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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Before
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
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	)	
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 Bands for Government Operations.	)	IB Docket No. 97-95 RM-8811

To: The Commission

REPLY COMMENTS

FIXED POINT-TO-POINT COMMUNICATIONS SECTION, NETWORK EQUIPMENT DIVISION, OF THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION

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June 2, 1997

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SUMMARY

In the captioned Notice of Proposed Rulemaking ("NPRM"), the Commission proposed an overall policy and framework for services in the 36-51.4 GHz band. Under this proposal, the 36-51.4 GHz band is segmented so that: (i) terrestrial fixed point-to-point microwave service ("FS") users, Geostationary ("GSO") and non-Geostationary ("NGSO") Fixed-Satellite Service ("FSS") users, and Mobile-Satellite Service ("MSS") users can have sufficient available spectrum; (ii) co-primary band sharing is minimized; (iii) spectrum for GSO and NGSO FSS users is allocated; and (iv) non-Government and Government sharing is promoted. Specifically, the Commission proposed designating the non-contiguous 38.5-40.5 and 41.5-42.5 GHz bands for FS and the non-contiguous 37.5-38.5 and 40.5-41.5 GHz bands for FSS.

In its comments, the Fixed Point-to-Point Communications Section, Network Equipment Division, of the Telecommunications Industry Association ("TIA"), generally supported the Commission's decision to eliminate unnecessary or impractical band sharing and to develop a comprehensive plan for future use of the 36-51.4 GHz band. However, TIA proposed revising the Commission's segmentation plan to satisfy the equally compelling spectrum needs of FS and satellite users. Under TIA's plan (depicted on Attachment B hereto), the Commission instead would designate the 37-40 GHz band for FS and the 40.5-42.5 GHz band for FSS. Furthermore, TIA strongly supported the Commission's decision to eliminate or reduce band sharing, but it questioned the proposed "underlay" approach.

The record of this proceeding, unfortunately, does not reveal a consensus regarding how the 36.0-51.4 GHz band should be designated among FS and FSS users. In particular, FSS users complain that they should be designated 6 GHz, not the proposed 4 GHz; and FS users demonstrate that, at a minimum, the successful deployment of services in the 38.6-40.0 GHz band (the "38 GHz

band") demands their retention of those frequencies on an exclusive basis. However, certain building blocks emerged from the comments on the NPRM that the Commission must use to establish a viable band plan:

- FS and FSS users each provide equally valuable services and each has equally compelling rights to spectrum in the 36-51.4 GHz band.
- FSS users do not justify the 6 GHz (i.e., 3 GHz for uplink and 3 GHz for downlink) requested in the 36-51.4 GHz band.
- FSS users finally recognize what FS users have been painfully aware of for many years -- limited spectrum is available to support their needs.
- Domestic spectrum designations must be made in harmony with global allocations.
- Band sharing between FS and FSS users will not work and must not be pursued as a solution to providing necessary spectrum. The Commission's proposed surrogate for band sharing -- the "underlay" approach -- also is unacceptable for existing applications.
- Band segmentation is the only viable approach to accommodate FS and FSS spectrum needs.

While TIA maintains that its initial proposal is the best option, it also is imperative that the issue of designating spectrum in the 36-51.4 GHz band get off "dead center." Thus, to facilitate resolution of the controversy over FS and FSS frequency designations, herein TIA proposes a second approach based upon the comments filed. Under this compromise (depicted on Attachment C hereto), the 37.5-38.5 GHz band and the 40.0-41.0 GHz band would be designated exclusively for FSS and the 38 GHz band would be designated exclusively for FS. TIA proposes this additional approach because: (i) based upon the demonstrated demand for FS in the 38 GHz band, it is crucial that this spectrum is preserved; and (ii) based upon the comments submitted on the NPRM, FSS users have a need for spectrum below 40 GHz. Thus, TIA now has provided the Commission two (2) alternative

band plans that satisfy the needs of both FS and FSS users and that equally promote the availability of their essential services.

TIA also urges the Commission to make FSS users accountable when seeking spectrum. Satellite users should change how they demonstrate a need for additional spectrum. Merely asking for more spectrum, as they have done in the past, no longer should be acceptable. Specifically, TIA questions whether FSS users have documented that they have a need for additional spectrum in the 36.51.4 GHz band. The need for this additional spectrum is especially suspect because FSS users (including many of the parties filing comments on the NPRM) recently were authorized to operate in the Ka band (18/28 GHz) and because the frequencies available in that band for their services are far from being exhausted. Thus, before the Commission can designate additional spectrum for FSS, TIA recommends that these users must demonstrate that their existing spectrum has been used to its full capacity.

