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March 30, 2004

**FILED ELECTRONICALLY**

Marlene H. Dortch, Secretary
Federal Communications Commission
Office of the Secretary
445 12th Street, SW
Washington, DC 20554

**Re: Notice of *Ex Parte* Presentation in Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems (Docket No. 98-153); Amendment of Part 2 of the Commission's Rules to Realign the 76-81 GHz Band and the Frequency Range above 95 GHz Consistent with International Allocation Changes (ET Docket Nos. 03-102 and 99-261); Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands (ET Docket No. 03-237)**

Dear Secretary Dortch:

Pursuant to Section 1.1206(b) of the Commission's Rules, 47 CFR § 1.1206(b), notice is hereby provided in the above-referenced dockets regarding an *ex parte* presentation made to Jennifer Manner, Senior Counsel, Office of Commissioner Abernathy, by Delphi Corporation ("Delphi") on March 31, 2004. Participating on behalf of Delphi were Stephen Alland, Manager, Advanced Radar Systems Department, Nicholas Morenc, a consultant to Delphi (and former Manager, Advanced Systems Radar Department), and Robert Kelly and Aspa Paroutsas of Squire, Sanders & Dempsey L.L.P., counsel to Delphi.

Delphi is the leading U.S. developer of vehicular radar systems that operate the 17 GHz, 22-29 GHz and 76-77 GHz bands. The purpose of the meeting was to discuss Delphi's technical and spectrum interests and concerns for its vehicular radar systems consistent with its comments in the above-referenced proceedings. Attached is a copy of a handout summarizing these issues, which was provided to the Commission staff named above.

Please do not hesitate to contact me if there are any questions regarding this submission. A copy of this notice and attachment is being provided to the Commission staff named above via email.

Sincerely,

Robert B. Kelly

Attachment

cc (with attachment): Jennifer Manner, Office of Commissioner Abernathy

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# Delphi Radar Overview and Spectrum Policy Discussions

Steve Alland

3/30/04

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# Delphi Overview

- Leading Global Auto Supplier
- 2003 Sales: $28.1B
- 187,000 employees and 169 wholly-owned manufacturing sites worldwide
  - US (and Canada): 58,000 employees and 48 manufacturing sites
- World Headquarters in Troy, MI
- Product lines:
  - Chassis and Safety
  - Wireless
  - Powertrain Electronics
  - Integrated Body Electronics

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# Breadth of Product

## Integrated Body

Body Electronics
Climate Controllers
Head-up Displays
Instrument Clusters
Security Systems
- Vehicle
- Content

## Powertrain Electronics

Standalone & Engine Management System Controllers
- Engine
- Machine and Heavy Duty
- Powertrain
- Transmission

Intellek® Pressure Sensors
Power Modules
Semiconductors
Software

## Chassis & Safety

Antilock Brake Control
Steering Electronic Control
Suspension Electronic Control
**Forewarn® Collision Warning Systems**
- **Adaptive Cruise Control**
- **Back-up Aid**

Restraint Systems Electronics
- Occupant Sensing
- Recognition® Crash Sensing

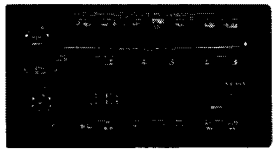
Occupant Protection Systems
- Air Bag/Seat Belt Systems
- Steering Wheels

## Wireless

Advanced Digital Audio
- Playback Devices
- Satellite Receivers

Amplifiers
Audio Systems
Communiport® Internet R@dio
Fuba® Advanced Antenna Systems

Hands-free Connectivity
Navigation Systems
PC Radios
Rear Seat Entertainment Systems
Receivers
Telematics Modules
Wireless Networking



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# Chassis and Safety Products Impact Automotive Safety

## CHASSIS and SAFETY

- National Highway Traffic Safety Administration (NHTSA) data for 2002 indicates:
  - 6.3 million police reported accidents
  - 3 million injuries
  - 42,000 deaths

- NHTSA estimates that in the year 2000, the economic impact of motor vehicle accidents, reported and unreported, reached approximately $230.6 billion

Source: National Highway Traffic Safety Administration, Traffic Safety Facts 2002 (January 2004)

