



A leader in RFID

Emerging DSRC Technology

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Agenda

- Sirit Technologies and Radio Frequency Identification Background
- DSRC Industry Consortium “DIC”
- 5.9 GHz DSRC - Definition and Tolling Viewpoint
- DSRC Industry Players
- Need and Uses regarding Vehicle Safety and Mobility
- A New Form of Communications
- Regulatory and Frequency Allocation
- Standards under Development
- Issues being Worked
- DSRC Outlook and VII Program Plan
- Realistic Scenario - OBU and RSU Implementation
- Summary

Sirit & Radio Frequency Identification (RFID) Background

- Located in Toronto, Canada, Loughborough, United Kingdom and Dallas, Texas
- 10 years experience in developing and providing RFID readers and tags products in:
 - E-Commerce (13.56 MHz)
 - Supply Chain Logistics (ISO 18000 / EPC, 868-928 MHz)
 - Tolling and Parking/Access Control, E-470 in Colorado and Title 21 in California (915 MHz)
 - DSRC Technology (5.9 GHz)

DSRC Industry Consortium “DIC”

- Sirit is a participating member in the DSRC Industry Consortium Prototype Development with Mark IV, Raytheon and TransCore
 - Sirit is responsible for the Test Lead
- Sponsored by U.S. DOT (FHWA), administrated by ARINC and coordinated by Highway Electronics
- Other DSRC industry activities involve:
 - Federal DOT
 - Technical implementation, Prototype, Business planning, Policy, Outreach & Test Program
 - State DOTs
 - Vehicle Infrastructure Integration (VII) /National VII Coalition
 - First public workshop in San Francisco (February 2005)
 - OmniAir (certification/application)
 - IBTTA and ITS America

5.9 GHz DSRC

- DSRC (WAVE mode) = Wireless Access Vehicular Environment using Dedicated Short Range Communications
- DSRC has different regions meanings in transportation industry
 - North America (5.9 GHz)
 - Europe (5.8 GHz, CEN TC278)
 - Asia (Japan, 5.8 GHz/ARIB T75)
- Uses IEEE 802.11 Chipset Technology “Wi-Fi” and provides wireless communication in linking the business, home and car
- Major focus around Highway Safety and Mobility
- From standpoint of Tolling Industry, 5.9 GHz is:
 - ‘Tag’ of the Future in 2010 Decade
 - Probably built-in (device) versus added-on (tag)
 - Standardized Technology
 - Requires new In-lane Equipment
 - Non-interference = simple, graceful migration
- U.S. DOT could “MANDATE” the Technology for Safety

DSRC Industry Players



Need and Uses

Safety and Mobility

- New system is needed to reduced fatalities (42,000 annually) and relieve increasing traffic congestion
- U.S. DOT's Priority one is "Intersection / Road Departure Collisions" Prevention
 - Other high priorities include collision avoidance, crash responses and vehicle based safety data
- VII (vehicle infrastructure integration) team identified ~110 use cases in public safety, vehicular mobility, consumer and commercial applications like
 - Traffic Probe Data, Emergency Braking Notification, Intersection Signal Violation Warning, Weather Advisory and Private Service
- New Information Services to Customers: Traffic, Precise Maps and Weather

A New Form Of Communications

What is it for?
plus a whole new range of vehicle communications uses

Featuring:

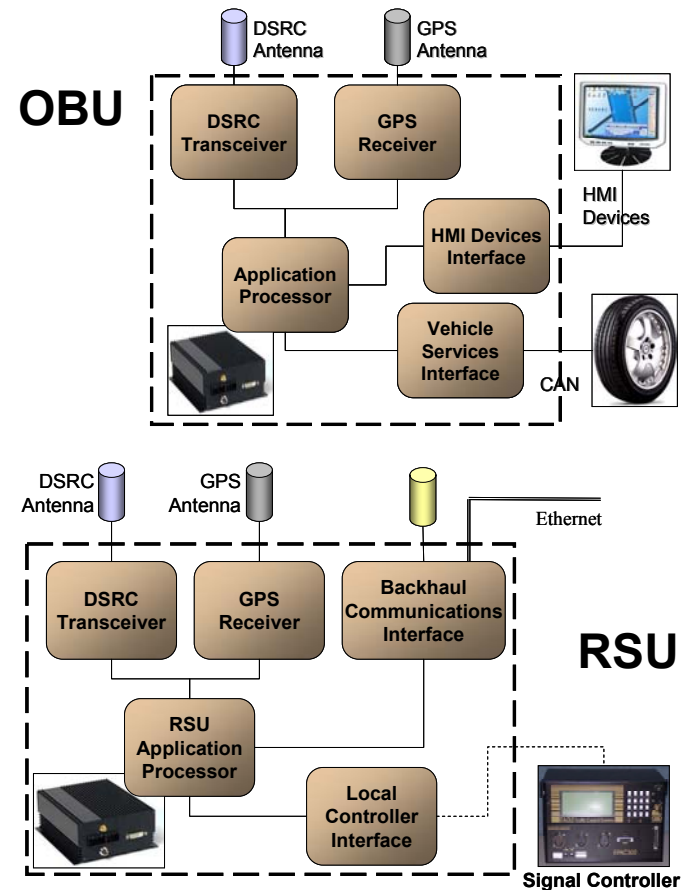
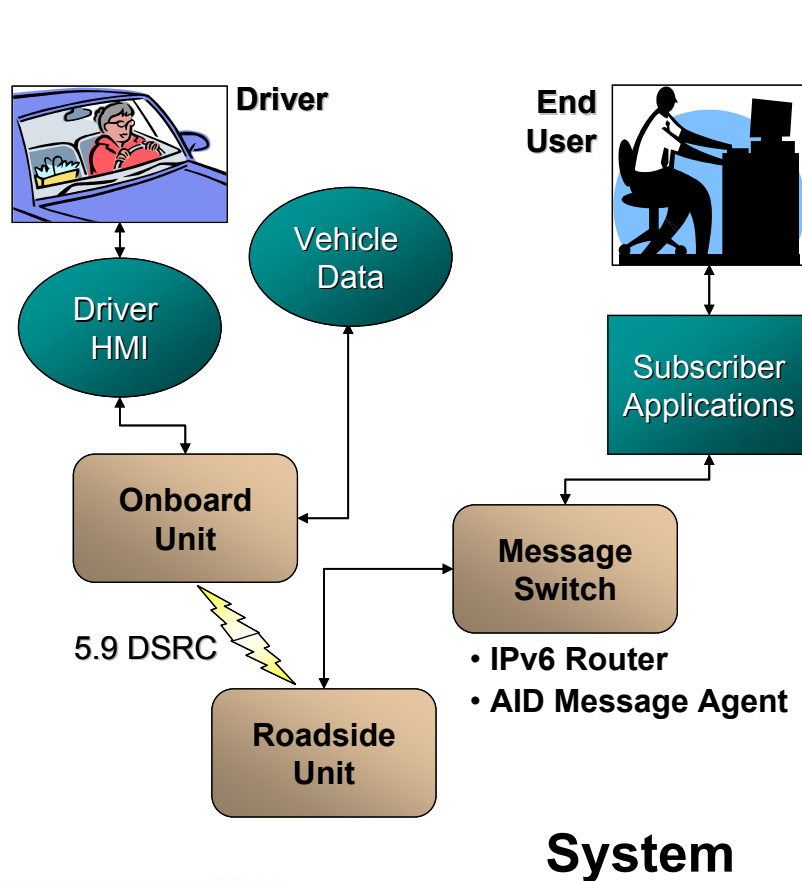
- Vehicle to roadside
- Vehicle to vehicle
- Mobile connection (up to 120mph)
- Very high data rates (up to 27 Mbps)
- High Availability & Low Latency (50ms) Prioritization Service
- Very long range (300m nominal, up to 1000m)
- Modem for any on-board device (IVN) or network (IPv6)

Existing DSRC (e.g. Toll tags)

Used for:

- Signage
- Collision avoidance
- Fee collection
- Internet access
- (And many others)

