

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Amendment 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 TRIMBLE NAVIGATION LIMITED

Trimble Navigation Limited (“Trimble”) submits these reply comments to the comments of other parties filed in response to the Notice of Proposed Rulemaking and Reconsideration Order (“*NPRM*”) issued by the Commission in the above-referenced proceedings on February 5, 2015.^{1/} Trimble appreciates that additional uses of the 76-81 GHz band must be compatible with existing and proposed applications. However, particularly in an increasingly spectrum-constrained environment, the public interest requires the Commission to pursue dual goals of protecting existing uses while also ensuring that spectrum is intensely used. Trimble’s proposed use of the band for non-fixed, three dimensional (“3D”) scanning, surveying, mapping, and

^{1/} See Amendment of Parts 1, 2, 15, 90 and 95 of the Commission’s Rules to Permit Radar Services in the 76-81 GHz Band, et al., Notice of Proposed Rulemaking and Reconsideration Order, ET Docket No. 15-26, et al., FCC 15-16 (rel. Feb. 5, 2015) (“*NPRM*”).

Geographic Information System (“GIS”) data collection applications squarely satisfies those twin objectives.

I. REPLY COMMENTS

In its comments, Trimble urged the Commission to maximize and further unlock the full potential of the 76-81 GHz band by adopting a regulatory framework that also allows the band to be used for 3D scanning, surveying, mapping, and GIS data collection applications.^{2/} Trimble pointed out that these additional applications are entirely consistent with the existing and anticipated uses of the band – including vehicular radars, airport foreign object debris (“FOD”) detection radars, level proving radars (“LPRs”), Radio Astronomy Service (“RAS”) operations, and Amateur operations. Trimble specifically demonstrated that its use of the band would be compatible with other radar uses because its proposed applications will not generally be used in areas where existing operations are present; the scale of the applications that Trimble proposes creates only a minimal risk of interference; and the technologies in the applications that Trimble proposes will be nearly identical to those used in vehicular radar applications.^{3/}

Others also envision additional radar applications that can be used in the 76-81 GHz band. For instance, Mantissa Ltd. (“Mantissa”) suggests that the FCC allow additional fixed radars, such as miniature fixed radar sensors for perimeter security that Mantissa manufactures, to operate in the 76-81 GHz band.^{4/} Navtech Radar Ltd (“Navtech”) similarly supports permitting use of the 76-77 GHz band for a range of fixed applications, including highway monitoring, obstacle detection, navigation for industrial machinery, and wide area surveillance

^{2/} See Comments of Trimble Navigation Limited, ET Docket No. 15-26, *et al.* (filed Apr. 6, 2015) (“Trimble Comments”).

^{3/} See *id.* at 5-9.

^{4/} See Comments of Mantissa Ltd., ET Docket No. 15-26, *et al.* (filed Apr. 6, 2015) (“Mantissa Comments”).

and security monitoring, among others.^{5/} And, Rockwell Collins, Inc. (“Rockwell Collins”) recommends that the Commission make the 76-77 GHz band available for helicopter-mounted surveillance radar systems – known as “heliborne radar.”^{6/} Like Trimble, Rockwell Collins notes that authorizing heliborne radars in the 76-77 GHz band will create economies of scale and scope and promote regulatory harmonization between the United States and Europe.^{7/}

Some of these additional uses may be compatible with incumbent and proposed operations.^{8/} Other parties express legitimate concern, however, that additional uses of the band will degrade the operations of current users – particularly those operating vehicular radars.^{9/} Trimble agrees that the Commission should take no action in this proceeding that will jeopardize current vehicular radar and other operations in the 76-81 GHz band. Nevertheless, continuing to preserve the band for a limited application in the face of potential compatible uses is not sound

^{5/} See Comments on Proceeding Number 15-26, FCC 15-16 Notice of Proposed Rulemaking and Reconsideration Order for the Band of 76-81 GHz Band, ET Docket No. 15-26, *et al.* (filed Apr. 8, 2015) (“Navtech Comments”).

