

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

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0- 38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

**COMMENTS OF THE  
FIXED WIRELESS COMMUNICATIONS COALITION**

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The Fixed Wireless Communications Coalition, Inc. (FWCC)<sup>1</sup> files these comments in

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<sup>1</sup> The FWCC is a coalition of companies, associations, and individuals actively involved in the fixed services—*i.e.*, terrestrial fixed microwave communications. Our membership includes manufacturers of microwave equipment, fixed microwave engineering firms, licensees of terrestrial fixed microwave systems and their associations, and communications service providers and their associations. The membership also includes railroads, public utilities,

response to the Notice of Proposed Rulemaking in the above-referenced dockets.<sup>2</sup>

#### **A. SUMMARY**

The FWCC supports the Commission’s basic proposals for implementing an Upper Microwave Flexible Use Service (UMFUS) in the 28, 37, and 39 GHz bands. We ask that existing 28 and 39 GHz fixed licensees be permitted to add mobile operations, and request that licensees be protected from interference due to other licensees’ mobile users operating outside their license areas. The Commission should rethink its proposal to use counties for license areas, as on average they are too small (mean population about 100,000) and extremely variable in both population and area. Instead, the Commission should use BTAs or EAs, which have served well for other communications services.

We strongly oppose license renewals based on coverage criteria. In the past these criteria have prompted licensees to build facilities that serve no practical purpose, and have resulted in license take-backs which left behind needlessly vacant spectrum. We support the alternative under which the licensee pays the winning bid amount, adjusted for inflation, every five years.

We support “hybrid licensing” at 37 GHz, combining local area operating rights (preferably limited to indoors) granted by rule with wide area rights granted by auction.

We oppose unlicensed operation in the 71-76/81-86 GHz bands as likely to cause interference to fixed operations, especially in light of pending rulemaking and waiver requests

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petroleum and pipeline entities, public safety agencies, cable TV providers, backhaul providers, and/or their respective associations, communications carriers, and telecommunications attorneys and engineers. Our members build, install, and use both licensed and unlicensed point-to-point, point-to-multipoint, and other fixed wireless systems, in frequency bands from 900 MHz to 95 GHz. For more information, see [www.fwcc.us](http://www.fwcc.us).

<sup>2</sup> *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, GN Docket No. 14-177 *et al.*, Notice of Proposed Rulemaking, FCC 15-138, 30 FCC Rcd 11878 (released Oct. 23, 2015) (Notice).

for relaxed antenna standards in these bands to facilitate small-cell backhaul. We suggest instead that the Commission extend the 57-64 GHz unlicensed band to include 64-71 GHz.

We reiterate our request for a non-Federal fixed allocation and service rules at 42-43.5 GHz, where the Fixed Service will fully protect radio astronomy facilities and will accept interference from Federal uplink earth stations. We will not oppose limited fixed non-Federal satellite uplinks in this band under the frequency coordination limitations discussed below.

UMFUS can successfully coexist with satellite operations in the 28 and 38-39 GHz bands subject to conditions that promote parity between the services. FSS operators should either negotiate with the incumbent UMFUS licensee for permission to operate in its territory, or alternatively, negotiate for a license partition. To limit both interference to UMFUS and territory made unavailable to UMFUS by frequency coordination, satellite operation should be restricted to gateways. The Commission's proposed alternatives—a Spectrum Access System, beacon signaling, lower limits on earth station elevation, and active signal cancellation—are variously unproven or known not to be effective. Earth stations should be required to frequency coordinate only the frequencies and azimuths they will actually use. Finally, unhappy experience with C-band Earth Station Vessels leads us to request that the Commission not allow earth stations on moving platforms.

**B. 28, 37, AND 39 GHz BANDS**

The Commission proposes to establish a new Upper Microwave Flexible Use Service (UMFUS) in the 28, 37, and 39 GHz bands, under a new Part 30 of the rules.

The FWCC generally supports this proposal, subject to the following comments.

## **1. *Mixing fixed and mobile***

The conventional wisdom has long said fixed and mobile services cannot coexist in the same region on the same frequencies, in part because mobile facilities cannot use frequency coordination in ways that prevent interference to fixed operations.

