

EX PARTE OR LATE FILED

Before the
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

RECEIVED
JUL 20 2000
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

ORIGINAL

In the Matter of)
)
)
Amendment of Parts 2 and 25 of the)
Commission's Rules to Permit Operation)
of NGSO FSS Systems Co-Frequency with)
GSO and Terrestrial Systems in the Ku-Band)

ET Docket No. 98-206

COMMENTS OF SKYBRIDGE ON RESULTS OF WRC-2000

SKYBRIDGE L.L.C.

Phillip L. Spector
Jeffrey H. Olson
Diane C. Gaylor
Paul, Weiss, Rifkind, Wharton & Garrison
1615 L Street, N.W., Suite 1300
Washington, D.C. 20036
Telephone: (202) 223-7300
Facsimile: (202) 223-7420

Its Attorneys

July 20, 2000

No. of Copies rec'd 0+4
List A B C D E

TABLE OF CONTENTS

SUMMARY	i
I. NGSO FSS SHARING WITH GSO FSS AND BSS.....	2
A. Single Entry EPFD _{down} Limits.....	2
1. "Validation" Limits	2
2. "Operational" Limits	4
3. "Additional Operational" Limits	7
B. Aggregate EPFD _{down} Limits	9
C. EPFD _{up} and EPFD _{is} Limits.....	11
D. GSO FSS Earth Station Off-Axis EIRP Limits.....	12
E. Amendments to the U.S. Table of Frequency Allocations.....	13
II. NGSO FSS SHARING WITH FS.....	14
A. Per-Satellite PFD Limits	14
B. Coordination Between NGSO FSS Earth Stations and FS Stations.....	14
III. NGSO FSS SHARING WITH RADIOLOCATION AND SPACE SCIENCES.....	14
A. Sharing Conditions	14
B. 13.75-13.8 GHz Band.....	16
IV. NGSO FSS SHARING WITH RADIO ASTRONOMY	17
CONCLUSION	17

SUMMARY

SkyBridge submits these comments on the agreements recently concluded at the ITU-R World Radiocommunication Conference (“WRC-2000”) related to NGSO FSS systems. WRC-2000 finalized power limits and related provisions to facilitate introduction of NGSO FSS systems in the Ku- and Ka- bands, while adequately protecting existing users of the band. SkyBridge fully supports the WRC-2000 agreements, and proposes in these comments the incorporation of these international standards into the Commission’s rules.

To protect GSO earth station receivers, WRC-2000 combined three different types of “EPFD_{down}” limits that will apply to NGSO FSS downlinks, each addressing a different concern and serving a different purpose. Some of these EPFD_{down} limits are to be evaluated by the ITU-R Radiocommunication Bureau using a software program that computes a worst-case upper bound of the interference an NGSO system could generate. Other, stricter, limits will apply only to the actual EPFD_{down} levels generated by a deployed NGSO system into operational GSO earth stations, and are therefore not subject to software validation.

WRC-2000 also finalized “EPFD_{up}” and “EPFD_{is}” limits to protect GSO satellite receivers from NGSO FSS earth station and satellite transmitters, respectively.

WRC-2000 adopted off-axis EIRP limits to apply to GSO earth stations (subject to certain grandfather provisions). These limits permit NGSO FSS operators to design their systems so as to prevent harmful interference from future generations of GSO systems.

WRC-2000 also adopted per-satellite PFD limits for the protection of terrestrial FS systems, and updated the coordination procedures that apply to coordination between FSS earth stations and FS stations.

Finally, WRC-2000 made certain important changes to the rules governing sharing among NGSO FSS, Radiolocation, and Space Sciences systems in the 13.75-14.0 GHz band. By adopting these changes, the Commission can assign the entire 13.75-14.0 GHz band to NGSO FSS systems, while ensuring that no undue burdens are placed on governmental Radiolocation systems or the TDRSS system.

For the reasons detailed in these comments, SkyBridge fully supports these agreements. The WRC-2000 provisions will satisfy the WRC-97 mandate to adequately protect GSO FSS systems, while avoiding undue burdens on any of the services involved. SkyBridge therefore urges the Commission to follow both the spirit and the letter of the WRC-2000 agreements, and adopt the rules outlined in these comments to govern NGSO FSS operation in the Ku-band.

