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

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Amendment of Parts 2 and 15)
of the Commission's Rules to Permit) ET Docket No. 94-124
Use of Radio Frequencies Above 40 GHz) RM-8308
for New Radio Applications)

To: The Commission

REPLY COMMENTS

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February 28, 1995

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SUMMARY

In the Notice of Proposed Rule Meeting ("NPRM"), the Commission proposes to reallocate "millimeter wave" frequency bands above 40 GHz for commercial development.¹ The Commission's proposed reallocation is generally supported in the record. Most parties acknowledge the need for the spectrum. However, different parties envision different uses for the newly available frequencies and propose different assignment and technical requirements to implement these uses.

In its comments, the Fixed Point-to-Point Communications Section, Network Equipment Division of the Telecommunications Industry Association ("TIA") applauds the NPRM as an appropriate first step in providing needed spectrum for fixed users. To support personal communications service ("PCS"), other wireless networks, and emerging short-haul point-to-point fixed applications, TIA proposes a further reallocation in the bands above 40 GHz band to satisfy the needs of private and common carrier fixed point-to-point microwave users. Specifically, TIA requests that, in addition to the proposed reallocations in the bands above 40 GHz for fixed commercial services, the Commission follow international guidelines by:

- Reallocating the 48.5 - 51.4 GHz and the 55.2 - 58.2 GHz bands for exclusive use by private and common carrier fixed point-to-point microwave users to match existing or proposed international allocations. This proposed reallocation ensures practical

¹NPRM, 9 FCC Rcd 7078 (1994).

transmit/receive spacings and allows for a broad range of RF channel bandwidths.²

- Reallocating the 40.5 - 42.5 GHz band (the "40 GHz band") for Local Multipoint Distribution Service ("LMDS") and reallocating the 28 GHz band for fixed point-to-point microwave service to match existing or proposed international allocations.

TIA also recommends that certain requirements be imposed on these reallocated bands to ensure that they meet the needs of emerging technology providers and fixed point-to-point microwave users:

- The bands above 40 GHz must be licensed pursuant to the proposed Part 101,³ and, consistent with clear statutory requirements, must be exempt from auction.⁴
- The proposed allocation of the 47.2 - 48.2 GHz band must be revised by: (i) eliminating the 47.2 - 47.4 GHz allocation for unlicensed vehicular radar systems and reallocating that 200 MHz for such radar systems to anywhere in the 45.0 - 47.0 GHz band; and (ii) moving the 800 MHz to be allocated for licensed use from 47.4 - 48.2 GHz to 47.2 - 48.0 GHz. These changes are required to provide a 500 MHz guardband between the proposed licensed uses and the proposed private and common carrier fixed point-to-point microwave allocation starting at 48.5 GHz.
- Formal procedures must be adopted to improve spectrum sharing between the government and the private sector. These procedures must include, at a minimum, reducing the time needed to coordinate

²These bands are consistent with interim European Conference of Post and Telecommunications Administrations ("CEPT") allocations for fixed point-to-point use. CEPT is responsible for setting European telecommunications standards. Moreover, in the near future, the International Telecommunications Union ("ITU"), the international telecommunications standards setting organization, is expected to adopt these allocations for fixed point-to-point use.

³See Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, Notice of Proposed Rulemaking, WT Docket No. 94-148 (FCC 94-314, released Dec. 28, 1994).

⁴47 U.S.C. Section 309(j) (1994).

frequencies between government and private users from weeks to hours.

TIA is not the only party addressing these issues. In comments filed on the NPRM, other parties: (i) propose alternative uses for the 48 - 59 GHz band; (ii) advocate use of the 40 GHz band for LMDS; (iii) recommend higher power limits and different emission requirements; and (iv) express concern over sharing government and non-government bands.

- 48 - 59 GHz Allocation -- Alcatel Network Systems, Inc. ("ANS"), Harris Corporation-Farion Division ("Farion"), Pacific Bell Mobile Services/Telesis Technologies Laboratory ("Pacific"), and AT&T Corp. ("AT&T") join TIA and strongly support use of the spectrum above 40 GHz for short-haul fixed services.⁵ Neither the amateurs,⁶ nor the proponents of vehicular radar systems,⁷ nor the educational interests,⁸ raise any issues that would be inconsistent with, or adversely affected by, TIA's proposal. Hughes Aircraft Company, Communications Product Unit ("HCP"), Hewlett-Packard Co. ("H-P"), and the Millimeter Wave Advisory Group ("mmWAG") propose using the 48 - 59 GHz band for mobile and fixed services, but they do not specify that this allocation should be for fixed point-to-point uses exclusively.⁹
- LMDS -- Several commenters agree with TIA and urge the Commission to reallocate the 40 GHz band for LMDS. However, these parties differ from TIA by recommending that the 28 GHz band

⁵ANS at 1; Farion at 1-2; Pacific at 3; AT&T at 3.

