

BEFORE THE  
**Federal Communications Commission**  
WASHINGTON, D.C. 20554

In the Matter of )  
)  
Allocation and Designation of Spectrum for )  
Fixed-Satellite Services in the 37.5-38.5 GHz, ) IB Docket No. 97-95  
40.5-41.5 GHz and 48.2-50.2 GHz Frequency )  
Bands; Allocation of Spectrum to Upgrade Fixed ) RM-8811  
And Mobile Allocations in the 40.5-42.5 GHz )  
Frequency Band; Allocation of Spectrum in the )  
46.9-47.0 GHz Frequency Band For Wireless )  
Services; and Allocation of Spectrum in the )  
37.0-38.0 GHz and 40.0-40.5 GHz for Government )  
Operations )

To: The Commission

**COMMENTS OF TRW Inc.**

**TRW Inc.**

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September 4, 2001

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## SUMMARY

TRW Inc. (“TRW”) strongly supports the Commission’s proposed modifications to the 37.0-43.5 GHz band to the extent they comport with the international sharing arrangements established for that band at WRC-2000. Where the Commission’s proposals conflict with the actions taken at WRC-2000 – in particular, with actions advancing the “soft segmentation” of spectrum between satellite and terrestrial users – TRW objects and suggests workable alternatives.

The Commission should adopt its proposal to add new non-government fixed-satellite service (“FSS”) allocations to the 41.0-42.0 GHz and 37.5-37.6 GHz bands. The former proposal would encourage and facilitate global high-density applications in the FSS (“HDFSS”) at 40.0-42.0 GHz consistent with the soft segmentation scheme; the latter is technologically feasible because non-ubiquitously deployed FSS earth stations are capable of sharing with high-density applications in the fixed service (“HDFS”). The Commission should also amend the Table of Frequency Allocations to include the FSS as a permissible service at 38.6-40.0 GHz.

TRW supports the proposed *secondary* allocation of non-government spectrum to the MSS at 40.5-41.0 GHz, provided that it is clear to all parties that this allocation is truly secondary. On the other hand, TRW strongly opposes the Commission’s proposals for a *primary* government mobile-satellite service (“MSS”) allocation and designation at 40.5-41.0 GHz. These proposals contradict the positions taken by the U.S. through WRC-2000, and would threaten the entire soft segmentation scheme by compromising the utility of the spectrum set aside for FSS at 40.0-42.0 GHz. TRW cannot overemphasize the critical need for two gigahertz of contiguous FSS spectrum for soft segmentation to work. If the Commission does not set aside the spectrum at 40.0-42.0 GHz for the unfettered use by FSS, and decides to encumber HDFSS use of spectrum at 40.0-41.0 GHz by

allowing co-primary government MSS and/or FSS systems, the Commission must be prepared to take appropriate compensatory actions to ensure meaningful commercial FSS access to spectrum elsewhere, including at 37.5-38.6 GHz.

TRW does not object to the addition of non-government allocations of spectrum at 42.5-43.5 GHz to the fixed and mobile services, which would be consistent with WRC-2000 determinations. To make this possible, the Commission should return the 42.5-43.5 GHz and 47.2-48.2 GHz bands to their original government and non-government allocations, with the understanding that FSS Earth-to-space operations will be permitted in the 47.2-48.2 GHz band (along with the already-allocated 48.2-50.2 GHz band). TRW also supports a government FSS allocation at 40.5-41.0 GHz if the Commission clearly indicates that government use will not receive priority over non-government use. To this end, TRW proposes that the Commission make a version of footnote US334 applicable to the 40.0-41.0 GHz band, and thereby limit government FSS use of that band to orbital locations outside the 70° W to 120° W orbital range.

TRW has several serious issues with the Commission's proposal to "fully protect" the Radio Astronomy service ("RA") in the 42.5-43.5 GHz band. RA is not entitled to some form of super-protection from adjacent-band services, and the proposal is premature because the unwanted emissions of FSS systems may already be able to meet the actual protection requirements of RA systems. At a minimum, the Commission should wait for the results of ITU-R studies into the extent of protection to be provided to RA.

On the issue of the PFD limits necessary to effect the proposed spectrum designations, TRW agrees with the Commission that such limits should be adopted immediately. Contrary to the Commission's proposal, however, these limits should not take the form of the obsolete "bottom up" limits backed by the U.S. at CITELE. Instead, the Commission should adopt PFD limits that conform

to the power control methodology agreed to at WRC-2000, while also specifying that the reduction of PFD limits by 12 dB from WRC-2000 values under clear-sky conditions applies only when the FSS satellites are serving the United States. TRW stresses that the viability of FSS requires that FSS satellites have the ability to operate at PFD levels up to the current WRC-2000 limits during fading conditions on the downlink.

In lieu of setting a limit on the percentage of time during which FSS systems can increase power to overcome fading conditions, TRW proposes that satellite systems serving the United States be required not to increase power for longer than is necessary to overcome fading, and to increase power by only the amount needed to close the link (up to 12 dB). TRW also suggests that the clear-sky PFD reduction rules apply only in the 38.6-40.0 GHz band, as the 37.5-38.6 GHz band has not seen deployment of HDFS systems in this country, and future HDFS use of this band can concentrate on more robust HDFS designs (with truly sensitive HDFS systems being concentrated in non-FSS bands such as 37.0-37.5 GHz and 42.5-43.5 GHz).

TRW generally supports the Commission's proposal to modify the Part 101 rules to reflect FSS operations below 40.0 GHz. The prohibition on the ubiquitous deployment of satellite earth stations is a necessary limitation on satellite operations in order to preserve the soft segmentation scheme. The redundant prohibition on service to "individual customers," on the other hand, is both unnecessary and too vague a requirement to adopt. Finally, TRW supports the Commission's proposal to treat earth station and wireless stations on the same terms for purposes of Part 101 interference protection.

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To: The Commission

**COMMENTS OF TRW Inc.**

TRW Inc. (“TRW”), 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 submits its comments in response to the above-captioned Further Notice of Proposed Rulemaking (“FNPRM”).<sup>1</sup> In its FNPRM, the Commission proposes modifications to its 1998 plan for the 36.0–51.4 GHz band (“V-band”)<sup>2</sup> that are intended to implement domestically the global sharing arrangements adopted by the 2000 World Radiocommunications Conference (“WRC-2000”). TRW generally supports the

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<sup>1</sup> Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed And Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band For Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations, Further Notice of Proposed Rulemaking, IB Docket No. 97-97; RM-8811 (released May 31, 2001).

<sup>2</sup> Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed And Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band For Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations, Report and Order, 13 FCC Rcd 24649 (1998) (“1998 Order”).

adoption of these proposals to the extent that they adhere to the actions taken by WRC-2000. TRW, however, strongly opposes the Commission's proposals that deviate from the WRC-2000 results and which risk undoing the achievements gained there by the U.S. In the place of these latter proposals, TRW offers workable modifications that will bring into effect the "soft segmentation" of spectrum between satellite and terrestrial users that has become the hallmark of the United States' V-band spectrum policy.

## **I. INTRODUCTION**

In the FNPRM, the Commission offers a comprehensive series of proposals to modify the V-band plan it adopted in 1998, and to adopt power flux-density ("PFD") limits on satellite operations in portions of this band, in a manner generally consistent with the U.S. proposals to and/or the decisions reached at WRC-2000 in Istanbul, Turkey. The Commission also proposes to adopt certain Part 101 rule changes in connection with fixed-satellite service ("FSS") earth station operations in the 37.5-40.0 GHz band.

As a key participant in the instant proceeding since prior to its inception, TRW has a keen interest in the V-band proposals advanced by the Commission. TRW filed an application (and an amendment thereto) for geostationary satellite orbit ("GSO") and non-GSO V-band satellite systems in 1997,<sup>3</sup> and has been extremely active in the International Telecommunication Union ("ITU") deliberations on V-band matters ever since. TRW is a leading representative of the U.S.

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<sup>3</sup> See Application of TRW Inc. for Authority to Launch and Operate TRW Global EHF Satellite Network, a Global Satellite System in the Fixed-Satellite Service, File No. SAT-LOA-19970904-00081-00084 (filed September 4, 1997). A short time later, TRW amended its application to add 30/20 GHz band ("Ka-band") capacity to the same satellites. See Amendment of Application of TRW Inc. for Authority to Launch and Operate a Global Satellite System Employing Geostationary and Nongeostationary Satellites in the Fixed-Satellite Service, File No. SAT-LOA-19971222-00229 (filed December 19, 1997).

satellite industry on V-band issues at the Inter-American Telecommunication Commission (“CITEL”), and served as the principal U.S. satellite industry participant on these issues in the U.S. preparations for and at both WRC-97 and WRC-2000.

In addition, TRW is a licensee in the 38.6-40.0 GHz (“39 GHz”) “wireless” band, having purchased 100 39 GHz licenses in 11 economic areas (“EAs”) for nearly \$2.5 million at last year’s auction.<sup>4</sup> Upon receipt of necessary space station and earth station licenses, TRW intends to use its 39 GHz band licenses and other frequency spectrum below 40 GHz primarily for satellite-to-hub earth station downlinks operating with a global constellation of GSO and non-GSO satellites employing both Ka- and V-band spectrum. User downlinks for the system would operate in the 40.0-42.0 GHz band. Uplinks (both hub and user) would be within the 47.2-50.2 GHz band. Tentatively named the Global EHF Satellite Network (“GESN”), TRW’s system will provide two-way point-to-point wideband data transport, multimedia, private network services, and broadband Internet access, among other telecommunications services.

