Rural ITS

Applications to Enhance Safety

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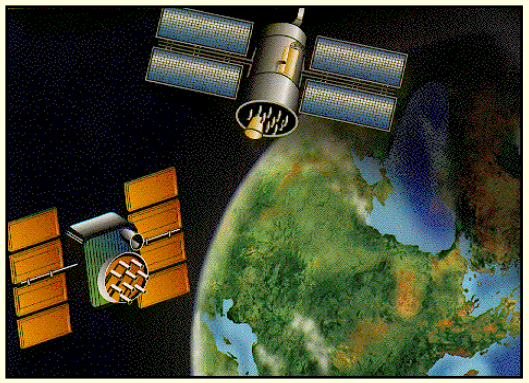
Outline

- ITS: definition and background
  - What worked well
  - Current/future initiatives
- Rural characteristics
- ITS safety applications
  - Regional examples
- A suggested approach to maximize benefits

ITS

Integrated applications of advanced sensor, computer, electronics, and communication technologies and management strategies to enhance safety, mobility, and efficiency of the surface transportation system



ITS

- Sensors
  - Weather
  - Traffic
- Communications
  - Fiber
  - Wireless
- Electronics
  - Dynamic message signs

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National ITS Program

- Operational tests (early 1990s)
  - Proof of concept
  - Develop/tailor technologies
  - Evaluate
- Deployment (late 1990s)
  - Field hardware
- Integration (current)
  - Seamless operations
  - National ITS Architecture

Current Major Initiatives

- Integrated Vehicle Based Safety Systems
- Cooperative Intersection Collision Avoidance Systems
- Next Generation 9-1-1
- Mobility Services for All Americans
- Integrated Corridor Management Systems
- Nationwide Surface Transportation Weather Observation System
- Emergency Transportation Operations
- Universal Freight Manifest
- Vehicle Infrastructure Integration (VII)

Rural Characteristics

- Longer distances
- Lower traffic volumes
- Higher speeds
- More commercial vehicles
- Drivers unfamiliar with the surroundings
  - Fewer alternative routes
- Weather has critical impacts
- Longer emergency response times
- Higher fatality rates than urban areas

Rural ITS

- Safety is a strong focus for rural ITS
- Program Areas
  - Crash prevention and security
  - Emergency services
  - Travel and tourism
  - Traffic management
  - Transit and mobility
  - Operations and maintenance
  - Road weather management

Rural ITS Safety Applications

- Speed Management
- Roadway Conditions
- Intersections
- Railroad Crossings
- Large Animal Crash Mitigation
- Work Zone Safety

Speed Management

- Spot treatment
- Example problem areas
  - Hazardous geometry
    - Steep grades
    - Sharp curves
  - Environmental conditions
    - Ice, high wind, fog
  - Work zone
  - Traffic congestion
  - Locations with known speeding problems

Downhill Speed Advisories

- Functions
  - Detect truck weight and speed
  - Display safe speed advisory
- System components
  - WIM
  - DMS
- Examples
  - Colorado, Oregon, West Virginia, Wyoming
- Challenges
  - Communications
  - WIM accuracy

Variable Speed Limits

- Display safe speed based on conditions
  - Environmental
  - Incidents
  - Work zones
- System components
  - Sensor
  - Communications
  - Control module
- Challenges
  - Legality
  - Driver response

Dynamic Curve Speed Warning

- Warns drivers approaching sharp curves at excessive speeds
- System components
  - Speed detection
  - Display (DMS)
- Examples
  - Oregon, California

Roadway Conditions

- Environmental conditions
  - Ice/snow
  - Poor visibility (fog)
  - Flooded roadways
- Road closure
  - Incidents
  - Weather

Automated Anti-icing Systems

- Detect ice formation and treat surface automatically
- System components
  - Ice detector
  - RWIS
  - Treatment system
  - Camera
  - DMS
- Challenges
  - Public perception

