

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

In the Matter of )  
 )  
Expanding Flexible Use in Mid-Band ) GN Docket No. 17-183  
Spectrum Between 3.7 and 24 GHz )  
 )

**JOINT COMMENTS OF INTELSAT LICENSE LLC AND INTEL CORPORATION**

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**I. INTRODUCTION AND SUMMARY**

The Mid-Band NOI specifically requests comment on the potential for increased flexible terrestrial use in the 3700-4200 MHz downlink portion of the conventional C-band, among others.<sup>2</sup> This spectrum now supports highly valuable Fixed Satellite Service (“FSS”) operations, which provide critical public services, global connectivity, and delivery of video content to millions of U.S. households. Incumbent C-band FSS operations consist of dozens of space stations, thousands of earth stations, and numerous well-established customer relations, making use of this spectrum for new terrestrial mobile services challenging. At the same time, the propagation characteristics as well as global 5G development plans make the 3700-4200 MHz band highly valuable and attractive for terrestrial mobile use.

Although Intelsat and Intel disagree over certain aspects of enabling terrestrial mobile operations in the 3700-4200 MHz band, they agree that the following joint proposal best serves the interests of all stakeholders in the near and long term and is far preferable to the other

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<sup>1</sup> Intelsat License LLC (“Intelsat”) and Intel Corporation (“Intel”) submit these comments in response to the above-referenced Notice of Inquiry (“NOI”) seeking comment on opportunities for expanding flexible use services in spectrum bands between 3.7 and 24 GHz (mid-band spectrum). *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd. 6373 (2017) (“Mid-Band NOI”).

<sup>2</sup> *See id.* ¶¶ 13-23.

alternatives proffered in the NOI. The optimal way to enable terrestrial use in the 3700-4200 MHz band is—as Intelsat and Intel propose here—to create market-based incentives for FSS space station incumbents to undertake voluntarily the complicated and costly process of clearing portions of the C-band downlink spectrum in specific areas across the country, thus opening the way for coordinated terrestrial use as rapidly as possible. A key advantage of this approach is that it places the implementation decisions in the hands of the entities that face the opportunity cost trade-offs based upon first-hand knowledge and technical expertise to successfully implement this plan.

In short, Intelsat and Intel urge the Commission to allow co-primary terrestrial mobile operations in the 3700-4200 MHz band through commercial agreements between terrestrial mobile interests and primarily affected FSS satellite operators.<sup>3</sup> Those FSS satellite operators, in turn, will work cooperatively to identify geographic areas of the country where they could undertake the complicated and costly process of clearing portions of the C-band for terrestrial use in defined areas by, for example, moving their services and customers to a portion of the 3700-4200 MHz band, physically moving ground antennas outside of identified geographic areas, or other means, as appropriate. This spectrum clearing will occur at significant cost, including lost opportunities, to incumbent satellite operators in the identified frequencies and geographic areas.

Having cleared spectrum for terrestrial use in certain geographic areas, FSS satellite operators would enter into market-based agreements with one or more potential terrestrial users of the cleared spectrum. This market-based approach would enable terrestrial use in cleared

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<sup>3</sup> Primarily affected FSS satellite operators are those with U.S.-licensed satellites serving earth stations within the identified geographic area and with coverage of the entire continental United States (“CONUS”).

spectrum in defined geographic areas, where and when it is efficient, while ensuring that incumbent FSS operations will be protected from harmful interference. Under this proposal, incumbent FSS operators will be able to facilitate terrestrial mobile use in a manner that fully accounts for their costs, as well as allows the continued use of the downlink spectrum by satellite operators outside of areas where terrestrial use is enabled.

As discussed in greater detail below, this approach:

- harnesses market forces to ensure that spectrum is put to its highest and best use expeditiously, with minimal regulatory intervention;
- minimizes the risk of interference to FSS earth stations and other costs of accommodating existing FSS uses of the 3700-4200 MHz band, where and when new terrestrial mobile service would be efficient;
- facilitates U.S. leadership in fifth-generation (“5G”) technologies and services; and
- allows for continued use of the full 3700-4200 MHz by FSS operators where that use is best.

