BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
FWCC Request for Declaratory Ruling on	)	
Partial-Band Licensing of Earth Stations	)	IB Docket No. 00-203
In the Fixed-Satellite Service That Share	)	RM-9649
Terrestrial Spectrum	)	
	)	
FWCC Petition for Rule Making to Set	)	
Loading Standards for Earth Stations	)	
In The Fixed-Satellite Service That	)	
Share Terrestrial Spectrum	)	
	)	
Onsat Petition for Declaratory Order that Blanket	)	
Licensing Pursuant to Rule 25.115(c) Is Available	)	SAT-PDR-19990910-00091
For Very Small Aperture Terminal Satellite	)	
Network Operations at C-Band	)	
	)	
Onsat Petition for Waiver of Rule 25.212(d) to	)	
The Extent Necessary to Permit Routine	)	
Licensing Of 3.7 Meter Transmit and Receive	)	
Stations At C-Band	)	
	)	
Ex Parte Letter Concerning Deployment of	)	
Geostationary Orbit FSS Earth Stations in the	)	
Shared Portion of the Ka-band	)	

To: The Commission

COMMENTS OF TRW INC.

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To: The Commission

COMMENTS OF TRW INC.

TRW Inc. ("TRW"), by counsel and pursuant to Sections 1.415 and 1.419 of the Commission's rules, hereby comments on the Notice of Proposed Rule Making ("*NPRM*") released in the above-captioned docket.[1] TRW is concerned that in adopting the *NPRM* in response to the petition filed by the Fixed Wireless Communications

[1] *FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations in the Fixed-Satellite Service That Share Terrestrial Spectrum*, FCC 00-369 (released October 24, 2000)("*NPRM*").

Coalition ("FWCC"), the Commission has leaped to propose rules to address FWCC-alleged failings in the current system for coordination of satellite and terrestrial services without determining whether such failings even exist, let alone whether a change in the current approach is warranted.[2] The Commission's proposal therefore fails to acknowledge that, despite the difficulties inherent in spectrum sharing involving two fundamentally different types of communications services, the C- and Ku-bands have been efficiently and equitably shared by space-based and terrestrial services for decades.

Moreover, the Commission has proposed to act despite acknowledging that increased regulation is undesirable.[3] The proposals embodied in the FWCC-inspired portion of the *NPRM* would not only upset the time-tested, albeit difficult, balance among services that exist in the subject bands, but would also halt progress toward more efficient sharing by freezing coordination parameters that have been established based upon existing technologies.

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[2] One indication of this failure to determine whether there is a problem before proposing new rules is the fact that the Commission seeks comment in the *NPRM* itself "on the extent of the FS and FSS sharing problem," including the "numbers of cases in which the FS and FSS have experienced sharing difficulties." *NPRM* at ¶ 30. This sort of basic inquiry would have been more appropriate as part of a Notice of Inquiry prior to any determination to propose new rules. Only if sharing problems are actually demonstrated and determined to be of such weight that a regulatory response is warranted would the Commission be in a position to advance credible proposals to modify the current procedures in response to the problems identified.

[3] *See NPRM* at ¶ 61.

I. INTRODUCTION

A. Statement of Interest

As a satellite manufacturer and participant in a number of satellite service ventures, TRW has long had an interest in the equitable and efficient allocation of spectrum. TRW has manufactured numerous satellites with operating frequencies ranging from UHF to V-band and beyond. It also is a leading manufacturer of high performance radio frequency components for the fixed service. The company has been an active participant in a wide variety of FCC proceedings dealing with spectrum allocation and service rules issues relating to both satellite and terrestrial services. It holds ownership stakes in Ka-band licensees,[4] is building Ka-band satellite payloads, and is currently an applicant for authority to utilize spectrum in the C-, Ka- and V-bands as part of its proposed Global EHF Satellite Network ("GESN").

