Alert System, permits rapid restoration of communications links when terrestrial systems are damaged, supplies basic long distance communications, telehealth services, and broadband connectivity to communities in Alaska, supports air traffic control and pilot safety initiatives, enables a national-level missile

warning system, delivers weather reports and forecasts including warnings for the safety of life and property, and allows broadband access for commercial and U.S. Navy ships at sea.

These services are made possible by a ubiquitous deployed base of earth station antennas communicating with spacecraft across the orbital arc that fully reuse the spectrum at two-degree intervals. The FSS network takes advantage of the latest coding and compression technology to further maximize the intensity of spectrum use. And the distance-insensitive nature of satellite communications means that a telephone cooperative based in Oxford, Wisconsin (population: 607) can offer the same variety of video programming and advanced capabilities, including ultra-high definition 4K video, available to residents of the largest U.S. cities.

The integral part played by C-band FSS cannot be readily filled by turning to alternative satellite spectrum or transmission methods. Ku- and Ka-band frequencies have a lower resistance to rain fade than does the C-band, and satellites in these higher bands have insufficient available capacity to take over the traffic carried by C-band spacecraft. Because fiber has a limited reach, particularly in less-populated areas, relying on fiber as a substitute for C-band FSS would leave video and audio providers outside urban areas with no economical means to continue receiving the programming their customers enjoy today. Moreover, continued improvements in compression techniques will not materially reduce the need for C-band FSS given increased demand for diverse, higher-quality content packages.

The Notice accurately recognizes that co-frequency sharing of the 3.7-4.2 GHz band between FSS and terrestrial 5G operations is infeasible. In fact, it would be a lose-lose proposition. Large required protection distances around thousands of widely-dispersed C-band receive earth stations would prevent terrestrial use in most populated areas. Meanwhile, interference to sensitive earth station receivers could imperil the critical services provided by the

C-band FSS infrastructure. Experience around the globe has shown the risks of assuming that terrestrial mobile services are compatible with co-frequency use by ubiquitous earth stations.

To continue to promote robust FSS use of C-band spectrum, support existing customer arrangements, and foster ongoing competition, the Commission must reject the drastic restraints on FSS operating flexibility and proposed introduction of point-to-multipoint (“P2MP”) services discussed in the Notice. Full-band, full-arc protection of C-band earth stations serves critical public interest objectives by allowing customers to immediately restore service following a space segment outage, benefit from competitive forces, and make opportunistic use of available capacity for coverage of live events. The long-standing policy also enables satellite operators to efficiently manage their networks to address interference and respond to customer demand. Preserving this critical flexibility will be even more important if the Commission moves forward with approaches that would limit the C-band spectrum available for FSS.

Tying the hands of satellite operators is particularly unjustified given the lack of proven demand for more P2MP spectrum. Providers of fixed broadband access today use more than 10 GHz across a range of frequencies, giving them ample resources to expand their networks to unserved areas. To the extent these entities show a valid need for yet more spectrum, the Commission should focus on bands that are less encumbered than the intensively-used C-band downlink frequencies.

The Notice contemplates replacing the current flexible framework for FSS with a burdensome and overly regulatory approach that would deprive customers of the benefits of their agreements and stifle competition. Requiring each of the thousands of earth station operators to provide highly detailed usage and antenna pointing information and thereafter protecting their operations only if they conform to those exact parameters or go through a costly coordination

and modification procedure would fundamentally disrupt the existing C-band FSS business by making it impractical for a content provider to shift to another transponder or satellite for any reason. Changes to restore service, to take advantage of more favorable prices or terms, or to counteract interference – all of which are commonplace and inexpensive today – would become virtually impossible to implement, undermining the quality and nationwide reach of C-band FSS. The Notice also proposes without justification to permanently prohibit applications for new C-band earth stations, preventing the extension of video and audio services to unserved or underserved communities.

These far-reaching changes in the regulatory environment would have negative effects on essential FSS services that far outweigh any potential benefits of new P2MP use of the C-band, especially as P2MP services would need to be excluded in the areas surrounding thousands of active C-band earth stations. The significant public value of existing, ubiquitous C-band FSS services must not be compromised in pursuit of purely speculative gains in P2MP deployment.

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**COMMENTS OF THE SATELLITE INDUSTRY ASSOCIATION**

The Satellite Industry Association (“SIA”)<sup>1</sup> hereby responds to the Notice of Proposed Rulemaking in the above-captioned proceeding, which invites comment on potential approaches for introducing new terrestrial wireless services in the 3.7 GHz-4.2 GHz C-band downlink frequencies used for fixed-satellite service (“FSS”) operations.<sup>2</sup> Given the critical importance

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<sup>1</sup> SIA Executive Members include AT&T Services, Inc.; The Boeing Company; EchoStar Corporation; Intelsat S.A.; Iridium Communications Inc.; Kratos Defense & Security Solutions; Ligado Networks; Lockheed Martin Corporation; Maxar Technologies; Northrop Grumman Corporation; OneWeb; SES Americom, Inc.; Space Exploration Technologies Corp.; Spire Global; and ViaSat Inc. SIA Associate Members include ABS US Corp.; Analytical Graphics, Inc.; Artel, LLC; Blue Origin; DataPath, Inc.; Eutelsat America Corp.; ExoAnalytic Solutions; Globalstar, Inc.; Globecom, Inc.; Glowlink Communications Technology, Inc.; HawkEye 360; Hughes Defense and Intelligence Systems/Government Solutions; Inmarsat, Inc.; Kymeta Corporation; L3 Technologies; Panasonic Avionics Corporation; Planet; SES; Telesat; TrustComm, Inc.; Ultisat, Inc.; and XTAR, LLC. For more information on SIA, see [www.sia.org](http://www.sia.org).

<sup>2</sup> *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Order and Notice of Proposed Rulemaking, GN Docket Nos. 18-122 *et al.* (rel. July 13, 2018) (the “Notice”).

and unique capabilities of C-band FSS and the impracticality of co-frequency sharing between FSS and terrestrial wireless systems, the Commission must act carefully to safeguard satellite operations. In particular, long-standing Commission policies ensuring full-band, full-arc access to C-band spectrum must be maintained to protect FSS customers' contractual rights and service quality, and proposals to introduce new, conflicting point-to-multipoint ("P2MP") fixed service operations in C-band downlink spectrum must be rejected.

Only by preserving rules that promote continued robust FSS use of C-band frequencies can the Commission ensure that its efforts to open up additional spectrum for terrestrial broadband operations do not undermine incumbent satellite operations that play an important and indispensable role in the nation's communications infrastructure.

## **I. CUSTOMERS RELY ON C-BAND FSS FOR SERVICES ESSENTIAL TO THE U.S. ECONOMY AND THE PUBLIC INTEREST**

SIA has previously detailed the central role that C-band space and ground stations play in supplying content and connectivity to U.S. consumers nationwide.<sup>3</sup> Specifically:

These core assets form the backbone for video and audio programming contribution and distribution, serve as the sole form of interconnection for residents of remote areas, are relied on by government agencies for key national security and public safety operations, deliver emergency information, restore service when terrestrial networks are damaged, and enable communication with naval and commercial ships at sea.<sup>4</sup>

Suggestions by some terrestrial parties that the C-band is underutilized by FSS operations have been conclusively disproven, as certain SIA members calculate that the Commission's International Bureau Filing System ("IBFS") now contains roughly 16,500 C-band earth stations,

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<sup>3</sup> Comments of the Satellite Industry Association, GN Docket No. 17-183, filed Oct. 2, 2017 ("SIA Comments") at 5-16.

<sup>4</sup> Reply Comments of the Satellite Industry Association, GN Docket No. 17-183, filed Nov. 15, 2017 ("SIA Reply Comments") at 2.



and that number is still growing. Thus, the record actually shows that FSS use of the 3.7-4.2 GHz frequencies is intensive and efficient. Any action taken by the Commission pursuant to the Notice must preserve the value of the multibillion dollar investment in C-band space and ground facilities and ensure that the companies and government entities that rely on C-band FSS for operations that benefit everyone in the U.S. continue to have protected, high-reliability access to this important spectrum.