Finally, there was a strong consensus in the comments opposing band sharing and the Commission's proposed "underlay" approach. Thus, these approaches to allocation must not be used in the 36-51.4 GHz band.

Any decisions made by the Commission in the NPRM must protect FS users. The fundamental role of FS, including the High Density Fixed Services ("HDFS") emerging in the bands above 30 GHz, must be promoted. Spectrum designation for FS and for FSS must be harmonized with international allocations.

Band sharing is an unacceptable spectrum management tool. For the first time, FSS users should be required to prove-up their requests for more spectrum. Sufficient spectrum must be designated to accommodate documented FS and FSS user needs. Thus, the Commission is urged to adopt the proposals set forth herein and to use them in guiding U.S. policy at the 1997 World Radiocommunication Conference and in implementing future spectrum allocations.

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To: The Commission

REPLY COMMENTS

In the above-captioned Notice of Proposed Rulemaking ("NPRM"), the Commission proposes certain fundamental changes to the millimeter wave bands above 30 GHz. Specifically, the Commission would segment the 36-51.4 GHz band so that terrestrial fixed point-to-point microwave service ("FS"), Fixed-Satellite Service ("FSS"), and Mobile-Satellite Service ("MSS") users can have sufficient available spectrum; minimize the need for co-primary band sharing; designate spectrum for Geostationary ("GSO") and non-Geostationary ("NGSO") FSS users; and develop standards so that non-Government and Government operations can share these bands.[1] Pursuant to Section 1.415 of the Commission's Rules,[2] the Fixed Point-to-Point Communications Section, Network Equipment

[1]NPRM at ¶ 1.

[2]47 C.F.R. §1.415 (1997). The NPRM was published in the Federal Register on April 4, 1997. 62 FR 16129. The Chief, Satellite and Radiocommunication Division, extended the deadline for filing reply comments to June 3, 1997. Order, IB Dkt. No. 97-95 (DA 97-1005, May 12, 1997).

Division, of the Telecommunications Industry Association ("TIA"),[3] hereby replies to the comments submitted on the NPRM.[4]

TIA PROPOSES A SECOND APPROACH TO ACCOMMODATE FS AND FSS USER NEEDS

As detailed herein, the record supports the Commission's general approach, which promotes band segmentation and reduces or eliminates band sharing. Unfortunately, instead of solidifying any consensus among FS and FSS users over how the 36-51.4 GHz band should be designated, the Commission's plan highlights their fundamental differences.

TIA recognizes the value of the FSS and supports adoption of rules by the Commission that would allow this technology to flourish. In the NPRM, the Commission proposed designating the non-contiguous 38.5-40.5 and 41.5-42.5 GHz bands for FS and the non-contiguous 37.5-38.5 and 40.5-41.5 GHz bands for FSS.[5] To accommodate and promote FS and FSS user needs for contiguous spectrum, TIA proposed a different approach in its comments. Under this proposal, which is depicted on Attachment B hereto, the existing 37-40 GHz band allocation for FS would be maintained, the 40.5-42.5 GHz band would be designated for FSS, and the 40.0-40.5 GHz band would be opened to accommodate any FS, FSS, MSS or Broadcast Satellite Service ("BSS") needs.[6]

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[3]TIA is the principal industry association representing all telecommunications equipment manufacturers, including fixed point-to-point microwave radio equipment. TIA members serve, among others, companies, including telephone carriers, utilities, railroads, state and local governments, and cellular carriers, licensed by the Commission to use private and common carrier bands for provision of important and essential telecommunications services.

[4]Attachment A lists the parties in this proceeding and the abbreviations for these parties used herein.

[5]NPRM at ¶ 14.

[6]TIA at 3.

Inexplicably, the FSS industry, in its comments and in its negotiations over how to divide the 36-51.4 GHz band, does not reciprocate. Throughout their comments on the NPRM, FSS users demand spectrum at the expense of FS users, persisting in their unjustified claims that fixed terrestrial services will not provide an essential platform for development of either the Global Information Infrastructure ("GII") or our national PCS network. They insist that at least six (6) GHz must be designated for FSS, not the 4 GHz proposed by the Commission in the NPRM. No compromise is offered. In effect, the FSS users attitude is one of "take it or leave it."

This myopic characterization of the FS must not be tolerated. It is well-established that FS users, including the emerging High Density Fixed Services ("HDFS") users,[7] have as much need for the 36-51.4 GHz band as FSS users because:

- These frequencies support the other telecommunications services that private and common carrier FS users provide, such as emergency, public health and safety services; and they support services for local exchange carriers, cellular licensees, utilities, railroads, petroleum companies, and financial institutions.

