I-95 Vehicle Probe Project
Traffic Monitoring System

Missouri Traffic and Safety Conference
May 16, 2012
Agenda

• Vehicle Probe Project Overview
• Data Quality and Validation
• Applications of the Data
• Next Gen VPP
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I-95 Coalition Background

... an alliance of transportation agencies, toll authorities, and related organizations, including law enforcement, from the State of Maine to the State of Florida, with affiliate members in Canada.

... provides a forum for key decision and policy makers to address transportation management and operations issues of common interest.

www.I95Coalition.org
VPP Timeline / Milestones

- 2006: Project planning begins, RFIs
- 2007: RFP Process, INRIX selected
- 2008
  - Service Starts July
  - NJ and NC Statewide Expansion
  - Initial Validation
- 2009 & 2010
  - PA & FL Expansion
  - SC & MD Statewide Expansion
  - Monthly Validations
- 2011
  - Contract Extended to 2014
  - VA, FL (East Coast), GA, RI Expansions
  - States pay 50% of core coverage and all expansions
- 2012 – Next Gen VPP
I95 Vehicle Probe Project

- Initial Coverage in July 2008
  - 1500 Freeway miles
  - 1000 Arterial miles
  - New Jersey to North Carolina

- Expansions
  - All NJ Freeways (500 miles)
  - All NC Interstates (1000 miles)
  - All SC Freeways (1000 miles)
  - Florida (500 miles)
Current Contracted Coverage – Oct 2011

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<td><strong>2483.9</strong></td>
<td><strong>4579.5</strong></td>
<td><strong>7063.4</strong></td>
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VPP Services

- **Monitoring Site**
  - [http://i95.inrix.com](http://i95.inrix.com) (agencies only)
  - ~ 450 officials in corridor have access

- **Data Feed**
  - Real-time access for integration into applications (published I/F Guide)

- **Data Archive**
  - 5 minute archive available through monitoring site

- **Traffic Tile Overlay**
  - Traffic flow image only to layer on agency maps (defined in I/F Guide)

- **VPP Suite (NEW)**
  - Real-time and historical tools for ops and planning
Benefits of the VPP

• Real-Time Traffic Monitoring
  ➢ Pay once everyone use
  ➢ Cross border travel times

• Managed by the I-95 Coalition
  ➢ Central admin / procurement mechanism
  ➢ Comprehensive validation
  ➢ Aggressive pricing

• Liberal data licensing agreement
  ➢ Full Rights for all internal applications
  ➢ Archive in perpetuity
  ➢ All external applications supported
  ➢ Limitations only on the distribution of base data

• Vendor Retains Ownership of Data
Agenda

• Vehicle Probe Project Overview
• **Data Quality and Validation**
• Performance Measures Tool
• Next Gen VPP
Data Quality Specifications

• Black Box Approach

Black Box

Traffic Data

Speed and Travel Time

Accuracy?

Latency?

Distribution?

Format and Transport?

Archive?

Applications?

• Technology Independent / Neutral
VPP Validation Effort

• Primary Specifications
  Max average absolute speed error   10 MPH
  Maximum speed error bias          +/- 5 MPH Max

• Specifications applied in four flow regimes
  0 - 30 MPH     30 - 45 MPH
  45-60 MPH     > 60 MPH

• Use Bluetooth Technology for ground truth
• Validation performed monthly
• Results impact payment
• Results and all data are public
Confidence Indicator

• From Contract RFP
  – Status flag to indicate normal operations, periods of low-traffic flow, inoperable status or unavailable data, etc. - Mandatory
  – Quality indicator – provide a numerical score that reflects the confidence in the estimate of the mean travel time and speed. - Desirable

• In the data feed ::Score Metric
  – 30 Real-time, 20 Historical, 10 Freeflow
Bluetooth Traffic Monitoring

* Bluetooth signals come from cell phones, PDAs, laptops, GPS, car radios…
** Provisional patent received
Data from many cars …

Actual Travel Time Data from I-95 Northbound on April 2

One Car’s Data
Data from many cars …

Actual Travel Time Data from I-95 Northbound on April 2
 Typical Deployment

www.I95Coalition.org
I-95 Corridor Coalition Vehicle Probe Project
May 16, 2012
PA Validation – Jan 2010

Bluetooth Data in Blue
Narrow SEM Band
Wide SEM Band
INRIX Data in Red
Outliers marked with Black
Key Results of Validation

• Monthly data collection and results
  – Anomalies and special concerns addressed

• Over 3+ years
  – Met or exceeded specifications
  – Continued improvement in data quality

• Keyed on performance during congestion

• Quality understood & accepted within 12-18 months
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Noteworthy VPP Applications

