

# TRAVEL TIMES IN ETLs

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# OVERVIEW OF TTMS

Why are travel times needed

State of practice Prior to ETL Deployment

Problem/Need Identified

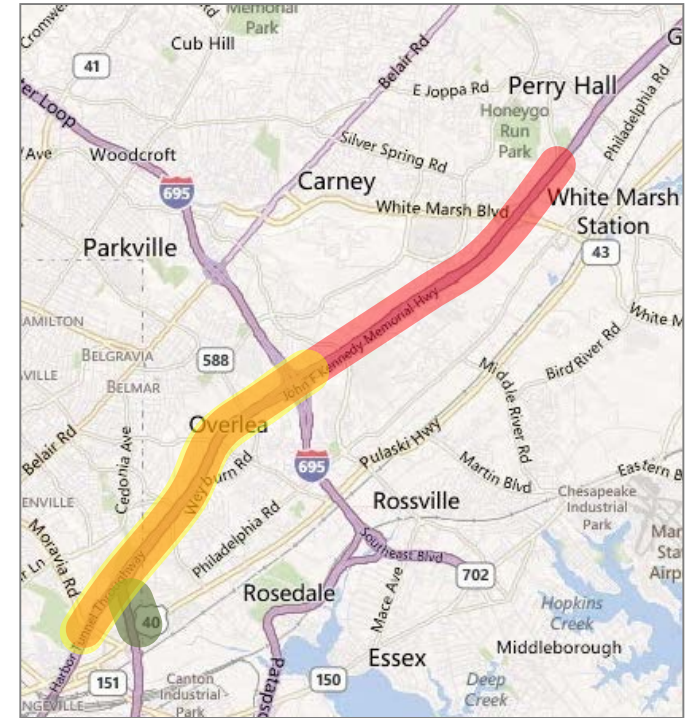
Options Evaluation

Deployment result



# TRAVEL TIME NEED

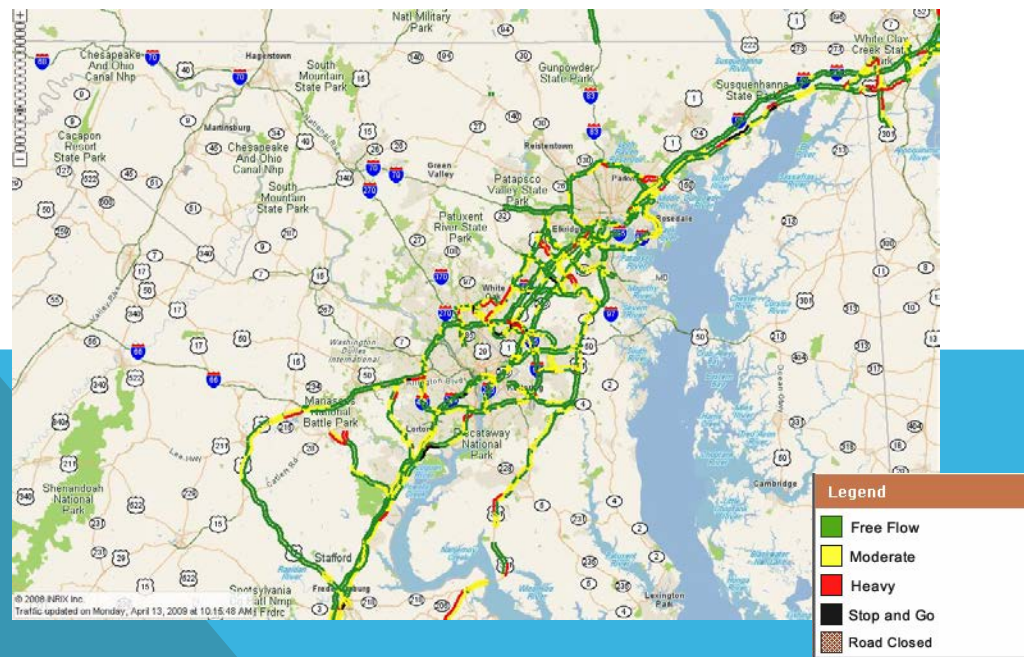
- ETL's are a Managed Facility
  - Need #1: We need to measure the management approach degree of success.
- Initially tolls are pre-set by time of day
- But may one day become dynamic – ie: tolls vary by actual traffic usage.
- Need accurate travel times to manage the traffic
  - Need #2: Used to set toll rates and schedule (times of day)
  - Need #3: Used in determine when a dynamic system may be necessary.



# STATE OF PRACTICE

## 3<sup>rd</sup> Party private firms gather data.

- Cell phone and fleet data.
- Maryland participates in programs to get the data.



# HOW TRAVEL TIME DATA WORKS

The data comes across with link ID's that are associated with the segment of road.

We build routes, consisting of contiguous links. The times for each link are added to calculate the travel time on the route.



# LIMITATIONS OF CELL/FLEET DATA

Poor lane to lane differentiation



Poor differentiation of traffic in ETLs vs GPL.