- Short-haul FS frequencies in the 36-51.4 GHz band are used for private LAN-to-LAN interconnection, surveillance, and other related applications. These needs are demonstrated by the number of businesses and governmental entities already employing these frequencies for such services. More importantly, these HDFS are essential building blocks for wireless network platforms. Such applications include local access, inter-cell links for mobile and wireless local loop networks, fiber backdrop, local TV distribution, broadband GII access, intelligent transport, SDH access, RLANs and ATM compatible transport.[8]

Within this framework, the Commission now must attempt to develop its proposed "band plan,

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[7]HDFS is a form of fixed point-to-point microwave service operating at high frequencies and over short paths. It is differentiated from more conventional fixed terrestrial service by its large scale deployment, utilization of wide bandwidth, and use of many different network topologies and path geometries.

[8]TIA at 3, 8-9. See also CPM-97, §7.5, "Fixed Service Above 30 GHz" ("CPM Report") at §7.5.2.3 and Table 7.2.

with frequencies designated for different types of high-density services," in a "manner that promotes open entry, appropriate flexibility, technical innovation, and seamless satellite and terrestrial networks" and in a manner that "will foster better business planning and expedite the commercial development of the 36-51.4 GHz" band.[9] This proposal can be implemented successfully if the Commission recognizes the following building blocks that emerged from the comments on the NPRM:

- FS and FSS users each provide equally valuable services and each has equally compelling rights to spectrum in the 36-51.4 GHz band.
- FSS users do not justify the 6 GHz (i.e., 3 GHz for uplink and 3 GHz for downlink) requested in the 36-51.4 GHz band.
- FSS users finally recognize what FS users have been painfully aware of for many years -- limited spectrum is available to support their needs.
- Domestic spectrum designations must be made in harmony with global allocations.
- Band sharing between FS and FSS users will not work and must not be pursued as a solution to providing necessary spectrum. The Commission's proposed surrogate for band sharing -- the "underlay" approach -- also is unacceptable for existing applications.
- Band segmentation is the only viable approach to accommodate FS and FSS spectrum needs.

The controversy over how the 36-51.4 GHz band should be designated must not retard the development of these emerging technologies. While TIA maintains that its original proposal, as depicted on Attachment B, is preferable, it also recognizes that a compromise between FS and FSS users is necessary so that this gridlock can be avoided. Resolution of this issue is especially timely given the proximity of the 1997 World Radiocommunication Conference ("WRC-97").

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[9] NPRM at ¶¶ 9, 11-12.

Based upon these building blocks, and consistent with the record of this NPRM and the record of related proceedings,[10] TIA proposes that the Commission also consider a second approach:

- Less spectrum is better if it is unencumbered with incompatible co-primary or secondary users. Thus, herein TIA proposes an alternative band plan, as depicted on Attachment C hereto: (i) the 37.5-38.5 GHz band and the 40.0-41.0 GHz band are allocated exclusively to FSS; and (ii) the 38.6-40.0 GHz band (the "38 GHz band") is allocated exclusively to FS.[11]

Furthermore, to achieve its objective of a balanced, fair and effective band plan and to eliminate the controversy over how much FS and FSS spectrum should be designated in the 36-51.4 GHz band, the Commission must adopt the following measures, regardless of which band plan is selected:

- Band sharing, as well as the Commission's proposed "underlay" approach, will not be used in the 36-51.4 GHz band.

- Satellite users should be required to demonstrate a need for additional spectrum. Merely asking for more spectrum, as they have done in the past, no longer will be acceptable.

Unless these changes are imposed, the Commission's efforts at making the 36-51.4 GHz band commercially successful and publicly beneficial will be stymied. The Commission should not delay acting on these issues at this time due to WRC-97. At a minimum, these proposals can guide development of U.S. positions at WRC-97. More importantly, these proposals should define how the 36-51.4 GHz band plan is implemented after WRC-97 is completed.

Finally, the Commission should take into account the extensive discussions that took place

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[10]See NPRM at ¶¶ 2-8.

[11]This alternative band plan is not intended to be a substitute for TIA's initial proposed plan. Instead, the Commission should evaluate the merits of both plans.

at the recently completed CPM-97 in connection with Agenda Item 1.9.6 of the forthcoming WRC-97.[12] A substantial number of delegates made clear their opposition to the reduction of spectrum available for FS in the 38 GHz band to accommodate still more satellite services. Several delegates strongly questioned the appropriateness of even considering satellite service spectrum allocations above 30 GHz at WRC-97.

Mindful of this moving target, TIA reiterates its open offer to engage in further industry negotiations to resolve the impasse over how to designate frequencies in the 36-51.4 GHz band among FS and FSS users. Nevertheless, let there be no misunderstanding concerning the FS industry's resolve to protect its operations. Any negotiation with the FSS industry always will be based upon the requirement that band sharing is unacceptable and that sound spectrum management by both industries is mandatory.

