ORIGINAL

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
	)	
Fixed Wireless Communications Coalition,	)	RM-_____
Inc., Request for Modified Coordination	)	
Procedures in Bands Shared Between the Fixed	)	
Service and the Fixed Satellite Service	)	

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PETITION FOR RULEMAKING

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PETITION FOR RULEMAKING

Pursuant to Section 1.401 of the Commission's rules, the Fixed Wireless Communications Coalition, Inc. (FWCC)[1] submits this Petition for Rulemaking.

A. SUMMARY

Large amounts of spectrum shared by the Fixed Service (FS) and Fixed Satellite Service (FSS) go needlessly unused. The Commission's rules permit every FSS earth station to routinely coordinate across an entire frequency band, and over the entire geostationary arc—regardless of how little spectrum the earth stations plans to use, and how few satellites it plans to access. This practice is sometimes called "full-band, full-arc" coordination. When an FSS licensee coordinates frequencies and directions it has no use for, valuable spectrum remains idle, even if needed by FS operators.

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[1] The FWCC is a coalition of companies, associations, and individuals interested in the fixed service – i.e., in 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, 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.

Full-band, full-arc coordination violates core principles of spectrum management and policies against warehousing. The Commission's only defense for the practice is its having been instituted fifty years ago, when demands for spectrum were far lower than today.

In lieu of the present practice, we propose that an earth station be permitted to coordinate specific combinations of frequency, azimuth, and elevation angle for immediate use, and also "growth capacity" for possible future use. That growth capacity might include the entire band and the entire geostationary arc. The earth station can apply to license any of its unused growth capacity at any time. An FS applicant may coordinate on this capacity on a showing that no other FS channels meet its requirements, and it can demonstrate its need for the capacity by filing a license application. If the FS applicant has a choice among channels in growth capacity, it must consult with the FSS licensee on which channels would minimize disruption to the licensee's future plans.

A subset of earth stations, such as teleports, must be able to access multiple satellites and to add and change satellites on short notice. Our proposal includes a waiver mechanism to address these cases.

A grant of this petition will result in more efficient spectrum use while keeping a reasonable balance between FS operators' immediate needs for spectrum and earth stations' need for flexibility.

B. ABOUT FREQUENCY COORDINATION

The FS and FSS share these bands on a co-primary basis:

3.7–4.2 GHz
5.925–6.425 GHz
10.7–11.7 GHz
12.7–13.25 GHz.[2]

In view of an ongoing proceeding,[3] we do not address shared bands above 24 GHz.

Frequency coordination in the shared bands follows these steps:

1. A party (or its frequency coordinator) planning an FS link or an FSS earth station ("notifying party") prepares a prior coordination notice (PCN) that provides technical detail on the proposed facility's transmit and receive characteristics.

2. The notifying party (or coordinator) sends the PCN to all FS and FSS licensees and prior applicants who might receive interference from the proposed facility, or cause interference to it ("notified parties").

3. The notified parties assess possible interference both to and from their own facilities.

4. A notified party that predicts it will *receive* interference so informs the notifying party. The notifying party's application cannot proceed until the predicted interference is resolved. The resolution might entail a change in frequency or polarization, use of a more directional antenna, a change in location, or other measures.

5. A notified party that predicts it will *cause* interference so informs the notifying party. The notifying party can choose to accept the interference; reduce or eliminate the interference with changes in frequency, polarization, antenna, location, etc.; or abandon its proposal.

6. Only after this process is complete can the notifying party file its application with the Commission.[4]

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22 *Compare* 47 C.F.R. § 25.202(a)(1) (table) *and* 47 C.F.R. § 101.101 (table). Some bands listed in Section 101.101 are no longer available to the fixed service.

3 *Use of Spectrum Bands above 24 GHz for Mobile Radio Services*, GN Docket No. 14-177 *et al.*, Report and Order and Further Notice of Proposed Rulemaking, FCC 16-89 (released July 14, 2016).

4 "Coordination must be completed prior to filing an application for regular authorization, or a major amendment to a pending application, or any major modification to a license." 47

The procedure implements a general rule: either an FS or FSS notifying party must ensure that no harmful interference is caused to a licensee or prior applicant in either service.

C. ASYMMETRIES BETWEEN FS AND FSS IN FREQUENCY COORDINATION

FSS earth stations transmit and receive in widely separated bands, while an FS station transmits and receives on different frequencies in the same band. An FSS transmitter thus cannot interfere with a FSS receiver, but an FS transmitter might interfere with an FS receiver. The objectives of frequency coordination break down to three cases:

1. An FS notifying party must not cause harmful interference to another FS link.
2. An FS notifying party in an FSS downlink band must not cause harmful interference to an FSS downlink earth station.
3. An FSS notifying party in an FSS uplink band must not cause harmful interference to an FS link.