We did research in other states with similar lane configurations to determine performance of the cell phone/fleet data. Research showed poor performance. At best the travel times presented were a mixture of traffic in both sets of lanes. When volumes were low, travel times tended to be skewed heavily.

# NEED IDENTIFIED

We needed to supplement the data.

Investigated many options, including but not limited to:

- EZPass readers
- License plate readers
- Bluetooth readers
- More private GPS tracking systems
- More Cell phone tracking systems
- Point detection (radar, loops, profilers)



# ANALYSIS

Many options were infeasible and eliminated early in the analysis.

The hosting/backend was also investigated and played some roll in the decision process.

Our “consumer reports” style final analysis was:

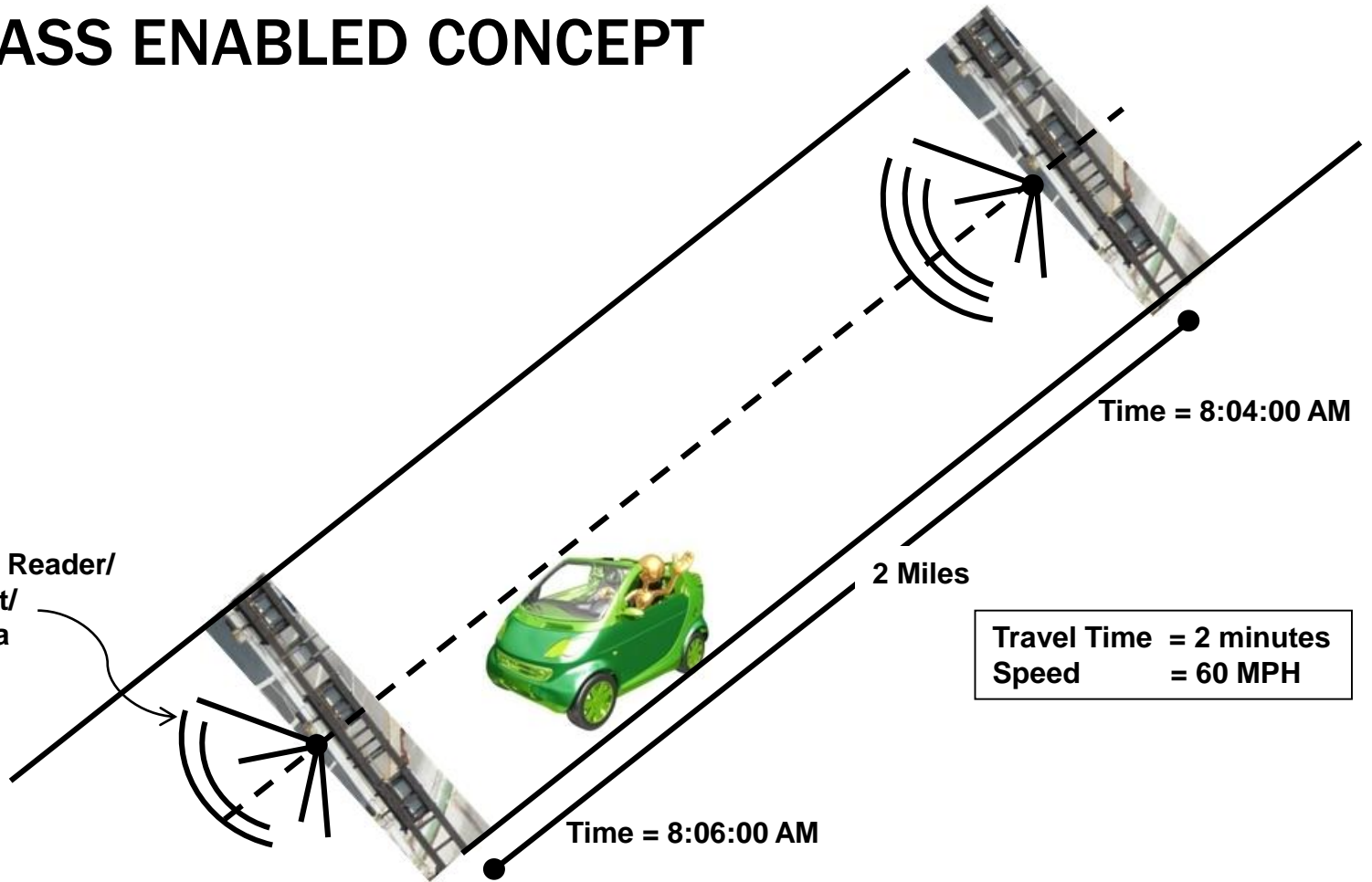
Technology	Capital Costs (Cost/Mile)	Maintenance Costs	Autonomy/ Agency Control	Accuracy	Technical Risk	Statewide Scaleability	Lane Data (GP vs. ML)	Competitive Bidding	Overall
Loops	●	●	●	●	●	●	●	●	●
Cell Phones	●	●	●	○	●	○	●	○	○
GPS Tracking	○	●	●	●	●	○	●	○	○
Bluetooth	○	●	●	●	○	●	○	●	○
ALPR (CR Best Buy)	○	○	●	●	●	●	●	○	●
INRIX (CR Best Buy)	●	●	●	●	●	●	●	●	●
EZ-Pass Readers (CR Best Buy)	●	●	●	●	●	○	●	○	●
RTMS/Wave	●	○	●	○	○	●	●	○	○

