DEDICATED SHORT-RANGE COMMUNICATIONS (DSRC) AND SPECTRUM POLICY

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Agenda

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I. Dedication of 5.9GHz DSRC

- FCC Report and Order FCC 99-305 allocated 75 MHz of spectrum in the 5.9 GHz DSRC band
- The FCC noted the benefits of DSRC “…to improve traveler safety, decrease traffic congestion, facilitate the reduction of air pollution, and help to conserve vital fossil fuels.”

- Original FCC spectrum allocation in 1999; FCC amended allocation in 2004 and 2006
- FCC refreshing the record in 2016
  - Updates to sharing proposals
  - Solicits equipment for testing
II. Basics of DSRC

- **What it is**
  - Low latency medium adapted for a highly mobile vehicle environment

- **How the technology works**
  - Data can be distributed in a broadcast mode (300m range – line of sight)
  - Peer-to-peer data exchanges
  - Engineered to work well in a moving vehicle environment
II. Basics of DSRC

- **Packet-based** medium based on **IEEE 802.11** specifications for lower-layer definition
- Additional **network** layer definitions and a **cryptographic** process for establishing trust and protecting confidentiality given in **IEEE 1609 family**
- **Payload** definitions and performance requirements for common data units established in **SAE standards**
- General **IP transport** available with certain **priority** requirements and packet **size** limitations

Source: FCC Report and Order FCC 03-324
III. DSRC Eco-System

- **Technical Maturity**
  - Physical Medium (802.11p-wireless local wide area network (LAN) Standards
  - SAE Data Standards—Dictionary, Message Sets
  - SAE Performance Standards

- **Technical Efficiency**
  - Band Plan supports a highly mobile environment (low latency, multi-path resilience, no association times)
  - Appropriate research into noise/interference allow applications to account for noise above and below the band

- **Policy and Institutional**
  - Band Plan allows for:
    - High density per second per square kilometer
    - Innovative use of spectrum: broadcast + peer-to-peer modes
  - User requirements are met:
    - Trust and Authentication
    - No subscription fee
    - Privacy, Security
  - Institutional requirements are met:
    - Aligns with regulatory constraints
    - Achieves co-existence with other primary users
    - Achieves appropriate level of international harmonization
IV. Objectives

**DSRC-ONLY Applications:**
Applications that cannot be replicated by any current, known vehicle-resident sensor- or camera-based systems:

- **V2V:**
  - Intersection Movement Assist (IMA)
  - Left Turn Assist (LTA)
  - Emergency Electronic Brake Light

- **V2I:**
  - Red Light Violation Warning
  - Curve Speed Warning
  - Reduced Speed/Work Zone Warning

- **Automation**
  - High-speed Platooning
V. Today’s Challenges

- **Market Challenges:**
  - Growing consumer demand for mobile entertainment and personal applications

- **Sharing Challenges:**
  - Executive/legislative branch interest:
    - President/White House interested in freeing up spectrum and/or sharing
    - Congressional interest in spectrum usage and spectrum policy
  - Sharing concepts need to be tested
    - Chip manufacturers have not yet tested processes to implement sharing
    - Some industry organizations want to divide the spectrum, not share
VI. USDOT Spectrum Sharing Position

- USDOT and industry has made considerable investment in life-saving technologies—on the cusp of becoming an everyday use
- Spectrum sharing has introduced a new challenge
- USDOT is not opposed to spectrum sharing:
  - With the condition that unlicensed devices provide interference-free operations of crash-avoidance safety systems in real-world conditions
- FCC’s Rule (Part 15):
  - The Nation’s deployment preparations are dependent upon FCC and NTIA enforcing Part 15—unlicensed devices must not interfere with licensed services
- NHTSA has submitted an NPRM on V2V communications to OMB
## VII. USDOT Research Efforts

<table>
<thead>
<tr>
<th>1. RESEARCH AND MEASUREMENTS</th>
<th>2. MODELING TO DEFINE SPECTRUM &amp; CHANNEL USAGE</th>
<th>3. INTERNATIONAL COORDINATION</th>
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<tbody>
<tr>
<td>• Noise and Interference</td>
<td>Models have to account for:</td>
<td>• Participating in the Agenda Item introduced by the Asian-Pacific Telecommunity (Working Party 5A, Item 1.12)</td>
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<td>• Emission Limits</td>
<td>• Message Size &amp; Frequency</td>
<td>• Also, ITU is recognizing DSRC (IEEE 802.11p) as a “radio access technology that plays an important role in the emerging 5G architecture--USDOT working to identify how DSRC standards become part of the architecture</td>
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<td>• Multi-Path</td>
<td>• Geographic layout and coverage that supports both broadcast and peer-to-peer exchanges without interference</td>
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<tr>
<td>• Indoor/Outdoor</td>
<td>• Noise + interference + multi-path</td>
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### Outcomes:
- Provides data-based conclusions on sharing feasibility
- Provides conclusions about:
  - How much of the spectrum will be used and when
- Allows ITS community to ensure a future path without disruptions

### 4. COMMUNICATIONS & PUBLIC OUTREACH

- **Meetings and workshops**
- **Public Presentations:** ITS World Congress
- **Reports:** Analysis of test results
VIII. DSRC Related Research Reports

- Vehicle-to-Vehicle Communications: Readiness of V2V Technology for Application

- DSRC Technology and Application – Report to Congress

- DSRC Test Plan

- DSRC Licensing and Spectrum Management Guide
IX. FCC Record Refresh for 5.9 GHz

- Federal Register Notice
  - [https://federalregister.gov/a/2016-13510](https://federalregister.gov/a/2016-13510)
  - Published on June 7, 2016
  - Comments provided by July 7, 2016
  - Reply comments provided by July 22, 2016

- Testing Approach Outlined
  - Devices submitted to FCC in August/September 2016
  - Three phases of testing:
    - Phase I: Laboratory testing—FCC has devices now
    - Phase II: Basic field research with devices—USDOT is working with partners to establish the research sites
    - Phase III: “Real-world” scenario testing
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