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

In the Matter of	)	
	)	
Amendment of Sections 15.35 and 15.253 of the	)	**ET Docket No. 11-90**
Commission's Rules Regarding Operation of	)	**RM-11555**
Radar Systems in the 76-77 GHz Band.	)	
	)	
Amendment of Section 15.253 of the	)	**ET Docket No. 10-28**
Commission's Rules to Permit Fixed	)	
Use of Radar in the 76-77 GHz Band.	)	

To: The Office of the Secretary

COMMENTS OF ROBERT BOSCH, GmbH

Robert Bosch, GmbH (Bosch), by and through counsel and pursuant to the *Notice of Proposed Rule Making*, FCC 11-79, 76 Fed. Reg. 35176, released in this proceeding May 25, 2011 (the Notice), hereby respectfully submits its comments[1] in response to the issues raised in the Notice. Bosch supports certain of the proposals in this proceeding. Specifically, Bosch supports the proposal of Toyota Motor Corporation to eliminate the present "in-motion" and "not-in-motion" distinctions in the Commission's Part 15 rules limiting emissions from vehicular radars, and instead to establish a single emission limit that applies in all directions from a vehicle. On the other hand, Bosch is opposed to the Notice proposal to permit the operation of fixed radars as part of fixed infrastructure systems generally, due to the undetermined potential for harmful interference to vehicular radars at 76-77 GHz and the attendant obvious danger to persons and property that would result from such interference. For its comments, Bosch states as follows:

[1] These comments are timely filed pursuant to Section 1.415 of the Commission's Rules (47 C.F.R. § 1.415), as they are being tendered within thirty (30) days of the date of publication of the Notice in the Federal Register.

1. Bosch is a multinational corporation which manufactures many different types of high-quality products for numerous industries, including vehicular radar systems and other automotive components and systems. Bosch is active in the establishment of international standards for automotive radar systems and automatic emergency braking systems. Bosch manufactures long-range and medium-range automotive radar systems for vehicles in the 76-77 GHz range and has a distinct interest in the effective performance of these safety-of-life systems in motor vehicles.

2. There is presently a worldwide plan to consolidate automotive radars in the 76-81 GHz band, and to utilize this band in lieu of the 24 GHz band for this application in the near future. However, the automotive industry long ago settled on the 76-77 GHz band worldwide for Short-Range Radars (SRRs) for anti-collision and adaptive acceleration and braking systems. On December 15, 1995, the Commission issued a *First Report and Order and Second Notice of Proposed Rule Making* in ET Docket 94-124,[2] 11 FCC Rcd. 4481 (1995) making available the entire 76-77 GHz band for Automotive Radar applications in the United States. In doing so, the Commission stated at Paragraph 17 of that First Report and Order that:

> As demonstrated by the comments, there is significant industry support for use of the entire 76-77 GHz band for vehicle radar systems. Indeed, the three major U.S. automobile manufacturers have targeted this band in their efforts to develop collision avoidance radars. Furthermore, testing of vehicle radar systems operating in the 76-77 GHz range has already commenced. We also foresee economic benefits, such as economies of scale and broader marketplace demand that may be obtained if both the U.S. and European markets use the 76-77 GHz band for vehicle radar systems. Accordingly, we are making this band available for vehicle radar systems.

[2] This was the so-called "millimeter wave" proceeding, in which a number of bands above 40 GHz were made available for certain purposes.

3. However, the Commission was careful to note that, due to "the safety nature of vehicle radar systems and the lack of experience of such systems sharing with totally different technologies," it had tentatively concluded in the Notice of Proposed Rule Making in that proceeding that "the bands should be made available for exclusive use by vehicle radar systems until spectrum sharing criteria were developed." (*Id., at* ¶ 18.) The comments were universally opposed to sharing with unspecified uses in the same band:

> AAMA, Epsilon Lambda, Ford, HP, mmWAG and VORAD support this proposal. VORAD points out that vehicle radar systems will be used for collision warning, automatic cruise control, automatic braking, plus other longitudinal and lateral vehicle control applications. In such applications, VORAD stresses the necessity of preventing false alarms that could result from shared uses of the spectrum. VORAD adds that vehicle radar manufacturers can develop interference avoidance systems to cope with other vehicle radar systems on the road, but if the band is shared with unlimited emitters and users, it will be much more difficult and therefore more costly, to design interference avoidance schemes for all possibilities. HP indicates that it would be impractical for vehicle radar systems to share spectrum with licensed services.