On August 3, 2001, the FCC granted TRW’s application for the Ka-band portion of its GESN system at the 119° W.L., 79° W.L., 15° E.L. and 116.5° E.L. orbital locations.<sup>5</sup> Because TRW intends to place both V-band and Ka-band packages on the same platforms at these locations, prompt action on its V-band application, now pending before the Commission for nearly four years, is critical to the realization of TRW’s vision for the GESN system. Moreover,

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<sup>4</sup> See Public Notice DA 01-800 (released March 29, 2001). Under Commission policy, TRW will be able to use this spectrum for satellite services, subject to its receipt of Part 25 satellite authorization.

<sup>5</sup> See TRW Inc. Application for Authority to Construct, Launch, and Operate a Ka-Band Satellite System in the Fixed-Satellite Service, File Nos. 113-116-SAT-P/LA-97, IBFS No. SAT-LOA-19970904-00081-00084 and IBFS No. SAT-LOA-19971222-00229 (released August 3, 2001).

prompt action is necessary because, as the Commission is aware, the ITU clock is rapidly ticking toward the 2006 “bringing-into-use” deadline on TRW’s V-band filings.

The Commission requests comment on the proposals made in the FNPRM that seek to “harmonize” the 37.0-43.5 GHz portion of the V-band with the international sharing arrangement that was established for the band at WRC-2000.<sup>6</sup> In general, the Commission proposes a system of “soft segmentation” modeled after the CITELE common proposals to WRC-2000. The CITELE approach, which was promulgated principally by the U.S., would have permitted both the FS and FSS – including high density applications in each service – to be allocated on a co-primary basis throughout the 37.5-42.5 GHz portion of the band. The approach also would have required FSS licensees to adhere to more restrictive PFD limits below 40 GHz and in the 42.0-42.5 GHz band to encourage and protect high-density fixed service (“HDFS”) use, while permitting FSS operators to produce greater PFD into the 40.0-42.0 GHz to encourage and facilitate high-density FSS (“HDFSS”) use. In an outcome that was based largely, but not exclusively, on the CITELE proposals, WRC-2000 created a sharing arrangement for fixed and fixed-satellite services in the 37.5-42.5 GHz band that embraces the principles of soft segmentation.

TRW generally supports the proposals made in the FNPRM to the extent that they further the global plan for sharing between the wireless services and satellite services that was adopted at WRC-2000. Although the WRC-2000 Final Acts differ significantly from the CITELE proposals in several respects – particularly on how and to what extent fixed systems would be protected from the PFD produced by FSS systems under clear-sky conditions in the 37.5-40.0 GHz band – the United States has formally embraced the WRC-2000 output as the U.S. position

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<sup>6</sup> No modifications have been proposed by the Commission to the 36.0-37.0 GHz and 43.5-51.4 GHz bands.

in post-WRC-2000 ITU meetings addressing V-band issues, and has not heretofore attempted to retreat to pre-WRC-2000 positions. To the extent that several of the Commission's proposals, including the designation or allocation of spectrum at 40.5-41.0 GHz for government mobile-satellite service ("MSS") on a primary basis and the proposal to abandon from the power-control methodology adopted at WRC-2000 in the 37.5-40.0 GHz band, conflict with the actions taken by WRC-2000 and the post-WRC-2000 actions, TRW objects to the Commission's proposals and suggests preferable alternatives. TRW also has concerns about the contemplated treatment of the 47.2-48.2 GHz uplink band, as well as both the stated objective and proposed means of providing "full protection" to the Radio Astronomy service ("RA") in the 42.5-43.5 GHz band.

With these comments, TRW offers several proposed modifications of and additions to the Commission's proposals, and shows how these changes would provide the desired balance of interests, advance the public and national interests, and be fully achievable by the U.S. at WRC-2003. Specifically, TRW proposes:

- to have the Commission's rules, with the one exception noted in the final bullet below, track the PFD approach adopted by WRC-2000 for the band 37.5-42.5 GHz and not to retreat to the CITELE "bottom up" PFD approach below 40.0 GHz;
- to allocate the band 40.5-41.0 GHz to the MSS on a strictly secondary basis in Region 2 only – as agreed to at WRC-2000 – and not to designate any spectrum for co-primary MSS use (government or non-government);
- to limit government FSS use of the band 40.0-41.0 GHz to orbital locations outside the 70° W to 120° W orbital range (much as is currently the case at Ka-band);
- to have the Commission restore the 47.2-48.2 GHz band to FSS uplink use, and provide the fixed service ("FS") with a new HDFS band at 42.5-43.5 GHz for both government and non-government use;
- to have the Commission track the allocations made at WRC-2000 in the 42.0-42.5 GHz band to FSS, along with the existing 40.5-42.5 GHz allocation to the broadcasting satellite service ("BSS"), and not to

prejudge outcomes of ITU-R studies on the extent of protection to be provided to RA observations in the adjacent 42.5-43.5 GHz band; and

- to limit the required use of reduced clear-sky PFD levels to the 38.6-40.0 GHz band (where sensitive FS systems have actually been proposed for possible deployment) and even there to restrict only satellites serving the United States.

TRW applauds the Commission's efforts in the FNPRM to implement domestically the sharing arrangements for fixed and satellite services in the 37.5-42.5 GHz band reached at WRC-2000, as well as its willingness to revisit a recent allocation decision in order to reconcile domestic policy with a complex international landscape and provide the best opportunity possible for the introduction of beneficial and economical global broadband satellite service in these bands. TRW urges the Commission to adopt its proposals, as proposed to be modified herein.

**II. THE COMMISSION SHOULD ADOPT ITS PROPOSED NON-GOVERNMENT ALLOCATIONS, BUT REJECT OR RESTRICT ANY PRIMARY GOVERNMENT ALLOCATIONS WITHIN THE 40.0-42.0 GHZ BAND, AND DENY THE OVERLY BROAD PROTECTION DEMANDS OF RADIO ASTRONOMY BELOW 42.0 GHZ.**

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The Commission proposes a variety of allocation changes in the 37.0-43.5 GHz band that are "reasonably consistent" with the output from WRC-2000, and that are intended to accommodate the proposed designation changes discussed in Section III below.<sup>7</sup> TRW generally supports these allocation changes as they relate to the non-government services, but opposes those newly-advocated changes from the National Telecommunications and Information Administration ("NTIA") that would defeat the objective of the soft-segmentation proposal.

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<sup>7</sup> See FNPRM at ¶ 18.

**A. The Commission Should Adopt Its Proposals To Add Non-Government FSS Allocations To The 41.0-42.0 GHz And 37.5-37.6 GHz Bands.**

As an initial matter, the Commission should adopt both of its proposals to allocate new spectrum to the non-government FSS. The first of these proposals would add a non-government FSS allocation to the 41.0-42.0 GHz band, thereby encouraging and facilitating global HDFSS operations at 40.0-42.0 GHz.<sup>8</sup> By allocating two gigahertz of contiguous spectrum for FSS use, this proposal comports fully with the soft segmentation division of spectrum between satellite and terrestrial users agreed to by WRC-2000. For this reason, TRW supports its adoption.

TRW also supports the Commission's proposed allocation of 100 megahertz of spectrum to the non-government FSS at 37.5-37.6 GHz for gateway/hub operations.<sup>9</sup> Although this portion of the spectrum has been designated by the Commission for wireless operations, the Commission correctly observed that non-ubiquitously deployed earth stations are capable of sharing this band, even with contemplated future HDFS systems that would be extremely sensitive to interference, such as the HDFS systems proposed for the 38.6-40.0 GHz band by WinStar Communications, Inc ("WinStar") during its expansion/growth phase.<sup>10</sup>

With the adoption of the new non-government FSS allocation proposed in the FNPRM, the Commission should then amend Part 101 of its rules to correct the "erroneous omission" of FSS from the list of services permitted in the 38.6-40.0 GHz band.<sup>11</sup> TRW has previously noted the incongruous omission of the FSS as an expressly permissible service in the 39 GHz band in

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<sup>8</sup> See id. at ¶ 19.

<sup>9</sup> See id. at ¶ 27.

<sup>10</sup> See id. at ¶ 21.

<sup>11</sup> See id. at ¶ 17.

light of clear Commission pronouncements encouraging such service.<sup>12</sup> The Commission's proposed addition of the FSS to the Table of Frequency Allocations will correct this oversight.