**A. C-Band Satellite Networks Are Critical to the Television and Radio Industries and Support Connectivity, Public Safety and National Security**

C-band satellite networks distribute video and audio signals on a 24/7/365 basis, supplying programming that is indispensable to cable systems and other multichannel video programming distributors (“MVPDs”), television and radio broadcasters, over-the-top video distributors, and Satellite Digital Audio Radio Service (“SDARS”) systems that deliver programming to end users. Transportable earth station operators also heavily use C-band FSS for coverage of live events. The distance-insensitive nature and broad coverage of C-band satellites provides a cost-effective means of ensuring that communities large and small have access to a full range of news, sports, and entertainment programming. In addition, C-band FSS supplies long-haul communications links, connectivity for remote areas, mobile backhaul, and public safety services such as emergency alerts and weather and air traffic data.

By far the largest users of C-band FSS are content providers that require the ability to reliably transmit programming to every corner of the United States. As a group of these entities has emphasized:

Cable operators, content companies, and radio and television broadcasters all rely on 3.7-4.2 GHz C-band spectrum for video and audio content distribution. Much of the programming that Americans enjoy on television and on the radio, at one point or another, transits the 3.7-4.2 GHz band. Video content received

using C-band spectrum reaches over 100 million American households (including 51.9 million cable video customers) and public radio content reaches over 42 million Americans each week.<sup>5</sup>

Religious broadcaster Eternal Word Television Network uses C-band satellites to distribute both television and radio programming that serves more than 91 million U.S. television households and millions more radio listeners.<sup>6</sup> SDARS provider Sirius XM, which serves 33.5 million U.S. subscribers, receives third-party audio content from multiple sources via C-band satellites.<sup>7</sup> Significantly, this content includes not only sports and entertainment programming but also news and weather information that can be critical to public safety. For example, during hurricanes Florence and Michael, Sirius XM made The Weather Channel – which it receives via a C-band satellite feed – available free-to-air to the more than 100 million SDARS receivers.<sup>8</sup>

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<sup>5</sup> *Ex Parte* Filing of the American Cable Association, National Association of Broadcasters, National Public Radio, Inc., and NCTA – The Internet & Television Association, GN Docket Nos. 17-183 & 18-122, filed June 15, 2018 at 1-2 (footnotes omitted). *See also* Comments of the American Cable Association, GN Docket No. 17-183, filed Oct. 2, 2017 (“ACA Comments”) at 2; Comments of the Content Companies (the Walt Disney Company, CBS Corporation, Scripps Networks Interactive, Inc., Time Warner Inc., 21st Century Fox, Inc., and Viacom Inc.), GN Docket No. 17-183, filed Oct. 2, 2017 (“Content Company Comments”) at 1; Comments of iHeartMedia + Entertainment, Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“iHeartMedia Comments”) at 1-2; Comments of the National Association of Broadcasters, GN Docket No. 17-183, filed Oct. 2, 2017 (“NAB Comments”) at 2; Comments of NCTA – The Internet & Television Association, GN Docket No. 17-183, filed Oct. 2, 2017 (“NCTA Comments”) at 3; Comments of SES Americom, Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“SES Comments”) at 2-3; Comments of Sirius XM Radio Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“Sirius XM Comments”) at 5-6.

<sup>6</sup> Comments of Eternal Word Television Network, Inc., GN Docket No. 17-183, filed Oct. 2, 2017, at 4 & n.5.

<sup>7</sup> Sirius XM Comments at 5-6.

<sup>8</sup> *See id.* at 7; <http://blog.siriusxm.com/get-live-hurricane-florence-updates-from-the-weather-channel-on-siriusxm/>; <https://www.cordcuttersnews.com/the-weather-channels-coverage-of-hurricane-michael-is-now-free-on-siriusxm/>.

Live programming coverage similarly is reliant on C-band FSS. Specifically, “the on-site newsgathering and live event audio and video essential to producing breaking news, sports, and other programming also depends upon the C-band, using temporary fixed uplinks to transport video from the field back to studios and on to viewers.”<sup>9</sup> PSSI Global Services, for example, operates trucks equipped with transportable C-band antennas used to carry a wide variety of live programming, including National Football League games, NASCAR races, golf tournaments, NCAA sports, and the Academy Awards.<sup>10</sup>

Content distribution and contribution are certainly not the only services supplied by C-band satellites, however. AT&T uses C-band FSS not only to support its DirecTV and U-Verse consumer video services but also as an element of its long-haul telecommunications plant.<sup>11</sup> In addition, AT&T has disaster response teams able to quickly deploy C-band antennas to restore service following natural disasters such as hurricanes.<sup>12</sup> Indeed, “services in the C-Band spectrum play a vital role in restoring communications to areas affected by natural disasters, particularly where infrastructure has been damaged or destroyed and is inoperable.”<sup>13</sup>

Both AT&T and General Communication Inc. (“GCI”) also rely on C-band satellites to serve communities in remote parts of Alaska that lack terrestrial alternatives. The AT&T Alascom C-band network “is essential for the safety and well-being of residents at these

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<sup>9</sup> Content Company Comments at 2.

<sup>10</sup> See Reply of PSSI Global Services, LLC, RM-11778, filed Jan. 12, 2017 (“PSSI RM-11778 Reply Comments”) at 2.

<sup>11</sup> Comments of AT&T Services, Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“AT&T Comments”) at 5.

<sup>12</sup> *Id.* at 8.

<sup>13</sup> Reply Comments of AT&T Services, Inc., GN Docket No. 17-183, filed Nov. 15, 2017 (“AT&T Reply Comments”) at 4.

locations because it is often the only communications infrastructure available to the local communities.”<sup>14</sup> GCI similarly uses “over 130 C-Band sites in Alaska (many of which are equipped with multiple antennas)”<sup>15</sup> to serve customers in areas that “rely exclusively on satellite technology for the provision of basic telephone service, medical service, and distance-learning.”<sup>16</sup>

Moreover, C-band FSS is a crucial part of the backbone of the Emergency Alert System (“EAS”) administered by the Commission and the Federal Emergency Management Agency (“FEMA”). Both iHeartMedia and National Public Radio have highlighted their use of C-band satellites to transmit EAS alerts to their affiliates.<sup>17</sup> Sirius XM also acts as a Primary Entry Point for EAS and has partnered with FEMA to provide a backup mechanism for distributing EAS alerts.<sup>18</sup>

C-band FSS connectivity supports other government operations critical to the public interest as well. These include the provision of air traffic control services in Alaska and elsewhere,<sup>19</sup> distribution of National Weather Service reports and forecasts by the National Oceanic and Atmospheric Association,<sup>20</sup> a network that provides missile warning, space

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<sup>14</sup> AT&T Comments at 9.

<sup>15</sup> Comments of General Communication, Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“GCI Comments”) at 5.

<sup>16</sup> *Id.* at 2-3.

<sup>17</sup> iHeartMedia Comments at 1-2; Comments of National Public Radio, Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“NPR Comments”) at 9.

<sup>18</sup> Sirius XM Comments at 8.

<sup>19</sup> See GCI Comments at 11; SIA Comments at 11-12 & n.21; Reply Comments of Aviation Spectrum Resources Inc., GN Docket No. 17-183, filed Oct. 3, 2017, at 2 (C-band FSS is used for backhaul of air traffic management data, allowing “reliable remote links to aviation communications sites that are in (primarily) remote or underserved locations where existing wired infrastructure is not available or [is] unreliable”).

<sup>20</sup> SIA Comments at 11.

surveillance, space control, and satellite command and control,<sup>21</sup> and a U.S. Navy program that provides wideband satellite communications to naval vessels.<sup>22</sup>

Apart from the commercial and government services delivered directly over C-band spectrum, C-band frequencies are also utilized by many satellite systems for crucial tracking, telemetry, and command (“TT&C”) operations. These TT&C operations control a spacecraft’s maneuvers and thus ensure its safe station-keeping. C-band frequencies, with their favorable propagation characteristics, offer the high reliability and flexibility required for these critical operations. That is why satellite systems operating across diverse frequency bands and providing services ranging from mission-critical mobile voice to high-speed broadband data rely upon C-band TT&C operations.