Since that 1995 Report and Order, the band 76-77 GHz has in fact developed worldwide as the standardized band for long-range automotive radar, and in particular for forward looking anti-collision and automatic braking radars. No study of which Bosch is aware since that time has concluded that there is compatibility between vehicular radars and unspecified fixed uses in the 76-77 GHz band. In Europe at the moment there are permitted certain fixed uses in the 76-77 GHz band, but the automotive industry has objected to the continuation of that sharing, as there have been incompatibilities noted and instances of increases in interference to automotive radar systems from such fixed uses.

4. The instant Notice, at page 3, cites the comments filed by ERA Systems Corporation (ERA) in the Commission's Docket 09-102 (the ten year Regulatory Flexibility Act review proceeding). Those comments suggested that the Commission amend Section 15.253 of the Commission's rules to permit fixed use of 76-77 GHz radars at airports for monitoring terrestrial vehicle movement. ERA had requested this authority, however, subject to the following specific operational limitations on such operation: 1) the maximum power must comply with the present limits for vehicles in motion; 2) fixed airport radars must be professionally installed and may not exceed the Maximum Permissible Exposure (MPE) limits in Section 1.1310 of the rules; 3) the radars may only be used at airports recognized by FAA and must be owned and operated by either the airport operator or an air carrier licensed by FAA, or operated on their behalf; 4) fixed radars must be installed so as to limit the power flux density reaching roads used by the general public to -57 dBW/m^2 (peak); and 5) the installer must make measurements to verify the power flux density on public roads at time of installation. The Commission decided to treat ERA's comments as a Petition for Rule Making; it afforded the comments a file number as such;[3] and accepted public comment thereon. However, only ERA filed comments in response to the public notice. There was nothing filed in response to the notice that established compatibility between fixed radars and automotive radars generally.

5. Based apparently on no more than the ERA proposal and ERA's own comments, the Commission has not only proposed in the instant proceeding to permit radars at airports on the above-specified conditions; it has also proposed to permit far

[3] *Office of Engineering and Technology Seeks Comment on Era Systems Corporation's Proposal to Permit Fixed Ground-Traffic Radar at Airports in 76-77 GHz band*, ET-Docket No. 10-28, released January 26, 2010, 25 FCC 896 (2010).

more wide-ranging authority with no cited compatibility determinations at all. At page 7 of the Notice, the Commission states that it is, based on ERA's request, proposing to permit fixed radars to operate in the 76-77 GHz band, and to require that such fixed radar systems meet the limits for vehicular radar systems (and the maximum permissible RF exposure levels) set forth in the Commission's rules. It says that it "believes" that, based on ERA's representations, use of (unspecified) fixed radar devices in this band will "enhance public safety by enabling applications such as monitoring vehicles on the ground at airports." However, the Commission does not propose to limit fixed operation to airports or to places where fixed radars would not illuminate public roads. Without any citation to any technical compatibility studies whatsoever, the Commission states that it "believes" that ERA's approach "may be overly restrictive and could cause unnecessary burdens for the public."[4] It claims that licensing and/or coordination would be burdensome for both users of the devices and the Commission with no corresponding benefits in terms of reduction of interference potential. The Commission suggests (but does not cite any technical support for its premises) that it "believes" that fixed radars operating at the same maximum power levels as vehicle-mounted radars "should be able to co-exist with vehicular radars because they would both operate with the same power level and because both would use antennas with narrow beamwidths, thus reducing the chances that the signal from one radar would be within the main lobe of the receive antenna of the other." While these conclusions may have some merit, the Commission has not apparently itself conducted any study to verify these assumptions, and the price of error in this context is unacceptably high. As noted above, Bosch has noted in Europe increased instances of interference to automotive radar systems attributable to fixed uses in the 76-77 GHz band. The argument favorably cited by the Commission in 1995 in the Millimeter Wave proceeding, to the effect that vehicle radar

[4] It is not clear what these burdens are, since there were no comments filed in the ERA proceeding except those of ERA, and no comment suggested that the Commission should broaden the scope of the ERA request.

manufacturers can develop interference avoidance systems to cope with other vehicle radar systems on the road, is correct. However, if the band is shared with unlimited emitters and users, it will be much more difficult and far more costly to design interference avoidance schemes for all possibilities.

