

Phase 1 Comprehensive Acquisition Plan (CAP)

Vehicle-to-Everything (V2X) Accelerator: Connecting the West – Utah Department of Transportation

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List of Acronyms and Abbreviations

BSM	Basic Safety Message
C-V2X	Cellular V2X
CAP	Comprehensive Acquisition Plan
CCTV	Closed Circuit Television
CDOT	Colorado Department of Transportation
CI	Connected Intersection
CIPT	Connected Intersection Preferential Treatment
ConOps	Concept of Operations
CSW	Curve Speed Warning
CTI	Connected Transportation Interoperability
CTW	Connecting the West
CV	Connected Vehicle
DSRC	Dedicated Short-Range Communications
DTS	Division of Technology Services
FHWA	Federal Highway Administration
GLOSA	Green Light Optimal Speed Advisory
GM	General Motors
GNSS	Global Navigation Satellite System
HMI	Human-Machine Interface
I-70	Interstate 70
IEEE	Institute of Electrical and Electronics Engineers
IR	Installation Report
IRC	Interstate and Rural Corridor
ITS	Intelligent Transportation Systems
JIT	Just in Time
LiDAR	Light Detection and Ranging
LTE	Long-Term Evolution
MAP	Map Data Message
NOFO	Notice of Funding Opportunity
NTCIP	National Transportation Communications for ITS Protocol
OBP	On-board Processor
OBU	On-board Unit
OEM	Original Equipment Manufacturer
PoE	Power over Ethernet
RFP	Request for Proposal
RSU	Roadside Unit
RTCM	Radio Technical Commission for Maritime Services
RWIS	Road Weather Information System
SAD	System Architecture Document
SCM	Signal Command Module
SCMS	Security Credential Management System
SDSM	Sensor Data Sharing Message
SDX	Situation Data Exchange
SI	Signalized Intersection
SOI	System of Interest
SPaT	Signal Phase and Timing
SWIW	Spot Weather Impact Warning
SyRS	System Requirements Specification

TIM	Traveler Information Message
TMS	Traffic Monitoring Station
UDOT	Utah Department of Transportation
USDOT	United States Department of Transportation
UTA	Utah Transit Authority
V2X	Vehicle-to-Everything
VMS	Variable Message Sign
VRU	Vulnerable Road User
WYDOT	Wyoming Department of Transportation

1 Introduction

This document is the Comprehensive Acquisition Plan (CAP) for the Connecting the West (CTW) Program, part of the United States Department of Transportation's (USDOT) Saving Lives with Connectivity: Accelerating Vehicle-to-Everything (V2X) Deployment grant program (often referred to as the V2X Accelerator program). The CTW Program is a partnership of three states: Utah, Colorado, and Wyoming. Each participating state has an existing connected vehicle (CV) ecosystem, and each state will expand and improve on this ecosystem through the CTW Program.

This document provides details for the acquisition of equipment and supporting systems for the CTW deployments. This Comprehensive Acquisition Plan (CAP) documents the baseline procurement strategy established at the beginning of Phase 1. As procurement and field deployment evolved, adaptive hardware adjustments were made—such as transitioning network switch models from Fortinet to Cisco (including Cisco IE-3100 series switches) and integrating supercapacitor power storage for solar sites. These hardware updates, the refined quantities, and the procurement progress have been continuously communicated to FHWA through formal monthly acquisition reports. High-level installation summaries, operational methodologies, and completed deployment locations for field and vehicle hardware are captured in the Phase 1 Installation Report (IR).

1.1 Purpose of the Plan

The purpose of this plan is to document the CTW Program's acquisition approach and to provide details about the equipment and supporting systems to be acquired. This will be useful to demonstrate compliance with both the policies for the States of Utah and Colorado and the Notice of Funding Opportunity (NOFO). This plan provides acquisition details for Utah and Colorado, as these CTW partners will make purchases for the CTW deployments. Wyoming is not included in this acquisition plan, as Wyoming's participation in the CTW Program does not include any new purchases.