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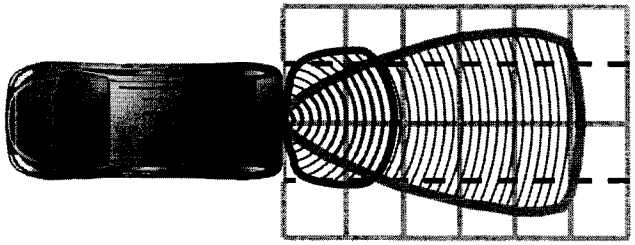
# Delphi is the Only Current Supplier of *Automotive* Short Range Radar (SRR)

## Delphi Radar Products: over 300,000 delivered to date

### Short Range Radar (SRR)

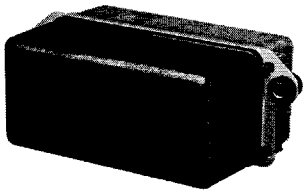
17 GHz Single Beam Radar Sensor

Controller

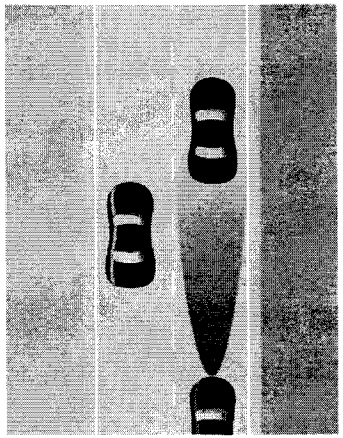


- Back-Up Aid (BUA) Radar
  - Production started CY2001
  - Current generation is at 17 GHz
  - Next generation at 24 GHz in development

### Long Range Radar (LRR)



76 GHz Forward Looking Radar and Controller



- Adaptive Cruise Control (ACC) Radar
  - Production started CY1999
  - Current generation is 76 GHz

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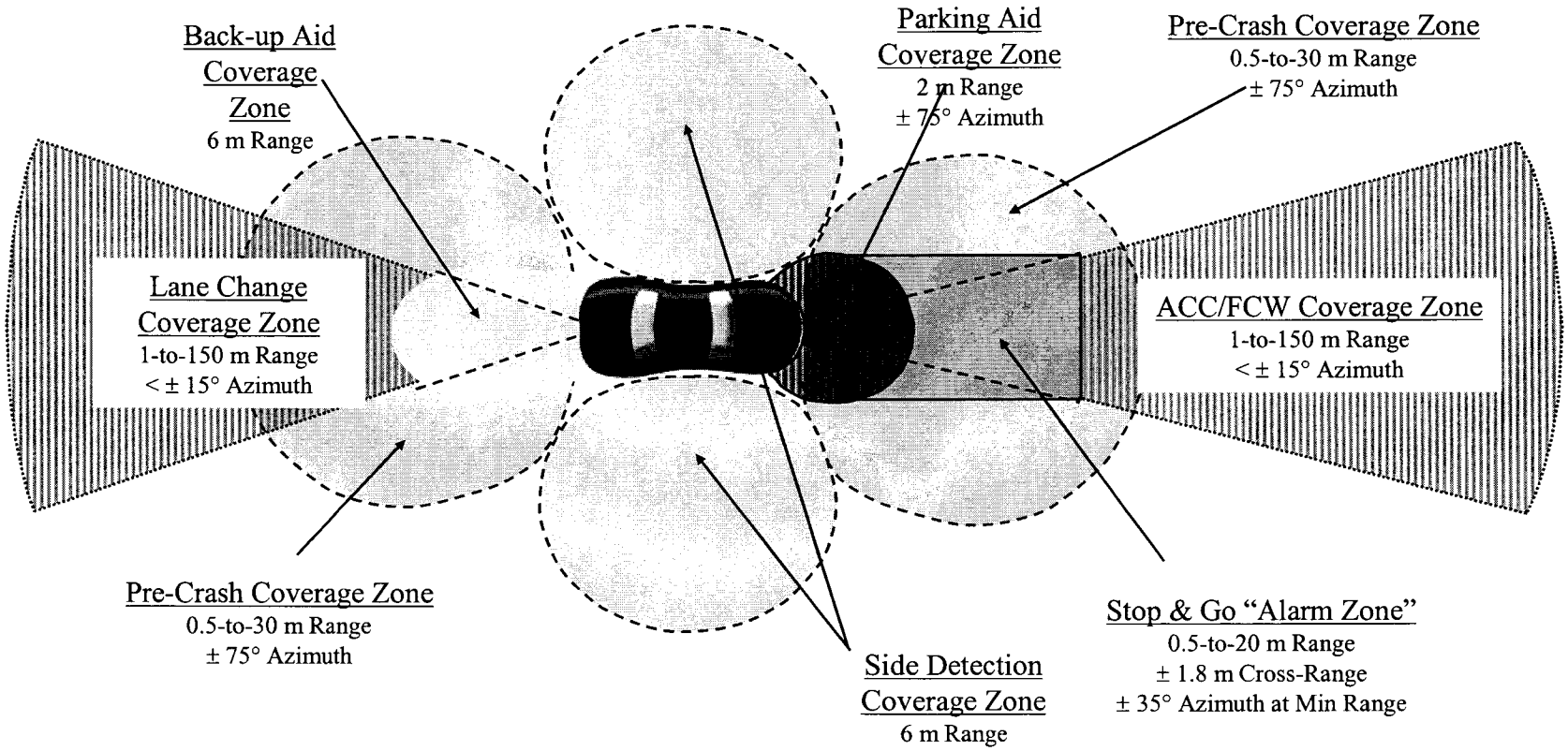
# Automotive Radar Applications




