ATL ATLANTA-REGION TRANSIT LINK AUTHORITY

ATL Regional Technology Committee

September 12, 2019

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

Project Task – 2 (8 weeks)

► 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

Project Task – 3 (4 weeks)

► 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.

Lori Sand

404.893.6130 (office)

lsand@atltransit.ga.gov

www.atltransit.ga.gov

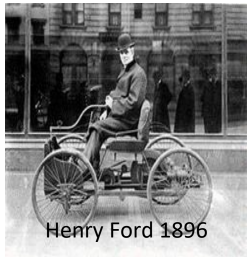
GDOT
Georgia Department of Transportation

Technology, The Future, and Transportation

John Hibbard, Division Director of Operations, Georgia DOT

Historic Comparison

Carl Benz 1886

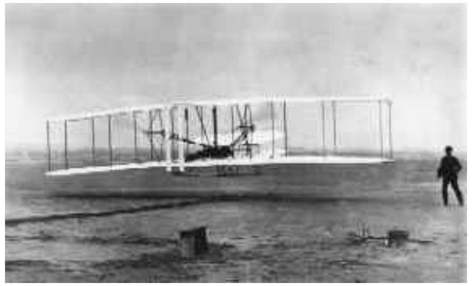


Henry Ford 1896

Ford Model T 1908

Samuel Langley 1893

Wrights
1903



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

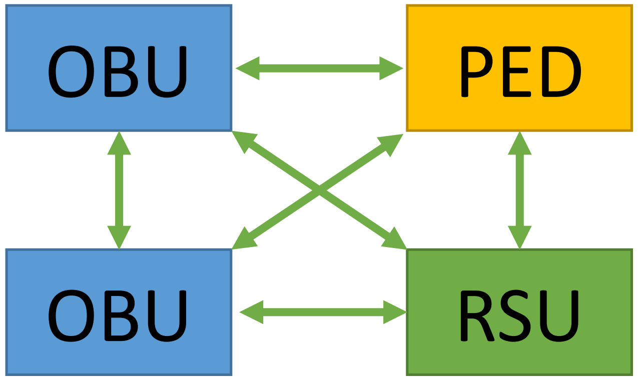
Motorist advisories and warnings
Enhanced decision support

Mobility

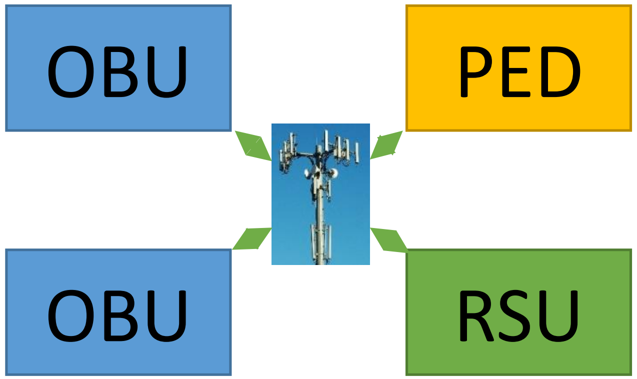
Signal priority
Emergency vehicle pre-emption
Dynamic speed harmonization
Queue warning

Key: Point – to – Point communications

V2X is this:

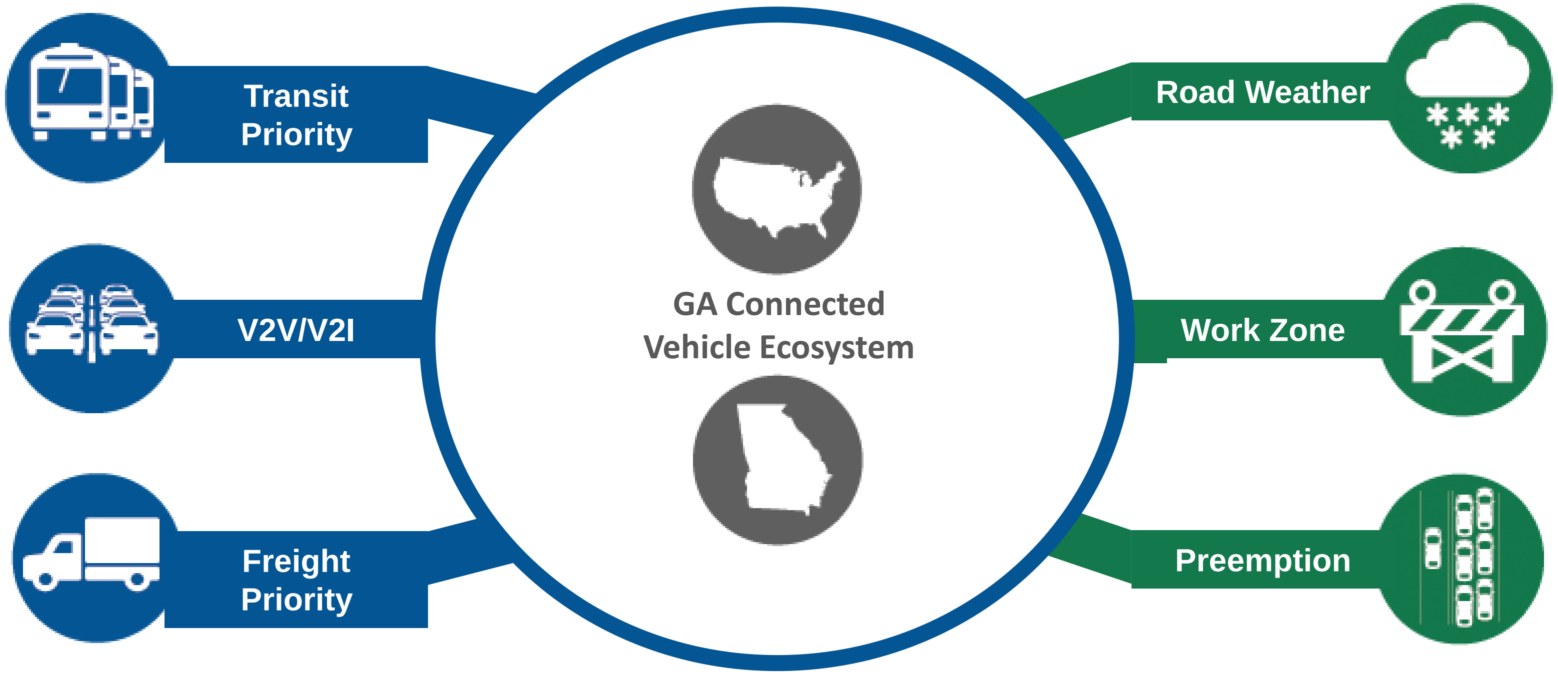


Not this:



Safety Critical vs. Infotainment

Interoperable Ecosystem

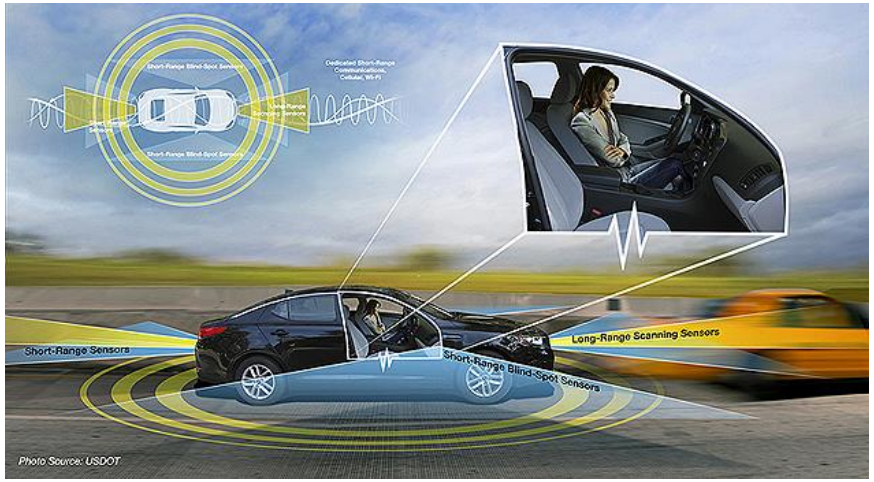


Regional interoperability through standards-based, non-proprietary technology deployments

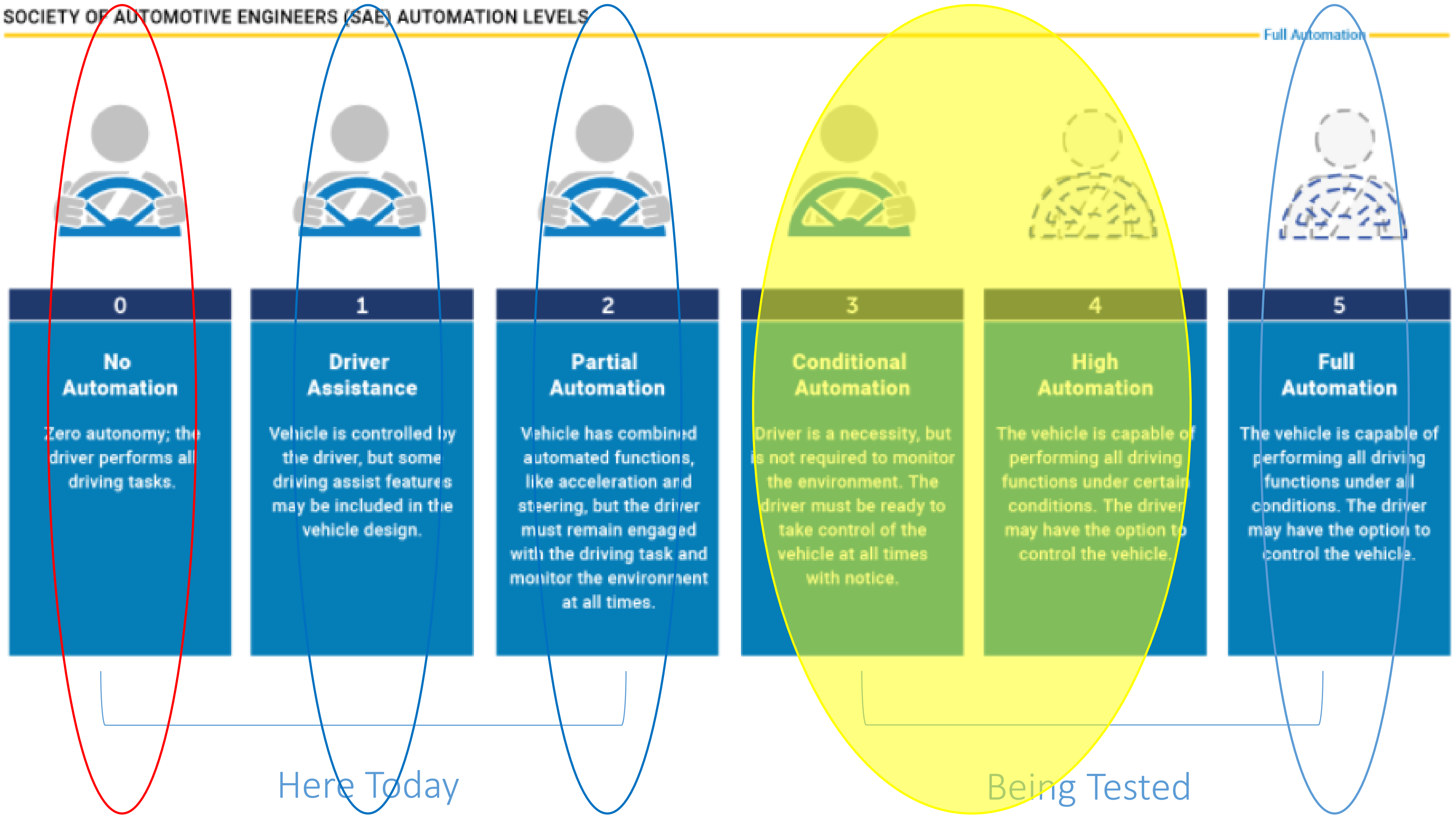
What are Autonomous Vehicles?

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

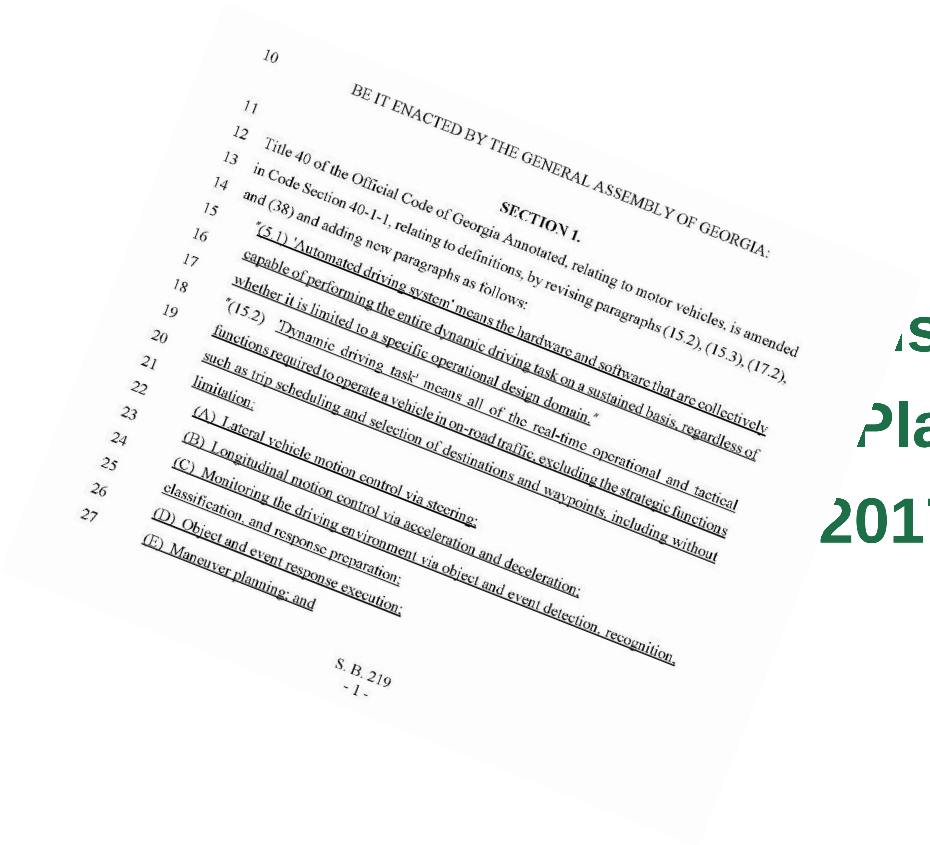
Automated does not always mean self-driving



Levels of Vehicle Automation



And, Legally . . .



