



Workshop Summary Highlights

Enhancing Interoperable Connectivity
for Safe Transportation:

Continuing The Momentum Toward National Deployment



Background

On April 28, 2023, the U.S. Department of Transportation (U.S. DOT) hosted the second Interoperable Connectivity Workshop, formerly the Vehicle-to-Everything (V2X) Communications Summit. This workshop was held in Grapevine, Texas, with approximately 475 registered attendees, including 175 in-person and more than 300 virtual. Discussions, presentations, panels, and breakout groups focused on creating a path towards achieving national interoperable connectivity and gathering input for the development of a National Interoperable Connectivity Deployment Plan (the Plan).

Workshop Purpose

The purpose of the Interoperable Connectivity Workshop was to reconvene a broad array of intelligent transportation system (ITS) community stakeholders to brief them on the U.S. DOT's progress since the August 2022 summit and gather input for the development of the Plan.

U.S. DOT Leadership Discussion

The workshop kicked off with welcome remarks from U.S. DOT Leadership, including:

- Egan Smith, Acting Director, *ITS Joint Program Office (JPO)*
- Dr. Robert Hampshire, *Deputy Assistant Secretary for Research and Technology and Chief Science Officer (U.S. DOT)*
- Shailen Bhatt, Administrator, *Federal Highway Administration (FHWA)*
- Dr. Morteza Farajian, *Executive Director, Build America Bureau, Office of the Secretary of Transportation*
- Martin Knopp, *Associate Administrator for Operations, FHWA*, and
- Valerie Briggs, *Director, Office of Transportation Management, FHWA*.

The welcome remarks were followed by an open question and answer session with the audience. Key highlights from this panel session included:

- Roadway safety can be improved by deploying interoperable connectivity devices, especially for vulnerable road users. Deployments of technology offer one of the best return-on-investments in the industry, and connectivity shows one of the best benefit-cost ratios.
- Success breeds success; documenting the success and demonstrating benefits from a large-scale deployment will be a catalyst for widespread deployment.
- To achieve national interoperable connectivity, devices will need to be deployed along corridors and at signalized intersections. Intersections are an important first step because of the safety challenges all road users face at these locations. Signalized intersections also offer an opportunity to deploy the devices quickly because supporting infrastructure, such as power, is already in place.
- A key component of the vision is to deploy V2X communications at scale to create interoperable connectivity for the nation. To achieve this vision, deployers will need resources including standards, financing, a working and interoperable security credential system, workforce training, and more. U.S. DOT and its partners will need to use all existing tools and create new ones to help deployers get to scale, which also involves identifying the correct use cases for deploying the technology.
- While funding may be a challenge, existing funding mechanisms such as discretionary grants, formula funding, and resources from the Build America Bureau can help deployment projects get started. The Plan will be written based on significant stakeholder engagement and input. One of the primary purposes of the Plan will be to fully use the dedicated upper 30 megahertz (MHz) of spectrum in the 5.9 gigahertz (GHz) band while taking advantage of other spectrum and innovative connectivity options.

Industry Discussion

An Industry Panel, moderated by Valerie Briggs of U.S. DOT's Federal Highway Administration (FHWA), followed the welcome panel. Panelists included King Gee ([American Association of State Highway and Transportation Officials](#)), Hilary Cain ([Alliance for Automotive Innovation](#)), Steve Kuciemba ([Institute of Transportation Engineers](#)), Timothy Drake ([Intelligent Transportation Society America](#)), and John Kwant ([5G Automotive Association](#)). The members of the panelists' organizations represent a diverse group of stakeholders. Key takeaways from the industry panel include:

- Many stakeholders need to be engaged to achieve national interoperable connectivity, including original equipment manufacturers (OEMs), infrastructure owner operators (IOOs), and government agencies. Each of these stakeholder groups, including the Federal Communications Commission (FCC) and the National Highway Traffic Safety Administration (NHTSA), needs to be present at discussions regarding their roles in advancing interoperable connectivity for transportation.
- 2023 should be the year to rapidly deploy interoperable connectivity devices. Extensive testing and demonstrations have proven that these technologies are among the most impactful ways to improve roadway safety and save lives.
- Public fleets will play an important early role in showing interoperable connectivity benefits. When members of the public can interact with interoperable connectivity devices and see their benefits, they will drive demand, which will accelerate deployments.
- The Plan must be forward looking. While it will focus on accelerating deployments in the upper 30 MHz of spectrum in the 5.9 GHz band, the U.S. DOT should ensure that the Plan does not exclude technologies that do not need the low latency required for crash prevention to achieve V2X benefits.

