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

## **Comments of R Street Institute**

Respectfully submitted,

\_\_\_\_\_/s/\_\_\_\_\_  
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## I. Introduction & Summary

In this proceeding, the Federal Communications Commission (“FCC” or “Commission”) seeks to expand flexible use of the 3.7–4.2 GHz band, which has been assigned to satellite downlink services.<sup>1</sup> Today, the band presents a tremendous opportunity for the FCC to make mid-band spectrum available for flexible use<sup>2</sup> and to pursue its statutory mandate to “generally encourage the larger and more effective use of radio in the public interest[.]”<sup>3</sup>

## II. Rationale for Reallocation and Potential New Uses

The 3.7–4.2 GHz band is a large, contiguous range of mid-band frequencies that is attractive for many alternative uses. The band is currently used for satellite downlink with some limited fixed-wireless use, and its attributes make it ideal for use in next-generation fixed and mobile wireless broadband service. The benefits of mid-band spectrum for these services derive from its advantageous propagation characteristics, which provide a compromise between coverage and capacity. There would likely be significant benefits to increasing flexibility in this band so that new uses that are potentially more productive than old ones have a chance to gain access.

Repurposing spectrum always entails challenges that will be discussed in detail below. However, not every potential new use requires all difficulties to be solved immediately. It

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<sup>1</sup> Expanding Flexible Use of the 3.7 to 4.2 GHz Band, *Notice of Proposed Rulemaking*, GN Docket No. 18-122, ¶1 (July 12, 2018) [hereinafter “NPRM”], <https://goo.gl/e5nRMN>.

<sup>2</sup> Joe Kane, “The FCC’S 3.7–4.2 GHz Spectrum Band Proceeding: Key Facts and Analysis,” *R Street Institute*, Sept. 5, 2018. <https://goo.gl/UcVi2S>. (Attached as appendix A).

<sup>3</sup> 47 U.S.C. § 303(g).

may be possible for services such as point-to-multipoint fixed wireless to operate alongside the current arrangement. Indeed, some fixed-wireless operations are already present in the band.<sup>4</sup> Since earth stations are usually in known positions from which they rarely move, fixed-wireless providers can use these vital data to operate around them without causing undue interference.

Another major use case for the band is mobile broadband. However, operating a terrestrial mobile service presents greater interference concerns for incumbents. By their nature, mobile networks connect devices that move around, and this presents increased complexities that may make it impossible for mobile providers and satellite incumbents to exist without the former causing harmful interference to latter. The current proceeding must seek ways to maximize the productivity of this band, given these technical constraints.

### **III. Current Allocation Presents Challenges**

Other challenges for productive reallocation are policy problems. These issues must be addressed by the Commission in order to ensure efficient use of the band.

#### **A. Unregistered Earth Stations**

Since the satellite licensees currently use this portion of the band for downlink only, the earth stations themselves cannot interfere with terrestrial services. As such, registration of earth stations has not been mandatory. However, this phenomenon has led to many earth stations going unregistered such that even more extensive fixed-wireless service could interfere with receivers simply because fixed-wireless providers are unaware of their presence. Productive use of this band necessitates the mandatory registration of earth

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<sup>4</sup> NPRM, ¶ 2.

stations in order for them to receive interference protection. However, the Commission should pair a shift to mandatory registration with a streamlining of the registration process. The current registration form may deter earth stations from registering because it is either too expensive or too difficult to understand.<sup>5</sup> A cheaper, simpler process would speed the process to enable new users in the band without unfairly harming less-sophisticated, earth-station operators.

