Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Procedures to Govern the Use of Satellite	)	IB Docket No. 02-10
Earth Stations on Board Vessels in Bands	)	
Shared with Terrestrial Fixed Services	)	

To: The Commission

Comments of the Fixed Wireless Communications Coalition

Mitchell Lazarus
Liliana E. Ward
Fletcher, Heald & Hildreth, PLC
1300 N. 17th ST., 11th Floor
Arlington, VA 22209
703-812-0400

May 10, 2002

TABLE OF CONTENTS.

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in Bands Shared with Terrestrial Fixed Services	)	IB Docket No. 02-10

To: The Commission

Comments of the Fixed Wireless Communications Coalition

The Fixed Wireless Communications Coalition ("FWCC") submits these Comments in response to the Notice of Inquiry in the above-captioned proceeding .[1]

The FWCC is a coalition that includes trade associations whose members operate stations in the Fixed Service ("FS"); manufacturers of FS equipment; frequency coordinators; and others with an interest in regulatory issues affecting FS frequencies. Many FWCC members operate FS links in port cities and coastal locations using the frequencies 5925-6425 MHz ("6 GHz band") shared with the Fixed Satellite Service ("FSS"). These include state and local law enforcement agencies; electric, gas and water utilities; railroads; pipeline and petroleum exploration companies; and providers of Commercial Mobile Radio Services ("CMRS"). Their 6 GHz links, used for both voice and data communications, support such applications as interconnecting mobile radio base stations used for dispatching vehicles (police cars, locomotives, emergency repair crews,

---

[1] *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels*, IB Docket No. 02-10, Notice of Inquiry, FCC 02-18 (released Feb. 4, 2002). *See also* Order Extending Comment Period, DA 02-806 (released April 9, 2002) (extending comment and reply dates to May 10, 2002, and June 10, 2002, respectively).

etc.); remote control of railroad switches and signals, pipeline valves, and electric utility circuit breakers; and carrying backhaul traffic on cellular and PCS systems.

Summary

The FWCC urges the Commission to bar earth stations on vessels ("ESVs") from operating while in motion in the 6 GHz band at locations close to U.S. coasts. In the alternative, however, if such operations must be permitted, the Commission should adopt a rigorous regulatory regime and require that it be followed scrupulously. This regime should have three goals: preventing interference in advance; identifying the source and quickly eliminating any interference that does occur; and preserving the availability of the 6 GHz band for future FS growth.

Introduction

FWCC members are concerned about potential interference into terrestrial FS receivers from ESVs operating in the shared 6 GHz band. This band is extremely important for terrestrial FS use, not only for existing applications, but for future growth as well. The Commission identified this band as the primary relocation band for FS licensees who were displaced by PCS licensees in the 1.9 GHz band, and who will be displaced in the future by Mobile Satellite Service operators (or possibly "3G" PCS licensees) in the 2.1 GHz band.[2] As it evaluates possible future ESV use of the 6 GHz band, the Commission should consider not only the prevention of interference to terrestrial FS users,

[2] *See Redevelopment of Spectrum*, 8 FCC Rcd 6495, 6506 (1993) (Second Report and Order in ET Docket No. 92-9); *Creating New Technology Bands for Emerging Technology*, OET Publication TS 92-1 (released January, 1992).

but also the future availability of the band for migration and relocation from the 1.9 GHz and 2.1 GHz bands.

As a general rule, sharing of the 6 GHz band by FS users among themselves is successful because of prior frequency coordination based on the geography of the respective systems. The same is true of sharing the band between terrestrial FS users, on the one hand, and FSS earth stations, on the other.[3] In both FS-FS and FS-FSS sharing scenarios, the potential interfering station is located in a fixed position at a known location. This certainty enables licensees, frequency coordinators, equipment manufacturers, and system designers to rely on geographic and spectral separation to achieve efficient use of the band for both FSS and FS use, and to minimize the likelihood of interference. In the event interference does occur, notwithstanding prior coordination, it is a relatively easy matter to pinpoint the interfering source.