B. Summary of Comments

Many industries rely on the non-coordinated, occasional use ability of satellite capacity for critical communications. Uses of this capability include broadcast newsgathering, inventory tracking, commercial video and data transmission, backup communications for other services, and U.S. Government strategic and emergency functions on behalf of such agencies as the Federal Emergency Management Administration, the Defense Department, and the National Aeronautics and Space Administration. The arbitrary usage and artificial coordination requirements that the *NPRM* suggests would undermine the ability to serve these users. For these and other

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[4] TRW owns approximately 18% of Astrolink International LLC and 5% of WildBlue Communications.

reasons, TRW has joined with a broad range of interested satellite operators, manufacturers, capacity users, and service providers – the Satellite Industry Coalition – to oppose the proposals contained in the *NPRM* that would reduce the utility of the allotted bands for provision of robust and flexible satellite services. TRW is also filing these separate comments to emphasize several key issues that it believes require special attention.

First, the Commission should be cognizant that emerging competition in the broadband services marketplace between the fixed service and FSS gives rise to possible anti-competitive motivations for the FWCC effort to impose new limits on the deployment of satellite technology. In a deregulatory environment, the Commission ought to be especially careful to prevent the manipulation of its rulemaking process by interests that seek to gain a marketplace advantage through adoption of more burdensome regulatory requirements for their competitors.

Second, the Commission has failed to consider fully the degree to which fundamental differences in terrestrial and satellite technology dictate different regulatory regimes for these services. Current distinctions in the regulation of satellite and terrestrial licensees are not evidence of "asymmetrical efficiency obligations," but of differences in the appropriate methods and measures of efficient spectrum use that necessarily apply to these services. Both the FCC's current regulations and the economic realities of providing satellite communications services compel operators to adhere strictly to exacting efficiency and performance standards, as this is the only way to amortize the large investment that satellite operators make in their facilities. Moreover, satellites provide coverage that is both broadly available and flexible in order to meet the

needs of rural and isolated users, as well as government agencies and industries requiring transmission capability on an emergency or occasional use basis.

Third, not only are additional regulations unnecessary to promote satellite efficiency, but the Commission's proffered justification for considering such regulatory changes is both logically and legally flawed. The current coordination approach for satellite and terrestrial services is wholly appropriate. On the other hand, the Commission's intimation that the fact that satellite authorizations are not assigned by spectrum auctions necessitates more intrusive regulation in the name of "efficiency" conflicts not only with common sense but is inconsistent with the policies underpinning both the FCC's auction authority and the recently adopted ORBIT Act.

Finally, as inappropriate as the proposals in the *NPRM* are with respect to the C-band and Ka-band, they are especially ill-suited for extension to the Ka-band and/or V-band frequencies that are shared on a co-primary basis by FSS and the fixed service. The Commission has taken great care, and entered into lengthy negotiations with applicants for these bands, as well as with other administrations in international fora, to secure agreements and adopt the service rules necessary to accommodate different types of satellite and terrestrial services, many of which are intended for use with some type of ubiquitous user terminals. These accommodations have involved various trade-offs to ensure that each type of service can exist. The nature of these services requires that terrestrial services and satellite services operate primarily in separate bands.

II. DISCUSSION

A. The Commission Should Consider That Anti-Competitive Motives May Lie Behind the FWCC Petition Given the Emerging Competition Between Satellite and Terrestrial Means of Broadband Service Delivery.

The Commission should recognize that both satellite operators and Fixed service licensees are increasingly seeking to employ their facilities to offer business and consumer broadband services. In the case of satellite operators, these initiatives are occurring not only via next-generation Ka-band and V-band networks, but also using the traditional Ku-band and C-band allocations, as well as Ku-band Broadcasting-Satellite Service frequencies. For this reason, the Commission should not ignore the interest that the FWCC and its member companies would have in creating barriers to the development of satellite systems that would compete with terrestrial providers in the broadband marketplace. Given the lack of specific evidence of unfair treatment or abuses to support changes in the current rules, the existence of an anticompetitive motive for FWCC against satellite broadband services should not be discounted. The Commission ought not promote a process through which Fixed service applicants would have the opportunity to impose burdensome coordination procedures on FSS earth station operators that expose them to permanent loss of rights to spectrum that they have long been licensed to use.