An FS notifying party is permitted to coordinate only the frequencies and azimuths it will actually use, and must in fact be using them within 30 months of receiving its license.[5] In contrast—and key to this request—an FSS earth station notifying party *routinely coordinates all frequencies in the band and every azimuth and elevation angle that aims at its geosynchronous arc.*[6] Most of those frequencies and pointing directions go unused for the life of most earth stations. Yet their having been coordinated makes them unavailable for FS use.

C.F.R. § 101.103(d)(1). For details on the frequency coordination procedure, *see* 47 C.F.R. §§ 25.203(c) (earth stations), 101.103(d) (fixed service links).

5 47 C.F.R. § 101.143(a)(3(ii) ("Traffic loading payload shall exceed 50 percent of payload capacity within 30 months of licensing.")

6 Geosynchronous (or geostationary) orbits are those around the equator at an altitude of 35,786 km. A satellite in this orbit appears to be stationary in the sky. A geosynchronous arc is this orbit as seen from a point on the Earth. At the equator, the geosynchronous arc passes directly overhead from horizon to horizon. North of the equator it is an arc in the sky, curved somewhat like a rainbow, whose highest point is due south of the observer.

Full-band, full-arc coordination by earth stations has no adverse effect on other earth-station applicants, again because FSS uplinks and downlinks operate in different bands. But it has a major negative impact on FS stations attempting to coordinate.

In an FSS downlink band, full-band, full-arc coordination bars an FS applicant from every frequency in the band over a wide area[7]—even if the earth station is not receiving on those frequencies and has no plans to. In the 3.7–4.2 GHz downlink band, registered earth stations are so numerous as to make any FS coordination impossible in most of the country. Yet many of those earth stations each access just one transponder on one satellite.

Similarly, in an FSS uplink band, full-band, full-arc coordination means that any earth station is free to transmit at any time on any frequency in the band in the direction of any point on its geosynchronous arc. An FS operator might successfully find a location and frequency that receives no actual interfering signal from any uplink earth station. Again depending on the particular geometries, however, the FS operator may be permanently vulnerable to interference should an earth station operator decide to change satellites or transponders. Many FS facilities that routinely carry critical services—pipeline control, operation of the electric grid, synchronizing the movement of railroad trains, public safety communications, and the like—cannot accept this risk and still achieve their needed availabilities at or above the 99.999 percent level.

In contrast, after an FS station coordinates, FSS earth stations (and other FS stations) have full access to all frequencies and azimuths the FS station will not actually use.

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[7] The exact area closed to the FS applicant depends in complicated ways on the location of the earth station and the location and azimuth of the proposed FS station.

Legal basis for full-band, full-arc coordination

The asymmetry between FS and FSS coordination procedures appears in the Commission's rules. The PCN of an FS applicant must include specific "[f]requencies and polarizations to be added, changed or deleted" and "[p]ath azimuth and distance."[8] In contrast, the PCN of an earth station notifying party provides

> "(ii) Proposed operating *frequency band(s)* and emission(s)" [as opposed to individual frequencies], and
>
> [...]
>
> "(v) Longitude range of geostationary satellite orbit (GSO) satellites at which antenna *may be pointed* ..."[9]

This language arguably supports full-band, full arc coordination.

The only Commission justification we can find for FSS full-band, full-arc coordination dates back to 1967—the early days of satellite communication, just ten years after Sputnik. Communications Satellite Corp. (COMSAT) and others had filed an earth station application that required international frequency coordination. The applicants had 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 ...[10]

French authorities objected, arguing that coordination should be based on discrete frequency assignments and specific angles of azimuth and elevation.[11] The Commission disagreed:

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8 47 C.F.R. § 101.103(d)(2)(ii).

9 47 C.F.R. § 25.203(c)(2) (emphasis added).

10 *Communications Satellite Corp. et al.*, Memorandum Opinion, Order and Authorization at ¶ 7, 8 F.C.C.2d 1001 (1967).

11 *Id.*

> This [full-band, full-arc] 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.*[12]

No doubt the lack of adverse effect was true in 1967, when fixed microwave (and earth stations) were still relatively new. Today, though, with severe spectrum congestion across much of the country, full-band, full-arc earth station coordination has strongly negative effects on terrestrial services.

Frequencies are not interchangeable.

We sometimes hear that FS spectrum congestion is not a problem because spectrum remains plentiful at higher frequencies, namely, those above 24 GHz. These frequencies propagate very differently from the lower-frequency FS bands, particularly 4 and 6 GHz. While the bands above 24 GHz work well for short-range, high data rate applications, they are unsuited to long-haul links. So-called "space attenuation" increases at higher frequencies;[13] and rain fade (due to moisture in the atmosphere) causes additional, significant attenuation above about 10 GHz. Transmissions that span kilometers or tens of kilometers require lower frequencies. All FS bands below 10 GHz are shared with FSS and are subject to the coordination procedures described above.