**B. The Proposal To Make A Secondary Non-Government MSS Allocation In The 40.5-41.0 GHz Band Is Acceptable, But The Commission Should Not Allocate Spectrum For Government MSS Use At 40.5-41.0 GHz, Which Would Unfairly Favor Government Users At The Expense Of Non-Government Users.**

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**1. A Truly Secondary Allocation To The MSS At 40.5-41.0 GHz Can Be Made.**

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The Commission proposes a secondary non-government MSS allocation at 40.5-41.0 GHz in conjunction with its proposal to add a primary government MSS allocation there.<sup>13</sup> For the reasons discussed below, TRW opposes the allocation of the spectrum at 40.5-41.0 GHz for *primary* MSS use by government systems because of concerns of FSS interference into co-frequency MSS. It can, however, support the proposal regarding *secondary* non-government MSS operations because such interference concerns would be mooted, as the MSS operators would, by rule, shoulder the full burden of accepting interference from FSS systems.<sup>14</sup> In addition, a secondary allocation to MSS would also be consistent with the decisions reached at WRC-2000.

To ensure the unencumbered use of this portion of the spectrum by the FSS, TRW urges the Commission to make certain that any allocation of spectrum to the MSS there must be made subject to the express condition that no harmful interference is caused to the FSS and no

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<sup>12</sup> See, e.g., 39 GHz License Application of TRW Inc., File No. 0000137436, FCC Form 601, Exhibit F (filed May 24, 2000).

<sup>13</sup> See FNPRM at ¶ 24.

<sup>14</sup> Under Section 2.104(d) of the Commission's rules, stations of a secondary service shall not cause harmful interference to stations of primary services and cannot claim protection from harmful interference from stations of primary services to which frequencies are already assigned or may be assigned at a later date. 47 C.F.R. § 2.104(d)(3).

protection is claimed from the FSS. In other words, it must be clear to all parties that MSS, without regard to other constraints, is truly secondary to FSS.

**2. Any Co-Primary MSS Use Of The 40.0-41.0 GHz Band Would Jeopardize The Success Of The Entire Soft-Segmentation Concept.**

In contrast to its support of the proposed secondary allocation at 40.5-41.0 GHz for non-government MSS operations, TRW strongly opposes the Commission's proposed primary allocation of the 40.5-41.0 GHz band for government MSS use. This proposal reflects an apparent willingness on the part of the Commission to elevate the spectrum needs of the government over those of non-government users in a manner startlingly inconsistent with U.S. proposals to and agreements reached at WRC-2000 and later in the ITU-R.

The Commission has specifically proposed to shift the primary government MSS allocation from the 39.5-40.0 GHz band to 40.5-41.0 GHz.<sup>15</sup> This proposal was made necessary, according to the Commission, by a commitment of NTIA to accept restrictive PFD limits and to forgo demands for additional protection from government MSS earth stations below 40.0 GHz that was conditioned upon military access to the 40.5-41.0 GHz band.<sup>16</sup>

NTIA's prospective spectrum needs notwithstanding, adoption of this proposal would undermine the viability of the entire soft segmentation scheme by compromising the utility of the two gigahertz of contiguous spectrum set aside for FSS operations at 40.0-42.0 GHz. A co-primary MSS allocation at 40.5-41.0 GHz flatly works against the notion of unencumbered bandwidth for FSS because sharing between the services is not feasible.<sup>17</sup> Specifically, due to their slow antenna roll-off, MSS systems operating with small earth terminals would not be able

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<sup>15</sup> See FNPRM at ¶ 22.

<sup>16</sup> See id. at ¶ 23.

<sup>17</sup> There is no study in ITU-R on how MSS/FSS sharing would be accomplished.

to tolerate the aggregate interference that would be produced by multiple FSS satellites (both GSO and NGSO). It is irrelevant that the users NTIA seeks to protect are government-based rather than non-government – although the Commission seems willing to draw a distinction between the two.<sup>18</sup> TRW believes that no practical differences exist.

The Commission also has grounds to deny NTIA’s request for co-primary government MSS as contrary to past U.S. proposals on this issue. The U.S./CITEL proposal to WRC-2000, for example, only called for a worldwide secondary MSS allocation at 40.5-41.0 GHz. WRC-2000 ultimately adopted a secondary MSS allocation at 40.5-41.0 GHz for Region 2 only at the very last minute. During and even after the Conference, the U.S. made almost no effort to achieve or prosecute this allocation. It did not seek to have the possible globalization of this secondary allocation included in the agenda for WRC-2003; it has made no post-Conference efforts to study the practicality of the allocation in a multi-service environment in the ITU-R (compare the efforts of the U.S. to study a potential secondary allocation to the aeronautical mobile-satellite service at 14.0-14.5 GHz under Agenda Item 1.11); and its U.S. view on the V-band agenda items for WRC-2003 indicate full support for “the comprehensive sharing arrangement that the CITEL countries took into WRC-2000” (including the secondary MSS allocation proposal for 40.5-41.0 GHz).<sup>19</sup> As far as TRW is concerned, NTIA’s statement that, “[i]n the national preparations for WRC-00, NTIA agreed to the U.S. proposals for the restrictive PFD limits in the band 39.5-40.0 GHz subject to military access to the band 40.5-41 GHz for

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<sup>18</sup> The Commission asked supporters of a non-government primary MSS allocation at 40.5-41.0 GHz to comment on the “consequences” of adopting a primary allocation there. See FNPRM at ¶ 25. No such request was made of supporters of a government primary MSS allocation.

<sup>19</sup> See U.S. Preliminary View for WRC-2003, Agenda Item 1.32B, at [www.fcc.gov/wrc-03/files/docs/prelimi\\_views/uspv\\_june11.pdf](http://www.fcc.gov/wrc-03/files/docs/prelimi_views/uspv_june11.pdf).

FSS and mobile-satellite service (MSS) operations on a primary basis[,]”<sup>20</sup> is incorrect. Primary MSS at 40.5-41.0 GHz was never an element in the development of the soft segmentation plan.<sup>21</sup>

For the foregoing reasons, the Commission should reject both the request of NTIA and its own proposal to shift a primary government MSS allocation to 40.5-41.0 GHz.<sup>22</sup> This proposal, if granted, would upset the entire soft segmentation scheme.

**3. The Commission Will Have To Consider Allocating Additional Spectrum Below 40 GHz For Ubiquitous FSS Deployments If HDFSS Use Of The 40.0-41.0 GHz Band Is Constrained By Government MSS (Or FSS) Uses.**

TRW cannot overemphasize the criticality of a determination that FSS systems at 40.0-41.0 GHz have no obligation to protect (through coordination or operationally) co-frequency MSS operations. Indeed, if the FSS cannot be assured access to the full two gigahertz of downlink spectrum for high density applications because of the NTIA’s need at 40.5-41.0 GHz, then the requirements of the soft segmentation plan dictate that the Commission identify substitute FSS spectrum elsewhere within the 37.0-43.5 GHz band. In this regard, TRW raises the prospect that, if MSS (government and/or non-government) is elevated to co-primary status with the FSS in the 40.0-41.0 GHz band, or if government FSS service is allowed somehow to constrain non-government GSO or NGSO FSS service at 40.0-42.0 GHz within the continental U.S. (see discussion in Section II.D below), the status of the FSS allocation at 37.5-38.6 GHz

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<sup>20</sup> See Letter from William T. Hatch, Office of Spectrum Management, NTIA, to Bruce Franca, Office of Engineering and Technology, FCC (March 2, 2001) (“Hatch Letter”) at 1. See also FNPRM at ¶ 25.

<sup>21</sup> A significant further complication regarding possible primary MSS use stems from the fact that there is no PFD limit at all on MSS. At 40.0-40.5 GHz, WRC-2000 made no changes; at 40.5-41.0 GHz, a PFD limit was not necessary because the allocation is secondary and only in Region 2. No allocation on a primary basis could be issued or made in the absence of such limits.

<sup>22</sup> On the other hand, TRW does not object to maintenance of the status quo, i.e., retention of MSS at 39.5-40.0 GHz.

must be revisited.<sup>23</sup> Specifically, TRW believes that it may become necessary for the Commission to align the PFD limits in this band with the limits now in place internationally at 40.0-41.0 GHz to create the opportunities its policy envisions for the development of high-density applications in the FSS.

To be sure, such a change would create international complications and would force yet another shift in U.S. positions in ITU-R Working Party 4-9S (which is preparing for WRC-2003 on this issue), as well as within other regional fora (e.g., CITELE). Nevertheless, the linchpin for the soft segmentation scheme from the FSS point of view is access to two full gigahertz of spectrum in each direction for HDFSS use. If the band 40.0-41.0 GHz is not fully available, other spectrum must be found. TRW observes that in the 37.5-38.6 GHz band, unlike the case at 38.6-40.0 GHz, there have been no HDFSS deployments (the band is currently designated for HDFSS use in the United States), and thus there is a solid basis for distinguishing that segment of the 37.5-40.0 GHz band from the upper 1400 megahertz where the hyper-sensitive HDFSS systems of the design contemplated by WinStar would operate. European HDFSS systems are more robust than the Winstar design, and thus are less sensitive to FSS interference (they are able to operate at the PFD levels in Table S21-4); the main impediment to global HDFSS use of the 37.5-38.6 GHz would be achievement of protection for HDFSS earth terminals from interference produced by fixed service transmitters.<sup>24</sup>

TRW genuinely hopes that the Commission does not permit the belated NTIA proposals to upset the soft segmentation scheme the U.S. has been championing for the last 18 months. If

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<sup>23</sup> TRW is prepared, if necessary, to retain the 37.5-37.6 GHz FSS proposal (for GSO and non-GSO FSS) at the WRC-2000 PFD conditions, in order to protect Earth exploration-satellite service operations there.

