



Next Generation Integrated Mobility:

Driving Smart Cities

www.itsworldcongress2017.org



ITS WORLD CONGRESS 2017
Montréal | OCTOBER 29 - NOVEMBER 2

Produced by



In Conjunction with



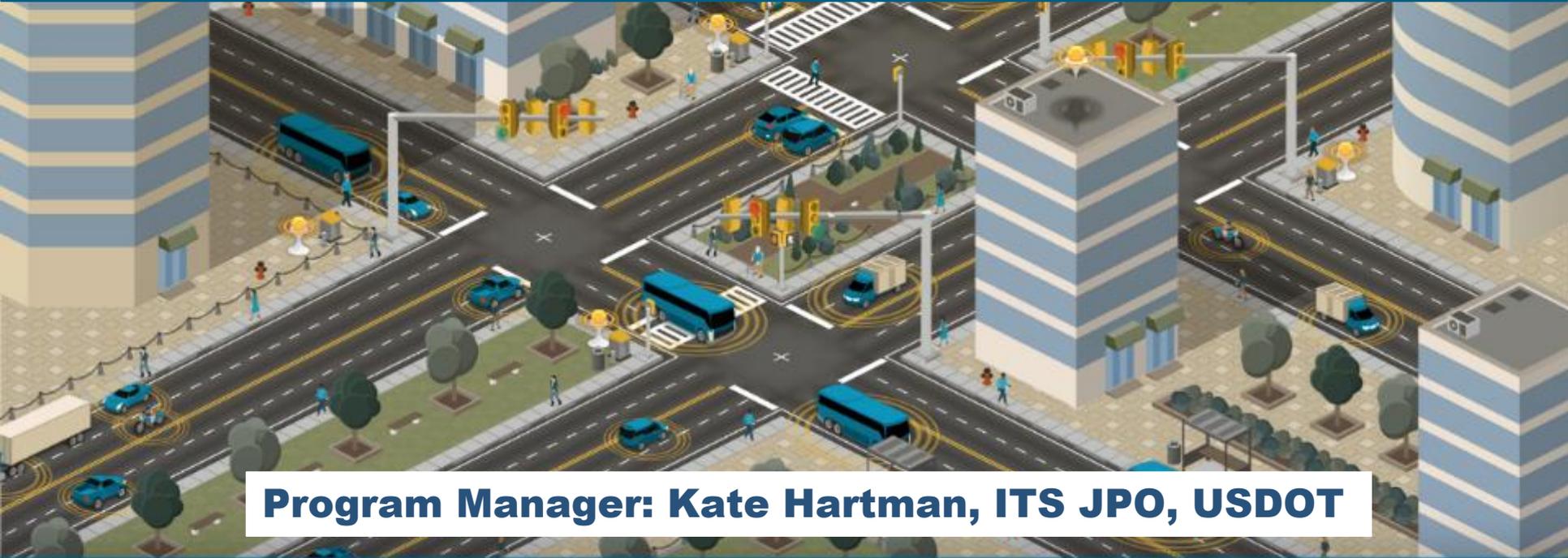
Co-organized by



CONNECTED VEHICLE PILOT Deployment Program



SESSION 2: TECHNICAL CHALLENGES AND PROPOSED SOLUTIONS



Program Manager: Kate Hartman, ITS JPO, USDOT

INTRODUCTION: OVERCOMING CHALLENGES IN DEPLOYMENT



- Deploying CV requires overcoming different types of challenges
 - Institutional and financial sustainability
 - New business models and incentive program (e.g., THEA)
 - Stakeholder interaction early and often leads to better concepts and more buy-in
 - Working across pilot deployment sites to address issues of national concern
 - Interoperability coordination (e.g., crosswalk, application identification codes)
 - Contributing to evolution of communication standards
 - Engaging new stakeholders and a broader deployment community
 - Hillsborough Community College (HCC) to perform OBU installations in Tampa
 - Sharing documentation and experiences to support other early deployers
 - Plus a wide range of technical challenges we will dive into today with key technical leaders from each Pilot site



NYCDOT



Tampa
(THEA)



WYDOT



SESSION FORMAT



- **Session Objective**
 - To discuss the technical issues and challenges related to the USDOT CV Pilot projects from the folks on the front lines

- **Panel Discussion**
 - One site engineering lead will present key technical challenges and proposed solutions, highlighting a specific topic of cross-cutting interest.
 - The other two site presenters will then join the discussion and verbally comment on addressing the specific cross-cutting topic and their site-tailored solutions.
 - There will be a Q&A time at the end of each topic discussion to get feedback from any member of the panel.
 - Repeat this format with each site taking the lead once.



