

# Vehicle to Infrastructure Deployment Coalition V2I DC

Final Phase 1 Webinar

3:30 – 4:30 PM (Eastern) | February 13, 2017

# Webinar Logistics

- All lines are muted
- Webinar will be recorded
- Submit questions and comments in chat or Q&A section of webinar window
- Questions will be answered at webinar conclusion

# Agenda

- Introduction
- Welcome and V2I DC Milestones
  - Shailen Bhatt, Colorado DOT
- Key Outcomes from V2I DC
  - Greg Larson, Caltrans
  - Matt Smith, Michigan DOT
  - Ed Seymour, TTI
- Future V2I DC Work
  - Dean Deeter, Athey Creek Consultants
- Q&A

# Welcome and V2I DC Milestones

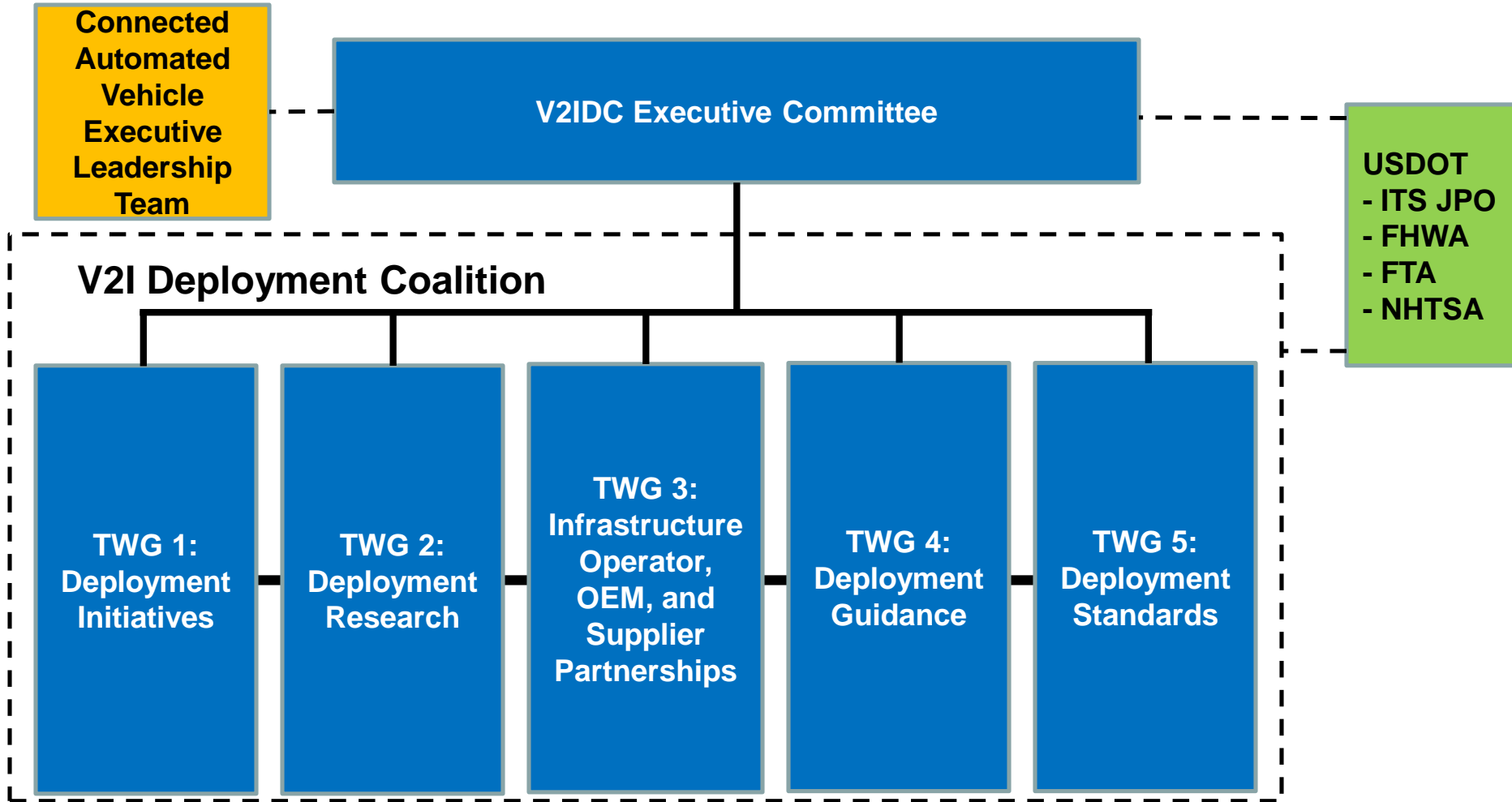
Shailen Bhatt, Colorado DOT  
Chair of V2I DC Executive Committee

# Initial Goal of V2I DC

To help accelerate V2I deployments that support passenger vehicles, freight and transit in both urban and rural areas, with initial focus on:

1. Intersections (signalized/unsignalized)
2. Queue warnings
3. Work zone management
4. Curve warning systems

# V2I DC Structure



# V2I DC Work on Deployment Issues

Issue	TWG 1 Initiatives	TWG 2 Research	TWG 3 Partners	TWG 4 Guidance	TWG 5 Standards
Issue 1: V2X Applications	P	S	P	S	S
Issue 2: Complementary Communications to DSRC	No action was taken on this issue during Phase 1				
Issue 3: V2I Data	N	S	P	N	S
Issue 4: Patents-Intellectual Property	No action was taken on this issue during Phase 1				
Issue 5: Security	No action was taken on this issue during Phase 1				
Issue 6: V2I Outreach	N	S	N	P	S
Issue 7: Understanding the Benefits and Costs of V2I Deployment and Operation	S	S	P	S	N
Issue 8: V2I Standards	N	N	N	N	P
Issue 9: Understanding V2I Liability Assignment	No action was taken on this issue during Phase 1				
Issue 10: V2I Synergies with Other Emerging Technologies	No action was taken on this issue during Phase 1				
Issue 11: V2I Consumer Messaging	N	N	N	P	N
Issue 12: V2I Multimodal Applications	No action was taken on this issue during Phase 1				
Issue 13: Infrastructure Processes as V2I Obstacles	P	N	N	S	N
Issue 14: Federal V2I Policy Statement	P	N	N	S	N
Issue 15: Maintaining V2I Infrastructure	P	N	N	N	N
Issue 16: Operator and OEM Goals for V2I	N	N	P	N	N

# V2I DC Key Events

Coalition Webinar 1	May 7, 2015
Coalition Workshop 1 (Pittsburg, PA)	Jun 4-5, 2015
Executive Committee Standup & Meeting 1	Sep 9-10, 2015
Coalition Webinar 2	Nov 5, 2015
Coalition Workshop 2 (Detroit, MI)	Apr 20-21, 2016
Executive Committee Meeting 2	Apr 22, 2016
Infrastructure Owner Operator/OEM Workshop	Sep 22-23, 2016
Executive Committee Meeting 3	Dec 6, 2016
<b><i>Final Phase 1 Webinar</i></b>	<b><i>Feb 13, 2017</i></b>



# V2I DC Deliverables

Tech Memo 1: V2I Deployment Issues	Jun 18, 2015
Tech Memo 2: Workshop 1 Findings & Progress	Oct 5, 2015
Tech Memo 3: Business Plan & Progress	Mar 17, 2016
Tech Memo 4: Phase 1 Final Report	Jan 31, 2017

***[www.transportationops.org/V2I/V2I-overview](http://www.transportationops.org/V2I/V2I-overview)***

# Key Outcomes from V2I DC

V2I DC TWG Chairs

Greg Larson, Caltrans

Matt Smith, Michigan DOT

Ed Seymour, TTI



# Key Outcome: SPaT Challenge

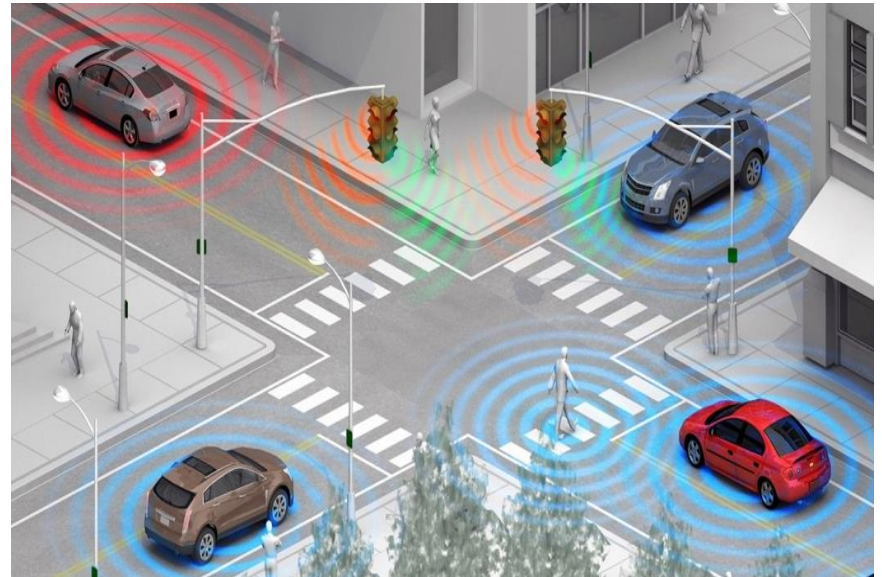
Greg Larson, Caltrans

# SPaT Challenge

## What is SPaT?

A Signal Phase and Timing (SPaT) message defines the current intersection signal light phases

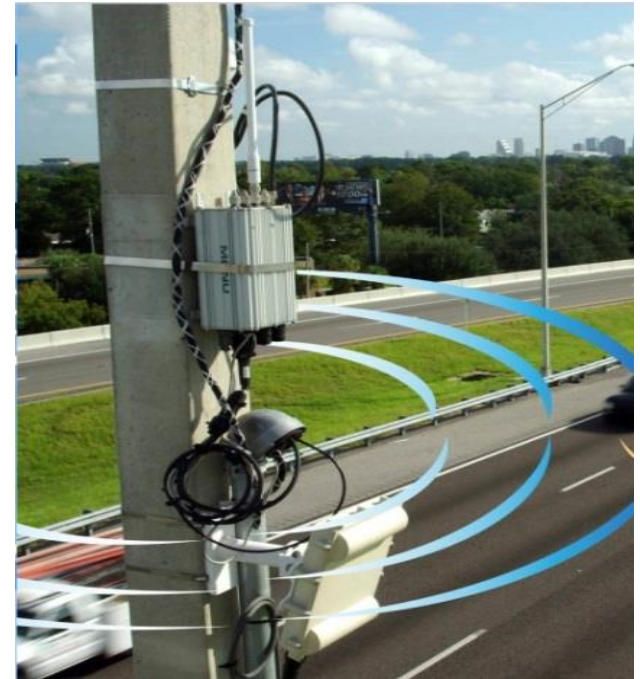
Current state of all lanes at intersection are provided, as well as any active pre-emption or priority