**Before the
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554**

In the Matter of)	
)	
Amendment of Parts 2 and 25 of the)	
Commission's Rules to Permit Operation)	ET Docket No. 98-206
of NGSO FSS Systems Co-Frequency with)	
GSO and Terrestrial Systems in the Ku-Band)	

COMMENTS OF SKYBRIDGE ON RESULTS OF WRC-2000

SkyBridge L.L.C. ("SkyBridge"), by its attorneys, hereby submits these comments on the results of the recently-concluded World Radiocommunication Conference ("WRC-2000") related to Non-Geostationary Orbit ("NGSO") Fixed-Satellite Service ("FSS") systems. The WRC-2000 agreement represents the successful culmination of an over three-year effort within the ITU-R to develop appropriate "rules of the road" to govern frequency sharing in the Ku- and Ka- bands between new NGSO FSS systems and Geostationary Orbit ("GSO") FSS, GSO Broadcasting-Satellite Service ("BSS"), Fixed Service ("FS"), Radiolocation and Space Sciences systems.¹ For the reasons given below, SkyBridge fully supports the WRC-2000 agreements, and proposes the incorporation of the substance of these international standards into the Commissions rules.²

-
- 1 SkyBridge is submitting simultaneously herewith a Motion for Expedited Licensing, urging the Commission to license the pending first-round applications for Ku-band NGSO FSS systems, subject to compliance with all of the WRC-2000 decisions and other conditions outlined in the motion (the "SkyBridge Motion for Expedited Licensing").
 - 2 See also Notice of Proposed Rulemaking, ET Docket No. 98-206, RM-9147, RM-9245, FCC 98-310, rel. No. 24, 1998 ("NPRM"); Comments of SkyBridge, ET Docket No. 98-206, RM-9147, RM-9245, March 2, 1999 ("SkyBridge NPRM Comments"); Reply Comments of SkyBridge, ET Docket No. 98-206, RM-9147, RM-9245, April 14, 1999 ("SkyBridge NPRM Reply Comments"); Supplemental Comments of SkyBridge, ET

I. NGSO FSS SHARING WITH GSO FSS AND BSS

A. Single Entry EPFD_{down} Limits

Ratifying a consensus reached at the Conference Preparatory Meeting (“CPM”) last November, WRC-2000 adopted three kinds of equivalent power flux-density (“EPFD”) limits for the protection of GSO FSS earth stations from NGSO FSS downlink emissions.³ As discussed below, each of the three “EPFD_{down}” limits adopted by WRC-2000 addresses a separate concern of NGSO or GSO operators, and each requires a different regulatory treatment. SkyBridge outlines below ways for the Commission to incorporate each of these types of limits into the Commission's rules, consistent with the function of each limit and the intent of WRC-2000.

1. "Validation" Limits

The first set of limits for GSO earth station protection are the so-called "validation" EPFD_{down} masks (referred to herein as the "Validation Limits"). Compliance with these limits will be checked using a generic software tool as part of the ITU notification process. The Validation Limits comprehensively bound the full EPFD_{down} statistics of each NGSO FSS constellation into a variety of GSO FSS and BSS earth station antenna sizes and locations.

Docket No. 98-206, December 20, 1999 (“SkyBridge CPM Comments”); Written *Ex Parte* Communications in ET Docket No. 98-206, jointly submitted by the Fixed Wireless Communications Coalition and SkyBridge L.L.C., December 8, 1999 and December 22, 1999 (“SkyBridge/FS Joint Proposal”); Comments of SkyBridge on FWCC/SkyBridge Proposal, ET Docket No. 98-206, RM-9147, January 12, 2000.

³ These limits are discussed in greater detail in the SkyBridge CPM Comments. In addition to the EPFD_{down} hard limits, WRC-2000 adopted coordination triggers applicable to certain very large GSO earth stations. If an NGSO FSS system exceeds the power levels contained in Article S9 of the Radio Regulations into a GSO earth station meeting specified requirements, the NGSO FSS system will have to coordinate with the affected GSO network.

The Commission should incorporate the single entry Validation Limits into its rules. Specifically, the Commission should incorporate Article S22.5C (EPFD_{down} definition) and Tables S22-1A through S22-1D (Validation Limits) of the ITU Radio Regulations into Section 25.208(d) of the Commission's rules, in lieu of the now-obsolete EPFD_{down} limits proposed in the NPRM.⁴

Compliance with the Validation Limits will be assessed by the ITU Radiocommunication Bureau ("BR"), using a software tool developed within the ITU-R.⁵ The BR software validation will be an open process. The software, as well as the input parameters provided by administrations, will be available to all administrations. In this way, administrations can independently verify the BR results, if they so wish.

The Commission should ensure that its licensed systems comply with the Validation Limits.⁶ The Commission could choose to rely on the validation conducted by the BR, knowing that the information used by the BR is available to resolve any dispute regarding whether a system meets the Validation Limits contained in the Commission's rules.⁷ On the

4 The various power limits adopted by WRC-2000 could be either directly incorporated or incorporated by reference into the Commission's rules. Either option would be acceptable to SkyBridge.

5 The specification for this software was recently approved by the ITU Radiocommunication Assembly (see Recommendation ITU-R BO.1503), and two companies have provided software packages based on this specification for evaluation by the BR. It is therefore expected that the software will be available well before the commencement of service of any of the proposed NGSO FSS systems.

