BEFORE THE

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Federal Communications Commission

WASHINGTON, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

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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 for Government Operations	)	IB Docket No. 97-95

To: The Commission

REPLY COMMENTS OF TRW INC.

TRW Inc. ("TRW"), by counsel and pursuant to Sections 1.415 and 1.419 of the Commission's Rules (47 C.F.R. §§ 1.415 & 1.419 (1996)), hereby replies to the initial comments submitted concerning the above-captioned Notice of Proposed Rulemaking, FCC 97-85 (released March 24, 1997) ("NPRM"). Comments were submitted by a variety of parties generally representing the terrestrial fixed service community, the satellite industry, and U.S. Government users. Notwithstanding the diverse interests of the parties, there is agreement among the commenters concerning several of the basic principles that should be employed in allocating spectrum in the bands from 36 to 51.4 GHz. In particular, a considerable number of those participating in the proceeding express the desire that the domestic allocations in these bands be as consistent as possible with the International Table of Frequency Allocations in order to facilitate harmonized global spectrum use. In addition, almost all parties addressing the issue agree that the Commission's notion to permit "underlay" services in certain bands is too vague and, at best, would require substantial clarification before it could be implemented.

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Despite these areas of basic agreement, however, there remain substantial differences among the commenters concerning how these principles should be applied to achieve a rational spectrum plan, and concerning which bands should be made available for particular services. Under these circumstances, the Commission should strive to apply equitably and rationally the spectrum allocation principles endorsed by TRW and other commenting parties to ensure that sufficient spectrum is available for each of the potential service offerings, both satellite and terrestrial, that are being planned for the subject bands.

DISCUSSION

Spectrum Allocation Principles

There is agreement among many satellite and terrestrial parties on at least one overarching principle pertaining to spectrum allocations — the need to secure harmonized global allocations for particular services.[1/] Unfortunately, there is not similar agreement concerning precisely where specific allocations should be within the bands at issue. However, while representatives of the satellite industry have provided substantive reasons why common global frequencies must be made available for space-based applications within the existing bands allocated for these services, the terrestrial interests have made no similar demonstration that particular bands sought for fixed and mobile services are uniquely suited to these uses.

In particular, although the Telecommunications Industry Association ("TIA") has advanced an alternative band plan, neither it nor any of the individual commenters from the terrestrial wireless service community have provided any concrete basis for the allocation of particular bands for fixed and mobile services. No specific quantity of spectrum is identified as necessary to meet the emerging needs of these users, and most of the band-specific discussion offered by these interests is focussed upon retaining access to the entire range of frequencies between 37 and 40 GHz. These

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1/ *See* Comments of BizTel, Inc. at 6-8; Comments of GE American Communications at 12; Comments of Lockheed Martin Corp. at 9; Comments of Telecommunications Industry Association at 19-21; TRW Comments at 7-8.

commenters fail to offer any reasons why all of this spectrum should be set aside for their use or why designation of other frequencies would be insufficient to meet their long-term needs. The fact that the Commission has begun making assignments in these bands before the adoption of a comprehensive spectrum allocation plan that addresses the needs of all allocated services is not a valid justification for codification of the band segmentation sought by many terrestrial commenters — it is the root of the problem now facing the Commission.

Terrestrial wireless applications should not be allocated large chunks of spectrum in a way that precludes satellite use of internationally-allocated frequency bands. The Commission has yet to articulate a reason why it believes that it is sound spectrum management policy to cede broad expanses of spectrum for exclusive terrestrial wireless use just as the commercial viability of satellite uses of the bands above 36 GHz is becoming established.[2/] Indeed, TRW does not believe that any cogent reason can be articulated for this approach.

The Commission should not permit a situation to develop where terrestrial fixed service allocations are utilized on a piecemeal basis while insufficient frequency resources are available for the development of global satellite systems. Instead, terrestrial uses should be concentrated domestically in the first instance in those bands where such use is already prevalent in other regions of the world, as the absence of prospects for successful co-frequency sharing means that such bands are already viewed as less attractive for use by potential global satellite service providers.

