

USDOT's 3rd V2X Summit: Saving Lives with Connectivity

Stakeholder Feedback Report



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Background

On October 26, 2023, the United States Department of Transportation (USDOT) hosted the third Vehicle-to-Everything (V2X) Summit. The Summit was held at the University of Michigan campus in Ann Arbor, Michigan with approximately 210 in-person attendees and ~570 unique devices logged on virtually (peak concurrent viewers was 279). Discussions, presentations, videos, panels, and breakout groups focused on creating a path towards achieving national interoperable connectivity and providing feedback on the draft National V2X Deployment Plan.

Summit Purpose

The event, opened with remarks by US Secretary of Transportation Pete Buttigieg, was the third in a series of V2X summits and workshops that brought together a wide cohort of V2X stakeholders. The purpose of this event was to share the draft National V2X Deployment Plan, hear from industry and public agencies on how they Plan to accelerate V2X deployment, and hold breakout sessions to refine the strategy to advance connectivity. Participants were given the opportunity to provide feedback on the draft Deployment Plan with the goal for the USDOT to release a final Plan in 2024. During the Summit, a \$40 million *Saving Lives with Connectivity: Accelerating V2X Deployment* grant opportunity to advance connected and interoperable vehicle technologies was also announced.

National V2X Deployment Plan

The USDOT, in unwavering commitment to the National Roadway Safety Strategy (NRSS) and its adopted Safe System Approach aiming at reducing traffic-related fatalities and serious injuries, formally announced the release of the draft [National V2X Deployment Plan](#)¹ to summit participants. This pivotal initiative aligns with the NRSS commitment and emphasizes the crucial role of connectivity between vehicles, infrastructure, and other road users in savings lives on US roadways faster and at scale.

The National V2X Deployment Plan sets the USDOT's vision, goals, and milestones, and issues a call to action for stakeholders, including the USDOT, public agencies, and the private sector.

¹ https://www.its.dot.gov/research_areas/emerging_tech/htm/ITS_V2X_CommunicationSummit.htm

Vision

Enable a safe, efficient, equitable, and sustainable transportation system through the national, widespread deployment of interoperable V2X technologies.

Mission

Deploy interoperable V2X connectivity using the dedicated 5.9 GHz spectrum and other available spectrum through collaboration and coordination across federal government, the public sector, and private industry.

The Plan describes how deployments can start now and defines the specific actions needed across stakeholder groups (see Figure 1). The Plan also identifies support available from the USDOT and other sources.



Figure 1. V2X Community Stakeholder Groups (Draft)

Source: USDOT

Reactions to the Draft National V2X Deployment Plan

The USDOT convened three panel sessions with experts from (1) Industry, (2) Public Agency Deployers and (3) the Cooperative Automated Transportation (CAT) Coalition to gain their reactions to the draft Plan. Each panelist was provided a copy of the draft Plan in advance, which allowed them time to review and develop their initial reactions and thoughts. The CAT Coalition serves as a ‘collaborative focal point for federal, state and local government officials, industry and their related associations to address critical program and technical issues associated with the nationwide deployment of connected and automated vehicles on streets and highways.’ CAT Coalition associations and groups represent some of the key V2X stakeholders.

The general reaction to the draft Plan was positive. Both public sector and private sector panelists remarked that the draft Plan demonstrated leadership, provided a clear vision with aggressive targets, identified stakeholders and their actions, and was well organized and structured. The sections below summarize key observations from the three stakeholder panel sessions. A summary of feedback and major themes from the panel sessions is provided in the table below.

Table 1. Summary of Panelists Responses

Questions	Panelists Responses Summary
<p>1. What is your first reaction to the current draft of the National V2X Deployment Plan?</p>	<p>The panelists responded positively, expressing appreciation, excitement, and hopefulness, while highlighting the initiative as a catalyst for change. Some of the responses included:</p> <ul style="list-style-type: none"> ■ Appreciation ■ Positivity ■ Excitement ■ Great place to start/helps us push forward ■ Hopefulness ■ Catalyst for change ■ Happy to see the National Highway Traffic Safety Administration (NHTSA) present
<p>2. What do you like about the draft Plan?</p>	<p>Panelists appreciated the draft Plan for its clarity, well-defined goals, inclusive stakeholder identification, and promotion of V2X as a shared responsibility. Some of the responses included:</p> <ul style="list-style-type: none"> ■ Well structured ■ Clear mission and vision ■ Concrete goals and targets/specific metrics ■ Bold/aggressive ■ Short/mid/long term timeframes ■ Identifies all stakeholders and their responsibilities ■ Promotes V2X as a shared responsibility ■ Uses V2X ecosystems approach
<p>3. What is missing in the draft Plan - or what would you change?</p>	<p>Most panelists agreed that incentives for agencies and specifics on the approach for moving forward were missing from the draft Plan. In summary, the responses included:</p> <ul style="list-style-type: none"> ■ Incentives for agencies on the fence or agencies who are not excited to deploy are needed ■ The safety benefits case, in more tangible terms, is needed; tell them what benefits they can expect ■ Original Equipment Manufacturers (OEM) commitment and representation is needed ■ More ownership from NHTSA is needed ■ Municipal, local engineers/planners perspectives were not adequately addressed ■ Specifics on ‘how’ we get there was not discussed ■ Significance of the role cellular network can play as we embrace opportunities beyond the 5.9 GHz spectrum is needed ■ More actions for training and education are needed ■ More discussion about governance is needed ■ Final rules and commitments from the Federal Communications Commission (FCC) are needed

Questions	Panelists Responses Summary
<p>4. What resources do you feel are needed to help deploy V2X technologies at scale?</p>	<p>Panelists felt that funding, success stories, and overall guidance/education are essential for deploying V2X technologies at scale. Some of the responses included:</p> <ul style="list-style-type: none"> ■ Funding is vital for deployment <ul style="list-style-type: none"> ■ Grant and formula funding ■ Funding policy clarity and promotion/highlighting for grants ■ Funding prioritization and clarity of V2X eligibility for formula programs ■ Mainstreaming from a budgeting perspective ■ Data to support funding and prioritization decisions ■ Estimating resources/funding required (OEMs and public agencies) ■ Business cases/models for industry ■ Money for education ■ Operations and Maintenance (O&M) funding ■ Examples of success stories and benefits ■ Training and education needs – technical training for the workforce, re-education needed, target to different stakeholders at different levels ■ Peer learning to share experiences ■ Lessons Learned sharing mechanism ■ Final communication standards for message sets ■ Guidance on governance, interoperability, and infrastructure installation
<p>5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?</p>	<p>Panelists would like to see collaboration among stakeholders, the FCC second report and order published, and a prioritization of execution, equity, and outcome-focused applications. In summary, the responses included:</p> <ul style="list-style-type: none"> ■ Continued strong leadership from the USDOT ■ Work together across the V2X stakeholders and coordinate actions and decisions ■ Infrastructure buildout (Roadside Units (RSUs)), so OEM customers have better reason to purchase ■ Get away from competitive grant system for supporting deployment, so that everyone can succeed ■ Increase end-user engagement ■ Increase the involvement and participation of staff from local jurisdictions ■ Adjust as we get into execution of the Plan – stay agile ■ FCC second report and order published ■ Establish and begin operating clearinghouse for V2X lessons learned ■ Get the early deployments rolled out to show some early benefits, get the constituents interested ■ Address equity – provide benefits to unequipped travelers ■ Focus on outcomes (e.g., saving lives) ■ List of applications/use cases identified outside and inside the 5.9 GHz spectrum (near-term and long-term)
<p>6. What is one action you'd like to see coming out of this summit and completed in the next 3 months?</p>	<p>Panelists would like to see progress on the FCC second report and order, secure OEM commitments, and a final comprehensive Plan with effective communication and funding strategies, emphasizing cellular connectivity. Some of the responses included:</p> <ul style="list-style-type: none"> ■ Commitment to or progress on getting FCC second report and order published ■ Commitments from at least one OEM to say it is going to be on the next vehicle model ■ NHTSA should convene OEMs to determine what is needed to stimulate deployment ■ Commitments from partner agencies and state and local DOTs around the country to say 'I am all in' ■ Socialize the Plan ■ Complete and finalize the Plan ■ Better communication and outreach strategies to explain to lay audiences (elevator pitch): how does V2X affect their quality of life? ■ Stay aggressive with goals ■ Include the funding Plan ■ Provide deployment resources ■ Leverage cellular connectivity

The subsections below provide specific takeaways and feedback from each of the three panel sessions.

Industry Reactions to the Draft National V2X Deployment Plan

The Industry Panel moderated by Kristin White (Chief Counsel, Federal Highway Administration (FHWA)) was convened to gain industry reactions to the draft Plan.