⁶The Amateur Radio Relay League, Incorporated at 4-5.

⁷American Honda Motor Co., Inc. at 1; VORAD Safety Systems, Inc. at 1; American Automobile Manufacturers Association at 4; General Motors Corporation ("GM") at 3; Association for Promotion of Millimeter-Wave Development and Utilization at 1; Research & Development Center for Radio Systems at 1; Mitsubishi Electric Corporation at 1; Fujitsu Limited at 1.

⁸Clarendon Foundation at 2-4; GHz Equipment Co., Inc. at 1; Educational Parties at 4; Troy State University in Montgomery at 1.

⁹HCP at 11; H-P at para. 5; mmWAG at 3.

should be allocated exclusively for fixed satellite service ("FSS").¹⁰ It is important to note that FSS and fixed point-to-point services are not incompatible. The ITU has given both services a co-primary status in that band.

- Technical rules -- A significant number of parties share TIA's concern that the proposed +16 dBW EIRP power limitation is too conservative. TIA proposed increasing the power limit to +40 dBW EIRP.¹¹ Other parties also propose increasing this limit from +36 dBW to +50 dBW.¹² TIA supports increasing the limit to +50 dBW. This power limitation is consistent with the +55 dBW used in the lower bands for fixed point-to-point microwave service.
- Sharing -- TIA is not alone in expressing concern over sharing the bands above 40 GHz with the government. All these parties welcome the opportunity for such band sharing, provided the private sector has more timely and open access to government coordinators.¹³

¹⁰Teledesic Corporation ("Teledesic") at 2; Hughes Communications Galaxy, Inc. ("Hughes") at 2-3; Rockwell International Corporation ("Rockwell") at 2; GE American Communications, Inc. ("GE Americom") at 1; The National Aeronautics and Space Administration ("NASA") at 4; TRW Inc. ("TRW") at 1; Martin Marietta Space Group ("Martin Marietta") at 1. Only Texas Instruments Incorporated ("TI") and CellularVision disagree, arguing that the 40 GHz band is inappropriate for LMDS.

¹¹TIA at 16.

¹²Hughes at 8-11; mmWAG at 5; AT&T at 4; HCP at 9-10; H-P at para. 15; Endgate Technology Corporation ("Endgate") at 2-3.

¹³ANS at 2; Farinon at 2; GM at 13; H-P at para. 13.

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To: The Commission

REPLY COMMENTS

Pursuant to Section 1.415 of the Commission's Rules,¹ the Fixed Point-to-Point Communications Section, Network Equipment Division of the Telecommunications Industry Association ("TIA"),² hereby replies to certain comments on the above-captioned Notice of Proposed Rule Making ("NPRM"), 9 FCC Rcd 7078 (1994), to allocate additional spectrum above 40 GHz.

¹47 C.F.R. Section 1.415 (1989).

²TIA is the principal industry association representing fixed point-to-point microwave radio manufacturers. 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.

**THE PUBLIC INTEREST WOULD BE SERVED BEST BY
REALLOCATING THE 48.5 - 51.4 AND 55.2 - 58.2 GHz BANDS
FOR FIXED POINT-TO-POINT MICROWAVE SERVICE**

The record of this NPRM supports TIA's proposed reallocation of the 48.5 - 51.4 and 55.2 - 58.2 GHz bands to fixed point-to-point microwave uses. Several parties recognize that point-to-point data lines are essential building blocks for emerging technologies and for a global telecommunications infrastructure. Availability of adequate spectrum for the point-to-point links in other bands, however, is highly questionable. The 48.5 - 51.4 and 55.2 - 58.2 GHz bands already are allocated internationally for fixed point-to-point use, thereby enhancing interoperability.

A. The U.S. Economy Will Benefit From TIA's Proposal.

Making the right decision regarding reallocation of the bands above 40 GHz is critical to the U.S. economy and to supporting emerging technologies. For example, HCP states:

A crucial component of the NII [National Information Infrastructure] will be short and medium range high speed point-to-point data links. These links are vital to creating Wide Area Networks ("WANs") that allow high speed data interconnection between various locations of a corporation, government agency, university campus, or other non-profit institution such as hospitals.