<sup>24</sup> The protection of HDFSS earth terminals at 40.0-42.0 GHz remains an issue under study within the ITU-R. See Resolution 84 (WRC-2000) at *invites* ITU-R 6. The Commission's proposal moots the issue in the U.S.

TRW's hope is not to be realized, however, the Commission must be prepared to take appropriate compensatory actions to ensure that HDFSS achieves meaningful access to two full gigahertz of downlink spectrum, and thus must be prepared to revisit HDFSS use of 37.5-38.6 GHz if necessary.

**C. TRW Supports Adding Non-Government Fixed And Mobile Allocations To The 42.5-43.5 GHz Band, But Would Restore The 47.2-48.2 GHz Band To FSS Use.**

In the FNPRM, the Commission sought comment on, but stopped short of expressly proposing, the addition of FS and mobile service ("MS") allocations for non-government use to the 42.5-43.5 GHz band and the related designation of the band for wireless services.<sup>25</sup> To accommodate wireless services in that segment of the spectrum, the Commission offered two alternative scenarios: (1) the return of the 42.5-43.5 GHz and 47.2-48.2 GHz bands to their original (pre-1998) allocations for both government and non-government use; and (2) the exchange of the non-government 47.2-48.2 GHz band for the government's 42.5-43.5 GHz band.<sup>26</sup>

TRW supports allocating spectrum at 42.5-43.5 GHz to the FS and MS.<sup>27</sup> Not only would this allocation be consistent with WRC-2000 determinations, the HDFSS systems (both government and non-government) permitted to operate in that band under this allocation are not expected to cause harmful interference into FSS systems below 42.0 GHz or to RA observations in the 42.5-43.5 GHz band. To effect this terrestrial allocation, the Commission should adopt the first of its two scenarios – namely, the return of the 42.5-43.5 GHz and 47.2-48.2 GHz bands

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<sup>25</sup> See FNPRM at ¶ 28.

<sup>26</sup> See id. at ¶ 30.

<sup>27</sup> TRW also does not object to the proposed designation of the 42.5-43.5 GHz band for wireless services, subject to the conditions discussed in Section III of these comments.

to their original government and non-government allocations – with the understanding that government and non-government FSS will be permitted in the 47.2-48.2 GHz band.

**D. The Addition Of A Government FSS Allocation At 40.5-41.0 GHz Is Acceptable If Not Given Priority Over Non-Government FSS.**

TRW can support the proposal to add a primary FSS allocation at 40.5-41.0 for government use, also advocated by NTIA, but only if the Commission clearly indicates that such use will not receive priority over non-government use.<sup>28</sup> As discussed above, the soft segmentation approach requires two gigahertz of unfettered spectrum for FSS. To this end, the band 40.0-42.0 GHz must be clearly made available without constraint, as intended, for global commercial HDFSS use.

To ensure that government FSS operations are able to take place, but do not unnecessarily constrain non-government FSS, TRW proposes that the Commission adopt for the 40.0-41.0 GHz band a footnote in the Table of Frequency Allocations that tracks the language of footnote US334, which applies to the 17.8-20.2 GHz FSS downlink band.<sup>29</sup> Footnote US334 was adopted by the Commission in 1995, at the behest of NTIA, which stated that the reallocation was essential to fulfill government requirements that could not be accommodated in

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<sup>28</sup> See FNPRM at ¶ 26.

<sup>29</sup> Footnote US334 provides as follows:

In the band 17.8-20.2 GHz, Government space stations in both geostationary (GSO) and non-geostationary satellite orbits (NGSO) and associated earth stations in the fixed-satellite service (space-to-Earth) may be authorized on a primary basis. For a Government geostationary satellite network to operate on a primary basis, the space station shall be located outside the arc, measured from east to west, 70 West Longitude to 120 West Longitude. Coordination between Government fixed-satellite systems and non-Government space and terrestrial systems operating in accordance with the United States Table of Frequency Allocations is required.

47 C.F.R. § 2.106, n.US334. The note contemplated by TRW would have the same language, but would replace “17.8-20.2 GHz” with “40.0-41.0 GHz.”

bands currently allocated for government use.<sup>30</sup> A similar rationale was expressed in the Hatch Letter.<sup>31</sup>

Here, there is very little spectrum available for high-density FSS use. If the government has a prospective requirement for FSS spectrum at V-band, the need should be met through an innovative approach based on US334, rather than on some archaic version of warehousing, which promotes inefficiency and creates uncertainty in the interim period before the government's plans crystallize.

**E. The Commission Should Not Unnecessarily Encumber FSS Operations In Order To “Fully Protect” Radio Astronomy.**

In order to “fully protect” Radio Astronomy in the 42.5-43.5 GHz band from potential interference due to the unwanted emissions of satellite transmitters, the Commission has proposed to adopt a modified version of footnote S5.551G that would only apply to the 41.5-42.0 GHz band for FSS.<sup>32</sup> This modification is possible because the Commission proposes not to allocate the 42.0-42.5 GHz band for FSS in the U.S.<sup>33</sup>

TRW has several serious issues with this proposal. The proposal not to allocate spectrum for FSS at 42.0-42.5 GHz is in clear conflict with U.S. positions at WRC-97 and WRC-2000 advocating just the opposite. Most proposed FSS systems operating in the 40/50 GHz bands use small spot beam antennas. Depending on the type of RA observations, and the actual protection

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<sup>30</sup> See Amendment of Part 2 of the Commission's Rules to Allocate Spectrum for the Fixed-Satellite Service in the 17.8-20.2 GHz Band for Government Use, Memorandum Opinion and Order, 10 FCC Rcd 9931 (1995).

<sup>31</sup> See Hatch Letter at 1.

<sup>32</sup> See FNPRM at ¶ 33. Footnote S5.551G, added by WRC-2000 to the Radio Regulations, provides that the aggregate PFD in the 42.5-43.5 band produced by all space stations in any non-geostationary system operating in the 41.5-42.5 GHz band shall not exceed  $-167$  dB(W/m<sup>2</sup>) in any one megahertz band at the site of an RA station for more than two percent of the time. It also restricts geostationary FSS or BSS operations in the 42.0-42.5 GHz band. The modified version of footnote S5.551G proposed by the Commission would appear as USXXX in the Table of Frequency Allocations.

<sup>33</sup> See id.

requirements, the unwanted emissions of FSS systems may be able to meet the actual protection requirements at the RA sites. The Commission's proposal also ignores the pending ITU-R study established by the Final Acts of WRC-2000 into the possible steps RA can take to reduce susceptibility to interference into its sites.<sup>34</sup> Any action on the part of the Commission to reduce the perceived threat of harmful interference into RA operations taken prior to the completion of this study would be premature and a hasty overreaction to meet the needs of RA operators at the expense of FSS operators.

The lack of a genuine need for the NTIA's proposal aside, TRW questions its very premise – namely, the idea that RA is entitled to some kind of super-protection (or, as the Commission phrased it, “full protection”) in adjacent bands. Although the FNPRM does not contain an explanation of exactly what “full protection” means, the Commission proposes what could be a novel form of protection that would set a dangerous precedent in times when demand for spectrum is growing and there is increasing pressure to maximize efficient use of the spectrum resource.<sup>35</sup> In this regard, the Commission should take due account of the fact that WRC-2000 lifted a freeze imposed by WRC-97 on FSS use of the 41.5-42.5 GHz band, a move which clearly emphasizes that use of this band by FSS systems is contemplated – regardless of the outcome of 42.0-42.5 GHz issues.<sup>36</sup>

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<sup>34</sup> See Res. 128 (WRC-2000) at *invites 2* (inviting ITU-R to identify “measures that may be implemented to reduce the susceptibility of stations in the radio astronomy service to harmful interference”).

<sup>35</sup> Under the ITU Radio Regulations, RA is treated as a radiocommunications service, and “protection from services in other bands shall be afforded to the radio astronomy service only to the extent that such services are protected from each other.” ITU Radio Reg. No. S4.6. Thus, far from being a service entitled to some form of heightened protection, RA is protected only at the lowest applicable levels.

<sup>36</sup> See Res. 128 (WRC-2000) at *recognizing a*) (recognizing that there was, but no longer is, a requirement that FSS systems not be implemented in the 41.5-42.5 GHz band until technical and operational measures have been identified and agreed within the ITU-R to protect RA from harmful interference in the 42.5-43.5 GHz band).

Providing “full protection” to RA also calls into question the viability of FSS operations at 40.0-42.0 GHz. While TRW wishes to protect RA operations to the extent needed, it can categorically state that FSS systems operating at 42.0-42.5 GHz will not be able to meet the existing interference threshold levels contained in Rec. ITU-R RA.769-1.

Contrary to the position taken in the FNPRM, however, this fact should not end the inquiry and spark a proposal for deletion of FSS and BSS allocations. Instead, the impact of the RA-generated protection criteria on adjacent-band services should prompt the Commission to take a long and critical look at the criteria themselves to see if they are unduly conservative in any way.