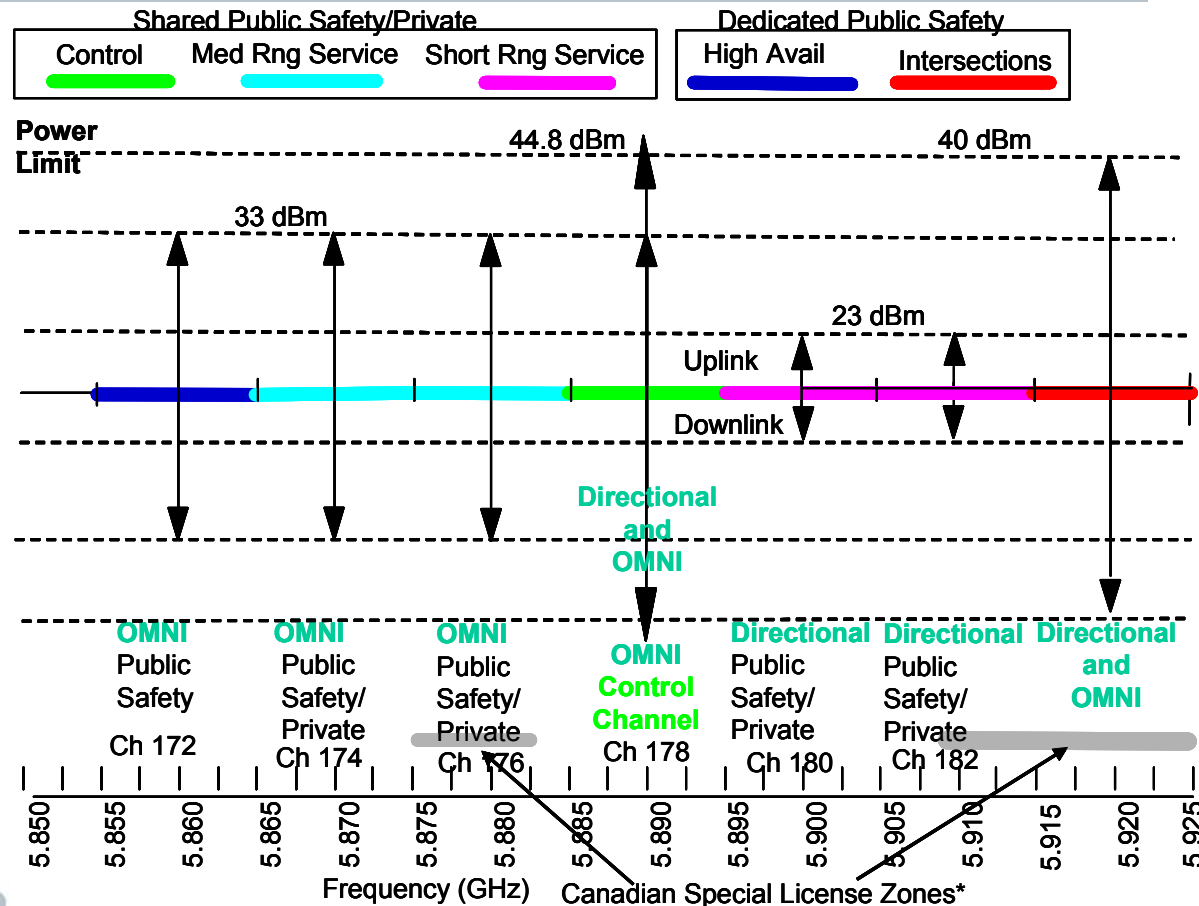
System Architecture & Components



Regulatory

- Allocated 5.825 - 5.925 MHz with seven 10 MHz channels
 - * Dedicated Primary Use *
- Public safety and private applications
- Governed by Use of standards
- OBU (vehicle): License by rule
- RSU (roadside unit): Geographic license with site registration through frequency coordination