Moreover, this approach achieves these objectives voluntarily, efficiently and expeditiously, unlike other regulatory alternatives, which would be impeded by the limitations of the administrative process. With proper market incentives, spectrum in the 3700-4200 MHz band can begin to be available for flexible terrestrial use in various geographic areas within 1-3 years of a Commission Report and Order. Intelsat and Intel accordingly encourage the Commission to take the actions necessary to expeditiously implement this proposal for facilitating flexible terrestrial mobile use of the 3700-4200 MHz band.

## **II. BACKGROUND**

Spectrum-reform initiatives have assumed new urgency in light of growth in demand for mobile broadband services. This challenge has increasingly led either to the reallocation of spectrum from incumbent users to wireless broadband services or the overlay of new services on

top of incumbent services with adoption of some form of protection methodology. These spectrum reform initiatives have also led to the U.S. being a leader in the deployment and delivery of mobile broadband. In the past couple years, the Commission has repurposed 84 MHz of low-band spectrum from television broadcasters through the first-ever voluntary incentive auction, 70 MHz of which now will be used for mobile;<sup>4</sup> adopted new three-tier sharing rules in the 3.5 GHz band to free up additional spectrum that is shared among incumbents and licensed and unlicensed broadband users;<sup>5</sup> and provided access to 11 GHz of high-band spectrum above 24 GHz for both licensed and unlicensed terrestrial 5G services, as well as identified additional high-band satellite frequencies for 5G.<sup>6</sup>

This proceeding addresses in part the space-to-Earth (*i.e.* downlink) segment of the conventional C-band, which runs from 3700 MHz to 4200 MHz<sup>7</sup> and is allocated on a co-primary basis to FSS and Fixed Service (“FS”).<sup>8</sup> This band has incumbent satellite rights and long-established customers, and the need to protect the large number of earth stations utilized by existing customers and their services presents very complex sharing issues. Intelsat and other

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<sup>4</sup> See *FCC Announces Results of World’s First Broadcast Incentive Auction*, Press Release, DOC-344397 (rel. Apr. 13, 2017).

<sup>5</sup> *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd. 3959 (2015).

<sup>6</sup> *Use of Spectrum Bands Above 24 GHz for Mobile Radio Service*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd. 8014 (2016) (“*Spectrum Frontiers Order*”).

<sup>7</sup> The conventional C-band is comprised of the 3700-4200 (space-to-Earth)/5925-6425 (Earth-to-space) MHz frequency bands.

<sup>8</sup> See 47 C.F.R. § 2.106. The 3700-4200 MHz band is also used by 119 terrestrial fixed microwave links. New terrestrial mobile licensees can protect the approximately 100 co-primary fixed terrestrial incumbents through a variety of location-specific means, including negotiated exclusion zones, compensated relocation, compensated equipment upgrades, or other mutually-agreed means.

incumbent FSS interests are rightfully concerned about potential interference from terrestrial mobile networks into the 3700-4200 MHz band if such systems are introduced on a co-channel basis in close proximity to incumbent satellite operations.

While the Commission's desire to expand opportunities for new uses in the 3700-4200 MHz band is understandable, we recommend a sound policy approach that avoids unnecessary disruption to existing licensed C-band satellite operations or limits to their future potential. C-band operations—utilizing billions of dollars of satellite ground infrastructure—provide critical public services supporting global telecommunications connectivity, including video distribution to millions of U.S. households. Indeed, virtually all national video programming, regardless of how it ultimately is received by viewers, is distributed over C-band satellites that have full CONUS coverage. C-band satellites today also enable maritime industry communication, as well as the National Oceanic and Atmospheric Administration and Federal Aviation Administration operations. C-band spectrum also often provides the sole source of connectivity in remote areas such as parts of Alaska.

