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Hollywood, FL

TRANSPORTATION SYMPOSIUM

Connected and Automated Vehicles

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Transportation Symposium Website
SCAN ME

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Why CAV?
- CAV Program Supports Target Zero

TARGET ZERO
FATALITIES & SERIOUS INJURIES

- Target Zero focuses on influencing change in specific behaviors ***before a crash occurs.***
- CAV Program is a tool in FDOT's toolbox to prevent crashes.
- Influence driver awareness with situational alerts to avoid crashes.

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How Many CAV Projects in Florida?

As of 10/25/2024

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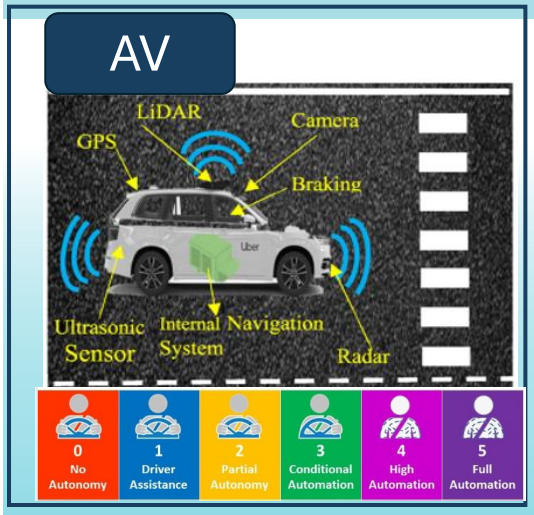
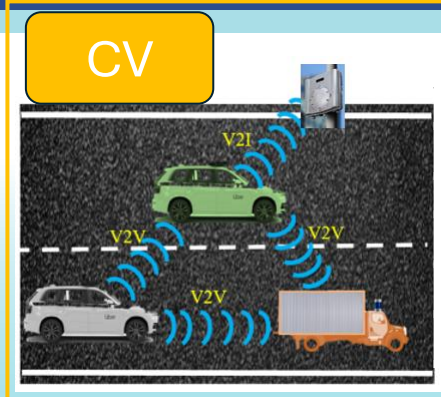
What is Connected and Automated Vehicles (CAV)?





MESSAGE SET	
Basic Safety Message	BSM
Signal Phase and Timing Message	SPaT
Map Data	MAP
Traveler Information Message	TIM
Signal Request Message	SRM
Signal Status Message	SSM

V2V -Vehicle to Vehicle
V2I -Vehicle to Infrastructure

Applications		
EVP	TSP	TIM

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Autonomous Vehicles

- All about being self sufficient
- Trying to not need infrastructure/information
- Could benefit from infrastructure
- Driven by private sector
- Supported by the Department

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Autonomous Vehicles and Florida

- Florida has been proactive in creating policies and regulations to support the operations of Autonomous Vehicles (AV) in the state. Examples of Florida Statutes for AV:
  - 316.003 – Definitions – defines automated driving systems and AVs.
  - 316.85 – AV Operations: Allows full AV to operate regardless of whether a human operator is physically in the vehicle, deems the automated driving system to be the operator of an autonomous vehicle while engaged, and addresses operations of on-demand autonomous vehicle networks.
  - 316.86 – Manufacturer Liability Exemption – addresses liabilities of a vehicle converted by a third party into AVs.
  - 316.303 (Television Receivers), 316.305 (Wireless Communication), 316.306 (School and Work Zone Wireless Communication) – exempts human operators from distracted driving laws (i.e., handheld phone usage) while the automated driving system is engaged.
  - 319.145 (Autonomous Vehicle Registration) – defines registration requirements for AVs.
  - 322.015 (Exemption from Driver License) – fully AVs are exempt from driver licenses.
  - 338.2216 (Florida's Turnpike Enterprise) – gives Florida's Turnpike Enterprise authority to advance autonomous and connected innovative transportation technologies for improving safety and mobility.
  - 339.64 (Strategic Intermodal System Plan) – mandates the consideration of infrastructure and technological improvements necessary to accommodate automated driving systems in the Strategy Intermodal System Plan.
  - 627.749 (Motor Vehicle Insurance) – outlines AVs insurance requirements.