THE PUBLIC INTEREST IS SERVED EQUALLY BY FS AND FSS USERS

Controversy over how the 36-51.4 GHz band should be designated was not stilled by the comments on the NPRM. Any lingering doubt over the need to provide spectrum for both FS and FSS users, however, was answered affirmatively.

A. Protecting FS Users Is In The Public Interest.

No doubt exists that "FS users serve specific industrial, public safety, and commercial requirements of many companies and public agencies that constitute much of this nation's infrastructure."[13] Need for spectrum in the 36-51.4 GHz band by FS thus is based upon empirical

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[12]WRC-97 Agenda Item 1.9.6 addresses the "identification of suitable frequency bands above 30 GHz for use by the fixed service for high-density applications."

[13]TIA at 5. See also ART at 3-4; WinStar at 1-2; BizTel at 2-3; Alcatel at 3.

evidence, not unjustified speculation.

Driven by shrinking spectrum for FS below 30 GHz[14] and by increasing demand for short-haul, wideband applications, service providers are focusing on the bands above 36 GHz. And, with good reason. For example, licensees in the 38 GHz band, such as WinStar, BizTel, and ART, can document significant success in providing competitive telecommunications services:

> [I]n the 38 GHz radio band, [licensees provide] "last mile" connectivity for other service providers and business customers over fixed wireless broadband, high speed digital telecommunications circuits. [Their] current customer base is comprised primarily of other services providers, such as fiber-based competitive access providers (CAPs), competitive local exchange carriers (CLECs), Personal Communications Service (PCS) providers, cellular service providers (CSPs), long distance carriers (IXCs) and local exchange carriers (LECs).
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>
> The 38 GHz broadband industry is one of the Commission's great success stories. Among the keys to the industry's success is the wide-area or footprint licensing, and the flexibility of the Commission's Rules. Over 800 terrestrial fixed service system authorizations have been issued by the Commission over the last several years, and are or soon will be in operation, utilizing one or more paired 50 MHz channels in the 38.6-40.0 GHz ("38 GHz") frequency band. These systems are area-licensed to serve a contiguous geographic region up to about 160 x 160 kilometers (and in some cases, a far larger area). The ability of the 38 GHz licensees to install new facilities within their licensed areas without obtaining additional Commission approval has enabled the industry to, for the first time, satisfy the public's need for rapid installation of facilities.
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>
> The licensed systems are providing their customers with a full range of digital local broadband voice, data and video distribution services (including mobile network backhaul) and can be readily interconnected with national and international networks . . . . [T]hese systems provide services comparable to and compatible with fiber optic networks.

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[14]See TIA at 5-6.

* * * * * *

> According to manufacturer estimates and other sources, in addition to the substantial deployments and pending equipment orders in the United States, there are as many as 50,000 links currently operating in the 37.0-40.5 GHz band in Europe and other nations around the world.

* * * * * *

> Although the current 38 GHz systems satisfy a substantial unmet demand, the full potential of 38 GHz has yet to be realized. Substantial advances in bandwidth compression promise to substantially increase capacity and to make the systems much more spectrally efficient. Indeed, current development plans forecast data rates as high as 310 MB/s in the near term.

* * * * * *

> A more significant advancement, however, will be the migration of the current systems to multiple point-to-point and point-to-multipoint architectures. Such architectures will be critical to the ultimate competitive success of the 38 GHz industry because such architectures will allow the systems to further reduce the deployment times and costs achievable today. In a point-to-multipoint architecture, the operator need only install the customer receive equipment when a new customer desires service, reducing the deployment time dramatically and reducing the customer cost by spreading the cost of the single hub site across many customers. These narrow-sectored hub and other advanced system architectures will allow the provision of services in increasingly dense coverage configurations throughout the currently authorized service areas.[15]

Such demand is not limited to existing 38 GHz band services. Future applications for HDFS in the 38 GHz band, and in other bands, are emerging worldwide:

> Local access and other high density radio-relay service planning and system deployments have rapidly accelerated in the last few years in many administrations. This acceleration is due in large part to the worldwide trend towards deregulation and increased competition in the provision of local telecommunications and video distribution services. Because of cost and speed of deployment considerations, these developments are placing a major new focus on the provision of services directly to end-users via fixed wireless systems. As a result, the number of fixed service subscribers in the bands

[15]ART at 2-4 (footnote omitted).

above 17 GHz worldwide is currently close to two hundred thousand and growing at a rapid rate. Some proposed new satellite systems already constrain further FS deployment and/or operation in most available bands, progressively increasing constraints arising from sharing with space and satellite services. The demand for local wireless broadband services is experiencing unprecedented growth, leading in turn to a new and pressing emphasis on the national, regional, and international designation of spectrum for the implementation of HDFS. However, HDFS deployment would be impeded under envisaged co-primary sharing constraints in bands above 30 GHz. This has formed the basis for WRC-97 agenda item 1.9.6.

