

BEFORE THE
Federal Communications Commission
WASHINGTON, D.C.

In the Matter of)
)
The Establishment of Policies and Service Rules for)
the Broadcasting-Satellite Service at the 17.3-17.7)
GHz Frequency Band and at the 17.7-17.8 GHz)
Frequency Band Internationally, and at the 24.75-) IB Docket No. 06-123
25.25 GHz Frequency Band for Fixed Satellite)
Services Providing Feeder Links to the)
Broadcasting-Satellite Service and for the Satellite)
Services Operating Bi-directionally in the 17.3-17.8)
GHz Frequency Band)

COMMENTS OF FIBERTOWER CORPORATION

FiberTower Corporation (“FiberTower”), by its attorneys and pursuant to Sections 1.415 and 1.419 of the Commission’s Rules, 47 C.F.R §§ 1.415, 1.419, hereby files comments on the Notice of Proposed Rulemaking in the above captioned proceeding,¹ which specifically seeks to promote “prompt commencement” of the 17/24 GHz Broadcasting Satellite Service (“BSS”). BSS is intended to introduce a new generation of broadband services to residential and business subscribers in the United States. FiberTower supports the general goal of more intensive use of spectrum. It also supports the Commission’s specific goal of commencement of BSS operations and, in accordance with paragraphs 91-92 of the NPRM, is prepared to contribute to efforts to

¹ See *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, Notice of Proposed Rulemaking, IB Docket No. 06-123, FCC 06-90 (rel. June 23, 2006) (“NPRM”).

resolve the questions regarding technical requirements for inter-service operations and sharing in the 24 GHz band.² It is important to understand at the outset, however, that since the technical data and assumptions presently before the Commission for both BSS and FS operations are outdated, reliable answers concerning band sharing criteria will only become available following the substantial expenditure of time and resources devoted to that end. This inevitably creates tension with any specific goal of prompt commencement of BSS. As described below, the best path to this goal involves locating BSS feeder-link stations sufficiently beyond the boundaries of terrestrial FS licensed areas, but its success is doubtful otherwise.

I. INTRODUCTION AND SUMMARY

FiberTower is a leader in delivering wireless backhaul³ and access⁴ services to mobile carriers and the enterprise and government markets. FiberTower's extensive 24 GHz spectrum assets (at 24.25-24.45 GHz and 25.05-25.25 GHz) in 77 markets covers nearly ninety percent of the U.S. population in the top 100 markets, but only about ten percent of the U.S. geography. When combined with its 39 GHz footprint that covers 99 percent of the U.S. population, FiberTower is very well positioned to provide high capacity connectivity to the vast majority of

² See *NPRM* at ¶¶ 91-93.

³ "Wireless backhaul" connects cell sites to a fiber backbone or back to the switch site through the use of wireless transport and hub sites. Radios are placed at the cell site and at the hub site, allowing the backhaul provider to wirelessly transmit backhaul traffic between these two points.

⁴ "Wireless access" provides high speed voice and data transport between two or more customer locations, or between a hub and a customer location. It can be utilized in many different network topologies, from basic point-to-point networking, to more advanced tree, chain, ring or mesh configurations.

cell sites and office buildings that may not have access to fiber, or are seeking a wireless redundancy solution.⁵

The availability of reliable wireless backhaul and access services is increasingly becoming an operational imperative in a number of high-growth areas, for example:

- *Mobile Carrier Migration to 3G:* As mobile carriers transition to 3G, the additional data transmitted is expected to quadruple by 2010. Wireless backhaul provides the capacity and reliability to enable this migration in a cost-efficient way.
- *Enterprise and Government Adoption of Wide Area, Carrier Ethernet:* Carrier Ethernet service demand is expected to jump 10 times by 2010, becoming ubiquitous in both the WAN and the LAN environments. Wireless Carrier Ethernet reaches the vast majority of enterprises and government agencies that cannot get access to high capacity connectivity.
- *Government Mandate for Diverse and Redundant Connectivity:* Federal government requirements for government offices to have physically diverse networks have recently been instituted.⁶ Wireless backhaul provides redundancy without the need for additional wired installations.
- *Proliferation of WiFi and WiMax Networks:* Due to the expanding use of these high-bandwidth options, wireless backhaul of WiFi/WiMax networks is expected to grow from \$1 million in 2005 to nearly \$130 million in 2009.