Ez-Pass Readers were the selected Option



# EZ-PASS ENABLED CONCEPT

EZPass Reader/  
Lane Kit/  
Antenna



Time = 8:04:00 AM

2 Miles

Travel Time	= 2 minutes
Speed	= 60 MPH

Time = 8:06:00 AM

# SYSTEM DESIGN

## 8 - EZ-Pass reader antennas

- Entry and exit point (2)
- North Bound and South Bound (2)
- Managed Lanes (ETL) and General Purpose Lanes (2)

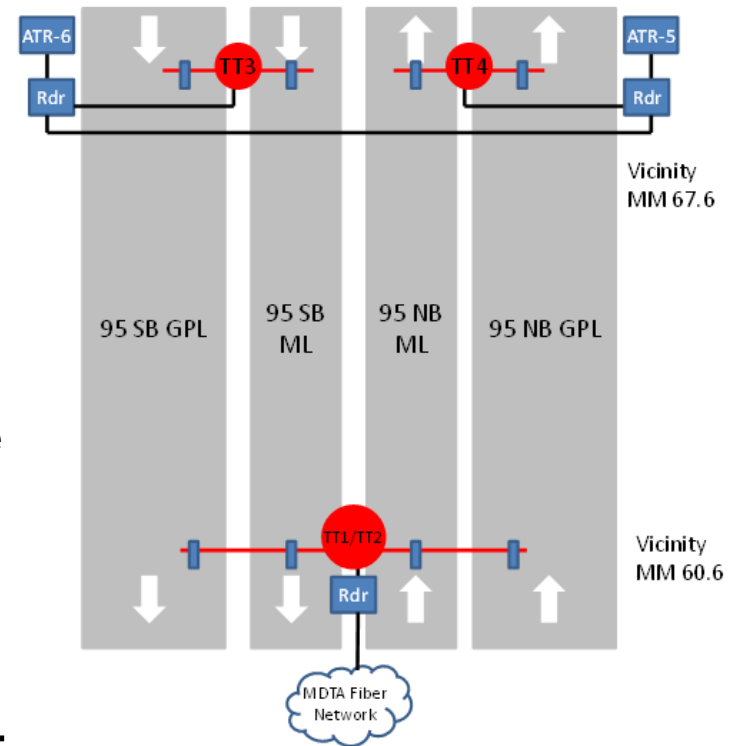
## Two sites

- North and south
- ML, GPL's at same point. Covers Entry and exit at same point. (comparable travel distance).

## Central Virtual Server gathers matched pairs

- No transponder ID's are stored.
- Outlier algorithm to eliminate bias in results.

From Final design to completed system was about 1 year.



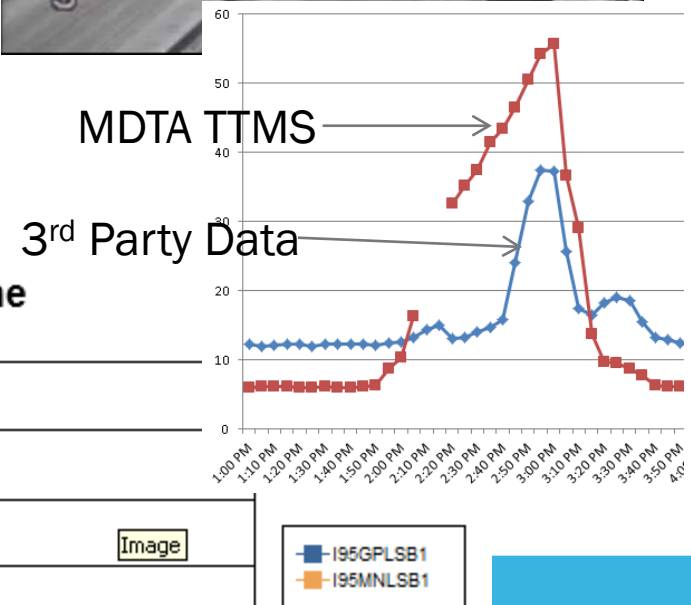
# RESULTS

Data from 3/6/15 incident (ML, SB), 5 Min Bin.

- Shown below

3<sup>rd</sup> party data – Reported only a single speed for the segment

- 3<sup>rd</sup> party does not show ML and GPL separately.
- Where we measured 55 minute delays, 3<sup>rd</sup> party shows <40 minutes.



03/06/2015 Average Travel Time