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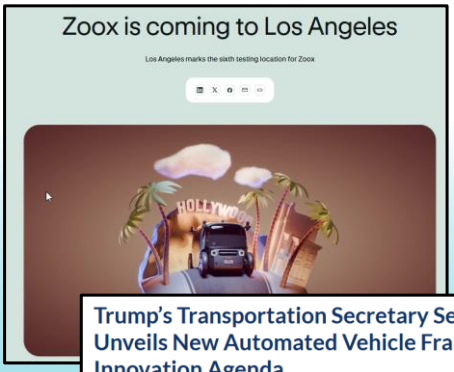
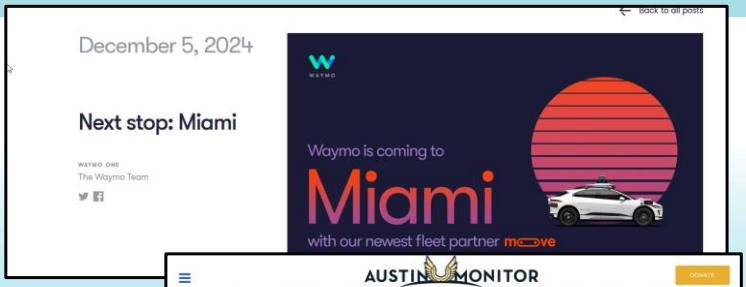
Autonomous Vehicle News





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Autonomous Vehicle

- Policy and Private sector driven
  - Florida managed risk via legislation
- Some design standards have been updated to reflect
  - Striping standards
- Conversation on data exchange
  - Construction locations
  - Lane closures
  - Signal Phasing and Timing
  - Building Information Model (BIM)
- Approved Products List is a boon
- SunTrax provides testing facility

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Connected Vehicles

- All about the communication – CONNECTING VEHICLES
- Driven by USDOT
- Reducing crashes
- Looking for a viable business model

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What are the data elements

- TIM – Warning Message
  - Road Closed Ahead
  - Apply I-95 NB 177 10pm-6am
- Map
  - EB 3 lanes, with one Left Turn
  - WB 2 lanes, dual Left Turn
- SPaT – Signal Phasing
  - Signal is red EBT
  - Signal is gren WBL

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Continued Data

- BSM – movement data → Current GPS location, Heading, speed
- SRM – Signal Request Message → I am a Fire Truck, give me the green

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Applications

- Leverage messages together to create a function
  - Emergency Vehicle Preemption
    - Know the position of a fire truck
    - Use Map to know what direction to place call to controller to activate green
    - Display the current signal status to the driver
- USDOT has a list
  - Many are undefined or have yet to actually be implemented
  - Use with care

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Applications example issues

- Pedestrian in crosswalk
  - Observe pedestrian in dangerous location
    - HOW IS THIS DEFINED
  - Generate a TIM
    - WHO GENERATES THE TIM (INFRASTRUCTURE OR VEHICLE)
  - What is the risk
    - TOO MANY ALERTS
    - TOO FEW ALERTS

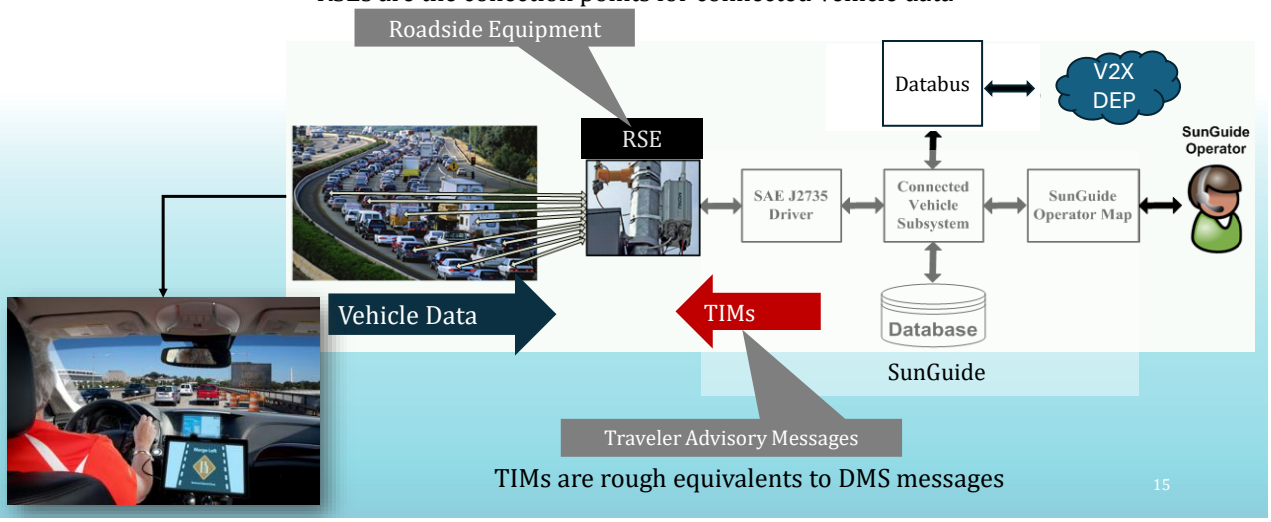
What is an RSU and OBU?