- Sensor requirements depend on the application
- A combination of short range, mid range, long range and/or multi-mode sensors is needed

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# Automotive Radar Spectrum Needs Depend on the Application

- Long Range Radar
  - Attributes include long range, narrow angle coverage, narrow beams, precision angle, small size and low cost ($250 to $500)
  - Spectrum needs include W-band with moderate ERP and moderate bandwidth
    - » Antenna size too big at lower frequency for narrow beams
    - » Technology not adequately developed above W-band

- Short Range Radar
  - Attributes include short range, wide angle coverage, wide beams, precision ranging, small size and lowest cost (<$100)
  - Spectrum needs include K-band with very low ERP and wide bandwidth
    - » Higher frequency too expensive (even beyond 2014)
    - » Radar architecture for wide angle coverage at higher frequency amplifies the cost differential

# Spectrum Policy

- U.S. spectrum policy can and should encourage the deployment of automotive radars
  - Make adequate spectrum allocations
  - Establish priority of use
    - » Unlicensed should not mean unprotected
    - » Widespread use of automotive radar (safety) devices will require protection levels higher than “unlicensed”
  - Provide flexibility in rules whenever possible
  - Avoid abrupt dislocation
    - » Emerging products in an emerging marketplace cannot tolerate engineering costs to adjust for significant disruptions
    - » “Temporary” allocations can kill this (presently fragile) business

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# Delphi Position Summary
# UWB (ET Docket 98-153)

- Use of Phase Modulation (PN DS BPSK Non-Pulsed Waveform) has been established
  - Proposed rules regarding regulation of duty cycle are not applicable
- Elimination of Minimum Bandwidth Requirement
  - "Narrowband" UWB has lower potential for interference than wideband UWB
  - Would allow development of more optimal, lower cost systems
- Adoption of peak-average power rule
  - Part 15 C transmitters should be allowed peak power levels that UWB devices enjoy
- Certification procedures
  - Un-modulated carrier leakage is present in all pulse and DS-BPSK UWB devices

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# Interference Temperature (ET Docket 03-237)

- Do not introduce in bands used by automotive radars on an experimental basis:
  - 17 GHz, 22-29 GHz and 76-77 GHz
- Automotive radars provide critical safety benefits
  - "Smart radio" techniques not applicable
  - Radars must be operable whenever vehicle is operable because its a safety device
- Interference temperature may be applied to automotive radar bands in the future
  - After initial experiments show efficacy
  - To promote band sharing
  - Band sharing must be accounted for in the automotive radar designs *a-priori*

# Future Considerations

- Use of 76-77 GHz Band by Space Research and Radio Astronomy Services (ET Docket 03-102)
  - 76 – 77 GHz automotive radars are widespread throughout the world
  - Delphi is concerned with allocation of Radio Astronomy as a primary service and Space Research as a secondary service
- Use of 77-81 GHz Band for mid/long -range automotive radars
  - Supports future high performance radars / safety systems
- Short range radar deployment in the 22-29 GHz Band
  - Delphi recognizes potential difficulties between 24 GHz UWB and the EESS service
  - A “minimal change” solution for minimum disruption is sought
  - Use of 77 – 81 GHz is inappropriate for SRR both technically and economically