* * * * *

The growing expansion of mobile communications, especially the Commission's recent action authorizing broadband Personal Communications Services (PCS) has also increased the need for high speed short and medium range data links. Point-to-point links operating at millimeter wave frequencies will play an increasingly significant role in these mobile networks to supply base station to base station and base station to Mobile Telephone Switching Office (MTSO) applications.

* * * * *

While there is a clear need for millimeter wave point-to-point links, a close review of the proposals in the NPRM reveals that there are significant limitations. The proposed licensing structure will essentially make the licensed bands unavailable to anyone other than the auction winners and the power limitations proposed for the general unlicensed bands will make them unusable for communicating at any reasonable distance. However, HCP believes that with small modifications, these difficulties in the NPRM can easily be overcome.³

H-P echoes this theme and encourages the Commission to make allocation decisions that will spur international trade:

We, and many of our U.S. competitors, are now heavily involved in the Information Technology business. This business is a key contributor to U.S. exports, and a key provider of American jobs. By the year 2000, we expect that 70% of the demand for information technology will come from outside the U.S., up from the present 62%. Right now, 88% of R&D jobs in the U.S. computer industry, and 70% of its manufacturing jobs are within the U.S. If we want to maintain this growth in exports while at the same time avoiding the export of jobs, we must capitalize on one of this country's main strengths: technical innovation. One field of U.S. technical excellence is millimeter wave technology, and although work in this field has been directed mostly toward military applications in the past, the technology has advanced to a point where commercial applications may be feasible. If technology costs can be reduced, two major information industry trends - wireless interconnects and high bandwidth data delivery - could be addressed by high-bandwidth millimeter wave technology. As are other U.S. companies, HP is investing R&D effort toward these goals. Government regulatory agencies have a key role to play here. Without regulatory permission, nothing can happen. Without regulatory protection and stability, private industry will not risk the investment required to develop commercial products and create jobs. Also, it should be pointed out, international coordination of regulatory efforts is mandatory from the point of view of American companies that wish to produce products for sale abroad. We hope that the proposals synthesized during the comment period will be given a thorough review for international compatibility, so that our radio regulations do not become de facto trade barriers.⁴

³HCP at 3-4.

⁴H-P at para. 2 (footnote omitted).

Using the reallocation proposed in the NPRM to provide needed fixed point-to-point links will establish sufficient spectrum to promote these goals. It is therefore incumbent upon the Commission to make the correct allocation decisions. TIA, with the support of several parties, has presented the Commission with a viable option, which satisfies a clear domestic need to for fixed point-to-point spectrum without disrupting the other objectives set forth in the NPRM.

B. Additional Fixed Point-to-Point Microwave Spectrum Is Needed.

As TIA details in its comments, there is not enough spectrum allocated for fixed point-to-point microwave services. First, it is highly unlikely that 2 GHz fixed point-to-point users, displaced for PCS, will have enough spectrum in the 4, 6 and 11 GHz bands. Second, these bands are appropriate for long-haul uses, not for short-haul PCS backhaul networks. Third, the 18 and 23 GHz bands are congested. Fourth, the 28 GHz band is the subject of a tug-of-war between FSS and LMDS users. Fifth, the Commission is restricting access to the 38.6 - 40 GHz band because of the large number of applications for PCS backhaul networks.⁵

The 48.5 - 51.4 and 55.2 - 58.2 GHz bands that TIA recommends should be reallocated are ideal for point-to-point microwave services. These frequencies can provide the short-haul backbone services needed for PCS and other emerging wireless technologies. Incompatible uses have not been allocated for these bands.

⁵TIA at 7-10.

TIA's request for additional point-to-point links in the bands above 40 GHz is not isolated. ANS and Farinon also strongly encourage the Commission to make this allocation.⁶ In its comments, Pacific states that "an application of point-to-point microwave links in blocks similar to the Commission's 38 GHz rules would be appropriate in these bands also."⁷ HCP agrees that "there is a significant need" for high speed short and medium distance links of at least 2.5 GHz to provide two-way links.⁸ All these parties join TIA in seeking Commission allocation of frequencies for fixed point-to-point microwave links.

