THE APPLICATIONS OF ADVANCED TECHNOLOGIES TO AUTOMATE TRAVEL TIMES

Port Aransas Ferry Operations Project
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Port Aransas Ferry

Facts:

- 8 Ferries
- 24-7 Operation
- Over 2 million passengers per year
- ¼ mile route (one way) takes less than 10 min. but varies during peak season
Calculation of Travel Times

Past, Present & Future
Past - Ferry Operations

1920’s
Past-How travel times were calculated

I. The Strategy
   • Asking the Traveling Public
   • Landmarks
   • Using PTZ Cameras
   • Employees feedback after shift work

II. Communication
   • Radio travel time to dispatcher
   • Update TxDOT website & City website
   • PCMS before DMS

PORT ARANSAS FERRY
OPERATIONAL STATUS
As of: 9/30/2014 12:15 PM

FERRIES OPERATING: 4
HARBOR ISLAND waiting time 15 min
PORT ARANSAS waiting time 15 min

Notes:
MV Michael W. Behrens & MV William G. Burnett are at the ship yard. Port Aransas ramp # 3 & Harbor Island ramp # 1 are out for preventive maintenance.
Calculation of Travel Times
I. Location Map of readers
   - Port Aransas
   - Harbor Island

II. Travel Time Calculations
   - Travel Time Segments
   - Bluetooth and Wi-Fi.....How does it work?

III. Reads and Matches
   - Bluetooth vs Wi-Fi
Present- Bluetooth-Location Map

Key
- Port Aransas
- Bluetooth location
Bluetooth Set Up - DMS Cabinet

- Bluetooth Reader
- Cell Modem
- Bluetooth Antenna
Present- Wi-Fi Locations

Key
- Port Aransas
- Wi-Fi
- Bluetooth location

Areas:
- SH 361 @ Dale Miller Bridge
- SH 361 prior to Ferry Landing
- W Cotter Ave @ N Alister St
- W Avenue G @ N Alister St
- SH 361 @ New Port Golf
- SH 361 @ Cut Off Rd
- 361 TEXAS
- 35 TEXAS
- Port Aransas

Locations:
- SH 361 @ PR 22
- 286 TEXAS
- 181
- 358 TEXAS
- Corpus Christi
- Mustang Island
- Kansas City
- Corpus Christi Bay

Map shows the distribution of Wi-Fi locations in Port Aransas, Texas.
Present- Wi-Fi TTI AWAM Suitcase Deployment

- Temporary deployment began June 23, 2014
- 6 portable suitcases
- Battery powered
- Battery Life up to 2 weeks
- Small solar panels that provide battery charging
Present - Wi-Fi Readers – Travel Times

3 Wi-Fi Readers

- Converted “suitcases” to semi permanent
- Installed at traffic signal cabinets
- Better Power Supply
- Travel Time studies
- Aransas Pass to Port A (SH 361 SB) 6.9 miles
- Port A to Aransas Pass (SH 361 NB) 7.7 miles
Wi-Fi TTI Set Up in Traffic Signal Cabinet

- Processor
- Wi-Fi Reader
- Cell Modem
- Antenna

AVERAGE TRAVEL TIME 5 MINUTES AT 8:00 AM
Address Matching Concept

Roadside Detection Station A
- CPU Processor
- Wi-Fi/Bluetooth Radio Adapter
- 2.4 GHz Antenna
- Field Software Component

Roadside Detection Station B
- CPU Processor
- Wi-Fi/Bluetooth Radio Adapter
- 2.4 GHz Antenna
- Field Software Component

MAC Address Matching Software
- Data Collection Server
- Travel Time Algorithm
- Data Archival

Enabled Devices

MAC Address
Detector ID
Timestamp

A to B
Travel Time: 1 Minute
Speed: 60 MPH
Bluetooth Versus Wi-Fi Detection

Bluetooth ➔ Continually *scans* for devices in proximity

Wi-Fi ➔ Continually *listens* for devices in proximity

*The results of this are that the re-identification rate of Wi-Fi devices are much lower than that of Bluetooth (it turns out that this doesn’t matter).*
Usage Recommendations

• Because of the detection method, the slower the traffic, the more devices Wi-Fi detects.
** initial suitcase system consisted of 6-reader locations -- only 3 installed after moving to cabinets on 7-10-2014
Bluetooth - Matches

SH 361 SB North of Ferry to Cut-off Rd at Cotter Ave (July 4, 2014)

Number of Matches

Time of Day
Bluetooth & Wi-Fi Matches

SH 361 South Bound
July 4th
Aransas Pass ferry Landing to Cotter-Cut Off

TTI Research, (Wi-Fi Anonymous Wireless Address Matching (AWAM))
Calculation of Travel Times

Future
Future - Automation of Travel Times To DMS

Diagram showing the network connectivity involving cellular networks, Bluetooth readers, Wi-Fi readers, and a server running LoneStar software.
Future - Automation of Travel Times to DMS
Future - Automation of Travel Times to DMS

Data going to Dynamic Message Sign

Bluetooth Reader or WiFi Reader
Future - Automation of Travel Times to DMS
Note: For proposed DMS locations, the phase I solution will be portable changeable message signs (PCMS) deployed under a trial basis. In Phase II, the new DMS will be deployed.
Future – Ferry Operations Queue During Peak Holiday

Independence Day Weekend 2014

Queue Lengths at Peak Hours

- ~ 1 mile on SH 361
- ~.5 mile on stacking loop
- ~.25 mile on W.Cotter St.
- Total Queue Lengths =~360 Veh
Future – TTI VISSIM Model for Queue during Peak Holiday
Future – Proposed Ferry Operations Layout

Proposed Stacking Area plus boarding area = ~ 464 vehicles
Future – TTI VISIM Model Proposed Ferry Ops Layout
Future – Why not build a bridge?

MAJOR traffic coming through!
Conclusion

- Provide OD data for transportation planning
- Monitor average speed of vehicles in highways
- Provide travel times
- Despite the low re-identification rate, the sheer volume of Wi-Fi devices provides adequate sample sizes
- Wi-Fi is an acceptable standalone or complementary tool to Bluetooth address matching
- Wi-Fi could be used as a supplement to Bluetooth to increase sample sizes

Wi-Fi = More Data
Contact Information

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