

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Amendments of Parts 1, 2, 15, 90, and 95 of the Commission's Rules to Permit Radar Services in the 76-81 GHz Band)	ET Docket No. 15-26
)	
Amendment of Part 15 of the Commission's Rules to Permit the Operation of Vehicular Radar Services in the 77-78 GHz Band)	RM-11666
)	
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
)	
Amendment of the Commission's Rules to Permit Radiolocation Operations in the 78-81 GHz Band)	WT Docket No. 11-202
)	

**REPLY COMMENTS OF THE FORMER
STRATEGIC AUTOMOTIVE RADAR FREQUENCY ALLOCATION GROUP,
CATERPILLAR, DELPHI AUTOMOTIVE, AND GENERAL MOTORS COMPANY**

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The former Strategic Automotive Radar Frequency Allocation Group (the “Former SARA Group”),¹ Caterpillar, Delphi Automotive, and General Motors Company submit these reply comments in response to the Notice of Proposed Rulemaking (“NPRM”) in the above-captioned dockets.² In that NPRM, the Federal Communications Commission (“FCC” or “Commission”) seeks comment on proposed rules that would allow for the deployment of various radar applications in the 76-81 GHz band.³

INTRODUCTION AND SUMMARY

In its comments the Former SARA Group urged the Commission to adopt its proposal to allow vehicular radar operations throughout the 76-81 GHz band. Such action would advance the development and evolution of important vehicle safety technologies that further the public interest.⁴ The Former SARA Group explained how authorizing vehicular radar services under Part 95 of the Commission’s rules will avoid overly burdensome individual licensing requirements while providing an important level of interference protection for critical automotive safety systems. Additionally, the Former SARA Group showed how vehicular radar systems can safely operate in the 76-81 GHz band without causing harmful interference to other services in the band, such as Radio Astronomy Services (“RAS”). However, the Former SARA Group

¹ SARA was a consortium of automotive suppliers and manufacturers formed in 2001 to promote worldwide frequency allocations for automotive radar, including the development of technology standards. Its members included Autoliv, BMW, Bosch, Continental AG, Daimler, Hella, and TRW. These comments are being submitted by a coalition that includes all former members of SARA, except Bosch. SARA worked extensively to develop 24 GHz short-range vehicular radar (“SRR”) technology in the U.S. and Europe and has been heavily involved in the European SRR transition from 24 GHz to 79 GHz wideband and ultra-wideband. *See, e.g.*, Press Release, SARA, Important Automotive Safety Development (Aug. 1, 2011).

² *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Notice of Proposed Rulemaking and Reconsideration Order, FCC 15-16 (rel. Feb. 5, 2015) (“NPRM”).

³ *See, e.g., id.* at 1.

⁴ *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Comments of The Former Strategic Automotive Radar Frequency Allocation Group, Caterpillar, Delphi Automotive, and General Motors Company, ET Docket No. 15-26, et al. (filed April 7, 2015) (“The Former SARA Group Comments”).

cautioned the Commission not to allow services that could cause harmful interference to vehicular radar systems, such as fixed infrastructure radar to operate in the 76-81 GHz band. Lastly, the Former SARA Group demonstrated that the Commission can continue to certify wideband and ultra-wideband vehicular radar equipment that operates in the 24 GHz band and discouraged the Commission from imposing a sunset date for such certifications.

Commenters in the proceeding widely recognize the important safety benefits from the further development and deployment of vehicular radar systems.⁵ Yet, some commenters propose rule changes that would undermine the effectiveness of vehicular radar systems that are responsible for keeping drivers and passengers safe.

Some fixed infrastructure radar manufacturers (“Fixed Radar Commenters”) assert that their systems can coexist with vehicular radar systems in the 76-77 GHz band without causing harmful interference. The Fixed Radar Commenters even propose more general and geographically ubiquitous operations throughout the 76-81 GHz band. The Commission should decline to certify fixed infrastructure radar applications in the 76-81 GHz band at this time pending the outcome of further study regarding the potential for interference from such systems with vehicular radar technologies operating in the same band. The Commission should further decline to adopt Navtech Radar Ltd.’s (“Navtech”) proposal to expand the bandwidth for fixed radar applications to a width of 2 GHz between 76 – 78 GHz.⁶

⁵ See e.g. *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Comments of the National Academy of Sciences’ Committee on Radio Frequencies, ET Docket No. 15-26, et al. at 10 (April 1, 2015) (“CORF is mindful of the potential safety benefits of enhanced vehicular radars.”) (“CORF Comments”).

⁶ *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Comments of Navtech Radar Ltd., ET Docket no. 15-26, et al. at 3-4 (April 1, 2015) (“Navtech Comments”).