All of this changes with the introduction of an in-motion transmitter, such as an ESV. The task of prior coordination becomes much more difficult, given that the ESV's path may not be predictable. Worse, if interference does occur, the transient nature of the moving vessel makes the task of tracking down and confirming the source almost impossible. An ESV could cause interference sufficient to disrupt a vital FS communications link, only to move on and never be traceable as the source of the interference. Indeed, the Commission's first authorization of ESV operations recognized that "the mobile nature of [ESV] stations makes it extremely difficult to prevent harmful

[3] Sharing between FS and FSS users is subject to other problems, however, as discussed in IB Docket No. 00-203, *FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations*.

interference and to identify the interference source."[4] As one example, the FWCC does not yet know of a resolution to its complaint lodged over a year ago alleging ESV interference to FS operations.[5]

[4] *Crescomm Transmission Services, Inc*., 11 FCC Rcd 10944 at para. 11 (IB and OET, 1996).

[5] *See* NOI at note 42. The FWCC has since become aware of another possible incident of ESV interference to FS communications, this one involving a link operated by Verizon Wireless in the vicinity of Newport News, VA. One end of this 12.6-mile link is at 37-12-41.9 N and 76-34-53 W (the "Lee Hall" site), transmitting on 6226.89 MHz with space diversity receive antennas at 175/145 ft. AGL. The other end is at 37-22-51.2 N and 76-29-30.7 W (the "Gloucester" site); transmitting on 5974.85 MHz, with space diversity receive antennas at 170/135 ft AGL. The radio is by Tadiran Microwave Networks, Model CM6HC/3DS3, using a 30 MHz RF channel. The link was installed in mid-November 2000. In the summer of 2001, traffic outages began to occur, and the manufacturer was called in to investigate. During a several-month period, alarms were observed in the Lee Hall radio indicating sudden onset of high bit-errors. Monitoring of the link by the manufacturer established that fading activity during the period was completely uncorrelated in time with the traffic-affecting events, and thorough evaluation of the equipment disclosed no hardware malfunctions. The problem occurred on both diversity antennas at the Lee Hall site; that is, when the outages occurred, the link automatically switched to the other antenna, but the problem persisted. The source of the interference could not be identified because of the intermittent nature of the outages. Finally, when all other trouble-shooting techniques were exhausted, the manufacturer recommended that the licensee swap frequencies end-for-end between the two sites. The swap was coordinated, approved, and implemented, and the outages stopped. This fact pattern supports the inference that the outages were being caused by intermittent transmissions in the direction of the Lee Hall site on the same frequency as the original (pre-swap) receive frequency at that location. The proximity to Newport News strongly suggests the possibility of a nearby vessel equipped with an ESV station.

Discussion

A. No ESV In-Motion Operation near U.S. Coasts Should Be Allowed

1. "Normal" licensing of ESVs is contrary to the Commission's Rules.

The Commission asks whether it can undertake "normal licensing procedures" for ESVs (as distinct from authorizing ESVs on a waiver and STA basis, as in the past).[6]

As long as ESVs constitute a non-conforming use under the ITU and/or FCC Tables of Allocations, the Commission has no choice but to continue authorizing them on the basis of STAs, developmental authorizations, or experimental grants. The 6 GHz band is allocated only for FSS and FS use in the international and U.S. allocation table.[7] The definitional framework for those services and their associated stations contemplates that FS and FSS stations be situated at fixed locations. In contrast, an ESV (except possibly when stationary at dockside, where it is classified as "temporary fixed"[8]) is a moving station, not a fixed station, and therefore does not conform to the definitional requirements of either the ITU or the FCC. [9]

Unless and until the Table of Allocations and definitions are amended to allow a mobile earth station to operate on frequencies allocated to the FS and FSS, the

---

[6] NOI at para. 14.

[7] *See* ITU Radio Regulations, Article S5, and Sections 2.102(a) and 2.106 of the Commission's Rules.

[8] NOI at para. 9.