## **B. Anticommons Tragedy**

The 3.7–4.2 GHz band is currently used to receive signals from geostationary satellites at any point along the geostationary arc, and satellite signals are sent over the entire 500 MHz of the band. The fact that the rights in this band are not clearly divided by frequency creates barriers to traditional market mechanisms that would tend toward efficient use. For example, in other bands, secondary markets can and have been used to reallocate spectrum to more productive uses in response to economic and technological changes, but this process depends upon rights that can be traded relatively easily with reasonably low transaction costs, such that the cost of making a trade does not exceed the gains from it. These market-enabling conditions are not present in the 3.7–4.2 GHz band. Since each licensee can transmit over the entire band, all incumbent licensees would have to agree to individual deals to sell or lease portions of the band to a new use that would interfere with incumbent uses. This high hurdle to deal-making presents a “tragedy of the

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<sup>5</sup> Federal Communications Commission, “Sample Application for License of New Earth Station (C-Band Transmit/Receive using U.S. licensed satellites).” <https://goo.gl/UgJubZ>.

anticommons,” in which rights are too ill-defined, numerous, or fragmented for mutually beneficial deals to take place.<sup>6</sup>

In the NPRM, however, the Commission misidentifies the economic problems associated with a well-functioning market in this band, stating: “The 500 megahertz of spectrum allocated for FSS is a public good, in that several distinct companies make non-exclusive, non-rivalrous use of the spectrum within a geographic area.”<sup>7</sup> This is not correct. The term “public good” refers to characteristics of the good itself; it is not merely a description of how it happens to be used at a given time.

Non-excludability is a characteristic of a public good, but the fact that multiple companies do, in fact, use it does not meet the definition of non-excludable. A non-excludable good is one that potential consumers cannot be prevented from using.<sup>8</sup> But all users of this band require a license from the FCC, and they may only use it in a manner prescribed by their license. All other uses and users are excluded. Indeed, the current proceeding is itself an example of new users desiring to use the band and being unable to do so under the current rules. Likewise, non-rivalry is a characteristic of a public good, but the fact that multiple users coexist does not meet the definition. A non-rivalrous good is one that does not diminish in usefulness the more it is used.<sup>9</sup> The myriad concerns about harmful interference indicates that this band *is* rivalrous. For example, there are many

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<sup>6</sup> Michael A. Heller, “The Tragedy of the Anticommons: Property in the Transition from Marx to Markets,” University of Michigan Law School Scholarship Repository (1998). <https://goo.gl/44YH77>.

<sup>7</sup> NPRM, ¶ 61.

<sup>8</sup> Hal R. Varian, *Microeconomic Analysis: Third Edition*, (Viva Books, 2015), p. 414.

<sup>9</sup> Ibid.

competing worries that introducing certain terrestrial services in the band could make it useless to incumbents.

#### **IV. Reforming Full-band, Full-arc Policy**

Enabling the market process to push this band to more productive use must include reform of the full-band, full-arc policy. This policy bestows expansive rights on incumbents that are outsized when compared to the benefits they achieve, while blocking numerous alternative uses of the band that may be more productive.

Because of the full-band policy, both the satellite industry and its downstream customers are correct when they claim to use the entire 500 MHz of this band at all times across the country. However, this is not true of every earth station in the country, since they only tune-in to certain frequencies from a certain space station at a given time. The frequencies not being listened to by an earth station in a given area are, essentially, unused in that area, since additional transmissions on those frequencies would not cause harmful interference.

The full-arc policy allows earth stations to point at any satellite in the geostationary arc. Since many earth stations remain in the same orientation for much or all of the time, this policy may result in unnecessarily large exclusion zones where fixed-wireless services could operate without harming incumbents. However, some earth-station operators have suggested that they would be harmed by any changes to the full-arc policy, or even by increased fixed-wireless use of the band, because their earth stations are not always

stationary.<sup>10</sup> However, the examples often cited for the necessity of full-arc rights are primarily uplink functions.<sup>11</sup> For example, a video crew may move between sports stadia or breaking-news events, but the point of filming these events is to send the feed up to satellites to be distributed elsewhere. The 3.7–4.2 GHz band, however, is used for downlink only. While there may be some advantages to on-site downlink for these applications, the overall impact of reallocation on them may be exaggerated.