Thus, C-band FSS contributes substantially to the U.S. economy as well as to public welfare. U.S. media industries dependent on C-band FSS include:

- Local television and radio broadcasting, which in 2016 directly accounted for \$53.37 billion in annual revenue and more than 303,000 jobs – when indirect effects are factored in, broadcasting has a total impact on the yearly gross domestic product of \$1.18 trillion and 2.42 million jobs<sup>23</sup>
- Cable television, which generated \$57.7 billion in residential video revenue in 2016<sup>24</sup> and accounts for 2.9 million jobs<sup>25</sup>

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<sup>21</sup> *Id.* at 10.

<sup>22</sup> *Id.* at 11.

<sup>23</sup> See Woods & Poole Economics, “Local Broadcasting: An Engine for Economic Growth,” at 2, available at: [http://www.nab.org/documents/newsRoom/pdfs/Local\\_Broadcasting\\_Engine\\_for\\_Growth\\_Publication.pdf](http://www.nab.org/documents/newsRoom/pdfs/Local_Broadcasting_Engine_for_Growth_Publication.pdf).

<sup>24</sup> See <http://variety.com/2016/biz/news/cable-tv-revenue-decline-broadband-cord-cutting-1201836417/>.

<sup>25</sup> See [https://www.ncta.com/industry-data?share\\_redirect=/industry-data#colorbox=node-2790](https://www.ncta.com/industry-data?share_redirect=/industry-data#colorbox=node-2790).

- Satellite television and radio, which had 2017 revenues of \$38.3 billion and \$5.4 billion, respectively<sup>26</sup>

It is impossible to place a dollar amount on the intangible benefits of C-band FSS, but they must be considered as well. For example, the Commission has consistently recognized the value that local broadcasters provide to their communities. In an address to the Michigan Association of Broadcasters earlier this year, Chairman Pai highlighted the group's public service role, including its efforts to promote vaccination, observing that:

the reality is that your day-to-day job is a public service. During emergencies, you're the ones people turn to learn about what's going on or where to find help. Your reporting holds local officials accountable. Our shared experiences, from high school football games to local elections, are memorialized by your storytelling, which helps bind communities together.<sup>27</sup>

Chairman Pai went on to make the commitment that during his tenure the Commission "would not take the value of broadcasting for granted."<sup>28</sup>

Without C-band FSS, however, the broadcast industry as we know it would not exist. Most television and radio stations rely on a core set of syndicated content because it is not economical for them to produce their own programming. Cost-effective access to content that is nationally distributed via C-band satellites keeps these broadcasters afloat financially, enabling

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<sup>26</sup> Comments of the Satellite Industry Association, IB Docket No. 18-251, filed Sept. 7, 2018, Appendix B.

<sup>27</sup> Remarks of FCC Chairman Ajit Pai before the Michigan Association of Broadcasters, Aug. 14, 2018, available at: <https://docs.fcc.gov/public/attachments/DOC-353552A1.pdf> ("Pai MAB Remarks") at 1. *See also* Remarks of FCC Commissioner Michael O'Rielly before the 2018 Radio Show, Sept. 27, 2018, available at: <https://docs.fcc.gov/public/attachments/DOC-354311A1.pdf> at 1 (thanking radio broadcasters for "providing critical emergency and weather information to your listeners when mother nature comes knocking," for "raising funding and awareness for charities when people in your communities are in need," for "bringing local news, sports, and/or events to your communities as many local newspapers falter," for "your long tradition of helping your fellow Americans," and for "the many other benefits that you bring to those within your listening areas on a daily basis").

<sup>28</sup> Pai MAB Remarks at 2.

them to focus their resources on generating the local news, weather, and community interest programming on which their viewers and listeners rely. LinkUp Communications Corporation, a provider of support services to broadcasters that are primarily faith-based non-profit entities, has highlighted this issue, noting that its “clients depend heavily on C-band for content not produced locally,” and that without “this ultra-reliable form of delivery, these non-profits would very likely be unable to continue to broadcast and serve in these communities.”<sup>29</sup>

C-band FSS is equally important to other public interest objectives given its role in supporting EAS, air traffic control, the National Weather Service, restoration of service in the wake of natural disasters, and lifeline connectivity in remote locations. C-band satellites, with their ability to provide nationwide, high-reliability, distance-insensitive communications capacity, make a unique and valuable contribution to U.S. consumer welfare that must be preserved.

#### **B. Claims that C-Band Is Underused by FSS Are Demonstrably False**

Suggestions by some terrestrial service interests that FSS networks do not robustly use C-band frequencies must be conclusively rejected as contrary to the facts. These allegations cited the relatively modest number of C-band receive earth stations in the Commission’s IBFS database before this proceeding began,<sup>30</sup> ignoring evidence presented by SIA and others showing

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<sup>29</sup> *Ex Parte* Letter of LinkUp Communications Corp., Society of Broadcast Engineers, Intelsat Corp., SES Americom, Inc., GN Docket Nos. 17-183 and 18-122, filed May 24, 2018, at 13-14.

<sup>30</sup> *See, e.g.*, Broadband Access Coalition, Petition for Rulemaking, RM-11791, filed June 21, 2017 (“BAC Petition”) at 15 & Ex. 3; Comments of the Computing Technology Industry Association, GN Docket No. 17-183, filed Oct. 2, 2017, at 2; Comments of Google LLC and Alphabet Access, GN Docket No. 17-183, filed Oct. 2, 2017, at 4; Comments of Nokia, GN Docket No. 17-183, filed Oct. 2, 2017, at 6-8; Comments of T-Mobile USA, Inc., GN Docket No. 17-183, filed Oct. 2, 2017 (“T-Mobile Comments”) at 13; Comments of Verizon, GN Docket No. 17-183, filed Oct. 2, 2017 at 11-12.

that only a fraction of active C-band receive earth stations had been registered in IBFS.<sup>31</sup>

Indeed, supporters of the BAC Petition seeking rule changes to allow the introduction of P2MP services in C-band downlink spectrum have continued to reference outdated information on receive earth station deployment<sup>32</sup> and to repeat their claims that C-band downlink spectrum is “severely underutilized,”<sup>33</sup> undeterred by the data proving otherwise.

As of October 26, 2018, the IBFS database included approximately 16,500 C-band receive earth stations that are registered or have registration applications pending. The vast majority of these were submitted in the past six months, after the Commission announced a temporary freeze on applications for new C-band earth stations and a filing window within which existing C-band earth stations could be registered.<sup>34</sup> These earth stations are scattered across the country, with locations in all fifty states, as well as in American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands.

Because the filing window has been extended through October 31, 2018, this number does not represent the final total. Moreover, SIA believes that even once the window is closed, a

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<sup>31</sup> See, e.g., SIA Comments at 18-19; ACA Comments at 4 n.6; NAB Comments at 3-4; NCTA Comments at 3; SES Comments at 6.

<sup>32</sup> See, e.g., BAC and Google LLC Notice of *Ex Parte* Presentation, GN Docket No. 17-183 and RM-11791, filed Mar. 29, 2018 (“BAC/Google *Ex Parte*”), Attachment 1 at unnumbered pages 8-10, Attachment 2 at 14, 25.

<sup>33</sup> Written Testimony of Claude Aiken, President/CEO, Wireless Internet Service Providers Association, Hearing Before the House of Representatives Committee on Energy and Commerce Subcommittee on Communications and Technology, *Realizing the Benefits of Rural Broadband: Challenges and Solutions*, at 9 (July 17, 2018), available at <https://democrats-energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Testimony-Aiken-Hrg-on-Realizing-the-Benefits-of-Rural-Broadband-2018-07-17.pdf>.