BE IT ENACTED BY THE GENERAL ASSEMBLY OF GEORGIA:

SECTION 1.

Title 40 of the Official Code of Georgia Annotated, relating to motor vehicles, is amended in Code Section 40-1-1, relating to definitions, by revising paragraphs (15.2), (15.3), (17.2), and (38) and adding new paragraphs as follows:

"(5.1) 'Automated driving system' means the hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis, regardless of whether it is limited to a specific operational design domain."

"(15.2) 'Dynamic driving task' means all of the real-time operational and tactical functions required to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints, including without limitation:

(A) Lateral vehicle motion control via steering;

(B) Longitudinal motion control via acceleration and deceleration;

(C) Monitoring the driving environment via object and event detection, recognition, classification, and response preparation;

(D) Object and event response execution;

(E) Maneuver planning; and

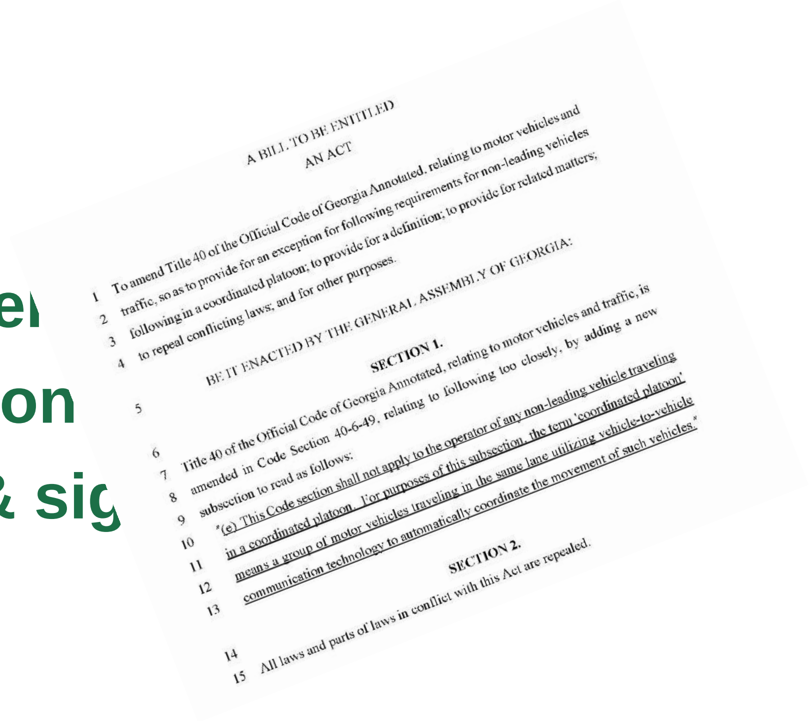
S. B. 219

- 1 -

…s Ve…

…Platoon

2017 & sig…



A BILL TO BE ENTITLED

AN ACT

To amend Title 40 of the Official Code of Georgia Annotated, relating to motor vehicles and traffic, so as to provide for an exception for following requirements for non-leading vehicles following in a coordinated platoon; to provide for a definition; to provide for related matters; to repeal conflicting laws; and for other purposes.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF GEORGIA:

SECTION 1.

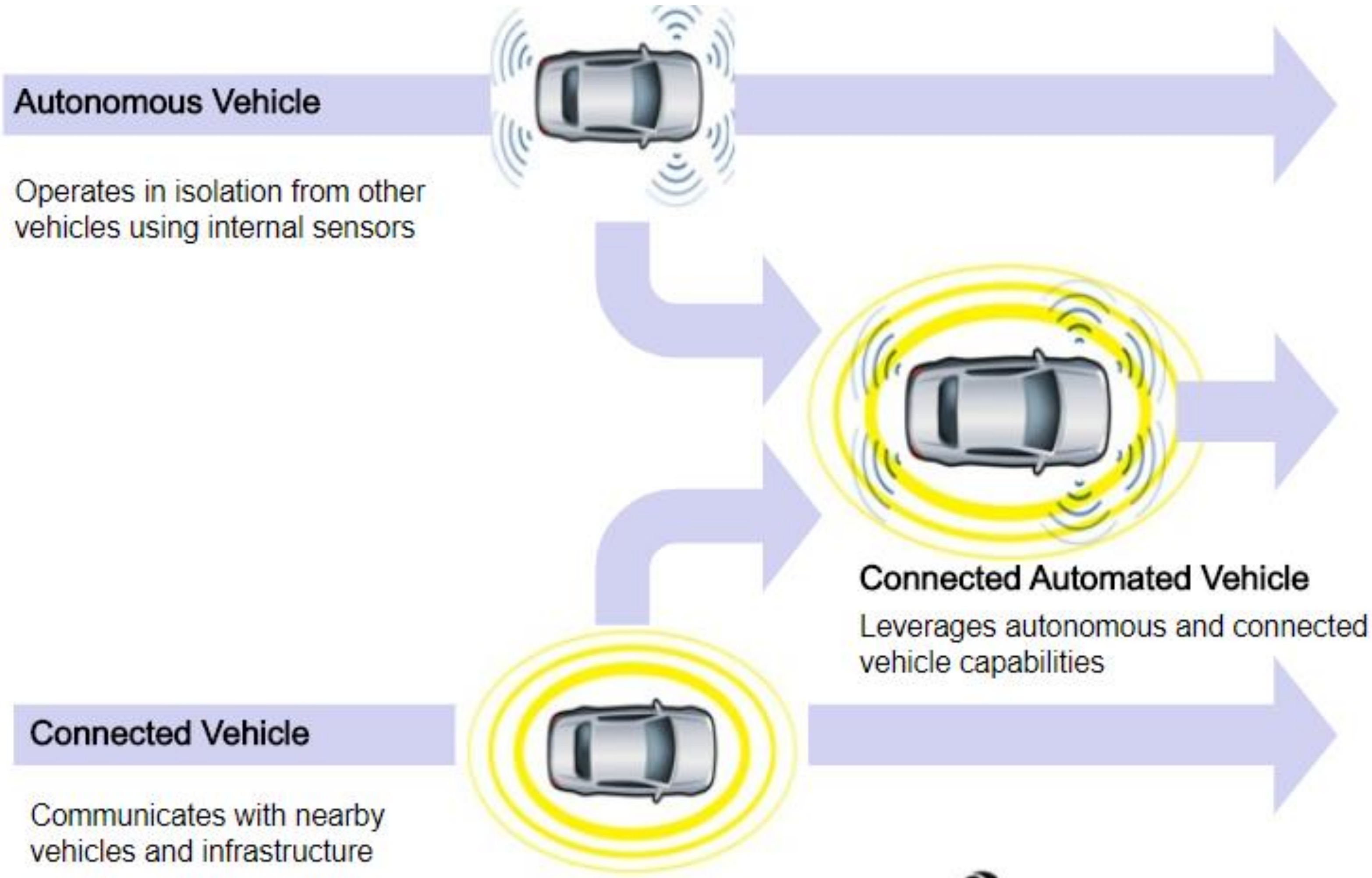
Title 40 of the Official Code of Georgia Annotated, relating to motor vehicles and traffic, is amended in Code Section 40-6-49, relating to following too closely, by adding a new subsection to read as follows:

"(e) This Code section shall not apply to the operator of any non-leading vehicle traveling in a coordinated platoon. For purposes of this subsection, the term 'coordinated platoon' means a group of motor vehicles traveling in the same lane utilizing vehicle-to-vehicle communication technology to automatically coordinate the movement of such vehicles."

SECTION 2.

All laws and parts of laws in conflict with this Act are repealed.

(CV + AV) = Merging into CAT



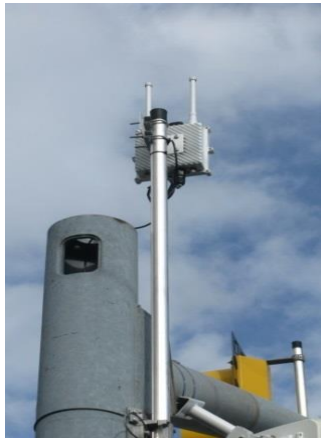
Policy Issues Still Being Explored

- **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.

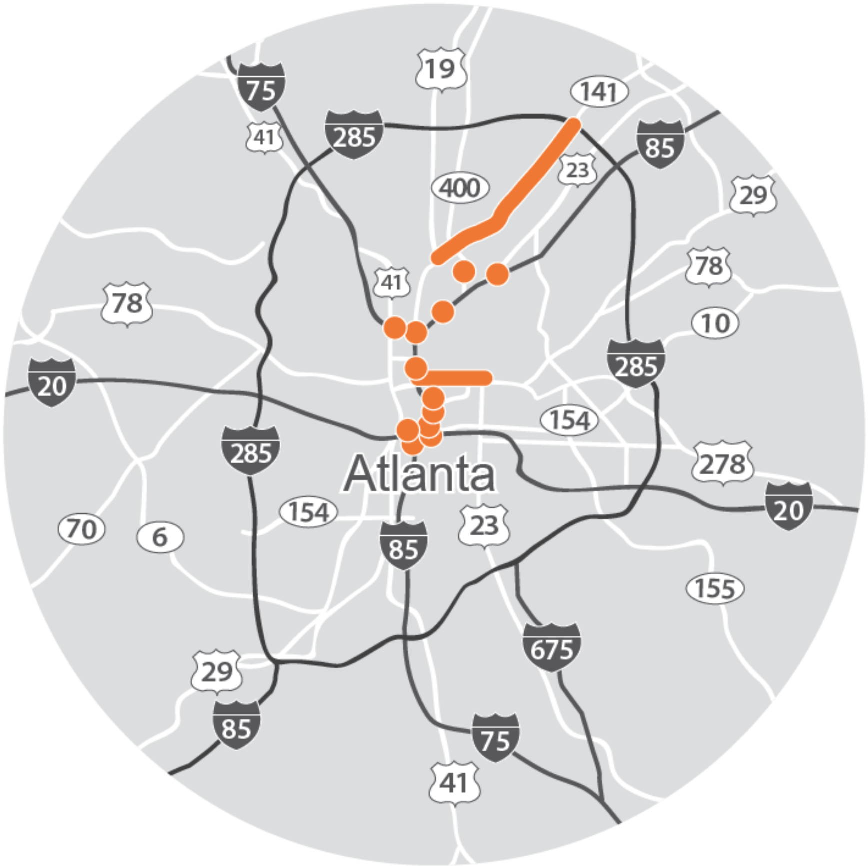
Primary Application Spaces:

- 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

Application		Benefit
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

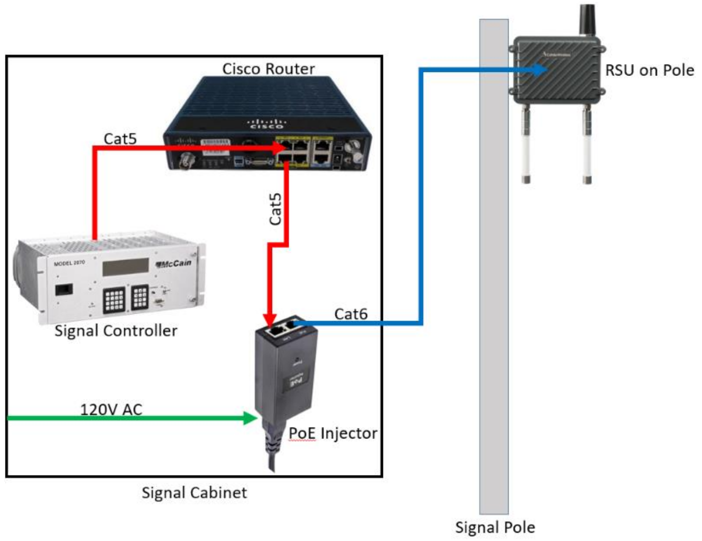
Real-time signal phasing and timing information

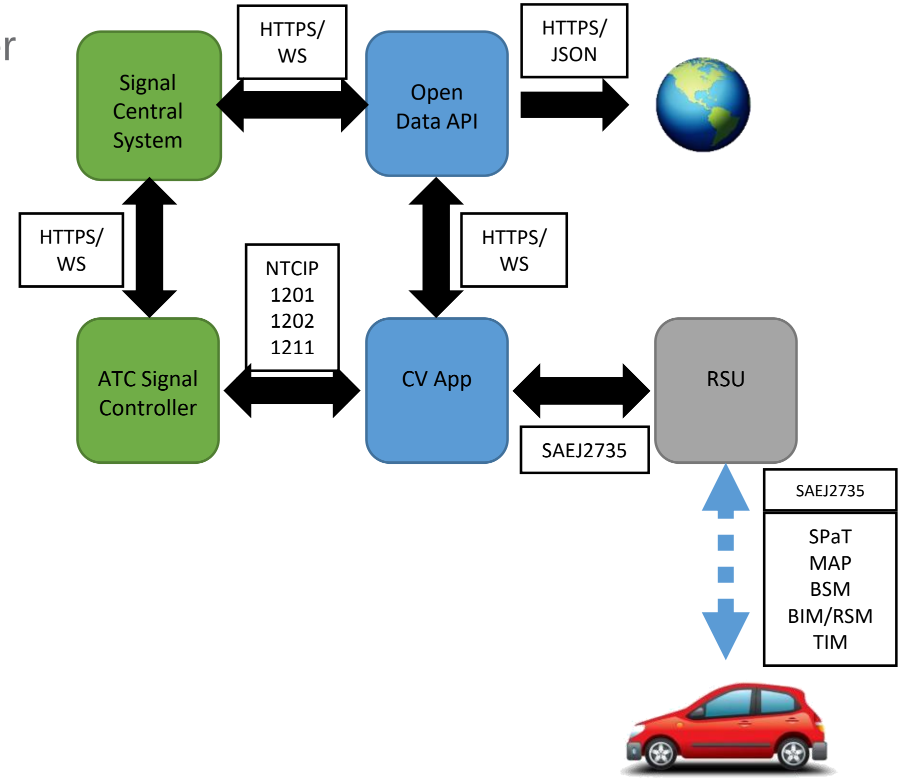
Aggregated data analytics for increased route efficiency