Opponents of changes to full band, full arc say they need the flexibility for their businesses to run and to maintain high levels of reliability.<sup>12</sup> There is no problem with the desire to have such flexibility and reliability. There is, however, a problem with trying to get it for free in a way that disallows other uses that may be more valuable. The Commission should strive to allow market prices to develop for use of the band, including the right to use all frequencies in it (full band) and any given satellite at will and without notice to others (full arc). Market prices will make clear the tradeoffs inherent in allocating a scarce resource with alternative uses. For example, 99.99 percent reliability produced by full-band coordination is clearly better than 99.98 or some point below, but whether that extra benefit is worth sacrificing the marginal fixed-wireless or mobile deployment is not clear without market prices. Similarly, consider an immobile earth station that is reoriented quite

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<sup>10</sup> NCTA – The Internet & Telecom Association, “Reply Comments In the Matter of Expanding Flexible Use in the Mid-Band Spectrum Between 3.7 and 24 GHz,” GN Docket No. 17-183, Nov. 15, 2017, pp. 5-6. <https://goo.gl/Zk5PCy>.

<sup>11</sup> Ibid.

<sup>12</sup> For example, current licensees and downstream users tout the “four-nines” figure of 99.99 percent up time. Kurt Riegelman, “Three Things on Which We’ll Never Compromise,” *Intelsat*, Nov. 7, 2017. <https://goo.gl/vGfHHt>. National Public Radio, “Ex Parte Notice In the Matter of Expanding Flexible Use in the Mid-Band Spectrum Between 3.7 and 24 GHz,” GN Docket No. 17-183, Nov. 8, 2017, p. 4. <https://goo.gl/3RvPTB>.



infrequently or a mobile earth station that uses this band only for monitoring an outgoing video stream. Full-arc flexibility is certainly a benefit to incumbents in these cases, but whether this flexibility is worth precluding extensive mobile or fixed-wireless use of the band is a question for the market.

For the band to be used productively, incumbents and newcomers alike must be made to account for the opportunity costs of their actions, as communicated by prices. The Commission should, therefore, consider all policy options to facilitate a functioning market in this band including at least partially revoking the full-band, full-arc policy.

## **V. Market-based Methods of Repurposing the Band**

The Commission could split the band into two sections and designate one of them—presumably the lower one—for flexible use, which could then be employed for services like mobile broadband that are unable to coexist with satellite transmissions. There are multiple proposals for how to carry out such a band split: an incentive auction, an overlay auction, and an industry-led consortium.

While competitive markets for flexible-use licenses are the best way to decide the allocation of spectrum rights, creating and operating markets are not free. Accordingly, the transaction costs associated with secondary markets for spectrum licenses must be taken into account.

In the current proceeding, the policies governing the band present significant transaction costs that make repurposing through incentive and overlay auctions difficult. Each of these methods would fall victim to the anticommons tragedy, in which the numerous users who must consent to clear a portion of the band will be unable to coordinate efficiently to do so.

Since each incumbent currently maintains rights to the whole band, any one of them could cause a holdup and essentially veto any potential secondary market deal. Because of the full-band, full-arc policy, all incumbents use the whole band, rather than only certain frequencies, as in the 600 MHz incentive auction. In the 3.7–4.2 GHz band, therefore, incumbents that refuse to relinquish their spectrum cannot simply be packed into a smaller block or moved to a different channel, so holdouts have a much stronger position in this case, which will lead to inefficient outcomes. Likewise for overlay auctions: auctioning exclusive rights to bargain away a portion of the spectrum is effective when negotiations are bilateral, but when the parties that must consent become more numerous, the probability of holdups increases the costs of successful negotiation and hampers the ability for deals to be made.