6. The Commission should not draw such important conclusions that affect safety systems relied upon by millions of motorists, developed over a period of years without the benefit of conclusive compatibility showings. These safety systems are increasingly important due to the crowded roadways in the United States. Bosch has itself carefully investigated the ERA proposal for airport fixed radars.[5] Bosch does not believe that those facilities proposed by ERA, which do not illuminate any public roads and which have reasonable field strength limits, pose any significant interference threat to automotive radars, *provided that the limitations suggested by ERA are incorporated in the rules*. However, the Commission has no record basis at all for proposing to expand its Part 15 rules to permit unspecified fixed operation in the 76-77 GHz band without substantial operating limitations. Bosch submits that the Commission correctly limited use of the 76-77 GHz band exclusively to automotive radars unless and until studies demonstrated that there was compatibility between those radars and certain fixed facilities operating in the same band. The Commission now, without such compatibility studies, proposes an unreasonable, unjustified and dangerous expansion of the narrow, and reasonable, operating authority proposed by ERA. Bosch is not aware of technical studies now outstanding to support the breadth of the Notice proposal.

[5] Bosch has met with the staff of FAA on this subject, and has concluded that, provided that the airport fixed radars are required to meet the operating conditions and limitations proposed by and agreed to by ERA, there are not likely to be numerous instances of interference to vehicular radars on public roads near airports. It is noted, however, that there are several configurations of systems available for detecting debris on airport runways, for example, which do not make use of the 76-77 GHz band. Bosch is informed that FAA takes no position with respect to the merits of these various systems and has not concluded that the ERA model for fixed radars at airports is in any way preferable to other systems which do not make use of the 76-77 GHz band.

7. Bosch is now an active participant in a currently ongoing, publicly funded project (to be finalized in 2012) in Europe conducted by MOSARIM (More Safety for All by Radar Interference Mitigation),[6] which will address the compatibility among automotive radars, and as well between automotive radars and fixed roadside installations of radars at 76-77 GHz. It is strongly recommended that the Commission not take any action in this proceeding unless and until these studies are completed and the results analyzed. There are efforts ongoing in Europe to segregate fixed operations and automotive radars at 76-77 GHz. Automotive radar manufacturers can address the controlled circumstances encountered in vehicle-to-vehicle radar compatibility, but such is not the case in the wide variety of circumstances surrounding unregulated fixed radar operations and their potential effects on the effective performance of automotive radars. Because of the safety considerations inherent in automotive radar operation, including automatic emergency braking systems, it is highly recommended that the Commission continue to permit automotive radar operation on an exclusive basis at 76-77 GHz; except that, as necessary, carefully regulated ERA airport radar devices operating under all of the conditions specified by ERA in its comments in Docket 09-102 could be permitted as well. Any further expansion of fixed radar operation in this band should await the results of careful studies such as the MOSARIM project in Europe discussed briefly hereinabove. Some preliminary results of the MOSARIM project are currently available.

8. Bosch supports the proposal of Toyota Motor Company to eliminate the "in-motion" and "not-in-motion" distinctions in the emission limits for vehicular radar systems. With the rapid expansion of automotive radar systems to include sideward looking as well as front and rearward looking systems, it is timely to establish a single emission limit that applies in all directions from a vehicle. The interference considerations are largely independent of the movement or stationary status of a vehicle, and it is noted that the distinction now in the Commission's rules derived from

[6] *See, www.mosarim.eu*

radio frequency (RF) human exposure concerns and not RF interference concerns. Because present MPE standards adequately address the RF exposure issues independently of the motion status of the vehicle, it makes sense to modify the Part 15 rules now to harmonize them with the applicable European Telecommunications Standards Institute (ETSI) limits. Specifically, Bosch supports the proposed replacement of the three limits for not-in-motion, rear-looking, and side-looking vehicular radar operation be replaced by a single peak emission limit of 55 dBm.[7] The Commission should also specify the limits in Section 15.253 in terms of maximum peak power as per established international standards.

Therefore, the foregoing considered, Robert Bosch, GmbH, respectfully requests that the Commission grant the relief requested by Toyota Motor Corporation. However, it should permit fixed radar facilities at airports only in accordance with the strict limitations proposed by ERA for such airport operation, and it should not proceed with the broader authority proposed in the Notice of Proposed Rule Making herein to permit unspecified fixed radar systems at 76-77 GHz. Such is completely unjustified at the

[7] *i.e.* a peak power density limit of approximately 279 $\mu W/cm^2$ at a distance of 3 meters from the radiating structure

present time, and may endanger motorists in the United States who have come to rely on the effective performance of vehicular radar systems.

Respectfully submitted,

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July 15, 2011