Panel Participants:

- Brock Aun, HAAS Alert
- Hilary Cain, Alliance for Automotive Innovation
- Angela Fessler, Valtech Mobility
- Robert Gee, Continental
- Laszlo Virag, Commsignia

Major Takeaways:

The Industry Panel participants expressed appreciation that there is now a draft Plan that sets a vision for moving forward with V2X and interoperable connectivity, providing a base from where stakeholders can start from.

What Industry panelists liked:

The panel expressed general excitement to see the Plan – with positive comments related to the timeline, feasibility of the goals, and importance of stakeholder identification. Industry panel participants liked that the Plan is actionable, laying out specific actions items and identifying who is responsible for them. Panelists liked that the draft Plan is inclusive, with the ability to use other communication technologies as a bridge to make solutions interoperable.

What Industry panelists thought was missing:

Industry panelists felt more work is needed with the security credential management system (SCMS), defining who is responsible for determining whether somebody is a bad actor, or if a vehicle simply has bad sensors. Recommendations to the USDOT included the suggestion to develop a ‘cheat sheet’ or checklist that agencies could follow to increase their chances of being interoperable with other deployments. For example, the checklist could identify things that deployers and industry must do to increase the likelihood of interoperable deployments as well as things to avoid. Other items that were suggested included the need for agencies to ensure that they have the funding, resources, and technical expertise available to support O&M once deployed.

Complete feedback from the Industry Reactions panel session is provided in [Appendix A](#).

Public Agency Deployer Reactions to the Draft National V2X Deployment Plan

The Public Agency Deployer panel moderated by Valerie Briggs (Director, FHWA) was convened to gain public agency deployer reactions to the draft Plan.

Panel Participants:

- Debby Bezzina, University of Michigan Transportation Research Institute (UMTRI)
- Danielle Deneau, Road Commission Oakland County, MI
- Elise Feldpausch, Michigan DOT
- John Hibbard, Georgia DOT
- Blaine Leonard, Utah DOT

Major Takeaways:

Public agency deployer panelists felt the Plan could be seen as a tipping point for technology adoption and will allow for market certainties. The panelists were positive about the Plan, and thought it was aggressive and could be a catalyst for making V2X technology benefits a reality.

What Public Agency Deployer panelists liked:

The public agency deployers liked the draft Plan's aggressiveness with its specific metrics, identified goals, and short-, medium- and long-term timelines. There was a positive reaction to a continued focus on 5.9 GHz low latency technologies and their safety applications at intersections.

What Public Agency Deployer panelists thought was missing:

Panelists would like more NHTSA commitment, especially on understanding how NHTSA might Plan to incorporate V2X technology in the New Car Assessment Program (NCAP) Safety Labeling. There were questions on the specific benefits that public agency deployers should be expecting, and concerns related to a lack of understanding and the funding limitations of smaller communities. The public agency deployers noted a need to emphasize the importance of sharing deployment experiences to other agencies, and for agencies to understand procurement processes.

Complete feedback from the Public Agency Deployer panel session is provided in [Appendix A](#).

Cooperative Automated Transportation (CAT) Coalition Reactions to the Draft National V2X Deployment Plan

The final panel session, moderated by Martin Knopp (Associate Administrator of Operations, FHWA) represented organizations and individuals involved in the Cooperative Automated Transportation (CAT) coalition. The CAT coalition serves as a 'collaborative focal point for federal, state and local government officials and industry and their related associations to address critical program and technical issues associated with the nationwide deployment of connected and automated vehicles on streets and highways.' CAT Coalition members include infrastructure owners and operators (IOOs), original equipment

manufacturers (OEMs), technology and service providers, and internet of things (IOT) suppliers. These associations and groups represent some of the key V2X stakeholders.

Panel Participants:

- Hilary Cain, Alliance for Automotive Innovation
- Laura Chace, ITS America
- Steve Kuciemba, ITE
- Jim Tymon, AASHTO

Major Takeaways:

CAT Coalition panelists' comments on the draft Plan were positive and felt that this will help push things forward. They were happy to see that NHTSA was present in the conversations, which would help get the V2X community moving forward together.

What CAT Coalition panelists liked:

Panelists felt the draft Plan was well structured, and appreciated the clear vision and mission that were identified. Other areas that the panelists liked were the concrete goals, and the identified targets and specific metrics. They appreciated the short-, mid- and long-term time frames the draft Plan includes, and the fact the Plan showed that V2X is a shared responsibility.

What CAT Coalition panelists thought was missing:

Areas that the panelists felt were missing were perspectives of other stakeholders, including local engineers, and urban planners. The CAT Coalition members want to see 'how' we achieve the goals in the Plan – specifically those related to deployments within the Top 75 metro areas.

Complete feedback from the CAT Coalition panel session is provided in [Appendix A](#).

Workshopping the Draft National V2X Deployment Plan: Breakout Sessions with Attendees

The USDOT facilitated breakout sessions, where attendees, both in-person and virtual, were asked to provide their feedback to specific questions relating to the Plan. The USDOT's goal was to solicit feedback which will be used to finalize the draft Plan.

Stakeholders were divided into groups to discuss and provide their feedback on the draft Plan. Six questions were asked including initial reactions, areas they liked, thoughts on what is missing or could be changed, what resources stakeholders needed to deploy V2X at scale, what actions should be taken in the next 2-3 months and actions they would like to see coming out of this summit and completed in the next 3 months.

The Summit participants were divided into randomly assigned groups (five in-person, six virtual). The questions were posed to participants for feedback, and facilitators managed the discussion and followed

a schedule to ensure that all six questions were answered by the groups. Virtual participants were encouraged to document their feedback by way of the Zoom chat feature and in-person attendees were given the option to complete a paper-based questionnaire that was distributed in the breakout rooms. Each stakeholder was encouraged to provide comments either during the event, or within the next 3 months by emailing their feedback to the USDOT at V2XDeploymentPlan@dot.gov.

Given the timing of the draft Plan’s release on the morning of the Summit, participants were not able to thoroughly review the document beforehand. While in-person attendees received the Draft Executive Summary of the Plan at check-in, and virtual attendees were provided links to both the Executive Summary and Full Draft Deployment Plan via the webinar chat, it cannot be assumed that they were able to carefully review those materials. As such, the feedback captured in the following sections of this report should be considered preliminary. For further feedback opportunities, summit participants, both in-person and virtual, were notified of the email address above for providing more comprehensive feedback after the Summit by January 31, 2024.

The table below outlines a summary of the themes and key observations derived from the 11 breakout sessions. More comprehensive analysis of the breakout session feedback can be found in the sections that follow. The major themes and key observations from all individual breakout sessions can be found in [Appendix B](#).

Table 2. Common Themes and Observations

1. What is your first reaction to the current draft of the National V2X Deployment Plan?	Common Themes
	<ul style="list-style-type: none"> ■ Well organized, the concrete goals and targets are compelling. ■ Good emphasis on coordination of multiple stakeholders, inclusive.
	Other Observations/Comments
	<ul style="list-style-type: none"> ■ ‘It’s finally here!’ Timing is critical – needed prior to FCC decision. ■ Needs more OEM-specific focus/buy-in.
2. What do you like about the draft Plan?	Common Themes
	<ul style="list-style-type: none"> ■ Timeline and targets are measurable and attainable/reasonable. ■ Plan recognizes that 5.9 GHz is crucial, but also recognizes multi-spectrum approaches will be needed.
	Other Observations/Comments
	<ul style="list-style-type: none"> ■ Several groups applauded emphasis on vulnerable road users (VRUs).
3. What is missing in the draft Plan - or what would you change?	Common Themes
	<ul style="list-style-type: none"> ■ Needs more focus on how aftermarket suppliers and OEMs engage and are incentivized to participate. ■ Would like to see a united Federal government approach.
	Other Observations/Comments
	<ul style="list-style-type: none"> ■ Fleet vehicles will be key – did not see enough on the key role they will play. ■ Missing long-term funding strategies for IOOs.

4. What resources do you feel are needed to help deploy V2X technologies at scale?	Common Themes
	<ul style="list-style-type: none"> ■ Need consistent funding over time, and mechanisms to access this funding. ■ Clear FCC 5.9 GHz rule-making to reduce uncertainty.
	Other Observations/Comments
	<ul style="list-style-type: none"> ■ Professional capacity building, public education may be as important as other obvious resources (like funding). ■ Need tools/procedures to test interoperability.
5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?	Common Themes
	<ul style="list-style-type: none"> ■ NHTSA/FCC involvement and engagement. ■ OEMs need to come on board in this time frame.
	Other Observations/Comments
	<ul style="list-style-type: none"> ■ Prioritized set of common highest-impact use cases and related benefits. ■ Cybersecurity and SCMS should be mainstreamed and scalable.
6. What is one action you'd like to see coming out of this summit and completed in the next 3 months?	Common Themes
	<ul style="list-style-type: none"> ■ 'Finalize the Plan!' ■ FCC report and order issued. ■ Drill down into the Plan and provide clear action items.
	Other Observations/Comments
	<ul style="list-style-type: none"> ■ Get OEMs and other key stakeholders to 'co-sign' the Plan. ■ Establish framework to report progress against goals/targets.