By one measure of regulatory parity, the fixed service has a dramatic advantage over satellite service providers in that it has access to much more spectrum on a primary basis. In just the past few years, the fixed service has obtained new primary spectrum allotments for the Wireless Communications Service, the Local Multipoint Distribution Service and in the bands at 18 GHz, 24 GHz, and 39 GHz. In some cases,

such as LMDS, these allocations resulted in a reduction in the amount of spectrum available for FSS on a primary basis.[5] In addition, contemporaneously with the release of the instant *NPRM*, the Commission has acted to limit sharply future FSS development of a portion of the extended C-band (3650-3700 MHz) as a means of making it available for primary use by the Fixed service.[6]

B. The Commission Has Failed To Consider Critical Differences In the Manner of Spectrum Use By Satellite and Terrestrial Licensees, and Should Have Concluded That Existing Service-Specific Regulations Promote Efficient Use of Satellite Spectrum.

In its *NPRM*, the Commission appears to assume without any basis in the record that some sort of regulatory intervention is required in order to encourage efficient use of spectrum by satellite operators. It further assumes that this efficiency goal would be served by imposing upon satellite networks use or efficiency standards resembling those that apply to Fixed service licensees. Neither assumption is correct.

While the Commission makes note of the extensive technical requirements currently imposed on satellite operators, including two-degree spacing, full-frequency reuse, and antenna performance standards,[7] it fails to acknowledge that these regulations, among other factors, promote efficient operation in the unique context of geostationary satellite services, as frequency loading requirements do for terrestrial service. Thus, while the Commission notes that its "full-band licensing policy provides all earth station

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[5] *See Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services,*11 FCC Rcd 19005 (1996).

[6] *See Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, ET Dkt. No. 98-237, FCC 00-363 (released October 24, 2000).

[7] *See NPRM* at ¶ 39 n.71.

operators the ability to conform to the constraints placed on the satellite operators and the flexibility to change channels to access available transponder capacity within a satellite network and available capacity on other satellite networks,"[8] it fails to make the connection between this overarching licensing principle and the unique wide-area nature of satellite services, which requires complex coordination of frequency use within and among networks.

The fact that a specific frequency is not currently in use at a particular earth station location is not an indication of fallow capacity, but a product of successful coordination and capacity utilization that allows the same frequency to be used elsewhere within the satellite network. Operation anywhere in a satellite beam means that the frequency in question is effectively in use throughout the beam. Changing circumstances may require changes in frequency utilization to maximize use of the space segment. This flexibility is advantageous, and is critical to the ability of satellites to serve transient users for on-location newsgathering, remote data transmission and emergency communications. To ensure that this flexibility is available, individual earth stations must retain access to the frequencies within which they are licensed to operate, so that space stations may continue to make effective use of their facilities when needed. If certain frequencies are no longer available to an earth station operator, this may also limit or preclude access to particular satellites, thereby altering not only the earth station's capabilities, but also space station operators' ability to provide service in a particular part of its coverage area.

The *NPRM* also seems to ignore the significant economies of scale and coverage advantages that are inherent in the provision of satellite service. Provision of satellite services requires very large up-front costs to design, construct, launch and insure

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[8] *See NPRM* at ¶ 40.

one or more sophisticated spacecraft and to build the associated ground segment. Once these facilities are in place, however, satellite systems have the capability to provide service to very broad areas at reasonable cost. The *NPRM* simply fails to consider this unique coverage capability as an aspect of efficiency, focusing instead solely on the amount of time that individual frequencies are used to the exclusion of a system's ability to provide service over expansive areas, including rural and other underserved populations.