TECHNICAL PANEL DISCUSSION TOPICS



- Security and Privacy Challenges
 - Bob Rausch, Deployment Lead, New York City Department of Transportation (NYCDOT) Pilot Project
- Data Management and Data Sharing
 - Tony English, System Design Lead, Wyoming Department of Transportation (WYDOT) Pilot Project
- Certification and Device/Application Development
 - Steve Novosad, System Design Lead, Tampa Hillsborough Expressway Authority (THEA) Pilot Project



NYCDOT



Tampa (THEA)



WYDOT





ITS WORLD CONGRESS 2017

Montréal | OCTOBER 29 - NOVEMBER 2

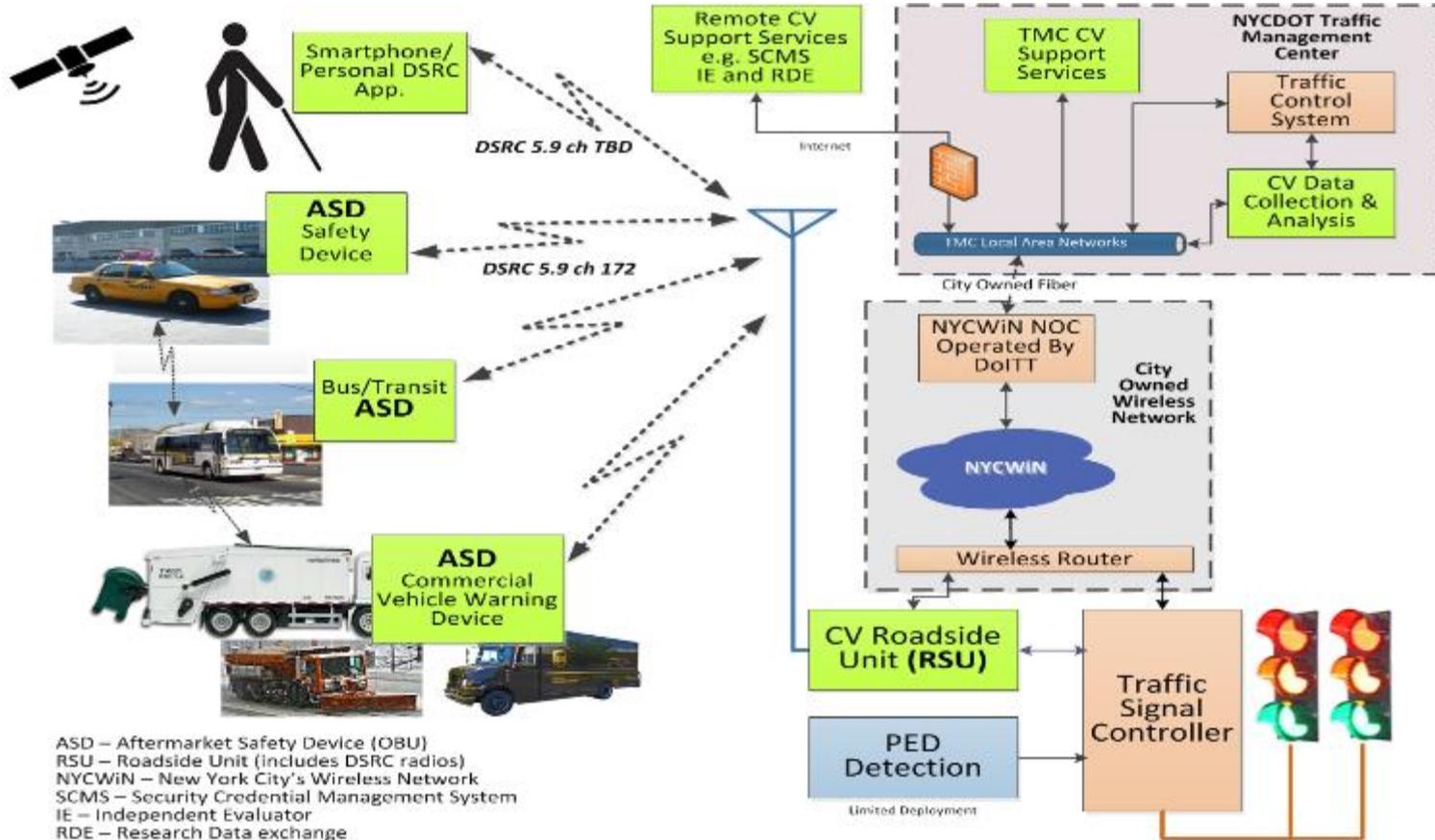
www.itsworldcongress2017.org

Bob Rausch

Transcore

**Technical Panel Discussion:
Security and Privacy Challenges**

OVERALL PROJECT CONCEPT



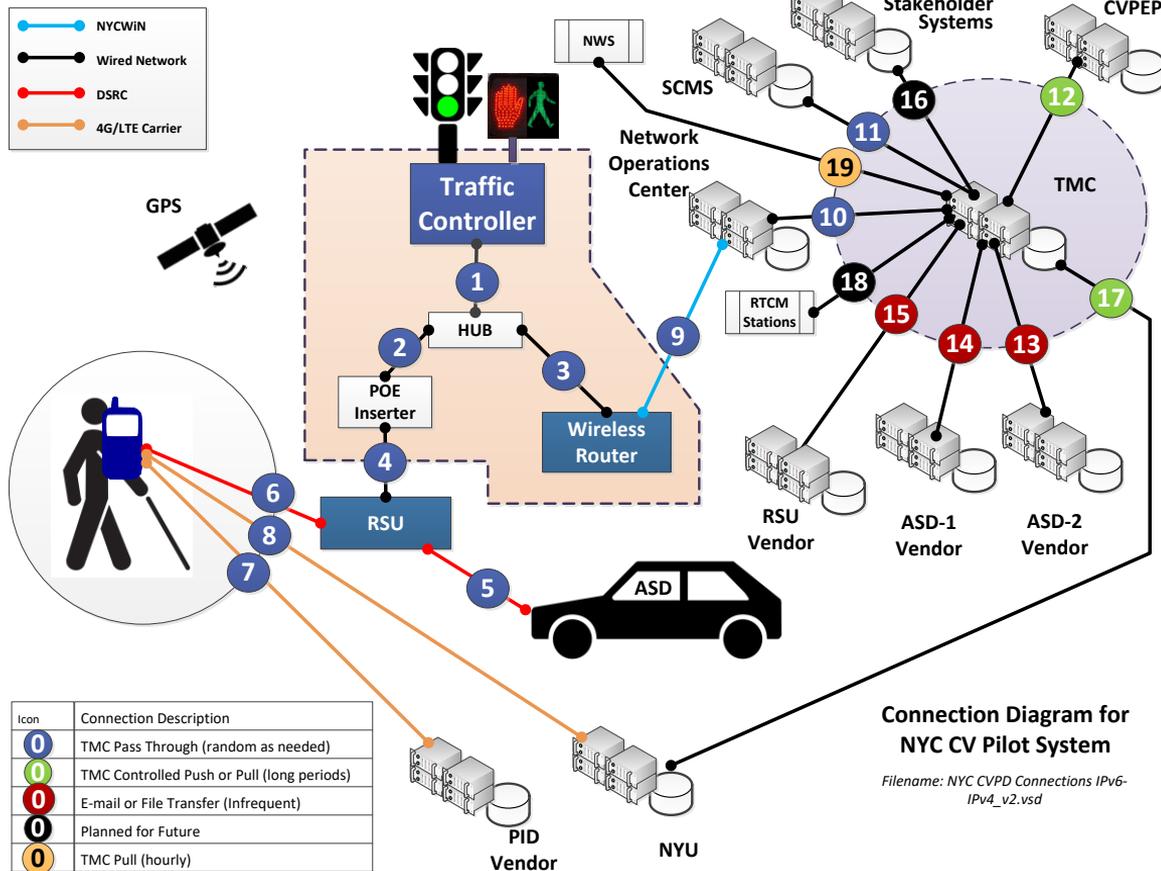
SYSTEM ARCHITECTURE – SECURITY CHALLENGE



- Security is a major Issue
 - Each link must be secure and prevent intrusion
 - Each media has different issues

- The CV SCMS only addresses some of the links

- The overall Security Plan (design) must address all of the links!