Feedback from each of the 11 breakout sessions are grouped by specific question and summarized below:

Question 1: What is your first reaction to the current draft of the National V2X Deployment Plan?

Summit participants' feedback regarding the draft Plan was overall positive, but there were varied opinions. Of the positive sentiments, participants appreciated the detailed metrics, defined goals, and the Plan's potential to motivate stakeholders for V2X deployment. Breakout attendees praised the Plan's structure and focus on connected intersections, citing that as a significant step forward. However, there were reservations about the Plan's thoroughness, with expressed concerns about the lack of specific responsibilities for Federal stakeholders, the need for more coverage on regulatory aspects, and questions about the commitment of all stakeholders moving forward. Participants highlighted the absence of clear roles for Congress and elected officials and expressed worries regarding OEM commitment and engagement. They recognized a lack of clear educational pipelines for V2X, suggesting that more guidance and specifics were required on that front. Initial reactions noted a concerning lack of language on handheld devices/hardware and incentives for OEMs. While there was excitement and appreciation for the Plan's direction and the leadership shown by USDOT, some stakeholders found the Plan aspirational, lacking explicit buy-in from key industry players, and not aggressive enough on deployment. Overall, breakout participants cited clear recognition of the Plan's positive aspects but wanted further detail, engagement, and pledges from key stakeholders to ensure effective implementation.

Question 2: What do you like about the draft Plan?

Breakout participants lauded the draft Plan's specificity, clear goals, and specific, measurable, achievable, relevant, and time-bound (SMART) goal framework, finding it both workable and realistic. They also appreciated the Plan's attention to intersections and infrastructure, its acknowledgment of multi-spectrum approaches beyond 5.9 GHz, and the inclusion of various stakeholders. They valued the emphasis on VRUs, security, interoperability, and recognized USDOT's actions outlined in the Plan. In summary, participants found the Plan's focus on actionable steps, funding mechanisms, and technological deployment elements, such as cellular integration, to be a significant step forward in the V2X space beyond past summits and guidance.

Question 3: What is missing in the draft Plan – or what would you change?

When asked about what was missing, participants noted the draft Plan lacked a focus on leveraging cellular technology beyond the dedicated 5.9 GHz spectrum. They found an absence of discussion on the role of program management in deployment, organization and governance decision making in procurement, and operations and maintenance planning and funding to be an issue. Multiple participants noted the draft Plan was missing engagement with key stakeholders, notably: law enforcement, first responders, insurance companies, and local entities such as tribes, cities, and counties. Additionally, they called out a prominent absence of clear strategies to incentivize OEM participation, whether that be via regulation or the identification of clear business models for success. Participants identified an inadequate emphasis on multimodal infrastructure, concerns regarding market penetration, missing strategies for public acceptance and commercialization, and a need for a clearer long-term funding Plan. Additionally, they commented that the Plan was missing sufficient emphasis on cybersecurity, data governance, and certification protocols, and in its current form failed to outline specific applications or use cases ready for deployment on day one. The Plan needed more focus on user experience (UX) consistency across jurisdictions, and potential future rulemaking or legislation to solidify funding and guarantee OEM buy-in. Overall, the draft Plan needed more comprehensive coverage of various aspects, including engagement with stakeholders, infrastructure, incentives, cybersecurity, and long-term sustainability measures.

Question 4: What resources do you feel are needed to help deploy V2X technologies at scale?

While funding was the resounding #1 response, breakout participants identified several critical points for successful V2X deployment beyond simple dollars and cents. These include fostering relationships with funding decision-makers, encouraging OEM leadership in deployment to get equipped vehicles on the road, ensuring access to live deployment data, and providing guidance on how to use Formula Funds for V2X. Noteworthy resources mentioned were:

- Funding for initial setup, and to document demonstrated value of V2X
- Long-term funding guidance and assistance for operations and maintenance expenses
- Live deployment data monitoring tools for project assessment
- Uniform, nationwide deployment guide

- Pre-certified equipment for streamlined deployment
- Education programs for workforce development and public awareness, notably from USDOT
- Templates and resources for local agencies to craft personalized deployment plans
- Technical assistance, technology transfer support, and funding commitments for IOOs
- Standardization guidelines for interoperability and scalability
- Adoption of interoperable standards for RSU connectivity across different suppliers nationwide

Notably, breakout participants emphasized the need for standardized guidelines and resources to ensure smooth deployment and interoperability across regions and agencies.

Question 5: What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?

Breakout participants emphasized numerous key points to bolster V2X technology adoption and implementation in the next 2-3 years. These included seeking incentives from insurance companies for V2X equipped vehicles, leveraging insight from global experiences in V2X, incorporating pedestrians and cyclists into the system, finalizing, and collaborating on the draft Plan with the FCC, and working towards increasing public confidence. Multiple breakout groups stressed the importance of an FCC commitment to retain the 30 MHz, full deployment of V2X in vehicles by OEMs, resolution of SCMS issues, revamping funding mechanisms at the USDOT, and encouraging OEMs to explicitly state their deployment requirements. Additionally, they highlighted the need for finalized rulemaking by the FCC. Beyond communications, participants believe we need to continue to build public acceptance and awareness on the safety and privacy of V2X by ensuring data anonymity. While simultaneously increasing the availability of aftermarket devices for adoption and publishing data from deployments like the Connected Vehicle (CV) Pilots to encourage broader adoption, participants also emphasized the critical need for prioritizing agreed-upon use cases and standards. Additionally, there was a call for a joint roadmap to define the necessary roles and actions across stakeholder groups in their discussions for future action.

Question 6: What is one action you would like to see coming out of this summit and completed in the next 3 months?

Breakout participants voiced a multitude of recurring priorities concerning the Deployment Plan in the next 3 months with the most frequent being finalizing the Deployment Plan. Their collective emphasis centered on several key aspects: seeking OEM commitment, urging FCC action within the next 3 months, defining clear criteria for what short term success looks like, explicit delineation of the Interoperable Deployment Program, and establishing strategies to depoliticize V2X amidst administration changes. Moreover, they stressed the necessity of defining 'interoperability' across program and spectrum levels, obtaining concrete NHTSA commitments, enhancing educational campaigns for public awareness, specifying how 5G Automotive Association (5GAA) and related industry groups goals align with the Plan, and fostering discussions between USDOT and OEMs.

Breakout Session Feedback Form Reactions to the Draft National V2X Deployment Plan

During the Breakout Sessions, each attendee was given a feedback form where they were able provide written response to each of the six questions that were discussed. At the end of the breakout sessions attendees were given the opportunity to share their completed forms with the USDOT. In total, 47 forms were collected. Complete feedback from the breakout session feedback form reactions is provided in [Appendix C](#).

Summit Conclusions and Next Steps

The USDOT created an official email account where stakeholders are encouraged to provide feedback on the current draft Plan (V2XDeploymentPlan@dot.gov). The USDOT will be soliciting additional comments and feedback on the draft Plan until January 31, 2024, and will be reviewing the feedback shared during the Summit's panel and breakout sessions.

Appendix A. Panelist Reactions

The tables below provide specific responses to each of the six overarching questions provided by the panelists during the three panel sessions: 1. Industry Reactions; 2. Public Sector Deployer Reactions; and 3. CAT Coalition Reactions. Given the consistency in the received responses and recurring comments, the table below provides a streamlined version with the frequency of appearance noted in parenthesis (e.g., x2, to mean the comment was made by 2 participants).

1. Industry Panel Reactions – Responses from Panelists

Questions	Industry Panel Responses
1. What is your first reaction to the current draft of the National V2X Deployment Plan?	<ul style="list-style-type: none"> ■ Relief, appreciation, thank you (x2) ■ Wow! Really positive, super happy ■ Excited
2. What do you like about the draft Plan?	<ul style="list-style-type: none"> ■ Sets a vision for all of us moving forward, good direction ■ Whole community is behind this ■ Provides momentum ■ Reflects the collaborative nature of V2X ■ Common iterative approach to accomplishing goals ■ Great timeline ■ Seems feasible ■ Stakeholders identified (x3) ■ Responsibilities and expectations of stakeholders identified (x2) ■ Like the structure of Plan (x2) ■ Appreciate the simplicity and breadth of detail ■ Right direction, right opportunity ■ Equity, inclusiveness, end to end ■ All the different users ■ Ties in the National Roadway Safety Strategy (NRSS) ■ Redundant and overlapping safety systems/solutions ■ Roadmap towards real value creation ■ Actionable; specific action items; provides accountability ■ The three-time frames (short/mid/long) ■ Ecosystems approach: it's going to take a partnership to make this happen