This connectivity advances a number of important Commission goals, including ensuring the availability of, and access to, reliable broadband services, and supporting broadband competition as wireless broadband services are increasingly viewed as substitutes for traditional wired networks. Based on these benefits and the considerable investment that terrestrial wireless fixed service (“FS”) operators have made to bring these important services to the marketplace, the Commission should approach the BSS and licensing issues affecting FS providers in the 24 GHz band with an appropriate degree of caution.

⁵ Studies show that less than 6% of cell sites and 15% of enterprises in the US have access to fiber. Because of this, the vast majority of mobile backhaul networks, enterprises and government agencies have been "un-served" in terms of high capacity connectivity.

⁶ See Public Law 108-447, Section 414; see generally Randolph J. May, *Preventing a Communications Blackout: The Need for Telecom Redundancy*, The Progress & Freedom Foundation (Release 10.24, Dec. 2003).

In the interest of providing sufficient protection to the hub and user stations of 24 GHz FS systems once BSS operations begin in the band, the Commission seeks comment on (1) whether the existing power limits for satellite earth stations in bands shared co-equally with terrestrial radiocommunications services are at the appropriate level, and (2) whether the antenna pattern requirements applicable to BSS feeder-link stations should be modified in any way to relieve the coordination burden on either or both services.⁷ It is difficult to respond to these requests in part because the record is quite incomplete. The characteristics of the proposed BSS feeder links and the BSS system are not well defined, and the FS operations in the 25.05-25.25 GHz band are licensed on an area basis and recent developments concerning available equipment and architectures add substantial complexity and numerous variables. Accordingly, in order to actually understand the technical interference issues raised by the prospect of BSS uplink operations geographically collocated *within or near the same area occupied by FS wide-area licenses*, significant information is needed, including, but not limited to:

- Introduction into the record in this proceeding of all filings at the Commission by the BSS community (license applications, technical proposals, technical ex parte materials, deployment architectures, etc.).
- Specification sheets (i.e., “spec sheets”) detailing the precise BSS uplink equipment proposed for use.

Also, numerous questions need answering, including, but not limited to:

- Is it accurate that all the proposed and envisioned systems are geosynchronous orbit (GSO) systems? Are non-geosynchronous orbit (NGSO) systems to be accommodated?
- Are BSS uplinks proposed for operation at angles that cross over FS license areas? At what angle(s), power(s) and frequencies? Is automated power control placed into these designs?

⁷ See NPRM at ¶ 92.

- Are BSS mitigation techniques like shielding and earth berms in the proposed uplink designs?
- Where are uplinks proposed for operation? How many? What is the proposed deployment schedule?

The only procedures for frequency coordination with an area-licensed service are those that can be inferred from Section 1.4.5 of Appendix 7 of the international Radio Regulations or from Section 1.4.9 of Annex 1 to Recommendation ITU-R SM.1448. These contain similar language that “for fixed earth stations that operate at unspecified locations within a service area defined by the administration, the coordination area is determined by extending the periphery of this service area by the maximum coordination distance.” Since the reverse situation applies in the 24 GHz band, the implication is that sharing should be implemented on the basis of geographic segmentation. That is, the area of operation of the FS in the 24 GHz band should be protected on this basis.⁸

If this straightforward, prophylactic approach is not used, things become a great deal more complicated. For example, in order to assess what operational restrictions should be applied to BSS systems and to the BSS feeder-link stations, a number of the characteristics and basic operational parameters of these systems and stations would need to be specified. Although all systems filed with the Commission evidently use GSO satellites, it is not clear whether or not all future systems in the 17/24 GHz band would also use GSO satellites or might also use any of the various types of non-GSO satellites.

⁸ Although the procedures of Recommendation ITU-R SF.1707 could be applied, they are only relevant when the other service (the BSS feeder links at 25 GHz) is not intensively used. As discussed in the following text, the potentially large coordination areas that are possible with some of the proposals in this NPRM, the use of the 25 GHz band by the BSS would not qualify unless significant operational restrictions were applied to the transmitting earth stations.