A corollary to this request for more microwave links is the firm opposition by numerous parties to auctioning spectrum for the facilities. In the NPRM, the Commission proposes subjecting all the bands above 40 GHz to competitive bidding.⁹ TIA strongly opposes such an approach:

First, subjecting these bands to competitive bidding is contrary to the [Communications] Act and to applicable Commission rules. Second, public policy dictates that these bands be exempt from auctions. Unlike commercial common carrier systems, private carrier systems do not generate adequate revenue to justify engaging in competitive bidding for a license. Thus, if auctions are imposed for fixed point-to-point microwave systems in the bands above 40 GHz, all private users, including those responsible for public safety and emergency services, and those responsible for providing services for utilities, financial institutions, internal needs, or other applications, effectively would be foreclosed from these frequencies.¹⁰

⁶ANS at 1-2; Farinon at 1-2.

⁷Pacific at 3 (footnote omitted).

⁸HCP at 10-11.

⁹NPRM, 9 FCC Rcd at 7089-90.

¹⁰TIA at 19.

Auctioning microwave links is not supported in the record of the NPRM. The Utilities Telecommunications Council ("UTC") criticizes the Commission for

delegat[ing] to the auction block its statutory obligation to allocate spectrum "in the public interest, convenience, and necessity."¹¹

ANS, Farinon and Pacific oppose auctioning of microwave links based upon the Communications Act and applicable Commission decisions.¹²

C. TIA's Proposed Reallocation Matches International Allocations.

TIA's proposal to reallocate the 48.5 - 51.4 and 55.2 - 58.2 GHz bands coincides with international allocations. These bands are designated for fixed point-to-point use by CEPT and by the United Kingdom, and ITU is expected to follow suit.

In a recent decision, the Commission reiterates the importance of using its regulatory jurisdiction to increase competition and open foreign markets for U.S. industry. The Commission is proposing rules that would allow it to consider the availability of competitive opportunities for U.S. industry overseas as an important factor in deciding whether foreign companies can export goods and services into the U.S.¹³ An essential element in ensuring such a level playing field is allocating spectrum when the opportunity arises to be consistent with international allocations. Such an opportunity exists with the proposals in the NPRM. Without such spectral comity, efforts by U.S. service providers and equipment manufacturers at selling 40 GHz products will be stymied.

¹¹UTC at 6.

¹²ANS at 2; Farinon at 2; Pacific at 5.

¹³News Release, FCC Proposes New Rules to Increase Competition and Open Foreign Markets for U.S. Industry (released February 7, 1995).

Action that isolates the United States and imposes requirements on users and manufacturers that conflict with global standards will jeopardize export opportunities for domestic companies and will drive up manufacturing costs by requiring two different sets of procedures. If the Commission is truly serious about promoting competition and unlocking foreign barriers to entry, it must adopt TIA's proposed reallocation. To open foreign markets for devices operating in the bands above 40 GHz, the Commission must guarantee interoperability with European and international standards. Thus, TIA strongly urges the Commission to adopt the international standards in this area by allocating the above-mentioned bands for exclusive fixed point-to-point microwave use.

Several parties concur with TIA that, in reallocating the bands above 40 GHz, the Commission must follow international standards. AT&T encourages the Commission to "do everything it can to achieve similar allocations of . . . spectrum internationally."¹⁴ Teledesic, in advocating exclusive allocation of the 28 GHz band for FSS, states that by

maintaining the harmony and compatibility of United States uses of spectrum with international uses, U.S. . . . equipment providers and . . . service providers will have maximum access to global markets. Having the same spectrum allocation . . . in the United States as in Europe will create export opportunities for U.S. manufacturers of . . . equipment who can establish a world leadership position in . . . technology. To maximize the public benefits of [new technologies], the Commission should seize the opportunity available to it in this proceeding for the optimum development of global . . . systems [by using the allocation process to forge truly international linkage].¹⁵

Similarly, Hughes declares that:

¹⁴AT&T at 5.

¹⁵Teledesic at 12.

Opening the currently unused millimeter wave bands to commercial applications will stimulate the rapid development of technology and create new opportunities for economic growth and jobs. This is confirmed by recent developments in other bands.

* * * * *

The response to opening the bands above 40 GHz will be similar. Indeed, this has already begun in the 40 GHz band in the U.K., where the government has issued specifications and is awarding franchises for Multipoint Video Distribution Systems (MVDS), the European equivalent of LMDS.