Questions	Industry Panel Responses
<p>3. What is missing in the draft Plan - or what would you change?</p>	<ul style="list-style-type: none"> ■ Final rule from FCC ■ More OEM representation ■ More refined timeline; report out at each timeframe to make sure on track or mitigate risks ■ Putting the people first; about how many people can be saved ■ Explanations on why V2X is different than other technologies ■ Provide more structure and related documentation; show how incrementally different the big jurisdictions are from the in the small urban and rural jurisdictions ■ Discuss more about governance (who makes a decision about removing bad users from ecosystem?) What happens when the situation turns bad, and somebody is trying to harm the system or just has really bad sensors and wrong data? ■ Educate more, train more, share the hands-on experience; provide more comprehensive and specific places and actions for training ■ On the provider side, need to learn the real problems and how we can solve them ■ Comprehensive cheat sheet or plan that guides people knowing what to do and what to avoid in order to foster interoperability ■ Don't forget the V2X support, maintenance and operations ■ Missing how significant of a role cellular network solutions are already playing today in solving for V2X and how critical it is that we embrace an opportunity to lay the foundation for the need for the 5.9 GHz band ('beyond 5.9' committee) ■ Provide data rich environment for automotive industry and others
<p>4. What resources do you feel are needed to help deploy V2X technologies at scale?</p>	<ul style="list-style-type: none"> ■ Need funding! (x3); resource issues (automakers in a challenging time moving to battery powered electric vehicles) ■ Safety groups and research groups to get messages standardized representing the VRUs – need the personal safety message ■ Position accuracy requirements ■ Get those standards finalized ■ Need examples of success stories ■ The support provided by us as the community (we are the resource) ■ Community building events ■ How would governance work? How is this going to be an interoperable nationwide system? How will that work in practice? ■ What needs to be put in place to check off the boxes on short-term, midterm and long-term goals? ■ Systems engineering guidance on what it means to install the basic V2X infrastructure ■ Federal government should contribute resources to protect VRUs ■ Make sure public fleets are connected ■ Guidance on when to alert people that something is imminent that they need to be prepared for (five, 10, 15, 20 seconds out; audible, visual, haptic?) ■ Provide data for DOT to demonstrate why they should make the funding available

Questions	Industry Panel Responses
<p>5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?</p>	<ul style="list-style-type: none"> ■ Get the early deployments rolled out right so we can start to show some early benefits, get the constituents interested ■ Be cost effective and equitable to address people that can't afford the newest cars ■ Start to save lives ■ Focus on outcomes ■ We need to have really good coordination (x2) ■ Everyone working well and smoothly together (x2) ■ Peer cohorts up and running ■ Applications/use cases identified outside and inside 5.9 GHz spectrum ■ Proven applications identified and their benefits ■ Concept of interoperability needs to be maybe narrowed and defined because it is unique to the concept of if we use 5.9GHz as primary conduit for data how does that work with other types of data ■ Industry needs to figure this out ■ Government should pay attention to what is being done and then proliferate it/accelerate it. ■ Encourage the smaller IOOs/agencies and cities to solve their problems with V2X by showcasing the bigger more experienced cities through education ■ Cooperation between automotive OEMs and suppliers with the USDOT ■ Find ways to have joint value creations and incentives for day 1, day 2, day 3 ■ Identify the priority near-term services/applications and the longer-term applications ■ Continue to build out the infrastructure in the short-term (very important to the automakers so that newly equipped cars have something (i.e., infrastructure) to talk to, resulting in benefits for the early consumers)
<p>6. What is one action you'd like to see coming out of this summit and completed in the next 3 months?</p>	<ul style="list-style-type: none"> ■ Progress on final rules for 5.9 GHz from the FCC ■ Detailed plan for sharing experiences from great examples of V2X ■ Factor in the work that's being done at the state level particularly with 405(h) but specifically also with public safety fleets, to leverage cellular connectivity in order to improve road safety. ■ Include the funding plan so that stakeholders know where to look and have what they need to execute ■ Deployment resources structured in a way that accounts for all the different levels and types of experiences of those deployers (early to advanced jurisdictions, tying in coordination between automotive and infrastructure).

2. Public Sector Deployers Reactions - Responses from Panelists

Questions	Public Agency Deployer Panel Responses
<p>1. What is your first reaction to the current draft of the National V2X Deployment Plan?</p>	<ul style="list-style-type: none"> ■ Excited/positive (x3), tipping point, we have a plan (x2), great place to start, hopeful, catalyst for change,
<p>2. What do you like about the draft Plan?</p>	<ul style="list-style-type: none"> ■ Specific metrics, aggressive (x4), action oriented (can move now), focus on intersections, bold (x2), something to strive for
<p>3. What is missing in the draft Plan - or what would you change?</p>	<ul style="list-style-type: none"> ■ Incentive for agencies on the fence or not excited to deploy: why should they allocate resources to V2X? ■ Build the safety benefits case in tangible terms; tell them what benefits they can expect at 20% or 50% deployed ■ Stay flexible, be able to learn and pivot ■ OEM commitment (add) ■ What happens beyond 10 years (2035 and beyond)? Is 75% the end? Do all intersections need V2X? ■ Strategies for financially conscious operations and maintenance of devices ■ More ownership from NHTSA; NCAP inclusion

Questions	Public Agency Deployer Panel Responses
4. What resources do you feel are needed to help deploy V2X technologies at scale?	<ul style="list-style-type: none"> ■ Lessons learned sharing mechanism ■ Funding models (share); how to get at the funding that might be right in front of you; federal eligibility of operations and maintenance costs (policy statements); e.g., 100% eligible funding categories ■ Information to help agencies prioritize V2X ■ Money, money, money. Grant and formula funding (federal); business models for private sector; money for education (STEM, college, HBCUs, graduating students) ■ Tools and education to minimize risk of not maintaining your system after the grant is done; ensure O&M funding is planned ■ Mainstreaming V2X from a budgeting perspective (highlighting importance) ■ Sharing education modules ■ Peer learning to share experiences from IOO to IOO ■ Procurement guidance ■ Education to local agencies (x3); education to different audiences ■ Workforce development ■ Ownership of public acceptance and public messaging
5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?	<ul style="list-style-type: none"> ■ FCC second report and order published ■ Get away from competitive grant system whereby success depends on winning grant awards; that allows all to be able to be successful somehow; dedicated funding for V2X; bring more locals out ■ Clearinghouse for lessons learned established and operational ■ Real progress by a lot of entities ■ Check ourselves against the short-term goals of the Plan ■ Establish a V2X Champion
6. What is one action you'd like to see coming out of this summit and completed in the next 3 months?	<ul style="list-style-type: none"> ■ Commitment to getting FCC second report and order published ■ One OEM said it is going to be in the next vehicle model ■ Commitments from partner agencies and state and local DOTs around the country to say 'I'm all in' ■ Complete and finalize the Plan; publish ■ Everyone commits to the Plan (every stakeholder)

3. CAT Coalition Reactions - Responses from Panelists

Questions	CAT Coalition Panel Responses
1. What is your first reaction to the current draft of the National V2X Deployment Plan?	<ul style="list-style-type: none"> ■ Extremely positive, helps us push forward, happy to see NHTSA present (x4), pleased to see it (x2), excited, thankful (x2), relieved, hopeful
2. What do you like about the draft Plan?	<ul style="list-style-type: none"> ■ Well structured, ■ Clear mission and vision, ■ Concrete goals and targets/specific metrics, ■ Short-mid-long term timeframes, ■ promotes V2X as a shared responsibility
3. What is missing in the draft Plan - or what would you change?	<ul style="list-style-type: none"> ■ Municipal, local engineers/planners perspectives not adequately addressed (needs enhanced, e.g., top 75 metro areas) ■ Want to see the 'how' we get there

Questions	CAT Coalition Panel Responses
<p>4. What resources do you feel are needed to help deploy V2X technologies at scale?</p>	<ul style="list-style-type: none"> ■ Estimation of funding required ■ Education, targeted to different stakeholders, at different levels, including policy makers, CEOs, and elected officials (see the whole path) (x2) ■ Re-education for those coming back to the field ■ Funding policy clarity and promotion/highlighting for grants (x3) ■ Funding prioritization and clarity of V2X eligibility for formula programs (x3) ■ Easing the grant writing process for local DOTs ■ Capitalize on BIL funding; happy with NOFO \$40 M ■ Need to be able to access all the different pots of money ■ Technical training for our workforce
<p>5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?</p>	<ul style="list-style-type: none"> ■ Infrastructure buildout (RSUs), so OEM customers have better reason to purchase ■ Keep working in this collective spirit ■ Get it done ■ Get away from competitive grants ■ Work on that funding side: government funding and private side business models ■ Adjust as we get into the Plan (x2), do not be afraid to fail; adjust goals and metrics if we do; ■ Continued strong leadership from DOT across modes; will help the state and locals and OEMs/automotive industry ■ consistency from FCC and from NHTSA ■ End user engagement (x2) ■ Bring in transit
<p>6. What is one action you'd like to see coming out of this summit and completed in the next 3 months?</p>	<ul style="list-style-type: none"> ■ Better socialization of the Plan vision and mission ■ Better public understanding the benefits if we implement the Plan ■ Better communication and outreach strategies to explain to lay audiences (elevator pitch): how does that affect their quality of life? (x2) ■ Better cooperation from the FCC ■ Final rules from FCC (x2) ■ Don't water it down; stay aggressive with the goals and targets ■ OEM commitments ■ NHTSA to convene OEMs to determine what is needed to actually get deployment going on OBU side

Appendix B. Breakout Session Group Responses

The table below provides the major themes and responses from each of the 11 breakout sessions.