- Ops Center Monitoring
  - Monitoring Site – ME, NH, NY, NJ, DE, MD, VA, NC, SC, FL
  - TMC Software Integration – RITIS, SC, FL (soon), NJ (soon)
  - Big Benefit – cross border monitoring
- Travel Times on Signs: SC and MD
- Travel Times on Web Sites: NJ, SC
- Traffic Tile Overlay on 511 site: NC
- Performance Analysis: Several
- Welcome Center/Mall Displays: VA
- Long Distance Trip Planner
Operations Center Situational Awareness – New Jersey

New Jersey Statewide TMC (NJDOT, NJ Turnpike)
Travel Times on Signs

- South Carolina (Columbia)
- Maryland
  - Live Jan 2010
  - Limited deployment
  - Sophisticated software
  - Driver for Statewide coverage expansion
- More on way...
Travel Times on Displays
VDOT

Tyson's Corner Mall

I-95 Welcome Centers (2)

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I-95 Corridor Coalition Vehicle Probe Project
Congestion Management Process – MWCOG

From Executive Summary:

- “The [VPP] provides the CMP an innovative and profound data source for both congestion and reliability analyses.”

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I-95 Corridor Coalition Vehicle Probe Project
Vehicle Probe Project Suite
Vehicle Probe Project Suite

Vehicle Probe Project Suite

**Vehicle Probe Project Suite Dashboard**
Explore the impacts of and relationships between bottlenecks and traffic events in real-time and at previous points in the past.

**Massive Raw Data Downloader**
Download raw probe data from our archive.

**Congestion Scan**
View how congested conditions rise and fall on a single stretch of road.

**Historic Tools**
View aggregated data from previous points in time.

**Bottleneck Ranking**
Search for recurring bottlenecks and discover which ones have the greatest impact.

**Tutorials**
Learn how to use each of the tools in the suite.
Massive Raw Data Downloader

Multiple roads at once

Fine-grained time/date selection options

Date range: 04/12/2011 - 04/12/2011

Days of week: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday

Time of day: 00:00 - 23:59

Fields: Speed, Average speed, Reference speed, Travel time, Confidence score
Bottleneck layer

Green 0 – 15 minutes  Yellow 15 – 30 minutes  Red > 30 minutes
Average weekday speeds by time-of-day on I-95 SB
Monthly comparison of Avg. Congestion on Southbound I-95

October, 2010

November, 2010

December, 2010

Significant Decreases in AM & PM Avg. Congestion

May 16, 2012
MPOs using VPP/INRIX data

- Boston
- NJTPA
- DVRPC
- WILMAPCO
- Baltimore
- Washington DC
- Richmond
- Hampton Roads
- Charlotte
- Atlanta
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• Vehicle Probe Project Overview
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• Applications of the Data
• **Next Gen VPP**
Next Gen Improvements

• Expand Coverage from Maine to Florida
• Enhanced content through connected vehicle inspired applications
  – Temps, braking, weather
• Extend VPP Suite
  – Weather, incidents, volume & sensor data
  – Additional Performance Measures Tools
Next Gen Improvements

• Research and Development
  – Validate Travel Time data on Arterials
  – TMC Codes impact, issues, and use
  – Integrate real-time traffic volume

• Education
  – Travel time On-line Course
  – Training and guidance on effective use of performance measures
Conceptual Data View

• Provide complete perspective of environment
• Support planning and operations
• Ease integration into applications
Questions?

- **INRIX Monitoring Site**
  Rick Schuman at 407-298-4346, rick@inrix.com

- **Vehicle Probe Project Suite**
  Michael Pack at 301-405-0722, PackML@umd.edu

- **Data Validation**
  Stan Young at 301-403-4593, seyoung@umd.edu

- **VPP Contract Issues**
  Kathy Frankle at 410-414-2925, kfrankle@umd.edu

- **General Project Questions**
  Marygrace Parker at
Thank You
THE HEARTLAND VPP
What would it look like?
Mileage and Cost at I95 Prices

• Mileage
  – NE ~460
  – IA ~754
  – MO ~958
  – KS ~793
  – OK ~864
  – TOTAL roughly 3829

• At $900/mile, about 3.4 million per year
Issues

• Predominantly rural interstate
  – Probability of congestion low
• Primary concerns
  – Weather events
  – Construction delays
  – Congestion
• Percent of fleets are higher
• Is volume data needed?
A Modest Proposal

• ITS Heartland Vehicle Probe Project
• Multi-state traffic monitoring for
  – Speed, Travel Time & Volumes
  – Integrate weather and construction
• Philosophy of procurement similar to I95
  – Tech neural, black box approach, validated
  – Challenge vendors to innovate
• Funding via pooled fund mechanism