We nonetheless support licensing that permits each licensee to opt for fixed, mobile, or (if possible) combined use. We condition this support on adoption of the proposal to allow existing 28 and 39 GHz fixed licensees to add mobile operations, if they wish.<sup>3</sup>

There will have to be some mechanism to protect fixed licensees from interference caused by other licensees' mobile users moving across license area boundaries. This may require a degree of technical standardization that could be established either in the Commission's rules or in industry standards—like the IEEE standards that ensure interoperability among different manufacturers' Wi-Fi equipment.<sup>4</sup> FWCC members offer to put their expertise at the Commission's disposal to address the problem.

## **2. *License areas***

The proposed county-sized license areas are too variable, and in general too small, to be practical.<sup>5</sup> The mean U.S. county population is only about 100,000,<sup>6</sup> but this datum hides an enormous spread. Individual county populations range from 82 (Loving County, TX) up to

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<sup>3</sup> Notice at ¶ 95.

<sup>4</sup> IEEE 802.11. The Wi-Fi Alliance enforces the standards by licensing the Wi-Fi trademark only for use on compliant equipment.

<sup>5</sup> Notice at ¶ 110.

<sup>6</sup> 2012 data. See [https://en.wikipedia.org/wiki/County\\_\(United\\_States\)#Population](https://en.wikipedia.org/wiki/County_(United_States)#Population) (checked 1/23/2015).

almost 10 million (Los Angeles County, CA)—bigger than many nations.<sup>7</sup> Areas range from 12 square miles (Kalawao County, HI) up to 20,000 square miles (San Bernardino County, CA)—again, bigger than many nations.<sup>8</sup> The Commission’s offices overlook the fourth smallest county, Arlington County, VA (26 square miles). Geographically small counties are a particular problem because the proposed limitation on field strength at the borders<sup>9</sup> would affect operations through most or all of the license area. At the other extreme, some geographically large counties having sparse populations spread over a wide area will be difficult to serve, and may not attract serious bids unless auctioned together with other regions.<sup>10</sup>

In principle, providers could structure their bids so as to combine counties into larger, more workable territories,<sup>11</sup> but in practice, the vagaries of the auction process can make this difficult or impossible in particular cases.

For these reasons the Commission instead should auction these bands using time-proven BTA or EA license areas.

### **3. *Renewal criteria***

The FWCC strongly opposes renewal criteria based on percentages of population coverage.<sup>12</sup> The Commission’s past efforts to apply a coverage-based renewal safe harbor for the 24, 28, 31, and 39 GHz bands—for example, construction of so many links per million

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<sup>7</sup> Data from 2010 census. *See* [https://en.wikipedia.org/wiki/County\\_statistics\\_of\\_the\\_United\\_States](https://en.wikipedia.org/wiki/County_statistics_of_the_United_States) (checked 1/18/2015).

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

<sup>9</sup> 47 C.F.R. § 30.204 (proposed).

<sup>10</sup> Loving County, TX, for example, has on average only one person for every eight square miles. [https://en.wikipedia.org/wiki/County\\_statistics\\_of\\_the\\_United\\_States](https://en.wikipedia.org/wiki/County_statistics_of_the_United_States) (checked 1/18/2015).

<sup>11</sup> Notice at ¶ 111.

<sup>12</sup> Notice at ¶ 207.

population<sup>13</sup>—were a conspicuous failure. Licensees that in some cases had made large financial investments, but had not yet constructed the requisite number of working links, lost their licenses. That outcome was precisely what the renewal requirements sought to avoid: unused spectrum. Some licensees adopted the stratagem of literal compliance by constructing useless “links to nowhere,” sometimes with outdated and inferior equipment—not to provide service, but solely to meet the conditions for retaining their licenses. Licensees and the Commission alike diverted uncountable hours and dollars into disputes about waivers, extensions, and requirements for compliance that reached the U.S. Court of Appeals.<sup>14</sup>

The Notice defends the coverage-based proposal:

Because licensees could keep any counties in which they satisfy the performance requirement, and because we are proposing a relatively low population-based benchmark (in comparison to buildout benchmarks we have imposed recently), licensees in these bands would be more likely to build out to actually provide services in areas where it is feasible and less likely to build for the sake of keeping their licenses.<sup>15</sup>

We respectfully disagree. The pace of construction depends (or should depend) on the development of demand for services, availability of suitable equipment, access to needed sites, availability of financing, and other hard-to-predict factors. Any requirement that takes the form of inflexible coverage percentages threatens the same unfortunate results that occurred in the 24, 28, 31, and 39 GHz bands.

Performance-based renewal criteria are not only unnecessary but counterproductive. A licensee has every incentive to recover its auction expenditure. Idle spectrum is costly to the

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<sup>13</sup> *E.g., Fixed Services at 24 GHz*, Report and Order, 15 FCC Rcd. 16934 at ¶ 38 (2000).

<sup>14</sup> *FiberTower Spectrum Holdings, LLC, v. FCC*, 782 F.3d 692 (D.C. Cir. 2015) (24 and 39 GHz bands).

<sup>15</sup> Notice at ¶ 201.

licensee, which must pay continuing interest on the auction bid (or, if self-financed, suffer opportunity costs). A prudent licensee will do everything possible to construct its system so as to launch a revenue stream. But a performance-based renewal requirement may deter that construction. Building out a system entails significant capital expenditures. License cancellation turns those into a loss. If there is any significant risk that the build-out, once begun, may not meet Commission requirements by the expiration date, the licensee might reasonably decide that construction is not worth the risk, and choose instead to walk away from the license. That benefits no one.<sup>16</sup>

This reasoning leads us to cautiously endorse the proposed alternative in which the licensee must pay the winning bid amount, adjusted for inflation, every five years to keep the license active.<sup>17</sup> Presumably the bids will be lower than for a one-time payment, but the successive payments from a successful licensee over the long term should more than make up the initial shortfall. This approach at least will encourage any construction that promises eventual revenues, without unduly penalizing construction that fails to meet minimum requirements within a set time. It also enables bidders, and then licensees, to make shorter-term, and hence

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<sup>16</sup> We acknowledge the statutory requirement that the Commission

include performance requirements, such as appropriate deadlines and penalties for performance failures, to ensure prompt delivery of service to rural areas, to prevent stockpiling or warehousing of spectrum by licensees or permittees, and to promote investment in and rapid deployment of new technologies and services[.]

47 U.S.C. § 309(j)(4)(B). The “such as” language suggests the Commission has authority to determine that the objectives of this paragraph are best met without the imposition of specific deadlines and penalties.

<sup>17</sup> Notice at ¶ 221.

better-informed financial decisions, which in turn may help to moderate the wild swings in the returns of some past auctions.<sup>18</sup>

The Notice proposes the additional alternative of separating the right to operate without interference from the right to exclude other users, with the latter requiring an additional “option” payment as proposed for 3.5 GHz.<sup>19</sup> Like much else in the 3.5 GHz proceeding, this idea remains untested in the real world. We think that extending it to other bands is premature.

#### **4. 37 GHz hybrid licensing**

The FWCC supports the concept of granting local area operating rights by rule, while auctioning wide area rights.<sup>20</sup> The proposal to limit 37 GHz local area operation to indoors will make this feasible.<sup>21</sup> The materials used for commercial buildings attenuate at millimeter-wave frequencies by several tens of dB,<sup>22</sup> and thus should isolate local area and wide area operations from one another.

#### **C. 64-71, 71-76, AND 81-86 GHz BANDS**

The FWCC strongly opposes requests to allow unlicensed operation in the 71-76/81-86 GHz bands.<sup>23</sup> These bands are badly needed for fixed point-to-point links, which are multiplying

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<sup>18</sup> E.g. net bids of \$578,663,029 for LMDS (28 and 31 GHz) vs. \$216,050 for 24 GHz. Factors in this differential doubtless include differing amounts of bandwidth and the presence of the 23 GHz “free” fixed service band close to the 24 GHz auctioned band. But those may not explain auction returns that differ by a factor of more than 2,600.