* * * * * *

The vast majority of current worldwide HDFS deployments are in the 38 GHz band, with a primary focus on urban and suburban business and industrial areas. Future HDFS deployment is expected to extend to residential areas, spearheaded by local distribution of television programs in competition to cable TV and other new broadband fixed services offered to the home. The variety of possible current HDFS network configurations includes: conventional point-to-point (P-P), conventional point-to-multipoint (P-MP), and combinations thereof, e.g. P-P systems deployed in multisectored P-MP configurations. High density deployment of independent P-P links similarly results in clusters that assume the essential characteristics of P-MP deployment. The densest HDFS deployment cases have reached the range of 1 to 10 stations per square kilometer, and are expected to increase several fold within a few years.

* * * * * *

Newly developed technology enables stationary lighter than air repeaters to be located at fixed points in the stratosphere above commercial flight path altitudes and over metropolitan areas. Such radio-relay systems using stratospheric repeaters can provide both domestic and international broadband wireless services to user terminals.[16]

These valuable attributes, associated with the HDFS, also were identified in TIA's comments:

Without question, the most important technology for supporting new wireless networks in the bands above 30 GHz will be the HDFS. These HDFS will be essential building blocks for wireless network platforms. Such applications include local access, inter-cell links for mobile and wireless local loop networks, fiber backdrop, local TV distribution, broadband GII access,

[16]CPM Report at §§7.5.2.1 and 7.5.2.3 (citations omitted).

> intelligent transport, SDH access, RLANs and ATM compatible transport. Thus, it is essential that adequate spectrum is made available for HDFS in the 36-51.4 GHz bands.[17]

Any Commission action regarding the 36-51.4 GHz band must be premised on this growing demand. Imposing barriers to fulfilling this growth, by continuing the reduction in FS bands, by relying upon sharing as a panacea for spectrum shortages, and by permitting FSS users to increase spectrum without demonstrating that they have made every effort to conserve and use their existing frequencies, would undermine the objectives supporting the NPRM and would disserve the public interest:

> To support cellular, PCS, LMDS and other emerging wireless technologies, adequate spectrum must be available for HDFS applications. Capacity can be increased by adding cell sites placed closer together, which requires additional point-to-point links to interconnect cells. As the distance between cell sites decreases, the frequency band of choice to interconnect cell sites has shifted from 2 GHz to 18 GHz. As cell sites continue to move closer together, licensees will show substantial interest in the bands above 30 GHz. Action by the Commission in the NPRM must not sidetrack development of these increasingly important HDFS technologies.[18]

B. Protecting FSS Users Is In The Public Interest.

Satellite users, without question, will provide valuable services. The record of this proceeding is replete with evidence that these technologies are capable of serving the public interest:

> Over the past 30 years the Commission has helped to create a dynamic U.S. satellite industry. This industry will offer a wealth of innovative new services to businesses and consumers, including: mobile personal communications, data, broadcast, direct-to-home entertainment, and broadband satellite services.[19]

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[17]TIA at 8-9 (footnote omitted).

[18]TIA at 10.

[19]SIA at 2. See also HCI at 5-7; Motorola at 4.

In determining how to designate the 36-51.4 GHz band, the Commission must recognize these potential benefits from FSS users. However, the Commission also must take time for a "reality check." Spectrum decisions must be based upon the fact that FSS and FS users serve the public interest in comparable ways, need comparable spectrum to continue providing such service, and can not share bands without significantly diluting these important qualities.

Notwithstanding this parity between FS and FSS users, Lockheed attempts to narrow how the Commission evaluates their comparative needs. It argues that a balanced decision is one that considers the interests of "early terrestrial entrants into the band, above 36 GHz" with those represented by future satellite advances.[20] Lockheed's comparison, which is indicative of how FSS users consistently attempt to undermine FS users, is inappropriate. The future interests of satellite users must instead be balanced against those of a large and ever-increasing number of FS incumbents and against those of the longer-term HDFS users. Unlike their satellite counterparts, the future needs of HDFS users above 30 GHz have been solidly documented at the ITU-R in preparing for WRC-97 Agenda Item 1.9.6.

BAND SEGMENTATION, NOT BAND SHARING, MUST BE ADOPTED

Certain truths emerged from the NPRM comments. First, band sharing will not work. Second, the Commission's proposed surrogate for band sharing -- the "underlay" designation -- is inconsistent with current international spectrum allocations for the 36-51.4 GHz band and is not feasible. Third, band segmentation is the best approach to spectrum planning.