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12 *Id.* (emphasis added).

13 Space attenuation, also called free-space path loss, is proportional to the square of the frequency. The loss over a given distance at 24 GHz is 15.6 dB higher than at 4 GHz. Losses are greater at higher frequencies.

D. REQUEST

In order to free up spectrum currently locked out of service, the FWCC asks the Commission to amend its rules so that conditions on FSS frequency coordination more closely parallel those for co-primary FS, subject to the exceptions set out in items (5) and (6) below:[14]

1. An FSS earth station can coordinate (*i.e.*, list in its PCN) only the specific combinations of frequency, azimuth, and elevation angle it intends to use.

2. An earth station license specifies the combinations of frequency, azimuth, and elevation angle that the applicant listed in its PCN.

3. The licensee's construction certification (required under Section 25.133(b)(1)) must certify that each combination of frequency, azimuth, and elevation angle listed in the license is in operation. Any combination not so certified, at the time the construction certification is due, is automatically deleted from the license.

4. A combination of frequency, azimuth, and elevation angle on the license that goes unused for more than 90 days must be reported to the Commission and deleted from the license.[15]

5. Notwithstanding the above, an FSS applicant can coordinate additional combinations of frequency, azimuth and elevation angle as "growth capacity," analogous to the growth channels permitted to parties coordinating FS facilities.[16] Growth capacity coordinations can be renewed indefinitely. An earth station can apply to license any or all of its growth capacity at any time.[17] FS applicants must make every reasonable effort to avoid blocking FSS growth capacity. An FS applicant may, however, coordinate on this capacity on a showing that no other

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[14] The Commission is considering whether to allow Federal earth stations to access non-Federal satellites. *Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations*, Notice of Proposed Rulemaking and Notice of Inquiry, 28 FCC Rcd 6698 (2013). We earlier stated our non-objection to this proposal, so long as Federal earth stations are subject to the same frequency coordination rules and procedures as are non-Federal earth stations. Comments of the FWCC in ET Docket No. 13-115 at 2 (filed Aug. 30, 2013). The present request would apply to both Federal and non-Federal earth stations.

[15] This tracks Section 25.161(c), under which an FSS earth station license terminates automatically if removal or modification of facilities renders the station not operational for more than 90 days.

[16] 47 C.F.R. § 101.103(d)(1).

[17] Once licensed, the combination of frequency, azimuth, and elevation angle must be put into operation within twelve months, by analogy with Section 25.133(a)(1) (twelve-month construction period for new earth station).

FS channels meet the applicant's requirements,[18] and can demonstrate its need for the capacity by filing a license application,[19] thereby obligating itself to construct within 18 months.[20] If the FS applicant has a choice of channels within the growth capacity, it must attempt to consult with the FSS licensee on which ones would be least disruptive to the FSS licensee's future plans.

6. Notwithstanding the above, an FSS applicant can request a waiver permitting it to coordinate its choice of frequencies, azimuths and elevation angles, and have those included in its license without construction deadlines, on a showing that the earth station in question will be operated as part of an overall network with a need to access multiple satellites, including possible satellites not yet identified at the time of coordination and licensing.

E. PRIOR PROCEEDING

The FWCC made a similar request once before. This one differs in important ways.

In 1999 we filed a Request for Declaratory Ruling and Petition for Rule Making that asked the Commission to (1) limit an FSS earth station's frequency coordination to twice the amount of spectrum for which the applicant has demonstrated actual need; (2) require an FSS earth station licensed for significant amounts of shared spectrum to load to 50% of licensed bandwidth within 30 months after licensing; and (3) require earth stations that accept cases of potential interference to extend the same modified interference objective to later-coordinated

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18 This provision tracks 47 C.F.R. § 101.103(d)(2)(xii) ("Any frequency reserved by a licensee for future use in the bands subject to this part must be released for use by another licensee, permittee or applicant upon a showing by the latter that it requires an additional frequency and cannot coordinate one that is not reserved for future use.")

19 "[F]iling an application in and of itself is sufficient to show that the applicant requires an additional frequency ...." *Declaratory Ruling on Microwave Frequency Coordination*, Public Notice, 30 FCC Rcd 355 at 7 (Wireless Telecom. Bur. & Public Safety and Homeland Sec. Bur. 2015), *citing Geodesic Networks, LLC*, Memorandum Opinion and Order and Order on Reconsideration, 29 FCC Rcd 10429 at ¶ 16 (Wireless Telecom. Bur. 2014) ("If one party is willing to file an application and start the clock ticking on the construction requirement, and another party has not, then the former has shown a greater need for the frequency.")