The Radio Astronomy Systems commenters (“RAS Commenters”) propose infeasible, expensive and unnecessary technology mandates to mitigate the remote possibility of automotive radar systems causing interference with the operation of RAS.⁷ These proposals would hamper the development and effectiveness of critical vehicular radar safety technologies despite the low chance for interference between RAS and vehicular radar systems. The Commission should reject the RAS Commenters’ unnecessary proposals.

Lastly, the record does not support the Commission’s proposed phase out of certifications for wideband and ultra-wideband vehicular radar systems that operate in 24 GHz band.⁸ The Commission should continue to certify such systems as it moves to expand vehicular radar operation in the 76-81 GHz band.

DISCUSSION

I. The FCC Should Reject Calls to Allow Fixed Infrastructure Radar in the 76-81 GHz Band at This Time.

In its comments, the Former SARA Group explained how fixed infrastructure radar operating in the 76-81 GHz band could cause harmful interference to vehicular radar.⁹ Specifically, the Former SARA Group cautioned the Commission that until it is established conclusively that fixed infrastructure radar can coexist in that band with vehicular radars, it should not adopt its proposal to allow non-geographically limited fixed infrastructure radar operations a one gigahertz band at 76-77 GHz.¹⁰ Similarly, the Commission should reject calls to allow fixed infrastructure radars throughout the 76-81 GHz band without knowing the results

⁷ *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Comments of the National Radio Astronomy Observatory, ET Docket No. 15-26, et al. at 9 (April 1, 2015) (“NRAO Comments”); CORF Comments at 10.

⁸ *Id.* at ¶ 44.

⁹ The Former SARA Group Comments at 12.

¹⁰ The Former SARA Group Comments at 12-13.

of further testing that directly addresses whether such expanded operations would result in interference with vehicular radar systems. To do otherwise would increase the chance of harmful interference to vehicular radar systems in the 76-81 GHz band and potentially endanger those who rely on advanced radar-enabled automotive safety features.

Despite the demonstrated threat of interference from fixed infrastructure radar operating in the 76-77 GHz band to vehicular radar systems, the Fixed Radar Commenters-- Mantissa Ltd (“Mantissa”) and Navtech separately assert that their fixed infrastructure radar systems can operate in that band without interfering with vehicular radar systems.¹¹ They also propose that the Commission expand fixed infrastructure radar operations into other portions of the 76-81 GHz band and enable fixed radar to operate within a greater geographical scope. The record contains ample evidence of the potential for harmful interference to automotive radar systems from fixed infrastructure radar operations and does not support the Fixed Radar Commenter’s proposals at this time. The Commission has recognized that the More Safety for All by Radar Interference Mitigation (“MOSARIM”) study suggested operation of fixed infrastructure radar in the 76-77 GHz band poses an unacceptable level of harmful interference to automotive radar systems.¹² However, MOSARIM’s testing did not focus squarely on the issue of interference from fixed infrastructure radar to vehicular radar systems and more testing is required to resolve that issue. Nor did the MOSARIM tests address the Mantissa and Navtech proposal to expand the operation of fixed infrastructure radars throughout the 76-81 GHz band or expand the

¹¹ *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Comments of Mantissa Ltd., ET Docket No. 15-26, et al. at 12-14 (filed April 7, 2015) (“Mantissa Comments”); Navtech Comments at 3-4.

¹² NPRM at ¶ 53; The Former SARA Group Comments at 12-14; The MOSARIM Consortium, *Results of Interference Tests Between Automotive Radar Systems and Navtech Traffic Monitoring System*, at 11 (Nov. 30, 2012), available at <https://assrv1.haw-aw.de/index.php/dataexchange/func-startdown/1319> (“MOSARIM Report”).

geographic scope of such operations. Additionally, contrary to Mantissa's assertions,¹³ the scope of the MOSARIM report's findings related to mitigation techniques only focused on mitigating interference between vehicular radar systems themselves and did not draw any conclusions on effective mitigation techniques for potential interference from fixed infrastructure radar systems.¹⁴

As noted in our comments, CEPT's Electronic Communications Committee's ("ECC") Working Group on Spectrum Engineering ("SE24") is conducting testing to directly address questions regarding the compatibility of vehicular radar and fixed infrastructure radar in the 76-77 GHz band and anticipates that a final report will be available in December 2015.¹⁵ The Commission should await the pendency of that study and reject proposals for fixed radar operation in the 76-77 GHz band.

If the Commission ultimately determines that fixed infrastructure radar will not interfere with vehicular radar systems in the 76-77 GHz band, to further mitigate the risk of harmful interference, fixed infrastructure radar should only have an allocation that is subordinate to vehicular radar's and be required to disclose its location to minimize the risk of harmful interference. The Commission could achieve this by only allowing fixed radar to operate on an unlicensed basis under Part 15 of the Commission's rules or as a secondary authorized service, subject to a site-based licensing or a registration requirement. Lastly, the Commission should reject Navtech's proposal to expand the bandwidth for fixed radar applications to a width of 2

¹³ Mantissa Comments at 9.