TRW has begun this process. It has found that the protection criteria in Rec. ITU-R RA.769-1 are plainly too conservative, as the results of several studies submitted to Task Group 1/7 and Working Party 4A make clear.<sup>37</sup> For example, Rec. ITU-R RA.769-1 assumes a RA antenna gain of 0 dBi at 19° off-axis angle. Yet, the actual RA antenna gain at that angle is at least –15 to –20 dBi, due to the faster antenna roll-off of the large antennas employed by the RA. In addition, as antennas with a two-foot diameter operating in the 40 GHz band have a gain of less than –15 dBi at a 19° off-axis angle, antenna gain of a large RA antenna should be significantly less than –15 dBi at the same off-axis angle.<sup>38</sup>

FSS systems operating in the 40.0-42.0 GHz band will also be unable to meet the provisional PFD limits established by footnote S5.551G. Several administrations and satellite

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<sup>37</sup> See, e.g., Document USWP4A/17 (Rev.2), “Working Document Toward Draft CPM Text: Potential Impact on FSS and BSS Service Systems Operating in the 40.5-42.5 GHz Band of Meeting The Protection Criteria of Recommendation ITU-R 769-1 for Radio Astronomy Receivers Operating in the 42.5-43.5 GHz Band,” (August 29, 2001) (approved by U.S. Working Party 4A).

<sup>38</sup> Moreover, because the RA antenna will scan during observations, the average antenna gain should be taken into consideration.

operators have submitted to Task Group 1/7 and Working Party 4A the results of studies depicting the practical levels of unwanted emissions of the existing GSO satellite networks operating in the 4/6 GHz and 11/14 GHz bands. According to these studies, the lowest levels of unwanted emissions from these systems into a RA receiver operating in the 42.5-43.5 GHz band is  $-202$  dB (W/m<sup>2</sup>/Hz) or  $-142$  dB (W/m<sup>2</sup>/MHz). The studies also indicated that the unwanted emissions of the future 4/6 GHz and 11/14 GHz FSS systems operating with multi-beam satellite antennas, particularly with phased array antennas will be significantly higher than  $-202$  dB(W/m<sup>2</sup>/Hz), because they may not be able to include significant filtering between the satellite transmit amplifiers and the antennas. It would, therefore, be difficult for FSS systems operating in the adjacent 40.0-42.0 GHz band to satisfy footnote S5.551G's provisional power limits of  $-227$  dB (W/m<sup>2</sup>/Hz) or  $-167$  dB (W/m<sup>2</sup>/MHz). The  $-167$  dB (W/m<sup>2</sup>/MHz) provisional value is 25 dB more stringent than the lowest emission level that can be achieved by existing GSO FSS systems operating in the C- and Ku-bands.<sup>39</sup>

In sum, the Commission should make the allocation approved by the U.S. and WRC-2000 to the FSS and BSS at 42.0-42.5 GHz, reject the proposal for the addition of footnote USXXX, and await the completion of studies on the protection objectively needed by RA in the 42.5-43.5 GHz band before unnecessarily thwarting or constraining FSS operations at 40.0-42.0 GHz or at 42.0-42.5 GHz.<sup>40</sup>

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<sup>39</sup> Because the propagation impairments are severe in the 40.0-42.0 GHz band, the downlink PFD level of GSO FSS systems in that band must be at least 10 to 20 dB higher than the limits of GSO FSS systems in the C- and Ku-bands.

<sup>40</sup> TRW recognizes that these studies may take some time yet, and would not object to deferral of this issue alone to a later stage of the rulemaking proceeding.

**III. THE COMMISSION SHOULD ADOPT ITS PROPOSED SWAP OF NON-GOVERNMENT WIRELESS AND SATELLITE DESIGNATIONS, BUT SHOULD NOT ADOPT ITS PROPOSED NON-GOVERNMENT MSS DESIGNATION.**

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**A. The Proposed Redesignation Of Spectrum Available For Wireless And Satellite Services Comports With Decisions Reached At WRC-2000.**

The Commission proposes to redesignate the spectrum available for non-government wireless services from 41.0-42.0 GHz to 37.6-38.6 GHz and redesignate the spectrum available for non-government satellite uses from 37.6-38.6 GHz to 41.0-42.0 GHz.<sup>41</sup> The proposal, if adopted, would alter the existing layout of satellite and terrestrial service designations but would not change the total amount of spectrum currently designated for use by these services.<sup>42</sup>

TRW supports the Commission's proposal to swap wireless- and satellite-designated spectrum. The proposal accords with the spectrum sharing agreements reached at WRC-2000, and would also increase the total amount of exclusively designated, contiguous spectrum available to satellite operators. In addition, TRW does not anticipate that the higher frequency band will have any adverse impact on satellite operations there, provided that NGSO FSS systems at 41.5-42.0 GHz are not constrained due to RA operations at 42.5-43.5 GHz, as discussed above. To reflect these new designations, Parts 25 and 101 of the FCC's rules should be modified, as proposed by the Commission.

When implementing these new designations, however, the Commission must emphasize that they are merely indications of the envisioned principal use of the spectrum, and do not have independent regulatory significance. The Commission should also make clear that a designation does not preclude or impose additional constraints (i.e., constraints beyond those contained in the

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<sup>41</sup> See FNPRM at ¶ 15.

<sup>42</sup> See id. at ¶ 12.

new rules proposed in this proceeding) on use by other allocated services. Finally, for reasons given in Section II.B above, TRW emphasizes that it may be necessary to revisit the principal use issue for 37.6-38.6 GHz based on treatment of NTIA proposals regarding government MSS and FSS spectrum at 40.0-41.0 GHz.<sup>43</sup>

**B. The Proposal To Add An MSS Designation To The 40.5-41.0 GHz Band Is Contrary To WRC-2000 Determinations.**

In contrast to the WRC-2000-compliant proposal to swap wireless and satellite designations, the Commission's proposal to add an MSS designation to the 40.5-41.0 GHz band flatly contradicts determinations made at WRC-2000.<sup>44</sup> The Commission tacitly acknowledges this inconsistency in the FNPRM by noting that WRC-2000 adopted only a secondary MSS allocation at 40.5-41.0 GHz in Region 2, yet nevertheless offered its proposal for the stated purpose of allowing satellite licensees the "maximum flexibility possible in deciding how to use this spectrum."<sup>45</sup>

To the contrary, adopting the proposed MSS designation would have the perverse effect of stifling flexibility by permitting incompatible services to operate co-primary in the same bands, thereby heightening the risk of harmful interference.<sup>46</sup> TRW believes that the "maximum flexibility" that the Commission would ostensibly provide to satellite operators could be interpreted to favor or encourage primary MSS operations at 40.5-41.0 GHz. In addition, with the imposition of MSS at 40.5-41.0 GHz, FSS would lose spectrum vis-à-vis the FS, which would also gains freedom from MSS with the deletion of that service's allocation at 39.5-40.0

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<sup>43</sup> See Section II.B.3, supra.

<sup>44</sup> See FNPRM at ¶ 16.

<sup>45</sup> Id.

<sup>46</sup> As noted previously, MSS and FSS are incompatible services. See Section II.B, supra.

GHz. In the FNPRM, the Commission deliberately proposed to continue the policy of having two gigahertz of designated spectrum for high-density applications in the FSS. It should not undo the effects of this designation by adopting a primary designation (or allocation) for MSS operations at 40.5-41.0 GHz.

**IV. THE COMMISSION SHOULD ESTABLISH PFD LIMITS THAT ARE GENERALLY CONSISTENT WITH THE DECISIONS REACHED AT WRC-2000.**

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The Commission has proposed PFD limits on satellite operations in the 37.5-42.5 band that are intended to be consistent with the spectrum designations discussed above, and to adopt these limits now rather than wait for the results of WRC-2003. While TRW enthusiastically supports the immediate adoption of PFD limits, it believes that certain modifications to the Article S21 levels proposed by the Commission are an unwarranted and potential dangerous departure from the agreements reached at WRC-2000.

**A. The Commission Should Adopt Workable PFD Limits Immediately Rather Than Wait For The Results Of WRC-2003.**

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The Commission correctly concluded that the benefits of adopting the WRC-2000 PFD limits for FSS now outweigh any potential advantage in awaiting the final results of WRC-2003 on this issue.<sup>47</sup> Among other benefits, immediate adoption of power limits will assist satellite operators by setting out the operational parameters under which they will be required to plan and construct their systems. TRW fully supports the Commission on this point.

**B. The Commission Should Adopt PFD Limits For The 37.5-40.0 GHz Band That Track The Approach Agreed To At WRC-2000.**

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Although it recognizes the benefit in the immediate adoption of the WRC-2000 PFD limits, the Commission inexplicably proposes to depart from the power-control methodology

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<sup>47</sup> See FNPRM at ¶ 40.

agreed to at WRC-2000 for the 37.5-40.0 GHz band (i.e., establishing more relaxed PFD limits in Article S21 for fading conditions and validation purposes, while contemplating that power control techniques would be used to reduce the PFD by up to 12 dB in clear-sky conditions) and proposes to adopt instead the CITELE approach (i.e., establishing more restrictive PFD limits for clear-sky operating conditions and permitting PFD increases to overcome fading conditions).<sup>48</sup> Although the CITELE approach was the official position of the U.S. prior to WRC-2000, since Istanbul the U.S. has firmly backed the WRC-2000 methodology in the ITU-R.<sup>49</sup> The contrary proposal advanced by the Commission in the FNPRM thus marks a significant retreat to an obsolete U.S. position that will likely cause confusion and compound already substantial international resentment to the clear-sky PFD elements of the soft segmentation concept as a whole. To avoid these unwanted consequences, TRW urges the Commission to reverse course and adopt the PFD approach taken at WRC-2000. Moreover, the Commission's rules should similarly specify that the clear-sky PFD limitation of 12 dB applies only when the FSS satellites are serving the United States.<sup>50</sup>

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<sup>48</sup> See FNPRM at ¶ 37.