Roadside Units (RSU)

Onboard Units (OBU)

Connected Vehicle Systems in Traffic Operations

RSEs are the collection points for connected vehicle data



TIMs are rough equivalents to DMS messages

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Network versus Direct/U-U/PC-5/C-V2X

- Need BSM (position, heading, speed)
- Need way to share message (sound and image)

What other equipment can do this (Known as Network CV)

- Cell Phone
- Your car's infotainment system
- Emergency Vehicle Light Bars

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Florida's Approach

- Both Network Based and Florida is approaching with dedicated equipment and network

- Dedicated Equipment
  - High Cost of Ownership
  - Low Latency
  - Safety Critical Applications

- Network Based
  - Software Development
  - Leverages Infrastructure Data
  - High Latency
  - Latency Tolerant Applications

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Florida's Approach

- FDOT Using FL511 Application and V2V work from FTE
  - Sending Messages
    - Approaching Work Zone
    - Curve Speed Warning
    - Lane Blocking
  - Working to gather information
    - Negotiation with App Stores

- Working with Car Manufacturers to provide alerts directly into cars

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Florida's Approach

- Building out additional use cases
  - Wrong Way Driver
  - Using New signal controllers
    - Emergency Vehicle Preemption
    - Transit Signal Priority
  - Sharing information
    - Emergency Vehicle Ahead

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Florida's Approach

- Mature System
  - Security – Security Credential Management System
  - Network – Functioning Multiagency Approach, looking to be more standard
  - Enterprise Software
  - APL listed equipment
  - Enterprise Data Management – Data Exchange Platform
  - Best Practices for design to maintenance

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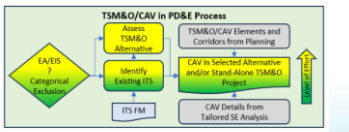
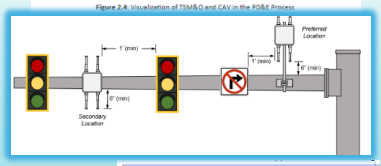
Your Role

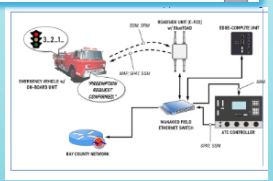
- Network - Concepts or ideas
  - Share opportunities – Concept of Operations
  - Execution via software contracts
- Direct
  - Plan, Design, Build, Operate and Maintain
  - This is where most of the work will be

Lessons Learned and Best Practices Document

Section 3: Design, Section 2: Planning and **Section 1: Intro**







1. Intro: Background, History, Purpose, Assumptions and lots of acronyms
2. Planning
   1. Statewide Planning Process
   2. District Planning Process
   3. LRTPs and MPOs/TPOs
   4. Alignment to TSM&O and ITS
3. Design
   1. Preliminary Engineering
   2. PSEMP
   3. Risk Assessment and Compliance
   4. ConOps, Validation Plan, Traceability Matrix
   5. Infrastructure (Use of existing structure, Cabinets, Power, Comms)
   6. Coordination (Stakeholder, Local Agency, Network Admins, Security and Connectivity)
   7. Other Equipment (Edge Computing, Ancillary, Mounting, Conduit and pathways)
   8. Creating a Design Plan (Plan Sheet, Installation Details, Device Summaries , DevSpecs + TSPs & MSPs)

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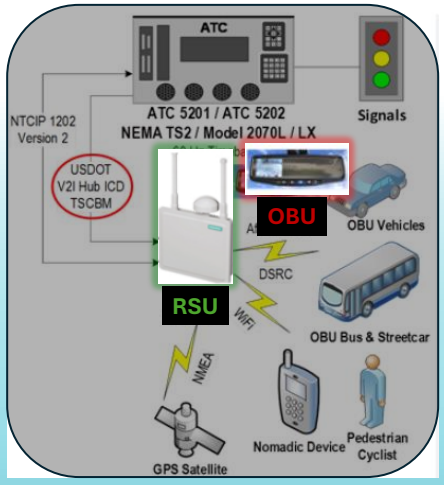
Section 4: Procurement

