

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

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

**COMMENTS OF
THE STRATEGIC AUTOMOTIVE RADAR FREQUENCY ALLOCATION GROUP**

The Strategic Automotive Radar Frequency Allocation Group (“SARA”) hereby submits these comments in response to the *Notice of Proposed Rulemaking* (“NPRM”) released by the Federal Communications Commission (“FCC” or “Commission”) in the above-captioned proceedings.¹ In the *NPRM*, the Commission seeks comment on proposals to facilitate enhanced vehicular radar technologies in the 76-77 GHz band, including by modifying the applicable Section 15.253 emission limits, eliminating the requirement that vehicular radars decrease power when the vehicle on which the radar is mounted is stopped or not in motion, and authorizing the use of unlicensed 76-77 GHz band radars in fixed infrastructure systems.² As discussed below, SARA supports modifying the emission limits and eliminating the “not-in-motion” requirement, but requests that the FCC refrain from further action on the fixed use proposal until the

¹ *Amendment of Sections 15.35 and 15.253 of the Commission’s Rules Regarding Operation of Radar Systems in the 76-77 GHz Band*, ET Docket No. 11–90, RM-11555, *Amendment of Section 15.253 of the Commission’s Rules to Permit Fixed Use of Radar in the 76-77 GHz Band*, ET Docket No. 10–28, Notice of Proposed Rulemaking, 26 FCC Rcd 8107 (2011) (“NPRM”).

² *Id.* ¶ 1.

automotive industry has completed its ongoing, comprehensive interference research and analysis.

I. BACKGROUND

Both proposals involve the use of radar in the 76-77 GHz band under Part 15 of the Commission's rules. SARA's members manufacture and install vehicle-based radars for use in that band and are thus concerned about the potential for harmful interference and the need to protect against such interference to existing operations.³ Vehicle-based radar systems have been installed in a wide range of automobiles in the United States. Automotive radars operating in 76-77 GHz have also been used worldwide for Adaptive Cruise Control ("ACC") since 1998 and in more advanced systems such as collision mitigation and pre-crash applications (often in combination with 24 GHz ultra-wideband short-range radar). Autonomous emergency braking will be mandatory in Europe for trucks starting in 2013.⁴

II. THE COMMISSION SHOULD MODIFY THE EMISSION LIMITS AND ELIMINATE THE "IN-MOTION" AND "NOT-IN-MOTION" DISTINCTION FOR 76-77 GHz VEHICULAR RADAR SYSTEMS.

SARA supports the Toyota Motor Company ("Toyota") proposal that led to ET Docket No. 11-90 and urges expeditious action to support the widest possible introduction of proven safety technology. As a general matter, SARA supports the harmonization of emission levels and operating conditions for ACC with European ETSI standard EN 301 091. SARA also supports the *NPRM's* proposed average power density limit of 88 uW/cm² (which corresponds to 50

³ SARA's members include Audi, Autoliv, BMW, Bosch, Chrysler, Continental AG, Daimler, Fiat, Ford, General Motors, Hella, Infineon, InnoSent, TRW, Volkswagen, and others.

⁴ See Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefore, OJ L200, July 31, 2009, page 1. This regulation requires certain classes of large commercial trucks to install "advanced emergency braking systems" starting in 2013. Many of these systems will rely on automotive radars operating in the 76-77 GHz range.

dBm average EIRP) and proposed peak power density limit of 279 uW/cm² (which corresponds to 55 dBm peak EIRP), consistent with EN 301 091.⁵ SARA requests that the Commission specify the EIRP values expressly in Section 15.253 in addition to the power spectral density values. SARA also supports abandoning the distinction between “vehicle in motion” and “vehicle-not-in-motion.” Doing so would eliminate this unnecessary and outdated distinction⁶ and harmonize the Commission’s rules with regulations in other regions, including Europe.

Harmonizing the Commission’s 76-77 GHz rules with the European standards promotes increased economies of scale, thereby reducing the cost of automotive technology. Automobile manufacturers operate in a global market, and sophisticated new safety technology is best implemented on a worldwide basis – especially highly sophisticated radar technology. In fact, the Commission recognized the benefits of making the 76-77 GHz band available in a manner consistent with European regulations when it first allocated this spectrum for automotive radar,⁷ and in this proceeding it noted the same goal of making U.S. rules “more comparable to those set forth outside the United States,” which would “therefore benefit the automotive industry in terms of new product development and cost reduction.”⁸ Moreover, there have been no negative effects in Europe of operating without the in-motion / not-in-motion distinction.

With respect to concerns expressed by the National Radio Astronomy Observatory Association (“NRAO”), SARA agrees with Toyota’s comments and the Commission’s own assessment in the *NPRM* that “there is very little likelihood that vehicular radar systems

⁵ *NPRM* ¶ 12.

⁶ *See id.* ¶ 7.

⁷ *Amendment of Parts 2, 15, and 97 of the Commission’s Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications*, First Report and Order and Second Notice of Proposed Rule Making, 11 FCC Rcd 4481 ¶ 17 (1995).