Question 1. What is your first reaction to the current draft of the National V2X Deployment Plan?	
Breakout Group Identifier	Breakout Group Themes and Responses
BLUE In-Person Breakout	<ul style="list-style-type: none"> The Plan may want to identify the responsibilities specific to USDOT The motivation aspect ('what is for me') of each class of stakeholder need to be identified. It would be good to have more coverage on the regulatory aspects
RED In-Person Breakout	<ul style="list-style-type: none"> Great and necessary start, but we need to use this Plan to continue to move forward Happily, surprised that there were aspirational metrics included in the Plan after years of listening and observing from USDOT Little suspicious about the full commitment of all stakeholders moving forward. Need to ensure we are agnostic of administration or policy changes that will inevitably happen
GREEN In-Person Breakout	<ul style="list-style-type: none"> The Plan does a great job of being inclusive, including covering goals and stakeholders (even stakeholders who are not currently involved) Having this Plan finally on paper shows great leadership by USDOT Timing-wise, looking like this Plan will be finalized before the FCC decision (which continues to drag on)
YELLOW In-Person Breakout	<ul style="list-style-type: none"> It is a good start, and it is about time. Good to see USDOT doing something A lot of good milestones and the goals are good to have. A good start and aiming point Feels like a wish list and not a government wide Plan (NHTSA's role is not specified – only based on FHWA/OST-R). There are no direct responsibilities assigned
ORANGE In-Person Breakout	<ul style="list-style-type: none"> It is finally here – it has good metrics. Clearly defined goals The Plan is nice – it is motivating to groups trying to get things out to deployment Happy to see the Plan established. Concerns we didn't see more OEM representation. Goals around OEM goals seem aspirational – want more buy-in from OEMs
Virtual Breakout Room #1	<ul style="list-style-type: none"> Participants did not have a chance to read the Plan
Virtual Breakout Room #2	<ul style="list-style-type: none"> Essential to have OEM engagement/commitment - Plan should have OEMs requirement or incentive Educational pipeline needed for V2X Guidance and specifics for X in V2X, as applies to handheld devices / hardware
Virtual Breakout Room #3	<ul style="list-style-type: none"> Glad it's going in the right direction Thrilled USDOT is making specific commitments with a detailed timeframe to serve as a catalyst Some people thought it wasn't aggressive enough
Virtual Breakout Room #4	<ul style="list-style-type: none"> Great and necessary start, but we need to use this Plan to continue to move forward Happily, surprised that there were aspirational metrics included in the Plan after years of listening and observing from USDOT Little suspicious about the full commitment of all stakeholders moving forward. Need to ensure we are agnostic of administration or policy changes that will inevitably happen
Virtual Breakout Room #5	<ul style="list-style-type: none"> Municipal, local engineers/planners perspectives not adequately addressed (needs enhanced, e.g., top 75 metro areas) Want to see the 'how' we get there
Virtual Breakout Room #6	<ul style="list-style-type: none"> Positive reaction, the Plan is an important step moving forward Didn't see what role Congress/elected officials should or can take, in the Plan

Question 2. What do you like about the draft Plan?

Breakout Group Identifier	Breakout Group Themes and Responses
BLUE In-Person Breakout	<ul style="list-style-type: none"> ■ Timeline and financial aspects outlined in the Plan are workable ■ The Plan is specific, measurable, achievable, realistic and time-bound (SMART) ■ The Plan opens the door for new possibilities
RED In-Person Breakout	<ul style="list-style-type: none"> ■ Liked the Specific goals outlined in the Plan and the focus on interoperability ('multi-vendor') – appreciated the short-, medium-, and long-term timeframes. ■ Stakeholder identification for both responsibilities and as a means to promote collaboration and communication across entities is great ■ Appreciated starting with intersections, helps to put the emphasis on infrastructure and extend beyond vehicles to include VRUs
GREEN In-Person Breakout	<ul style="list-style-type: none"> ■ The goals are very clear; also having them split into Short/Medium/Long term makes them seem less daunting and more achievable ■ Like that the Plan is multi-spectrum, so it is not just 5.9 GHz being looked at ■ The Plan does a good job incorporating all elements of the ecosystem, including the various stakeholders, the SCMS, etc.
YELLOW In-Person Breakout	<ul style="list-style-type: none"> ■ Stakeholders are recognized in one place and their roles are defined with steps and expectations moving forward ■ Happy to look at VRUs and other applications outside of 5.9 spectrum ■ There is a Plan with an aggressive scope, specific goals and targets, and some money (not enough) behind it
ORANGE In-Person Breakout	<ul style="list-style-type: none"> ■ Identifies stakeholder roles and responsibilities. Clear metrics and measures with timelines. There is very specific tech deployment elements and goals and focuses on interoperability ■ Cellular is listed as an onramp, or an escape hatch.... There is motivation to fill the gaps ■ Having stakeholders with responsibilities listed is huge. Has a vision for the future
Virtual Breakout Room #1	<ul style="list-style-type: none"> ■ Given green light. Deployers were postponing V2X goals pending federal initiative, relieved by growing momentum ■ Appreciating focus on VRUs and incremental plan ■ Emphasizing security, interoperability for OEM engagement and addressing legal concerns
Virtual Breakout Room #2	<ul style="list-style-type: none"> ■ Plan and infrastructure funding keeps V2X afloat for aftermarket since OEMs not yet committed to national ■ Like that it is brief and accessible – people don't have time to read long docs
Virtual Breakout Room #3	<ul style="list-style-type: none"> ■ Centralized direction we've all been waiting for ■ Outlined the benefits (safety, operations, etc.) ■ Liked the specific USDOT actions to be taken ■ Liked that it was concise with designated milestones
Virtual Breakout Room #4	<ul style="list-style-type: none"> ■ Liked that Plan specifically calls out spectrum and communications. However, only discusses 5.9 GHz
Virtual Breakout Room #5	<ul style="list-style-type: none"> ■ The Plan ties into principles of safe system, funding mechanism, and informative but not lengthy ■ Potential actions for major stakeholders ■ The actions, initiatives, and security issues are laid out well in Plan. (Table 1) ■ Focus on interoperability
Virtual Breakout Room #6	<ul style="list-style-type: none"> ■ Quantitative milestones were positive to see; shows whether they are being met in the future

Question 3. What is missing in the draft Plan -- or what would you change?

Breakout Group Identifier	Breakout Group Themes and Responses
BLUE In-Person Breakout	<ul style="list-style-type: none"> ■ Leveraging of cellular technology is not covered in the Plan ■ Pain or blocking points are not covered in the Plan, ■ Program Managements and Governance are not covered in the Plan
RED In-Person Breakout	<ul style="list-style-type: none"> ■ Missing Key Stakeholders: Law Enforcement, First Responders, Insurance Companies, Local IOOs (tribes, cities, counties). ■ OEMs need incentive or mandate to act in this space. What will be the Carrot / the Stick? ■ Missing discussion of Operations and Maintenance Planning – Need to prevent ‘digital potholes’ that the equipment can become ■ Training and explicit strategies for Locals – can we identify an easy win to get boarder public on board
GREEN In-Person Breakout	<ul style="list-style-type: none"> ■ Need a way to incentivize OEMs to follow through on commitments. ■ Need to better tie the Plan into the movement to digital infrastructure. ■ Need to improve the messaging and marketing of V2X for the general public
YELLOW In-Person Breakout	<ul style="list-style-type: none"> ■ The Plan is not DOT-wide nor Gov-wide. Would like to see a united front with FCC, NHTSA, NCAP. Connection with DOT data exchange ■ Would like to see a larger focus on multimodal/multifacility approach. Rural roads vs solely highways, incorporating bike lanes (etc.) and those who implement them ■ Market penetration rate is an issue, new cars are rare purchases and long turnover rate. Would like to see more in the realm of after-market providers/devices
ORANGE In-Person Breakout	<ul style="list-style-type: none"> ■ Plan is missing strategies on ‘how’ to recruit OEMs to participate and get on board. ■ Public acceptance – who is going to drive this? Need to ensure the public is behind this and a willingness to pay. ■ What is the business case. How to commercialize and fund ongoing maintenance, who will sustain long term. ■ Absent stakeholders – examples include the need to get bicycles, construction workers
Virtual Breakout Room #1	<ul style="list-style-type: none"> ■ Missing a law enforcement perspective. ■ Missing the OEMs incentive for them to participate. ■ Missing detail on the automotive aftermarket and the technology. ■ Missing the long-term strategy for funding – is concern for IOOs
Virtual Breakout Room #2	<ul style="list-style-type: none"> ■ Need clearly defined day 1 deployable applications with guidance for short/med term ■ Unbalanced- what is the sense in investment if only a few OEM vehicles. Need incentive or mandate ■ Uncertainty on data exchange and data governance including vehicle / cellular data
Virtual Breakout Room #3	<ul style="list-style-type: none"> ■ Missing larger emphasis on long-term cybersecurity and vulnerabilities to quantum attacks ■ Guide for IOOs regarding the vast amount of data that is going to be needed for V2X (tie into digital infrastructure, edge computing, roadside, etc.) ■ Use cases ■ Clear funding plan to deploy beyond competitive grants
Virtual Breakout Room #4	<ul style="list-style-type: none"> ■ Important for IOOs to understand certification requirements (what certification protocols apply?) ■ Did not see much about trucking industry and FMCSA. Involve UPS, Amazon, Walmart, and other trucking industries. ■ Too focused on C-V2X with slight mentions of other communication technologies. Map of applications served by network cellular vs 5.9 GHz band would be useful
Virtual Breakout Room #5	<ul style="list-style-type: none"> ■ Emphasis on variety of communication technology and how they can coexist. ■ Business models for engaging the private sector ■ Distinction between application that require low latency 5.9 GHz and all other things (which don’t require ultra-low latency) ■ Lack of incentive for OEM to participate. (e.g., tax incentives and inclusion in NCAP)