<sup>34</sup> Public Notice, *Temporary Freeze on Applications for New or Modified Fixed Satellite Service Earth Stations and Fixed Microwave Stations in the 3.7-4.2 GHz Band; 90-Day Window to File Applications for Earth Stations Currently Operating in 3.7-4.2 GHz Band*, GN Docket No. 17-183, WTB Docket No. 18-122, DA 18-398 (IB/PSHSB/WTB Apr. 19, 2018) at 1.



potentially significant number of earth stations will remain unregistered. Notwithstanding active outreach by SIA members and the Commission, some C-band earth station operators likely are still unaware of the need to register in order to obtain interference protection from prospective new terrestrial services. Others may lack the resources to gather the required information and prepare registration filings. Moreover, because government agencies with C-band earth stations cannot register directly with IBFS, an unknown number of government earth stations have been left out of this total. But leaving aside these omissions, the updated IBFS database clearly puts to rest any suggestion that FSS networks are not fully using the 3.7-4.2 GHz frequencies.

Thousands of these C-band earth stations – most notably, cable headends – need access to the full range of C-band frequencies and have antennas oriented towards multiple satellites to receive the complete set of programming channels provided to American viewing households.<sup>35</sup> Other earth stations primarily rely on more limited bandwidth but may need to change frequencies or antenna pointing in response to a variety of circumstances.<sup>36</sup> In addition, transportable earth stations make opportunistic use of C-band spectrum to cover live events.<sup>37</sup>

C-band earth stations communicate with satellites that employ spectrum highly efficiently. Dozens of space stations located at two-degree intervals across the orbital arc are capable of serving customers nationwide – all using the same 500 MHz of spectrum.

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<sup>35</sup> For example, the ACA states that its members operate approximately 3,000 earth stations that receive programming from C-band satellites carrying nearly 2,000 video channels that occupy 308 transponders on 24 satellites. ACA Comments at 4 n.6, 6. NCTA reports that its members similarly operate thousands of C-band receive earth stations. NCTA Comments at 3.

<sup>36</sup> See, e.g., NPR Comments at 11; NAB Comments at 5.

<sup>37</sup> See PSSI RM-11778 Reply Comments at 1-2.

Compliance with Commission policies on frequency re-use<sup>38</sup> further increases the satellites' efficiency.

Moreover, significant advances in coding have permitted the delivery of more advanced, more diverse programming options in response to customer demand.<sup>39</sup> Indeed, given the substantial costs of satellite facilities, both space station operators and their customers have a strong incentive to maximize the content that can be carried on a satellite. Evolving compression techniques have increased data throughput, laying the foundation for the explosion in both the number of programming channels offered today and the video quality delivered to viewers.

Taken as a whole, the U.S. C-band space and ground infrastructure represents an investment in the tens of billions of dollars. The network blankets the country with reliable, high-quality communications capacity, enabling users to access a wealth of video and audio programming and data services from virtually anywhere and wringing significant value from every megahertz of available spectrum.

## **II. NEITHER OTHER SATELLITE SPECTRUM NOR OTHER TECHNOLOGIES CAN MATCH THE PERFORMANCE AND REACH OF C-BAND FSS**

As SIA has previously emphasized, claims that C-band FSS can readily “be switched to other satellite spectrum or entirely to fiber, or that reliance on C-band FSS can be reduced through advanced compression methodologies, are groundless.”<sup>40</sup> C-band satellite services offer unique advantages by providing cost-effective, high quality capacity available everywhere in the country. Alternatives cannot serve as equivalent replacements for C-band FSS.

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<sup>38</sup> 47 C.F.R. § 25.210(f).

<sup>39</sup> See, e.g., SIA Comments at 20-21.

<sup>40</sup> SIA Reply Comments at 19.

For example, due to the immutable principles of physics, higher frequencies used for FSS like the Ku-band and the Ka-band are more susceptible to atmospheric attenuation than C-band.<sup>41</sup> As AT&T has explained:

The propagation characteristics of the C-Band . . . make it resistant to signal fade due to weather phenomena such as fog, particles, or rain. This is particularly important for cable and IP video transmission, since signal quality and uptime are critical issues.<sup>42</sup>

In short, satellite frequency bands are not interchangeable – their technical characteristics make different FSS bands best suited to meet different customer requirements.

Furthermore, in-orbit Ku- and Ka-band satellites do not have enough vacant bandwidth to handle the volume of traffic carried over C-band satellites today. Both Ku- and Ka-band satellites are in active use and have limited idle capacity that cannot accommodate the hundreds of transponders on dozens of satellites required for C-band content delivery alone.<sup>43</sup> Nor do the designs of Ku- and Ka-band satellites necessarily align well with the business requirements of most C-band FSS customers. For example, the use of multiple spot beams in these higher frequency satellites is ideal for customers seeking high data rates within a spot beam footprint, but not for content providers seeking to send the same programming package to broadcast affiliates and cable systems nationwide.<sup>44</sup>

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<sup>41</sup> See, e.g., *id.* at 20; SES Comments at 2; *Ex Parte* of Comcast and NBCUniversal, GN Docket Nos. 17-258 & 18-122, filed May 16, 2018 (“Comcast/NBCU *Ex Parte*”), Attachment at 1.

<sup>42</sup> AT&T Reply Comments at 8.

<sup>43</sup> ACA Comments at 2 (“video programming carried by C-band satellites comprises an astonishing number of channels – almost 2,000 – and takes 308 transponders on 24 satellites”).

<sup>44</sup> See SIA Reply Comments at 21-22.

These factors mean that Ku- and Ka-band satellites do not offer C-band customers the same set of attributes supplied by existing C-band FSS facilities. Moreover, to shift services to higher frequency bands, the deployed network of ground infrastructure would have to be replaced at tremendous cost to earth station operators, which would have to purchase new equipment and abandon the significant investments they have already made in C-band ground facilities. These costs would be particularly burdensome for cable systems and broadcasters serving smaller communities.

Nor is switching to fiber optic delivery a viable option for the C-band FSS customer base. Fiber deployment is not ubiquitous and is particularly limited in lesser populated areas.<sup>45</sup> As a result, in the short and medium term, fiber cannot practically meet the needs of content distributors for nationwide delivery. The American Cable Association has emphasized that many of its members' "headends in rural areas lack access via fiber to a transit provider" and that the "cost of deploying fiber to a headend from the nearest transit provider could easily run to millions of dollars for cable operators without such access today, depending on the distance and the terrain that the fiber would have to traverse."<sup>46</sup> NCTA has similarly noted that even as its cable operator members "have worked toward expanding the use of fiber in delivering content to homes, this expansion has not diminished the need for C-band satellite services to acquire the content for distribution."<sup>47</sup>

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<sup>45</sup> Data provided by T-Mobile in this proceeding indicates that fiber is available in just a few hundred cities. T-Mobile Comments at 14.

<sup>46</sup> ACA Comments at 16; *see also id.*, Exhibit 1 (declaration of William D. Bauer) at ¶ 10 and Exhibit 2 (declaration of Mark Love) at ¶¶ 9-10; Comcast/NBCU *Ex Parte*, Attachment at 7.

<sup>47</sup> Comments of NCTA – The Internet & Television Association, IB Docket No. 18-251 & GN Docket No. 17-183, filed Sept. 7, 2018 at 2.

Even where fiber is available, redundancy may be required to satisfy the high reliability expectations of content providers. Fiber systems are vulnerable to cable cuts, and such damage is particularly likely following a natural disaster, when residents of the area are most in need of reliable access to news and weather information. For example, cuts to the underground fiber system in the U.S. Virgin Islands increased in the weeks after the 2017 hurricanes, as residents trying to hack their way out of their homes severed fiber lines,<sup>48</sup> and similar issues have plagued efforts to recover from Hurricane Michael in Florida, Georgia, and Alabama.<sup>49</sup> The only way to mitigate the risk of cable cuts is to deploy redundant fiber capacity, multiplying the cost for users.<sup>50</sup>

In areas where extending fiber is currently cost-prohibitive, attempting to rely on fiber as a substitute for C-band satellite service would leave content receivers outside densely populated areas with no affordable means to continue to access the content that they receive today. Consumers in more rural areas would be the clear losers under such a scenario. At a minimum, they would see the price for cable television service increase dramatically to cover new fiber deployment costs. But they also could lose service altogether if cable operators could not afford the fiber buildout expenses necessary to stay in business – and these customers are the least likely to have alternative means of video delivery, such as over-the-top transmission.

