General Transit Feed Specification (GTFS) Project

ATL Regional Technology Committee
Lori Sand / September 12, 2019
IBI Group

► Atlanta Work
  • November 2018 GTFS Workshop funded by ARC
  • Lead private partner for the Integrated Mobility Innovation (IMI) grant application

► Regional Work/Agency Work
  • Toronto Metrolinx Triplinx for the Greater Toronto and Hamilton Area encompassing about a dozen transit agencies
  • Florida DOT District 5 – six transit agencies within the region
Project Tasks – 1 (6 weeks)

► Data Assessment
  • 30-day process
  • Collect GTFS datasets and links to GTFS-real-time feeds if available
  • Verify conformity to GTFS and real-time specifications
  • Ensure feeds follow industry standards
  • Verify accuracy
  • Compare predicted to actual stop times, verify vehicle locations, service alerts, etc.

► Workflow Assessment
  • On-site workshops with each operator
  • Discuss GTFS, GTFS-real-time, and GTFS-Flex
  • Document existing conditions
  • Present data quality assessment
  • Discuss issues and needs related to data provision and data quality
  • Identify gaps
Recommendations for Feed Improvement

- Required fields and files that must be included in the feed according to the specifications
- Optional fields and files that would be beneficial for third-party feed consumers
- Changes needed to bring the data up to conformance with best practices
- Representation of detours
- Representation of special services of events
- Recommendations for workflow
- Implementation of real-time feeds
Regional Policy Recommendations

- Establishing a baseline threshold for data quality that all Transit Operators must meet before being included in the regional feeds
- Setting up a platform for the aggregation and validation of individual feeds
- Determining how to handle common services/identifiers among all Operators
- Establishing a data monitoring program
Next Steps

- Move to Open Portal hosting for consumption by apps
- Contract for post-processing of CAD/AVL data and GTFS static feeds into GTFS Real-Time
- A second phase of technical assistance
Thank You.

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Technology, The Future, and Transportation

John Hibbard, Division Director of Operations, Georgia DOT
And now to the present . . .

Mr. Musk
And looking forward
(but not too far)
Back to the Present: What is Connected Vehicle Technology?

Wireless technology connecting vehicles to each other and to roadside infrastructure

Connections may be
- Vehicle-to-Vehicle (V2V)
- Vehicle-to-Infrastructure (V2I)
- Vehicle-to-Other (V2X)
Examples of Connected Vehicles
Applications

**V2I Safety**
- Red light violation warning
- Curve speed warning
- Stop sign gap assist
- Reduced speed zone warning
- Phase termination/next signal phase
- Green-band speed

**V2V Safety**
- Forward collision warning
- Left turn assist
- Blind spot/lane change warning

**V2I Road Weather**
- Motorist advisories and warnings
- Enhanced decision support

**Mobility**
- Signal priority
- Emergency vehicle pre-emption
- Dynamic speed harmonization
- Queue warning
Key: Point – to – Point communications

V2X is this:

Not this:

Safety Critical vs. Infotainment
Interoperable Ecosystem

Regional interoperability through standards-based, non-proprietary technology deployments
What are Autonomous Vehicles?

Automated vehicles use onboard sensors, cameras, global positioning, and telecommunications to help perform safety-critical driving functions such as steering, acceleration and braking - without direct driver input.

Automated does not always mean self-driving.
Levels of Vehicle Automation

0: No Automation
- Zero autonomy; the driver performs all driving tasks.

1: Driver Assistance
- Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

2: Partial Automation
- Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.

3: Conditional Automation
- The driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.

4: High Automation
- The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

5: Full Automation
- The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Here Today
- Being Tested

Society of Automotive Engineers (SAE) Automation Levels.
And, Legally . . .
(CV + AV) = Merging into CAT

Autonomous Vehicle
Operates in isolation from other vehicles using internal sensors

Connected Vehicle
Communicates with nearby vehicles and infrastructure

Connected Automated Vehicle
Leverages autonomous and connected vehicle capabilities
Policy Issues Still Being Explored

- Privacy
- Security
- Data ownership
- USDOT authority
  - NHTSA: Regulate safety equipment in vehicles
  - FHWA: Provide guidance on roadside infrastructure
- Driver and vehicle licensing
  - NHTSA distraction guidelines
AASHTO SPaT (CV) Challenge

To challenge state and local public sector transportation Infrastructure Owners and Operators (IOOs) to deploy DSRC infrastructure with SPaT (and MAP) broadcasts in at least one corridor or network (approximately 20 signalized intersections) in each state by January 2020.

20 intersections in 50 states by 2020!

- 26 States Committed
- 450+ Signals Operating
- 3,800+ Signals Planned
**Pilot Deployment Objectives**

**Primary goal:** Develop back-end infrastructure, network components, and business processes to support broad vehicle to infrastructure applications that is broadcast-medium agnostic, scalable, and sustainable.

**Secondary goal:** Begin broad installation of available roadside units and on-board units to facilitate applications that improve safety and mobility.