Question 3. What is missing in the draft Plan -- or what would you change?

Breakout Group Identifier	Breakout Group Themes and Responses
Virtual Breakout Room #6	<ul style="list-style-type: none"> ■ How to ensure consistency of user experience between jurisdictions/areas? Missing: <ul style="list-style-type: none"> ■ Specific applications/use cases for deployment ■ Protocol versions for each layer for IOP to crossing different project/region ■ General support for all parties (IOOs, OEMs, MNOs) involved in deployment ■ What does possible future rulemaking/legislation or the role of a national framework look like?

Question 4. What resources do you feel are needed to help deploy V2X technologies at scale?

Breakout Group Identifier	Breakout Group Themes and Responses
BLUE In-Person Breakout	<ul style="list-style-type: none"> ■ Robust relationship with people who are making funding decisions. ■ OEM involvement and them taking the lead in the deployment. ■ Live data on the progress of the deployment
RED In-Person Breakout	<ul style="list-style-type: none"> ■ Information on how to use Formula Funds for Deployment/Maintenance/Operation of V2X ■ Data as a tool to establish safety use cases and build accurate models and apps ■ Something like a liability waiver or coordination from the Legal side to encourage OEMs to partner in ways they otherwise would not
GREEN In-Person Breakout	<ul style="list-style-type: none"> ■ Need a uniform, nationwide, deployment guide ■ Equipment needs to come pre-certified and ready to deploy (less R&D) ■ Streamline access and availability of funding, agencies should not have to duke it out
YELLOW In-Person Breakout	<ul style="list-style-type: none"> ■ Funding to stand up deployments and keep them stood up. Funding used to demonstrate initial value. (CV rebate) ■ Workforce development and general education. Make sure people know the why and how to ■ A general program commitment from DOT to ensure success. Maintained support and peer exchanges
ORANGE In-Person Breakout	<ul style="list-style-type: none"> ■ Money is #1 but others include: ■ Public Education. Specifically, from the USDOT, and at all levels from decisions makers to the consumer. Need awareness ■ Trust. Need for confidence that V2X will work ■ Standardization
Virtual Breakout Room #1	<ul style="list-style-type: none"> ■ Long-term operations and maintenance funding ■ More equipped vehicles ■ Rule making ■ Educate the public about the benefits and privacy
Virtual Breakout Room #2	<ul style="list-style-type: none"> ■ For OBU scale – NHTSA and incentives needed – financial decision not a technical one. ■ Intersection funding – for enabling support like modern controllers, comm, O&M, (expensive) ■ Tools for uniform nationwide infrastructure conformity and data accuracy/validity (certification) for OEMs
Virtual Breakout Room #3	<ul style="list-style-type: none"> ■ Long-term funding and funding guidance ■ Technology consistency need to be more plug-and-play to allow for scalability ■ Local agency and consumer awareness of V2X capabilities needed

Question 4. What resources do you feel are needed to help deploy V2X technologies at scale?

Breakout Group Identifier	Breakout Group Themes and Responses
Virtual Breakout Room #4	<ul style="list-style-type: none"> Recommend coordination with AASHTO to get broader perspectives from IOOs. Outreach to actual road users, third-party app developers, and broader community. Organizing grand challenges and competitions Better messaging on the availability of FHWA sites that link to deployment guidance documents
Virtual Breakout Room #5	<ul style="list-style-type: none"> One-Pager (infographics) to display the benefits of the technology to the public Showcase of how the technology is beneficial Template for local agencies/municipalities to create their own personalized standalone plans to address local issues Display of additional funding opportunities and how they can be acquired
Virtual Breakout Room #6	<ul style="list-style-type: none"> Technical assistance and resources for IOOs to deploy in different contexts Funding and commitment for Operations & Maintenance along with Workforce development support and technology transfer assistance Adoption of standards is critical to interoperability and also for reducing deployment costs. Interoperability across RSU's of different suppliers across the country is still a challenge

Question 5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?

Breakout Group Identifier	Breakout Group Themes and Responses
BLUE In-Person Breakout	<ul style="list-style-type: none"> Insurance companies need to provide incentives to those who are using the V2X technology Lessons learned from EU and APAC need to be leveraged Pedestrians and bicyclists need to be incorporated in the system
RED In-Person Breakout	<ul style="list-style-type: none"> Share data Finalize the draft Plan and work with the FCC on final rules Increase public confidence
GREEN In-Person Breakout	<ul style="list-style-type: none"> Want to see FCC commitment to retain the 30 MHz Want to see OEMs with full-deployed V2X apps in vehicles Want to see cell phone provider integration for what we cannot accomplish with the available 30 MHz
YELLOW In-Person Breakout	<ul style="list-style-type: none"> Full coordination with FCC and NHTSA as active stakeholders involved in the conversation. Exhaustive list of stakeholders OEMs need to be on board – would like to see a plan from them. They need to deploy SCMS issues need to be resolved
ORANGE In-Person Breakout	<ul style="list-style-type: none"> Look at how to revamp funding mechanisms at the USDOT Ask OEMs to be specific on what it takes for them to deploy. What do they need to see to get onboard Bring in new stakeholders – talk with insurance companies to get the true costs of property damage/life insurance; talk with consumer product safety board
Virtual Breakout Room #1	<ul style="list-style-type: none"> Rule making TV advertising/campaign to build awareness and promote the importance of safety, privacy, and security Letting states and the public know that the data is anonymized and has no PII Increasing availability of aftermarket devices may lead to OEM adoption
Virtual Breakout Room #2	<ul style="list-style-type: none"> NHTSA to analyze data from CV Pilots and formulate incentive for OEMs OEMs need to step up to deploy/commit Joint roadmap of next steps, implement subset of use cases

Question 5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?

Breakout Group Identifier	Breakout Group Themes and Responses
Virtual Breakout Room #3	<ul style="list-style-type: none"> ■ OEM commitment and path to scale ■ USDOT and NIST work together to ensure cybersecurity and avoid future quantum computer attacks
Virtual Breakout Room #4	<ul style="list-style-type: none"> ■ NHTSA involvement. Mandates from NHTSA are going to be the game changer/accelerators ■ Call for dedicated formula funding for V2X. Rulemaking for V2X (FCC)/removing spectrum uncertainty ■ Increased messaging to the State/Local DOTs on the importance of V2X
Virtual Breakout Room #5	<ul style="list-style-type: none"> ■ FCC ruling (report and order) ■ Allow DOTs access to data (market penetration of equipped vehicles) to effectively report performance (USDOT, NHSTA, Auto Manufacturers) ■ Legislative mandate for specific entities to participate (for vehicles and infrastructure)
Virtual Breakout Room #6	<ul style="list-style-type: none"> ■ Concrete action from the FCC; an FCC ruling. ■ IOO and OEM announcements on their future commitments and steps. ■ Prioritization of agreed upon use cases and standards

Question 6. What is one action you would like to see coming out of this summit and completed in the next 3 months?