6 However, as discussed in the SkyBridge Motion for Expedited Licensing, it is not necessary that compliance with the BR validation software be completed before licensing, only that compliance has been verified before a system enters service. Therefore, the Commission may proceed to grant licenses to qualified NGSO FSS applicants, in each case conditioned on a demonstration of compliance with the Validation Limits.

7 Indeed, for systems for which the U.S. is the notifying administration, it is the Commission that will need to forward this information to the BR.

other hand, the Commission could undertake such validation itself, using the same software tool as the BR. While either option is acceptable to SkyBridge, it should be noted that at least one GSO operator has stated that it sees no need for the Commission to duplicate this ITU effort.⁸ Once compliance with the Validation Limits has been demonstrated using the BR software, this requirement of the Commission's rules should be considered satisfied, assuming the NGSO system continues to operate within the parameters provided to the BR and the Commission.⁹

2. "Operational" Limits

The second set of EPFD_{down} limits, the "Operational Limits", bound the maximum EPFD_{down} that an operational NGSO FSS system may transmit into operational GSO FSS earth stations of varying sizes.¹⁰ These levels are more stringent than those of the Validation Limits, and are therefore more constraining on the NGSO operator. They apply to each NGSO system in operation, and not to the conservative upper bound calculated by the BR software. They were designed to address the concern of GSO operators regarding the degree of conservativeness of the BR software, in terms of the likelihood of having an NGSO system actually generating a high level of EPFD_{down} into larger GSO earth stations. In

8 Comments of PanAmSat Corporation, ET Docket No. 98-206, December 20, 1999, at 13 (stating that the Commission need only impose a license condition that an NGSO operator may not begin U.S. operations until the ITU confirms in writing to the Commission that the licensee has met the Validation Limits).

9 Consistent with the Commission's rules and practices applicable to other services and systems, NGSO FSS licensees would need to report to the Commission any change in system characteristics that would cause the system to perform outside the envelope defined by the parameters provided to the BR and the Commission, so that validation using the BR software can be reconfirmed.

10 In addition, there is one Operational Limit that applies during a 15-year transition period to protect certain GSO BSS earth stations. See Table S22-4C.

particular, they ensure protection of these larger GSO earth stations against short term interference that could cause loss of synchronization of the GSO earth station demodulators.

The Commission should incorporate the Operational Limits into its rules. Specifically, the Commission should incorporate the substance of Article S22.5I (explanation of Operational Limits) and Tables S22-4A (Ku-band Operational Limits), S22-4B (Ka-band Operational Limits), and S22-4C (Operational Limits to protect specific BSS earth station in Region 2) into Section 25.208(d) of its rules.

Compliance with the Operational Limits is not to be assessed using the BR software; the BR will assess compliance only with the Validation Limits. Moreover, because the Operational Limits apply to operational EPFD_{down} levels received by actual GSO earth stations, no demonstration by the NGSO operator of compliance with these limits is required.¹¹ However, once in service, should an operating NGSO system exceed the Operational Limits into an operational GSO earth station, all necessary steps to ensure that interference levels into that earth station are restored to the Operational Limits would have to be taken by the NGSO network as expeditiously as possible. Such a determination would be made by individual administrations, upon review of relevant technical data provided by the affected GSO and NGSO operators.

11 In particular, the Commission should not require NGSO applicants to demonstrate compliance with operational limits as part of the licensing process. This is clearly not consistent with the principle behind the Operational Limits. It was, in fact, the difficulty of implementing a generic regulatory approach that assessed *a priori* the operational levels generated by an NGSO system (which are subject to change) that led to the adoption of both Validation Limits and Operational Limits. The latter should come into play only in the event of receipt of interference into a GSO earth station in violation of the limits that is traced to an NGSO system.

To assist administrations in this making such determinations, feasible means of measuring the actual EPFD_{down} levels generated by an NGSO system into operational GSO earth stations have been developed within the ITU-R as a Preliminary Draft New Recommendation (“PDNR”).¹² SkyBridge has been actively involved in this effort, and will work with other participants of WP 4A to finalize this PDNR, which is expected to occur at the next WP 4A meeting in September. Once systems are launched, SkyBridge urges the Commission to rely on the measurement techniques contained in this PDNR to help resolve any claim of violation of the Operational Limits.¹³

Moreover, WRC-2000 developed guidelines for development of an international regulatory procedure for resolving such disputes.¹⁴ Although SkyBridge would support the adaptation for the Commission’s rules of any regulatory procedures for resolving disputes that are developed within the ITU-R, it should be noted that in the interim, the Commission’s rules already provide procedures for resolving interference complaints, which are appropriate for use in this context.¹⁵ In addition, the Commission already has at hand a number of ways to deal severely with any proven non-compliance with the operational limits.