These operations, through satellites operated by competing providers,<sup>9</sup> are spread across the entire C-band spectrum and are enabled by over 40 years of private investment made in reliance on existing regulations and interference protections, including the expansion potential afforded by the current scope of licenses. Introducing co-primary terrestrial operations into the 3700-4200 MHz band will require careful coordination in specific areas to avoid impairing these satellite services. Such impairment would be contrary to the public interest.<sup>10</sup>

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<sup>9</sup> Intelsat and SES combined have the vast majority of U.S.-licensed satellites serving this band in the United States.

<sup>10</sup> It is Intelsat's belief that removing or involuntarily limiting FSS use of the 3700-4200 MHz band in order to introduce terrestrial mobile use would be bad public policy and could be considered a regulatory taking forbidden by law.

Legitimate FSS incumbent interests and the complex sharing issues implicated by allowing overlapping terrestrial mobile use of the 3700-4200 MHz band would require the FCC to make numerous technical and economic determinations with limited information. Picking winners and losers in this band promises to tie up valuable spectrum resources for years in regulatory proceedings and potential litigation. In contrast, Intelsat and Intel's flexible, voluntary approach will avoid creating an unnecessary cloud of regulatory and technical uncertainty for all stakeholders.

### **III. PROPOSAL**

Recognizing the desirability of reconciling the Commission's expanded use goal and the need to protect existing and future licensed satellite operations, Intelsat and Intel recommend that the Commission encourage a market driven, voluntary accommodation that could be executed expeditiously with minimum regulatory intervention, would capitalize on the technical expertise of satellite operators, and would permit prospective terrestrial operators to provide the incentives necessary to offset the costs necessarily involved. Specifically, we believe that the Commission should encourage primarily affected FSS satellite operators to develop a centralized clearance mechanism that, in consultation with prospective terrestrial mobile users, would consolidate satellite operations in a portion of the 3700-4200 MHz band in specific geographic areas of terrestrial interest and thus "clear" portions of the C-band for terrestrial use free of interference issues in those geographic areas.<sup>11</sup> The primarily affected FSS satellite operators could enter into commercial agreements with terrestrial mobile carriers, which then could operate on a co-

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<sup>11</sup> Note that in some cases it may not be feasible to completely clear specified geographic areas on a single time schedule, and the parties reserve the right to reach negotiated mitigation measures on a case by case basis in order, for example, to permit earth station operations to continue within the geographic area, perhaps with an expectation that the earth station can be relocated at a future date.

primary basis in various geographic areas and frequencies. The Commission could facilitate this market-driven process by suitably amending the Table of Allocations and clarifying that the terrestrial mobile C-band operations would be contingent upon a showing that the applicant had coordinated with primarily affected satellite operators. This approach would not involve any modification of existing satellite licenses and, in our view, would be the fairest and most expeditious way to expand C-band use in the public interest.

More specifically, Intelsat and Intel propose that the FCC add a co-primary terrestrial mobile allocation in the 3700-4200 MHz band for users who have successfully coordinated with FSS satellite operators. This proposal would enable incumbent FSS operators to reach market-based agreements with third parties for terrestrial use of some spectrum in this band. It also would leverage the technical expertise of satellite operators and create appropriate incentives for incumbents to adapt their operations to allow new terrestrial services within the 3700-4200 MHz band with minimal regulatory delay, where and when it would be efficient to do so.

Primarily affected FSS satellite operators would work cooperatively to identify geographic areas of the country where they could commence the complicated and costly process of clearing portions of the band for terrestrial use (*e.g.*, by confining their services and customers to a portion of the licensed 3700-4200 MHz band in specific geographic areas, or other means of making spectrum available). The amount of spectrum retained for FSS use could vary by geographic area, and over time, based on the amount of spectrum needed to provide satellite service to existing and future customers. Intelsat anticipates that FSS operators will be able to clear some spectrum in top geographic areas, including dense urban areas, if market forces prove this is the highest and best use of the spectrum. Satellite operators would establish alternative arrangements to serve satellite customers on the cleared frequencies within the defined

geographic area. To ensure adequate protection for valuable incumbent services, FSS satellite operators will maintain spectrum in each defined geographic area for existing and future satellite use. Furthermore, different blocks of this spectrum in terms of sizes and frequencies may be retained for satellite use in certain geographic areas allowing the full 500 MHz to be usable for FSS.<sup>12</sup>

Finally, Intelsat and Intel propose that primarily affected FSS satellite operators be given the flexibility to enter into market-driven private agreements with one or more potential terrestrial mobile users of the cleared spectrum for each designated geographic area.<sup>13</sup> The satellite licensees and terrestrial operators would negotiate the economic incentive necessary to permit satellite operators to undertake the costs and efforts necessary to clear satellite use of the agreed spectrum in the defined area.