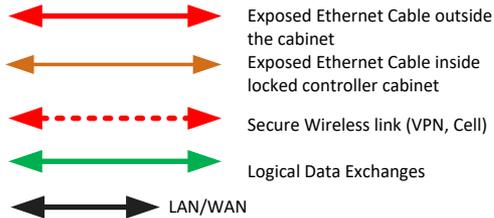
ISSUE – THE ASC-TMC-RSU NETWORK EXCHANGES



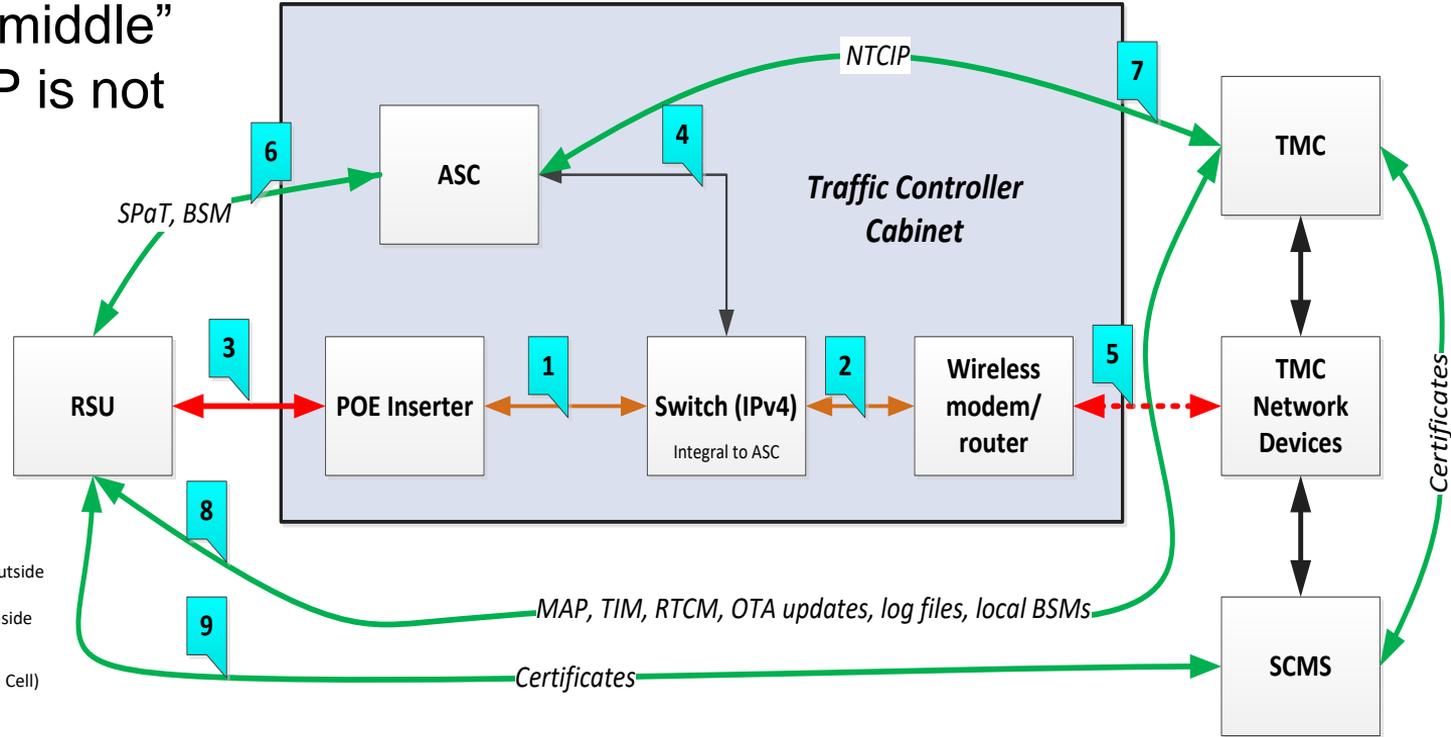
- Protect the exposed links from “man in the middle” corruption; NTCIP is not secure!