1.2 Organization of the Plan

This CAP contains the following sections:

- Section 2. Acquisition Overview – Provides an overview of the acquisition approach, schedule, and vendor selection.
- Section 3. CTW Project #1: Utah Signalized Intersection (SI) Roadside Units (RSUs) – Summarizes the Utah Department of Transportation's (UDOT) planned acquisition of equipment and software for the Utah connected intersection preferential treatment (CIPT) deployments.
- Section 4. CTW Project #2: Utah Interstate and Rural Corridor (IRC) RSUs – Summarizes UDOT's planned acquisition of equipment and software for the Utah IRC deployments.

- Section 5. CTW Project #3: Utah Vulnerable Road User (VRU) Safety at Intersections – Summarizes UDOT’s planned acquisition of equipment and software for the Utah VRU Safety Systems deployments.
- Section 6. Utah General Motors (GM) Test Vehicle – Summarizes UDOT’s planned acquisition of the GM test vehicle.
- Section 7. CTW Project #4: Colorado Interstate 70 (I-70) Expansion and Integration – Summarizes Colorado Department of Transportation’s (CDOT) planned acquisition of equipment for the Colorado I-70 expansion and integration.

1.3 CTW System Overview

The proposed CTW system is a System of Systems, with a system of interest (SOI) that includes Central Systems, Field Equipment, and Vehicle Systems. UDOT, Wyoming Department of Transportation (WYDOT), CDOT will continue to operate their individual central systems and field equipment while also continuing to operate fleet vehicles equipped with Cellular V2X (C-V2X) technologies. WYDOT will also continue to operate fleet vehicles equipped with satellite-enabled V2X communications. In addition to the SOI, external systems will support the CTW SOI. This CTW Program will expand existing in-place, operational systems. As such, the CTW system field components and analysis approaches (e.g., testing and validation tools and data analytics) that have been used for in-place deployments will continue to be used for this CTW system expansion.

As introduced originally in the CTW Concept of Operations (ConOps) document, the following summary of capability changes describes the expansions and changes planned through the CTW Program.

The description of desired changes includes the following categories of changes:

1. Expansion of existing capabilities (e.g., existing capabilities that will be expanded with no change to the functionality).
2. Capability changes (e.g., changes to existing conditions in terms of enhanced system capabilities and expanded deployments).
3. Personnel changes (e.g., changes to roles and responsibilities of CTW agency staff).

The following describes the anticipated changes within each category introduced above:

1. **Expansions of existing capabilities:** The following expansions of existing functions will be performed by the CTW Program:
 - a. *Expanded preferential treatment at connected intersections (CIs).* Expand SI preferential treatment for transit and emergency vehicles and snowplows to additional intersections and vehicles in Utah.
 - b. *Expanded CIs.* Expand the number of SIs in Utah that operate as CIs and meet the accuracy, reliability, and timeliness parameters needed to support in-vehicle safety applications to address the user needs to the extent possible.

- c. *Expand the number of RSUs broadcasting and receiving messages.* Expand the deployments of RSUs to broadcast traveler information messages (TIMs) and receive basic safety messages (BSMs) in Utah and Colorado.
 - d. *Expand VRU detection and alerts at intersections.* Deploy systems at a limited number of intersections in Utah to further test and demonstrate capabilities to detect VRUs that cross intersections and provide alerts to drivers about possible conflicts with the vehicles.
 - e. *Expand system monitoring and reporting.* Expand and enhance the collection, storage, and management of data describing the health of systems and messages exchanged with equipped vehicles.
 - f. *Expand security credentialing.* Expand the processes of attaching security credentials to messages exchanged by additional Field Equipment and Vehicle Systems.
 - g. *Demonstrate original equipment manufacturer (OEM) vehicle interoperability.* Involve a C-V2X-enabled OEM vehicle with safety applications as a public agency-operated test vehicle with available safety applications and drive a predetermined, instrumented “loop” corridor within the three CTW states.
 - h. *Expand integration of CV data.* Expand the ingest, quality-check, and processing of data from CVs in Colorado and Utah as the number of RSU data collection sites expand.
 - i. *Expand data storage.* Expand data storage processes to support additional RSU data collection sites.
2. **Capability changes:** The proposed system will accomplish the following capability changes:
- a. *Improve TIM consistency.* Modify the approaches used in CTW states for generating and managing TIMs to achieve consistency in message structure and content.
 - b. *Increase and improve TIM creation.* Expand the capability to create TIM messages (using the consistent approach agreed upon) that describe Spot Weather Impact Warning (SWIW), Curve Speed Warning (CSW), road closure and weather alerts, and advisories by increasing the geographic coverage and expanding message content creation in Utah, Wyoming, and Colorado.
 - c. *Improve consistency of Interstate exchange of event reports.* Modify event report creation in each state to a consistent approach and exchange event reports describing traveler information alerts among the CTW states using the Situation Data Exchange (SDX).
 - d. *Create new TIM exchanges.* Utilize the SDX such that each CTW state sends TIMs and receives TIMs from neighboring states.
 - e. *Demonstrate Security Credential Management System (SCMS) interoperability.* Conduct demonstrations to understand the extent to which SCMS certificates are interoperable between the CTW states and take steps to achieve interoperability as needed.
 - f. *Refine SCMS certificates without cellular service.* Refine and expand an approach to topping off SCMS certificates in Utah fleet vehicles that does not require cellular service.
3. **Personnel changes:** No new personnel are expected to be added as a result of the proposed system, but roles and responsibilities of staff may change:

- a. *Manage additional MAP messages.* In Utah, staff and/or contractors will be responsible for creating and managing additional MAP messages.
- b. *Maintain additional Field Equipment.* In Colorado and Utah, staff will be responsible for maintaining new Field Equipment added as part of this effort.
- c. *Maintain additional Vehicle Systems.* In Utah, staff will be responsible for maintaining equipment on fleet vehicles that support C-V2X connectivity.
- d. *Manage additional TIMs and TIM interoperability.* In all CTW states, staff will need to manage the creation, update, and removal of TIMs to ensure they convey the maximum information possible to travelers and adhere to interoperability standards and best practices.
- e. *Manage expanded data.* In each CTW state, staff will be responsible for managing data retention and access.

Figure 1 shows the CTW SOI and external systems.

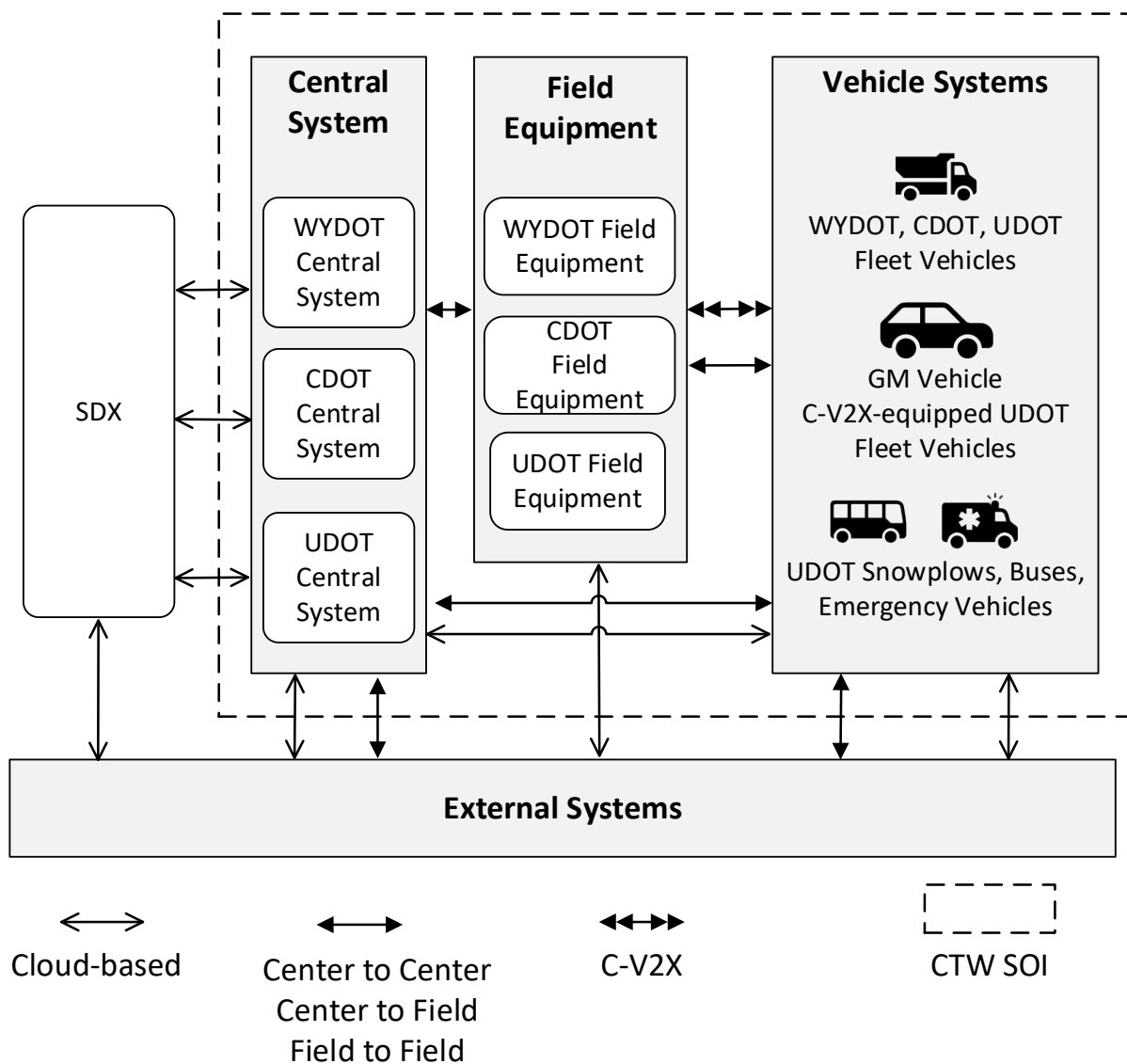


Figure 1. System Overview Diagram

Source: UDOT, 2026

2 Acquisition Overview

This section provides an overview of the acquisition approach and vendor outreach plan for the CTW Program deployments. The acquisition approach includes Utah and Colorado, as these CTW partners will make purchases for the CTW deployments. Wyoming is not included in the acquisition approach, as Wyoming's participation in the CTW Program does not include any new purchases.

The CTW acquisition approach follows the NOFO, the State of Utah's acquisition policies (for Utah's acquisitions), and the State of Colorado's acquisition policies (for Colorado's acquisitions). To ensure full compliance with policies and laws for the State of Utah and State of Colorado, all purchasing is being done directly through each state's respective purchasing system. UDOT and CDOT have a procurement process that allows the acquisition and tracking of equipment and software for client contracts. The procurement and accounting processes include the following staffing resources: legal/contracts, accounts receivable, accounts payable, inventory tracking, and reporting.

2.1 Acquisition Approach