* * * * *

Other countries also are turning to the millimeter wave bands above 40 GHz as a means to serve their terrestrial broadband needs. In particular, many other countries have begun to promote the development of broadband video and other services above 40 GHz. Licensing these bands in the United States provides an added opportunity to promote United States competitiveness internationally by stimulating the development of technology for potential use in other parts of the world.¹⁶

D. TIA's Proposed Reallocation is Not Inconsistent With Other Proposals In The NPRM.

To accommodate TIA's suggested reallocation, only minor changes to the Commission's proposals for the bands above 40 GHz would be necessary. These changes would not preempt other uses proposed by the Commission in the NPRM for the 40 GHz frequencies.

A 500 MHz guardband between fixed point-to-point services and other allocations is needed to ensure adequate signal selectivity.¹⁷ The Commission proposes reallocating spectrum up to 48.2 GHz for licensed use. The 300 MHz between this proposed

¹⁶Hughes at 11-12.

¹⁷TIA at 18.

reallocation and the 48.5 - 51.4 GHz band proposed by TIA for fixed point-to-point microwave use is inadequate. Consequently, TIA proposes that the 47.2 - 47.4 GHz band, proposed for vehicular radar systems, be eliminated and that the 47.4 - 48.2 GHz band, proposed for licensed use, be shifted to 47.2 - 48.0 GHz. This would retain the 800 MHz proposed for licensed use and would create a 500 MHz guardband between the licensed uses (i.e., 47.2 - 48.0 GHz) and fixed point-to-point microwave uses (i.e., 48.5 - 51.4 GHz). The 200 MHz proposed for allocation to the vehicular radar systems (i.e., 47.2 - 47.4 GHz) could be shifted to the 45.0 - 47.0 GHz band without causing any conflict to present or proposed non-government and government allocations.

TIA's proposals are consistent with allocations contemplated in the NPRM and with existing allocations in Section 2.106 of the Commission's Rules. TIA's proposed allocation satisfies the needs of fixed point-to-point microwave, amateur radio, and vehicular radar users, with minimum disturbance to other bands in the Commission's proposal.

E. Other Uses For The 48 - 59 GHz Band Proposed In The Record Are Not Justified.

Alternate uses for the 48 - 59 GHz band are proposed by H-P and the mmWAG. These options involve allocating up to 1 GHz of spectrum for fixed or mobile use. However, unlike TIA, these proposals do not identify any specific services or rules for these bands and do not justify the requested allocation.

H-P proposes reallocating the 48.2 - 50.2 GHz band into two (2) licensed bands and reallocating the 56 - 58.2 GHz band into multiple licensed bands.¹⁸ H-P's proposal for the 48.2 - 50.2 GHz band is not inconsistent with TIA's proposal:

This band could, for example, be used for point-to-point links between locations where it is not economical to interconnect with fiber. It would also provide for future growth in the need for delivery of broadband services in a frequency band that can be economically addressed with solid state technology that is now, or soon will be, available.¹⁹

Nor is H-P's proposal for the 56 - 58.2 GHz band dramatically at odds with TIA's suggested reallocation:

The NPRM establishes licensed bands below the oxygen absorption band [56 - 64 GHz] and sets aside 63% of the O₂ band for unlicensed use [59 - 64 GHz]. We strongly support this decision, but point out that there may well be, in future, applications which require both the attenuation characteristics of the O₂ band and the absolute protection from interference that licensing affords. Such an application could be for short range point-to-point broadband links, where the ability to re-use a frequency on a distance scale of [approximately] 1 km could be extremely desirable and spectrally efficient. In anticipation of such demand, we recommend the establishment of a licensed band 56 - 58.2 GHz, the lower frequency being set by the O₂ absorption band edge, and the upper limit being set by the edge of the 58.2 - 59 GHz band. This would have the advantage of establishing a home for licensed applications, with the coordinated benefit of relieving possible future pressure to cannibalize the 59 - 64 GHz unlicensed band. We have made inquiries through the NTIA's Spectrum Openness Program about possible government concerns over the use of this band. The response was [negative].²⁰

The mmWAG makes a similar proposal. It recommends that: (i) the 48.2 - 50.2 GHz band be reallocated into two (2) licensed bands for satellite and mobile applications;

¹⁸H-P at para. 5 and Table 1.

¹⁹H-P at para. 6 and Table 2.

²⁰H-P at para. 7.

and (ii) the 56 - 58.2 GHz band be reallocated for multiple licensed bands, including short-range point-to-point broadband uses.²¹

Neither the H-P nor the mmWAG proposal is acceptable. They do not conform to international point-to-point usage. Thus, the Commission should reject these proposals.