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<sup>48</sup> See “Strong Local Regulatory Key to Virgin Islands Hurricane Response, NARUC Told,” Communications Daily, Nov. 15, 2017 at 14 (“Buried fiber survived the storm, but three days later there were four cuts, a week later 17 and now 48.”).

<sup>49</sup> See “Wireless Coverage Being Restored After Michael; Verizon Says Fiber Cuts a Problem,” Communications Daily, Oct. 16, 2018 at 6.

<sup>50</sup> See ACA Comments at 17 n.34.

Claims that advances in compression technology could materially reduce demand for C-band FSS<sup>51</sup> are also misplaced. Historically, increases in the number of channels that can be carried per transponder have been more than offset by demands for more diverse, higher quality video programming packages. As the ACA has noted, the bandwidth demands of video “have been steadily increasing owing to the increase in the number of video channels over the last couple of decades, and, even more important, the increasing quality of the resolution that consumers demand.”<sup>52</sup> Improvements in compression and modulation, though significant, “have been unable to catch up” with this rising demand.<sup>53</sup> The bandwidth requirements of 4K, and eventually 8K, video offerings suggest that these trends are likely to continue.

Thus, the scope and reliability of C-band FSS make it the gold standard for nationwide content delivery and will drive continued strong demand for C-band satellite capacity. No other available technology can provide equivalent reach and quality.

### **III. THE NOTICE CORRECTLY RECOGNIZES THAT CO-FREQUENCY SHARING BETWEEN FSS AND TERRESTRIAL 5G OPERATIONS IS INFEASIBLE**

The Notice aptly summarizes the serious challenges involved in attempting to introduce terrestrial mobile services on a co-frequency basis with ubiquitously-deployed C-band FSS facilities that provide critical services. Specifically, the Commission acknowledges that after traveling roughly 36,000 kilometers, satellite signals received at earth stations are “extremely weak,” such that terrestrial mobile operations could create harmful interference to earth stations “over large distances absent adequate protection.”<sup>54</sup> Given that thousands of broadly-scattered

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<sup>51</sup> See, e.g., Comments of CTIA, GN Docket No. 17-183, filed Oct. 2, 2017, at 12.

<sup>52</sup> ACA Comments at 5-6.

<sup>53</sup> *Id.* at 6; see also Comcast/NBCU *Ex Parte*, Attachment at 5.

<sup>54</sup> Notice at ¶ 50.

receive earth stations currently use the C-band, implementing such protection is inconsistent with widespread introduction of terrestrial 5G networks in the same frequencies.

**A. Significant Required Separation Distances from Receive Earth Stations Would Preclude Meaningful Terrestrial Wireless Deployment**

The record provides the Commission with ample evidence quantifying the “large distances” needed to safeguard receive earth stations from harmful interference. All parties agree that required separation distances between new terrestrial mobile facilities and co-frequency receive earth stations would be in the tens of kilometers. For example, an analysis performed by Ericsson “concluded that *at least 30 kilometers of separation* (best case scenario), and *potentially as high as 50-70 kilometers of separation* (less favorable conditions), would be needed between a terrestrial wireless base station and a C-band earth station in order for the two services to co-exist on the same spectrum.”<sup>55</sup>

The Ericsson findings comport with the results of international studies. Report ITU-R S.2368, which was produced with the participation of both FSS and terrestrial mobile interests from the U.S. and around the world, determined that required separation distances between new terrestrial mobile facilities and receive earth stations would be in the tens of kilometers to 100 kilometers or more.<sup>56</sup>

Separation zones of this magnitude surrounding every one of the thousands of active C-band receive earth stations will leave no realistic opportunity for co-frequency deployment of

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<sup>55</sup> Comments of Ericsson, GN Docket Nos. 18-122 and 17-183, filed May 31, 2018, at 5 (footnote omitted, emphasis in original).

<sup>56</sup> Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15, Report ITU-R S.2368-0 (06/2015), available at: [https://www.itu.int/dms\\_pub/itu-r/opb/rep/R-REP-S.2368-2015-PDF-E.pdf](https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-S.2368-2015-PDF-E.pdf) at 31.

terrestrial 5G networks. A map included in the Notice illustrates this issue, depicting 20-kilometer exclusion zones surrounding the C-band earth stations that were registered in the IBFS database as of early May, 2018 and noting that 83.25% of the United States population would be covered by these zones.<sup>57</sup> But the map vastly underrepresents the true scope of the problem. As discussed above, Ericsson’s data shows that a 20-kilometer zone is inadequate – instead, co-frequency separation distances would need to be increased to as much as 70 kilometers. Moreover, thousands more earth stations have been registered since May. Using these corrected values would produce an even higher proportion of the U.S. population covered by exclusion zones in which terrestrial 5G systems would be precluded from operating on a co-frequency basis with FSS.

In short, the data overwhelmingly support the Notice’s conclusion that specifying co-frequency shared access to the 3.7-4.2 GHz band by FSS and terrestrial 5G networks would mean “mobile service would not be viable for much of the population,”<sup>58</sup> thwarting the Commission’s ability to achieve its primary objective in this proceeding.

## **B. Imposing Co-Frequency Sharing Would Imperil Essential FSS Operations**

In addition, attempting to impose co-frequency sharing would threaten critical satellite services. As the Notice observes, signals received from geostationary satellites in orbit 36,000 kilometers from earth are highly attenuated and therefore quite vulnerable to interference.<sup>59</sup> The sensitivity of C-band receive antennas means that signals from new terrestrial services, “even if operating at what otherwise might be considered ‘low’ power . . .

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<sup>57</sup> Notice at ¶ 51 & Figure 2.

<sup>58</sup> *Id.* at ¶ 52.

<sup>59</sup> *Id.* at ¶ 50.



have significant potential to interfere with the reception of satellite signals by earth stations operated by MVPDs, broadcast television stations, and others.”<sup>60</sup> Because C-band FSS operations play such a critical role in the nation’s infrastructure, the Commission must not open the door for operations that could compromise the near-perfect availability on which C-band customers depend.<sup>61</sup>

This obligates the Commission to carefully review proposals for introduction of new terrestrial services in any part of the C-band downlink spectrum to ensure that ongoing FSS operations will be adequately protected. Promises from terrestrial proponents about their ability to operate without harming FSS networks are insufficient. Instead, the Commission must base its decisions on rigorous technical analysis of interference issues based on the real-world characteristics of existing technology, not predictions that lack any empirical basis.<sup>62</sup>

The perils of introducing terrestrial mobile services in FSS bands without adequate protections have been demonstrated on a number of occasions. For example, field trials of terrestrial service in Hong Kong caused television signals serving 300 million households throughout Asia to be knocked off the air,<sup>63</sup> and testing of C-band terrestrial service in Bolivia

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<sup>60</sup> Content Company Comments at 6.

<sup>61</sup> Letter from The Walt Disney Company, CBS Corporation, Scripps Networks Interactive, Inc., 21st Century Fox, Inc., Univision Communications Inc. and Viacom Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, filed July 24, 2017, at 2.

<sup>62</sup> *See, e.g.*, AT&T Reply Comments at 3; Content Company Comments at 6 (parties proposing new terrestrial uses must demonstrate that harmful interference will not result from proposed new terrestrial uses by providing “detailed technical parameters for evaluation by the Commission and the public”); NCTA Comments at 1-2; Sirius XM Comments at 11 (the “burden must be on proponents of new terrestrial services to conclusively show” that compatibility issues can be overcome).

<sup>63</sup> *See* International Associations of the Satellite Communications Industry, Position Paper on Interference in C-band by Terrestrial Wireless Applications to Satellite Applications at 2, ITU Workshop on Market Mechanisms for Spectrum Management (2007), available at: [http://www.itu.int/osg/spu/stn/spectrum/workshop\\_proceedings/Background\\_Papers\\_Final/C-](http://www.itu.int/osg/spu/stn/spectrum/workshop_proceedings/Background_Papers_Final/C-)

caused “major interference,” disrupting satellite carriage of television channels and causing viewers to miss World Cup games.<sup>64</sup> In addition, Report ITU-R S.2368 documents cases of actual interference to FSS operations from terrestrial transmissions in Bangladesh and Brazil.<sup>65</sup>

The Commission must not allow the United States to be the next country to experience the disasters that can occur when unreasonably optimistic assumptions about the feasibility of spectrum sharing are used in place of meticulous and fact-based analysis. Instead, any Commission action to introduce terrestrial services in the 3.7-4.2 GHz band must be supported by a thorough and comprehensive review of the relevant data.