Breakout Group Identifier	Breakout Group Themes and Responses
BLUE In-Person Breakout	<ul style="list-style-type: none"> ■ OEM's need to express commitment ■ Can we push for the FCC's second report and order in the next 3 months? ■ Need a very specific criteria for success so that stakeholders including OEM's can make commitment
RED In-Person Breakout	<ul style="list-style-type: none"> ■ we need to define the Interoperable Deployment Project (NOFO) more explicitly ■ Create a way to remove V2X from a political party/administration change ■ a component-based model/System architecture
GREEN In-Person Breakout	<ul style="list-style-type: none"> ■ Want to see the Deployment Plan finalized ■ Want to see 'interoperability' defined at the program-level, spectrum-level, etc. ■ Want to see an FCC final ruling
YELLOW In-Person Breakout	<ul style="list-style-type: none"> ■ A legitimate NHTSA commitment – a statement or plan that shows ownership ■ Need USDOT to keep their word this time (i.e., DSRC) and high-level assurance (at the Secretary level) will help ■ ITS JPO openness and information sharing. Desire for sharing another revision for comment to work together. Defining terms (interoperable, V2X) move fast together
ORANGE In-Person Breakout	<ul style="list-style-type: none"> ■ Finalize the Plan! ■ Develop Concrete metrics from DOT to measure progress on goals. ■ NHTSA to send a clear message there will be FMVSS requirements
Virtual Breakout Room #1	<ul style="list-style-type: none"> ■ AASHTO will promote the draft Deployment Plan for wider awareness among members ■ Enhance outreach through accelerated rulemaking, educational campaigns, and multichannel advertising showcasing safety benefits and federal commitment to technology ■ Online technical forums (e.g., Usenet group) where everyone can share their updates regarding the Deployment Plan
Virtual Breakout Room #2	<ul style="list-style-type: none"> ■ Defining how 5GAA work / recent profile fits into this ■ Reference specification for OEM/supplier deployment ■ Get USDOT and OEMs conversation and show up at next summit panel

Question 6. What is one action you would like to see coming out of this summit and completed in the next 3 months?

Breakout Group Identifier	Breakout Group Themes and Responses
Virtual Breakout Room #3	<ul style="list-style-type: none"> ■ Finalize the Plan ■ Drill down into the work plan with clear action items ■ Provide clarity that we want ALL vehicles connecting to infrastructure ■ FCC rule ■ More public education on V2X benefits
Virtual Breakout Room #4	<ul style="list-style-type: none"> ■ Final version of the Plan ■ More public statements coming from DOT ■ Revised NPRM
Virtual Breakout Room #5	<ul style="list-style-type: none"> ■ A commitment from OEMs to at least cosign the Plan ■ FCC (report and order) or commitment of when it would be available
Virtual Breakout Room #6	<ul style="list-style-type: none"> ■ A short list of priority use cases that can be supported by the community of stakeholders within timelines identified in the Plan ■ Clear lines of communication between the FCC and the DOT that leads to a finalized FCC ruling ■ Communication/collaboration with the Canadian government on V2X consistency

Appendix C. Breakout Session Feedback Form Reactions

The table below provide specific responses from the breakout session feedback forms to each of the six overarching questions.

Breakout Session Feedback Form Overview: In general, the feedback provided in the forms aligned with the major themes and observations that was discussed during the actual breakout sessions. However, there was some more specific and negative responses.

Feedback Form Response: The table below provides a snapshot of responses. Given the consistency in the received responses and recurring comments, the table below provides a streamlined version with the frequency of appearance noted in parenthesis (e.g., x2, to mean the comment was made by 2 participants).

Table 3. Common Themes and Observations

Question 1. What is your first reaction to the current draft of the National V2X Deployment Plan?	
Feedback Form Responses	
<p>POSITIVE</p> <ul style="list-style-type: none"> ■ Good we have a plan. (x11) ■ Numbers/Metrics are good. (x6) ■ Great/good start. (x7) ■ Appropriate, aggressive goals. (x4) ■ A clear understanding of goals depends on the definition of V2X (5.9 or beyond). ■ Great goals/targets. (x7) ■ Hopeful/Optimistic (x2) ■ Focus on intersections. ■ Need a purified one. ■ Appreciate the leadership [USDOT]. (x4) ■ Good to see strategy and timeline. (x2) ■ Bringing all the involved parties was the move that was long pending. ■ Good that the need of SCMS (security credential management system), interoperability and trust and cybersecurity is recognized. ■ Let's do it! ■ Brief, broad, and enough detail. (x2) ■ Good to see the Government take the first step. (2x) ■ Adoption drives interaction. ■ Finally, we have been ready and perfecting our technology for 7 years! ■ University researchers have expertise and would benefit from stable funding and V2X needs. ■ Deployments benefit from infrastructure applications. ■ Incentivize OEMs/Buy-ins. (x2) ■ Necessary state of fundamentals. 	<p>NEGATIVE</p> <ul style="list-style-type: none"> ■ Overdue. (x2) ■ Missing who's responsible for what by when. (x2) ■ How do we get to the 'what'. ■ Feels like Ops, OST-R, JPO Plan not a DOT or government report. ■ FCC/NHTSA commitment missing. (x3) ■ Aspirational but no direct way to accomplish it. ■ NHTSA's role is not defined. ■ Funding mechanism is not provided to meet aggressive goals and schedule. (x2) ■ Still many questions, players and input needed, including goals and timeline. (x2) ■ Lacks path to sustainability. ■ Plan to move forward and get unstuck is lacking. ■ Need more details to answer questions. ■ Excited, but now what? Follow-up actions. (x2) ■ Goal does not equal/mean plan. (x3) ■ Has strategy, but lacking structure and finance. (x2) ■ Finance needs to be measurable, tangible, and collect benefits. ■ Concern that the Plan will not come to fruition. (x2) ■ Automotive need[s] long-term vision and return on investment perspectives. ■ Opens door to possibility of funding.
<p>NEUTRAL</p> <ul style="list-style-type: none"> ■ I haven't read it yet. (x2) ■ When is the final Plan? ■ Lack of ownership of items is ambitious. ■ A plan to be a facilitator, not a driver! ■ Déjà vu, another plan. ■ What's the carrot/stick to drive this. ■ What is the motivation to come to this rush? 	

Question 2. What do you like about the draft Plan?

Feedback Form Responses

POSITIVE

- Sets direction and hope. (x3)
- That there is a plan. (x6)
- The short-, mid-, and long-term goals. (x8)
- The commitment to get to target. (x2)
- Statement of intent.
- Good strategy. (x2)
- Roadmap structure good intact, something to react to. (x3)
- Involvement of all parties.
- Interoperability access deployment of SCMS (security credential management system). (x12)
- Goals at the right level for all stakeholders.
- Bold, Concrete.
- Focused on intersections first. (x2)
- Numbers/metrics to define goals on a timeline. (x13)
- VRU focus. (x3)
- Slope is aggressive. (x3)
- V2I alternative. (x3)
- Specific roles and steps. (x2)
- Grant/funding announcement. (x7)
- Set expectations for OEMs. (x7)
- Stakeholder recognition. (x11)
- Consistent topic discussions.
- Aspirational/Brings energy. (x3)
- Motivation to fill gaps.
- Less technology dependent allowing combination of solutions.
- Some aspects of regional hands-on framing.
- Seems to push for FCC resolution. (x2)
- Takes into consideration different group's experiences.
- Specific groups of people on stage talking about good and bad (for engagement). (x3)
- Infrastructure goals. (x3)
- It identifies things that everyone agrees would be great to have.
- Vehicle goals are light.

NEGATIVE

- Some stakeholders are missing.

Question 3. What is missing in the draft Plan -- or what would you change?

Feedback Form Responses

- Buy-in from stakeholders and individuals. (x3)
- O&M discussion on commitment. (x5)
- OEM incentives. (x5)
- Stakeholders. (x4)
- Structure and finance. (x3)
- Agency usage/roles. (x3)
- NCAP/should support V2I safety use case. (x7)
- NHTSA integration/roles. (x9)
- Federal Transit Administration (FTA) roles. (x2)
- Federal Railroad Administration (FRA) roles.
- Federal Motor Carrier Safety Administration (FMCSA) roles. (x2)
- Interagency agreement with FCC (and NHTSA) for deployment confidence. (x7)
- FCC Office of Engineering and Technology (OET).
- Interoperability (definition)/ Who will mediate? (x5)
- Funding/supplies mechanism. (x7)
- Accountability/enforcement progress? / Milestones. (x5)
- Mandate?
- Collaboration plan with 5GAA, OEMs, NHTSA, demand action plan.
- Liability.
- Educate the public/define benefits of Step 1 – 20%. (x7)
- Training. (x2)
- More USDOT involvement/ DOT scope. (x5)
- Automotive Aftermarket Plan. (x11)
- Bike and Motorcycle OEMs.
- A certificate policy for the SCMS.
- Multimodal approach.
- If vehicles don't get ready the Plan will not succeed in benefits.
- Thoughts about mandating V2X by a certain year.
- What are the benefits once Stage 1 is deployed? / Quantified benefits. (x2)
- Thoughts about Global Navigation Satellite System (GNSS) accuracy vendors involvement.
- In the deployers guidelines, please provide guidance to help the deployers that are not as familiar with V2X, and who have few funds.
- Spectrum plan.
- Expansion for advanced services.
- Lack of ownership for individual actions.
- Need to identify the metrics that it is working to continue.
- Clarity on highway definition. (x2)
- Rural areas. (x2)
- Data collection. (x2)
- Data exchange and digital infrastructure.
- Data issues management.
- Certification process (standards mandatory). (x3)
- Value proposition/Cost. (x2)
- Representation of other parts of the government.
- Human experience.
- Resources to the Plan, how to get locals to add to budgets, the things that support V2X outside of grants. (x2)
- Path to achieve goals, e.g., there is a goal for 2 SCMSs, but SCMS isn't done yet. How do we finalize it? (x2)
- SCMS discussion is too high level.
- Incentive for those that are not 1 or 2 that are picked for the Federal Funding/Grant Opportunity, will they get any benefit?
- Technical detail of goals/fully defined applications. (x5)
- Discussion of what could be left out in a transportation 5-year plan.
- Outlook beyond 2034.