Upon completing an agreement, primarily affected FSS satellite operators could file a notice to the Commission stating with whom a terrestrial use has been agreed, the frequencies

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<sup>12</sup> To aid the transparency of the process, upon completing a spectrum utilization review identifying terrestrial use possibilities, primarily affected FSS satellite operators could file an initial notice with the Commission stating the geographic areas, the frequencies dedicated to the provision of FSS and the frequencies to be made available for terrestrial use. This could be followed by additional notices, *e.g.* if future phases of spectrum clearing or consolidation for terrestrial use become feasible. Under this proposal, primarily affected FSS satellite operators will have the flexibility to respond to market forces to determine the appropriate basis to define geographic areas and frequency ranges based on the location of existing satellite earth stations and the terrestrial demand for contiguous blocks of spectrum. Several options exist for defining the geographic area such as Cellular Market Areas (“CMAs”), Basic Trading Areas (“BTAs”), Economic Areas (“EAs”), Partial Economic Areas (“PEAs”), and Regional Economic Areas (“REAs”). A long-term geographic area size target will be selected, but it may be advantageous in the name of expeditious clearing to initially clear subsets of a geographic license area. For example, if the PEAs were chosen as the long-term target, a subset of a given PEA, but staying within the PEA boundaries, might be made available sooner, with a plan to eventually make the full PEA available.

<sup>13</sup> Satellite operators could jointly enter such agreements, form a Joint Venture company or other consortium, or designate an agent to act on their joint behalf in securing agreements.

identified for terrestrial use and the defined geographic area. No further operation on cleared frequencies by earth stations (existing or new) in the licensed geographic area would be protected from potential interference.

#### **IV. DISCUSSION**

Intelsat and Intel are committed to using spectrum in increasingly creative and intensive ways to ensure that valuable, scarce resources are used efficiently and that incumbent operators are not impaired. Intelsat and Intel anticipate that the collaborative, FSS licensee-led approach set forth herein could bring flexible use spectrum to market beginning within 1-3 years of a Report and Order in this proceeding. As discussed below, the Intelsat and Intel voluntary proposal offers by far the best path to make some spectrum in the 3700-4200 MHz band available for flexible terrestrial use expeditiously while still ensuring the protection of existing services, such as video programming distribution and service to rural areas that rely heavily on satellite. By allowing market forces to identify and enable the highest and best use of spectrum, the proposal benefits all interested parties and advances the public interest without the risk and delay associated with a sharing framework by regulatory fiat. Allowing appropriate commercial agreements with limited government involvement will help accelerate the mobile 5G transition.

##### **A. CURRENT FSS OPERATIONS IN THE 3700-4200 MHZ BAND ARE HIGHLY VALUABLE AND COMPLEX.**

The FSS satellite operators make extensive, non-exclusive, use of the 3700-4200 MHz band in the United States, having invested billions of dollars to provide a broad array of critical services and telecommunications connectivity platforms. For instance, FSS C-band communications ranging from basic voice telecommunications to broadband Internet service supply important benefits nationwide, especially to customers in rural areas unserved or underserved by terrestrial networks. Major content providers utilize C-band satellite capacity to

distribute video with unparalleled reliability, including breaking news and live sporting events, to over-the-top distributors, MVPDs, and broadcast affiliates. Public radio content, including back-up emergency alert system notices, is distributed nationwide over C-band satellites. FSS C-band satellites also supply communications infrastructure for merchant credit card transactions, enable connectivity in-flight and on-board ships, and support corporate data networks.