When efficiency is measured in terms of the service area reached using allotted frequencies, the Fixed service must be considered less efficient than satellite services. Nowhere in the Commission's rules is there any requirement that terrestrial licensees build out systems capable of serving all parts of their license areas. In practice, and taken as a percentage of license area, many fixed wireless providers will use no more than a fraction of their "license capacity" in terms of area coverage. For example, while rural areas have exactly the same amount of fixed wireless spectrum available to them as urban areas, they receive far less service because construction of facilities in these areas is not cost-effective. The majority of the U.S. that is not served by fixed wireless lacks service not because of the unavailability of spectrum for this use, but because fixed wireless is an economically poor solution to serving rural areas. This underutilization is evidenced by the fact that many licenses for less populated areas that were up for bid in the auctions for the Local Multipoint Distribution Service and the 39 GHz wireless service either were sold for the minimum opening bid or did not attract any bidding interest at all.

Moreover, because of the long lead time required for satellite construction, and the inability to modify facilities after launch, designers must try to accommodate the

capacity requirements that are likely to arise up to twenty years in the future. In this respect, satellite engineering is similar to highway or bridge engineering. The initial design cannot focus on current needs and traffic patterns, but must anticipate what the peak load will be at the end of the facility's life. Permanently limiting the utility of extant satellite capacity would be the equivalent of ripping lanes out of the completed Dulles Toll Road in 1985 due to light traffic, failing to anticipate the explosive growth of the surrounding suburbs over the next decade and a half.

In sum, a critical flaw in the Commission's *NPRM* is that it fails to recognize the fundamental distinction in the ways that satellite licensees and fixed service licensees make the most efficient use of their allotted frequencies. Fixed service operators make intense use of specific frequencies over narrow service areas, but leave these same frequencies unused – and thus provide no service – over much broader, less densely populated areas. Satellite systems, on the other hand, require the flexibility to coordinate use of a range of frequencies in order to permit service over very broad regional, hemispheric, or sometimes global, service areas, allocating resources as necessary to meet demand and optimize service. Each type of system makes necessary tradeoffs in order to provide service efficiently, and the significant operational differences between them preclude attempting to impose similar regulatory requirements on each.

It would be no more appropriate to impose the spectrum-use-based standard on satellite systems that the Commission has advanced than it would be to require terrestrial wireless licensees to provide mandatory coverage throughout their entire licensed service areas. Perhaps it would nonetheless be appropriate for fixed service licensees to relinquish operating rights for those portions of their license area in

which they do not actually provide transmission links. Unless the Commission is willing to impose such a requirement upon the Fixed service in order to achieve "regulatory parity," it should not impose terrestrial service spectrum use standards upon satellite services.

C. Additional Regulation Is Not Required To Promote Efficient Use of Satellite Spectrum, And Imposition of Regulatory Limits to Secure More Spectrum For Auction May Be Impermissible Under The Communications Act.

It is also noteworthy that the Commission makes reference to spectrum auctions as a means of ensuring that spectrum is used efficiently by licensees.[9] The logic underpinning this statement is that an entity that has paid a substantial upfront cost to secure spectrum access will be compelled to make timely and efficient use of the spectrum in order to recoup its investment. While this is ordinarily a sound presumption as a general matter, it does not follow that auctions are the *only* spur to promoting spectrum efficiency. As noted above, construction of any satellite network requires the investment of large amounts of money up front to design, construct, insure and launch the necessary spacecraft. These large sunk costs provide a similar incentive for satellite operators to maximize their use of the spectrum they are licensed to use as spectrum acquisition costs provide for licensees in auctionable services, over and above the technical rules mandating two-degree spacing and full frequency re-use. The need to amortize these costs compels satellite designers to expend great effort to eke out the last bit of performance obtainable, as changes cannot be made once a satellite is launched.

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[9] *See NPRM* at ¶ 61.

Nor is it by any means clear that the general presumption that auctioned spectrum will be brought into use efficiently has been borne out with respect to Fixed service licensees. As indicated above, terrestrial wireless licensees with large geographic service areas may be considered to have substantially implemented service under the Commission's rules based on build out of only a handful of links.[10] While spectrum auctions may raise the up-front costs for some Fixed service providers, they do not provide the same incentive to use spectrum efficiently that is present for all satellite system operators, which must necessarily spend hundreds of millions of dollars to launch even a single spacecraft satellite network. Further, the majority of current fixed service licensees did not obtain their authorizations through competitive bidding, and many such "non-auctioned" licensees continue to operate as incumbents in areas subsequently licensed by auction and are perpetually primary for their entire license area provided that they meet the minimum use requirement. Yet the *NPRM* proposes that a different standard apply to satellites, making it clear that the general distinction drawn by the Commission between the incentives present for auctionable and nonauctionable services – and for FSS and the fixed service, in particular – is not general at all and is premised on faulty logic.