At a minimum, it is evident that a more equitable division is necessary in order to serve the dual goals of ensuring harmonized domestic and international allocations while minimizing the need to seek changes in the current ITU allocation tables. As TRW pointed out in its initial

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2/ TRW notes that the suggestion of one commenter that additional spectrum be set aside for terrestrial use is premised on the patently unlawful rationale that creation of licenses "in each market across the nation" (as opposed to single national satellite licenses) would allow the Commission to increase "the return from any future auction." *See* Comments of ICE-G, Inc. at 3. The statute authorizing the Commission to use competitive bidding to assign spectrum prohibits the Commission from making spectrum allocation decisions based on the expectation of auction-derived revenue. *See* 47 U.S.C. § 309(j)(7)(A).

comments, while common global allocations are beneficial for both terrestrial and satellite services, many space-based telecommunications systems would not be viable at all without the ability to serve broad regional and/or global markets using the same frequencies. At the same time, the economies of scale advantages of creating global equipment markets apply as strongly to satellites as to other types of wireless technology.

Spectrum Sharing and The Commission's Underlay Proposal

In addition to modifying its spectrum segmentation approach, the Commission should not, in TRW's view, rule out possible approaches to spectrum sharing between satellite and terrestrial users. Although several commenters from the fixed service community have gone to great lengths in attempting to demonstrate that sharing is not feasible, the assumptions upon which these showings rest are rooted in existing technologies and preliminary assessments concerning sharing with Motorola's proposed M-Star system.[3/] The conclusions reached are of no relevance to sharing possibilities that may be presented by other satellite system technologies. Indeed, if anything, sharing is easier in these bands, where terrestrial propagation distances are short, beams are much more narrow, and satellite elevation angles are, of necessity, high.

The ability to share is a function of both system design and the willingness of the parties coordinating use to carefully work out the means through which sharing can be achieved. In order to maximize the efficient spectrum use, all interested parties should be willing to explore new sharing approaches as they develop.

To the extent that sharing proves possible in frequency bands that remain allocated on a co-primary basis to both satellite and terrestrial services, it should be encouraged. One practical means of achieving this result is simply for the Commission to become affirmatively involved in setting standards that would permit services, including secondary services, to co-exist by observing protocols that avoid interference. So long as these standards are clear and are established in a rational

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[3/] *See* Comments of Advanced Radio Telecom Corp. at 5-13; TIA Comments at 10-11.

manner, there is every reason to expect that prospective terrestrial licensees that would use spectrum allocated on a secondary basis would be able to gauge the probable value of access to bandwidth for the purpose of bidding on licenses that are assigned by auction. Indeed, to the extent that the Commission is inclined to assign licenses for the provision of multiple services in the same spectrum bands, this purpose would be best served by preserving primary and secondary designations and making clear through defined technical rules the service limitations applicable to particular types of licensees. Far more troublesome would be an attempt to create a new category containing elements of primary and secondary status, as the Commission has apparently suggested with its proposed "underlay" approach.

TRW believes that the Commission should not further consider the "underlay" idea.[4/] Wireless services, for example, should not be able to gain priority rights as "underlay" providers simply by commencing operations in any spectrum band allocated for satellite use — yet the Commission's proposal does not rule out this prospect. Such an approach could effectively eviscerate a primary FSS allocation by allowing it to become cluttered with terrestrial transmitters before any satellite systems are launched.

Moreover, introducing the notion of an "underlay" service as a concept distinct from the existing secondary category could result in confusion by foreign administrations concerning the meaning of the U.S. band plan. Too much must be accomplished through the ITU in the effort to secure appropriate spectrum allocations for efforts to be squandered explaining the amorphous "underlay" concept to representatives of other administrations.[5/] Accordingly, the Commission should abandon this proposal, and concentrative instead on instituting the technical standards and

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[4/] The majority of commenters have urged that the "underlay" idea either needs to be substantially clarified or abandoned. *See* Advanced Radio Telecom Comments at 15-16; GE Americom Comments at 5-8; Comments of ICE-G, Inc. at 3-4; Lockheed Martin Comments at 17-18; Comments of Motorola Satellite Systems, Inc. at 15-21; TIA Comments at 18-19; TRW Comments at 20-21.