Further, the e.i.r.p. limits that apply to the BSS feeder-link earth stations are also a matter of great concern to the FS. The limits of § 25.204(b) of the Commission rules seem to be excessively permissive, and have not been revisited to take into account present-day equipment and system architecture developments. The implementation of earth stations operating near these limits would require that they be located at distances beyond the radio horizon from the FS operating area. These separation distances would typically exceed 100 miles. The need for such high levels of e.i.r.p. towards the horizon is not obvious. The FS operates its communication links within an e.i.r.p. limit of 55 dBW per transmitter in most frequency bands. This is a significantly lower level of e.i.r.p. than the value of 64 dBW per MHz permitted under § 25.204(b). The e.i.r.p. toward FS receivers could be reduced significantly by requiring the use of sufficiently large antennas and/or by limiting the minimum elevation angle of the main beam of the earth station antenna. At the same time, the gain pattern should continue to satisfy the requirements of the Commission,⁹ or preferably, those given in Appendix 7 of the Radio Regulations.¹⁰ The use of large antennas would be consistent with our perspective that the number of these earth stations needed to provide service in the 17/24 GHz band in the U.S. would be small, perhaps one or two per system or as many as five in the country. Requiring larger earth station antennas would increase their cost but could greatly simplify the coordination, which would be an advantage for both the FS and the BSS. It would be useful if the Commission could determine from the proposed users of the BSS allocation the numbers of earth stations that they anticipate building both initially and in the future.

⁹ See 47 C.F.R. § 25.209(b).

¹⁰ See Section 3 of Annex 3 to RR Appendix 7.

In developing the rules for the implementation of 17/24 GHz BSS operation, the Commission may wish to refer to the limits imposed on earth station on vessel operations as a framework for limiting the e.i.r.p. of the potential source of interference into the FS.¹¹ In developing the e.i.r.p. limits on the BSS transmitters, the Commission should clearly define whether the limits are intended to be limits on the “clear air” emissions or the maximum emissions that are employed in the presence of heavy precipitation. Because the correlation of rain attenuation on the earth-space path with rain attenuation on any particular FS link is not well understood, this is a matter of critical importance to the FS.

FiberTower respectfully finds a substantial portion of foregoing efforts unnecessary. As detailed below, a readily available solution exists.

II. PROHIBITING BSS FEEDER-LINK STATION FROM OPERATING WITHIN 100 MILES OF 24 GHZ TERRESTRIAL FS LICENSED AREAS IS A REASONABLE AND COST-EFFECTIVE WAY TO AVOID INTERFERENCE AND IS NECESSARY TO ENSURE PROMPT COMMENCEMENT OF BSS

In the NPRM, the Commission asks whether existing power limits for satellite earth stations¹² and the antenna pattern requirements that apply to BSS feeder-link stations¹³ require revision, either to strengthen or relax the restrictions placed on the BSS.¹⁴ The Commission also asks whether the existing coordination mechanism for minimizing interference between satellite earth stations and FS stations, in bands where both services share equal rights, is adequate.¹⁵ The

¹¹ See 47 C.F.R. § 25.204(h).

¹² See *id.* at § 25.204.

¹³ See *id.* at § 25.209.

¹⁴ See NPRM at ¶ 92.

¹⁵ See 47 C.F.R. § 25.203.

tests and analyses necessary to answer these questions will be very time consuming and costly. Furthermore, the ongoing costs of complying with coordination procedures, once technical issues are sufficiently understood, would be substantial. This is a function of the nature of FS licenses. The very essence of the area-wide license concept is to permit providers to continuously optimize their networks in response to changes in technology and demand. Thus, when a provider's service footprint changes, which predictably it often will, time consuming and costly coordination procedures would be required unless an interim solution designed to avoid these complications is straightforward — simply require that BSS feeder-links be located at least 100 miles outside of 24 GHz terrestrial FS licensed areas.

Given the very limited geographic coverage areas of existing 24 GHz FS licenses, and the modest number of BSS feeder-link stations that will be necessary for the provision of BSS, it is perfectly feasible for these BSS feeder-links to be placed in more remote locations, at least 100 miles from the periphery of existing FS license areas. This approach not only obviates the need for immediate and extensive co-location testing and co-location interference analyses, it also postpones coordination costs that are certain to arise in any spectrum sharing environment.

Should the Commission allow BSS up-link stations to be located within FS licensed areas, great care should be taken in setting forth detailed and dependable service and technical rules to ensure that interference is avoided. Furthermore, despite the co-primary status of FS and BSS operators in the 24 GHz band, the Commission should adhere to its policy of limiting the disruption to existing licensees when bands become shared, and avoid diminishing the considerable investment in facilities, customer contracting, and deployment planning that incumbent FS providers have already made. FS providers in wide-area bands often engage in

detailed contracts to deploy services over large geographic areas on deployment schedules that involve detailed, staged deployment timelines and significant upfront resource planning.

