







## CDM Smith Experience – Smart Freight Technology

# CDM Smith staff has been Developing Concepts and Prototypes to Improve Freight Efficiency and Safety for trucking operations for more than 20 years.

- Kansas City Cross Town Improvement Project
- Memphis Drayage Optimization
- Freight Advanced Traveler Information (FRATIS) Ports
- FRATIS Prototype Dallas/Fort Worth
- FRATIS Prototype Miami
- I 81 Corridor Freight Information System ConOps
- Port of Los Angeles Eco-Drive, GEOSTAMP, FRATIS extension
- Columbus Smart Cities Truck Platooning

### (FRATIS-P)

Freight Advanced
Traveler
Information
System + Truck
Parking







# Opportunity for Improvement









# Question asked by a Truck Driver...







# Methodology to answer the question

- Leverage existing data streams between existing public and private sector systems
  - Create a collaborative systems environment
  - Minimize the need to build a system from the ground up
  - Keeps costs low and provide for a higher rate of return on the investment
- Deliver FRATIS-P on multiple types of devices
  - Cell Phone, Tablets, Telematic Devices
  - Incentivize the adoption and use of the system
- Integrate the planned technologies with public sector ITS and sensor information systems
  - Available in current highway system
  - Lower costs and increase ROI on investment







# Integration of ITS Data

### Regional ITS Data

#### Sources

Port Authorities

Enforcement

Service Patrols

Agencies

- Regional 511
   Systems
- MPO
- State DOT
- Cities

#### Types

- Real-Time Freeway Speeds and Volumes
- Real-Time Key Arterial Speeds and Volumes
- Incident Information
- Road Closure Information
- Route Restrictions/Bridge Heights

### Future U.S. DOT Connected Vehicle Data

- Road Weather Management Route Specific Conditions and Forecasts
- "Probe Data" From V-V and V-I Connected Vehicle Technologies
- V-IV & V-I Safety Applications Data

### Third Party Truck-Specific Movement Data

- Real-Time Speed Data from Fleet Management Systems GPS Data
- Cell Phone and/or Bluetooth Movement/Speed Data
- Truck Parking Availability

### Regional Public-Private Partnership

### **Data Integration**

Public Sector



Private Sector

### FRATIS IT Toolkit

- ConOps, Architecture, Use Cases
- FRATIS Baseline API's
- FRATIS Baseline Web and AED Apps
- FRATIS Testing Best Practices Guide and Performance Criteria
- · FRATIS Business Plan

#### Intermodal Terminals Data

- Queue Length (Including Video)
- Container Availability Status

### FRATIS Basic Applications

- Dynamic Travel Planning and Performance
- Intermodal Drayage Operations Optimization
  - Based on Open Source Data and Services

#### FRATIS Commercial Applications

- Dynamic Travel Planning and Performance
- Intermodal Drayage Operations Optimization
  - Value Added Services with Target Markets (For Profit)



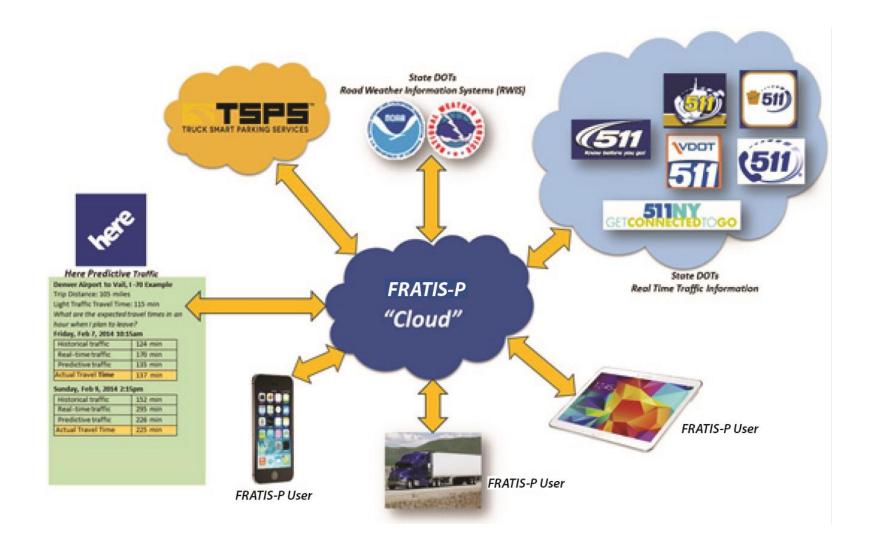
➤ API's and/or Web Services

USDOT Open Source Web Portal





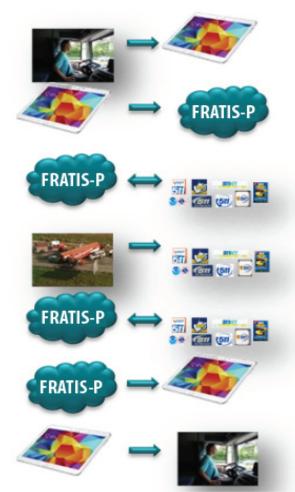
## I-81 FRATIS-P "Cloud"