12 See Doc. 4A/TEMP/221(Rev.1), February 28, 2000.

13 In order to determine the source of any violation of the Operational Limits, it will be necessary have a mechanism for identifying the satellites of each NGSO constellation. This may involve, for example, a means for ensuring the availability of ephemeris information for each of the constellations. The Commission should follow the mechanisms developed by the ITU-R working groups in this regard. As a practical matter, the Commission already has full authority to require any of its licensees -- whether space segment or earth station -- to provide any necessary technical data on request, including such ephemeris information, in the event of a credible claim of interference, as an aid to resolving the dispute. See 47 C.F.R. §§ 25.273-25.274.

14 See Resolution [COM 5/23] (WRC-2000).

15 See, e.g., 47 C.F.R. §§ 25.271-25.274.

If any of the Commission's operational requirements are violated, the Commission has the authority to require that the operator reduce its power so that it is within specified limits, as well as the authority to require a system operator to cease operations if it fails to do so. The Commission also may impose forfeitures against its licensees for violation of its rules, or, in extreme cases, revoke the relevant operational license.¹⁶

3. "Additional Operational" Limits

The third set of single entry limits for the protection of GSO systems from NGSO FSS downlink emissions are the "additional operational" EPFD_{down} limits ("Additional Operational Limits"), which apply to 3 and 10 meter GSO FSS earth stations.¹⁷ As with the Operational Limits, the Additional Operational Limits are more stringent than the Validation Limits, and are intended to give GSO operators further assurance that the actual EPFD_{down} statistics from any given NGSO system will, in operation, fall below specified points, consistent with NGSO commitments that this would be the case.

Again, SkyBridge proposes that the Additional Operational Limits be incorporated into the Commission's rules. Specifically, the substance of Article S22.5I (explanation of Additional Operation Limits) and Table S22-4A1 (Additional Operational Limits) of the ITU Radio Regulations should be incorporated in Section 25.208(d).

As in the case of the Operational Limits, these limits are not to be assessed using the BR software.¹⁸ As the Commission knows, the intention regarding these limits was

¹⁶ See, e.g., 47 U.S.C. §312; 47 C.F.R. §25.160.

¹⁷ These are specified as points of EPFD_{down} at specific percentages of time. There are no Additional Operational Limits applicable to GSO BSS earth stations.

¹⁸ ITU-R studies have demonstrated that NGSO systems in operation will produce EPFD statistics lower than predicted with the BR software, and have demonstrated in particular

that the administration proposing the NGSO system shall commit that, when in service, the interference from that system into any operational antenna of diameter 3 m and 10 m will meet the additional operational limits. Such commitment will be made in the Appendix S4 submission sent by the filing administration of the system. WRC-2000 recognized that ITU-R Recommendations are needed to assist administrations in making such commitments.¹⁹ SkyBridge agrees, and will work toward refinement of simulation tools for computing actual EPFD_{down} statistics during the next ITU-R study period.²⁰

Consistent with the intent of the CPM in developing these limits, SkyBridge proposes that the Commission require each NGSO FSS system to commit, as part of the licensing process, to meeting the Additional Operational Limits once in service. In support of this commitment, the Commission should require that each licensee be prepared to demonstrate the technical basis for its commitment to the Commission, on request, in the course of any investigation into an alleged violation of the Additional Operational Limits.²¹ The basis for such commitment will presumably be detailed simulations of the constellation, employing actual operational parameters at the time of the alleged violation. Although these simulations will change from time to time and reflect commercially sensitive information, and therefore should not be required to be submitted as a pre-condition to licensing or operation, a licensee must be prepared to make an appropriate demonstration of compliance to the

the ability of certain individual systems, such as SkyBridge, to meet the Additional Operational Limits. See, e.g., Documents JTG 4-9-11/243 and JTG 4-9-11/245.

19 Resolution [COM 5/7] (WRC-2000).

20 In fact, considerable work has already been undertaken in JTG 4-9-11 and WP 4A on such techniques. See Recommendation ITU-R S.1325.

21 Such a requirement would parallel that applicable to FSS earth station antenna performance requirements. See 47 C.F.R. §§ 25.209, 25.132.

Commission in the event of a credible claim of a rule violation. Because these detailed simulations can contain highly proprietary information, the Commission should be prepared to afford confidential treatment to any such submission, consistent with existing Commission rules.²²

Such an approach is fully consistent with the regulatory treatment of other satellite systems, including GSO systems, in the Commission's rules. For example, the Commission's limits on PFD for the protection of FS systems, and frequency tolerance and emission limitations, applicable to all FSS operations, are simply a condition of each license, and are not subject to measurement or other validation except in the context of a dispute.²³ Similarly, the GSO FSS antenna performance standards of Section 25.209 are governed by a compliance certification requirement.²⁴ In such cases, the Commission relies on each operator to honor the commitments contained in their applications to abide by such rules, knowing full well that failure to do so could lead to sanctions, including, in extreme cases, to loss of license.