<sup>19</sup> Notice at ¶ 222.

<sup>20</sup> Notice at ¶¶ 100-04.

<sup>21</sup> Notice at ¶ 102.

<sup>22</sup> For example, an ITU-R report estimates loss through the outer wall of a modern building, taking glass into account, to be about 33 dB at 37 GHz. *Technical feasibility of IMT in bands above 6 GHz*, Report ITU-R M.2376-0 at 69, figure A3.1-1 (July 2015). Available at [https://www.itu.int/dms\\_pub/itu-r/opb/rep/R-REP-M.2376-2015-PDF-E.pdf](https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2376-2015-PDF-E.pdf) (checked 1/25/2016).

<sup>23</sup> Notice at ¶ 87.

rapidly as lower-frequency bands become increasingly congested. The “light licensing” procedure, while not as easy as unlicensed operation, presents very low barriers to commercial deployment.<sup>24</sup> We are not aware of any demand for consumer use of these bands.

The FWCC has pending a rulemaking request to relax the antenna standards at 71-76/81-86 GHz,<sup>25</sup> while FWCC member Aviat Networks and others have filed waiver requests seeking identical relief.<sup>26</sup> Aviat explained:

[A]s costs have dropped, the 71-76/81-86 GHz bands have become more attractive for applications that carry less data over shorter distances, and require antennas closer to the ground. ... Backhaul distances are declining from kilometers to a few hundred meters. Small cell deployment will accelerate this trend.<sup>27</sup>

A multiplicity of small antennas having relatively wide patterns, mounted close to street level, is not compatible with uncontrolled, unlicensed operations in the same band.

The logical solution is for the Commission instead to adopt its proposal to extend the present unlicensed band at 57-64 GHz to include 64-71 GHz, under the same technical rules.<sup>28</sup>

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<sup>24</sup> *Wireless Telecommunications Bureau Announces Permanent Process for Registering Links in the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands*, Public Notice, 20 FCC Rcd 2261 (Wireless Telecom. Bur. 2005).

<sup>25</sup> Comments of the Fixed Wireless Communications Coalition in Response to the Commission’s Notice of Inquiry, WT Docket No. 10-153 at 2-6 (filed Oct. 5, 2012).

<sup>26</sup> *Wireless Telecommunications Bureau Seeks Comment on Requests of Aviat Networks and CBF Networks, Inc. D/B/A Fastback Networks for Waiver of Certain Antenna Requirements in the 71-76 and 81-86 GHz Bands*, WT Docket No. 15-244, Public Notice, DA 15-1166 (released Oct. 13, 2015). Several parties have filed in support of Aviat Networks.

<sup>27</sup> Aviat Networks, Request for Waiver of Certain Antenna Requirements in the 71-76 and 81-86 GHz Bands, WT Docket No. 15-244 at 4 (filed April 5, 2013). Aviat Networks amended its request on March 24, 2014, as to the co-polar discrimination requirement in the antenna standards. The FWCC made the same change to its rulemaking request, on the same day. Letter from Mitchell Lazarus, Counsel, FWCC, to Marlene H. Dortch, Secretary, FCC (March 24, 2014).

<sup>28</sup> Notice at ¶¶ 58-59. The FWCC has no objection to protecting the Earth Exploration Satellite Service by carrying over the present prohibitions against use on aircraft or satellites and

This will satisfy the need for additional millimeter-wave unlicensed spectrum without threatening interference to the evolving applications at 71-76/81-86 GHz.

**D. 42-43.5 GHz BAND**

In 2012-13, the FWCC requested a non-Federal fixed allocation and service rules for 42-43.5 GHz, co-primary with the Radio Astronomy Service at 42.5-43.5 GHz and subject to possible interference from Federal Fixed Satellite Service uplink earth stations.<sup>29</sup>

The Notice correctly observes that the 42.5-43.5 GHz segment is unsuitable for mobile use because of the need to protect radio astronomy observations.<sup>30</sup>

The FWCC reiterates its request. We undertake to fully protect radio astronomy facilities that observe in this band from harmful interference.<sup>31</sup> We propose to integrate this protection into the Fixed Service's usual frequency coordination procedures. The FWCC also acknowledges the presence of Federal uplink earth stations in the band, and agrees to operate subject to possible interference from those stations.

