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March 1, 1995

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VIA HAND DELIVERY
William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

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Re: Reply Comments of Millimeter Wave Advisory Group --
ET Docket No. 94-124

Dear Mr. Caton:

Millimeter Wave Advisory Group, hereby submits its Reply Comments to the Commission's *Notice of Proposed Rule Making* issued in ET Docket No. 94-124, FCC 94-273 (released November 8, 1994).

Should you have any questions regarding these Comments, please contact the undersigned or Mr. Charles P. Mason, 3945 Freedom Circle, Suite 1100, Santa Clara, California 95054, telephone number (408) 653-3407.

Sincerely,

WILKINSON, BARKER, KNAUER & QUINN

By: Lawrence J. Movshin

Enclosure

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FEDERAL COMMUNICATIONS COMMISSION

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

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

To: The Commission

Reply Comments of Millimeter Wave Advisory Group To Proposed Rulemaking for Frequencies Above 40 GHz For New Radio Applications

February 28, 1995

I. Introduction

1. After reviewing comments from other interested parties filed with the Commission regarding its Notice of Proposed Rule Making (NPRM) proposing to open for commercial development and use a portion of the Millimeter Wave Frequency Bands above 40 GHz, the Millimeter Wave Advisory Group (mmWAG) respectfully submits the following reply comments.

II. Comments

II.1 Frequency Band Allocations

2. The mmWAG generally supports other interested parties' reasoning on spectrum allocation recommendations. Accordingly, we revised our previously suggested Frequency Band Allocation Proposal as the new Table 1 below. The revisions are highlighted in italics.

Table 1: Revised Frequency Band Allocation Proposal

Frequency Band	NPRM Proposal	mmWAG Recommendation
40.5 - 42.5 GHz	2 Licensed Bands	2 Licensed Bands
45.5 - 45.7 GHz	*None*	*Exclusive Vehicular Radar*
46 - 47 GHz	*None*	*General Unlicensed Devices*
47.2 - 50.2 GHz	*Vehicular Radar & 2 Licensed Bands*	*Multiple Licensed Bands*
54.25 - 58.2 GHz	*None*	*Licensed Band*
59 - 64 GHz	General Unlicensed Band	General Unlicensed Devices
71 - 74 GHz	*Half Licensed / Half Unlicensed for 71-72 GHz*	*Single Licensed Band*
76 - 77 GHz	Vehicular Radar	Exclusive Vehicular Radar
84 - 85 GHz	*Half Licensed / Half Unlicensed*	*Experimental Licenses Only*
94.7 - 95.7 GHz	Vehicular Radar	Exclusive Vehicular Radar
103 - 104 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only
116 - 117 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only
122 - 123 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only
126 - 127 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only
139 - 140 GHz	Vehicular Radar	Experimental Licenses Only

152 - 153 GHz	Half Licensed / Half Unlicensed	Exclusive Vehicular Radar
153 - 154 GHz	None	Exclusive Vehicular Radar

3. The key revisions are:

(a) We support the proposals by TIA, Alcatel, and Harris that VORAD vehicular radar band should be relocated to the 45.5-45.7 GHz band.

(b) We suggest that the 46-47 GHz band be made available for unlicensed spread spectrum communications.

(c) We suggest the concatenation of the 47.2-47.4 GHz band (NPRM's Vehicular Band), 47.4-48.2 GHz band (NPRM's Licensed Bands), and 48.2-50.2 GHz band (our previously suggested Licensed Bands) into one single band for Licensed applications.

(d) We suggest that our previously suggested 56-58.2 GHz band be expanded to 54.25-58.2 GHz for licensed applications.

(e) We suggest the 71-72 GHz band (NPRM's Licensed and unlicensed bands) be expanded to 71-74 GHz band for single-license high-speed high-bandwidth applications.

(f) We suggest that the commission's actions on the 84-85 GHz band could be delayed until the rules for other bands are adopted.

4. To accommodate the service needs of high-speed high-data-rate, we suggest that the Commission allocate three broad bands of spectrum for licensed applications with 3-4 GHz of bandwidth (i.e., 47.2-50.2 GHz, 54.25-58.2 GHz, and 71-74 GHz). In addition, we strongly recommend the Commission authorize only one license in the 71-74 GHz band with 3 GHz bandwidth in each service area. For the other two broad bands, we also recommend the Commission authorize at least 1-GHz to each license and to retain flexibility in granting broader bandwidths so that multi-gigahertz services will be possible.