B. Aggregate EPFD_{down} Limits

All of the limits discussed above are "single entry" limits, and apply to each NGSO FSS system individually. Recognizing that the aggregate interference produced by all NGSO FSS systems operating co-frequency is of primary concern to GSO operators, WRC-2000 adopted a Resolution to provide a regulatory mechanism for ensuring that the aggregate

²² See 47 C.F.R. §§ 0.457-0.459.

²³ See 47 C.F.R. §§ 25.202, 25.208.

²⁴ 47 C.F.R. §25.132.

levels used to derive the single entry Validation Limits are not exceeded as multiple NGSO FSS systems commence service.

Resolution [COM 5/6] (WRC-2000) provides that administrations operating NGSO FSS systems should take all possible steps to ensure that the actual aggregate interference into GSO networks caused by such systems do not exceed specified levels (“the Aggregate Limits”), and should this occur into an operational GSO earth station, such administrations shall expeditiously take all necessary measures to reduce the aggregate EPFD levels to the specified levels (or higher acceptable levels). It further requests the ITU-R to develop a methodology for calculating the aggregate EPFD_{down} levels produced by multiple systems. SkyBridge supports this approach.²⁵

Unlike the single entry limits, however, and consistent with the ITU approach, the Commission should not incorporate the aggregate limits into its rules. These limits govern the collective behavior of multiple systems, some of which may not even be licensed or serving the U.S.²⁶ It would be impossible for any given applicant to provide any kind of documentation demonstrating that it meets the aggregate limits contained in Resolution [COM 5/6].

Notwithstanding this difficulty, SkyBridge agrees with the overall objective of this Resolution. Although any rigorous assessment of the aggregate must be conducted on an international level, SkyBridge would support a requirement (whether as a rule or a condition

25 In principle, this differing regulatory treatment of single entry and aggregate interference levels can be compared to the single-entry coordination threshold between GSO systems (noise temperature increase of 6%) and the recommended aggregate interference from adjacent GSO systems (noise temperature increase of 20%).

26 As the Commission is aware, side-lobe interference from NGSO FSS system serving neighboring regions can contribute to the aggregate interference at locations in the U.S.

to each license) that NGSO FSS licensees that have actually commenced operation²⁷ must cooperate fully with any effort undertaken by the Commission to resolve any dispute regarding the collective compliance of operating NGSO FSS systems with the aggregate limits in Resolution [COM 5/6], based on the methodologies developed within the ITU-R.²⁸ As is the case of the Operational and Additional Operational Limits, this may require provision of highly proprietary information. The Commission should be prepared to afford confidential treatment to such submissions.

C. **EPFD_{up} and EPFD_{is} Limits**

WRC-2000 also finalized “EPFD_{up}” and “EPFD_{is}” limits to protect GSO satellite receivers from Ku- and Ka-band NGSO FSS earth station emissions and satellite emissions, respectively. These limits, contained in Articles S22.5D (definition of EPFD_{up}), S22.5F (definition of EPFD_{is}), and S22.5J (exceptions to EPFD_{up} limits for cases of *force*

27 There is no reason to include systems not actually launched in such evaluation, and ample reasons not to. As the Commission has recognized, NPRM ¶ 72, it is difficult, if not impossible, to assess the aggregate interference if the operating parameters of the NGSO FSS systems are not fully known. Proposed NGSO systems may change operational protocols before launch, particularly as the result of coordination with other NGSO systems. According to the licensing procedure proposed by SkyBridge in its accompanying Motion for Expedited Rulemaking, coordination agreements would be developed as applicants actually enter the band. Moreover, the point of the exercise is to protect GSO systems from actual aggregate interference levels. As the Commission well knows, for a variety of reasons, many systems filed at the ITU and the Commission are never launched.

28 SkyBridge urges the Commission to allow the development of the studies called for Resolution [COM 5/6] to mature. It should be kept in mind that the aggregate level is based on 3.5 effective NGSO FSS systems all producing interference at the level of the Validation Limits. As evidenced by the applications on file with the Commission, it will be some years before enough systems will be operating at power levels sufficient to reach the aggregate levels. This will provide more than adequate time for appropriate international agreements to be developed to ensure that the aggregate levels used as the basis of the single entry Validation Limits are not exceeded in practice.

majeure), and Tables S22-2 (EPFD_{up} limits) and S22-3 (EPFD_{is} limits), should also be incorporated into Part 25 of the Commission's rules.

As in the case of the Validation Limits discussed above, compliance with these limits will be checked by the BR using the software validation tool discussed above.