¹⁴ *See generally* MOSARIM Report.

¹⁵ The Former SARA Group Comments at 13 (citing CEPT Electronic Communications Committee, SRDMG#61 Results (Apr. 7, 2014, 4:24 p.m.), <http://www.cept.org/ecc/groups/ecc/wg-fm/srdmg/page/srdmg61-results-2-4-april-2014> (confirming that these tests will "only be performed on fixed transport infrastructure radars operating in 76-77 GHz with regard to the co-existence with vehicular radars"))).

GHz between 76-78 GHz.¹⁶ The Commission has noted that “a bandwidth of 1 gigahertz or less would appear to be sufficient for [] fixed radars.”¹⁷

II. The FCC Should Not Adopt the Technology Mandates Proposed by RAS Commenters.

As the Former SARA Group explained in its comments and the Commission recognized in its NPRM, automotive radar systems pose a negligible interference risk to RAS operations in the 76-81 GHz band.¹⁸ Still, the RAS Commenters ask the Commission to require manufacturers of vehicular radar systems to implement either a manual or GPS determined on/off switch to further reduce the already de minimis chance for interference from vehicular radar systems to RAS facilities operating in the 76-81 GHz band.¹⁹ These proposed technology mandates are unnecessary, impractical, and ultimately counterproductive to ensuring the safety of drivers and passengers who rely on the advanced safety features enabled by vehicular radar systems.

The RAS Commenters’ concerns regarding the potential for interference from vehicular radar system to RAS facilities are overly pessimistic. Their proposal to implement a manual or GPS driven on/off switch for vehicular radar systems is unnecessary given the “negligible” chance for harmful interference from automotive radar systems to RAS operations in the 76-81 GHz band.²⁰ Indeed, there have been no documented cases of harmful interference between vehicular radar systems in the 76-77 GHz band and RAS. The Commission has recognized that that the horizontal direction of vehicular radar beams, the propagation characteristics of the spectrum, and the remote geographical locations of RAS sites all operate to mitigate the risk of

¹⁶ Navtech Comments at 3-4.

¹⁷ See NPRM at ¶ 55.

¹⁸ NPRM at ¶ 31; The Former SARA Group Comments at 4.

¹⁹ CORF Comments at 10; NRAO Comments at 9.

²⁰ NPRM at ¶ 31; The Former SARA Group Comments at 4.

harmful interference.²¹ Additionally, RAS facilities generally control at least a one kilometer area around their facilities, putting them in the best position to implement cost-effective mitigation techniques should interference from vehicular radar systems pose a problem in the future.²²

The on/off switch proposal is impractical given the size and scope of the automotive fleet in this country-- which is increasingly reliant on automotive radar technologies for safety applications-- as compared to the two RAS facilities that operate in the 76-81 GHz band.²³ The expense of implementing an on/off switch throughout the entire U.S. automobile fleet borders on the absurd considering that only an estimated ten vehicles pass in view of one RAS facility a day.²⁴ Further, it is unlikely that most drivers would know how to operate an on/off switch, considering the remote possibility that any particular driver would ever pass by either of the two RAS facilities that operate in the in 76-81 GHz band. The existence of a manual on/off switch could also put drivers and passengers in jeopardy if a vehicle's radar-enabled safety systems are inadvertently turned off unbeknownst to the vehicle operator. A GPS enabled on/off switch for vehicular radar systems is even more impractical because most vehicles in the United States do not have integrated GPS systems. To comply with a GPS mandate, automobile manufacturers would be forced to incur significant costs to install and integrate GPS into vehicular radar systems. These costs could discourage them from installing vehicular radar systems altogether in their economy models, thereby depriving the drivers of such vehicles of access to the important safety features vehicular radar offers. The RAS commenters' proposed technology mandates

²¹ *Amendment of Sections 15.35 and 15.253 of the Commission's Rules Regarding Operation of Radar Systems in the 76-77 GHz Band*, Report and Order, 27 FCC Rcd 7880 ¶¶ 15-16 (2012) (“*Vehicular Radar R&O*”).

²² *Id.* at ¶ 16.

²³ CORF Comments at 10.

²⁴ NRAO Comments at 5.

could ultimately stifle the further development of innovative automotive radar safety technologies if automobile manufacturers are unable to spread the cost of development over their entire product line due to the increased cost of implementing a GPS shut-off system.

III. The FCC Should Not Adopt a Sunset Date for New 24 GHz Wideband and Ultra-Wideband Vehicular Radar Equipment Certifications.