The Commission estimates there are approximately 4,700 licensed or registered earth stations throughout the United States utilizing 3700-4200 MHz, the licenses/registrations for which are held by hundreds of different entities.<sup>14</sup> Thousands of additional receive-only earth stations operate on an unlicensed, unregistered basis.<sup>15</sup> In some cases the satellite customer holds the earth station license, while in other cases the earth station is licensed to the FSS operator. In still other cases, it is the satellite operators' customers' customer—such as cable multiple system operators—that operate the earth station.

This complicated ecosystem of satellite earth stations, differences between FSS operators in their customer relationships, bandwidth of various services, migration strategies, redundancy strategies, and occasional use operations would make it challenging for an FCC-directed sharing framework to be put in place in advance of developing a terrestrial mobile market in this band.<sup>16</sup> Any introduction of terrestrial mobile services would need to take into account these long-

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<sup>14</sup> *Mid-Band NOI*, ¶ 14.

<sup>15</sup> As Intelsat noted in another proceeding, one customer alone has more than 3,700 unregistered receive-only antennas used for the distribution of religious programming. *See* Reply Comments of Intelsat License LLC, RM-11791, at 3-4 (filed Aug. 22, 2017).

<sup>16</sup> Part of the difficulty is that the FCC database entries for earth stations need to be validated, have obsolete information removed, and have errant information corrected. Various parties have acknowledged the appropriateness of cleaning up the Commission's International Bureau Filing System ("IBFS") database containing earth station licensing and registration information to ensure its ongoing accuracy and completeness.

established satellite services and consider the value of the deployed satellite assets and their associated lifetimes. The satellite operators are uniquely situated to determine accurately all of these factors relevant to the utilization in the 3700-4200 MHz band.

**B. FUTURE TERRESTRIAL MOBILE USE IN THE 3700-4200 MHZ BAND WOULD ALSO BE HIGHLY VALUABLE.**

Terrestrial mobile service continues to be the most widely used form of connectivity in the United States with nearly 400 million subscribers, including over 260 million smartphone users,<sup>17</sup> and it is growing rapidly. According to the Cisco VNI forecast, U.S. mobile data traffic is expected to grow five-fold from 2016 to 2021 (a compound annual growth rate (“CAGR”) of 35%), reaching 6.1 exabytes per month by 2021. In terms of mobile traffic per mobile-connected end-user device, the forecast is for 13,096 megabytes per month by 2021, a CAGR of 30%.<sup>18</sup>

Senator Thune, Chairman of the Senate Commerce Committee, recently wrote a letter to FCC Chairman Pai on the topic of additional spectrum for mobile broadband, noting that

“While the U.S. has pushed ahead with efforts to free new spectrum at both low and high frequencies, we lag behind other countries in so-called ‘mid-band’ spectrum. Europe, China, Japan, and South Korea are all moving ahead to allocate hundreds of MHz of mid-band spectrum, for licensed and unlicensed uses, in anticipation of both new Internet of Things applications as well as rising demand for mobile broadband.”<sup>19</sup>

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<sup>17</sup> CTIA, Annual Wireless Industry Survey, <https://www.ctia.org/industry-data/ctia-annual-wireless-industry-survey>.

<sup>18</sup> Cisco, VNI Mobile Forecast Highlights, 2016-2021, [https://www.cisco.com/assets/sol/sp/vni/forecast\\_highlights\\_mobile/index.html#~Country](https://www.cisco.com/assets/sol/sp/vni/forecast_highlights_mobile/index.html#~Country).

<sup>19</sup> Letter from John Thune, Chairman of the U.S. Senate Committee on Commerce, Science, and Transportation, to Ajit Pai, Chairman of the Federal Communications Commission (June 21, 2017), *available at* [https://www.commerce.senate.gov/public/\\_cache/files/3cefb171-0d50-4c23-9f31-48942e874cc6/4CAB0C0B754962807BB0C203E951D581.thune-letter-on-mid-band-spectrum.pdf](https://www.commerce.senate.gov/public/_cache/files/3cefb171-0d50-4c23-9f31-48942e874cc6/4CAB0C0B754962807BB0C203E951D581.thune-letter-on-mid-band-spectrum.pdf).