[5/] *See* Motorola Comments at 20-21.

associated regulatory safeguards that will ensure that the maximum degree of co-frequency operation is both attained and maintained.

Designation of FSS Spectrum For Particular System Types

Finally, although there is remarkable unanimity within the satellite community concerning the majority of the issues raised in this proceeding, these commenters part company on one significant matter. While many satellite industry commenters urge the Commission not to divide spectrum among satellite technologies at this time,[6] two commenters support the Commission's proposal to earmark separate bands for geostationary and for non-geostationary satellite services.[7]

TRW believes that such preemptive segmentation is premature at present, because the FCC does not currently have sufficient details concerning the range of services that may be proposed in these bands. Information yielded by actual system applications can be expected to provide critical insights into both the relative need for spectrum for particular system types and the portions of the subject frequency bands where particular allocations are desired. Accordingly, the Commission should not limit particular spectrum blocks to specific technological models until after it has received additional space segment applications from those companies that expect to provide new satellite services in the 36 - 51.4 GHz bands.

Another reason not to rush to intra-service segmentation is that once segmentation occurs, the incentive to find sharing solutions evaporates, and the prospects for maximization of spectrum efficiency disappear. This is contrary to the Commission's policy favoring flexible use of spectrum, and should be avoided to the extent possible.

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[6] *See* Comments of Hughes Communications, Inc. at 18-19; Lockheed Martin Comments at 13 n.15; TRW Comments at 14-15 and n.9.

[7] *See* Motorola Comments at 7-9; Comments of Teledesic Corp. at 2-3.

Alternative Band Plan

In reviewing the comments filed and endeavoring to strike a suitable balance between the legitimate interests of service providers in both the satellite and terrestrial communities, TRW has developed a band plan alternative (see Table 1) that differs in several key respects from the plan proffered by the Commission. First, TRW's approach includes a combination of regional and global allocations, in an effort both to take account of what apparently is happening in portions of the subject frequency bands and to maximize the efficient use of the spectrum resource. Second, TRW's proposed approach also does away with the confusing notion of "underlay" services that was introduced in the NPRM. If it is important to minimize the changes that are necessary to the ITU Tables of Frequency Allocations, and TRW's views both in its initial comments and above demonstrate that it is, the underexplained concept of "underlay" services seems to be contrary to the objective. TRW's approach adheres to the conventional pairing of "primary" and "secondary" services, and thus avoids the need for new regulatory considerations to be interjected at the ITU level. Third, TRW does not attempt, at this juncture, to draw any distinction for allocation purposes between geostationary and nongeostationary FSS services. TRW views this "suballocation" question as one that is more appropriately addressed when the characteristics of satellite systems seeking to use the band become more well known; for now, it is enough that any allocation to the FSS would be broad enough to include nongeostationary and/or geostationary FSS networks.[8/] Finally, and most importantly, TRW's approach modifies the allocations that would be made in an attempt to achieve a reasonable balance between satellite and terrestrial interests.

Most of the adjustments TRW would make to the Commission's proposed band plan come in the downlink bands (at 37.5-42.5 GHz). If claims as to deployments of high-density fixed

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8/ TRW recognizes that with a combination of regional and global allocations, certain bands may be more naturally suited to geostationary operations than to non-geostationary operations. At this point, however, it is still premature to adopt any measure that forecloses a band segment to one type or system or the other.

service systems in Europe and the United States are correct, it would appear that the band 37.5-38.6 GHz is used in Europe for HDFS, and the band 38.6-40.0 GHz would be used for such services in the United States. In the former case, the band 37.5-38.5 GHz could be made available for satellite use in at least ITU Regions 2 and 3 — and perhaps in the non-European portion of Region 1. As such, there is no need to change the allocation proposed by the Commission in this band. In the latter case, however, the band 39.5-40.0 GHz could be made available for satellite use outside of the United States.[9] Also, a secondary allocation to the FSS should be added to the band 38.5-39.5 GHz, so as to permit sharing efficiencies that may develop. These changes are reflected in Table 1.