# SPaT Challenge

## What is the Challenge?

To challenge state and local public sector transportation IOOs to cooperate together to achieve deployment of DSRC infrastructure with SPaT broadcasts in at least one corridor or network (approximately 20 signalized intersections) in each state by January 2020



# SPaT Challenge

## Why do this Challenge?

To provide IOOs with an entry into DSRC-based V2I deployment and gain valuable procurement, licensing, installation, and operation experience, which in turn will:

- Lay ground work for more advanced V2I deployments
- Show a commitment to OEMs and applications developers
- Analogous to early fiber deployments – most benefits came later



# SPaT Challenge

## What are the benefits?

- Be more prepared for DSRC-equipped vehicles and on-board V2I applications
- Useful as testing site for future applications
- Other V2I applications that build on SPaT at intersections:
  - Smart Transit Signal Priority
  - Red Light Violation Warning
  - Intelligent Signal Systems
  - Eco-Driver



# SPaT Challenge

## What resources will be available?

The screenshot shows the NCoE website with a navigation menu and a main content area. The navigation menu includes links for Home, About, Contact Us, SHRP2, and social media icons for Twitter and LinkedIn. There are also buttons for Login, Subscribe, and Search. The main content area is titled "RESOURCES" and contains a list of resources compiled by members of the V2I Deployment Coalition. A sidebar on the right lists the resources in a hierarchical menu.

**NCoE** National Operations Center of Excellence  
Your Transportation Operations Resource

Home About Contact Us SHRP2 Login Subscribe

KNOWLEDGE CENTER DISCUSSION CALENDAR TSM&O RESOURCES WHY TSM&O? NEWS BLOG

Home

### RESOURCES

The following resources have been compiled or created by members of the V2I Deployment Coalition and are available or will soon be available.

- [Resource #1: DSRC licensing information](#)
- [Resource #2: Implementation guidance](#)
- Resource #3: Estimated costs (install & maintenance) - *Coming Soon*
- Resource #4: Sample SPaT documentation - *Coming Soon*
- [Resource #5: Guidelines for selecting corridors](#)
- Resource #6: Procurement Guidance - *Coming Soon*
- Resource #7: Identifying existing funding sources to consider - *Coming Soon*
- [Resource #8: Frequently Asked Questions \(FAQs\)](#)
- Webinar Schedule and Recordings - *Coming Soon*
- [Additional Links](#)

> SPaT Home

> Resources

- > Resource #1: DSRC licensing information
- > Resource #2: Implementation guidance
- > Resource #5: Guidelines for selecting corridors
- > Resource #8: Frequency Asked Questions (FAQs)
- > Additional Links

> Contact Us



# Key Outcome: V2I Research Definitions

Greg Larson, Caltrans

# V2I Research Definitions

1. Research Definition for Cooperative Vehicle-Infrastructure Situational Awareness System
2. Research Definition for Readiness Assessment of Connected Vehicle (CV) Applications in the OSADP
3. Research Definition for How to Prepare TIM Responders for a Connected Vehicle / Automated Vehicle World

# V2I Research Definitions

4. Research Definition for I2V for Automated Vehicle Navigation
5. V2I Outreach (One-Stop Shop for Research)
6. Research Definition for Cost-Effectiveness Assessment of Vehicle to Infrastructure Applications
7. Research Definition for Planning Analysis Methods for Assessing the Mobility and Reliability Impacts of Connected and Autonomous Vehicles

# Key Outcome: Engaged a Unified Coalition

Matt Smith, Michigan DOT

# Engaged a Unified Coalition

- V2I DC has grown to over 250 members with transportation and technical professionals from public and private sectors
  - Organized a unified message regarding DSRC bandwidth needs and issues
  - Reviewed and commented on V2I Deployment Guidance and products for USDOT
  - Learned about outcomes and findings of V2I research and demonstrations

# Key Outcome: IOO/OEM Workshop

Matt Smith, Michigan DOT

# IOO/OEM Workshop

- Initial two-day workshop held Sep 22-23
- Long-term collaboration framework established
- Technical needs identified
- General consensus to:
  - Proceed with a “forum for collaboration”
  - Forum will function within V2IDC structure

# IOO/OEM Workshop

- IOO Representatives
  - Matt Smith, MDOT – Overall IOO State Lead
  - Faisal Saleem, MCDOT – Overall IOO Local Co-Lead
  - Ahmad Jawad, RCOC – Arterial Apps
  - Blaine Leonard, UDOT – AASHTO STSMO CAV TWG Chair
  - Melissa Lance, VDOT – CV PFS Lead
  - Greg Larson – Caltrans
  - Ed Seymour, TTI and Standards



# IOO/OEM Workshop

- OEM/CAMP Representatives
  - Mike Shulman, Ford (CAMP) – Overall OEM Lead
    - ❖ Jay Parikh, CAMP
    - ❖ Others as appointed by CAMP (including Nissan, Volvo, etc.)
  - Ed Bradley, Toyota (Outside CAMP)
  - Other OEM participation with USDOT support
- USDOT
  - FHWA – Bob Arnold, Bob Rupert
  - ITS JPO – Bob Sheehan, Jonathan Walker
  - TFB FHWA – Brian Cronin, Carl Andersen, Gene McHale