Thus, the suggested approach for deploying BSS outside the FS license areas is fully consistent with the Commission's rules regarding the choice of sites for earth stations operating in frequency bands shared with equal rights between terrestrial and space services. Specifically, § 25.203(a) requires that such sites "shall be selected, to the extent practicable, in areas where the surrounding terrain and existing frequency usage are such as to minimize the possibility of harmful interference between the shared services."¹⁶ Applying the fundamental goal of this rule in earnest, it would be more than reasonable for the Commission to require that BSS feeder-link station be placed 100 miles outside of FS terrestrial licensed areas.

Considering that between eighty to ninety percent the U.S. geography is unlicensed for terrestrial FS operations, the burden upon BSS licensees by requiring, initially, a limited number of necessary BSS feeder-links be located well outside of FS licensed areas is minimal compared to the significant time and expense ultimately required of both FS and BSS operators alike to establish comprehensive sharing criteria and then to comply with ongoing coordination obligations.

In addition to specifying minimum distance restrictions on the location of BSS feeder-links, it may be appropriate for the Commission to also initially limit the number of allowable BSS feeder-links nationally to less than five, at least until mutually acceptable analyses and supporting data are available to affirmatively show that additional BSS feeder-links are actually necessary and that they can be operated in greater numbers without causing interference to FS

¹⁶ 47 C.F.R. § 25.203(a).

providers in existing license areas. Then, if the Commission determines that additional flexibility is necessary to allow for more extensive use of BSS feeder-links, the large amount of U.S. geography that is unlicensed for terrestrial FS operations is vast enough that any adverse impact on BSS operators that must initially operate outside FS licensed areas should be minimal.

In light of the Commission's goal of prompt commencement of BSS, this approach overcomes the serious obstacle that significant technical issues have not yet been adequately explored in the period since the Commission allocated these frequencies for BSS use. Should the Commission allow BSS feeder-links in FS licensed areas, numerous significant technical unknowns would need to be fully explored and vetted by the providers of both services.¹⁷

III. BEFORE THE COMMISSION ALLOWS BSS FEEDER-LINKS IN OR NEAR TERRESTRIAL FS LICENSED AREAS, (1) COMPREHENSIVE SERVICE RULES AND COORDINATION REQUIREMENTS THAT REFLECT THE CURRENT REALITIES OF BOTH FS AND BSS MUST BE ESTABLISHED, AND (2) SIGNIFICANTLY MORE INFORMATION ABOUT BSS AND FS OPERATIONS NEEDS TO BE INTRODUCED INTO THE RECORD

As described above, in order to achieve the specific goal of prompt commencement of BSS, the Commission would be reasonable to require that initial BSS feeder-links be located at least 100 miles outside of the existing 24 GHz terrestrial FS licensed areas. Should the Commission allow such feeder-links within or near FS licensed areas, irrespective of the number of stations that are permitted, the Commission must take great care in ensuring that the technical coordination models, supporting data and assumptions upon which band-sharing criteria are based are valid. Further, the Commission must avoid, to the extent possible, diminishing the

¹⁷ In paragraphs 28-31 of the NPRM, the Commission discusses the reasons for not permitting the use of BSS earth stations in the U.S. in the 17.7-17.8 GHz band. FiberTower supports this position, as it would not be possible to coordinate such use with the ongoing FS operations in this band. Further, to implement BSS in this band would require a reallocation of this segment from the FS to the BSS. Such a further change to the U.S. allocation table would again disrupt operations of the FS in order to rechannelize the 18 GHz band.

considerable investment made by the incumbent FS providers to date, and those investments for the substantial regional and national deployments which are planned or underway.

A. Considerable Testing and Analysis is Necessary to Update the Technical Coordination Model and Supporting Data Upon Which the Commission Must Rely if Establishing Robust, Scalable Inter-Service Operations in the 24 GHz Band.

The 24 GHz band is now allocated on a co-primary basis to both the FS and the fixed satellite service (earth-to-space). Therefore, as the Commission correctly acknowledges, the “potential exists for 17/24 GHz BSS feeder-link earth stations operating in the 25.05-25.25 GHz band to interfere with existing and future 24 GHz FS hub and *user stations* that operate in the same frequency band.” (Emphasis added)¹⁸ When the Commission initially adopted the shared BSS allocation at 24 GHz in 2000, the full extent of such interference potential was unknown. In fact, at that time, the Commission’s “belief in the feasibility of sharing was based on limitations on the number of expected 17/24 GHz BSS feeder-link facilities and the fact that potential interference to the 24 GHz service would be limited to hub stations.”¹⁹ Hence, limited data available to the Commission at that time were, and are, dated. Even the data contained in some of the more recent BSS applications that have been filed,²⁰ which the Commission indicates it will use “as a basis for developing service rules for BSS systems in these bands[,]” may not accurately reflect all mutual interference potential and concomitant coordination limitations that define BSS. As explained above, sufficient technical parameters do not appear to be a part of the public record to allow such analysis. At the same time that the BSS service technology has been

¹⁸ *NPRM* at ¶ 91.