[9] *See ITU Radio Regulations*, RR S1.20 ("fixed service"), S1.21 ("fixed satellite service"), S1.66 ("fixed station"), and S.1.70 ("land earth station"); and Section 2.1 of the Commission's rules.

Commission's Rules provide only four means of authorizing ESVs, none of which applies to ESV operations as presently conducted. Specifically, Section 2.102(a) requires that all licensing conform to the Table of Frequency Allocations in Section 2.106; and Section 1.102(b) sets out four exceptions: the Commission may authorize the use of frequencies in a manner that does not conform to the Table of Allocations on the condition that no harmful interference be caused to conforming stations (1) on a temporary basis for projects of short duration or emergencies; (2) for developmental purposes; (3) for experimental stations pursuant to Part 5 of the rules; or (4) when a band has been reallocated so as to delete its availability for use by a particular service.

None of these exceptions fits the current pattern of ESV operations. The website of Maritime Telecommunications Network ("MTN"), the principal provider of ESV services, reports that ESV operations have been functioning commercially since the early 1990s; in 1999 the company was sold for over $100 million dollars; and by the year 2000, MTN was providing ESV service to over 90 cruise ships and numerous U.S. Navy vessels.[10] This is hardly an "experiment," a "developmental program," or an "emergency" as defined in Section 2.102(b) of the rules, and it is certainly not a "temporary" operation!

2. The Commission should require ESV use of Ku-Band in coastal waters.

The FWCC urges the Commission to require ESV use of Ku-band frequencies in coastal areas, and to limit ESV use of the 6 GHz band to the high seas, out of interference

[10] See, "The History of Maritime Telecommunications Network" at http://www.mtnsat.com/history.htm.

range of coastal FS receivers. [11] The Commission correctly observes that, as ESVs come nearer to the coast, "the potential for interference to FS operations increases, necessitating coordination of ESV use with FS operations so as not to cause interference."[12] A dual-band operation, in which ESVs use the 6 GHz band at sea with a requirement for automatic cut-over to Ku-band when the vessel comes within a predetermined distance from shore, would protect shore-based 6 GHz FS operations from interference while, at the same time, eliminating an expensive coordination burden that otherwise would fall on both FS licensees and ESV operators. By its own account, MTN offers dual-band technology and claims that its "2.7 meter dual feed, C & Ku-band antenna" can handle "continuous full-duplex, simultaneous transmit/receive at both C- and Ku- band frequencies."[13]

3. Classification of ESVs for licensure

The Commission asks whether it should license ESVs as a special restricted class of earth station under Part 25 of its rules.[14] In response, FWCC reiterates its observation, *supra*, that ESV stations are inherently mobile in nature and therefore do not conform to the definition of earth stations intended to operate with FSS satellite networks. Imposing "restrictions" as suggested at paragraph 21 would not cure this fundamental non-

---

[11] See NOI at paras. 18-20.

[12] NOI at para. 18.

[13] *See* MTN's Website at http://www.mtnsat.com/navy.htm.

[14] *See* NOI at para. 21.

conformity. As to dockside operations, FWCC agrees with the decision of the International Bureau that these are properly classified as "Temporary-Fixed" services.[15]

4. A non-interference condition should be mandatory.

The Commission asks whether the current condition of the ESV STAs regarding non-interference should be continued if ESVs are "licensed."[16] Again, FWCC reiterates that "licensing" of an ESV in a band allocated to FS and FSS is not permissible under the Commission's own rules, unless the Table of Allocations is first amended to allow the use of a mobile earth station in a fixed frequency band. Absent such amendment, any authorization of a non-conforming use must be pursuant to Section 2.102 (b), which establishes a non-interference condition (presumably patterned after ITR Radio Regulation No. S4.4) as a prerequisite to any authorization. Only if the ITU and the FCC were to amend the Table of Allocations to "legalize" ESV operations in the 6 GHz band would it be permissible for the Commission, under its own rules, to "license" ESVs. But even in that event, given the high potential for interference from ESVs, the Commission should include the non-interference condition in any ESV license.