■ Integrity:

- DTLS 1.2 per RFC 6347
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA



Security Context for Traffic Controller Infrastructure



ISSUE – PRIVACY PROTECTION FOR COLLECTED DATA



- **Stakeholders fear “big brother”**
 - CV data used for fault determination
 - CV data used to discipline Drivers or to force remediation
- **Balanced with the need for data collection for analysis!**

- **Solution: limited data collection**
 - Only collect data surrounding an “event” – defined as an alert or warning
 - Encrypt Data onboard the vehicle
 - Purge all data after 48 hours (in case of impound)
 - Encrypted data is only decrypted at TMC – **or by vehicle owner!**
 - Uploaded data [to TMC] is immediately processed [daily]
 - Normalized, Obfuscated, Aggregated



ISSUE – CERTIFICATE LIFE



- At the time of our ConOps and design, the Security Credential Management System was still under design.
- Today
 - there is no specification for Misbehavior Detection
 - There is no automation to the certificate revocation activity
 - It will be many months before the security suite is complete
- While the Certificate Revocation List distribution is available, without the above, bad actors are a threat to the system.
- Adopted a 1 week certificate download
- Requested that the SCMS recognize this as a limitation for our Enrollment Certificates
- Bad actors can only exist for up to 2 weeks.

- This is consistent with the approach for the RSU and the CRL updates!





Panel Discussion and Q&A

Topic: Security and Privacy Challenges





ITS WORLD CONGRESS 2017

Montréal | OCTOBER 29 - NOVEMBER 2

www.itsworldcongress2017.org

Tony English

Trihydro Corporation

**Technical Panel Discussion:
Data Management and Data Sharing**



PILOT ELEMENTS



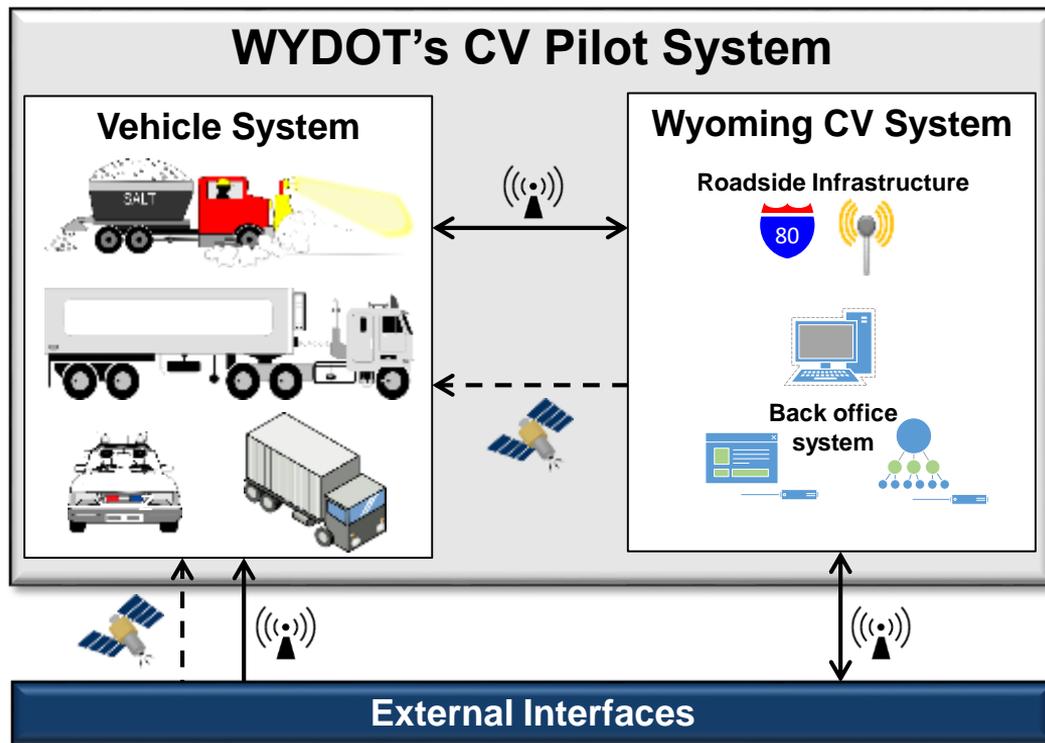
CV Environment
75 Roadside Units on I-80
400 Vehicles with DSRC Connectivity



V2V Applications
Forward Collision Warning
Distress Notification



V2I Applications
Situational Awareness
Spot Weather
Work Zone Warning



VEHICLE SYSTEM



All vehicles that are part of the vehicle system will have:

- Ability to share information via DSRC with connected devices (vehicles and RSUs)
- Ability to broadcast Basic Safety Message Part I
- Ability to receive Traveler Information Messages (TIM)
- Human-Machine Interface (HMI) to communicate alerts and advisories to driver