Increased awareness improving safety and mobility

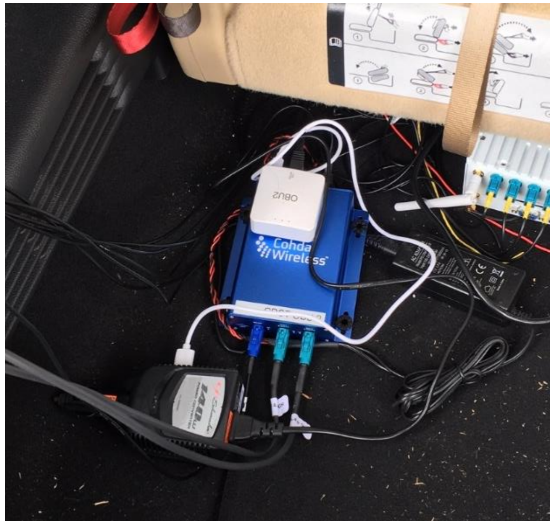
GDOT CV Architecture

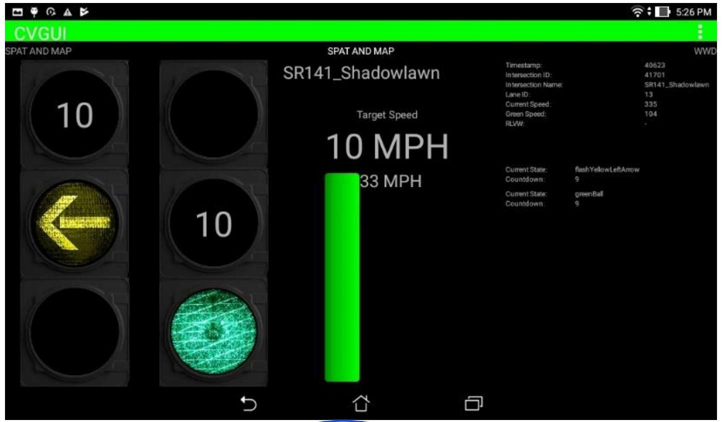
- CV Application resides on signal controller
- No additional hardware (outside of RSU) required
- Open access to third parties
- **Conformity to national standards, interoperable, and open access**