# FRATIS Deployment with FMCSA "One Button" Rule



Truck driver launches application to choose destination and route

Application requests travel information from FRATIS-P

FRATIS-P retrieves and returns current information for the driver's chosen route

An event occurs and information is captured by existing systems

FRATIS-P continuously polls existing systems and retrieves event information

FRATIS-P evaluates options for diversion/ parking and pushes to application

Application notifies driver and dispatcher of options/implications





# Example Truck Parking Reservations...... Predictive Algorithms Provide Best Solution

### Truck Traveling on I-81 Driver Receives Push Notifications · Current ingate status · Number of spaces available · Predicted ingate status · Truck Stop amenities Current Terminal Turn Time · Availability or reservations Predicted Terminal Turn Time Other parking facility information · Time/distance remaining in trip Incident and Weather Warnings Uses Predicted Travel Application Time/distance to parking facility · Hours of Service left in trip Makes a decision to reserve parking reservation or continue to terminal (d) = (q) (u) (q) **I-29/I-435** (q) T . (q) Predictive Travel Algorithm







## **FRATIS Available Services**

- Truck Parking information Services (TPIS)
- Truck Alternate Routing Services (TARS)
- Truck Travel Predictive Services (TTPS)
- Truck Road Weather Travel Services (TRWTS)

(FRATIS-P)

**Parking** 

Freight Advanced Traveler Information System + Truck







## **FRATIS Available Services**

### Truck Parking information Services (TPIS)

- Network of commercial and public facilities
- Real-Time Information on availability
- Truck Parking Reservations
- Information on availability pushed to driver

## Truck Alternate Routing Services (TARS)

- Truck-specific GPS navigation solution that accounts for truckrestricted and prohibited roads
- Provide safe and reliable navigation around congestion and accidents







## **FRATIS Available Services**

### Truck Travel Predictive Services (TTPS)

- Predicts travel distance and arrival time and distance based on:
  - Driver's current location
  - Current traffic conditions
  - Historical traffic patterns
  - Estimated hours of service remaining
  - Considers persistent trends (seasons, holidays, and months)
  - Temporal trends (construction)
  - Dynamic trends (weather)

### Truck Road Weather Travel Services (TRWTS)

- Pushes road weather link-specific information to drivers
- Provides road weather alerts and warnings within a short time horizon of adverse conditions







## Benefits to Trucking Companies and Drivers

- Improve productivity and efficiency of the fleet
- Empower drivers with real-time information for faster and better decisions
- Generate near optimal truck planned work itinerary taking into consideration travel times with traffic, waiting times at the terminal, weather conditions, etc...
- Drivers will be able to navigate to their destinations and be rerouted in case of heavy traffic, incidents and congestion in their current route







## **Public Benefits**

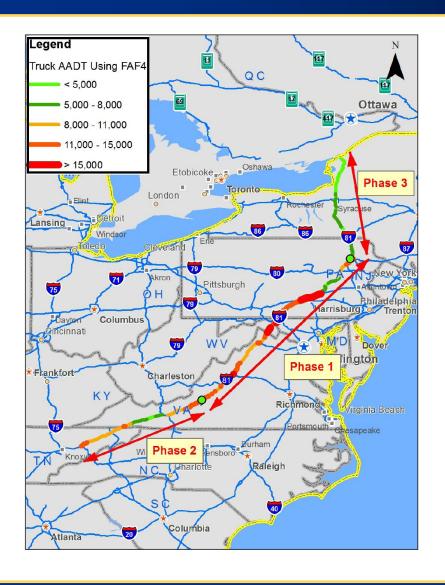
- Improve air quality and traffic operations
- Provides a platform to support economic development in the region
- Improve quality of life of the region
- Better utilization of existing infrastructure and capacity
- Provides capabilities for safer routes for trucking operations







# I-81 FRATIS-P System Implementation Phases



### **Three Phases:**

- Phase 1: Roanoke, VA to Scranton, PA
  - 411 miles
- Phase 2: Roanoke, VA to Junction I-40 and I-81
  - 225 miles
- Phase 3: Scranton, PA to Thousand Islands Bridge
  - 231 miles







# **Funding Options**

- National Highway Freight Program (\$14.8M/yr.)
- FASTLANE Grants
- TIGER Grants
- CMAQ
- Technology and Innovation Deployment Program
- Accelerated Innovation Deployment Demonstration (AID)
- Advanced Transportation and Congestion
   Management Technologies Deployment



Fastlane Grants
Source:
Transportation.gov







## Questions

# Questions?

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# Scenario Planning Tool for Transportation Technology

- Provides the criteria and process to develop a business case to support the deployment and use of transportation technologies
- The tool will also drive a behavioral change in the decisionmaking process within the transportation industry's management to adopt and use ITS
- Columbus Smart City