Vehicle Sub-Systems

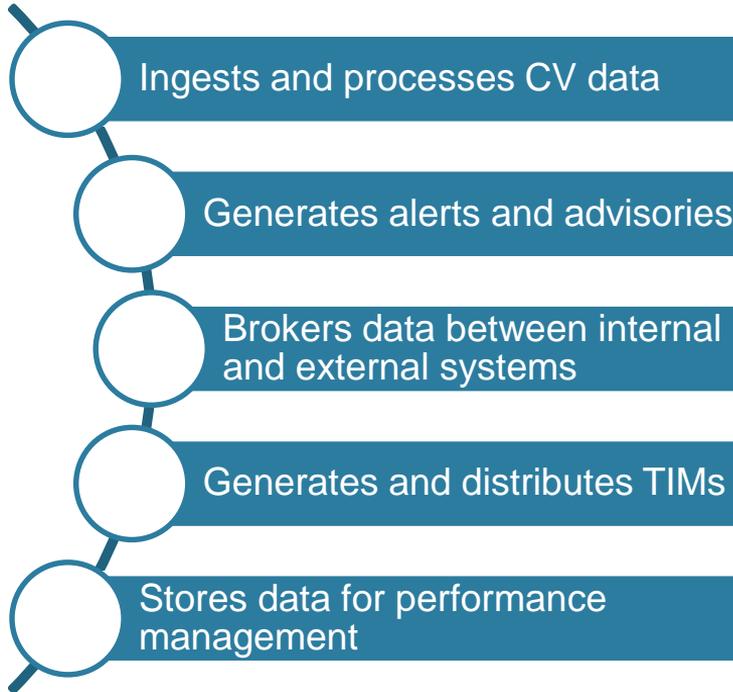
1. WYDOT Fleets
2. Integrated Trucks
3. Retrofit Vehicles
4. Basic Vehicles

On-board Vehicle Technologies

- OBU with DSRC only
- OBU with DSRC and Satellite Receiver
- Human Machine Interface
- CAN Bus Integration (selected vehicles)
- Environmental Sensors (selected vehicles)



SYSTEM OVERVIEW – WYOMING CV SYSTEM



Wyoming CV Pilot System

External Interfaces

- US DOT Interfaces (e.g. SCMS)
- WYDOT Interfaces (e.g. ATMS and ATIS Systems at the TMC)
- Weather

CV Subsystems

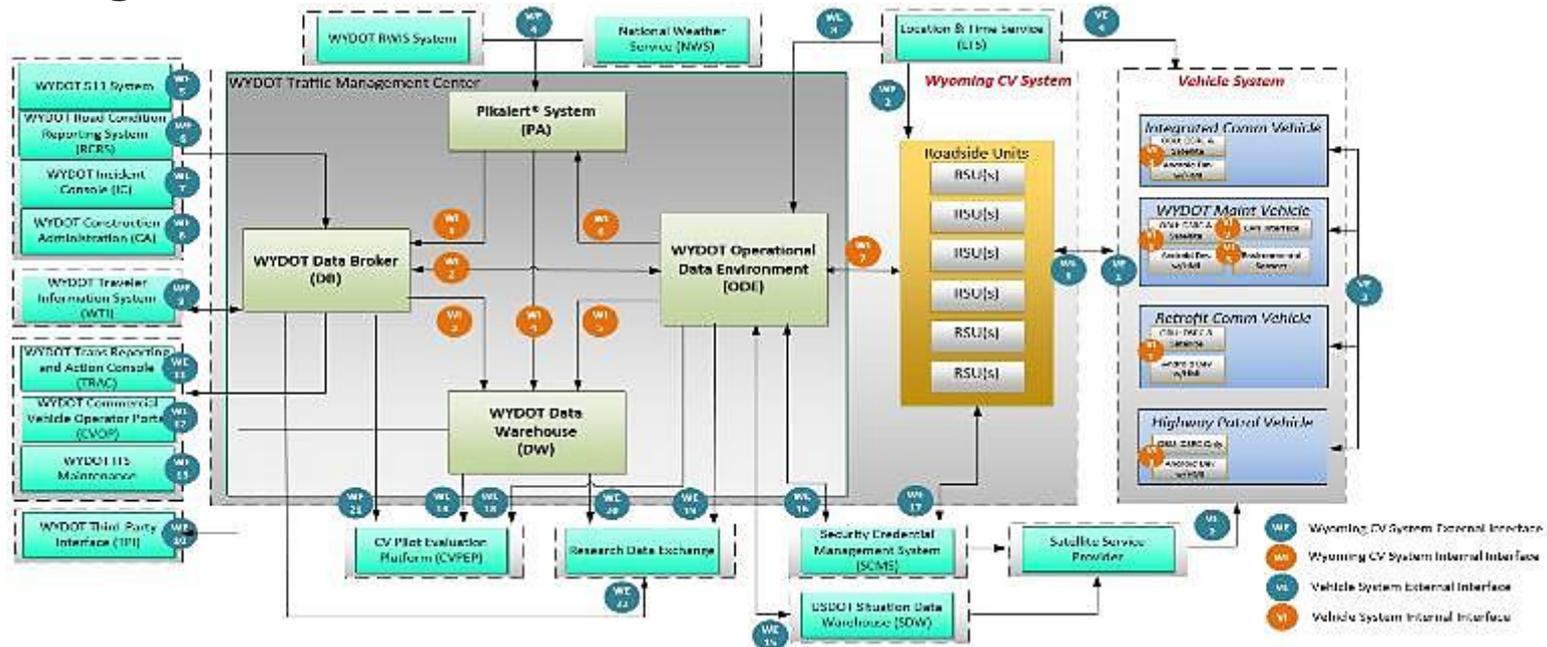
- Roadside Units
- Operational Data Environment
- Pikalert® System
- WYDOT Data Broker
- WYDOT Data Warehouse



