



# FMCSA Safety and Security Accomplishments



Office of Research and Analysis

Washington, DC

January 22, 2006



U.S. Department of Transportation

**Federal Motor Carrier Safety Administration**



# Wireless Inspection Program Highlights

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# Outline

- ◆ Project Description
- ◆ Need for Improved Inspection Processes
- ◆ Comments from Request for Information
- ◆ Technology Assessment
- ◆ Concept Evaluation
- ◆ Recommended Solution
- ◆ Estimated Costs and Benefits
- ◆ Next Steps



# Overall Project Goals

- ◆ Develop alternative concepts to support commercial vehicle inspections
  - Improve the accuracy and efficiency
  - Allow for increase in total number of inspections completed
- ◆ Leverage advanced on-board sensor systems and wireless communication technologies
- ◆ Evaluate concepts relative to
  - Safety impacts
  - Estimated cost of implementation
  - Institutional and policy issues

# Current Inspection Activities



- ◆ 3 million roadside safety inspections each year
  - 45 minutes to an hour to complete
  - 1,200 fixed facility inspections stations
  - 1,000 portable/mobile units
- ◆ 73% Violation rate
  - 23% Vehicle Out-Of-Service rate
  - 7% Driver OOS rate





# Need for Improved Inspection Process

- ◆ Infrequent inspections
  - Average less than one per year
  - Many CMVs over 10,000 – 26,000 lbs rarely inspected due to operations
- ◆ Current inspection program directed at interstate carriers using tractor-trailers
  - 27% of all CMV fatal crashes involve straight trucks
  - 40% of all CMV crashes occur on secondary roads
- ◆ Inspection program challenged by both volatility and growth in the CMV sector
  - 3.3% annual growth for number of CMVs and VMT
  - 40,000 new entrants annually
  - In last 20 years, 1 million new tractor-trailers on highways



# Opportunities for Technology

- ◆ Analysis of historical inspection data reveals that a large portion of significant “defects” are limited to a few items
- ◆ With the exception of load-securement, most of the key vehicle and operator condition criteria lend themselves to on-board electronic monitoring and diagnostic assessment.

Driver Violations	% Driver OOS Violations
Logbook	40.0%
HOS	28.7%
CDL	19.4%
<b>Total</b>	<b>88.1%</b>

Vehicle Violations	% Vehicle OOS Violations
Brakes	41.2%
Lighting	16.6%
Tires	9.4%
Load Securement	15.7%
<b>Total</b>	<b>82.9%</b>

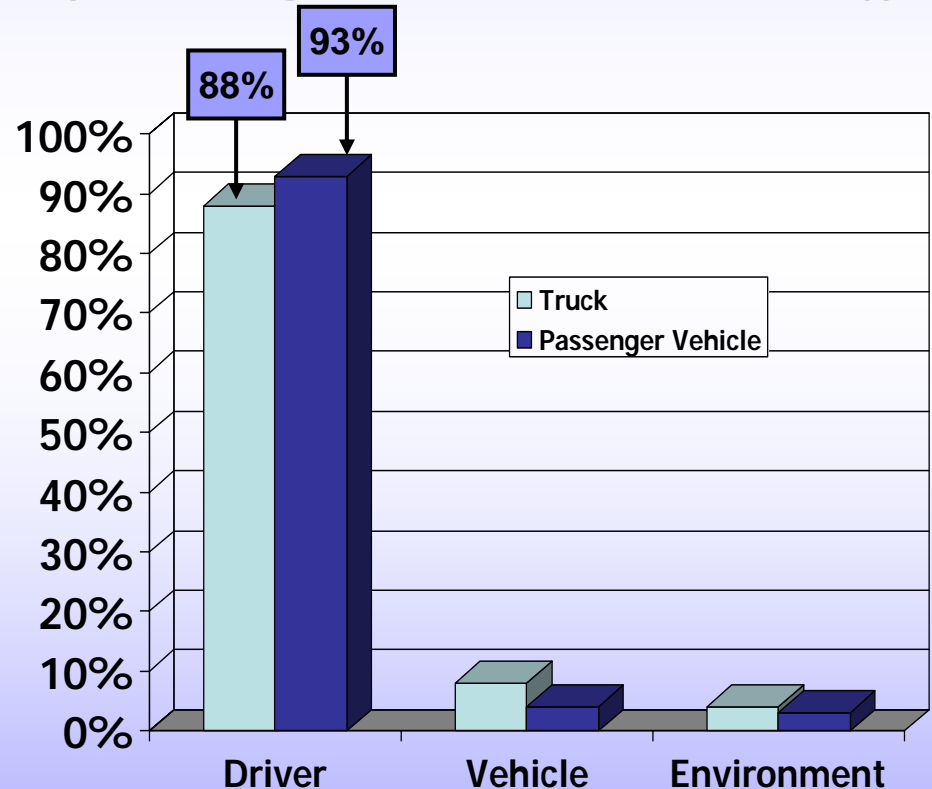
# Identification of Items to be Inspected