Frequency Allocation



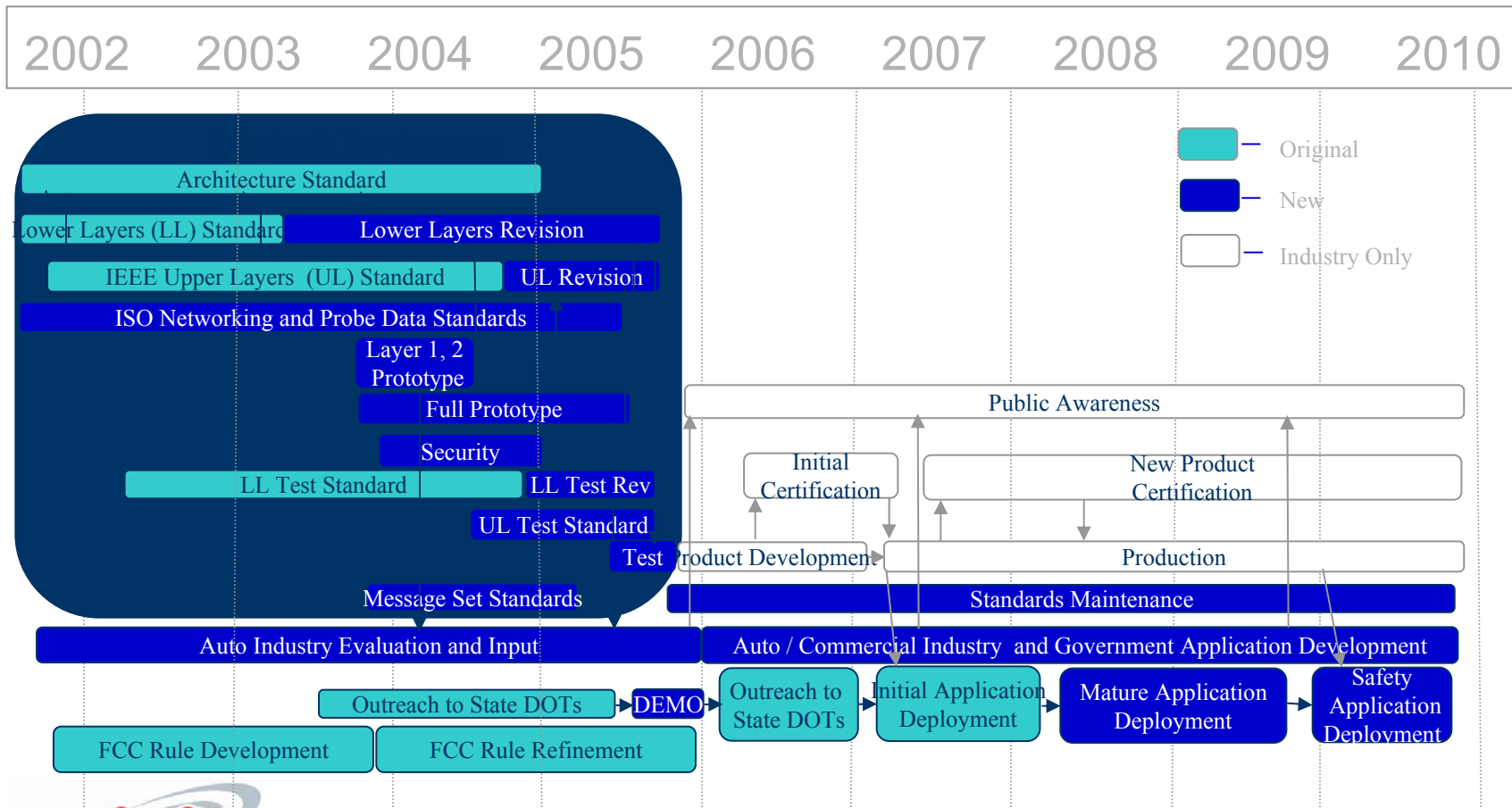
Standards under Development

- ASTM 2213 Physical Layer (Original)
- IEEE 802.11p Physical Layer
- IEEE 1609.1 Resource Manager
- IEEE 1609.3 Network Services (Channelization)
- IEEE 1609.4 Prioritization
- IEEE 1556 Security
- SAE xxx Message Set & Data Dictionary