SYSTEM OVERVIEW – WYOMING CV SYSTEM



Back-office functions located at the Wyoming Transportation Management Center



THE ODE IS THE TMC SUPER HIGHWAY FOR CV DATA



- ASN.1 (UPER/COER)
- BSM
- TIM (SAT/RSU)
- Driver Alerts
- Distress Notifications
- 1609.2 (with HSM)
 - Signature Validation and Message Signing
- Open source / developed in the open solution (HSM/encode/decode/1609.2)
 - github.com/usdot-jpo-ode/jpo-ode
- CV-PEP/RDE/SDW/SDC interfaces included





Panel Discussion and Q&A

Topic: Data Management and Data Sharing





ITS WORLD CONGRESS 2017

Montréal | OCTOBER 29 - NOVEMBER 2

www.itsworldcongress2017.org

Steve Novosad

HNTB

**Technical Panel Discussion:
Certification and Device/Application Development**

CERTIFICATION AND DEVICE/APPLICATION DEVELOPMENT



- Evolving standards
- Security
- Interoperability
- Application maturity not as evolved as expected
- Lack of information on legacy equipment
- Use of non-CV technology as part of solution
- Data
- Project Delivery - Depth



CERTIFICATION



- Concurrent Evolution
 - Security Credential Management System
 - Certified test labs
 - Certified test tool suites
 - Application development
- Support
- Changing certification requirements
- Interoperability





DEVICE/APPLICATION DEVELOPMENT

- Specifications/Standards
- Existing V2V apps
- New V2I app development
- Integration
 - Apps on a device
 - Infrastructure and Vehicle
- Integrating Security
- Updating OBUs
- Interoperability





Panel Discussion and Q&A

Topic: Certification and Device/App Development



STAY CONNECTED



Stay with Us to Learn More about Technical and Evaluation Aspects

- 3:30 – 5:00 PM
 - Session 3 - Evaluating Performance and Long-Term Sustainment

Visit USDOT Exhibition Booth

- USDOT Booth #1301
- Talk to the Pilot Site Representatives
 - October 31, 2017, 2:00 PM – 5:00 PM
 - November 1, 2017, 9:00 AM – 12:00 PM



NYCDOT



Tampa (THEA)



WYDOT

Contact for CV Pilots Program/Site AORs:

- Kate Hartman, Program Manager, Wyoming DOT Site AOR; Kate.hartman@dot.gov
- Jonathan Walker, NYCDOT Site AOR Jonathan.b.Walker@dot.gov
- Govind Vadakpat, THEA Site AOR G.Vadakpat@dot.gov

Visit CV Pilot and Pilot Site Websites for more Information:

- CV Pilots Program: <http://www.its.dot.gov/pilots>
- NYCDOT Pilot: <https://www.cvp.nyc/>
- Tampa (THEA): <https://www.tampacvpilot.com/>
- Wyoming DOT: <https://wydotcvc.wyroad.info/>

