

**FCC Notice of Proposed Rulemaking  
Submitted electronically Via FCC Docket**

Docket No: 10-23, FCC 12-34

Tank Level Probing Radar and Level Probing Radar Regulations

Delphi Automotive appreciates the opportunity to submit comments to FCC's Tank Level Probing Radar and Level Probing Radar FNPRM which proposes to amend the Commission's rules to permit unlicensed operations under Part 15 of the Commission's rules in the 77-81 GHz band and in the frequency bands 5.925 – 7.250 GHz, 24.05 – 29.00 GHz, and 75 – 85 GHz.

Delphi is a leading global supplier of mobile electronics and transportation systems, including powertrain, safety, thermal, electrical/electronic architecture, controls and security systems.

Headquartered in Kokomo, Indiana, Delphi's Electronics and Safety division is a leader and innovator in the design and manufacture of vehicular radar systems and has actively and consistently participated in the rulemaking process for several of FCC's rulemakings affecting such devices in recent years. Delphi has obtained a number of FCC authorizations for sale of nonlicensed Part 15 automotive radar products at 10 GHz, 17 GHz, 24 GHz and 76 GHz.

Delphi agrees with the commission that Level Probing Radar and Tank Level Probing Radar is an application that is in the public interest. Delphi also believes that harmonization of regulations with Europe and others will lead to a more rapid and less expensive deployment of safety critical devices such as automotive radar.

Delphi has reviewed the ETSI and ECC documents referenced by the FCC and compared them with the rules proposed in the FNPRM. Delphi believes the ECC recommendations (ECC Report 139 pages 55-56) call for tighter controls on LPR than does the FCC proposal. Specifically, Delphi is concerned that specifying a mainlobe power (EIRP) and an absolute side lobe gain relative to isotropic can result in higher sidelobe emissions than discussed in the FNPRM and recommended in the ECC report. More specifically, Delphi is concerned that specifying in this manner can lead to sidelobe emission greater than the intended general emissions limit of -41 dBm/MHz.

For example, considering an antenna with the specified 8 deg circular beamwidth, the directivity would be about 29 dBi. For antenna gain to be 29 dBi the efficiency would need to be unity. Hence, 29 dBi would seem to be the theoretically maximum possible gain for the LPR antenna. For 29 dBi peak gain, the specified sidelobe level of -10 dBi means relative sidelobe level of 39 dB (that is, 39 dB below the mainlobe gain). Then, for average mainlobe EIRP emission

limit of -3 dBm/MHz, the sidelobe emission level is -42 dBm/MHz (just below the intended general emission limit of -41 dBm/MHz).

Now instead let's assume the antenna efficiency is only 10%. Peak gain is then 19 dBi and, for absolute sidelobe level of -10 dBi, the relative sidelobe is only 29 dB. The system can still transmit mainlobe EIRP of -3 dBm/MHz using a higher power transmitter to make up for the lower antenna gain. The resulting sidelobe emission level would then be -32 dBm/MHz or about 10 dB above the intended general emission limit of -41 dBm/MHz.

Antenna efficiency of only 10% may represent a very pessimistic worst case. However, the example illustrates that specifying the mainlobe EIRP emission limit and the absolute sidelobe gain does not control the sidelobe emission level. In fact, as specified, it seems the antenna efficiency must be near unity for the sidelobe emission level to be at or below the general emission limit.

The ECC report also requires that outdoor LPR units have an automatic power control (APC). The FNPRM discussed this issue and the FCC concluded that this requirement was not necessary as the proposed sidelobe emissions were below the general emission level of -41.3 dBm/MHz.

The ECC report also recommends certification of the antenna used in LPR systems. This requirement coupled with APC could be used to demonstrate compliance with the required sidelobe emission level by an appropriate ratio between the mainlobe gain and sidelobe gain (the relative sidelobe level) or by lowering the mainlobe emissions according to the projected sidelobe power.

The ECC report does not recommend trying to measure the sidelobe power at the installation as that appeared to be both difficult and inaccurate. As Delphi reads the FNPRM, it is not clear that the FCC requires measurement of sidelobe power as a part of the usage authorization tests.

Therefore, Delphi believes that sidelobe power emissions should be specified and verified. Verification can be made at the antenna level by measuring the ratio of mainlobe gain to sidelobe gain or at the system level if it is determined that sidelobe power emission levels can be accurately measured.

Delphi reminds the commission that the European Union has already authorized the 77-81 GHz band for short range automotive radar applications. The argument used in this FNPRM regarding the benefits of harmonized applications should also be considered in the 77-81 GHz band.

The FCC also has two open NPRMs requesting operation of devices at airports. The 78-81 GHz NPRM discusses licensed use of the band for FOD. The 76-77 GHz NPRM discusses unlicensed use of the band for airport ground based vehicle motion monitoring. The Part 15 rules allow unlicensed use of the 76-77

GHz band for automotive radar. As the need for improved automotive safety systems increases, there is a requirement for increased bandwidth in order to meet certain requirements such as range resolution. Europe has responded by allocating the band 77-81 GHz for unlicensed use by automotive radar. Delphi suggests that the FCC give the same consideration to the future use of the 77-81 GHz band in the United States under Part 15 rules to ensure automotive safety.

Delphi supported the use of 76-77 GHz for fixed radar on an unlicensed Part 15 basis only for the purpose of airport ground traffic monitoring. Delphi opposed opening the band for all non-airport fixed position applications due to the potential for interference with safety critical automotive systems. The system proposed by Era operated at essentially the same power levels as specified for automotive radar.

The system proposed by Trex in the 78-81 GHz band requests three times the bandwidth and 15 dB greater power than the system proposed by Era in the 76-77 GHz band and, further, 38 dB greater power than allocated for automotive SRR in Europe. Although Delphi has not studied the FOD application and cannot address the differences in system performance, Delphi is concerned that allowing use of the 78-81 GHz band on an unlicensed basis at the power levels proposed by Trex could make the band unusable to future safety systems as already allowed in Europe.

Delphi believes that operation in the 78-81 GHz band for the specific application of FOD at airports should not pose a problem with other potential safety applications if approved as a licensed device operating under Part 90 of the Commission's rules at appropriate maximum power levels. With licensed use and airport restricted use, provisions can be made and enforced to minimize the potential for interference in the direction of public roadways. Delphi believes that the NPRMs concerning Trex operating under Part 90 of the Commission's rules, and Era operating under part 15 of the Commission's rules, should be coordinated and resolved concurrently. Additionally, when finalizing the two NPRMs, the Commission should also take into careful consideration the expansion of automotive safety systems into the 77-81 GHz band, as already allowed in Europe.

In summary, Delphi agrees with the Commission's that allowing LPR and TLPR systems to operate under part 15 can be allowed with minimal risk of interference under an appropriate set of rules. Delphi strongly believes that the proposed rules must be modified to ensure the sidelobe emission level is below the intended general emissions limit. Delphi also agrees with the Commission's statements of harmonizing requirements with Europe and urges the commission to take automotive radar into account when considering both the TLPR/LPR and the FOD airport applications.

If you have any questions regarding this submission, please contact me at 248-813-2085.

Best regards,

A handwritten signature in black ink that reads "Rágiemra Amato". The signature is written in a cursive style with a long, sweeping underline.

Rágiemra Amato,  
Director Government/Technical Affairs  
Delphi Automotive