Poor Visibility Warning

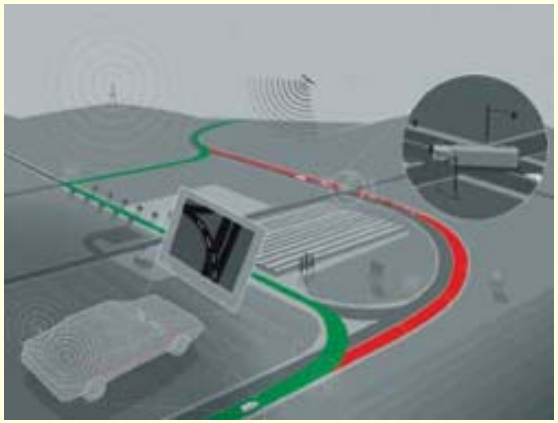
- Fog, blowing snow, blowing sand
- Detect visibility deterioration and provide warning to drivers
- System components
  - Visibility sensor (laser/radar)
  - Weather sensor
  - DMS
- Challenges
  - Timeliness of information

Intersections

- Low traffic volumes/high speeds
  - Hazardous intersections
- Missing or invisible traffic control devices
  - Environmental conditions
- Solutions range from advanced collision warning to in-vehicle signing

Collision Avoidance Systems

- Detect potential violations
- Display warning
  - Violating driver
  - Drivers on affected approaches
- Common in urban area signalized intersection applications
  - Red light running warning systems



Railroad Crossings

- Passive detection of trains
- Warn approaching drivers
- System components
  - Train detection
    - Radar/video
  - Display
    - DMS
    - In-vehicle
- Minnesota Guidestar evaluation
  - In-school bus RR signing

Work Zone Safety

- Systems falling under the Work Zone Safety include several applications
  - Speed Feedback Systems
  - Dynamic Speed Advisories
  - Safety Radar
  - Downstream Hazard Warning
  - Over-size detection

- Smart Work Zone technology combines several applications in one system

Animal Crash Mitigation

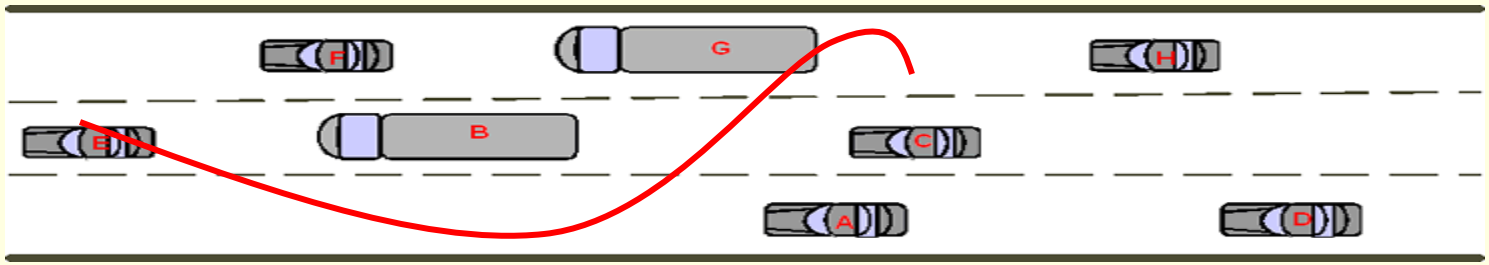
- System functions
  - Detect animal
    - Laser
  - Warn drivers
- Advanced in-vehicle warning
- Example applications
  - WTI pooled fund study
  - Washington State

Vehicle Infrastructure Integration (VII)

- Definition: The establishment of vehicle to vehicle and vehicle to roadside communication capability
- Purpose: To enable a number of new services that provide significant mobility, safety and commercial benefits
  - Cooperative Safety Systems
  - Active Probe Vehicles
  - Telematics
  - Mobility Management

VII Applications

- Cooperative Collision Avoidance Systems
- Integrated Vehicle-Based Safety Systems
  - Lane departure
- Vehicle Infrastructure Integration
  - Vehicle-to-infrastructure
  - Vehicle-to-vehicle



Other ITS Applications

- Maintenance and construction
  - Traveler information and 511
  - Enhanced snow plow operations
- Commercial vehicle operations
  - Electronic clearance
  - Inspection selections systems
- Emergency management
  - Evacuations
  - Incident management

Suggested Approach

- Map problem areas to potential ITS applications
- Follow the ITS architecture framework for planning and design
- Evaluate critical infrastructure
- Evaluate and document lessons learned
- Partnerships

Critical Infrastructure

- Communications – backbone of ITS
  - Requirements vary by application
    - Fiber (e.g., video applications)
    - Wireless
    - Dedicated short range radio
- Sensing devices
- Control and display devices
- Processing and management systems

Evaluation

- Technical
  - Did the application work
- Technological
  - Did the technology work
- Cost
- Institutional
- Lessons-learned

Questions/contact

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