Although SkyBridge would not oppose independent examination of compliance with these limits by the Commission using the BR software, as noted above, there appears to be no need for such a duplication of effort.

D. GSO FSS Earth Station Off-Axis EIRP Limits

An important part of the WRC-2000 agreement was the adoption of off-axis power limits on GSO FSS earth stations. As the Commission noted in the NPRM, limiting the signal energy radiated by GSO FSS earth stations places an upper bound on the level of uplink interference that NGSO FSS systems must tolerate.²⁹ At the same time, all parties agreed that undue burdens should not be placed on GSO operators. Accordingly, the WRC-2000 limits were designed to permit the continued use of existing earth stations, while ensuring the protection of NGSO FSS systems against significant changes in the interference environment that could conceivably be caused by future generations of GSO systems in the absence of any such restrictions. The limits are relaxed as compared to pre-existing ITU-R recommendations, and are subject to grandfather provisions. There is no reason to believe that GSO FSS earth station operators will find it difficult to meet these limits.³⁰

²⁹ NPRM ¶ 76.

³⁰ See also NPRM ¶ 77. Moreover, no substantial regulatory complications will be introduced by these limits. WRC-2000 decided against compliance-testing at the ITU level; instead operators will simply certify in their filings that their earth stations meet the applicable requirements.

As discussed below, WRC-2000, with strong U.S. support, accepted these limits, in combination with language, discussed below, specifying that NGSO FSS operators may not claim protection from GSO FSS systems operating in accordance with these limits (and other applicable Radio Regulations). These provisions provide important regulatory certainty for both NGSO FSS and GSO FSS operators, and the Commission should therefore incorporate these off-axis EIRP limits, contained in Section VI of Article S22 (S22.26-S22.39) of the Radio Regulations, into Section 25.204 of the Commission's rules.

E. Amendments to the U.S. Table of Frequency Allocations

WRC-2000 amended certain Article S5 footnotes (S5.441, S5.484A, S5.487A, S5.516) dealing with use of the Ku- and Ka-band by NGSO FSS systems. With the exception of a now-obsolete version of S5.441, these footnotes have not been incorporated in the U.S. Table of Frequency Allocations in Part 2 of the Commission's rules (the "U.S. Table"). In order to fully implement both the letter and spirit of the WRC-2000 agreements, SkyBridge proposes that these footnotes be amended or added to the U.S. Table.³¹

31 As noted above, the GSO FSS community agreed to accept the above-referenced off-axis EIRP limits in exchange for assurances (set forth in the relevant footnotes) that NGSO FSS systems would not claim protection from GSO FSS systems operating in compliance with the Radio Regulation, including those limits. The language in those footnotes was hard-fought, and SkyBridge urges the Commission to adopt this language essentially verbatim.

In addition, footnote S5.43A, newly adopted at WRC-2000 and referred to in the above footnotes, will need to be included in the U.S. Table as well. S5.43A states that, where it is indicated in the Radio Regulations that a service or stations in a service may operate in a specific frequency band subject to not claiming protection from another service or from another station in the same service, this means also that the service which is subject to not claiming protection shall not cause harmful interference to the other service or other station in the same service. The S5.441, S5.484A, S5.487A, and S5.516 footnotes importantly state that S5.43A does not apply to NGSO FSS systems with respect to GSO networks in the relevant bands.

II. NGSO FSS SHARING WITH FS

A. Per-Satellite PFD Limits

WRC-2000 finalized per-satellite PFD limits for the protection of terrestrial FS systems from Ku- and Ka-band GSO and NGSO FSS systems. These limits, contained in Articles S21.16 and Table S21-4 of the ITU Radio Regulations, should be incorporated into Section 25.208(b) of the Commission's rules.

B. Coordination Between NGSO FSS Earth Stations and FS Stations

Under current Commission rules, the technical aspects of coordination are based on Appendix 28 of the ITU Radio Regulations.³² At WRC-2000, Appendix 28 was replaced with by Appendix S7. These revised procedures include, *inter alia*, coordination calculation tools that take into account the statistical nature of NGSO interference. SkyBridge therefore urges the Commission to amend Section 25.251(b) to refer to Appendix S7 instead of the now-obsolete Appendix 28.³³

III. NGSO FSS SHARING WITH RADIOLOCATION AND SPACE SCIENCES

A. Sharing Conditions

WRC-2000 adopted important changes to the Radio Regulations to facilitate sharing among NGSO FSS, Radiolocation, and Space Sciences systems in the 13.75-14.0 GHz band. SkyBridge urges the Commission to adopt these changes, which affect the S5.502

³² See Section 25.251(b).