[20]Lockheed at iv.

A. Band Sharing Between Satellite and Fixed Terrestrial Services Will Not Work And Must Not Be Used As a Spectrum Planning Tool For The 36-51.4 GHz Band.

Historically, the Commission has sought to maximize its accommodation of disparate user needs by promoting band sharing. Industry efforts to develop sharing criteria between FS and satellite users have been futile.[21] It is time to bury this misguided spectrum planning tool once and for all. Thus, the Commission's proposal, in the NPRM, to avoid band sharing,[22] must be adopted.

Convincing evidence in the record of the NPRM exists that band sharing is a mistake that will not be cured. In its comments, ART identifies the hazards that sharing creates:

> The imposition of spectrum sharing between high-density FS and satellite deployments would prevent the requisite quick coordination (needed by FS users), thereby undermining the Commission's licensing plan and thwarting the benefits gained from self-coordination.
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> [S]haring would create interference from each service into the other, which would be nearly impossible to avoid and would require impractical, or unduly expensive, methods to mitigate[.][23]

TIA also has demonstrated that

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[21]See NPRM at ¶ 12. See also Report of the Ad Hoc Millimeter Wave Group on U.S. Proposals For Agenda Item 1.9.6 Of WRC-97, March 5, 1997, at §3.1.1 ("AHMW Report"). In addition, it should be noted that TIA TR.14 and TR.34 have been working with the satellite industry to determine if sharing with FS users in the 2 GHz band is feasible. To date, these efforts have been unsuccessful.

[22]NPRM at ¶ 12.

[23]ART at 6. See also Alcatel at 2; BizTel at 3-5; WinStar at 3. Motorola and other FSS users claim that geographic coordination and use of ATPC would solve these problems. However, these users provide no evidence to support their claim. Indeed, there is substantial evidence to the contrary. ART at 8-12; TIA at 3-4; AHMW Report at §3.1.1. Moreover, as ART details, "operation elevations up to 40 degrees (or perhaps more)" are required or preferred for certain FS installations, but NGSO and GSO satellite systems could cause serious interference to such high elevation systems. ART at 13.

> [s]uch sharing will not work. In lower frequency bands, terrestrial FS links are approximately horizontal and satellite links are approximately vertical. Both deployments are relatively far removed from each other geographically. In theory, under such conditions, these services might be able to share frequencies. At high frequencies, including the 36-51.4 GHz bands, these simplifying assumptions do not apply. Satellite and terrestrial FS users deploy many systems in urban areas. Both systems could implement paths with high elevation angles. These considerations make frequency band sharing impractical.[24]

Due to these factors, specific interference problems will result: (i) satellite transmitters will interfere with FS receivers; (ii) FS transmitters will interfere with NGSO FSS earth stations; and (iii) NGSO earth station transmitters will interfere with FS receivers.[25] Consequently, WinStar specifically and appropriately urges the Commission to eliminate sharing in the 38 GHz band because FSS operations would retard continued FS licensee success at "building out and operating their systems . . . .[26]

Even satellite users fear band sharing:

> [T]he prospect of multiple, ubiquitously deployed, and incompatible services [is unacceptable]. The traditional paradigm of satellite/terrestrial co-frequency operation -- by which a relatively small number of large, expensive terrestrial links were coordinated site by site with a relatively small number of large, expensive satellite earth stations -- [does] not fit these newer services and provide[s] no help in resolving the conflict.[27]

The impossibility of band sharing also is recognized internationally, as illustrated by the

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[24]TIA at 14. The Commission also inquired about the feasibility of sharing between Government and non-Government users in the 36-51.4 GHz band. NPRM at ¶¶ 18-20. TIA questioned the efficacy of such sharing due to historical problems concerning the protracted time it took for the Government to complete its coordination. TIA at 18-19. In its comments, NTIA expressed a guarded willingness to share its spectrum. NTIA at 4-6. Otherwise, there was not any strong support for such sharing in the comments. Thus, the Commission should defer on this issue.

[25]TIA at 14-15.

[26]WinStar at 5.