Indeed, the Commission's comments in the *NPRM* suggest a disposition to penalize satellite services through additional regulation largely because they have not obtained access to spectrum through competitive bidding procedures that result in payments to the Federal Treasury. The Commission is either mandated or permitted by Section 309(j) of the Communications Act to assign certain licenses via competitive

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[10] *See 39 GHz Report and Order*, 12 FCC Rcd 18600, 18625 (¶ 46) ("one example of a substantial service showing for a traditional point-to-point licensee might consist of four links per million population within a service area"). *See also* 47 C.F.R. 101.527.

bidding, but this section does not provide a basis for the Commission to use its auction authority to make allocation decisions or spectrum management determinations spectrum previously allocated. Indeed, the Commission's general authority to use competitive bidding is applicable only to situations where the Commission has received mutually exclusive applications for initial service authorizations.[11] The statute specifically provides that the competitive bidding mechanism does not change existing spectrum allocation criteria and procedures.[12] Thus, when the Commission proposes to base spectrum management decisions in significant part on whether authorizations within a service were assigned by competitive bidding or obtained "free of charge,"[13] it may be exceeding its authority under the Act. Such action is especially problematic in this instance, where the regulations proposed would permanently divest spectrum from FSS licensees to which it had been assigned and reassign it to Fixed service applicants.

The jaundiced eye focused on the satellite industry based on the fact that licenses are not assigned via auction is especially troubling in that the exemption of satellite services from competitive bidding is mandated by statute.[14] The ORBIT Act specifically denies the Commission authority to assign orbital locations or spectrum used in the provision of global or international satellite communication services by competitive bidding.[15]

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[11] *See* 47 U.S.C. § 309(j)(1).

[12] *Id.* at § 309(j)(6)(A).

[13] *NPRM* at ¶ 61.

[14] *See* Open-Market Reorganization for the Betterment of International Telecommunications Act of 2000, Public Law 106-180, 114 Stat. 48 (adopted March 17, 2000), *codified at* 47 U.S.C. §§ 761, et seq. (the "ORBIT Act").

[15] *See* 47 U.S.C. § 765f.

The ORBIT Act was adopted as a means of promoting the stated national objective of achieving a fully competitive global market for satellite communication services for the benefit of consumers and providers of satellite services and equipment.[16] The Commission's proposals are incompatible with this policy to the extent that they benefit the fixed service at the expense of satellite services. Compounding the inconsistency is the fact that Commission's rationale for favoring the fixed service is that fixed service licensees acquire their authority through competitive bidding, while satellite licenses are assigned "free of charge." Proposing to disadvantage satellite systems by rescinding the right to use spectrum simply because the original license for this spectrum was not assigned by auction is inconsistent with the command of the ORBIT Act specifically denying the Commission authority to assign satellite spectrum by auction in the first instance.

D. The Commission's Proposals Are Especially Ill-Suited For The Shared Frequency Bands Above Ku-Band.

The primary focus of the Commission's attention in this proceeding has been on the C- and Ku-band frequencies used for traditional geostationary FSS services. At several points, however, the Commission queries whether the same requirements that it proposes for the lower frequency bands might be extended to other bands that are shared by satellite and terrestrial services.[17] As inappropriate as the proposals in the *NPRM* are in general terms, they are especially ill-suited to the higher bands that have been allocated for specific geostationary and non-geostationary satellite services in recent

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[16] *See* Public Law 106-180, at § 2.