**THE 28 GHz BAND SHOULD BE REALLOCATED
FOR FIXED POINT-TO-POINT MICROWAVE USE**

In its comments, TIA proposes that the Commission change course regarding LMDS. Instead of using the 28 GHz band, TIA recommends that the 40 GHz band be assigned for LMDS use and that the 28 GHz band be allocated for fixed point-to-point use.²² This allocation for the 40 GHz band is consistent with international point-to-multipoint (i.e., MVDS) allocations and is needed to free spectrum for unsatisfied point-to-point applications.

TIA is not alone. Numerous parties also propose substituting the 40 GHz band for the 28 GHz band to provide LMDS. ANS and Farinon agree with TIA that the 28 GHz band should be used for fixed point-to-point services.²³ Satellite carriers seek the 28 GHz band for exclusive FSS applications.²⁴ Only CellularVision and TI oppose allocating the 40 GHz band for LMDS.²⁵

²¹mmWAG at 3, Table 1.

²²TIA at 25.

²³ANS at 2; Farinon at 2.

²⁴See, e.g., Teledesic at 1; Hughes at 2.

²⁵CellularVision at 2-3; TI at 1.

TIA's proposal to reallocate the 40 GHz band for LMDS and permit sharing of the 28 GHz band by FSS and fixed point-to-point users is technically feasible and represents the best use of the spectrum. Suggestions in the comments that FSS should have exclusive use of the 28 GHz band or that the 40 GHz band should not be reallocated for LMDS are without merit.

A. Fixed Point-to-Point And FSS Users Can Share The 28 GHz Band.

Use of the 28 GHz band exclusively for FSS is not in the public interest. Sharing of the 28 GHz band by FSS and fixed point-to-point users is achievable. To exclude either the FSS or fixed point-to-point users from this band would not be spectrally efficient. The ITU, in its allocation table, wisely recognizes the co-primary use of the 28 GHz band by both FSS and fixed point-to-point users. Thus, FSS should not, and need not, have exclusive right to the 28 GHz band.

B. Reallocation of The 40 GHz Band For LMDS Is Technically Feasible.

CellularVision and TI argue that reallocating the 40 GHz band for LMDS is not technically feasible. TIA disagrees.

Achievable power outputs for the 40 GHz band increase every year. TIA agrees with Hughes that the Commission's assumption of a maximum solid state amplification of only -20 dBW (0.01W) is too conservative in 1995.²⁶ TI incorrectly states that "[s]olid state power generation that is available with today's technology . . . is 0.01 watt (-20 dBW) at 40 GHz."²⁷

²⁶Hughes at 10 n.6.

²⁷TI at 1.

Solid state power amplifiers of -10 dBW (0.1W) are commercially available today from several sources and amplifiers of -3 dBW (0.5W) SSPA are just around the corner. In fact, advanced work has already been done on 0 dBW (1W) SSPA in the same frequency range.

TIA questions CellularVision's statement that, at 40 GHz, "LMDS would suffer a degradation in spectral efficiency by a factor of four" and that "in the 40 GHz band, an LMDS system would not be able to achieve the necessary polarization and sidelobe isolation...."²⁸ This last observation refers to characteristics of CellularVision's subscriber antennas.²⁹ This statement is probably correct with respect to 28 and 40 GHz directive antennas of equivalent gains. However, for similar antenna dimensions, sidelobe isolation will, in fact, be far superior at 40 GHz. At 40 GHz, lower power outputs (as discussed above) and a slight increase in atmospheric attenuation will favor better frequency reuse.

TIA is surprised, then, by CellularVision's alarmist declaration on spectral efficiency. It notes that one TV channel in 20 MHz worth of bandwidth is certainly not spectrally efficient. At 38 GHz, current microwave radios can put a T1 signal (1.544Mb/s) in a 2.5 MHz bandwidth (contrary to the 10 MHz proposed by GHz Equipment Co., Inc. for the 40 GHz band³⁰) or a T3 (45 Mb/s) in 40 MHz.

²⁸CellularVision at 8.

²⁹CellularVision, App. 2, p. 17.

³⁰GHz Equipment Co., Inc. at 6.