The record does not support the Commission’s proposal to sunset wideband or ultra-wideband vehicular radar equipment certifications in the 22-29 GHz band (“24 GHz Band”).²⁵ Indeed, no commenter offered support for the Commission’s phase-out proposal. Among those commenters who discussed automotive radar operations in the 24 GHz band, there is broad support for the Commission to continue accepting equipment certification applications for all 24 GHz band vehicular radars and forgo a phase-out altogether.²⁶ It continues to be unclear why the Commission proposed to phase out 24 GHz wideband or ultra-wideband vehicular radar systems given that current 24 GHz vehicular radar usage is limited to low-power, unlicensed Part 15 operations under strict technical rules that require the devices to avoid causing interference to higher-powered operations in the band.²⁷ Stakeholders have already invested time and capital into developing and deploying such vehicular radar systems and no reason is given as to why

²⁵ NPRM at Appendix B.

²⁶ *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Service in the 76-81 GHz Band et al.*, Comments of Mercedes-Benz USA, LLC, ET Docket No. 15-26, et al. at 3-4 (“MBUSA Comments”); Comments of the Alliance of Automobile Manufacturers, Inc. at 5-6 (“The Alliance Comments”); The Former SARA Group Comments at 9-11. Delphi Automotive Systems (“Delphi”) expressed support for the Commission’s proposal to grandfather all existing devices operating under Part 15, including any older designs operating at 17 or 24 GHz. Comments of Delphi Automotive Systems at 1-2. This should not be misconstrued to mean that Delphi supports the Commission’s 24 GHz certification sunset proposal. Delphi did not comment on the future regulation of 24 GHz vehicular radar certifications. Rather, Delphi only responded to the Commission’s request for comment on the proposal to grandfather existing 24 GHz equipment designs, which is not inconsistent with opposing the phase-out of additional 24 GHz certifications. *Id.*

²⁷ *See, e.g.*, 47 C.F.R. §15.515 (requiring that “on or after January 1, 2014” Ultra-wide band 24 GHz vehicular radar systems “attenuate any emissions within the 23.6-24.0 GHz band that appear 30 degrees or greater above the horizontal plane” by 35 dB); 47 C.F.R. § 15.5(b) (providing that unlicensed operation under Part 15 “is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station”).

those systems should not continue to operate in that band. Further, all of the commenters who discuss the proposed phase-out of wideband and ultra-wideband vehicular radar systems agree that at the very least the Commission should match the more accommodating phase-out schedule adopted by the European Union.²⁸ In contrast, the Commission's proposed thirty day phase-out period is woefully inadequate, considering the production cycles at issue in the automotive industry, which require longer lead times than in other industries regulated by the Commission. Given the dearth of support or an articulated purpose for adopting the proposed phase-out of new 24 GHz wideband and ultra-wideband vehicular radar certifications, the Commission should decline to adopt its phase-out proposal.²⁹

IV. Conclusion

The Former SARA Group continues to support the adoption of Commission's proposals to expand vehicular radar use in the 76-81 GHz band. However, the Commission should reject premature proposals to allow fixed infrastructure radar to operate in the 76-81 GHz band before it receives empirical confirmation that fixed radar poses no interference threat to vehicular radar systems. Further, the Commission should also decline to adopt impractical technology mandates designed to avoid the already negligible chance of interference from vehicular radar systems to

²⁸ MBUSA Comments at 3-4; The Alliance Comments at 5-6; The Former SARA Group Comments at 9-11; Comments of Robert Bosch, LLC at 25 ("Bosch Comments"). Robert Bosch, LLC asserts that there is an "anticipated sunset date of 2022 for [24 GHz vehicular radars] in Europe, which is sufficiently far in the future that prohibiting certification of new vehicular radars that operate in bands other than 76-81 GHz is not burdensome." Bosch Comments at 25. However, Bosch does not offer direct support for phasing out new 24 GHz wideband and ultra-wideband equipment certifications, nor does it offer any reasons for or benefits of the proposed sunset. The fact that the phase-out proposal for new wideband or ultra-wideband vehicular radar certifications in the 24 GHz band is not burdensome for one company does not confirm that others will not continue to rely on wideband or ultra-wideband 24 GHz vehicular radar systems.

²⁹ The Former SARA Group repeats its request for the Commission to clarify that it will not phase out the ability to secure new 24 GHz narrowband vehicular radar equipment certifications under sections 15.245 and 15.249 of the Commission's rules. Although the granular details of the Commission's proposal do not appear to eliminate the ability to secure such narrowband equipment certifications, some of the Commission's general language suggests otherwise. Many manufacturers of narrowband 24 GHz vehicular radars rely on sections 15.245 and 15.249. *See* The Former SARA Group Comments at 11-12.

RAS operations. Lastly, the Commission should support continued innovation in the development of vehicular radar systems by declining to adopt its proposal to phase out the ability of manufacturers to obtain new wideband and ultra-wideband vehicular radar certification in the 24 GHz band.