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in field disturbance sensors, including vehicle radar systems, unless installed in fixed equipment. 47 C.F.R. § 15.255(a).

<sup>29</sup> Notice at ¶ 75; *Service Rules for the Fixed Service in the 41.0-42.5 GHz Band*, RM-11664, Petition for Rulemaking (filed May 9, 2012) (41.0-42.5 GHz), *withdrawn in part*, Reply of the Fixed Wireless Communications Coalition in RM-11554 (filed July 24, 2012), *amended*, *Fixed Service Non-Federal Allocation and Service Rules in the 42.5-43.5 GHz Band*, Supplemental Petition for Rulemaking (filed Feb. 11, 2013) (42-43.5 GHz).

<sup>30</sup> Notice at ¶ 79.

<sup>31</sup> For numerical details on the measures we offer, see *Fixed Service Non-Federal Allocation and Service Rules in the 42.5-43.5 GHz Band*, Supplemental Petition for Rulemaking at 12-14 (filed Feb. 11, 2013).

## E. SATELLITE ISSUES

### 1. *Background*

Band-sharing between the Fixed Service and FSS (Fixed Satellite Service) has always been highly asymmetric in favor of the FSS. Fixed Service applicants are permitted to coordinate only the frequencies and azimuths they will actually use, and must in fact be using that capacity within 18 months of the license grant, or the license terminates.<sup>32</sup> FSS operators, in contrast, routinely coordinate the entire band and the entire geostationary arc, even if they intend to communicate with only one transponder on one satellite. In a downlink band, such as 4 GHz, a Fixed Service applicant may not be able to establish a link passing close to an earth station even if the earth station is pointed in a different direction or receiving on a different frequency. The proliferation of 4 GHz TV receive-only backyard dishes (TVROs) in the 1980s, each one coordinating the entire band and arc, closed off 4 GHz to the Fixed Service across much of the country. In an uplink band, such as 6 GHz, a Fixed Service applicant is free to construct within coordination distance of an earth station pointed in a different direction, or transmitting on a different frequency. But the earth station has the option at any time of initiating transmissions in an interfering direction or on an interfering frequency, even years after the Fixed Service station went into service.

We trace this lopsided approach to a 1967 Comsat order:

[Satellite] applicants have coordinated the entire bands 5925-6425 GHz (transmit) and 3700-4200 GHz (receive) and all azimuths from 0 degree-360 degree and all elevation angles from 5 degree and above, in order to allow for flexibility of operation. This procedure is consistent with the practice followed within the United States *which has had little or no adverse effect upon terrestrial systems* in the areas concerned.<sup>33</sup>

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<sup>32</sup> 47 C.F.R. §§ 101.63(a), (c).

<sup>33</sup> *Communications Satellite Corp.*, Memorandum Opinion, Order and Authorization, 8 F.C.C.2d 1001 at ¶ 7 (1967) (emphasis added). The order granted an application to construct an

In 1967, when there was plenty of spectrum to go around, this coordination practice created no problems. By the 1990s, though, spectrum suitable for long-haul microwave—below about 10 GHz—had come into short supply. The Commission repurposed the valuable 2 GHz fixed microwave band to the Personal Communications Service (“2G” cellular voice service). TVROs had claimed most of the 4 GHz band. The only long-haul band left, at 6 GHz, was fast becoming saturated, in part because of the earth stations’ extraordinary coordination privileges.

Nothing in the Commission’s rules mandates this imbalance in coordination. It appears to be a practice that arose in the 1960s as a then-harmless convenience to satellite operators, and which has continued, without any better rationale, despite subsequent spectrum shortages and damage to the Fixed Service. We are not aware of any other administration that accords these privileges to the FSS.