<sup>49</sup> Indeed, the current U.S. View for this Agenda Item to WRC-2003 provides, in pertinent part, that:

The PFD limits established in Article S21 (Table S21-4) for the FSS (space-to-Earth) in the bands 37.5-40.0 GHz and 42.0-42.5 GHz, and for the MSS (space-to-Earth) in the band 39.5-40.0 GHz should be maintained, and should be used for validation purposes. When GSO and non-GSO satellites operate in these bands under clear-sky conditions, their operational PFD levels should be reduced to the levels in Table S21-4 minus 12 dB.

U.S. Preliminary View for WRC-2003, Agenda Item 1.32 B (May 21, 2001). See [www.fcc.gov/wrc-03/files/docs/prelimi\\_views/uspv\\_junell.pdf](http://www.fcc.gov/wrc-03/files/docs/prelimi_views/uspv_junell.pdf).

<sup>50</sup> The reduced clear-sky PFD concept of Resolution 84 (WRC-2000) applies only in ITU Region 2. For now, and pending adoption of similar rules by other countries in Region 2, the clear-sky rules' reach should be limited to the United States. Whatever the outcome of the issue in other countries in Region 2, however, any extension beyond Region 2 territory would put U.S. satellites at a disadvantage with respect to their foreign counterparts, and thus be unwieldy.

There is, in addition, a risk that the Commission’s proposed power limits could effectively preclude the economic viability of FSS operations in the V-band. The Commission specifically proposes to lower, for both NGSO and GSO FSS, the Article S21 PFD limits by 12 dB under normal, clear-sky conditions but provide for operations up to the Article S21 levels under fading conditions.<sup>51</sup> The international community, however, has not accepted as fact that high-density applications in the fixed service requires the level of protection that would be provided by Article S21 limits minus 12 dB – particularly given the fact that compliance with those already strict levels is ascertained through the use of a methodology that is of dubious applicability in this frequency range.<sup>52</sup> Moreover, the clear-sky levels proffered by the Commission are marginal at best, forcing FSS stations to larger dish sizes and more arid geographic locations in order to meet availability objectives. The benefit of “knowing the parameters” under which satellite operations are to be provided is real only if the known parameters are not so constraining as to preclude a viable service. Insistence on the protection of the power levels proposed by the Commission in the face of international (and longstanding U.S.) skepticism on the need therefore jeopardizes the delicate balancing of interests that is the essence of the comprehensive soft segmentation scheme.

Put another way, the viability of the FSS (both GSOs and NGSOs) requires that FSS satellites have the ability to operate at levels up to the current Article S21 limits during fading

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<sup>51</sup> See FNPRM at ¶¶ 41, 42. Although the Commission’s proposed rules do not put limitations on the manner in which FSS systems would overcome fading conditions (something TRW supports), the fact of the matter is that other Administrations cannot be blithely expected to follow the Commission’s lead on this critical issue – particularly given the existence of Resolution 84 (WRC-2000) and Footnote S5.551AA, as well as the fact that studies on this question pursuant to *invites 7* of Resolution 84 remain in their early stages within the ITU.

<sup>52</sup> See, e.g., Document 4-9S/68, “Impact of Non-GSO and GSO Satellites on the Fixed Service in the 37.5-42.5 GHz Bands” (contribution of France to March 2001 meeting of ITU-R Working Party 4-9S); Document 4-9S/90, “Progress Report on the Further Development and Refinement of the New Methodology Presented in Doc. 4-9S/TEMP/25” (contribution of Canada to March 2001 meeting of ITU-R Working Party 4-9S).

conditions on the space-to-Earth link. The WRC-2000 approach satisfies this practical need of the FSS – and does so with little risk of a countervailing downside. Because FSS stations will have the operational incentive not to run at full power any longer than necessary, the probability of additional interference being caused to FS receivers during maximum PFD operations will be negligible. The Commission’s proposed approach, while acceptable for the United States, leaves satellite operators unacceptably exposed in other countries where the “bottom up” approach would be followed, as there is no assurance that the Commission’s rules would be adopted in those countries.

Under the WRC-2000 approach, the limitations on GSO operations contained in *resolves* 2 of Resolution 84 also come back into play.<sup>53</sup> The U.S. rules, as modified per TRW’s proposals, would serve as the GSO FSS “agreement” called for by Resolution 84 for the U.S., and also serve as a model agreement for other administrations in Region 2.<sup>54</sup>

Finally, TRW agrees that the Commission should adopt power limits in Article S21 for 40.0-42.5 GHz band for FSS, and in the band 40.0-40.5 GHz for MSS. These limits on FSS at 40.0-42.0 GHz are adequate to permit HDFSS operations.

**C. No Time Limit Should Be Imposed On Power Increases To Overcome “Fade Conditions,” A Term Which the Commission Should Define Generally.**

The Commission requests comment on the percentage of time during which licensees may exceed the proposed PFD limits that would apply when fading conditions exist.<sup>55</sup> TRW believes that there should be no specific limit on the percentage of time during which FSS

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<sup>53</sup> See Res. 84 (WRC-2000) *resolves* 2.

<sup>54</sup> A similar agreement is not required for NGSO FSS systems under Resolution 84. The only applicable regulation is the recommendatory language in Footnote S5.551AA.

<sup>55</sup> See FNPRM at ¶ 43.

systems can increase power to overcome fading conditions. However, the percentage of the time during which FSS satellites will need to exceed the clear-sky PFD levels to overcome fading conditions is in a range from 1 percent to 5 percent depending on the location. To this end, TRW suggests that satellite systems be required: (1) not to increase power for longer than necessary to overcome fading; and (2) to increase power by only the amount needed to close the link (up to 12 dB).<sup>56</sup> Again, such measures would only apply for service to the United States.

The Commission also seeks comment on whether, and how, to define “fading conditions.”<sup>57</sup> TRW believes that this term should be defined generally to mean changes in atmospheric propagation conditions, as compared to a clear-sky baseline, that would degrade the desired satellite-to-Earth station link.

**D. The Commission Should Revisit The Need For The Reduced Clear-Sky PFD Approach At All In The 37.5-38.6 GHz Band.**

One way to eliminate unresolved issues over the PFD limits below 40.0 GHz – which tend to reverberate intermittently into the PFD limits at 40.0-42.0 GHz – is for the Commission to consider eliminating the power control provisions of Resolution 84 from the 37.5-38.6 GHz band. FS systems are not deployed in this band – all but 100 megahertz of which was identified for FSS use in the 1998 Order in this proceeding. This means that there are no FS systems with the extremely sensitive characteristics of HDFS systems that were targeted for future operation in the band 38.6-40.0 GHz, where FS deployment has occurred to some extent. International studies clearly show that many high-density applications in the FS are protected at the Table S21-4 PFD levels, and future HDFS systems in the lower 1100 megahertz of the 37.5-40.0 GHz

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<sup>56</sup> Resolution 84 has no limit on the amount by which power may be increased above the Article S21 limits minus 12 dB, so the proposal to restrict increases to 12 dB would provide FS operators with a measure of assurance they currently lack.

<sup>57</sup> See id.

band could be designed for the higher PFD environment. As noted above, European HDFS systems tend to be more robust and can successfully exist in this PFD environment. Truly sensitive FS systems, to the extent they remain on the drawing boards, could be steered toward bands (such as 37.0-37.5 GHz and 42.5-43.5 GHz) where FSS systems do not operate.

Eliminating the power control restriction would not upset the spectrum balance, as the 37.5-38.6 GHz band could not be considered an HDFSS band unless restrictions were to be imposed on FS deployment and emissions to protect the FSS earth terminals. TRW would not seek such restrictions unless, as explained above, it loses meaningful access to 40.0-41.0 GHz as a result of proposals advanced by NTIA.

**V. TRW SUPPORTS THE COMMISSION’S PROPOSAL TO RESTRICT UBIQUITOUSLY-DEPLOYED EARTH STATIONS TO THE 40.0-42.0 GHZ BAND AND TO TREAT PART 101 LICENSEES EQUALLY REGARDLESS OF SERVICE.**

The Commission proposes to limit the 37.5-40.0 GHz satellite earth station operations that a Part 101 licensee may deploy in its license area to “gateway” facilities.<sup>58</sup> More specifically, under this proposal, satellite earth stations in this band would be prohibited from being ubiquitously deployed and from serving individual customers.<sup>59</sup> TRW does not object to the limitation on the ubiquitous deployment of satellite earth stations, as it recognizes the need to sacrifice a measure of Part 101 flexibility in order to preserve the proposed designation of the 37.5-40.0 GHz band for use by wireless services. TRW opposes, however, as redundant and unnecessary the Commission’s prohibition on service to “individual customers” by satellite earth stations. The ubiquitous deployment limitation contained in the Commission’s proposal should be adequate to assure wireless operators with unencumbered use of spectrum below 40 GHz, and

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<sup>58</sup> See *id.* at ¶ 47.