¹⁹ *Id.* at ¶ 32.

²⁰ *See id.* at ¶ 6.

evolving, we also note that the technical characteristics defining terrestrial FS have also evolved dramatically.

In the six years since the Commission first assumed that interference would be limited to FS hub sites²¹, the terrestrial FS Service landscape has also changed significantly. For example, 24 GHz has seen the development and deployment of next-generation point-to-multipoint systems. Material developments in lower profile antennas, multipoint systems, Ethernet and other technologies have all occurred in this decade and need careful consideration. Thus, as the Commission now considers technical rules and sharing criteria for BSS and FS, it must acknowledge that the available factual predicate (i.e. the basis for previous assumption that interference would be limited to FS hub sites) is still not sufficient to permit the immediate rigorous technical analysis required to ensure the interference-free operation of BSS feeder-links in terrestrial FS service areas.

This lack of a necessary factual background also makes it imperative, at this time, for the Commission to consider a number of other issues raised in the NPRM. For example, the Commission seeks comment on whether it should establish an expedited process for licensing uplinks in the 24 GHz band.²² FiberTower agrees that up to five stations, situated beyond 100 miles of the area licensed boundaries of the 24 GHz FS licensees could be licensed on an expedited basis. The Commission also requests comment on how it should process licensing requests for non-conforming BSS systems (*i.e.*, those proposing to operate at e.i.r.p. levels that

²¹ See *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, Report and Order, 15 FCC Rcd. 13430 (2000).

²² See NPRM at ¶ 48.

are higher than those established in Part 25 of the Commission's rules).²³ Consideration of these issues are premature until the proper technical studies are thoroughly and soberly completed.

B. Consistent with Commission Precedent, Efficient Solutions Are Preferred, and If It Proves Necessary To Update Technical Rules and Coordination Procedures in this Context, They Must Be Carefully Conceived and Properly Calibrated to Ensure that Incumbent Terrestrial FS Providers with Considerable Facilities Investments are Minimally Affected

As mentioned above, the underlying technical research and analysis necessary to develop rules for inter-service operations and sharing in or near 24 GHz band license areas will be time consuming and expensive. The best way to avoid these costs and the costs of ongoing coordination, as well as to promote the Commission's goal of prompt commencement of BSS, is to require that BSS feeder-links be reasonably limited to five and located at least 100 miles outside of 24 GHz terrestrial FS licensed areas. If, however, the Commission concludes that BSS operations prove imperative near or within 24 GHz FS license areas, then substantial resources will need to be devoted by all FS operators and prospective BSS operators to develop technical showings that accurately reflect their current and planned network deployments in the context of co-primary operations. In addition, it is imperative to avoid any requirement that limits the flexibility and immediacy of FS deployments since substantially reduces FS licensee ability to respond to sudden requirements, including emergency restoration applications. This significant economic impact directly relates to the Initial Regulatory Flexibility Analysis (IRFA) noted in paragraph 103 of the NPRM and must be carefully considered by the Commission

Should the Commission seek to establish sharing criteria near or within license areas, FiberTower will engage with the Commission and BSS operators to ensure that defensible technical studies and sharing criteria are completed with the appropriate care and are adequate to

²³ See NPRM at ¶ 51.

allow both services to operate. However, if this is necessary, FiberTower respectfully asks that the Commission adhere to its policy of limiting the disruption to facilities-based licensees when an effectively once-exclusive band becomes, in practice, a co-primary band shared between two services, as it has in this instant case.

Respectfully submitted,

FIBERTOWER CORPORATION

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October 16, 2006

APPENDIX A - DECLARATION

BEFORE THE
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IB Docket No. 06-123

DECLARATION

I, William Rummler, Consultant to FiberTower Corporation, hereby declare, under penalty of perjury under the laws of the United States, that I have reviewed the comments submitted by FiberTower Corporation in response to the June 23, 2006 Notice of Proposed Rulemaking in the above-captioned proceeding, and that the statements of fact made therein are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.



William Rummler
Consultant to
FiberTower Corporation

Date: 10/16/06