⁸ *NPRM* ¶ 12.

operating at either the current or proposed limits would cause harmful interference to radio astronomy equipment.”⁹ Because Radio Astronomy sites are very remote, and physical access to them is limited, harmful interference from vehicular radars is not likely, and the power level proposed in this proceeding (55 dBm) is lower than that already permitted as a peak limit (48+20 = 68 dBm).

SARA also has serious concerns regarding NROA’s request for coordination zones based on GPS–aware vehicular radar systems to prevent harmful interference. SARA has experience with automatic deactivation requirements near radio astronomy sites in Europe for ultra-wideband automotive radar operating in the 24 GHz range. That requirement has slowed market take-up of this safety technology in Europe because it limits the installation of automotive radars to vehicles with GPS location equipment. Although GPS devices necessary for automatic deactivation modes are becoming more prevalent, they are less common in economy and smaller cars due to their additional cost. Imposing a similar requirement in the 76-77 GHz band would thus limit the ability of the automotive industry to install new safety technology in mass market automotive product lines and could possibly deny the benefits of automotive safety radar to consumers of lower-cost vehicles.¹⁰ Thus, automatic deactivation based on GPS would prevent a wide market deployment of 76-77 GHz safety technology (especially in mid- and low-segment cars) and should be avoided.

⁹ *Id.* ¶ 14.

¹⁰ SARA notes that the European Commission recently has adopted technical implementing measures (*i.e.*, regulations in the form of a “Decision”) to permit automotive radar in a slightly higher portion of the 24 GHz band, which avoids the need to rely on automatic deactivation devices. No such requirement was ever adopted for either 76-77 GHz automotive ACC radar or 79 GHz automotive short range radar. The former is implemented through a CEPT / ECC decision. *See* ECC Decision (02)01 (Mar. 15, 2002 on the frequency bands to be designated for the co-ordinated introduction of Road Transport and Traffic Telematic Systems. The latter was imposed through a July 2004 European Commission decision. *See* European Commission Decision on the Harmonisation of Radio Spectrum in the 79 GHz Range for the Use of Automotive Short-Range Radar Equipment, OJ L 241 (Jul. 13, 2004) at 66.

III. THE COMMISSION SHOULD DEFER ACTION ON THE PROPOSAL TO AUTHORIZE FIXED USE OF THE 76-77 GHz BAND ON AN UNLICENSED BASIS.

Although SARA supports the *NPRM*'s vehicular radar proposals, it opposes the proposal to permit general fixed use of 76-77 GHz radars.¹¹ The fixed use proposal is derived from a concept introduced by Era Systems Corporation ("Era"), and SARA participated in earlier proceedings related to that concept.¹²

As SARA has discussed with Era, an essential requirement regarding Era's waiver request must be that no public roads accessible by motor vehicles be illuminated by the proposed fixed radars. Thus, SARA could support the use of fixed 76-77 GHz radars at airfields that are remote or separated from public roads because such use would avoid harmful interference to automotive radars. SARA has significant concerns, however, regarding a general deployment of fixed radar installations near public roads because the devices could illuminate in an uncontrolled and uncoordinated way, creating a high risk of harmful interference to automobile radars. A simulation of the interference effects of fixed installations into automotive radar is included at Annex 1.

Even Era recognized the potential for harmful interference from fixed operations when it suggested various approaches to avoid the problem, including limiting operations to avoid illuminating public roads,¹³ compatibility tests, or compliance with the ETSI standard. Nevertheless, in the *NRPM* the Commission concludes (based on no input and no evidence) that

¹¹ There is no necessary linkage between the two proposals because, even though both involve operation in the 76-77 GHz band, one applies to automotive radar while the other would introduce an entirely different set of fixed installations.

¹² See *Era Systems Corporation Request for Waiver of Sections 2.803, 15.201 and 15.253 of the Commission's Rules*, Order, 24 FCC Rcd 12179 ¶ 5 (OET 2009).

¹³ This concern was addressed by Era in setting a maximum power spectral density on public roads of -57 dBW/m².

the use of such fixed installations would cause no more interference to vehicular applications than vehicular applications would cause to one another.¹⁴ The automotive industry recognizes the possibility that different vehicular applications operating in the band could cause mutual interference. Unfortunately, although the automotive industry is working on mutual interference mitigation between vehicular radars (*e.g.*, by dynamically using only a portion of the 76-77 GHz band and other means that are continuously being improved), it has no means of controlling the emission and operational parameters of general fixed radar applications. Thus, the Commission's assumption that a fixed 76-77 GHz radar would not pose a greater interference risk to an automotive radar than another automotive radar has not been sufficiently analyzed, and further analysis is needed to assess the risk of harmful interference from general fixed radars to automotive radars.

Due to the increasing number of 76-77 GHz automotive radars in use, the automotive industry is investigating such interference mechanisms and possible countermeasures in a European-funded project that also is examining the risk of interference from fixed installations. This project, "More Safety for All by Radar Interference Mitigation" or "MOSARIM," was initiated on January 1, 2010 and is expected to conclude by December 31, 2012. It is funded and led by a consortium made up of a substantial portion of the European automotive industry and the European Commission's Joint Research Centre ("JRC"), under the structure of the European Union Seventh Framework Programme (ICT for Transportation). It held its first workshop on automotive radar interference mitigation and countermeasures in Ispra, Italy, on May 26, 2011, at the JRC headquarters.¹⁵

¹⁴ *NPRM* ¶ 17.