Developing a National Interoperable Connectivity Plan and Workshop Charge

John Harding (FHWA) and Govind Vadakpat (ITS JPO) provided an overview of the collaborative process that the U.S. DOT is implementing to develop a plan and strategy for national interoperable connectivity. The presentation covered the following elements:

- Background information collected through dialogues since August 2022
- Definitions (e.g., Interoperable Connectivity)

- A working framework for the Plan
- A process moving forward to develop the Plan in a collaborative fashion with stakeholders
- A discussion of the two breakout sessions to follow

Deployment Plan Workshop Breakout Sessions

The workshop contained two breakout sessions comprised of 10 smaller groups. The first breakout session was focused on editing and suggesting goals needed to achieve interoperable connectivity that should be included in the Plan. The second breakout session was focused on creating a roadmap of prioritized tasks for advancing nationwide, scalable, interoperable connectivity.

Design a Plan: Breakout Discussions Highlights (Session 1)

Using input gathered from stakeholders between September 2022 and early April 2023, this breakout session discussed a set of interoperable connectivity goals. Discussion highlights heard from stakeholders in the breakout groups include:

- **Timeline:** Some groups felt that the timeline of the proposed goals was too conservative while others found the timeline too aggressive. However, the groups generally agreed that widespread adoption of V2X communications will take time so deployments should start soon.
- **Stakeholder Goals:** The Plan should include goals for all stakeholders, including U.S. DOT, IOOs, OEMs, and communications device manufacturers.
- **Role of Other Federal Agencies:** Many of the proposed goals rely on action from other federal agencies such as the FCC and NHTSA. For example, participants stated that the proposed goal to transition dedicated short-range communications (DSRC) devices to Long Term Evolution (LTE)-V2X should follow the FCC release of its Second Report and Order. In general, this goal generated a discussion in multiple breakout groups with some agreeing with the goal to transition devices and others stating that legacy DSRC devices should be part of the Plan itself.
- **Measurable Outcomes:** Participants agreed that there should be both short-term and long-term goals that have measurable outcomes. The measured outcome results should be publicly shared as a part of the Plan to demonstrate that the outcomes can be met and encourage apprehensive agencies to deploy, which will then accelerate national interoperable connectivity deployments.

- **Generating Public Buy-In:** Increasing public understanding of how interoperable connectivity devices work and their benefits will help generate buy-in, creating demand for the technology and encouraging additional deployment.
- **Defining Key Terms:** The goals need to consistently define terms such as “widespread” and “interoperability.” Fundamental technical terms such as LTE-V2X and Cellular-V2X also need to be clearly defined in the Plan. The goals and definitions should be flexible enough that future technologies and new spectrum opportunities are not excluded.
- **Cybersecurity Standards:** There should be an explicit goal for agreeing on and setting cybersecurity standards.
- **Guidance Materials:** The Plan should include goals for creating technical guidance materials related to interoperable connectivity deployments. These materials should cover:
 1. Foundational information about interoperable connectivity including use cases
 2. Vendor device selection and procurement
 3. Device installation and maintenance information
 4. Opportunities and processes for workforce training
 5. The certification process for interoperable connectivity technologies that support a connected eco-system.
- **Funding and Financial Models:** The breakout groups also discussed the need for funding and a sustainable financial model for installing and maintaining interoperable connectivity systems and devices. It’s important for potential deployers to understand deployment funding opportunities, the operations and maintenance costs for these systems, and workforce needs and training costs.