Deployment





SOUTHWEST RESEARCH INSTITUTE

MAXTIME CV

Search

Home

Status

Connected Devices

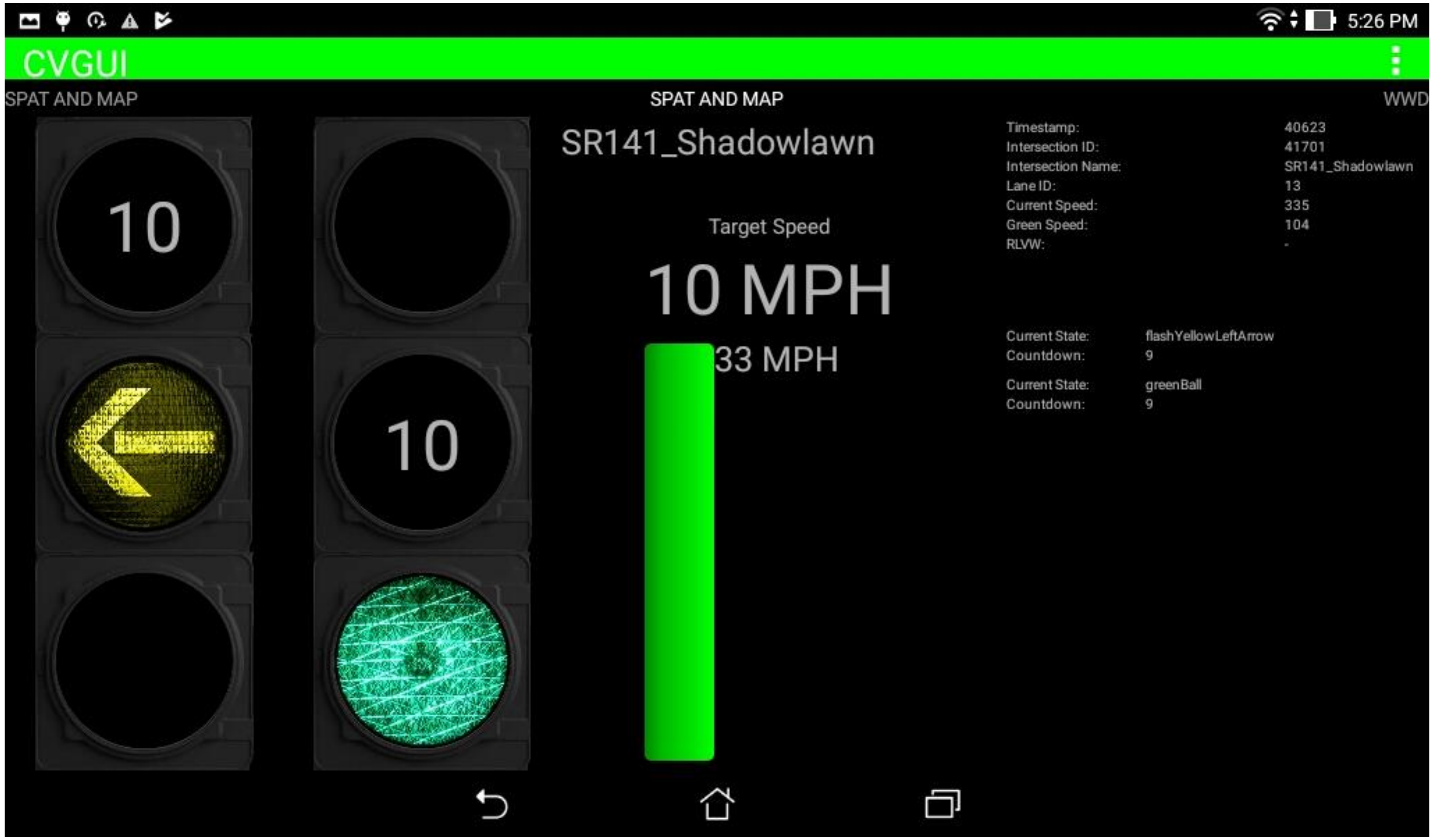
SPaT Message

MAP Message

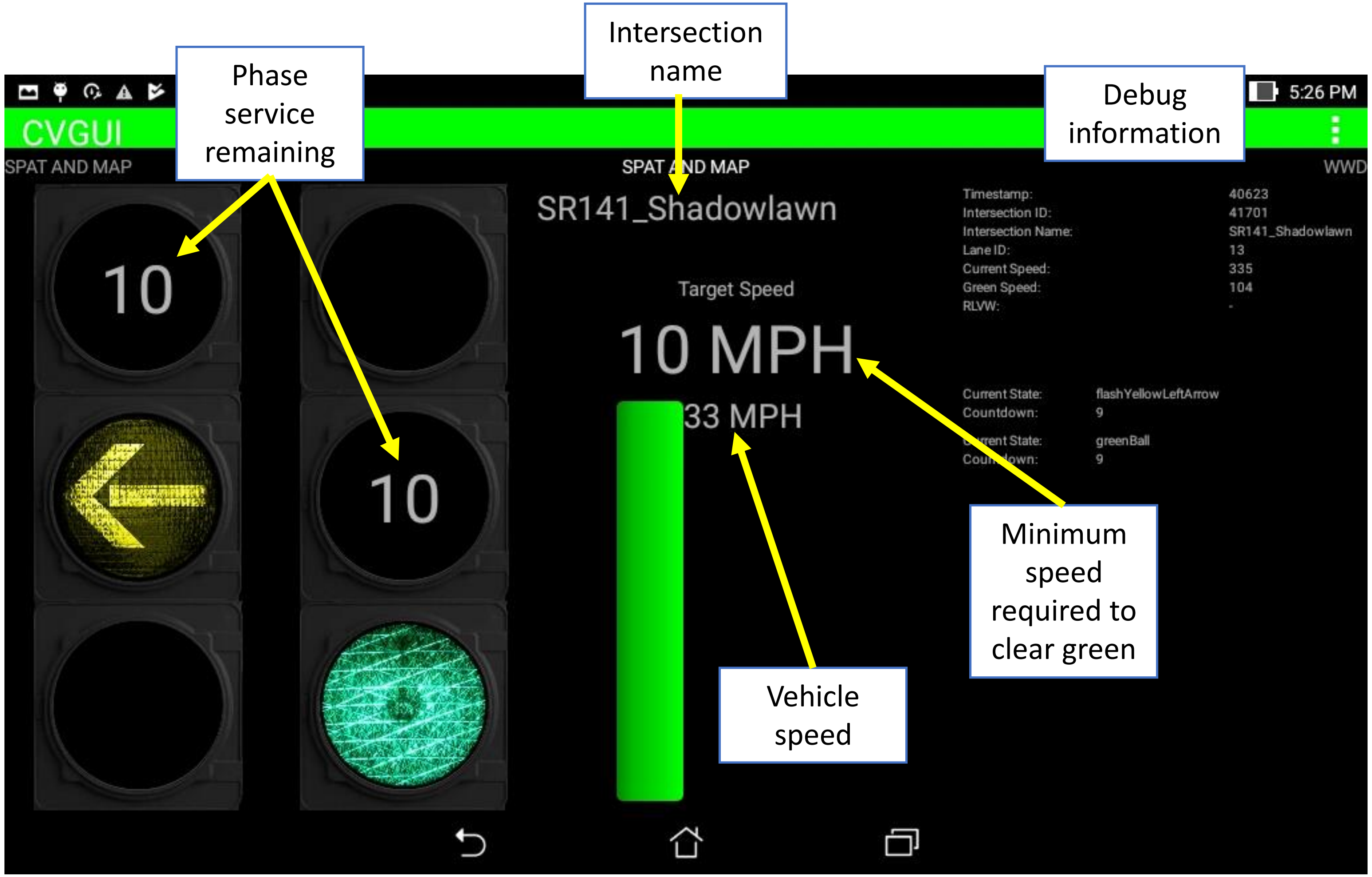
Connected Devices Status

Show All Devices

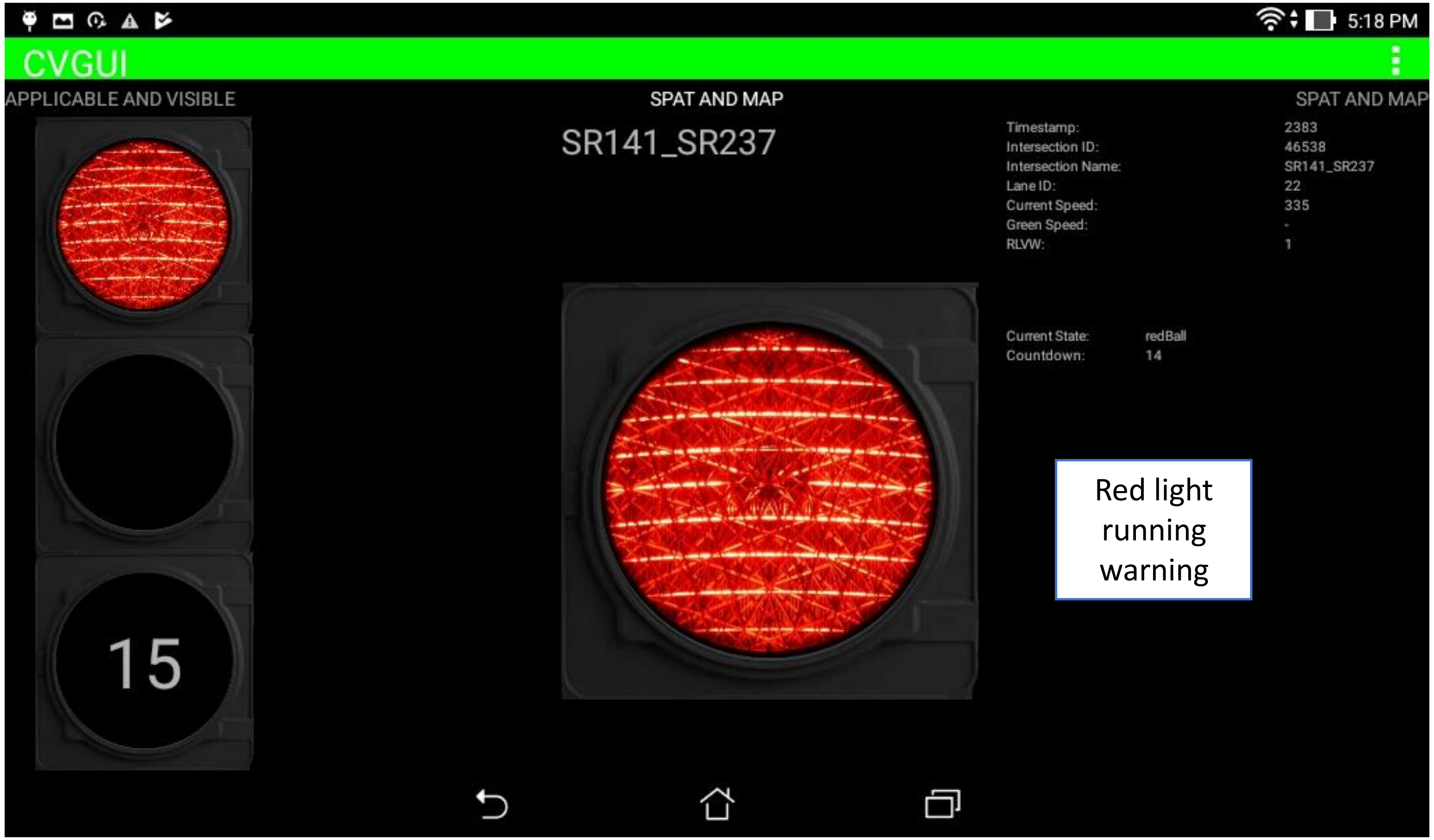
Device	Device Type	Peer ID	Connection Status
1	MaxTime	1	Connected
2	RSU 4.1 SPAT UDP	2	Connected
3	RSU 4.1 MAP UDP	3	Connected
4	RSU 4.1 TIM UDP	4	Connected
5	Generic RSU UDP	5	Connected