---

15 NOI at note 30.

16 NOI at para. 22.

B. The Commission Must Adopt Safeguards and Conditions Against Interference.

1. The Commission should impose interference-protection measures on U.S. licensees of FSS earth station gateway facilities.

If the Commission continues authorizing ESV operations in the 6 GHz band, it should impose certain conditions to protect FS receivers from interference. One possible safeguard suggested by the Commission is to impose obligations on U.S. licensees of FSS earth station gateway facilities used by ESVs.[17] FWCC wholeheartedly supports this suggestion. Because many ESVs will be (and are) installed on ships of foreign registry and are therefore beyond the FCC's licensing jurisdiction, restrictions and conditions on the U.S. gateway operator are essential for meaningful enforcement of the Commission's interference-prevention regime.

2. Foreign-flagged vessels must be subject to bi-lateral agreement.

In addition to attaching certain conditions (specified below) to authorizations for individual 6 GHz ESV stations on U.S.-registered ships, and to licenses for FSS gateway earth stations used for communicating with ESVs, the FWCC urges the Commission to prohibit 6 GHz ESV stations installed on foreign-flagged vessels from transmitting within interference range of U.S. coastlines unless the nation of registry has first entered into a bilateral agreement with the United States, as described here.

---

[17] NOI at para. 22.

3. Recommended conditions on ESV operation

The following conditions should apply to ESV authorizations, gateway earth station licenses for ESV networks, and bilateral agreement for use of 6 GHz ESVs within interference range of U.S. coasts:

- Antenna specifications, including a minimum antenna elevation angle coordinated to a specific satellite, minimum antenna diameter and maximum half-power antenna beamwidth, and antenna tracking accuracy;[18]

- Specification of minimum amount of spectrum needed for the applicable service, and limits on the maximum ESV transmitter power;[19]

- Maintenance by the ESV gateway operator of a web-accessible list of all ESV stations connected to its network, including a list of all frequencies cleared for use by each ESV station, and the name and country of registry of each ESV vessel;[20]

- Prior coordination (discussed further below), tied to a specific satellite (or satellites) and limited to the specific bandwidth required; and

- Installation on each ESV station of an automatic means of terminating transmissions whenever the vessel travels outside its predetermined geographic operating area (*i.e.*, its "coordination area") or in the event the station operates at variance from the required technical parameters (*e.g.*, operating frequency and speed of the vessel).[21]

Even assuming that all of the coordination details and agreements can be

---

18 *See* NOI at para. 24.

19 *Id*.

20 *See* NOI at paras. 30-31.

21 NOI at para. 31.

determined and agreed upon, an automatic means for terminating transmissions remains essential. Operators of the ship are not likely to be actively aware of the coordination conditions allowing operation in the vicinity of fixed stations on land; and the gateway station operator cannot realistically monitor the details of 90 cruise ships and numerous U.S. Navy vessels to ensure that all the conditions of the coordination are met. Moreover, when a vessel changes its operating route months or years later, the potential need for recoordination will not always be apparent.

In addition to the conditions set out above, the Commission should restrict the licensee of an FSS gateway earth station from communicating with any ESV station that is not either authorized by the FCC or, in the case of a vessel under the jurisdiction of a foreign country, the subject of a bilateral agreement between the U.S. and the country of registry.

4. Distance requirement should be 300 km.

The Commission observed that a distance of 200 km might be the appropriate distance from shore beyond which unacceptable interference to a 6 GHz FS receiver should not be possible, and within which prior coordination should be required.[22] The FWCC disagrees. Typically the coordination distance used when implementing a C-band earth station varies with power, horizon gain, and radio climate. Earth station sites located on the coast generally require a coordination contour greater than 200 km, often approaching 300 km. ESV coordination will require maximum distances for two reasons. First, the terrain separating a seafaring vessel from an FS receiver on or near a coastline is

[22] NOI at para. 26.