#### **IV. FSS FLEXIBILITY, INCLUDING FULL-BAND, FULL-ARC PROTECTION, MUST BE PRESERVED, AND P2MP PROPOSALS MUST BE REJECTED**

In order to make good on its commitment “to protect incumbent earth stations from harmful interference,”<sup>66</sup> the Commission must retain key existing policies on which C-band customers rely and that are integral to the ongoing robust and efficient satellite use of C-band spectrum. Proposals in the Notice to terminate full-band, full-arc flexibility for C-band earth stations,<sup>67</sup> impose onerous information and application requirements on earth station operators,<sup>68</sup> introduce incompatible P2MP operations in FSS spectrum,<sup>69</sup> and codify the freeze on new earth station applications<sup>70</sup> are inconsistent with these objectives and are wholly unjustified. These

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[band%20Interference%20-%20Global%20Position%20Paper%20for%20ITU%20%20%20%20%20%20%20spectrum%20workshop.pdf](#).

<sup>64</sup> *Id.* at 3.

<sup>65</sup> Report ITU-R S.2368 at 24-30.

<sup>66</sup> Notice at ¶ 27.

<sup>67</sup> *Id.* at ¶¶ 37-40.

<sup>68</sup> *Id.* at ¶¶ 41-45.

<sup>69</sup> *Id.* at ¶¶ 116-132.

<sup>70</sup> *Id.* at ¶ 30.

changes would heavily burden C-band satellite service customers, disrupting their established business agreements and expectations and subjecting them to a crushing new set of bureaucratic obligations, all to lay the groundwork for letting new P2MP operations use this spectrum. Yet the purported beneficiaries of this raft of regulatory changes – providers of fixed broadband services – have shown no need for still more spectrum to be added to the wide range of frequency bands already available to them and have failed to show that their operations can effectively co-exist with the intensive FSS use of the 3.7-4.2 GHz band.

The Commission cannot sacrifice the vibrant, competitive C-band FSS ecosystem relied on by critical industries and government agencies, especially when the potential upside is so limited and uncertain. Preserving C-band FSS operations that provide a distance-insensitive, nationwide platform for the delivery of content and data to urban areas and remote communities alike must take precedence, and any demonstrated need for additional spectrum for fixed broadband operations should be accommodated in other frequency bands.

**A. Full-Band, Full-Arc Earth Station Protection Is Central to the Value C-Band FSS Provides to Customers and Promotes Efficient Spectrum Use**

Satellite service customers rely heavily on the flexibility provided by the Commission's long-standing policy in favor of full-band, full-arc earth station licensing, which is essential to ensure service continuity, take advantage of competition, resolve interference, accommodate changes in demand driven by advanced services, and support coverage of live news, sports, and entertainment events. Robbing earth station operators of this flexibility in order to accommodate new P2MP services would be highly disruptive to content providers and others that depend on C-band FSS, depriving them of the value of their existing contracts and the benefits of a competitive satellite services marketplace.

The Notice acknowledges that “the full-band, full-arc policy has certain advantages” in providing flexibility to FSS operations.<sup>71</sup> But this faint praise fails to fully appreciate the importance of the policy in supporting the existing C-band FSS business and ignores the information presented by SIA and others regarding the serious harm to C-band customers that would result if the policy were to be revoked. Moreover, the assumption underlying the proposal to do away with full-band, full-arc licensing – that eliminating the policy would increase spectrum efficiency – is wholly groundless.

The record provides overwhelming evidence of the public interest benefits of full-band, full-arc earth station licensing. For example, a number of commenters have explained that the policy is necessary to permit C-band FSS customers to ensure service continuity in the event of a malfunction affecting their primary space segment.<sup>72</sup> Indeed, major content providers for whom reliability is critically important typically purchase protected service, which gives them the right to use specified alternative capacity in the event their default satellite suffers an outage.<sup>73</sup> But the value of such rights depends on the ability of receiving earth stations to immediately repoint their antennas to the designated recovery satellite and to use the new frequency segment without harmful interference, which can happen only if those earth stations have full-band, full-arc protection.

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<sup>71</sup> *Id.* at ¶ 40.

<sup>72</sup> *See, e.g.*, NPR Comments at 11-12; SES Comments at 4.

<sup>73</sup> *See, e.g.*, GCI Comments at 5 (GCI “currently operates on three full time satellites, with its stations configured to restore services across two additional satellites at different orbital locations than their primary service locations); Comments of the North American Broadcasters Association, GN Docket No. 17-183, filed Sept. 29, 2017 (“NABA Comments”) at 5 (C-band customers require flexibility to “switch from a failed transponder to a backup either on the same satellite or on a different one” or to change to a different satellite entirely in the event of an in-orbit failure or solar outage); NPR Comments at 11 (“[t]o operate effectively, earth stations must have the ability to reorient to different frequencies or different satellites in case of a disruptive event.”).

The full-band, full-arc policy is also necessary to enable meaningful competition for satellite services.<sup>74</sup> As a practical matter, an FSS customer is free to shop around for a more favorable deal for satellite services only if it knows that the earth stations in its distribution network can readily be reoriented to the new provider's space station. As the ACA notes, the pro-competitive effects of full-band, full-arc licensing place downward pressure on costs, benefiting C-band FSS customers.<sup>75</sup>

The flexibility enshrined in the full-band, full-arc policy also enhances FSS service quality and allows efficient spectrum management. Satellite operators routinely rearrange traffic on their spacecraft as needed to resolve interference issues that might arise or to make capacity available in response to customer demand, including for more advanced services such as ultra-high definition and 4K video delivery.<sup>76</sup> Moreover, flexibility is needed to support video contribution via C-band FSS. Providers of such services rely on access to the full range of C-band spectrum and satellites to cover news, sports, and entertainment events in real time, taking advantage of satellite capacity that is available for live broadcasts on short notice.<sup>77</sup>

Customers' need for the flexibility conferred by the full-band, full-arc policy will only increase under potential changes to the C-band regulatory framework being considered in the Notice that would limit or eliminate use of satellite services in a portion of the 3.7-4.2 GHz frequencies. If the Commission proceeds with such efforts, in order to ensure that current and future C-band users have comparable capabilities as today, the remaining C-band spectrum

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<sup>74</sup> See, e.g., Comments of the National Association of Broadcasters, RM-11778, filed Jan. 24, 2017, at 1-2; Comments of General Communication, Inc., RM-11791, filed Aug. 7, 2017, at 10.

<sup>75</sup> See ACA Comments at 18-19.

<sup>76</sup> See, e.g., ACA Comments at 15; SIA Comments at 30-31.

<sup>77</sup> PSSI RM-11778 Reply Comments at 1-2.

available for FSS must not be encumbered by new spectrum sharing models that would limit the possibility of offering full-band, full-arc services. If, as the Notice indicates, the Commission intends to avoid changes that would “alter current business models and operations of C-band licensees and registrants,”<sup>78</sup> it must retain its policy of protecting earth stations’ ability to receive signals across the full band and full arc.

## **B. P2MP Interests Have Not Shown a Need for C-Band Spectrum**

In contrast to the well-documented advantages of the current flexible regulatory framework for C-band FSS, there is no evidence to suggest that eviscerating that framework in order to make C-band downlink spectrum available for P2MP services would provide net public benefits. Instead, the Broadband Access Coalition (“BAC”) and other proponents of P2MP services in the 3.7-4.2 GHz band rely on a mixture of inaccurate assumptions and unsupported assertions, failing to provide a reasoned basis for Commission action to open up the C-band for P2MP.