5:26 PM
CVGUI
SPAT AND MAP
SPAT AND MAP
WWD
10
10
SR141_Shadowlawn
Target Speed
10 MPH
33 MPH
Timestamp: 40623
Intersection ID: 41701
Intersection Name: SR141_Shadowlawn
Lane ID: 13
Current Speed: 335
Green Speed: 104
RLVW: -
Current State: flashYellowLeftArrow
Countdown: 9
Current State: greenBall
Countdown: 9



Phase service remaining
Intersection name
Debug information
CVGUI
SPAT AND MAP
SPAT AND MAP
WWD
5:26 PM
10
10
SR141_Shadowlawn
Target Speed
10 MPH
33 MPH
Timestamp: 40623
Intersection ID: 41701
Intersection Name: SR141_Shadowlawn
Lane ID: 13
Current Speed: 335
Green Speed: 104
RLVW: -
Current State: flashYellowLeftArrow
Countdown: 9
Current State: greenBall
Countdown: 9
Minimum speed required to clear green
Vehicle speed


5:18 PM
CVGUI
APPLICABLE AND VISIBLE
SPAT AND MAP
SPAT AND MAP
SR141_SR237
Timestamp: 2383
Intersection ID: 46538
Intersection Name: SR141_SR237
Lane ID: 22
Current Speed: 335
Green Speed: -
RLVW: 1
Current State: redBall
Countdown: 14
15
Red light running warning

Phase 2 Deployment

Phase 2: RTOP – June 2020

GDOT Investment +

USDOT ATCMTD Grant

1,600 traffic signals in metro Atlanta

185 ramp meter locations

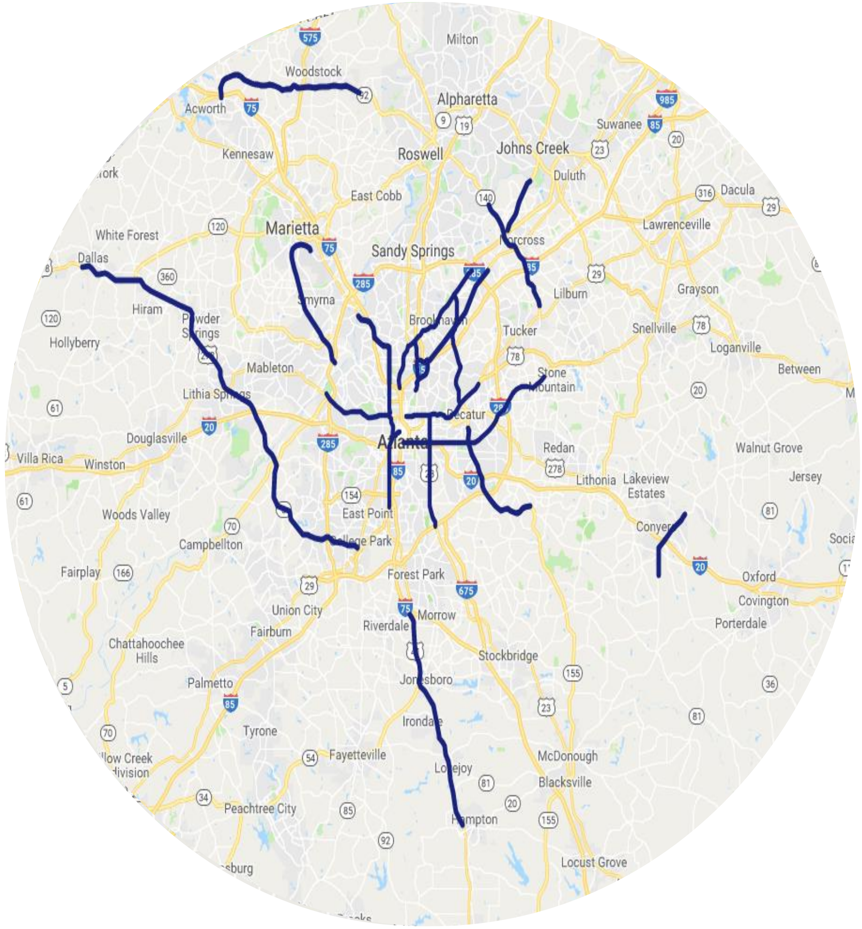
Regional deployment

- **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

Emergency vehicle preemption	Preemption at select signals to improve emergency vehicle response time
Transit signal priority	Priority requests to signal controllers for specific transit applications and routes
Freight signal priority	Signal priority for freight vehicles that are operating in cooperative platooning mode

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"

GDOT Georgia Department of Transportation

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[A,B]
- *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.[B]
  - Speeding was a factor in nearly **10,000** highway fatalities.[B]
  - Nearly **3,500** fatal crashes* involved distracted drivers.[B]
- *Commercial Vehicles:* **13 percent** of annual roadway fatalities occur in crashes involving large trucks.[B]
- In 2017, **82 percent** of victims in fatal large truck crashes were road users who were not an occupant of the truck(s) involved.[B]
- *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.[C]
- *Pedestrians:* **5,977** pedestrians were killed by motor vehicles in 2017, representing 16 percent of all motor vehicle fatalities.[B]
- *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.[A]

Sources:
A U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, September 8, 2018
B NHTSA 2017 Fatal Motor Vehicle Crashes: Overview (DOT HS 812 603)
C Beede, David, Regina Powers, and Cassandra Ingram, *The Employment Impact of Autonomous Vehicles*, U.S. Department of Commerce, Washington, DC: http://www.esa.doc.gov/sites/default/files/Employment%20Impact%20Autonomous%20Vehicles_0.pdf

