Collecting Data: 
Technologies and Partnerships

California 511

October 28, 2008
Collecting Data: Overview

- Technologies
  - Gather from different sources
  - Process and improve data quality

- Partnerships
  - Connected Traveler (CCIT/Caltrans)
  - Los Angeles/Inland Empire (District 8)
  - Sacramento (District 3)
  - San Diego (SANDAG/ District 11)
  - San Jose (District 4)
  - San Francisco (District 4)

- Delivery of Data Services
  - Real time
  - Archived
Technology Leadership: End-to-End Solution

Traffic.com Sensor Network
Agency Sensor / Flow Data
Probe Data - Cell, GPS and GPS Cell
Historic Data
Incident and Event Data

Collection → Processing → Delivery

Television
511 Services
Radio
Internet
Wireless
Data Management Software

TIMS
Comprehensive Traffic Flow Data Solution

- **NAVTEQ’s Sensor Network**
  - Owns and operates over 2,500 center lane miles of sensors providing volume, speed, classification and density

- **Agency Data**
  - Agency data is processed through the TIMS engine to clean the data.

- **Probes (Cell and GPS)**
  - Extends the sensor network with coverage and accuracy. Tens of millions of GPS data points/day.

- **NAVTEQ Operations Centers- Three in California**

- **Historic Data**
  - Augments real-time traffic data with a nationwide historic traffic model covering 900,000 miles
NAVTEQ Sensors

- Lane-by-lane data
- Data collected every 60 seconds
- Lane by lane average speed, volume, lane occupancy, & vehicle classification
- Up to four vehicle classifications
  - Non-commercial
  - Single-unit commercial
  - Single-trailer commercial
  - Multi-trailer commercial
- Technology
  - Solar Powered
  - Wireless Communications
  - Modular Components
  - Non-Intrusive
  - Covers All Lanes
  - High Reliability
NAVTEQ is uniquely positioned to source consumer probe data
- Supplier to wireless carriers, and car and device manufacturers
- Nokia relationship
- Map and traffic products
Two coordinated programs

- Contract with US Department of Transportation, Caltrans, and Univ. of California
  - Advanced technology development
  - Special focus on ensuring privacy
- Commercial deployment
  - Alpha and beta tests in Q4 2008
  - Commercial launch in Q1 2009
## Comparison of GPS Probe Data

### Not all probes are created equal

<table>
<thead>
<tr>
<th></th>
<th>Commercial Probe</th>
<th>Consumer Applications</th>
<th>Automotive Applications</th>
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</thead>
<tbody>
<tr>
<td>Available today</td>
<td>🟠</td>
<td>🟠</td>
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<tr>
<td>Sequence of probes in each report</td>
<td>🟥</td>
<td>🟠</td>
<td>🟠</td>
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<tr>
<td>High Volume</td>
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<td>Consumer Driving Patterns - Road Class</td>
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<td>Consumer Driving Patterns - Time-of-Day</td>
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<tr>
<td>Highly accurate position (map-matching)</td>
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<td>🟠</td>
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<tr>
<td>Advanced content</td>
<td>🟥</td>
<td>🟠</td>
<td>🟠</td>
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</table>
San Francisco Area Traffic Map
Sacramento Area Traffic Map
Processing: HTTM (Hierarchical Travel Time Model)

- Incorporate all data sources
  - Fixed Sensors
  - Probe (fleet and GPS cell)
  - Probe Sequences (previous probe combined with current probe)
  - Incident Data
  - Historical Data
- Optimizes calculation cycles
  - Data feed synchronization
- Weighs data sources on a continuous basis
  - Distance decay
  - Time decay
- Confidence calculation
Operations and Traffic Management

Stakeholder access to real-time, digital sensor data

- Region-wide Map
- Individual Sensor Access
- Lane-by-lane Data
- Speed, Volume and Lane Occupancy
Incident and Event Monitor

Operations and Traffic Management

Stakeholder/Broadcasters access to incidents and events

- Web-based tool
- Incidents and events
- Archived
Sensor Speed Display

Operations and Traffic Management

Agency access to real-time speed data by roadway and direction

- Speed data
- Aggregated by direction and lane type
- View of individual lanes
- Ability to see speeds below user selected threshold

<table>
<thead>
<tr>
<th>Routes</th>
<th>Speed Data</th>
<th>Aggregated by Direction and Lane Type</th>
<th>View of Individual Lanes</th>
<th>Ability to See Speeds Below User Selected Threshold</th>
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</thead>
<tbody>
<tr>
<td>I-80/NB</td>
<td>✔️ Bay Bridge</td>
<td>✔️ Capital City Freeway/BUS. I-80</td>
<td>✔️ Dumbarton Bridge</td>
<td>✔️ Golden Gate Bridge</td>
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<tr>
<td></td>
<td>✔️ Hwy 1</td>
<td>✔️ Hwy 101</td>
<td>✔️ Hwy 13</td>
<td>✔️ Hwy 109</td>
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<td>✔️ Hwy 13</td>
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<td>✔️ Hwy 937</td>
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</table>

**SPEED DISPLAY (San Francisco)**

<table>
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<tr>
<th>Routes</th>
<th>Monitored Point Group</th>
<th>Thru</th>
<th>Exit</th>
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<tr>
<td>I-80/NB</td>
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<td>57</td>
<td>57</td>
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<tr>
<td>I-80/SB</td>
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</table>

**Agencies**

- State: All
- Lane: All
- Status: ACTIVE

**N A V T E Q**

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Planning and Operations

Agency access to archived sensor and incident traffic data

- **Raw Data**
  - 1 min. data by lane
- **Historical data**
- **Incidents & events**
- **Reports**
- **Select Station**
- **Date Range**
  - Start Date
  - End Date
- **Aggregate Time**
  - 24 hour
  - 1 hour
  - 15 minute
  - 5 minute
- **Format**
  - HTML
  - Excel
Daily Agency and NAVTEQ Sensor Data Reports
- 5-minute reports by lane
- 15-minute reports aggregated by direction
- 1-hour reports aggregated by direction
- Data quality reports

Monthly Agency and NAVTEQ Sensor Data Reports
- Traffic Monitoring Reports (HPMS Format)
- Performance Measure Reports

Station Reports
- Agency and NAVTEQ Station information in a single file
Tampa Bay 511 Example

Home Page

Flow Maps

Email Alerts
How NAVTEQ Can Help

- **511 Services: Free or Customized**
  - Interactive voice system
  - Web Site
  - Personalized routes and alerts

- **Traffic Data Services**
  - Expand Sensor coverage
  - Expand Agency data and/or fill gaps
  - Operate and maintain system

- **Data Management Systems**
  - Real-time monitoring systems
  - Archive database
  - Data quality tools

- **License Incident and Probe Data**
  - Support operations
  - Traveler information
  - 511 Services
NAVTEQ Fast Facts

- NAVTEQ creates digital maps and map content that power navigation and location-based services solutions around the world.
- Traffic.com is owned by NAVTEQ, which gives us access to worldwide resources.
- NAVTEQ/Traffic.com is the only provider of one stop, end-to-end traffic solutions to customers and commuters.
- NAVTEQ is the largest provider of in-vehicle mapping/traffic to automotive manufacturers.
- NAVTEQ was founded in 1985 and has approximately 3,400 employees located in 144 offices and in 28 countries.
- Nokia’s acquisition of NAVTEQ/Traffic.com gives us the ability to leverage cell phone technology for traffic information.
- Nokia is the world’s largest cell phone manufacturer.