CellularVision notes limited MVDS activity in Europe where the service was first recommended in 1990.³¹ This is not at all surprising, considering the state of 40 GHz RF technology five years ago and knowing about the differences between American and European TV cable traditions. CellularVision concludes that "the 40 GHz activity in Europe is irrelevant to American LMDS"³² As a direct response to this highly questionable and simplified statement, TIA joins AT&T³³ and reiterates the importance of adopting internationally recognized spectrum allocations to free the export potential of the U.S. industry.³⁴

C. The 40 GHz Band Is Not Destined To Be, And Should Not Become, A Point-to-Point Microwave Band.

Most U.S. based manufacturers of point-to-point microwave equipment are active members of TIA. These manufacturers are not interested in building an orphan 40 GHz microwave radio, for a band unique to the U.S. and in contradiction with allocations which have been established specifically by the ITU for the very same applications that are

³¹CellularVision at 7.

³²CellularVision at App. 2, p. 12.

³³AT&T at 5.

³⁴As noted by Hughes, Canada is presently going through a public consultation process on the future of frequency bands above 20 GHz. Hughes at 12-13. Industry Canada has been following all Commission proceedings on LMDS and will be heavily influenced by future Commission decisions on that matter. At this point and in accordance with the current status of Commission discussions, Canada is considering 28 GHz, among other bands, for eventual LMDS service (called LMCS by Ottawa). However, according to a well established tradition, Canada always favors internationally recognized spectrum allocations when possible. It would likely be receptive to a 40 GHz LMDS allocation if it was selected by the U.S. industry.

described by Pacific,³⁵ AT&T,³⁶ and HCP.³⁷ TIA members are acutely aware of these well identified needs for more high frequency microwave spectrum and have recently taken several regulatory actions to properly address them:

- Over the last three (3) years, TIA members have participated actively in various ITU-R SG-9 negotiations to ensure adoption of a North American 2.5 MHz grid in the 26/28, 38 and 55 GHz ITU-R microwave bands.
- On February 9, 1995, TIA members Harris and Digital Microwave Corporation petitioned the Commission for the adoption of a precise microwave channel plan at 28 GHz, in the spirit of the corresponding international consensus. The proposal includes link-per-link licensing of wide bandwidth channels for ATM/SONET access, private LAN applications, and wide area licensing for PCS networks applications.
- On September 9, 1994, TIA petitioned the Commission to channelize the 37.0 - 38.6 GHz fixed service allocation for point-to-point microwave usage.³⁸ More specifically, TIA proposes channelizing the 37.0 - 38.4 GHz band in exactly the same way as the 38.6 - 40.0 GHz band currently is channelized. It also proposes establishing unidirectional unpaired channels in the 38.4 to 38.6 GHz range. A NPRM is expected to be issued shortly on this matter.
- In this proceeding, TIA specifically has asked that the 48.5 - 51.4 GHz and 55.2 - 58.2 GHz bands be exclusively allocated for private and common carrier fixed point-to-point microwave use. In its comments, TIA mentioned many of the short-haul applications covered by Pacific, AT&T and HCP in their comments.³⁹ As for the 28 and 38 GHz bands, the 55 GHz allocation has been channelized by the ITU for a broad range of low (1 to about 30 Mb/s), medium (30 to about 100

³⁵Pacific at 2-3.

³⁶AT&T at 2.

³⁷HCP at 3.

³⁸RM-8553.

³⁹TIA at i, ii, 2.

Mb/s) and high (above 100 Mb/s, including the SONET rates) capacity point-to-point microwave applications.

AT&T, which proposes the unorthodox idea of a 40 GHz point-to-point microwave allocation, clearly says that "the Commission should do everything it can to achieve similar allocations of that spectrum internationally."⁴⁰ TIA agrees totally with this statement and thinks that the 28, 37.0 - 40.0, 50 and 55 GHz bands should be rapidly allocated and channelized for fixed point-to-point microwave.

THE COMMISSION MUST REVISE ITS MILLIMETER WAVE TECHNICAL RULES

The Commission proposes imposing a 16 dBW EIRP limit for licensed millimeter wave systems.⁴¹ TIA disagrees:

There is no need to limit power to +16 dBW EIRP for the proposed fixed point-to-point microwave allocation. Higher power is needed for good reliability. Current commercial transmitters slightly below the proposed band can transmit at power levels up to -10 dBW. Consequently, TIA proposes a +40 dBW EIRP to allow for future development.⁴²

Numerous parties agree with TIA. For example, HCP demonstrates that the EIRP could be increased significantly:

Currently, commercially available millimeter wave sources (either Gunn Oscillator or Gallium Arsenide monolithic microwave integrated circuits (MMICs) amplifiers) are capable of generating a few hundreds of milliwatts in the frequency range of 40 GHz up to 75 GHz. The power capability will further improve in the very near future. Further, antenna gains as high as 50 dBi are readily available. Thus, EIRPs as high as +50 dBW will be easily achievable.