* *This number is likely underreported.*

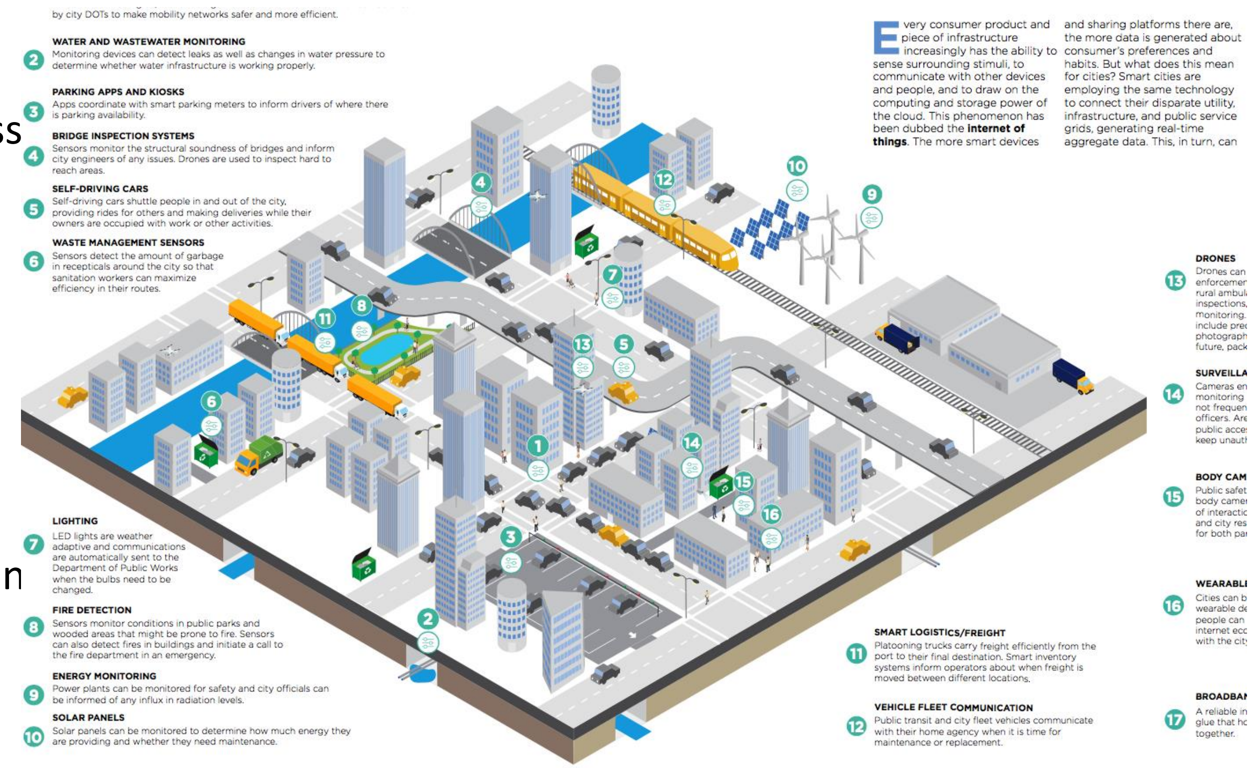
Source: USDOT Preparing for the Future of Transportation – Automated Vehicles 3.0

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



Example Technologies from Smart City Challenge

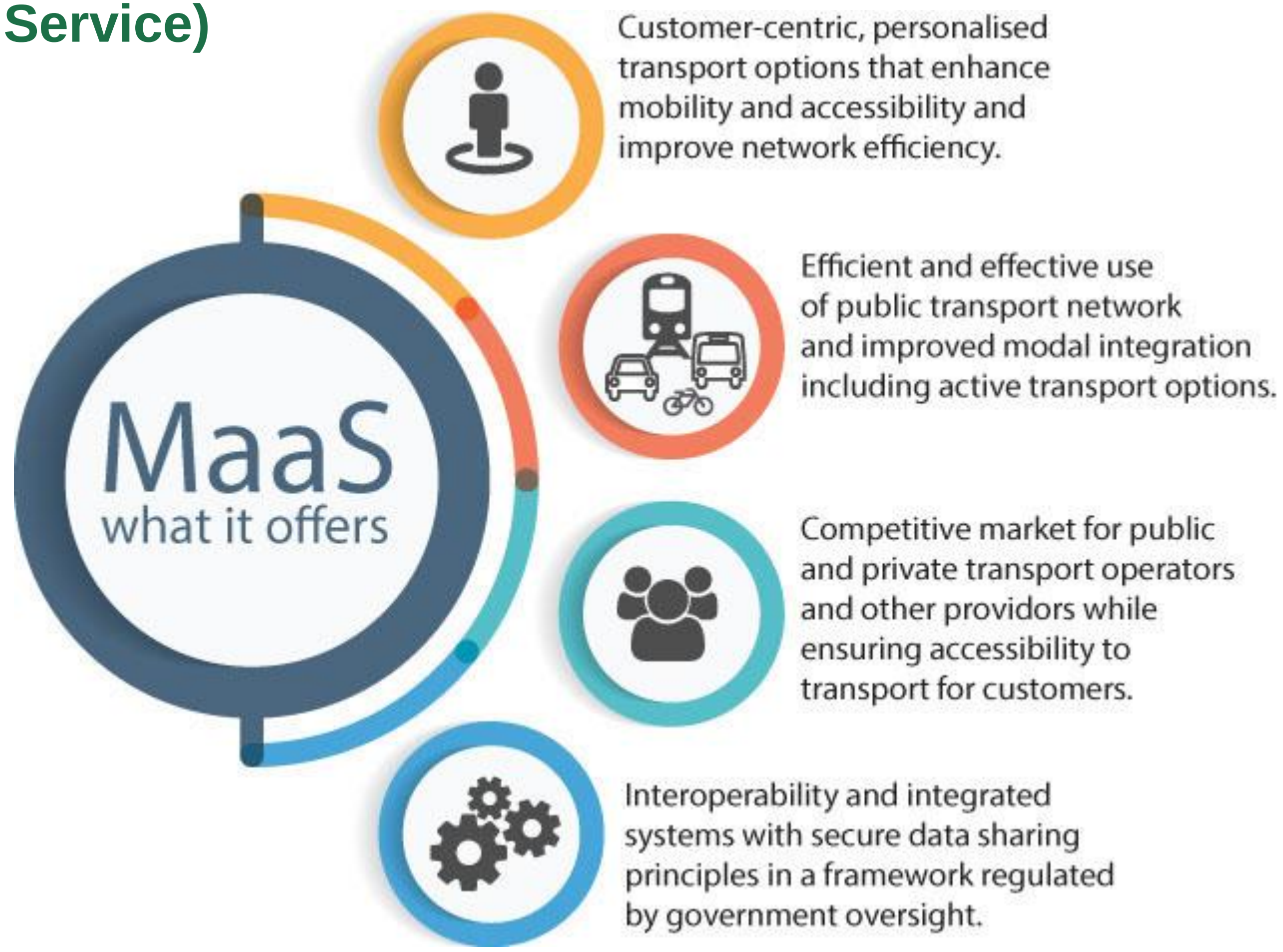
- Autonomous vehicles for first and last-mile
- Dynamic curb parking reservation and space sensing to expedite freight loading and unloading
- Improved and expanded charging systems for electric vehicles
- Connected vehicles, bicyclists and pedestrians
- Unified data analytics platforms across modes 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)



Examples of Mobility as a Service

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

Thanks!

Questions?

jhibbard@dot.ga.gov

www.dot.ga.gov

ATLANTA-REGION
TRANSIT LINK
AUTHORITY

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ADJOURN