SIA does not dispute the idea that wireless internet service providers (“WISPs”) can play an important role in supplying terrestrial fixed wireless broadband capacity to areas that have no other access to such services. The question remains, however, whether the C-band downlink spectrum is needed for, or even particularly suited to, such efforts.

Nothing in the filings by the BAC or its supporters documents any actual need to grant WISPs rights to use C-band frequencies. Indeed, providers of wireless broadband already have access to significant spectrum resources, relying on both licensed and unlicensed bands including the 500-700 MHz, 902-928 MHz, 2.4 GHz, 2.5 GHz, 3.55-3.7 GHz, 5.15-5.85 GHz, 28 GHz,

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<sup>78</sup> Notice at ¶ 40.

39 GHz, and above 40 GHz bands.<sup>79</sup> The total bandwidth available in these bands is more than 10 GHz, dwarfing the limited spectrum in the C-band FSS downlink frequencies that P2MP proponents seek to use for terrestrial fixed broadband.

To the extent that WISPs are seeking to expand coverage to areas where there is no terrestrial broadband service, existing spectrum resources give them ample options for initiating new operations. As SIA has previously emphasized, spectrum scarcity cannot possibly be a constraint in areas that lack terrestrial fixed wireless service.<sup>80</sup> Thus, whether WISPs gain access to the C-band is irrelevant to their ability to broaden the scope of their operations. The Notice proposes to sunset fixed point-to-point microwave services in the 3.7-4.2 GHz frequencies, pointing to the fact that a number of other bands can be used for such networks.<sup>81</sup> The same rationale argues against allowing new P2MP services in the C-band downlink frequencies given the substantial alternate spectrum available for P2MP operations.

To the extent that WISPs have a legitimate need for yet more frequencies – presumably to add capacity in areas where they already have deployed facilities – changes being considered by the Commission will allow them opportunities to gain access to more spectrum. For example, implementation of the Commission’s Citizens Broadband Radio Service (“CBRS”) will allow WISPs new licensing options to intensify their use of the 3.55-3.7 GHz frequencies, including bidding at auction for Priority Access Licenses or making opportunistic use of spectrum under

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<sup>79</sup> See The Carmel Group, Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless, the BWA Industry Report, at 13 (2017), *available at* [http://www.wispa.org/Portals/37/Docs/Press%20Releases/2017/TCG's\\_2017\\_BWA\\_FINAL\\_REPORT.pdf](http://www.wispa.org/Portals/37/Docs/Press%20Releases/2017/TCG's_2017_BWA_FINAL_REPORT.pdf).

<sup>80</sup> See, e.g., Opposition of the Satellite Industry Association, RM-11791, filed Aug. 7, 2017, at 15.

<sup>81</sup> Notice at ¶ 48.

the General Authorized Access rubric. In addition, WISPs have been actively seeking expanded access to the 2.5 GHz Educational Broadcast Service band.<sup>82</sup>

These bands are considerably less encumbered than the C-band downlink spectrum, in which new P2MP systems would need to avoid interfering with the deployed base of at least 16,500 existing earth stations. The Notice emphasizes that the Commission was able to establish the CBRS “despite the presence of FSS receivers because there are only FSS earth stations in 35 cities” that use the 3.6-3.7 GHz band, unlike the situation in the 3.7-4.2 GHz frequencies.<sup>83</sup> Moreover, WISPs will also be eligible to participate in any market-based mechanisms that may be put in place for the 3.7-4.2 GHz band under the flexible use framework proposed in the Notice.<sup>84</sup>

Because the need to protect critical incumbent satellite operations will impede any significant P2MP operations in frequencies used for FSS, the Commission should look elsewhere to accommodate any demonstrated need on the part of terrestrial fixed broadband providers for additional spectrum.

**C. Proposals to Accommodate P2MP Services Would Thwart FSS Competition and Impose Unnecessary Burdens on the Commission and FSS Customers**

To pave the way for introduction of P2MP services, the Notice sets forth a set of onerous new information, coordination, and application requirements that would place unprecedented burdens on earth station operators as well as on the Commission staff. Complying with these

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<sup>82</sup> See Comments of the Wireless Internet Service Providers Association, WT Docket No. 18-120, filed Aug. 8, 2018.

<sup>83</sup> Notice at ¶ 52.

<sup>84</sup> *Id.* at ¶¶ 58-115.



requirements would obstruct competition for satellite services and ultimately undermine the nationwide coverage of C-band FSS.

Initially the FCC would require all earth station operators to submit detailed information regarding the specific parameters of their existing operations, including the satellites and frequencies used, antenna patterns, and specific antenna pointing details.<sup>85</sup> For many earth station operators, simply gathering and submitting this data would impose a huge burden. The failure to comply, however, would render their earth stations ineligible for any protection from future P2MP services.<sup>86</sup> Earth station operators that did file the required information regarding their technical and service parameters would thereafter be protected from harmful interference only to the extent that they continue to use the same frequencies, antenna pointing, and other operating specifications set forth in their submissions to the Commission.

The implications of this proposed rewrite of existing policies for C-band FSS would be wide-ranging and disastrous. Under this framework, a content provider switching to use a different satellite, transponder, or channel would trigger a domino effect of extremely costly regulatory obligations for each of the hundreds or thousands of earth stations receiving that content. Every one of those earth station operators would first need to coordinate the changed parameters – despite the fact that the earth station cannot possibly cause interference to other operations.<sup>87</sup> But it is unrealistic to assume that an FSS customer with hundreds of receive sites could possibly coordinate with potentially hundreds of P2MP operators in any time period that would be considered acceptable by programming consumers. Moreover, following completion

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<sup>85</sup> Notice at ¶ 39, ¶¶ 41-45.

<sup>86</sup> *Id.* at ¶ 39.

<sup>87</sup> *Id.*

of coordination (and assuming that the coordination was successful), the earth station operator would then have to seek a license modification for the updated operating characteristics to obtain ongoing interference protection from any future P2MP deployments.<sup>88</sup> Any earth station operator unwilling or unable to bear the costs of this coordination and modification process – amounting to roughly \$1000 – would be at risk that interference from a P2MP system would disrupt the earth station’s signal reception.

By imposing such substantial financial burdens on any change in a content provider’s C-band distribution network, these requirements would effectively freeze competition in the FSS marketplace. A satellite customer could be practically precluded from choosing an alternative service provider, even one that offered substantially more favorable terms, because the costs of the change would almost certainly outweigh any benefits obtained from switching providers. Such an outcome would directly contravene the Commission’s stated objective of fostering the “development of innovative satellite communications services for U.S. consumers through fair and vigorous competition among multiple service providers”<sup>89</sup> and render worthless the existing framework the Commission established to promote competition, including the Approved Space Station List of satellites that can be used by any U.S. earth station operator.<sup>90</sup>

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<sup>88</sup> *Id.* The Notice also suggests the possibility of relying on a database to facilitate the coordination of P2MP applications with FSS spectrum use, similar to the approach adopted for CBRS (*see id.* at ¶ 124), but it is not clear that a database approach would reduce the burdens on earth station operators. In any event, the database mechanism – which has not yet been tested for its ability to manage interference to the small number of earth stations using the CBRS spectrum – cannot be presumed to be reliable for protection of the exponentially greater number of earth stations that require protection in the 3.7-4.2 GHz band. *See, e.g.*, SIA Comments at 39-41; SIA Reply Comments at 35-38.

<sup>89</sup> *Amendment of the Commission’s Policies to Allow Non-U.S. Licensed Space Stations providing Domestic and International Service in the United States*, Report & Order, 12 FCC Rcd 24094, 24098, ¶ 6 (1997).

<sup>90</sup> *See* <https://www.fcc.gov/approved-space-station-list>.

The costs of altering a C-band network's service characteristics would impose new regulatory burdens in other contexts as well. Satellite customers that have contracted for protected status would be deprived of the value of those agreements, as real-time switchovers following an outage would be rendered impossible. Instead, each of the earth stations in the network would need to jump through a series of regulatory hoops to secure interference protection for the revised technical parameters associated with the follow-on satellite service. Changes needed to resolve interference issues would be made exponentially more difficult as well, undermining satellite operators' ability to redress issues that can impair service quality.