Question 4. What resources do you feel are needed to help deploy V2X technologies at scale?

Feedback Form Responses

- Funding for RSU deployment; local level funding to deploy and O&M. (x2)
- Funding. (x18)
- Affordability – how to reduce cost.
- Tax Rebate/Tax breaks for CV. (x2)
- Better handle on technology choices/software to manage V2X deployment. (x4)
- Complementary between Advanced Driver Assistance Systems (ADAS) & V2X.
- Public sector to be more aligned to preserve momentum.
- Reference the '5GAA Day 1, Cooperative Intelligent Transportation Systems (C-ITS),' and related documents while developing the resource document.
- Human interface.
- Roadmap Deployment Plan. (x2)
- Spreading the word of technology to common people; education (what, why, how). (x16)
- Community building sessions/testimonies. (x2)
- Consumer demand incentives.
- A Common Specifications Document: A systems-engineering document for engineering solution, application support, cybersecurity, interoperability, and certification (to guide uniform deployment nationwide). (x3)
- Scalable, interoperable solutions. (x3)
- Industry accepted Certificate Policy for SCMS to facilitate interoperability, trust, and competition.
- Trained workforce/technical expertise. (x9)
- Tools available to IOOs and supplies adhering to latest standards.
- System standards. (x4)
- Equipment (certified by OmniAir).
- Involve GNSS vendors, traffic controller manufacturers/OEM participation. (x2)
- SCMS management for IOOs & OEMs.
- OEM deployment. (x2)
- More than one committed OEM partner.
- NHTSA involvement/boldness. (x2)
- FCC commitment.
- O&M.
- Financial incentive for stakeholders. (x2)
- Mandates.
- Centralized management of certificate revocation lists. (x2)
- Detailed, regular coordination between infrastructure and vehicle teams during early deployment years.
- Neutral host that can deploy shared digital infrastructure not only to drive cost down but enable fast and easy deployment.
- Infrastructure differentiation.
- Leadership, spectrum. (x2)
- Peer exchanges.
- Data analytics ownership/previous deployment records (website). (x7)
- Deployment based on technical certainty.
- Require V2X for trials. Fully autonomous vehicle needs to cooperate with infrastructure.
- Regulatory compliance.
- Distributed deployment test capability. (x2)
- Performance criteria.
- Technology usage records.
- IOO data management.
- Consolidated place of information to create person-to-person (P2P) sharing of information, tech support, equipment loan. (x3)
- Needs to be national, fast, and assessable (not the historic USDOT locked down/not shared).
- Rules across counties, states, and countries.
- Signal upgrades requirements.
- Accurate transmission assurance.
- One stop shop place with all the info needed (map). (x2)
- Help for startups in research, development, staffing.

Question 5. What specific actions would you like to see other stakeholders take in the next 2-3 years, including USDOT?

Feedback Form Responses

- National certificate policy for the SCMS supported by USDOT. (x2)
- OEMs (motorcycles, bikes, auto suppliers) should participate more with incentive. (x13)
- State deployment.
- Cell provider engagement.
- Satellite provider engagement (Traffic Information Management (TIM) & RSU).
- FCC rule. Good with protections for harmful interference. (x5)
- FCC reserve additional bandwidth. (x3)
- FCC commitment/completion study. (x9)
- NHTSA commitment/use case implementation. (x9)
- NHTSA integration with FHWA.
- NHTSA creates NCAP.
- NHTSA – V2X champion. (x3)
- Start deploying RSUs.
- NCAP rules and regulations/involvement. (x7)
- Work with 5GAA.
- Insurance regulations (NCAP). (x3)
- Stakeholder cases/commitment are defined. (x5)
- Set standards and regulations surrounding different use cases and spectrum usage.
- Bring a city to scale to show the specific safety case, like avoided crashes.
- Bring forward needs and concerns of road users needing preemption and signals.
- Consumer product safety group.
- Get local agencies onboard. (x2)
- Congressional long-term commitment. (x4)
- SCMS for all of North America. (x2)
- SCMS for all of Canada. (x2)
- SCMS policy definition/certification from the USDOT. (x5)
- Present the deployment Plan to OEM and stakeholder leadership.
- Deployments made in a very educated manner/fleet deployment. (x2)
- Commitment to deploy CV technology in vehicles and aftermarket solutions.
- Regular coordination meetings for all deployers with lessons learned, rent practices, and missing elements. (x2)
- Define V2X and interoperability. (x5)
- Next spectrum in addition to 30 MHz.
- Visibility on day 2/3.
- Strategize VRU.
- Minimum standard for interoperability and methods/tools to validate these. (x2)
- Unified USDOT.
- Clarify liabilities.
- Backward compatibility and USDOT wireless roadmap (accounting for advancements). (x3)
- Inner-city, state, county applications, benefits.
- Data analytics/Integration timeline. (x3)
- Model deployment to be shared and marketed to others around the country – modular for components.
- Make it not depend on a political party.
- Communication between standards and operations.
- Consumer outreach (ask dealerships about CVs). (x2)
- Funding, money, budget.
- Support the NOFO awardee(s) to complete their deployment without burdensome management requirements.

Contrary

- Prioritize our focus on educating the internal agencies about V2X before attempting to educate the public on television.
- Significant progress on grant projects. (x2)
- Treat as a 'National Priority' not just a USDOT issue. (x2)

Question 6. What is one action you'd like to see coming out of this summit and completed in the next 3 months?

Feedback Form Responses

- Draft Plan to be finalized and shared. (x7)
- Funding the Plan. (x2)
- Modesty and transparency.
- A commonly agreed upon certificate policy.
- Strategy Plan on the infrastructure of what the future would look like.
- Discuss top 5 problems USDOT wants to solve.
- Get stakeholder buy-in/solid contacts. (x2)
- More tactical actions with assigned on volunteer stakeholders.
- Get individual stakeholder groups to form up action item Crash Avoidance Metrics Partners (CAMP) funding.
- Need SCMS manager to include certificates that are interoperable from suppliers/stakeholders other than Integrity Security Services (ISS) for competition (next 6 months). (x2)
- Non-competitive environment.
- Interoperability- certified/standards- OmniAir (protocol, spectrum, cyber, Signal Phase and Timing (SPAT), MAP, Radio Technical Commission for Maritime Services (RTCM)). (x5)
- Consortium developments and workshops to resolve issues for interoperability.
- USDOT leadership meets with OEM and stakeholder leadership to communicate plan.
- Secure commitments to deploy CV technology in infrastructure OEM vehicle aftermarket vehicle option.
- Create structure for deployment.
- NHTSA commitment – plan and protocols. (x6)
- Government commitment. (x2)
- Organizations to oversee applications.
- Keep the Plan flexible.
- Specifications/steps on deployment. (x2)
- Registration of technology and solutions with different vendors to work together. (x2)
- Change in USDOT, particularly ITS JPO, of communication, transparency, and leadership. It doesn't have to be perfect!
- Educational videos to raise consumer awareness.
- FCC final rule on 5.9 GHz with protections for harmful interference. (x3)
- FCC spectrum finalization. (x3)
- OEM commitment. (x4)
- Performance metrics for OEMs to accept the data.
- Release compelling information on pedestrian injury with a case to address V2X.
- Day 1 V2X applications identified.
- Start a widescale public engagement exercise. Get the public to go to their dealership and ask for it.
- Begin study on bike safety trends as bad pedestrians.
- Insurance position.
- Getting specific criteria for success.
- Need an OEM commitment to hit 2027 vehicles goal.

Other Feedback

- Active Smart Cities movement, including a national organization & conferences. As we work to include cities, can we collaborate with and leverage this group to make V2X part of their plans?
- Great work, keep going!
- Good dialogue.
- What brings OEMs to the table.
- Concerns about innovation in V2X is focused on small vendors who are overshadowed by big companies. The advancement in this space is being done by small startups who get drowned out quickly by the noise of larger vendors.
- Incentives/motivation to come to the table.
- Safety is not the only benefit. Environmental is also of paramount importance: reducing carbon emissions. Specific Measurable Achievable Relevant Time (SMART)-bound.