[17] *See, e.g., NPRM* at ¶¶ 31 & 55.

years. The Commission has taken great care, and entered into lengthy negotiations with applicants for these bands, as well as with other administrations in international fora, to secure agreements and adopt the service rules necessary to accommodate different types of satellite and terrestrial services, many of which are intended for use with some type of ubiquitous user terminals. These accommodations have involved various trade-offs to ensure that each type of service can exist. The nature of these services requires that terrestrial services and satellite services operate primarily in separate bands.

Frequency bands have been divided into fixed service-only spectrum, FSS-only spectrum, and shared spectrum. In each case, the appropriate balances among services have already been struck, and it would be unreasonable to impose additional burdens upon operation of FSS in these frequencies. For example, Ka-band geostationary FSS systems already face significant sharing burdens in operating in bands on a co-primary basis with the Fixed service. In the 18 GHz band plan, the Fixed service and geostationary FSS are co-primary in the 18.3-18.58 GHz; while the 18.58-18.8 GHz band is allocated to geostationary FSS on a sole primary basis, but with existing Fixed service operations in the band grandfathered for a period of ten years.[18] Terrestrial wireless facilities thus will have had unimpeded access to the lower band for a number of years prior to FSS systems beginning service in these frequencies. Nonetheless, the satellite systems are required to work around the existing facilities once they commence operation. Even in the sole primary spectrum at 18.58-18.8 GHz, Ka-band FSS systems must either accept interference from the existing Fixed service operators for ten years or pay for relocation of these grandfathered facilities to alternative spectrum. The fixed

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[18] *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in*

service faces no such impediment in any band where it is designated for sole primary access.

Moreover, specific spectrum protocols used in upper bands may not be susceptible to the "use" based approach that the Commission has outlined in the *NPRM*. For example, most Ka-band satellite systems will employ wideband transponders (*i.e.*, 125 MHz to 250 MHz), sending packets at different intervals within time-division multiplex (TDM) signals that occupy the full band. Within the beam, each earth station will receive the specific data packets that have been addressed to it. This contrasts with the frequency-division multiplex (FDM) architecture that is commonly used at lower frequencies and in fixed links where coordination can be done channel by channel. In the typical Ka-band system, the wideband signal is always in use by each earth station within the satellite beam, and it is not feasible to identify "unused" frequencies in the manner proposed in the *NPRM*.

Given the substantial challenges already facing Ka-band FSS systems, and the advantages already enjoyed by the incumbent terrestrial services in the 18 GHz shared spectrum, it would be outrageous for the Commission to further limit Ka-band systems by altering the assumptions on which the Ka-band frequency plan was based. If undertaken, such an action would significantly hinder the ability of Ka-band systems now under construction to provide advanced broadband services in accordance with their authorizations. This, in turn, would endanger the delivery of such services to rural and other underserved areas, which are unlikely to receive broadband access via terrestrial technology.

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the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, 20 Comm. Reg. 1252 (P&F 2000).

Similar considerations apply at V-band. At WRC-2000, the delegates adopted the U.S.-endorsed sharing plan for the 37.5-42.5 GHz band, whereby Fixed service systems with ubiquitously-deployed user terminals would be situated primarily in the 37.5-40 GHz and 42-42.5 GHz band (along with low density FSS gateway terminals) with the fixed service entitled to protection from FSS in the form of significant power constraints. FSS high-density user terminals would be placed primarily in the 40-42 GHz band, and entitled to be protected there from Fixed service transmissions. Proposals of the type advanced in the *NPRM*, if applied to V-band, would disturb the delicate balance achieved at WRC-2000 to the prejudice of the public and national interests.

Accordingly, the Commission should reject as contrary to the public interest any notion of applying changes in its earth station rules to satellite systems operating at frequencies above the Ku-band.

III. CONCLUSION

For the foregoing reasons, TRW urges the Commission to reject the proposals advanced in the *NPRM* that are directed to modifying the current time-tested approach to FSS earth station spectrum assignment and FSS/Fixed service coordination. The regulatory changes that have been suggested in response to the FWCC petition cannot be justified on the record established in this proceeding, and would be harmful to satellite operators and users, and to the public at large.

Respectfully submitted,

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