In May 1999, the FWCC filed a request for declaratory ruling to make the frequency coordination process more equitable.<sup>34</sup> The satellite industry opposed. The Commission responded with a proposed a rule that would require an earth station denying coordination to a Fixed Service applicant to show, at that time, that it was actually using the spectrum in question.<sup>35</sup> The satellite industry opposed this, too—as did the FWCC, because the rule

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earth station in Puerto Rico for access to INTELSAT space segment. The French Ministry of Posts and Telecommunications had expressed its view that coordination should be based on discrete frequency assignments, and that angles of azimuth and elevation of the station antenna should be specifically defined. The order suggests that the French had facilities within coordination distance of the Comsat site, but does not give further details. The Commission here overrode the French concerns.

<sup>34</sup> But not equal. The FWCC proposal would have allowed an FSS earth station to license *twice* the amount of spectrum it actually needed, and would not have affected teleports at all.

<sup>35</sup> *FWCC Request for Declaratory Ruling*, Notice of Proposed Rulemaking, 15 FCC Rcd. 23127 at ¶ 8 (2000).

threatened to trigger protracted disputes just when the Fixed Service station was trying to get on the air. Seeing no support from either side, the Commission terminated the proceeding without action.<sup>36</sup>

That history bears on the present proceeding. While the FWCC will not oppose UMFUS sharing spectrum with FSS earth stations in the bands discussed below, we do request even-handed frequency coordination. Specifically, we condition our lack of opposition on satellite operators' coordinating only the frequencies and azimuths they will actually use. Otherwise, we fear, these bands will go the way of 4 and 6 GHz, where overly broad FSS coordination leaves large amounts of spectrum unused by the FSS but beyond the reach of others.

Additional considerations apply to some of the bands.

## **2. 28 GHz**

Satellite uplink earth stations are presently authorized in the 28 GHz band as secondary to the Fixed Service (LMDS) for limited gateway operations.<sup>37</sup> The Notice asks whether to upgrade their allocation to co-primary with the Fixed Service,<sup>38</sup> about mechanisms for coexistence with the Fixed Service,<sup>39</sup> whether to relax the limitation to gateways,<sup>40</sup> and whether to allow "fixed" earth stations on moving platforms.<sup>41</sup>

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<sup>36</sup> *FWCC Request for Declaratory Ruling*, Second Report and Order, 17 FCC Rcd. 2002 (2002).

<sup>37</sup> Notice at ¶ 124.

<sup>38</sup> Notice at ¶¶ 127-33.

<sup>39</sup> Notice at ¶¶ 133-46.

<sup>40</sup> Notice at ¶¶ 147-53.

<sup>41</sup> Notice at ¶ 159.

As a possible way to manage interactions between FSS and other users, the Commission suggests that satellite operators might acquire their own UMFUS licenses.<sup>42</sup> Our recommendation for larger license areas makes this impractical as a general solution. Instead, we think satellite operators should have a choice between the two following alternatives.

First, the operators of a proposed earth station can undertake negotiations with the incumbent UMFUS licensee for permission to operate. The two parties would work out between themselves the details of how to protect the incumbent, including the earth station's frequency usage, permissible azimuths, etc. (The earth station itself, being an uplink in this band, needs no interference protection.) If the proposed earth station site is close to a license boundary, the negotiations might have to include the neighboring licensee as well. Alternatively, to increase its own security for future expansion, the earth station operator could negotiate with the incumbent UMFUS licensee for a partition that lets the earth station operator become a licensee in its own right. Both it and the original licensee would then have to respect the Part 30 signal limits at their new mutual boundary, unless they agree otherwise. Under our preferred renewal criteria (repayment of the winning bid amount every five years), the earth station operator would become responsible for a negotiated share of the original licensee's payments.

We oppose relaxing the limitation to gateways.<sup>43</sup> Allowing user equipment in this band would create too much risk of interference to mobile UMFUS users. Of the four suggested techniques the Commission lists to address that problem, none is reliable enough for widescale deployment. Proposals for a Spectrum Access System,<sup>44</sup> like that being developed for the 3.5

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<sup>42</sup> Notice at ¶¶ 132-34.