[27]Teledesic at 4.

unequivocal condemnation in the CPM Report:

> HDFS intra-service station distances are substantially smaller than inter-service separation distances. Therefore, the integrity of HDFS service areas can be severely affected by the exclusion zones required for sharing. Accordingly, coordination with and by other services should be carried out for HDFS service areas instead of individual HDFS stations.
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> * * * * * *
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> Similarly, HDFS using stratospheric repeaters use a full range of elevation angles. Thus, sharing with services other than broadcasting-satellite service feeder links located outside primary coverage areas may present difficulties in the bands proposed for such systems.
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>
> All the frequency bands above 30 GHz allocated to the fixed service are also allocated to one or more other services on a shared basis. Sharing with another service in the same deployment area would severely impair:
>
> - achievable coverage density;
> - service quality;
> - cost effectiveness;
> - spectral efficiency;
> - rapid installation of large quantities of links.[28]

Despite this overwhelming opposition to sharing, several satellite users cling to the fantasy that such an approach should be pursued.[29] Seemingly impervious to these obstacles, Motorola even admonished the FS industry because it has "not demonstrated a similar willingness to fashion sharing arrangements . . . ."[30] Any insinuation that FS users have not seriously attempted to establish viable criteria for band sharing with FSS users is totally unjustified.[31] All sharing proposals have been

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[28]CPM Report at §7.5.3.2. See also AHMW Report at §3.1.1.

[29]TRW at 15-16; GE Americom at 8; Lockheed at 5.

[30]Motorola at 11-12.

[31]See footnote 21, supra.

fully considered and evaluated.[32] No matter what FSS users claim, these efforts lead to a singular, inescapable conclusion -- sharing will not work.

Further, FSS users' efforts at getting the FS industry and the Commission to focus on accepting band sharing is another obvious gambit to avoid the more important issue of designating sufficient and appropriate spectrum for both terrestrial and satellite licenses. A nearly unanimous negative reaction by satellite companies to the Commission's proposal for allowing "underlayed" FS in FSS bands, as detailed below, illustrates their intimate awareness that sharing really will not work.[33] The fact that some FSS users fear having FS systems deployed in their bands, even before the satellite systems are operational,[34] confirms that band segmentation is the only solution.

B. The "Underlay" Approach Must Be Rejected.

Even though the Commission acknowledged the inefficacy of band sharing, it still could not completely divorce itself from the concept of designating more than a single service to operate in a given spectrum block. This stubborn desire to pack the bands gave birth to the proposed "underlay" concept, which the Commission described as "a type of service that fits within existing or subsequently modified spectrum allocations, but is not our designated predominant use of a particular band."[35]

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[32]Sharing between FS and FSS users has been accommodated every time that it has been possible, despite the corresponding constraints imposed upon FS users. The 4, 6 and 18 GHz bands are shared between FS and FSS users. After years of careful technical evaluation, segmentation between LMDS and FSS was preferred for most of the 28 GHz band. More recently, however, at the last ITU-R SG9 and CPM-97 meetings, the international FS community made it clear that FS/FSS sharing is not feasible in the bands above 36 GHz.

[33]See, e.g., GE Americom at 6-8.

[34]Lockheed at 10.

[35]NPRM at ¶ 23.

Hiding behind this new nomenclature for sharing did not work. Almost unanimously, both FS and FSS users panned the "underlay" concept.

TIA opposed the "underlay" concept for existing FS applications because it would create the very same problems that band sharing would create:

> FS and FSS at high frequencies are mutually exclusive. They both plan to use the same geographic area, roughly the same transmission paths, and high density deployment with little or no coordination. Consequently, the "underlay" concept would serve no purpose for existing FS.[36]

The FSS interests also oppose the "underlay" approach because it

> complicates the long-term planning and investment fundamental to any successful satellite service. A satellite operator or investor simply cannot assume that an underlay operation would not somehow limit the use of spectrum for satellite services.[37]

Most telling, however, is the FSS concern over how primary and underlay users would co-habitate. For example, while advocating band sharing, Motorola opposes adoption of the underlay approach unless FSS users are fully protected against interference from FS users:

> If the Commission's underlay proposal is not intended to create rights against primary licensees exceeding those of secondary users, Motorola can support the [underlay] proposal, subject to certain conditions. First, the Commission should not grant underlay licenses in a particular band until after FSS services are licensed and operating. This will ensure that new FSS operations do not face already congested bands that must be cleared. Second, no permanent underlay license should be granted until after a tentative FS licensee demonstrates to the satisfaction of FSS licensees and the Commission that their systems do not actually interfere with an existing primary FSS user in the band. Third, no underlay licensee should be permitted to hold any

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[36]TIA at 17. See also ART at 15-16. At best, the Commission could consider using the "underlay" designation for above 50 GHz band "campus" applications.

[37]GE Americom at 6-7. See also Lockheed at 8; Motorola at 15-21; TRW at 18-19; Teledesic at 5. Among the reasons cited by these FSS users for questioning adoption of the "underlay" designation are its inconsistency with International Telecommunications Union ("ITU") allocation tables and the uncertainty over how it would be applied.