The presentation also featured the newly-created Interoperable Connectivity page on the ITS JPO’s [Smart Community Resource Center \(SCRC\)](#). This online tool includes over 100 resources that states, tribal governments, and local communities can use to support interoperable connectivity deployment. The resources are organized by the systems engineering process.

Design a Roadmap: Breakout Discussions Highlights (Session 2)

Each group was asked to fill in a blank roadmap provided by the U.S. DOT and vote on the priority of the tasks. When considering attendee feedback on the importance of each activity area presented in the provided roadmap, 5 out of 15 received a majority of the votes. Those 5, in order of votes received, were:

1. Roadside Unit (RSU) Installations: Intersections, Highway Corridors, etc.

2. Public Fleet Deployments
3. Technology Stability: Standards and Certification Tests
4. OEM Equipped Passenger Vehicles and Safety Applications
5. Demonstrated interoperability:
 - a. LTE V2X devices from different RSU/on-board unit manufacturers
 - b. Communications inside 30 MHz (of 5.9 GHz) to communications in other spectrum bands
 - c. Security credential interoperability
 - d. Application interoperability.

Discussion highlights heard from the breakout groups include:

- **Cautious Trust:** One of the key items delaying interoperable connectivity deployments is trust. Automobile manufacturers are cautious to put the equipment on their vehicles given that the benefits of V2X devices on vehicles require infrastructure that is not yet in place. Infrastructure deployers are cautious because their devices need V2X-capable vehicles and portable devices to communicate with to realize the V2X use case benefits.
- **Building Trust and Accelerating Deployments:** Trust can be built by having all stakeholders at the table, including the FCC and NHTSA. Specifically, stakeholders suggested that NHTSA incorporate V2X devices into its New Car Assessment Program and the FCC publish its Second Report and Order in order to help build trust in the technology and accelerate deployments. Additionally, creating a supportive environment around interoperable connectivity deployment, including standards and specifications, and materials that educate the public about interoperable connectivity would help build trust.
- **Establishing Clear Targets:** Specific targets are needed for deploying interoperable connectivity devices at an exact number of intersections by a specific year. For example, the ITS America National V2X Deployment Plan calls for 100,000 equipped intersections in five years and 250,000 intersections in 10 years. Additionally, a target for equipping an exact number of vehicles by a specific year should be established. The ITS America National V2X Deployment Plan sets clear targets that could be used as a basis for the Plan.
- **Public and Commercial Fleet Deployments:** Fleet deployments were viewed as key for achieving national scalability. Public fleets will play an important early role in showing interoperable connectivity benefits because IOOs can equip these vehicles and achieve benefits from V2X applications. Commercial fleets will play an important future role to show safety, mobility, environmental, and logistics benefits. Commercial fleet deployments are

expected to play an important role in the future because fleet turnover takes time and, because these vehicles traverse the nation, fleet owners will want V2X benefits available to them everywhere.

- **Security and Certification Processes:** Security policies, operational functions, and certification are near-term items that require attention. Specific proposed actions include having a self-certification process by 2023, making the process more robust by 2024, and having a fully operational third-party security audit certification by 2040.

Next Steps

In synthesizing the input from this workshop, several next steps were identified by stakeholders. Some of these steps have already been initiated. The next steps include:

- The FCC must continue to grant waivers. Waivers indicate some level of certainty around the 5.9 GHz spectrum (underway). The publication of the Final Rule and Order will further cement spectrum certainty.
- The U.S. DOT and the industry should continue work on interoperability and modularity of mature communication technology (underway).
- The U.S. DOT will release a National Interoperable Connectivity Deployment Plan, expected Fall 2023 (in development).
- The U.S. DOT and the industry should continue research and policy development on Security Credential Management System and cybersecurity (underway).
- The U.S. DOT and the industry should continue to develop a comprehensive suite of standards, testing and validation procedures, and calibration procedures (underway).
- The U.S. DOT will continue to bolster its stakeholder engagement, public outreach, workforce development, and technical assistance activities (underway).