^{6/} See Comments of Rockwell Collins, Inc., ET Docket No. 15-26 (filed Apr. 6, 2015) (“Rockwell Collins Comments”).

^{7/} See *id.* 14-16.

^{8/} Mantissa, for example, explains that its applications will be compatible with vehicular (and other) radars because they will be operated in relatively remote locations away from roadways and the propagation characteristics of the 76-81 GHz band will make device interference less problematic. See Mantissa Comments at 8-12. Navtech contends that its proposed radars should be able to co-exist with vehicular radars in the 76-77 GHz band due to the narrow beamwidth and highly directional antennas that will be employed. See Navtech Comments at 2-3. Rockwell Collins adds that heliborne radars will be compatible with vehicular radars in the 76-77 GHz band because they will be geographically separated from vehicular radars and the propagation characteristics of the spectrum will ensure that interfering signals dissipate quickly, among other reasons. See Rockwell Collins Comments 10-15; see also *id.* at 14 (suggesting that heliborne radars could also co-exist with Amateur operations because the probability of the helicopter radar transmitting directly into the main beam of an Amateur station is low).

^{9/} For instance, the Former Strategic Automotive Radar Frequency Allocation Group, Caterpillar, Delphi Automotive, and General Motors Company (together “Joint Commenters”) assert that “[s]erious concerns exist regarding the ability of fixed infrastructure and vehicular radar to share the 76-81 GHz band without interference.” Comments of the Former Strategic Automotive Radar Frequency Allocation Group, Caterpillar, Delphi Automotive, and General Motors Company, ET Docket No. 15-26, *et al.*, at 12 (filed Apr. 6, 2015) (“Joint Commenters Comments”); see also Comments of Robert Bosch, LLC, ET Docket No. 15-26, *et al.*, at 10 (filed Apr. 6, 2015) (“Bosch Comments”).

spectrum management and contrary to the public interest. The Commission should not reject out-of-hand all additional uses of the band. Instead, it should meaningfully assess whether proposed applications will be compatible with existing and planned operations.^{10/}

Based on that assessment, the Commission should find that the non-fixed, 3D scanning, surveying, mapping, and GIS data collection uses that Trimble proposes are applications that will be compatible with existing and planned operations and will have a *de minimis* impact on the spectrum environment. Most parties that object to additional use of the band note the challenges of co-existence between *fixed* and vehicular radar.^{11/} As Delphi points out, “the possibility of interference from multiple fixed radar installations in certain scenarios would increase the probability of interference when compared to a multiple vehicle scenario.”^{12/} It explains that fixed radar presents an increased risk to vehicular radar because of potential exposure from multiple devices and over an extended period of time.^{13/}

However, these concerns do not exist with the type of non-fixed applications that Trimble proposes. 3D scanning, surveying, mapping, and GIS data collection devices will be operated on an intermittent, portable basis, reducing the likelihood of interaction with vehicular radars, particularly in view of the limited relative number of units expected to be in operation compared to vehicles. These uses are intermittent in the sense that devices will only be use when there is a scanning or surveying task to be performed in particular area. Moreover, Trimble expects to use

^{10/} See also Bosch Comments at 12 (suggesting a case-by-case approach for assessing additional fixed radar uses of the 76-77 GHz band).

^{11/} See, e.g., Comments of Delphi Automotive Systems, ET Docket No. 15-26, at 3 (filed Apr. 6, 2015) (“Delphi Comments”); Comments of the Alliance of Automobile Manufacturers, Inc., ET Docket No. 15-26, *et al.*, at 4 (filed Apr. 6, 2015) (“Automobile Alliance Comments”); Joint Commenter Comments at 12-13.

^{12/} Delphi Comments at 4.