In short, the transaction costs of getting all rights-holders to agree will make market deals extremely difficult to achieve through traditional auction mechanisms. The Commission should not give up on market reallocation, however, since the rights regime that results in the anticommons tragedy is a creation of the Commission and thus could be repaired by it. This could be accomplished by adopting the proposal of many satellite industry stakeholders who have volunteered to form a consortium that would operate as a single body with which potential new users of the band could negotiate. In short, the consortium proposal could remedy the tragedy by reducing the number of rights holders who must consent.

Of course, this proposal is not without its own drawbacks. The Commission should not be blind to the possibility that the internal politics of the consortium may resemble the same kinds of holdup problems that would have prevailed without it. Moreover, the consortium

would hold a monopoly over the rights to use the band. Both of these factors will tend to lead to less clearance than would be optimal in a competitive market. The Commission should, therefore, empower such a consortium, but also mandate that it clear at least a certain amount of the band. A target of 300 MHz would be an appropriate starting point, but this number could be allowed to shift in response to actual bids—as the clearing target did in the broadcast incentive auction. Irrespective of the final number, the market should be kept open on an ongoing basis so that more spectrum can be cleared in the future.

The satellite industry’s proposal suggests that it could clear the lower 100 MHz of the band with an additional 50 MHz cleared as a guard band.<sup>13</sup> The Commission should not rely too heavily on this number, however, because the consortium cannot know ahead of time how much it can clear. Satellite operators will face significant costs when clearing a portion of the band, but whether or not those costs are worth it depends upon how much new users are willing to pay. We should expect incumbents to clear as much as newcomers are willing to pay for, and there is no reason to think that 100 MHz is a special cutoff point. Satellite companies do face rapidly increasing costs as the fraction of the band they must clear increases, especially if the final reallocation results in their launching new satellites or providing extensive filtering equipment to keep serving their existing customers. But while these costs are real, neither the Commission nor the satellite industry should assume that wireless carriers (or other new users) will be unable to pay them. For example, if carriers offer a high enough price, satellite users could clear the band entirely and exit the market.

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<sup>13</sup> NPRM, ¶ 172. Intelsat and SES, “Ex Parte In the Matter of Expanding Flexible Use in the Mid-Band Spectrum Between 3.7 and 24 GHz, Attachment C” GN Docket No. 17-183, April 19, 2018, p. 5. <https://goo.gl/Uo87To>.

The Commission should not accept the assumption that current levels of satellite usage of the band must continue after some of it is reallocated to flexible use.

## **VI. The Rights of Incumbent and Downstream Interests**

Downstream customers of incumbent licensees, such as cable and radio operators, have expressed concerns that changes to the band may result in the transmission services they currently buy becoming less available, such that they may have to switch to less-suitable or more-expensive media.<sup>14</sup> For example, wireless alternatives, such as the Ku band, do not offer the same advantageous propagation characteristics as the C band, and switching to fiber transmission often entails significant cost increases. The Commission should not, however, focus on keeping downstream users from facing increased costs. If market allocation of this band results in higher costs to these parties, that shift is merely evidence that past Commission policies have resulted in inefficient use of the 3.7–4.2 GHz band. The Commission’s goal should not be to preserve the profitability of downstream customers; if technological change dictates that their old business models are no longer viable, the government should not seek to subsidize them and allow the reallocation to take place after an appropriate grace period. The FCC putting its finger on the scale to promote certain business models has been a persistent problem throughout the history of spectrum policy.<sup>15</sup>

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<sup>14</sup> See e.g. NCTA – The Internet & Telecom Association, “Reply Comments In the Matter of Expanding Flexible Use in the Mid-Band Spectrum Between 3.7 and 24 GHz,” GN Docket No. 17-183, Nov. 15, 2017, pp. 3-4. <https://goo.gl/Zk5PCy>.

<sup>15</sup> Thomas Winslow Hazlett, *The Political Spectrum: The Tumultuous Liberation of Wireless Technology from Herbert Hoover to the Smartphone* (Yale University Press, 2017).

This Commission should therefore continue its track record of allowing markets, rather than government manipulation, to determine which business models succeed or fail.

Respectfully submitted,

/s/

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