# IOO/OEM Workshop

## Approach for initial 90 days

- IOO and OEM individual participation
  - ❖ Invitation only – not open to entire V2I DC
- Ad-hoc focus area groups
  - ❖ SPaT Challenge / RLWV
  - ❖ Data Exchange
  - ❖ Cooperative Automation (e.g. Eco-Drive, MMITSS)
- Ad-hoc groups report back to full forum

# IOO/OEM Workshop

## Progress during initial 90 days

### SPaT / RLVW Group

#### IOO members:

- Blaine Leonard
- Bill Legg
- Matt Smith
- Faisal Saleem

#### Webinars:

- Oct 26
- Dec 15

### Data Exchange Group

#### IOO members:

- Matt Smith
- Greg Larson
- Melissa Lance
- Bill Legg

#### Webinars:

- Dec 12

### Cooperative Automation / Eco- Drive

#### IOO members:

- Ahmad Jawad
- Matt Smith
- Faisal Saleem
- Greg Larson
- Bill Legg

#### Webinars:

- Dec 16

# IOO/OEM Workshop

## Approach for next 12 months

- Continue the Key Focus Areas:
  - SPaT/RLVW
  - Reduced Speed Zone Warning (RSZW)
  - Eco-Drive
  - Data Exchanges

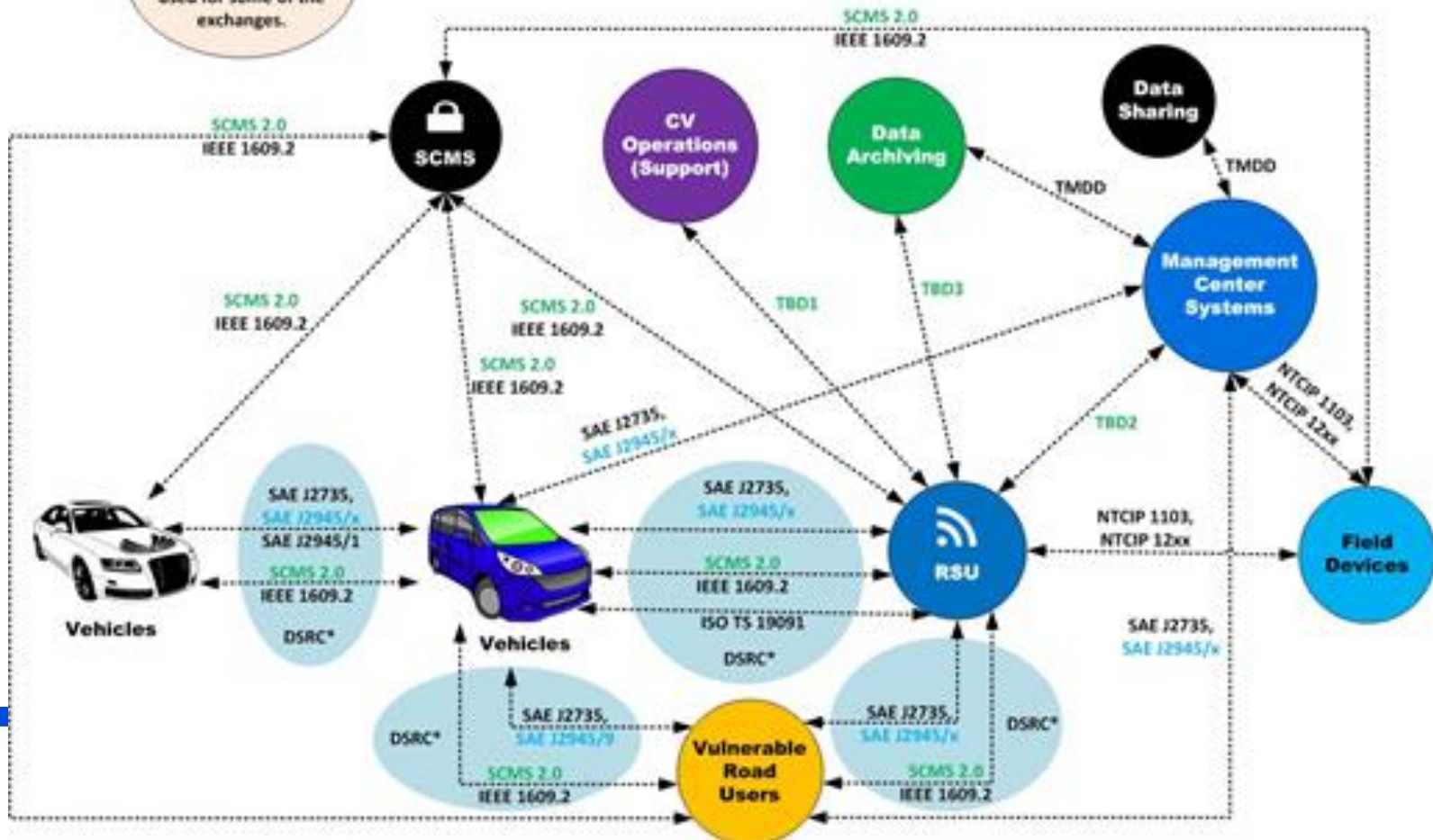
# Key Outcome: Standards Context and Recommendations

Ed Seymour, TTI

# Standards Context and Recommendations

**LEGEND:**  
 Existing standard  
 Proposed information standard  
 Proposed performance standard

\* DSRC shown (IEEE 1609.x, 802.11p). Other media may be used for some of the exchanges.