¹⁵ Papers from the first MOSARIM workshop are available at <http://www.mosarim.eu/>.

The MOSARIM project brings together relevant stakeholders in a highly effective research platform. Participating SARA members include Bosch, Continental, Hella and Daimler. Its goal, among others, is to prepare recommendations and guidelines for vehicular mutual radar interference mitigation. Using MOSARIM tools, the University of Karlsruhe (a MOSARIM participant) is examining the interference effects of fixed 76-77 GHz installations into automotive radar sensors. The preliminary results of this examination indicate that the Commission's confident view of such operations is not justified. As shown in Annex 1, early conclusions indicate:

- Fixed 76-77 GHz installations result in significant interference to automotive radar sensors.
- Simulation results show that the interference power of an interferer with +45 dBm EIRP is up to 75 dB above the noise floor of the 76-77 GHz automotive radar sensor. Such a strong level of interference cannot be mitigated in the radar sensor.
- In contrast, regarding interference between different automotive radar sensors, the automotive industry is developing countermeasures. However, if an unlimited number of fixed radars share this band, it will be extremely difficult to develop countermeasures for all possible scenarios.

These results are neither conclusive nor final – the entire MOSARIM project has a detailed timeline that will culminate at the end of 2012. Nonetheless, the early results support caution in the introduction of fixed installations into the 76-77 GHz band, where many thousands of consumers currently rely on automotive radar for safety. At a minimum, they indicate that the Commission cannot simply rely on its current analytical approach of assuming, without evidence, that fixed installations present merely the same risk of interference as mutual interference between vehicles. In a situation where *even the proponent of such fixed installations* has agreed to a more cautious approach, the general deployment of fixed 76-77 GHz radar installations should not be authorized until additional test data and analysis is available.

In addition to the MOSARIM project, another ongoing research program that will provide additional evidence in the near term regarding fixed use of the 76-77 GHz band is being conducted by the Electronic Communications Committee (“ECC”). The ECC has started compatibility studies to investigate the conditions under which fixed installations (*e.g.*, surveillance radar) in the 76-77 GHz band could be deployed without causing interference to 76-77 GHz automotive radar sensors.¹⁶ This program is based on European Telecommunication Standardization Institute (“ETSI”) System Reference Document TR 102 704,¹⁷ which highlights the potential problems and urges the ECC to study the interference between automotive radar sensors and fixed installations such as surveillance radars in the 76-77 GHz band. The ECC will release a report on its findings in 2012.

*

*

*

¹⁶ Compatibility between Surveillance Radar Systems and other services/systems in the band 76-77GHz, http://eccwp.cept.org/WI_Detail.aspx?wiid=117

¹⁷ ETSI TR 102 704; Electromagnetic compatibility and Radio Spectrum Matters (ERM); System Reference Document; Short Range Devices (SRD); Radar sensors for non-automotive surveillance applications in the 76 GHz to 77 GHz frequency range.

For these reasons, SARA fully supports Toyota's proposal to modify the emission limits and eliminate the "not-in-motion" requirement contained in Section 15.253 of the Commission's rules. SARA urges the Commission, however, to defer action on its proposal for fixed use of the 76-77 GHz band until the automotive industry has completed its ongoing, comprehensive interference research (or, as an interim measure, to permit unlicensed fixed 76-77 GHz radar facilities to illuminate only those areas that are not likely to be accessed by motor vehicles until more conclusive information regarding compatibility is available).

Respectfully submitted,

/s/ Gerhard Rollmann

Dr. Gerhard Rollmann
Chairman
Strategic Automotive Radar Frequency Allocation Group
Ellwangerstr. 20
D-71732 Tamm, Germany
Phone: +49 7141 1290 730

/s/ Ari O. Fitzgerald

Ari Q. Fitzgerald
Gerry Oberst
Hogan Lovells US LLP
555 Thirteenth Street, NW
Washington, DC 20004
Phone: (202) 637-5423
Ari.Fitzgerald@hoganlovells.com

*Counsel to the Strategic Automotive
Radar Frequency Allocation Group*

July 18, 2011

ANNEX

Simulation of Interference Effects of Fixed Installations into Automotive Radar by University of Karlsruhe with Preliminary Methodology Used in the MOSARIM Project

Parameters:

- Interferer positioning:
2° with respect to driving lane, 2m besides driving line,
Height: 1m above driving lane
- Antenna: Beam width: $\pm 1^\circ$ (azimuth and elevation), 1st sidelobe attenuation: 20dB

Preliminary results:

- Simulation results show that the interference power of an interferer with +45dBm EIRP is up to 75dB above the noise floor of the 76-77 GHz automotive radar sensor. Such a strong interference without any mitigation effect will defeat the operation of the automotive radar sensor and its associated safety system.

For a +55dBm interferer, the interference power would be even 10dB higher.