◆ Examination of CMV crash data also completed to help identify items that should be inspected

- Most crashes linked to driver error
- While “fatigue” is not directly cited as the “critical reason” for a crash, drivers were cited as being fatigued in a significant portion of CMV crashes
- Where a vehicle defect was the critical reason for the crash, brakes, tires and load securement issues were most often cited

Critical Reasons in  
One Truck-One Passenger Vehicle Crashes  
(FMCSA Large Truck Crash Causation Study)





# Request for Information Summary of Comments



RFI issued in September 2005: 27 respondents, including fleets, drivers, OEMS, safety advocacy groups, and the enforcement community

Type of Respondent	Number of Responses
Vehicle OEMs and Suppliers	9
Fleets/Motor Carriers	1
State Enforcement/Inspection Agency	2
Industry Associations/Advocacy Groups	7
Transportation Research Centers	2
Private Party/Individual	6
<b>Total</b>	<b>27</b>



# RFI Responses

- ◆ Communication Standards/Protocols
- ◆ Data Concerns
  - Security, integrity, privacy
- ◆ Data Message Content & Structure
- ◆ End-User Concerns
  - Operator resistance, electronic falsification, O&M
- ◆ Inspection Frequency Level to Change Behavior
- ◆ Implementation Strategies to Equip Every CMV



# Technology Assessment

- ◆ Most Viable Option for Wireless Inspection Concepts
- ◆ Dedicated Short-Range Communication (DSRC) at 5.9 GHz
- ◆ 5.9 GHz DSRC has significant advantages:
  - Designed for vehicle-to-infrastructure communications and has high data rates up to 27 Mbps
  - Can support many other safety and “convenience” applications



# Concepts of Operation Evaluation

## ◆ Deployment-based

- Fixed, mobile, virtual, remote, kiosk, etc.

## ◆ Data Message Set-based

### ■ Basic

- Driver – License number and log book information
- Vehicle – Fault codes

### ■ Enhanced

- Driver – Fatigue warning, lane tracking, and collision-avoidance systems
- Vehicle – Brake sensors, tire pressure monitoring



# Recommended Wireless Inspection Solution

## ◆ Driver and Vehicle Basic

### ■ Driver Basic

- Driver identification, CDL status, and log info

### ■ Vehicle Basic

- Fault codes



# Wireless Inspection Concept Deployment Plan

- ◆ State and Federal Government
  - 1,200 fixed facility inspection sites
  - 1,000 virtual inspection stations
  - 500 mobile inspection vehicles
  - IT infrastructure (roadside to back office systems)
- ◆ Motor Carrier Industry
  - All CMVs equipped with DSRC and on-board computers



# Estimated Costs

- ◆ Public sector annual costs of \$45M – \$76M
- ◆ Private sector annual costs of \$224M – \$395M
  - \$533 – \$940/vehicle
  - 420,000 new vehicles equipped per year



# Benefits Assumptions

## ◆ Dramatic Paradigm Shift

- Electronic safety checks will be frequent and expected
- Number of unsafe CMV drivers and vehicles on road would be reduced
- Crashes related to unsafe CMV drivers and vehicle defects would be reduced

## ◆ Size & weight program comparison

	CMV Size & Weight Program	CMV Safety Inspection Program
Number of Inspections	82M	3M
Violation Rate	0.63%	73%





# Benefit-Cost Analysis

## ANNUAL BENEFITS

Annual Lives Saved	253
Annual Injuries Prevented	6,192
Total Annual Benefits (\$)	\$1.7B

## ANNUALIZED COSTS

<b>Government</b> —Facility, Equipment, IT, Communications Capital Costs (Amortized over 10 years)	\$22M – \$34M
<b>Government</b> —Facility, Equipment, IT, Communications O&M Costs	\$23M – 42M
<b>Industry</b> —Annual Incremental CMV Costs (Based on 420,000 units/yr) (\$533 - \$940/CMV)	\$224M – \$395M
Total Annualized Cost	\$269M – \$471M

## BENEFIT/COST RATIO

High – Low	6.17:1 – 3.51:1
Average	4.84 : 1



## Next Steps

- ◆ Conduct proof of concept field tests
- ◆ Develop data interchange and message set standards
- ◆ Partner with states and motor carrier industry to resolve institutional issues
- ◆ Coordinate with ongoing testing and deployment programs (e.g., CVISN grants, I-95 Corridor Coalition efforts, Vehicle Infrastructure Integration program)
- ◆ Investigate broader DSRC applications for trucks and buses