As Chairman Thune alluded to, the C-band downlink spectrum, or parts of it, is being targeted in Europe and Asia for 5G, with multiple countries planning to develop it for that purpose. Thus, terrestrial mobile use of this band—as part of an overall 5G plan in the U.S.—would be highly valuable for its propagation characteristics relative to high-band spectrum and equipment availability.

**C. FORCED REALLOCATIONS OF SPECTRUM ARE OFTEN LONG DELAYED AND INEFFICIENT.**

A government-led approach to making spectrum available for flexible use can be both time-consuming and inefficient. Ten spectrum allocations over roughly the last 40 years took between six and 18 years—on average 13 years—to reallocate spectrum, from the time of the initial Commission Order to first deployment.<sup>20</sup> Commissioner O’Rielly has observed that some government-led reallocation efforts have taken 15 years or more.<sup>21</sup>

In contrast, enabling primarily affected FSS licensees to facilitate flexible use of the 3700-4200 MHz band for terrestrial mobile service can greatly expedite the introduction of such services. In recent years, the Commission increasingly has embraced flexible use rules that allow spectrum to be put to its highest and best use. That model has worked extremely well for licensees and yielded dramatic benefits for consumers.

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<sup>20</sup> CTIA, FOSTERING 21<sup>ST</sup> CENTURY WIRELESS CONNECTIVITY: KEY SPECTRUM & INFRASTRUCTURE ISSUES FOR POLICYMAKERS, at 4 (Jan. 12, 2017) (observing that the 700 MHz and AWS-3 spectrum took 14 years and 15 years respectively to get to market); Thomas K. Sawanobori, CTIA, FROM PROPOSAL TO DEPLOYMENT: THE HISTORY OF SPECTRUM ALLOCATION TIMELINES, at 2 (2015).

<sup>21</sup> Commissioner Michael O’Rielly, *How to Free Up Government Held Spectrum in the Face of Increasing Budgetary Pressure*, Blog Post (Sept. 6, 2017) (referencing Thomas K. Sawanobori & Robert Roche, *From Proposal to Deployment: The History of Spectrum Allocation Timelines*, <https://www.ctia.org/docs/default-source/default-document-library/072015-spectrum-timelines-white-paper.pdf>).

Indeed, the Commission has long recognized that flexible spectrum rules are essential in today’s dynamic communications world to allow companies to respond to market conditions without government intervention.<sup>22</sup> Most recently, the Commission created flexible use licenses in the *Spectrum Frontiers* proceeding, authorizing mobile terrestrial operations in millimeter wave bands together with FSS and FS allocations.<sup>23</sup>

The alternative to flexible use rules—rigid, service-specific allocations—can cause inefficient results, including the misallocation of spectrum, with some services having too much spectrum and others too little, leading to distorted pricing. Rigid allocations can also artificially depress the value of spectrum by preventing licensees from shifting spectrum to potentially higher-value uses that could yield monetary and social benefits.

Here, the Commission should enable primarily affected FSS satellite operators to facilitate flexible terrestrial mobile use of the 3700-4200 MHz band. In doing so, the Commission will promote economic efficiency, create certainty for licensees—including incumbents and their customers—and encourage investment.

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<sup>22</sup> See, e.g., *Remarks of Federal Communications Commission Chairman Ajit Pai at the Mobile World Congress, Barcelona, Spain*, at 2-3 (Feb. 28, 2017) (“Instead of mandating that a specific type of wireless technology be used in a particular spectrum band, the government left that choice to the private sector, which is better able to calibrate use to meet consumer demand. This enabled our wireless networks to evolve with technology, including the rollout of 4G LTE on a timeline that matched consumer demand.”).

<sup>23</sup> See *Spectrum Frontiers Order*, ¶ 4.