> preferred interference protection status as against a subsequently licensed (or modified) primary FSS system. This last condition is crucial because FSS systems require a longer development and implementation period than do FS systems.[38]

Similarly, GE Americom

> assumes that the Commission would never permit a wireless service with an underlay license to take precedence over satellite services in that area of spectrum, even if the underlay license predates a proposed satellite service.[39]

The FSS users can not have it both ways. If they are so concerned that FS users could "invade" their turf by being classified as "underlay" licensees, it is highly disingenuous for them to support band sharing. There should be no confusion, however, concerning the satellite industry's true motives. All they want is to keep FS users out of the 36-51.4 GHz band by erecting any possible barrier to their entry, as evidenced by the request that "identification of spectrum for [HDFS] in bands allocated to satellite services should be limited."[40]

Reliance on the "underlay" designation would exacerbate the sharing problem. It would not cure any flaws in this outdated, counter-productive spectrum allocation policy. There is no reason for FS users to be balkanized by accepting "underlay" status in bands assigned to FSS users on a primary basis, and FS users also do not want FSS users to have "underlay" status in their primary bands. Thus, the Commission must jettison this proposal as being unrealistic.

C. Band Segmentation Must Be Adopted.

Given the acute problems with sharing and with the "underlay" status, band segmentation is the only answer. In the NPRM, the Commission signaled its strong desire to develop a rational new

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[38]Motorola at 17 (footnotes omitted).

[39]GE Americom at 7. See also Lockheed at 10-11.

[40]GE Americom at 12.

approach to spectrum planning. Instead of forcing incompatible services to share spectrum blocks, the Commission favored band segmentation.[41] TIA strongly supported the Commission's approach.[42] So did most of the other parties, including several FSS users.[43]

For example, WinStar declares that "segmentation is the best solution as it will eliminate interference problems and allow both FS and satellite services to be deployed to their full potential."[44] BizTel

> agrees with the Commission's conclusion that designations providing access to separate spectrum blocks for terrestrial and satellite systems is a crucial component to preserving flexibility in service offerings and maximizing efficient use of the millimeter wave spectrum resource.[45]

One FSS user reaches the same conclusion:

> Teledesic agrees with the Commission's assessment of satellite/terrestrial sharing and endorses its tentative conclusion that separate frequencies should be designated for satellite and terrestrial services in the future. Teledesic also agrees with the Commission's articulation of the overarching policy goal: to "provide the various proposed systems with the best opportunity to succeed." The identification, *a priori*, of discrete frequency bands in which each service may flourish without being constrained by the other is likely to be the best way to ensure that each system enjoys the operational flexibility, and freedom for technical innovation, that it needs to succeed. Any imposition of *a priori* operational constraints will limit flexibility, inhibit technical innovation, and in most cases impose cost burdens that will make the service less affordable for users.[46]

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[41]NPRM at ¶¶ 9-12.

[42]TIA at 12-13.

[43]ART at 5; Lockheed at 2; Teledesic at 4-5; Alcatel at 2.

[44]WinStar at 4-5.

[45]BizTel at 5-6 (footnote omitted).

[46]Teledesic at 4-5 (footnotes omitted).

If band segmentation is adopted, both FS and FSS users each would get less actual spectrum. In this case, however, less is more:

> Establishing new exclusive FS and FSS allocations within the existing co-primary allocations . . . . would allow both services to be deployed by administrations to their full potential in terms of subscriber density, system capacity, service quality, cost effectiveness and spectral efficiency, by allowing each service to independently optimize the multiple trade-offs between coverage density, service quality, cost effectiveness and spectral efficiency. While this solution does reduce the actual amount of spectrum available to both the fixed service and the fixed satellite service, it effectively increases resulting system capacities and minimizes disruption to the directly affected services, as well as to services allocated in other bands above 30 GHz.[47]

THE COMMISSION MUST NOT DESIGNATE ADDITIONAL SPECTRUM FOR FSS USERS

The FSS users strongly criticize the proposals in the NPRM because the Commission would not designate enough spectrum for their needs. They bemoan the fact that, under the Commission's plan, only 4 GHz is designated for FSS, which "would severely impact the viability of broadband satellite systems worldwide."[48] To meet FSS user needs, they claim that at least 6 GHz (3 GHz uplink and 3 GHz downlink) must be designated in the 36-51.4 GHz band to "meet the demonstrated system needs . . . and the expected demand by . . . FSS system operators."[49]

Nowhere, however, is any evidence submitted by FSS users that such demand actually exists. Nor is any evidence submitted that the proposed 4 GHz is inadequate, that 6 GHz actually is needed, or, most importantly, that all management and efficiency measures have been implemented to

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[47]ART at 13-14. See also AHMW Report at §3.1.1.

[48]Motorola at 5.

[49]Motorola at 6 (emphasis added). See also SIA at 2; HCI at 8-12; Lockheed at 8; GE Americom at 4-5.