ocean surface, which exhibits far better radio propagation than land surfaces. Second, the FSS earth station example involves a single transmit station at a fixed point as the potential interferor, while multiple ESV vessels could contribute to interference affecting coastal FS receivers. For these reasons, FWCC urges the Commission to adopt distance that has been agreed upon by ITU-R Working Party 4-9S, namely, 300 km for the 6 GHz band.[23]

5. The "Composite Area" method of determining interference is acceptable.

The FWCC has no objection to the "Composite Area" method, being addressed within the ITU-R as a draft new recommendation, for determining the interference potential from an in-motion 6 GHz ESV station operating closer than 300 km to the U.S. shore.[24] This procedure would identify the mandatory operating contour of the vessel — *i.e.*, the operating areas that do not trigger an automatic shut-down, as discussed above — to determine the area within which coordination is a pre-condition to operation.

6. License terms for ESVs should be short.

The FWCC agrees the license terms for ESVs, the duration of STAs, and the terms of bilateral agreements for ESVs on foreign-flagged vessels should all be relatively short, for two reasons.[25] First, the recurring need for renewal would provide an incentive for ESV operators to cooperate in the resolution and prevention of interference. Second, a

---

[23] *See* NOI at note 36.

[24] *See* NOI at paras. 27-29.

[25] *See* NOI at para. 32.

short license term would prevent ESV operators from "tying up" the band for long periods of time. As noted earlier, the 6 GHz band is extremely important for future FS use, not only for normal growth, but also as the primary "relocation" band previously identified by the Commission for FS facilities that will be displaced from 2.1 GHz. Short terms on ESV authorizations will ensure that the band will be available for future FS use, rather than be precluded by long-term ESV commitments.

C. ITU-R Working Party 4-9S Meeting Report

Finally, in its Order Extending the Comment Period in this proceeding, the Commission invited parties to comment on the results of the recent ITU-R Working Party 4-9S meeting in Geneva from April 17-25, 2002. FWCC has reviewed the draft text of the report of the Conference Preparatory Meeting ("CPM") produced at the April meeting and, in particular, has evaluated the alternative formulation of provisions for protecting FS links from ESV interference. In this regard, FWCC prefers the three example footnotes to the Table of Allocations designated in Annex 1 of the draft CPM text as 5.ESV-FSS1, 5.ESV-FSS3, and 5.ESV-MMSS1, all of which would require mandatory compliance by ESVs (i.e., operation or use of ESVs "*shall* be in accordance . . .") with the requirements of example "Resolution XXX (Annex 2)."

Conclusion

First and foremost, the FWCC urges the Commission to abandon altogether any further authorization of ESV operations in the 6 GHz band for in-motion activity within 300 km of U.S. shores, and to require that all ESV operations be conducted in dual-band

mode, using C-band on the high seas and Ku-band close to U.S. shores. If the Commission finds it necessary to continue authorizing close-to-shore in-motion ESV operations in the 6 GHz band, it should do so subject to the conditions and restrictions described above.

Respectfully submitted,

FIXED WIRELESS COMMUNICATIONS COALITION

By: Mitchell Lazarus
Liliana E. Ward
Fletcher, Heald & Hildreth, PLC
1300 N. 17th ST., 11th Floor
Arlington, VA 22209
703-812-0400

May 10, 2002

SERVICE LIST

Chairman Michael K. Powell
Federal Communications Commission
445 12th Street, SW Room 8 B201
Washington, D.C. 20554

Commissioner Kathleen Q. Abernathy
Federal Communications Commission
445 12th Street, SW Room 8 B115
Washington, D.C. 20554

Commissioner Michael Copps
Federal Communications Commission
445 12th Street, SW Room 8 A302
Washington, D.C. 20554

Commissioner Kevin J. Martin
Federal Communications Commission
445 12th Street, SW Room 8 A204
Washington, D.C. 20554

Jim Ball, Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Breck Blalock, Deputy Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Ronald T. Repasi
Engineer
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Trey Hanbury
Special Counsel
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Paul Locke
Engineer
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554