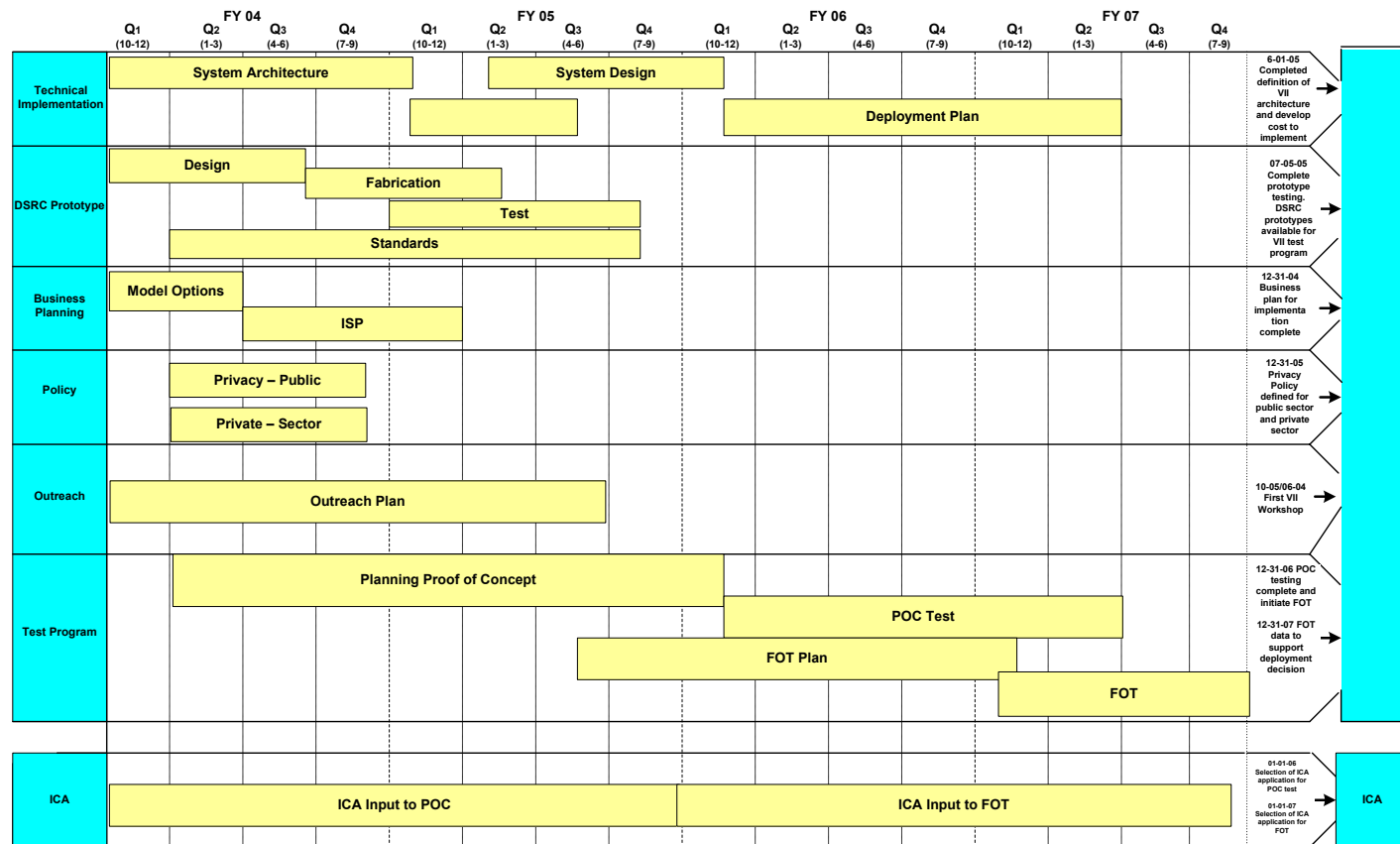
Issues Being Worked

- Security & Privacy
 - OBU Address Randomized (prevents tracking and gives anonymity)
 - Licensed Transmitters
 - Authenticated RSU Application Announcements (prevents bogus messages)
 - Link Level Encryption (prevents eavesdropping)
 - Certificate Authentication
- Network Management (Availability, Data access/ownership)
 - No Data Retention
 - Authorized end users
- Certification and Applications
- Policy (Privacy, Liability & Data Ownership)
- Nationwide Capability, Deployment and Long Term Stability

DSRC Outlook



Vehicle Infrastructure Integration Initiative Plan



Source: <http://www.its.dot.gov/initiatives/initiative9.htm>

Realistic Scenario - OBU & RSU Implementation

OBU (Vehicle):

- Assumption: Mid-2008 Deployment Decision by Automotive OEMs
- Normal OEM design/implement cycle: 3 years
 - Some indications this could happen in 2 years
 - Therefore, first vehicles could appear in 2010

RSU (Roadside):

- Assumption: Mid-2008 Deployment Decision by U.S. DOT
- First Safety Priority: Intersections
- Current Plan: Equip 400,000 intersections over 6 years starting 2009

Summary

- WAVE DSRC is Emerging Technology with Integrating Performance
- Standardized Technology & Product Availability for Large Scale Deployment for 2010 Decade
- U.S. DOT and Automotive OEMs will be the Decision Makers anticipated in 2008
- Multiple Uses in Vehicle / Public Safety and Commercial Applications
- Commercial Marketing / Advertisement Possibilities in the Vehicle
- Less Expensive and Real-time Response than current Satellite Systems
- Could be leveraged for ETC / Open Road Tolling Usage
- Leverage from 802.11 Wi-Fi and GPS Positioning Deployments