# Standards Context and Recommendations

- Context diagram illustrates various standards that exist to support vehicle, infrastructure, and roadside units
- Diagram has been critical towards understanding spectrum of V2I standards
- Serves as a framework to show relationships among V2I standards – both current and needed

# Standards Context and Recommendations

- Recommendations included additional actions to address needs and gaps related to V2I standards
  1. Maintain Standards Context Diagram
  2. Representatives from V2I DC should interact with SAE DSRC Technical Committee
  3. Once DSRC RSU specification is stabilized it should be transferred to an appropriate SDO and updated to a consensus driven standard
  4. Explore development of automated testing tools for RSUs
  5. Support standardization and expansion of SCMS



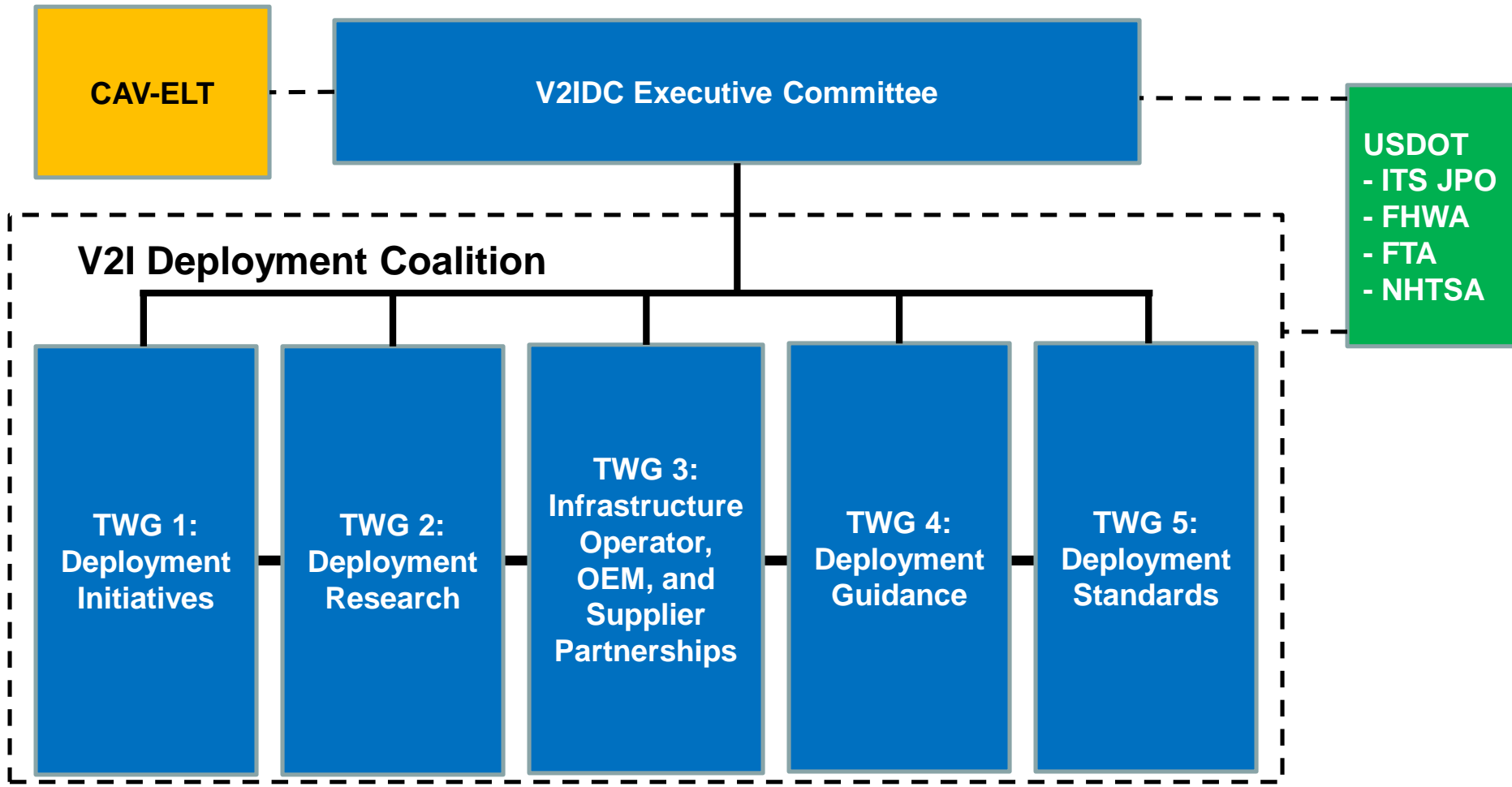
# Standards Context and Recommendations

6. Monitor RSU certification activities as actual deployments occur and develop comprehensive certification process
7. Explore move from best practices to “enforceable” or “gradable” performance
8. Encourage and work among associations to support efforts to update MUTCD and other guidance documents
9. Conduct webinar to review the USDOT Data Capture Management document with V2I DC
10. Engage with Smart City and ATCMTD projects to identify lessons learned
11. Engage telecommunications and IT industries to ensure that standards and guidelines are robust and reflect current technologies
12. Look for gaps in fleet-related standards