⁴⁰AT&T at 5.

⁴¹NPRM, 9 FCC Rcd at 7092.

⁴²TIA at 16.

* * * * *

Given the Commission's goal of "opening portions of the millimeter wave spectrum . . . [to] stimulate new applications of radio technology for the American public, facilitate technology transfer from the military sector, and create opportunities for economic growth and jobs" (NPRM at ¶7), it would be unfortunate if the rules adopted from this proceeding were to severely limit these opportunities. Thus, HCP believes that the proposed power limits need to be substantially raised. HCP recognizes, and appreciates, the Commission's stated willingness to "consider higher power limits on a case-by-case basis" (NPRM at ¶33), but we believe that mandating case-by-case applications to the Commission for all transmitters over +16 dBW will simply overburden both the Commission and licensees with paperwork.

* * * * *

HCP recommends that, at least for point-to-point links, that the allowed EIRP limit be raised to +50 dBW. A coordination requirement among licensees in any band will easily resolve any potential interference concerns. This should not be burdensome to licensees and need not involve the Commission's staff in the process. Point-to-point links with their highly directional antennas at both the transmitter and receiver have low interference potential, the atmospheric attenuation of millimeter waves reduces significantly the distances at which coordination needs to be done, and the large area involved in a Major Trading Area limits both the number of cases which will affect any other licensee and the total number of licensees involved in the coordination process.⁴³

TIA agrees with these suggestions. On further evaluation, TIA proposes increasing the EIRP to +50 dBW, which is consistent with the +55 dBW EIRP used in the lower bands allocated for fixed point-to-point microwave services.

**PROCEDURES FOR SHARING WITH
GOVERNMENT USERS MUST BE IMPROVED**

Most of the spectrum proposed by the Commission in the NPRM for reallocation above 40 GHz is shared between government and private sector users. TIA welcomes this

⁴³HCP at 9-10 (footnotes omitted). See also mmWAG at 5; Endgate at 2-3; AT&T at 4.

opportunity to share spectrum with the government, but it has serious reservations because of difficulties in coordinating spectrum:

One critical ingredient to this improved spectrum management is frequency coordination between government and non-government users. It currently does not work. Private users coordinate among each other in a matter of hours. Private users coordinate with government users over a period of several weeks.

* * * * *

If the shared government and non-government bands above 40 GHz are to be reallocated as proposed in the NPRM, this situation cannot continue. Waiting for government coordination must no longer be a mystery for the private sector. A coordinated effort among NTIA, the Commission, private users, and government users, must be made to improve this situation.⁴⁴

H-P echoes this concern:

We believe that the vast majority of government millimeter wave applications can best be provided through use of commercial equipment and services, and that many government agencies will voluntarily look to the private sector for such technology and services. We urge the Commission to proceed immediately with rules for the millimeter wave bands, and believe that the public interest - both government and non-government - will best be served by such action. However, any auction proceedings which may occur for these bands would need to include full disclosure of possible government use or interference to potential bidders.⁴⁵

CONCLUSION

The Commission has a rare opportunity to reallocate a reasonable amount of largely unused spectrum and to satisfy the needs of disparate user groups. In the NPRM, it addresses the needs of mobile, amateur, vehicular radar and other users. However, the

⁴⁴TIA at 24. See also ANS at 2; Farinon at 2.

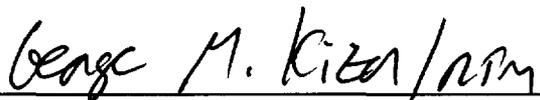
⁴⁵H-P at para. 13. To facilitate private sector/government band sharing, the mmWAG requests that "restriction[s] due to government uses should be fully disclosed to the intended users." mmWAG at 4.

Commission does not address adequately the needs of fixed point-to-point and fixed point-to-multipoint users.

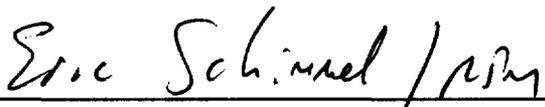
These needs can be met by adopting TIA's proposed reallocations. Reserving the 48.5 - 51.4 and 55.2 - 58.2 GHz bands for fixed point-to-point microwave use and the 40.5 - 42.5 GHz band for LMDS is in the public interest.

Respectfully submitted,

FIXED POINT-TO-POINT COMMUNICATIONS
SECTION, NETWORK EQUIPMENT DIVISION
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February 28, 1995