<sup>59</sup> See *id.*

that they will not be overrun with FSS terminals; there is no need to artificially limit – and in an ambiguous way at that – where an FSS terminal meeting the PFD limitations may be located.<sup>60</sup>

The Commission next seeks comment on how to apply its Part 101 rules to a satellite licensee operating in the 37.5-40.0 GHz band – an issue that directly affects TRW as the holder of 100 39 GHz authorizations. For purposes of interference protection, the Commission proposes to treat earth stations the same as terrestrial stations (either EA licensees or incumbents) operating under Part 101 of its rules.<sup>61</sup> Under this approach, an earth station Part 101 licensee would be required to coordinate operations for any and all of the stations that it intends to locate within 16 km of the boundary of its licensed area. Any such station would not be entitled to protection from other Part 101 EA (or incumbent) licensed earth stations that are further than 16 km from its service area. Similarly, a non-earth station Part 101 license in another EA (or rectangular area) would have to coordinate all of its proposed stations within 16 km of the boundary of its licensed area with all FSS earth stations within 16 km of the boundaries of adjacent areas.<sup>62</sup> TRW supports the Commission’s approach to treat earth station and wireless licensees on level terms. For purposes of coordination and interference resolution, there is no legal or policy reason to draw a distinction between the two types of services.

Finally, the Commission proposes that the level of protection granted to FSS earth stations during the coordination process be comparable to that provided to terrestrial fixed

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<sup>60</sup> The Commission has indicated that it has not yet defined the term “gateway” because “gateway configurations often vary by system and service. See FNPRM at n.44. TRW agrees that it is not necessary to formally define “gateway” earth stations, but has no objection to a conceptual policy understanding that reflects the fact that these are relatively larger dishes that are not typically consumer-level, mass-market deployments.

<sup>61</sup> See FNPRM at ¶ 49.

<sup>62</sup> See id.

stations operating in the band.<sup>63</sup> The intent of this proposal is to avoid an “onerous coordination burden” on wireless services in the band. TRW intends to comply fully with the coordination procedures set out in Part 101, and thus fully supports this proposal.

## **VI. CONCLUSION**

With the release of the FNPRM, the Commission has taken an important step toward implementing domestically the important global sharing arrangements adopted by WRC-2000. Many of the proposals made by the Commission adhere to the WRC-2000 plan of soft segmentation of terrestrial and satellite services in the 37.0-43.5 GHz band, and TRW strongly supports their immediate adoption. On the other hand, where its proposals deviate from the decisions reached at WRC-2000 in general, and from the soft segmentation approach in particular, the Commission should adopt modifications to these proposals as advanced herein so that the achievements of WRC-2000 can be fully realized.

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<sup>63</sup> See id. at ¶ 51.

In the Attachment to these Comments, TRW provides a redline version of the proposed rules that track its views expressed above.

Respectfully submitted,

**TRW Inc.**

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## ATTACHMENT

### Proposed Rules from Appendix B to FNPRM with TRW Modifications

Parts 2, 25, and 101 of title 47 of the Code of Federal Regulations are proposed to be amended as follows:

#### **PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS**

1. The authority citation for part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

- a. Revise pages 76, 77, and 78.

- b. Add, under International Footnotes, New "S" Numbering Scheme footnotes S5.551AA and S5.551G in numerical order and remove footnotes S5.551.B, S551.C, S551.D, and S551.E.

- c. Add United States footnotes USFSS, USGFSS ~~USXXX~~ and USYYY in numerical order.

- d. Revise Government footnote G117.

The revisions and additions read as follows:

#### **§ 2.106 Table of Frequency Allocations.**

\* \* \* \* \*

36-37 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) S5.149	36-37 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US263 US342		
37-37.5 FIXED MOBILE SPACE RESEARCH (space-to-Earth) S5.547	37-37.5 FIXED MOBILE SPACE RESEARCH (space-to-Earth)	37-37.5 FIXED MOBILE	
37.5-38 FIXED FIXED-SATELLITE (space-to-Earth) <a href="#">S6-554AA</a> MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) S5.547	37.5-38.6 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE	37.5-38.6 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE	Satellite Communications (2b)
38-39.5 FIXED FIXED-SATELLITE (space-to-Earth) S5.551AA MOBILE Earth exploration-satellite (space-to-Earth)	38-38.6 FIXED MOBILE	<a href="#">USFSS</a>	
S5.547	38.6-39.5	38.6-39.5 FIXED-SATELLITE (space-to-Earth) MOBILE US291	Auxiliary Broadcasting (74) Fixed Microwave (101) Satellite Communications (25)
39.5-40 FIXED FIXED-SATELLITE (space-to-Earth) S5.551AA MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) S5.547	39.5-40 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	39.5-40 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE US291 USYYY G117	

International Table		United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3		
40-40.5 EARTH EXPLORATION-SATELLITE (Earth-to-space) FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth)			Federal Government 40-40.5 EARTH EXPLORATION-SATELLITE (Earth-to-space) FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth) G117 <a href="#">USGFSS</a>	Non-Federal Government 40-40.5 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Satellite Communications (25)
40.5-41 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) S5.547	40.5-41 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) S5.547	40.5-41 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE Mobile S5.547	40.5-41 FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) Fixed US211	
41-42.5 FIXED FIXED-SATELLITE (space-to-Earth) S5.551AA BROADCASTING-SATELLITE Mobile			US211 <a href="#">USGFSS</a> G117 41-42.5 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE MOBILE US211 <a href="#">USXXX</a> <del>42-42.5</del> <del>FIXED</del> <del>BROADCASTING-SATELLITE</del> <del>MOBILE</del> US211 <a href="#">USXXX</a>	
S5.547 S5.551F [ <a href="#">S5.551G</a> ]			US211 <a href="#">USXXX</a>	

42.5-43.5 FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE except aeronautical mobile RADIO ASTRONOMY	42.5-43.5 RADIO ASTRONOMY	
S5.149 S5.547	US342	
43.5-47 MOBILE S5.553 MOBILE-SATELLITE RADIO NAVIGATION RADIO NAVIGATION-SATELLITE	43.5-45.5 MOBILE-SATELLITE (Earth-to-space) FIXED-SATELLITE (Earth-to-space) G117	
	45.5-46.9 MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO NAVIGATION-SATELLITE S5.554	RF Devices (15)
S5.554	46.9-47 MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO NAVIGATION- SATELLITE	
47-47.2 AMATEUR AMATEUR-SATELLITE	S5.554 47-47.2 AMATEUR AMATEUR-SATELLITE	Amateur (97)
47.2-50.2 FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE	47.2-48.2 FIXED FIXED-SATELLITE (Earth-to-space) US297 MOBILE US264	
S5.149 S5.340 S5.552A S5.555	48.2-50.2 FIXED FIXED-SATELLITE (Earth-to-space) US297 MOBILE US264 S5.555 US342	Satellite Communications (25)

\* \* \* \* \*

## INTERNATIONAL FOOTNOTES

\* \* \* \* \*

### I. New "S" Numbering Scheme

\* \* \* \* \*

S5.551AA In the bands 37.5-40 GHz and 42-42.5 GHz, non-geostationary-satellite systems in the fixed-satellite service should employ power control or other methods of downlink fade compensation of the order of 10 dB, such that the satellite transmissions are at power levels required to meet the desired link performance while reducing the level of interference to the fixed service. The use of downlink fade compensation methods are under study by ITU-R (see Resolution 84 (WRC-2000)).

\* \* \* \* \*

S5.551G In order to protect the radio astronomy service in the band 42.5-43.5 GHz, the aggregate power flux-density in the 42.5-43.5 GHz band produced by all the space stations in any non-geostationary –satellite system in the fixed-satellite service (space-to-Earth) or in the broadcasting-satellite service (space-to-Earth) system operating in the 41.5-42.5 GHz band shall not exceed  $-167 \text{ dB(W/m}^2\text{)}$  in any 1 MHz band at the site of a radio astronomy station for more than 2% of the time. The power flux-density in the band 42.5-43.5 GHz produced by any geostationary station in the fixed-satellite service (space-to-Earth) or in the broadcasting-satellite service (space-to-Earth) operating in the band 42-42.5 GHz shall not exceed  $-167 \text{ dB(W/m}^2\text{)}$  in any 1 MHz band at the site of a radio astronomy station. These limits are provisional and will be reviewed in accordance with Resolution 128 (Rev.WRC-2000).