^{13/} See *id.* at 3-4.

the precise technology that is already in operation in vehicular radars under the technical parameters specified in the proposed rules. Therefore, even in the limited geographic areas where there may be both vehicular and 3D scanning, mapping, and GIS data collection activities, the currently used contention technologies will allow the co-existence of all devices without distinguishing the nature of the application being used. Vehicular radar is already designed to accommodate multiple cars in the same location. The potential addition of a limited number of 3D scanning, mapping, and GIS data collection devices will be consistent with how vehicles already co-exist with each other.^{14/}

Several commenting parties argue that the Commission should take no action in this proceeding to permit the additional use of the 76-81 GHz band for fixed radars until the European Conference of Postal and Telecommunications Administrations (“CEPT”) has completed a study on the interference impact of fixed infrastructure radars to vehicular radars in the 76-77 GHz band.^{15/} The Commission should reject those suggestions to the extent they may delay use of the 76-81 GHz band by non-fixed, 3D scanning, mapping, and GIS data collection applications. *First*, and most importantly, the CEPT study is intended to study the impact of *fixed* radar uses in the 76-77 GHz band on vehicular radars. Trimble’s proposed applications are non-fixed radar uses. As other parties have noted, vehicle-to-vehicle interference has already been assessed in the More Safety for All by Radar Interference Mitigation (“MOSARIM”)

^{14/} While the applications that Trimble proposes can co-exist with vehicular radar today with no changes to current devices or technology, Trimble’s comments noted that a random coding scheme, such as random frequency hopping mechanisms used by Bluetooth technologies employed in the 2.4 GHz band, could be overlaid to the waveform used in 3D scanning, surveying, mapping, and GIS data collection applications to even further reduce the possibility of interference. *See* Trimble Comments at 9 n.26.

^{15/} *See, e.g.*, Joint Commenters Comments at 12-14 (noting that CEPT reports 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”) (internal citation omitted); Bosch Comments at 10-11 (explaining that the results of this study are expected by the end of 2015); Automobile Alliance Comments at 4.

study,^{16/} and the impact of the additional applications that Trimble proposes is already covered by that evaluation. Use of the spectrum for non-fixed, 3D scanning, mapping, and GIS data collection devices will use the same technological platform, including contention technology, as vehicular radar devices. *Second*, the Commission already has a strong record of the shared use in the 76-77 GHz band in the United States by vehicular radars and airport FOD detection radars, RAS, and Amateur operations. There have been no reported instances of interference between current users of the band today.^{17/} The Commission should build on that current success by permitting additional compatible use of the expanded 76-81 GHz band on a shared basis as well.

II. CONCLUSION

The record in this proceeding demonstrates that the Commission can and should expand use of the 76-81 GHz band to support additional, compatible radar applications. Trimble therefore respectfully urges the FCC to permit non-fixed, 3D scanning, surveying, mapping, and GIS data collection applications. Doing so will facilitate greater use of the spectrum without causing harmful interference to existing or proposed operations.

^{16/} See, e.g., Joint Commenters Comments at 13 (“[T]he MOSARIM study was designed to primarily test vehicular radar to vehicular radar interference.”); Mantissa Comments at 9.

^{17/} See, e.g., *NPRM* ¶ 47 (observing that vehicular radars can co-exist with FOD detection radars in the 76-77 GHz band and reasoning that vehicular radars should therefore be able to co-exist with FOD detection radars in the 77-81 GHz band); see also Mantissa Comments at 11 (reporting that “there are no reports in the record of actual malfunctioning of vehicle-mounted radars due to mutual interference among them”); Bosch Comments at 17-18 (explaining that there have been no reports of interference between vehicular radars and RAS operations in the 76-77 GHz band); Joint Commenters Comments at 5-6.

Respectfully submitted,

/s/ James A. Kirkland

Russell H. Fox
Angela Y. Kung

James A. Kirkland
Vice President and General Counsel

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND
POPEO, PC
701 Pennsylvania Ave., NW
Suite 900
Washington, DC 20004
(202) 434-7300

TRIMBLE NAVIGATION LIMITED
935 Stewart Drive
Sunnyvale, CA 94085
(408) 481-8000

Counsel for Trimble Navigation Limited

April 20, 2015