TRW's approach would also return the 40.0-40.5 GHz band to satellite use (without specifying which type(s) of satellite service would receive assignments in the band). Finally, TRW would add a co-primary FSS allocation to the extant BSS allocation in all three ITU Regions at 40.5-42.5 GHz.[10] As some parties noted in their initial comments, however, there are significant unanswered technical questions as to whether the full 2 GHz could be made available for FSS services in the space-to-Earth direction.[11]

From 42.5-47.2 GHz, TRW's plan is no different than what the Commission proposed in the NPRM. In the band 47.2-48.2 GHz, TRW proposes its only modification to the Commission's plan in the satellite services Earth-to-space direction. Specifically, TRW is of the view that the

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9/ It is TRW's understanding that European "HDFS" systems do not use spectrum above 39.5 GHz.

10/ With this proposal, TRW does not address the question of what happens if necessary international allocation changes are not made at the ITU's 1997 World Radiocommunication Conference. As TRW argued in its initial comments, the Commission should not take any final action prior to the conclusion of WRC-97. It seems clear that if no allocations are made at WRC-97, and the prospects for allocations at WRC-99 are viewed objectively as slim, the allocations proposed either in the Commission's NPRM or by TRW above would have to be substantively revisited. *See* TRW Comments at 16-18. Also, a secondary allocation to the FSS should be added to the band 38.5-39.5 GHz, so as to permit sharing efficiencies that may develop.

11/ *See* TRW Comments at 9-10.

proposed CWS allocations at the lower and upper edges of the band should be reduced from the 300 MHz envisioned for the single proposed system of stratospheric repeaters in the fixed service to a maximum of 250 MHz at each band edge.

The reasons for this are two-fold: First, and as TRW noted in its initial comments, the 300 MHz figure was introduced at a time when it was believed by the application's proponent that multiple stratospheric systems could emerge. This did not prove to be the case — no competing applications were filed during the filing window. The application's proponent has indicated that a single system could be accommodated with as little as 10 MHz in each direction, meaning that 300 MHz is an unnecessarily overgenerous allocation for the service.[12/] Second, with the reduction of the band-edge CWS allocations to a maximum of 250 MHz in each direction, there would be room in the middle (i.e., from 47.45-47.95 GHz) for a 500 MHz FSS allocation in the Earth-to-space direction. The 500 MHz allocation is the minimum bandwidth for satellite systems in these frequency ranges.

TRW also proposes that FSS systems be made co-primary with CWS in the 250 MHz band edges at 47.2-47.45 GHz and 47.95-48.2 GHz, subject to a requirement that any FSS uses of these bands on a co-primary basis would be made with large earth station antennas. Although the precise requirement remains to be worked out, TRW expects that BSS uplinks and large-dish FSS services would be able to operate in the 250 MHz band edges (at 47.2-47.45 GHz and at 47.95-48.2 GHz) on a compatible basis with at least stratospheric CWS systems. Any other type of CWS system that seeks authorization for this band would, of course, also be required to be compatible with certain "large-dish" satellite uses.[13/]

12/ TRW Comments at 10 n.6.

13/ As an alternative to reducing the amount of spectrum at 47.2-48.2 GHz that is available for CWS, TRW would not object to the suggestion of some commenters that the stratospheric CWS systems be accommodated in the portion of the band (51.2-52.2 GHz) where there is no present or proposed satellite allocation. *See* Motorola Comments at 9.

All in all, TRW has attempted to come up with an alternative band plan that takes due account of current users of the subject bands, and makes a rational and equitable accommodation of the interests of the competing services that are preparing to make use of the subject bands. It urges the Commission and interested parties to look at this proposal as a way to expedite the resolution of this complex proceeding and allow the U.S. to get on with the difficult task of securing the requisite adjustments to the ITU Table of Frequency Allocations.