**Primary Application Spaces:**
- Safety
- Mobility
- Freight
- Partnerships
Initial Deployment

Phase 1: Pilot – Active June 2018

- SR 141 (Peachtree) from SR 9 to I-285
- SR 8 (Ponce de Leon) from Peachtree to SR 42
- 54 traffic signals
- 12 ramp meters
- Signal Phasing and Timing (SPaT)
  - Red light warning
  - Pedestrian in signalized crosswalk (in development)
  - Phase termination/next signal phase
  - Green-band speed (Green light optimal speed)
Phase 1 SPaT Applications

- **Red light warning**: Safety for drivers – alerts of inability to safely clear intersection
- **Pedestrian in crosswalk**: Safety for drivers and pedestrians – turning vehicles have additional awareness of other users
- **Phase service remaining**: Efficiency for drivers – alert drivers for safe intersection passage or efficient stopping
- **Green speed for coordinated signals**: Efficiency for drivers – inform drivers of the optimal driving speed through coordinated signals to minimize stops

**Initial DSRC in Metro Atlanta**

- **SR 141 (Peachtree)** – 39 intersections
- **SR 8 (Ponce de Leon)** – 15 intersections
- **North Avenue** – 22 intersections
GDOT CV Architecture

• CV Application resides on signal controller
• No additional hardware (outside of RSU) required
• Open access to third parties
• Conformity to national standards, interoperable, and open access
Deployment
**Phase service remaining**

**Intersection name**

**Debug information**

**Minimum speed required to clear green**

**Vehicle speed**
Phase 2 Deployment

Phase 2: RTOP – June 2020
GDOT Investment + 
USDOT ATCMTD Grant

1,600 traffic signals in metro Atlanta
185 ramp meter locations
Regional deployment

Not a pilot program: a deliberate inter-agency deployment across the entire metro Atlanta region
Phase 2 Deployment

Phase 2.1: RTOP – Fall 2019

Additional 600 of FY 2019 to be installed by Fall 2019
305 RSUs operational as of July 2019
Connectivity on every major arterial in metro Atlanta
Open data stream to third parties also available

**ADDITIONAL APPLICATIONS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Emergency vehicle preemption</td>
<td>Preemption at select signals to improve emergency vehicle response time</td>
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<tr>
<td>Transit signal priority</td>
<td>Priority requests to signal controllers for specific transit applications and routes</td>
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<tr>
<td>Freight signal priority</td>
<td>Signal priority for freight vehicles that are operating in cooperative platooning mode</td>
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But Wait!

There’s more!

- Our first rural deployment
  I-85, just east of the Alabama State Line
  A partnership with a non-profit foundation, The Ray
  6 RSU’s
  Rural and Freight-focused
  Panasonic “data ecosystem”
Why is this important to GDOT?

Safety by the Numbers

- An estimated 39,141 people lost their lives on all modes of our transportation system in 2017. The vast majority—37,133 deaths—were from motor vehicle crashes.³
- Driver Factors: Of all serious motor vehicle crashes, 94 percent involve driver-related factors, such as impaired driving, distraction, and speeding or illegal maneuvers.
  - In 2017:
    - Nearly 11,000 fatalities involved drinking and driving.⁴
    - Speeding was a factor in nearly 10,000 highway fatalities.⁵
    - Nearly 3,500 fatal crashes involved distracted drivers.⁶
- Commercial Vehicles: 13 percent of all roadway fatalities occur in crashes involving large trucks.⁷
- In 2017, 82 percent of victims in fatal large truck crashes were road users who were not an occupant of the truck(s) involved.⁸
- Professional Drivers: Professional drivers are ten times more likely to be killed on the job, and nearly nine times more likely to be injured on the job compared to the average worker.⁹
- Pedestrians: 5,977 pedestrians were killed by motor vehicles in 2017, representing 16 percent of all motor vehicle fatalities.¹⁰
- Highway-Rail Grade Crossings: Over the past decade, highway rail grade crossing fatalities averaged 253 per year, representing about one-third of total railroad-related fatalities.¹¹

Source: USDOT Preparing for the Future of Transportation – Automated Vehicles 3.0

*This number is likely underestimated.
What is a Smart City?

Urbanized areas that use data and connectivity to improve mobility

Common challenges to address

- First/last-mile service for transit users
- Goods movement efficiency
- Coordinating data collection and dissemination across systems
- Reducing inefficiency in parking systems and payment
- Reducing carbon emissions
- Optimizing traffic flow

Every consumer product and piece of infrastructure will be connected to the Internet of Things, enabling devices to communicate with other devices and people, and so data on the status of street lights, traffic signals, or parking lots will be available on the cloud. This phenomenon has been called the Internet of Things. The more smart devices and sharing platforms there are, the more data is generated about everything from $100 billion worth of IoT connected devices. Smart cities are employing the same technology to manage transportation infrastructure, and public service areas are working to use this aggregated data. This, in turn, can
Example Technologies from Smart City Challenge

Autonomous vehicles for first and last-mile

Dynamic curb parking reservation and space sensing to expedite freight loading and unloading

Improved and expanded charging systems for electric vehicles

Connected vehicles, bicyclists and pedestrians

Unified data analytics platforms across modes to improve decision making
What are the Benefits?

- Improved mobility and efficiency
  - Makes travel available to more people
  - Reduces individual mobility costs
  - Smoother traffic flow and coordination with traffic operations

- Improved safety
  - Crash avoidance
  - Better information about roads for drivers and vehicles
  - More awareness of vehicle, pedestrian, and bicyclist interaction

- Increased freight, transit and emergency vehicle efficiency
  - Better truck staging and flow in traffic
  - Improved signal priority for transit and emergency services
What is MaaS?

(Mobility as a Service)

- Customer-centric, personalised transport options that enhance mobility and accessibility and improve network efficiency.
- Efficient and effective use of public transport network and improved modal integration including active transport options.
- Competitive market for public and private transport operators and other providers while ensuring accessibility to transport for customers.
- Interoperability and integrated systems with secure data sharing principles in a framework regulated by government oversight.
Examples of Mobility as a Service

- Ridesharing
- E-hailing
- Bike sharing
- Car sharing
- On-demand transit
- Scooters
Thanks!

Questions?

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ADJOURN