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

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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.

Background (2)

- Multiple users to consider:
  - Allocation table prior to R&O:

<table>
<tr><td colspan="2">76-77.5 GHz
RADIOLOCATION</td><td></td><td>78-81 GHz
RADIOLOCATION</td></tr>
<tr><td>76-77 GHz
Amateur</td><td>77-77.5 GHz
Amateur
Amateur-satellite</td><td>77.5-78 GHz
AMATEUR
AMATEUR-SATELLITE</td><td>78-81 GHz
Amateur
Amateur-satellite</td></tr>
<tr><td colspan="2">76-77.5 GHz
RADIO ASTRONOMY</td><td>77.5-78 GHz
Radio astronomy</td><td>78-81 GHz
RADIO ASTRONOMY</td></tr>
<tr><td colspan="4">76-81 GHz
Space research (space-to-Earth)</td></tr>
</table>

  - Amateur access to 76-77 GHz band had been suspended since 1998.

Decision – Vehicular Radar

- 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:

76-81 GHz GHz RADIOLOCATION	
76-77 GHz Amateur	77-81 GHz Amateur Amateur-satellite
76-81 GHz RADIO ASTRONOMY	
76-81 GHz Space research (space-to-Earth)	

  - 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!

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