CONCLUSION

As detailed above and in its initial Comments, TRW believes that the Commission is correct to address spectrum allocation in the 36 - 51.4 GHz bands in a comprehensive proceeding that fully considers the requirements of all potential service providers. With the modest modifications to the initial band plan proposed herein, TRW expects that the emerging requirements of both satellite and terrestrial fixed and mobile service users can be adequately accommodated in this band and it pledges to continue working with Commission staff and other interested parties to achieve this goal.

Respectfully submitted,

TRW Inc.

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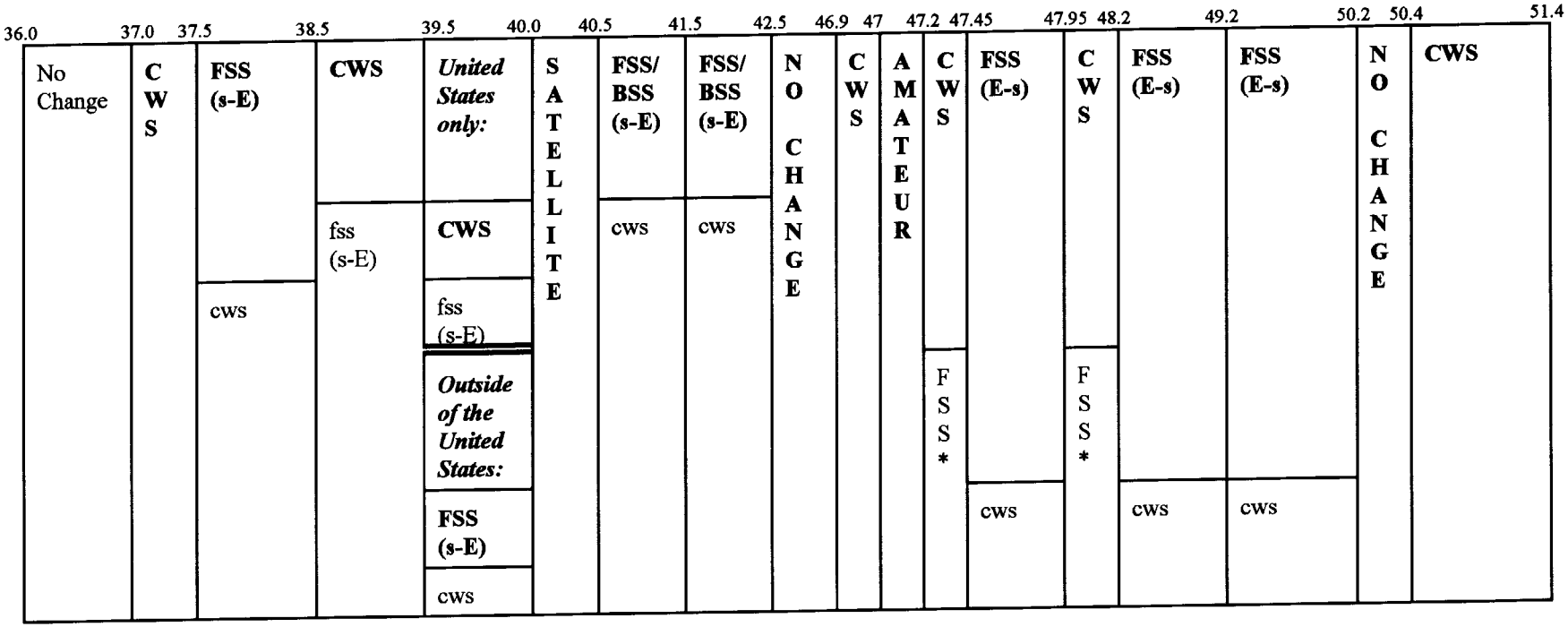
Its Attorneys

TABLE 1

TRW Inc.
U.S. BAND PLAN ALTERNATIVE:
3 JUNE 1997



* Subject to Restrictions on Minimum Antenna Size