\* \* \* \* \*

## UNITED STATES (US) FOOTNOTES

\* \* \* \* \*

~~USXXX To protect the radio astronomy service in the band 42.5-43.5 GHz, the aggregate power flux density in the 42.5-43.5 GHz band produced by all the space stations in any non-geostationary –satellite system in the fixed-satellite service (space-to-Earth) operating in the 41.5-42.0 GHz band or in the broadcasting-satellite service (space-to-Earth) system operating in the 41.5-42.5 GHz band shall not exceed  $-167 \text{ dB(W/m}^2\text{)}$  in any 1 MHz band at the site of a radio astronomy station for more than 2% of the time. The power flux density in the band 42.5-43.5 GHz produced by any geostationary station in the broadcasting-satellite service (space-to-Earth) operating in the band 42-42.5 GHz shall not exceed  $-167 \text{ dB(W/m}^2\text{)}$  in any 1 MHz band at the site of a radio astronomy station.~~

USFSS In the United States, S5.551AA shall only apply to the 38.6-40.0 GHz band.

USGFSS In the band 40.0-41.0, Government space stations in both geostationary (GSO) and non-geostationary (NGSO) satellite orbits and associated earth stations in the fixed-satellite service (space-to-Earth) may be authorized on a primary basis. For a Government geostationary satellite network to operate on a primary basis, the space station shall be located outside the arc, measured from east to west, 70 West Longitude to 120 West Longitude. Coordination between Government fixed-satellite systems and non-Government space and terrestrial systems operating in accordance with the United States Table of Frequency Allocations is required.

USYYY In the band 39.5-40 GHz, Government earth stations in the mobile-satellite service (space-to-Earth) shall not claim protection from non-Government stations in the fixed and mobile services. S5.43A does not apply.

### GOVERNMENT (G) FOOTNOTES

\* \* \* \* \*

G117 In the bands 7.25-7.75 GHz, 7.9-8.4 GHz, 17.8-21.2 GHz, 30-31 GHz, 33-36 GHz, 39.5-41 GHz, 43.5-45.5 GHz and 50.4-51.4 GHz, the Government fixed-satellite and mobile-satellite services are limited to military systems.

\* \* \* \* \*

### PART 25--SATELLITE COMMUNICATIONS

3. The authority citation for Part 25 continues to read as follows:

AUTHORITY: 47 U.S.C. 701-744. Interprets or applies sec. 303, 47 U.S.C. 303. 47 U.S.C. sections 154, 301, 302, 303, 307, 309, and 332, unless otherwise noted.

4. Section 25.202(a)(1) is proposed to be revised as follows:

#### § 25.202 Frequencies, frequency tolerance and emission limitations.

(a)(1) Frequency band. The following frequencies are available for use by the fixed-satellite service. Precise frequencies and bandwidths of emission shall be assigned on a case-by-case basis.

Space-to-Earth (GHz)	Earth-to-space (GHz)
3.7-4.2 <sup>1</sup>	5.925-6.425 <sup>1</sup>
10.7-10.95 <sup>1, 12</sup>	12.75-13.15 <sup>1, 12</sup>
10.95-11.2 <sup>1, 2, 12</sup>	13.2125-13.25 <sup>1, 12</sup>
11.2-11.45 <sup>1, 12</sup>	13.75-14 <sup>4, 12</sup>
11.45-11.7 <sup>1, 2, 12</sup>	14-14.2 <sup>5</sup>
11.7-12.2 <sup>3</sup>	14.2-14.5
12.2-12.7 <sup>13</sup>	17.3-17.8 <sup>9</sup>

18.3-18.58 <sup>1, 10</sup>	27.5-29.5 <sup>1</sup>
18.58-18.8 <sup>6, 10, 11</sup>	29.5-30
18.8-19.3 <sup>7, 10</sup>	478.2-50.2
19.3-19.7 <sup>8, 10</sup>	
19.7-20.2 <sup>10</sup>	
37.5-40 <sup>14</sup>	
40-42.5	

<sup>1</sup> This band is shared coequally with terrestrial radiocommunication services.

<sup>2</sup> Use of this band by geostationary satellite orbit satellite systems in the fixed-satellite service is limited to international systems; *i.e.*, other than domestic systems.

<sup>3</sup> Fixed-satellite transponders may be used additionally for transmissions in the broadcasting-satellite service.

<sup>4</sup> This band is shared on an equal basis with the Government radiolocation service and grandfathered space stations in the Tracking and Data Relay Satellite System.

<sup>5</sup> In this band, stations in the radionavigation service shall operate on a secondary basis to the fixed-satellite service.

<sup>6</sup> The band 18.58-18.8 GHz is shared co-equally with existing terrestrial radiocommunication systems until June 8, 2010.

<sup>7</sup> The band 18.8-19.3 GHz is shared co-equally with terrestrial radiocommunication services, until June 8, 2010. After this date, the sub-band 19.26-19.3 GHz is shared co-equally with existing terrestrial radiocommunication systems.

<sup>8</sup> The use of the band 19.3-19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to feeder links for the mobile-satellite service.

<sup>9</sup> The use of the band 17.3-17.8 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for broadcasting-satellite service, and the sub-band 17.7-17.8 GHz is shared co-equally with terrestrial fixed services.

<sup>10</sup> This band is shared co-equally with the Federal Government fixed-satellite service.

<sup>11</sup> The band 18.6-18.8 GHz is shared co-equally with the non-Federal Government and Federal Government Earth exploration-satellite (passive) and space research (passive) services.

<sup>12</sup> Use of this band by non-geostationary satellite orbit systems in the fixed-satellite service is limited to gateway earth station operations.

<sup>13</sup> Use of this band by the fixed-satellite service is limited to non-geostationary satellite orbit systems.

<sup>14</sup> Use of this band by the fixed-satellite service is subject to the condition that limited to “gateway” earth station operations, provided the licensee under this Part obtains a license under Part 101 of this Chapter or an agreement from a Part 101 licensee for the area in which an earth station is to be located. Satellite earth station facilities in this band may not be ubiquitously deployed and may not be used to serve individual consumers.

\* \* \* \* \*

5. Section 25.208 is proposed to be amended by adding new paragraphs (n), (o), (p), (q), ~~and (r), (s) and (t)~~ to read as follows:

**§ 25.208 Power flux-density limits.**

\* \* \* \* \*

(n) In the bands 37.5-40.0 GHz and 42-42.5 GHz, the power flux-density at the Earth's surface produced by emissions from a non-geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

~~-120~~<sup>-132</sup> dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

~~-120~~<sup>-132</sup> + 0.75 (δ-5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

~~-105~~<sup>-117</sup> dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions. ~~These PFD limits may be exceeded by up to 12 dB under fade conditions.~~

(o) In the band 38.6-40.0 GHz, in clear-sky normal operation, the power flux-density levels of any one non-geostationary space station produced at the Earth's surface in the territory of the United States shall, for all methods of modulation, be reduced to:

~~-132~~ dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

~~-132~~ + 0.75 (δ-5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

~~-117~~ dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

~~(p)~~ In the bands 37.5-40.0 GHz and 42-42.5 GHz, the power flux-density at the Earth's surface produced by emissions from a geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

~~-127~~<sup>-139</sup> dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

~~-127+39~~ + 4/3 ( $\delta$ -5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival  $\delta$  (in degrees) between 5 and 20 degrees above the horizontal plane; and

~~-107+49~~ + 0.4 ( $\delta$ -20) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival  $\delta$  (in degrees) between 20 and 25 degrees above the horizontal plane;

~~-105+17~~ dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions. ~~These PFD limits may be exceeded by up to 12 dB under fade conditions.~~

(q) In the band 38.6-40.0 GHz, in clear-sky normal operation, the power flux-density levels of any one geostationary space station produced at the Earth's surface in the territory of the United States shall, for all methods of modulation, be reduced to:

-139 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

-139 + 4/3 ( $\delta$ -5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival  $\delta$  (in degrees) between 5 and 20 degrees above the horizontal plane; and

-119 + 0.4 ( $\delta$ -20) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival  $\delta$  (in degrees) between 20 and 25 degrees above the horizontal plane;

-117 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

(pr) In the band 40.0- 40.5 GHz, the power flux-density at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall not exceed the following values:

-115 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

-115 + 0.5 ( $\delta$ -5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival  $\delta$  (in degrees) between 5 and 25 degrees above the horizontal plane; and

-105 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

(~~qs~~) In the band 40.5-42.0 GHz, the power flux density at the Earth's surface produced by emissions from a non-geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

-115 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

-115 + 0.5 (δ-5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

-105 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux density that would be obtained under assumed free-space propagation conditions.

(~~ft~~) In the band 40.5-42.0 GHz, the power flux-density at the Earth's surface produced by emissions from a geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

-120 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

-120 + (δ-5) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 15 degrees above the horizontal plane;

-110 + 0.5(δ-15) dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival δ (in degrees) between 15 and 25 degrees above the horizontal plane; and

-105 dB(W/m<sup>2</sup>) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

**PART 101 – FIXED MICROWAVE SERVICES**

6. The authority citation for part 101 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 303.

7. Section 101.147 is proposed to be amended by adding new note 31 to read as follows:

**§ 101.147 Frequency assignments.**

(a) Frequencies in the following bands are available for assignment for fixed microwave services.

\* \* \* \* \*

38,600–40,000 MHz (4)(31)

\* \* \* \* \*

Notes

\* \* \* \* \*

(31) Frequencies in this band are shared with stations in the fixed-satellite service, subject to the conditions specified in footnote 14 of Section 25.202(a)(1), *see* 47 C.F.R. § 25.202(a)(1) n.14.