76-81 GHz Radar Operations
Report & Order, FCC 17-94

Jamison Prime
Chief, Policy and Rules Division, OET, FCC
Proceeding overview

Proceeding dates to 2015 Notice of Proposed Rulemaking, petition for rulemaking filed by Robert Bosch, LLC.

Supports international efforts to harmonize automotive radar use in 76-81 GHz.

New rules became effective on October 20, 2017.
Background

Vehicular radars prior to R&O:
- Only 76-77 GHz, plus several lower bands (16.2-17.7 GHz, 22-29 GHz, 23.12-29 GHz, 46.7-46.9 GHz).
- Designed to support long-range radar (LRR) applications.
- Regulated under Part 15 unlicensed model.

Airport radar applications prior to R&O:
- 76-77 GHz permitted for fixed radars at airports for foreign object debris (FOD) detection.
  - Same Part 15 rules and emission limits as vehicular radar operations.
- 78-81 GHz subsequently permitted for fixed and mobile FOD detection at airports.
  - Part 90 licensed service, but no current operations.
Multiple users to consider:

- Allocation table prior to R&O:

<table>
<thead>
<tr>
<th>76-77.5 GHz</th>
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<th>78-81 GHz</th>
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<td>Amateur</td>
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<td>Amateur-satellite</td>
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- Amateur access to 76-77 GHz band had been suspended since 1998.
Vehicular Radars may now operate anywhere in the 76-81 GHz band.

Greater bandwidth supports both long-range radar (LRR) and short-range radar (SRR) applications.

No specific bands or bandwidths are designated or required within the 76-81 GHz frequency range.
Decision – Other Radars

- Fixed and mobile radar applications permitted in airport air operation areas.
  - Supports existing FOD detection functions.
  - Opens door to other applications – such as wingtip-mounted radars.
  - Like vehicular, no specific bands or bandwidths designated or required.

Rejected proposal for fixed radar use outside airport areas.
## Decision – Non-Radar Uses

### Allocations Table post-R&O:

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- Primary radiolocation for the entire band.
- Amateur suspension lifted, but now secondary throughout band.
- Determined that radio astronomy, space-research compatible with radar use.
Licensing Rules

- Consolidated all radar use under new subpart M of Part 95 (licensed by rule).
- Generally structured to allow maximum flexibility in design.
  - e.g., Rejected suggestion to designate separate LRR and SRR band segments.
  - Exception: airborne use strictly prohibited; aircraft mounted radars **must** include an automatic shut-off capability that discontinues all 76-81 GHz radar functions while the aircraft is airborne.
Technical Rules

- Radar equipment subject to certification (95.3361).

- EIRP limits, unwanted emissions limits, and radiofrequency (RF) exposure evaluations for all 76-81 GHz radars are the same as previously authorized/required for 76-77 GHz vehicular and FOD detection radars under the Part 15 rules.

- New rule sections: 95.3361-95.3385
Technical Rules (2)

- The EIRP limits apply per channel (i.e., over the channel bandwidth).

- Maximum transmitted power (EIRP) within the 76-81 GHz band must not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz resolution bandwidth (RBW).

- The maximum peak power (EIRP) within the 76-81 GHz band must not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW.
**Transition provisions**

Cut-off for vehicular radars that operate in the 16.2-17.7 GHz and 46.7-46.9 GHz bands:

- As of July 13, 2017, applications for equipment certification no longer accepted.
- One device authorized a long time ago at 16 GHz and none at 47 GHz.
- No opposition to these proposals.
- Associated Part 15 rules removed.
Transition provisions (2)

Transition for wideband vehicular radars that operate in the 23.12-29 GHz (Section 15.252) and ultra-wideband (UWB) vehicular radars that operate in the 22-29 GHz band (Section 15.515):

- Applications for equipment certification will not be accepted as of Sept. 20, 2018.
- Class II permissive changes will not be permitted after January 1, 2022.
- Manufacture, importation, marketing, sale and installation not permitted after January 1, 2022.
- See transition provisions in Section 15.37.
- Radars under 15.245 and 15.249 not affected.
Transition provisions (3)

- Cut-off for vehicular radars and fixed radar systems used in airport air operations areas that operate in the 76-77 GHz band under Part 15:
  - Equipment certification and Class II permissive changes not permitted as of October 20, 2017.
  - Already-installed equipment may continue to operate.

- Part 90 Airport radar rules removed.
Transition provisions (4)

- Currently certified radars need not be recertified under Part 95, but future certification, or change of already issued certification and operation of such equipment shall be under Part 95, Subpart M of the rules.

- Decision provides for continued operation of installed base of radars with limited provisions for repair/replacement (see, e.g., Section 15.37).

- Unlicensed level probing radars that operate throughout the 75-85 GHz band under Section 15.256 of the rules may continue to operate in the band (i.e. no phase-out for these devices).
Conclusion

Thank you!

jamison.prime@fcc.gov