³³ Moreover, as the Commission knows, SkyBridge has reached agreement with leading members of the U.S. FS community on related provisions that the Commission should adopt regarding the introduction of Gateways in these bands. See SkyBridge/FS Joint Proposal, *supra* note 2.

and S5.503 footnotes in the U.S. Table, as well as Section 25.204(f), as follows (marked to show changes from current Commission rules):

S5.502 In the band 13.75-14.0 GHz, an earth station in the fixed-satellite service shall have a minimum antenna diameter of 4.5 m and the e.i.r.p. of any emission from an earth station in the fixed-satellite service shall should be at least 68 dBW, and should not exceed 85 dBW, with a minimum antenna diameter of 4.5 metres. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services ~~towards the geostationary-satellite orbit~~ shall not exceed 59 dBW. The protection of assignments to receiving space stations in the fixed-satellite service operating with earth stations that, individually, have an e.i.r.p. of less than 68 dBW shall not impose constraints on the operation of the radiolocation and radionavigation stations operating in accordance with the Radio Regulations. No. S5.43A does not apply. See Resolution [COM5/10] (WRC-2000).

S5.503 In the band 13.75-14.0 GHz, geostationary space stations in the space research service for which information for advanced publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. Until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band:

a) ~~the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in geostationary-satellite orbit shall not exceed 71 dBW per in the 6 MHz band from in the frequency range 13.772-13.778 GHz until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band;~~

b) the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in non-geostationary-satellite orbit shall not exceed 51 dBW in the 6 MHz band from 13.772-13.778 GHz.

Automatic power control may be used to increase the e.i.r.p. density ~~above 71 dBW per in the 6 MHz band~~ in this frequency range to compensate for rain attenuation, to the extent that the power-flux density at the fixed-satellite service space station does not exceed the value resulting from use by an earth station of an e.i.r.p. of 71 dBW or 51 dBW, as appropriate, in the per 6 MHz band e.i.r.p. in clear-sky conditions.

25.204(f) In the band 13.75-14.0 GHz, (i) an earth station shall have a minimum antenna diameter of 4.5 m; (ii) the e.i.r.p. of any emission from an earth station operating in the frequency band 13.75-14.0 GHz shall should be

at least 68 dBW, (see footnote S5.502 of Section 2.106); and (iii) the e.i.r.p. of any emission from an earth station shall not exceed 85 dBW, with a minimum antenna diameter of 4.5 metres; except in the frequency band 13.772-13.778 GHz, where the e.i.r.p. shall be at least 68 dBW and density of emissions from any earth station operating with a space station in the geostationary-satellite orbit shall not exceed 71 dBW in this per 6 MHz band, and the e.i.r.p. density of emissions from any earth station operating with a space station in the non-geostationary-satellite orbit shall not exceed 51 dBW in this 6 MHz band with a minimum antenna diameter of 4.5 meters. Automatic power control may be used to increase the e.i.r.p. density above 71 dBW per 6 MHz in the 13.772-13.778 GHz band to compensate for rain attenuation to the extent that the power-flux density at the fixed-satellite service space station does not exceed the value resulting from use by an earth station of an e.i.r.p. of 71 dBW or 51 dBW, as appropriate, in the per 6 MHz band e.i.r.p. in clear sky conditions.

B. 13.75-13.8 GHz Band

In the NPRM, the Commission declined to assign the 13.75-13.8 GHz band to NGSO FSS operations, due to concerns regarding the ability of such systems to protect the Tracking Data and Relay Satellite System (“TDRSS”) downlinks to the space shuttle.³⁴ However, in view of the above agreements, which reflect the results of studies on the protection requirements of these downlinks, SkyBridge urges the Commission to reverse this decision and conform its NGSO FSS allocations to those adopted internationally at WRC-2000.³⁵ This is necessary to ensure sufficient uplink spectrum for the multiple NGSO FSS systems seeking access in the Ku-band, particularly in view of the decision of WRC-2000 not to permit NGSO FSS operations in the 17.3-17.8 GHz band in Region 2.

³⁴ NPRM, ¶¶ 14, 39, 41-43.

³⁵ It should be recalled that if the Commission applies footnote US 337 of the U.S. Table to NGSO FSS systems, as SkyBridge has proposed, NGSO FSS systems would be required to coordinate to minimize harmful interference to TDRSS downlinks. See SkyBridge NPRM Comments at 14.

IV. NGSO FSS SHARING WITH RADIO ASTRONOMY

As the Commission noted in the NPRM, sensitive radio astronomy operations exist in the 10.6-10.7 GHz band, adjacent to the NGSO FSS allocation.³⁶ The protection requirements for radio astronomy are defined in Recommendations ITU-R RA.769 and SM329, the latter of which was revised by the Radiocommunication Assembly in May 2000. These methodologies define how the specified protection levels should be applied to emissions from GSO systems. However, work is ongoing on how to apply them to NGSO systems. As SkyBridge explained in its NPRM Comments, the protection requirement in SA.769 is defined as an average integrated over 2000 seconds, and it would be appropriate to base the NGSO methodology on the same principle.³⁷ This has been proposed to ITU-R WP 7B and TG 1/5, and it is expected that further elements will be developed in the coming study period to complete the analysis.