<sup>43</sup> Notice at ¶¶ 147-49.

<sup>44</sup> Notice at ¶¶ 150-53.

GHz band, are premature; the technology is still a long way from establishing its feasibility, much less achieving operational status. Beacon signaling<sup>45</sup> from UMFUS base stations to earth stations presupposes that the earth station receives the UMFUS beacon before the UMFUS station receives the interfering earth station signal. This in turn requires the UMFUS base stations to have power and propagation at least equal to those of earth station signals, which may not always be true. Keeping earth station elevations above some angle relative to the horizontal<sup>46</sup> has the benefit of simplicity and may help to protect mobile operations, but our long experience with shared-band frequency coordination shows it does not work to protect fixed links. Active signal cancellation<sup>47</sup> is worth further study, but for now is too easily defeated by unexpected motion, reflections, and moment-to-moment atmospheric variations in propagation.

We urge the Commission not to allow “fixed” satellite uplinks on moving platforms in bands shared with UMFUS.<sup>48</sup> The Notice expresses concern about interference into adjacent satellites, but overlooks the problem of interference into terrestrial services that share the same frequencies. Of the three precedents cited in the Notice—vehicle-mounted earth stations, earth stations on vessels (ESVs), and earth stations aboard aircraft—only ESVs operate in bands shared with the Fixed Service. ESVs are subject to stringent frequency coordination requirements,<sup>49</sup> helped by the fact that they move relatively slowly. We nonetheless have reports of harmful interference into Fixed Service operations that are very probably due to ESVs, although the transient nature of the interference precludes our establishing to a certainty that

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<sup>45</sup> Notice at ¶¶ 154-55.

<sup>46</sup> Notice at ¶¶ 156.

<sup>47</sup> Notice at ¶¶ 157-58.

<sup>48</sup> Notice at ¶¶ 159.

<sup>49</sup> 47 C.F.R. § 25.221(a)(8)-(13).

ESVs are the cause.<sup>50</sup> The experience makes us wary of trying to coordinate with moving earth station platforms. Reliably coordinating a mixture of fixed and mobile UMFUS units with stationary earth stations will be difficult enough.

### **3. 38-39 GHz**

Our concerns about satellite operations at 37.5-40 GHz band, a downlink band, turn not on interference *per se*, but on frequency coordination issues. As at 28 GHz, we propose that earth station operators needing interference protection either negotiate with the incumbent UMFUS licensee for that protection, or else seek a license partition. To leave room for UMFUS use, frequency coordination must be limited to gateway earth stations and to the frequencies and azimuths each will actually use. We have no objection to the presence of user downlink equipment if the provider is willing to accept possible interference from UMFUS.

We do not support a change in the allocation table at 37-38.6 or 39.5-40 GHz, or in the division of Federal/non-Federal responsibilities.

### **4. 42.5-43.5 GHz**

We would not oppose *limited* fixed non-Federal satellite uplinks at 42.5-43.5 GHz under frequency coordination that uses the same procedures and conditions as Fixed Service applicants

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<sup>50</sup> For example: A major communications carrier operates a route that crosses the inland waterway in Alaska. Its links had received intermittent interference for some time but the carrier could not identify the source. A technician happened to be on site when the interference recurred, and saw a ship passing through the waterway. After it passed, the interference ceased. The kind and duration of the interference on this occasion were similar to those in the past. The carrier attempted discussions with the ESV operator but no resolution resulted. It seemed clear to carrier personnel that the ESV was intentionally operating on the frequencies used by the Fixed Service microwave links without first completing required frequency coordination. The incident adds the dimension of intentional disregard to the possibility of unintentional interference. In both situations, identification of the interference source is difficult and expensive, if it can be achieved at all. Even then, resolution requires cooperation from the offending ESV operator, which in this case the carrier could not achieve.

use among themselves, and that coordinates only the frequencies and azimuths the earth stations will actually put to use.

### **CONCLUSION**

The Commission should proceed promptly with its plans to develop UMFUS, subject to the comments above.

Respectfully submitted,



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