**D. INTELSAT AND INTEL’S PROPOSAL TO OPEN THE 3700-4200 MHz BAND FOR TERRESTRIAL MOBILE USE ADVANCES THE PUBLIC INTEREST BY MAKING SPECTRUM AVAILABLE VOLUNTARILY, EFFICIENTLY AND EXPEDITIOUSLY.**

**1. Voluntarily**

Commissioner O’Rielly recently noted that allowing licensees to determine the value of spectrum to their enterprise, and whether to sell or continue utilizing the spectrum, is “usually [a] reliable tool to promote efficiency and consumer welfare.”<sup>24</sup> The Intelsat and Intel proposal would free up mid-band spectrum for flexible use in markets nationwide, and it ensures that the free market—rather than the government—determines the highest and best use of the spectrum in each geographic area. Importantly, making this spectrum available for flexible use, under this voluntary approach does not come at the expense of existing FSS users who rely on C-band downlink spectrum access. As such, the Intelsat and Intel proposal is a “win-win”—consumers will benefit from both the deployment of innovative terrestrial mobile services *and* the continued operation of broadcast and other applications supported by FSS.<sup>25</sup>

This voluntary proposal furthers the Commission’s stated goal of identifying additional spectrum to support the development of 5G mobile technologies, while also protecting the substantial investments of U.S.-licensed satellite incumbents and the existing services of their customers. 5G development is a national priority, and the Intelsat and Intel proposal is consistent with the Commission’s two-part spectrum policy “formula”: (1) continue to make

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<sup>24</sup> Commissioner Michael O’Rielly, *How to Free Up Government Held Spectrum in the Face of Increasing Budgetary Pressure*, Blog Post (Sept. 6, 2017).

<sup>25</sup> *Id.*

spectrum available for commercial wireless services and (2) allocate spectrum for flexible use.<sup>26</sup>

As Chairman Pai explained, the Commission must “make spectrum available and then do our best to stay out of the way of technological development and the details of implementation.”<sup>27</sup>

## **2. Efficiently**

Intelsat and Intel propose an efficient solution to overcome the complex sharing challenge in the 3700-4200 MHz band by providing FSS operators an appropriate economic incentive to undertake the arduous and costly task of clearing and relinquishing satellite operations in a certain amount of spectrum in designated geographic areas throughout the country. The satellite industry has made considerable investment in C-band technology over the past 40 years and is capable of undertaking the complex and costly process of clearing some amount of spectrum on a market-by-market basis for flexible terrestrial use without delay. To maximize this flexibility, both satellite and earth station operators would retain their existing authorizations to operate in the entire 3700-4200 MHz band and utilize the entire spectrum band outside of voluntarily cleared spectrum areas.

FSS satellite operators are best positioned to identify the frequencies that can be relinquished for terrestrial use in specific geographic areas, on the most expeditious timeline, and in the most efficient way possible. These FSS operators have direct knowledge of their 3700-4200 MHz band operations and thus are well-positioned to work collaboratively—and with their customers—to ensure that current and future C-band demand is met. The FSS operators have unique knowledge of contractual durations, terms, and conditions (which cannot be found in any

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<sup>26</sup> *Remarks of FCC Chairman Ajit Pai at “Broadband for All” Seminar, Stockholm Sweden, at 4-5 (June 26, 2017), [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2017/db0627/DOC-345512A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0627/DOC-345512A1.pdf).*

<sup>27</sup> *Id.* at 4.

FCC database and may include non-public information). Additionally, U.S. C-band satellite operators are uniquely qualified and motivated to protect frequencies required for telemetry, tracking, and control operations to ensure the continued safe operation of satellites.

The specific frequencies and amount of C-band downlink spectrum that will be reserved for satellite downlink transmissions will vary on a geographic area-by-geographic area basis following discussions with potential terrestrial mobile service providers and a determination of current and future demand levels. FSS satellite licensees, for example, will likely need to reserve more spectrum for FSS use in areas outside of Atlanta, Georgia where several earth stations servicing the Southeast region are based. By contrast, more spectrum could potentially be made available for flexible use in other urban areas throughout the country—like San Francisco and Chicago—where there is both higher demand for mobile broadband and fewer FSS earth stations. This flexible, market-based approach allows for the most efficient use of the spectrum.