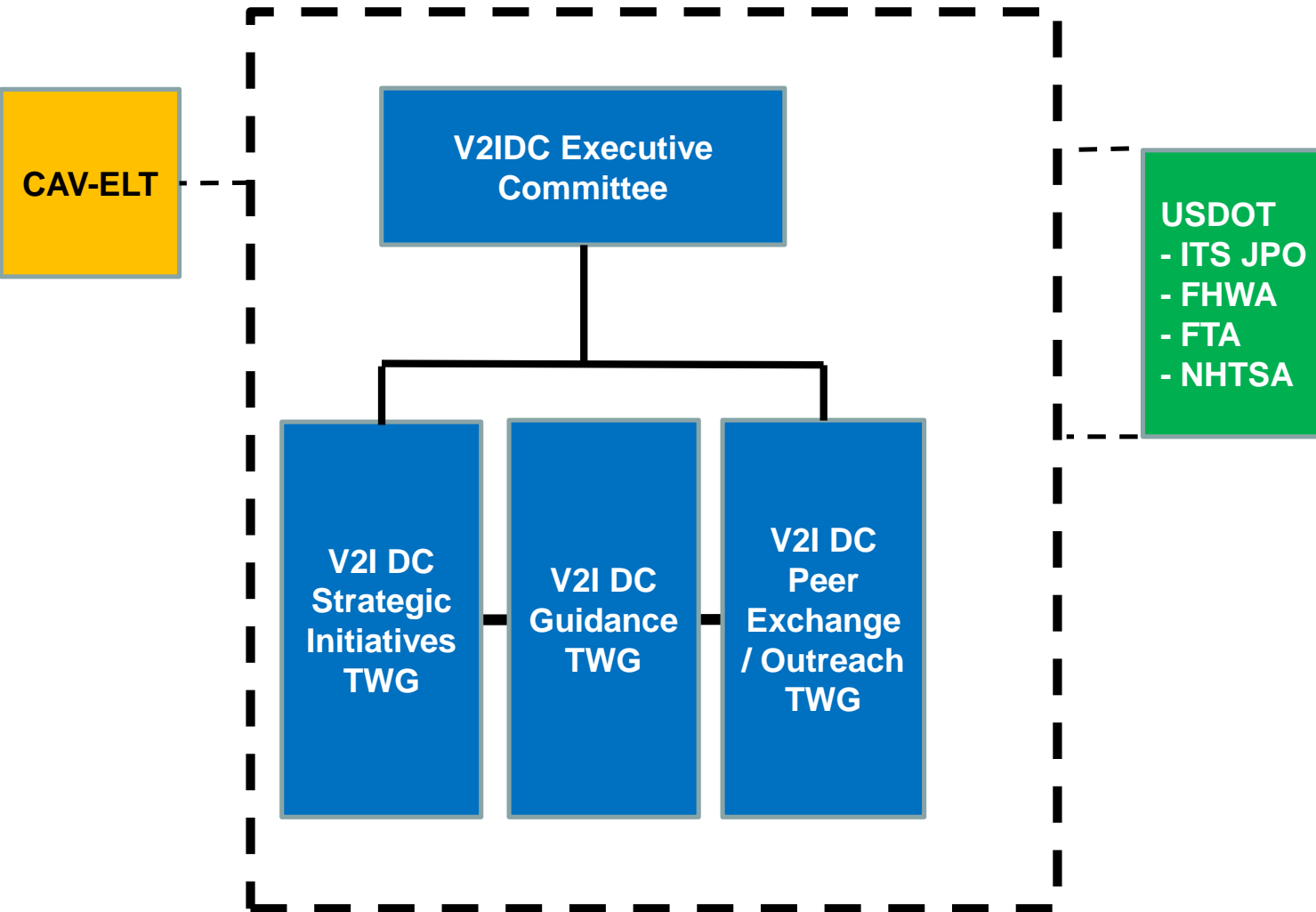
# Future V2I DC Work

Dean Deeter, Athey Creek Consultants

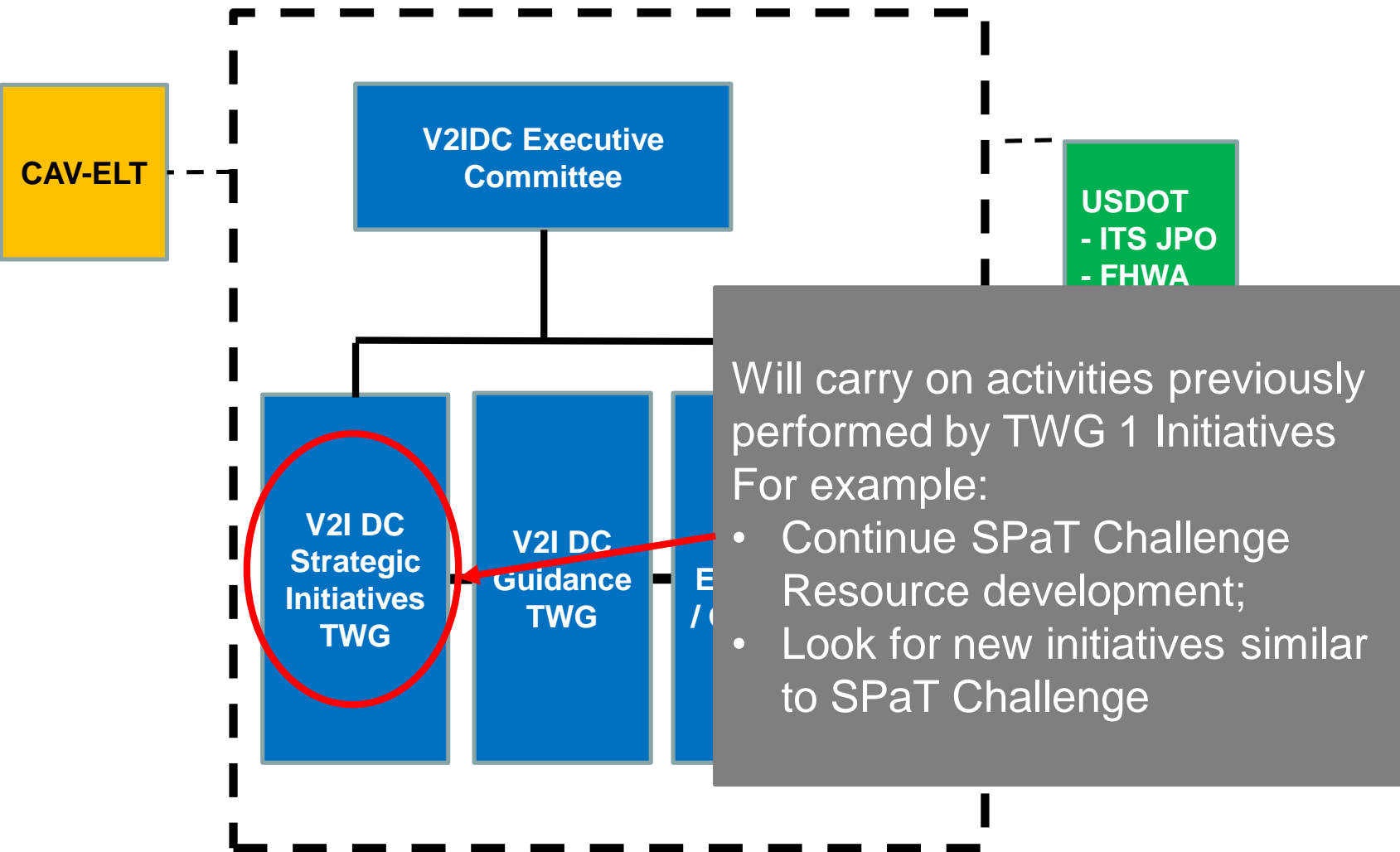
# Current V2I DC Structure – Phase 1



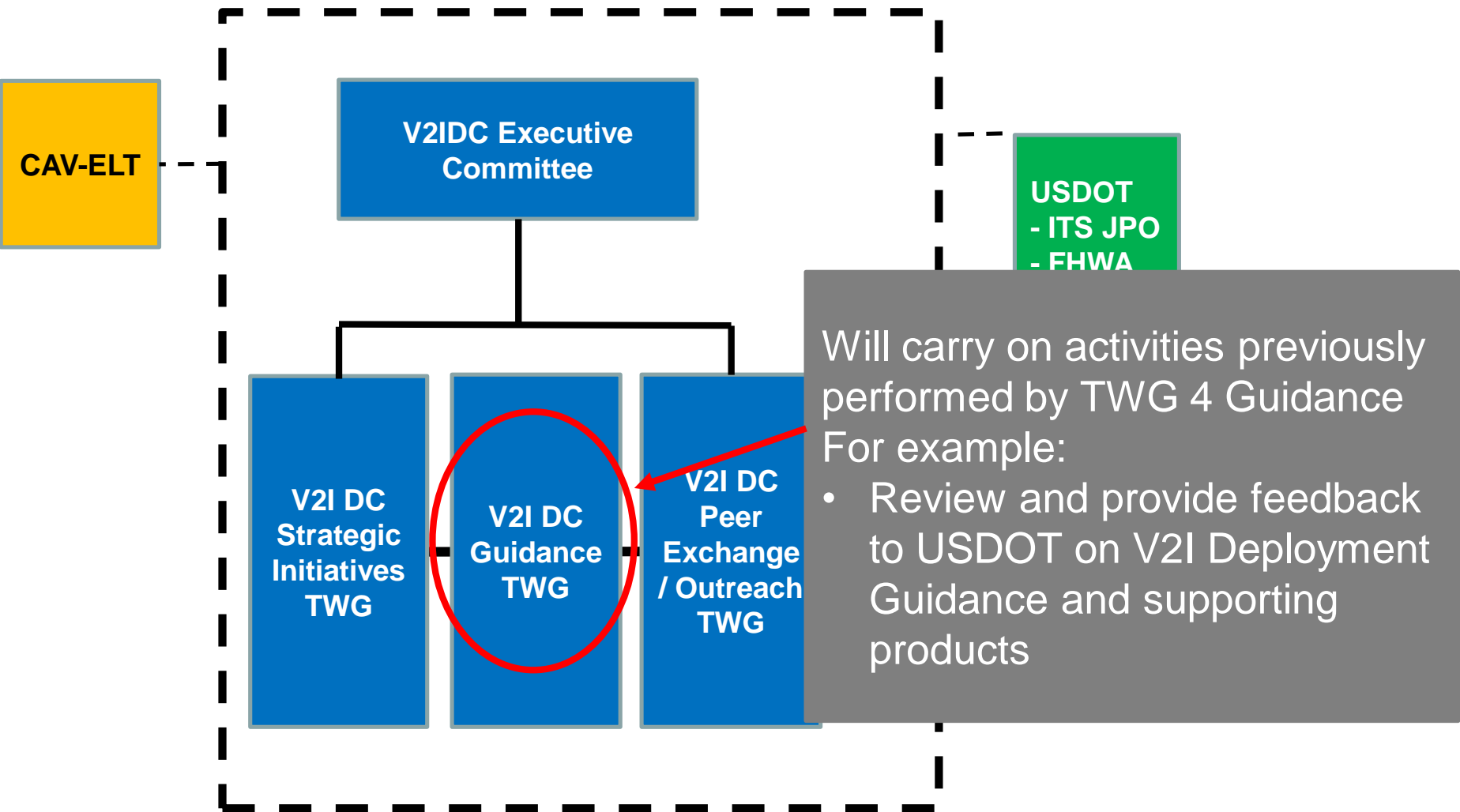
# Proposed V2I DC Structure – Phase 2



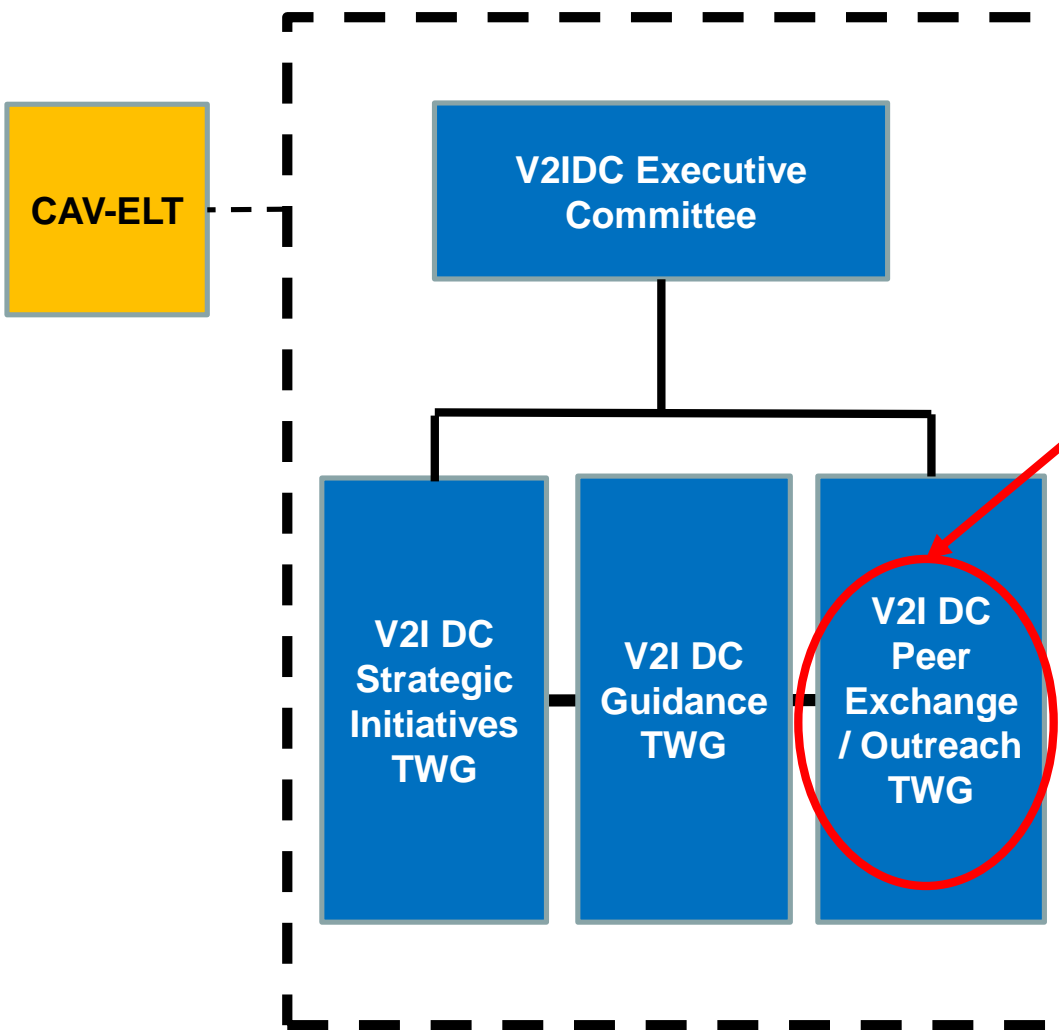
# Proposed V2I DC Structure – Phase 2



# Proposed V2I DC Structure – Phase 2



# Proposed V2I DC Structure Phase 2



Large working group, meeting approximately quarterly, with well constructed agendas and invited speakers to allow peer exchange on key V2I topics, including:

- Pilot Deployment / Smart City Updates
- Connected Vehicle Standards
- Connected Vehicle Research
- Deployment Status
- AV Policy Updates
- Outcomes of IOO/OEM Forum Discussions

All members of V2I DC would be encouraged to participate in this TWG; group will carry on many functions of current TWG 2, 3, and 5

# V2I DC Phase 1 Transition to Phase 2

- New structure will be activated once Phase 2 begins
- TWG meetings will be supported as needed during transition
- Coalition wide webinars every other month
  - April 12, 11:00-12:30 (Eastern)



# Q&A

Submit questions and comments in chat or Q&A section of webinar window

***V2I Deployment Coalition Website***

***[www.transportationops.org/V2I/V2I-overview](http://www.transportationops.org/V2I/V2I-overview)***