20 47 C.F.R. § 101.63(a).

terrestrial facilities.[21] There was no mention of growth capacity. In a subsequent pleading, the FWCC offered a liberal construction of "actual need" to address cases in which an earth station must access multiple and changing satellites, where the satellite or frequency are under control of the space segment provider, and in other special situations.[22]

Satellite interests opposed.

The Commission released a Notice of Proposed Rulemaking that outlined a different plan. FSS earth stations would still be coordinated for the entire allocated band and the entire geostationary arc. However, if an FSS earth station in C- or Ku-band shared spectrum, having been licensed for 24 months or longer, denied coordination to an FS applicant, the earth station would have to show it was using, had recently used, or had imminent plans to use the requested spectrum; otherwise the FS applicant could coordinate. The NPRM proposed criteria for each of the past, present, and future showings. It further proposed that disputes could be taken to the Commission for review.[23]

The satellite industry opposed. The FWCC opposed as well, on the ground that any dispute over denial of coordination would arise at the worst possible time: when the FS station is attempting to file an application and commence operations.[24] Protracted disputes would have had much the same effect as outright denial of coordination under the present rules.

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21 Request for Declaratory Ruling and Petition for Rule Making of the Fixed Wireless Communications Coalition, RM-9649 (filed May 5, 1999).

22 Reply comments of the Fixed Wireless Communications Coalition, RM-9649 at 10-14 (filed July 27, 1999).

23 *FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations*, Notice of Proposed Rulemaking, 15 FCC Rcd 23127 at ¶ 53 (2000) (*2000 NPRM*). Earth stations licensed for 40 MHz or less of bandwidth in each direction would have been exempt.

24 Comments of the Fixed Wireless Communications Coalition in IB Docket No. 00-203 at 8-9 (filed Jan. 8, 2001).

The FWCC offered a counterproposal: an earth station could be initially licensed for twice the spectrum for which it claimed "projected need" at the end of two years, with no documentation other than the applicant's signature. After two years, the earth station would have had to modify its license to reduce the bandwidth to twice its then-actual need, liberally construed.[25]

The satellite industry opposed this as well.

Finding no consistent support for any one proposal and an inadequate record overall, the Commission terminated the proceeding without action.[26] The Commission closed by saying:

> [A]s always, we are open to new proposals or approaches that could effectively address concerns that have been raised regarding the equitable sharing of the spectrum. We, therefore, do not foreclose the possibility that changes to our rules could improve the sharing environment and licensing processes for both the FS and FSS services.[27]

We here take up the Commission's offer.

F. DISCUSSION

The present proposal differs from the 1999 request in these respects:

- We propose here that earth stations coordinate only the spectrum they plan to use, not twice that; and instead suggest that earth stations be allowed to accommodate their possible future needs by coordinating unlimited growth capacity.
- We propose a waiver mechanism for earth stations that must access multiple or changing satellites.
- We do not request a loading requirement for earth stations, as we did in 1999, nor do we ask that earth stations modify their interference objectives in light of past acceptance of interference cases.

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25 *Id.* at 10-11.

26 *FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations*, Second Report and Order, 17 FCC Rcd 2002 (2002).

27 *Id.* at ¶ 13.

Our proposal for growth capacity in some respects resembles the proposal in the Commission's *2000 NPRM*, under which an earth station denying coordination to an FS applicant would have had to show it was using, had recently used, or would soon use the spectrum. But there is an important difference. The *2000 NPRM* raised multiple questions on the meaning of past, present, and future spectrum "use" by an earth station and the showings required to establish it; and it contemplated Commission review to resolve disputes.[28] We foresaw at least some FS coordination attempts becoming contentious and time-consuming, at a point in the process when the FS operator typically had a customer who urgently needed to get on the air.

The concept of growth capacity is far simpler to implement, thanks in part to last year's Wireless Telecommunications Bureau holding that the filing of an FS application is sufficient to show need for another FS licensee's growth channel.[29] The concept should apply equally well in an FS/FSS context, and thereby eliminate the disputes and delays that we fear would have followed adoption of the Commission's *2000 NPRM* proposals.

CONCLUSION

The routine practice of full-band, full arc earth station coordination might have made sense fifty years ago. At that time, when spectrum was plentiful, full-band, full arc coordination offered earth stations flexibility to meet their future needs without any significant downside. Today, when spectrum suitable for long-haul microwave links is in desperately short supply, it no longer makes sense to lock away large blocks on the principle that an earth station might need

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28 *2000 NPRM* at ¶ 54.

29 *Declaratory Ruling on Microwave Frequency Coordination*, Public Notice, 30 FCC Rcd 355 at 7 (Wireless Telecom. Bur. & Public Safety and Homeland Sec. Bur. 2015).

it someday—when FS operators need it now. Our proposal offers a reasonable balance between maintaining earth station flexibility and meeting FS operators' immediate needs.

Respectfully submitted,

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