1. Road Side Units and Equipment
   i. Purpose, Location, Communication, Data Use and Transmission
   ii. Consideration for Materials Procurement
   iii. RSU Dev Spec 681
2. On Board Units
   i. Purpose, Location, Communication, Data Use and Transmission
   ii. Consideration for Materials Procurement
      i. Example Contracts from D7 and D5
   iii. Form Factor and Application Considerations
3. Other Devices to Consider
   i. Controller related considerations
   ii. Specialized Communication considerations for CV use
   iii. Specialized Edge Devices
   iv. Specialized Detection System



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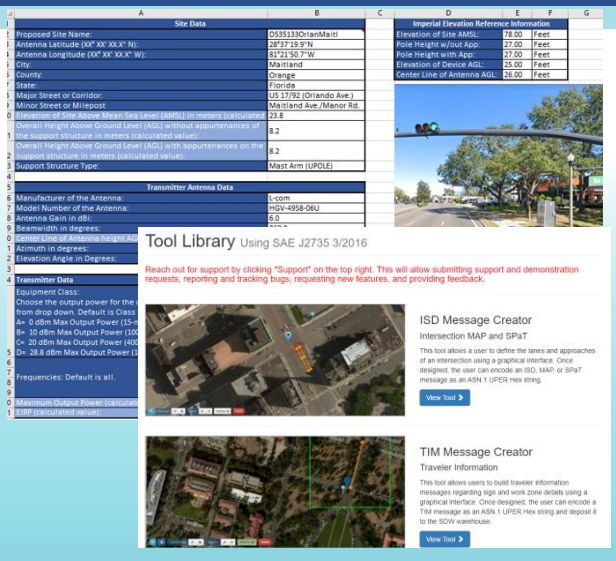
Section 5: Construction

1. Contract Types Pros and Cons
   i. Design-Bid-Build
   ii. Design-Build
   iii. Systems-Manager
   iv. RFP
2. Other Project Coordination Considerations
3. Configuration, Installation and Integration
   i. Network Access and Security
   ii. FCC Data Collection and Site Registration
   iii. MAP Development Guidance
   iv. Requirement and Processes (SCMS, RSU-HMS)
   v. Field Testing and Systems Testing
4. Documentation
   i. As-Built Information and Documentation
   ii. ITSFM Asset Form documentation



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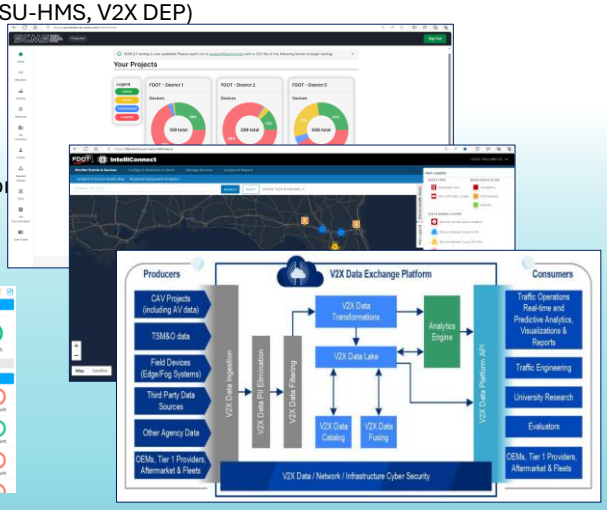
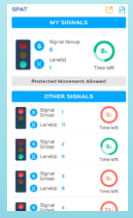
Section 6: Operation and Maintenance Considerations

1. Overview of Operational Software
   i. FDOT Statewide Software (SunGuide, SCMS, RSU-HMS, V2X DEP)
   ii. Vendor-specific Software Systems
2. Preventative Maintenance and Troubleshooting
   i. Operational Monitoring and Check
      a. Local and Remote Spot Checks
      b. Onsite Drive Tests
   ii. Useful tools for remote access and configuratio
      a. Webmin and Browser tools
      b. Terminal Program Application (PuTTY)
      c. File Transfer Applications





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SAFE SUMMER TRAVEL MONTH

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Questions

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Thank you!

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