Intelligent Transportation Systems Society of Canada - Société des systèmes de transport intelligents du Canada

# WEBINAR SESSION ATMS TRAFFIC DETECTION



#### BLUETOOTH TRAFFIC MONITORING

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### Corporate Overview

- Robert Bruce founder of TPA North America Inc. (Traffic and Parking Automation), ITS industry for 15 years
- Company was founded in 2005 and based in Toronto, ON
- First Bluetooth deployment was on the Don Valley Parkway in June, 2009 and has been actively working in this sector since that time.
- Projects in BC, AB, ON, QC, NS, AZ, NY, WA, Hong Kong, Switzerland, France, Brazil, Czech, England. Primary focus is the Canadian marketplace.

# Bluetooth Concept



Each Bluetooth devices has a unique, but anonymous device ID.

#### **Bluetooth Traffic Monitor collects:**

- 1. ID of each detectable device.
- 2. Time stamp ID detected.

# Real Time Travel Time Executive:

- 1. Processes station data.
- 2. Filters and processes data.
- 3. Outputs average travel time and predicted travel time

**Detection zones.** IDs are detected within a detection zone, the size and shape of which varies based on the Level of Bluetooth radio and the antenna configuration.

Detection

Zones

# **BTM Deployment Options**

- Temporary
  - Ground mounted for maximum versatility
  - Pole Mounted
  - 12VDC battery enclosed in the unit
- Permanent
  - Integrated into existing traffic control cabinet
  - Pole Mounted
- Power options
  - 12 to 24VDC
  - Solar
- Communications
  - Cellular (Rogers, Bell, Telus, AT&T, etc)
  - Ethernet using existing communications infrastructure
  - Other



#### Deployment Pictures

PEACE



## Server Deployment Options

#### • TPANA's Server software performs:

- Data collection in real-time
- Outlier detection
- Average travel time calculations
- Predictive travel time calculations
- Outputs to other systems

#### TPANA's three server options

- Customer hosted solution at Traffic Management Centre
- Field hosted solution in road-side cabinet for self contained queue warning system
- Software as a Service system is hosted by TPANA in the cloud.

# Data Types

• Bluetooth data provides

00:20:00

00:18:00

00:16:00 Q

Out:14:00

00:10:00

00:08:00

- Travel Time
- Origin/Destination
- Turning Movements





# Average Travel Time



## **Turning Movements OD**



AADT Estimate for Voyager road in the Fort McMurray Oil Sand region

### Server Interfaces

- XML file interface allows other users/software systems to access the data.
- Browser Interface allows monitoring of the system.
- Customized interfaces for data exchanges



## Variable Message Sign Output

- NTCIP Interface to the sign
- Average travel time updated every minute
- Normal travel time updated every 15 minutes



### **Bluetooth Considerations**

#### Accuracy of Travel Time

- Recognized as the Gold Standard for Travel time measurements
- Lane based LPR is similar, but one Bluetooth reader can cover 8 lanes
- Automatic Incident detection and queue warning
- What BTM is not?
  - BTM does not:
    - Classify vehicles
    - Count vehicles (although can give an approximation)
    - Measure occupancy

### **Bluetooth Considerations**

- Outlier Algorithm impacts accuracy
  - TPANA has developed a robust exponential outlier detection filter, tested and proven in arterials and freeways in Canada
- Vehicle Sample Size
  - Estimate between 15 and 20% in Canadian urban areas.
    - By 2016, 95% of all vehicles driving off new lots will have Bluetooth
- O Privacy
  - TPANA Blueooth solutions do NOT collect any personal data and are acceptable to privacy commissioners in Canada.

# **Deployment Considerations**

#### Antennas:

- Directional and omni-directional antenna options
- Range:
  - 100meters
  - Flexible deployment
  - Remote control of transmission power to reduce the detection area

#### Output Deployment Density:

- Freeway: 2 -3Km, interchanges
- Arterial: 1 km, major intersections



# Successful Deployments

| Location                  | Description  | Comments   |
|---------------------------|--|--|
| York Region               | Work Zone Travel Time solution – 12 units              | Provides real-time travel time to 10 Portable VMS    |
| City of Calgary           | 35 units on Deerfoot, Crowchild, Glenmore and Memorial | Travel times posted on<br>permanent Message boards   |
| Alberta / Wood<br>Buffalo | Arterial / Highway 47 units throughout region          | Comprehensive travel time, turning movement and O-D. |
| Border Wait Time          | Queenston-Lewiston Bridge, Peace<br>Bridge – 24 units  | Measurements for Nexus,<br>Commercial and Cars       |
| City of Chandler          | Travel time to permanent VMS                           | ITS Deployment Project of the year                   |
| City of Montreal          | 21 unit in Urban Corridors                             | Ethernet, installedin Traffic<br>Control cabinets    |

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