CONCLUSION

In sum, SkyBridge fully supports the WRC-2000 agreements. These provisions satisfy the WRC-97 mandate to adequately protect GSO FSS systems, while avoiding undue burdens on any of the services involved. SkyBridge therefore urges the

³⁶ See NPRM, ¶ 82; SkyBridge NPRM Comments at 101-102.

³⁷ See SkyBridge NPRM Comments at 101.

Commission to follow both the spirit and the letter of the WRC-2000 consensus, and adopt the rules outlined above to govern NGSO FSS operation in the Ku- and Ka-bands.

Respectfully submitted,

SKYBRIDGE L.L.C.

By: 

Phillip D. Spector
Jeffrey H. Olson
Diane C. Gaylor

PAUL, WEISS, RIFKIND, WHARTON & GARRISON
1615 L Street, N.W., Suite 1300
Washington, D.C. 20036
Telephone: 202-223-7300
Facsimile: 202-223-7420

Its Attorneys

July 20, 2000

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Comments of SkyBridge on Results of WRC-2000 was served by hand the 20th day of July, 2000, on the following:

Honorable William Kennard, Chairman
Federal Communications Commission
445 12th St., S.W., Room 8-B201
Washington, D.C. 20554

Commissioner Harold Furchtgott-Roth
Federal Communications Commission
445 12th St., S.W., Room 8-A302
Washington, D.C. 20554

Commissioner Susan Ness
Federal Communications Commission
445 12th St., S.W., Room 8-B115
Washington, D.C. 20554

Commissioner Michael Powell
Federal Communications Commission
445 12th St., S.W., Room 8-A204
Washington, D.C. 20554

Commissioner Gloria Tristani
Federal Communications Commission
445 12th St., S.W., Room 8-C302
Washington, D.C. 20554

Clint Odom, Esq.
Legal Advisor to the Chairman
Federal Communications Commission
445 12th St., S.W., Room 8-B201N
Washington, D.C. 20554

Bryan Tramont, Esq.
Legal Advisor to
Commissioner Furchtgott-Roth
Federal Communications Commission
445 12th St., S.W., Room 8-A302B
Washington, D.C. 20554

Mark Schneider, Esq.
Legal Advisor to Commissioner Ness
Federal Communications Commission
445 12th St., S.W., Room 8-B115C
Washington, D.C. 20554

Peter Tenhula, Esq.
Legal Advisor to Commissioner Powell
Federal Communications Commission
445 12th St., S.W., Room 8-A204F
Washington, D.C. 20554

Adam Krinsky, Esq.
Legal Advisor to Commissioner Tristani
Federal Communications Commission
445 12th St., S.W., Room 8-C302F
Washington, D.C. 20554

Donald Abelson
FCC, International Bureau
445 12th St., S.W., Room 6-B722
Washington, D.C. 20554

Harry Ng
FCC, International Bureau
445 12th St., S.W., Room 6-A668
Washington, D.C. 20554

Thomas Tycz
FCC, International Bureau
445 12th St., S.W., Room 6-A665
Washington, D.C. 20554

Ari Fitzgerald, Esq.
FCC, International Bureau
445 12th St., S.W., Room 6-B722
Washington, D.C. 20554

Peter Pappas, Esq.
FCC, International Bureau
445 12th St., S.W., Room 6-C746
Washington, D.C. 20554

Thomas Sugrue, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
Room 3-C252
Washington, D.C. 20554

Kathleen Ham
Wireless Telecommunications Bureau
Federal Communications Commission
Room 3-C255
Washington, D.C. 20554

Thomas Stanley
Wireless Telecommunications Bureau
Federal Communications Commission
Room 3-C460
Washington, D.C. 20554

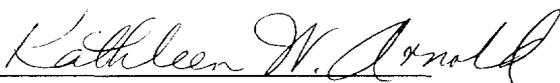
Dale Hatfield
Office of Engineering & Technology
Federal Communications Commission
Room 7-C155
Washington, D.C. 20554

Julius Knapp
Office of Engineering & Technology
Federal Communications Commission
Room 7-B133
Washington, D.C. 20554

Bruce Franca
Office of Engineering & Technology
Federal Communications Commission
Room 7-C153
Washington, D.C. 20554

Thomas Derenge
Office of Engineering & Technology
Federal Communications Commission
Room 7-A222
Washington, D.C. 20554

Geri Matise
Office of Engineering & Technology
Federal Communications Commission
Room 7-A123
Washington, D.C. 20554


Kathleen W. Arnold