II.2 Unlicensed Automotive Applications

5. We strongly oppose the proposal of allocating 60-61 GHz for Vehicular Radar applications. The primary reasons are as follows:

(a) The 60-61 GHz band may not meet the size requirements of the automotive industry. This point is clearly stated in the comments filed by GM and GM Hughes Electronics, Paragraph 5, "*GM and Hughes built and field tested a 60 GHz test radar in 1989. Evaluation of this unit showed that increasing the frequency would be necessary to fully*

meet the size requirements of the automotive industry." The same document also went on to explain why the 76-77 GHz band is a better choice for vehicular radar applications: "*GM and Hughes in 1994 built and field tested a redesigned unit operating at 76 GHz. ...76 GHz was chosen because it offered an excellent trade-off of antenna size and component costs ...*"

(b) Since the 76-77 GHz band has already been chosen as the band for European forward vehicular radar, allocating 76-77 GHz for vehicular radar applications in the U.S. will facilitate U.S. manufacturers' entrance into the European market and greatly enhance their ability to compete effectively in that market.

(c) As stated in our previous comments and many other parties' comments, it is not desirable nor practical to share the unlicensed band between vehicular radar and other general unlicensed devices. Therefore, it is undesirable and impractical to allow vehicular radar to "share" 1 GHz of spectrum in the 59-64 GHz portion of the oxygen absorption general unlicensed band. Furthermore, if 60-61 GHz were allocated for vehicular radar applications, this would destroy the possibility of utilizing this contiguous 5 GHz for high-speed high-data-rate on-premises communications as anticipated in the Information Superhighway environment.

(d) The Commission should assign services to bands where the natural propagation characteristics are best suited to the application. The oxygen absorption band is ideally suited to short-range communication links, but confers no benefit to vehicular radar. The reason is as follows: vehicular radar must be immune to interference from similar radars at **all distances**, therefore design features must prevent such interference. Once these design features are in place, there is no need for the attenuating properties of atmospheric oxygen, which reduces interference at km distances.

6. To prevent potentially hazardous interference between vehicular radar and general unlicensed applications, we would like to repeat our support in the Commission's thinking that vehicular radar applications should have the exclusive use of the vehicular radar bands, i.e., 45.5-45.7 GHz, 76-77 GHz, 94.7-95.7 GHz, and 152-154 GHz, and **use only these bands**; other general unlicensed devices should have the exclusive use of the remaining unlicensed bands, i.e., 46-47 GHz and 59-64 GHz, and only these bands.

II.3 Higher Transmitter Power Limit of Licensed Bands

7. Millimeter wave antennas are capable of very high directivity, enabling efficient point-to-point transmission in a narrow field of view with high EIRP, but little probability of interference with receivers not in the line-of-sight. Therefore, we recommend that **Licensed** point-to-point links be allowed to transmit +50dBW EIRP in cases where no conditions exist at the licensed location which would cause interference with other bands or licensees.

II.4 Potential Uses of Spectrum

8. A number of applications have been proposed for the various bands, depending on the commentators and the bandwidths. In particular, the mmWAG agrees that the Commission is correct in beginning this proceeding in order to enable industry and other development institutions to operate in these bands in order to pursue the stated applications, and to allow further research to develop services for these bands using broad bandwidths.

9. The automotive industry wishes to enable applications and services around the concept of collision avoidance radar. This will tie in well to the Intelligent Vehicle Highway System (IVHS) applications and cruise control and traffic management uses.

10. The broader bandwidths above 40 GHz can also serve the emerging PCS industry well as a means for major backhaul links, as has been mentioned. Further interest in LMDS applications will enable video dial tone as a broad definition service to businesses and homes for interactive services and information access as well as education, distance learning and entertainment.

11. Very high speed and broad bandwidths are required for wireless premises area communications networks, supporting extremely high speed applications, e.g. SONET speeds and beyond. These applications enable computer networks to communicate effectively over those links where people and businesses need to share information and directly link machines.

III. Conclusion

12. From the comments filed by interested parties, it is evident that several useful applications of the above 40 GHz bands are well understood and ready to be further developed. Therefore, we urge the Commission to take immediate action to allocate the above 40 GHz spectrum bands as we suggested in Table 1 above.

13. We appreciate the opportunity to submit our reply comments on this NPRM. We will continue to provide assistance to industry and the Commission on this important matter throughout the rule making process.

Respectfully submitted,

Millimeter Wave Advisory Group

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