Over time, these regulatory burdens on the flexibility of satellite operations would erode the ubiquitous C-band satellite coverage relied on by content providers. Some earth stations in a network would inevitably be unable to successfully coordinate required changes to frequencies or satellites used by the network with any P2MP deployments in the area. For other earth station operators, the high costs of the steps necessary to secure protection from future P2MP deployments would deter compliance, leaving their services vulnerable to interference. In each case, these issues are most likely to arise in – and would disproportionately harm – smaller communities that lack alternative sources of programming.

These radical changes to the flexible, pro-competitive environment in which C-band satellite services currently operate would fundamentally disrupt the FSS ecosystem, keep customers from extracting the full benefits of their contractual agreements, and prevent efficient management of the spectrum used for C-band FSS.

#### **D. A Permanent Freeze on C-Band Earth Stations Is Unwarranted**

The proposal in the Notice to codify the current temporary freeze on new C-band receive earth stations<sup>91</sup> likewise cannot be squared with the Commission’s public interest objectives. As SIA and others have made clear, C-band FSS remains in high demand for content distribution, with cable companies confirming their intention to add earth stations to their networks to meet existing demand.<sup>92</sup> Moreover, future demographic shifts will create situations in which increases in population justify the introduction of new cable or broadcast outlets that will need to receive programming over the C-band FSS infrastructure. A Commission policy of precluding the deployment of C-band earth stations would keep growing communities from obtaining access to the news, sports, and entertainment programming other U.S. consumers enjoy. This would expressly contravene the Commission’s stated policy of supporting the extension of broadcast service to more communities.<sup>93</sup>

Such an artificial limit on the organic evolution and development of the C-band infrastructure is wholly unjustified. The Commission’s desire to “provide a stable spectral environment for more intensive terrestrial use” of the C-band<sup>94</sup> should not take precedence over its statutory obligation to make communications services available “to all the people of the United States.”<sup>95</sup> Thus, the balance of interests clearly favors permitting deployment of new C-band earth stations as needed to satisfy market demand.

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<sup>91</sup> Notice at ¶ 30.

<sup>92</sup> *See, e.g.*, NCTA Comments at 3 (a poll of NCTA members revealed that several “indicated an intent to construct new earth station facilities in the next few years”).

<sup>93</sup> Remarks of FCC Chairman Ajit Pai at the National Association of Broadcasters Show, Apr. 10, 2018 at 2, available at: <https://docs.fcc.gov/public/attachments/DOC-350163A1.pdf>.

<sup>94</sup> Notice at ¶ 30.

<sup>95</sup> 47 U.S.C. § 151.

**E. The Harms Associated with Adding P2MP Services Greatly Outweigh Any Benefits**

A simple cost-benefit analysis makes clear that the proposals in the Notice to hamstring C-band FSS operations in order to allow new P2MP deployment must be rejected. Eliminating full-band, full-arc protection of C-band earth stations would nullify the rights under existing FSS service contracts, stymie competitive market forces, and block satellite operators' ability to groom traffic to redress interference or make capacity available in response to customer demand. The flexibility inherent in the Commission's current FSS framework would be replaced by a system of regulatory micromanagement that would straightjacket FSS customers, imposing staggering new costs and administrative burdens due to even the smallest change in operating parameters. Network adjustments that are commonplace today – cable operators have reported that they receive notifications from programmers of the need to repoint antennas “all the time, indicating that programming migrates often from one satellite to the other”<sup>96</sup> – would become a practical impossibility given the costs associated with requiring every one of potentially hundreds or even thousands of receive earth stations in a programming network to coordinate the change and seek modification of Commission authorizations. Meanwhile, even adding an earth station to allow establishment of a new cable franchise or broadcast affiliate would be prohibited, preventing developing communities from sharing in the diverse array of video and audio programming offered by content providers.

In short, the proposals in the Notice intended to allow for new P2MP services would make it impossible for the Commission to fulfill its intention “to protect incumbent FSS earth stations from harmful interference and avoid disruption to existing operations in the band.”<sup>97</sup>

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<sup>96</sup> See ACA Comments, Exhibit 1 at 2; see also *id.*, Exhibit 2 at 2.

<sup>97</sup> Notice at ¶ 116.

Instead, the raft of regulatory measures imposed on satellite operations would seriously undermine the quality and reliability that are the core attributes of the C-band FSS infrastructure that supports U.S. media industries and provides services essential to the nation's security, safety, and welfare.

On the other side of the ledger, the prospects of any material benefits from allowing P2MP services in the 3.7-4.2 GHz frequencies are highly speculative. Curiously, although the Notice specifically addresses the feasibility of co-frequency sharing between FSS and flexible use terrestrial wireless systems,<sup>98</sup> it does not perform a similar analysis with respect to the introduction of fixed P2MP networks. Yet filings by the BAC and its supporters suggest that the required separation distances needed to prevent interference from a P2MP system into a vulnerable C-band receive earth station are on the same scale – 50 kilometers or more.<sup>99</sup>

Moreover, the BAC's analysis of the feasibility of P2MP operations in C-band downlink spectrum is premised on earth station deployment numbers that do not reflect the recent flood of registrations.<sup>100</sup> Indeed, the premise of the BAC's proposal for P2MP service – the idea that the 500 MHz of C-band downlink spectrum would accommodate twenty-five 20 MHz channels, allowing multiple entities to provide last-mile, fixed wireless access<sup>101</sup> – relies on a steadfast refusal to acknowledge the reality that thousands of ubiquitously-deployed incumbent earth stations intensively use the 3.7-4.2 GHz frequencies. As discussed above, these include thousands of antennas at cable headends that use the full range of available spectrum. Factoring in these updated earth station numbers produces the incontrovertible conclusion that

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<sup>98</sup> *Id.* at ¶¶ 50-52 & Figure 2.

<sup>99</sup> *See, e.g.,* BAC/Google *Ex Parte*, Attachment 1 at unnumbered page 9; Attachment 2 at 33.

<sup>100</sup> *See id.*, Attachment 1 at unnumbered pages 8-10, Attachment 2 at 14, 25.

<sup>101</sup> *See* Notice at ¶ 116, *citing* BAC Petition at 4.

opportunities to shoehorn in new P2MP uses would be extremely few and very far between, and the chance that such limited opportunities would happen to occur in an area where there is unmet demand for fixed terrestrial broadband is even more remote.

Thus, the Commission's interest in enabling terrestrial broadband wireless access providers to extend their scope to encompass currently unserved areas would not be advanced by opening up C-band FSS downlink spectrum for P2MP services. Instead, to the extent that the 10 GHz of spectrum currently available to WISPs for such services is demonstrated to be inadequate, the Commission should identify alternative frequencies to supplement that spectrum that are less intensively used than the C-band. The Commission should abandon the idea of introducing new, incompatible services into spectrum needed for C-band FSS and reject the associated burdensome information and application requirements for earth station operators contemplated in the Notice.

#### **F. C-Band TT&C Should Be Protected**

Regardless of what other actions the Commission chooses to take with respect to the 3.7-4.2 GHz band, it should afford interference protection to C-Band TT&C facilities for the operating life of the associated satellite systems. The Commission anticipated in the Notice the need to protect TT&C operations.<sup>102</sup> As recognized by the Commission, and explained above, many satellite systems rely on the 3.7-4.2 GHz band for TT&C.<sup>103</sup> The Notice also explains that because TT&C frequencies are a function of satellite design that cannot be changed after launch, TT&C operations will need protection throughout the life of the spacecraft.<sup>104</sup> SIA agrees with

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<sup>102</sup> Notice, ¶ 180.

<sup>103</sup> *Id.*

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

the Commission's assessment on this point, and respectfully suggests that the Commission should protect C-band TT&C earth stations for the full operational life of all in-orbit spacecraft, as well as satellites launched in the near term.

## **V. CONCLUSION**

The Commission must ensure that essential satellite uses of C-band spectrum are protected and ongoing FSS access to the 3.7-4.2 GHz band is preserved so that satellite industry members can continue to offer services that promote the public interest, enhance national security, and provide significant economic value.

Respectfully submitted,

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