Facilitating terrestrial use of 3700-4200 MHz spectrum will require extensive transformation of existing satellite operations. Spectrum suitable for mobile use, as well as required frequency and geographical separation between services, must first be identified in each key market area across the entire CONUS. Next, satellite operators will likely need to alter their existing space station operations to consolidate their spectrum use, maximize frequency reuse, and prevent disruption to FSS customers—a process that will require considerable planning and capital expenditure.

FSS operators could consider a variety of complex and costly options to make spectrum available for terrestrial mobile use. For example, FSS operators could coordinate the relocation of certain customers on a geographic area-by-geographic area basis to a subset of frequencies in the 3700-4200 MHz band, thus freeing up well-defined portions of the band for terrestrial mobile

use within the geographic area. Additionally, FSS satellite operators could relocate antennas outside the geographic area and make use of wired or wireless alternatives, *e.g.*, using fiber to bring the transmission back inside the area from the earth station facility. Earth stations with difficult migration circumstances could be protected via negotiated exclusion zones and/or shielding. Satellite operators would be compensated for the expenses incurred in this process via the mobile license transaction proceeds.

Although a complicated and potentially costly undertaking, these challenges are not insurmountable if satellite operators are appropriately incentivized. Market incentives for satellite operators are key to achieving the highest and best use of the 3700-4200 MHz spectrum in the shortest amount of time. The FCC would not need to perform detailed economic analysis to justify creating an FCC-directed sharing plan, as this task would be placed in the hands of the FSS operators who hold the relevant economic information on their assets and can make the appropriate opportunity cost trade-offs. Allowing FSS operators the flexibility to phase in the transitions of their customers and adapt to market changes during the implementation would ensure current satellite earth station customers continue to receive their service without disruption on a high-quality and efficient basis. Thus, the introduction of terrestrial mobile service would be most feasible on a case-by-case, location-by-location, varying timetable basis, when implemented under a framework with sufficient flexibility given to FSS operators to address such variations. Given the FSS operators' control and knowledge of the relevant space, ground, and customer assets, they are well positioned to work collaboratively on determining where, when and how to convert satellite spectrum for the provision of terrestrial mobile service.

In sum, nearly all aspects of this efficient proposal would be accomplished through negotiation, coordination, and agreement between FSS satellite operators and terrestrial users

interested in accessing 3700-4200 MHz spectrum. Market demand, at any point in time, would determine the amount of spectrum needed to maintain the satellite service to existing customers, the amount that can be cleared for terrestrial use, and the economic incentive necessary to motivate satellite operators to undertake the extensive efforts and accept the costs necessary to clear and relinquish portions of the spectrum in identified geographic areas.

### **3. Expeditiously**

A cooperative, industry-led approach like Intelsat and Intel’s could bring flexible, mobile use spectrum to market beginning 1-3 years after a Report and Order. The accelerated, yet attainable timeline enabled by the Intelsat and Intel proposal will help cement American leadership on 5G technology and services. As Chairman Pai said last year, Commission policy should be to “allow American consumers to continue to enjoy a mobile experience that is the envy of the world.”<sup>28</sup> Yet decisions to enhance terrestrial American consumers’ enjoyment should take into account the opportunity cost to the consumers who enjoy video and audio programming delivered directly or indirectly to them via satellites operating in the 3700-4200 MHz band. Free from regulatory roadblocks, Intelsat and Intel’s proposal would unleash myriad benefits of 5G for consumers in record time—all while ensuring protection of important incumbent satellite services.

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<sup>28</sup> *Spectrum Frontiers Order and FNPRM*, Statement of Commissioner Ajit Pai, at 1.

**V. CONCLUSION**

For the reasons stated above, the Commission should promptly issue a Notice of Proposed Rulemaking to implement the Intelsat and Intel proposal to permit flexible terrestrial mobile use within the 3700-4200 MHz band.

Respectfully submitted,

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