The first step in the acquisition approach was to define the ConOps based on the identified user needs. This process led to the development of the System Requirements Specifications (SyRS) document and the System Architecture Document (SAD). These documents provide enough information to describe the acquisitions needed for the CTW deployments. Based on these documents, vendor research has been conducted on in-place system procurement processes and/or master contracts to identify vendors knowledgeable in each area that equipment, software, or services are required. Vendor selection criteria will consider vendor responsiveness for all areas, including: software, hardware, support, warranties, product support as applicable, and their ability to deliver on time. Procurement of the equipment will be handled by a purchasing officer within the respective UDOT and CDOT acquisition teams. The procurement process will follow these steps:

1. Evaluation of the purchase request by the team, including any sole source justifications if necessary.
2. Submittal of a purchase order to the vendor based on the agreed-upon purchase price of the equipment and quantities required.
3. Tracking of the order confirmation and delivery schedule provided by the vendor.
4. Receipt and inventory of the delivery to compare the purchase order and equipment received.

As part of the acquisition process, the CTW team will assess the time-to-procure for each equipment item relative to the overall CTW deployment schedule to ensure that sufficient time is available for procurement, delivery, verification, and testing of devices. This assessment will be documented in an Acquisition Report that will be prepared by the CTW team, discussed at CTW technical team meetings, and updated periodically until all equipment and associated capabilities have been acquired. The Acquisition Report will be submitted with CTW Monthly Reports to USDOT to convey acquisition progress

and status. Accordingly, all real-time shifts from this baseline—including hardware substitutions like Cisco IE-3100 switches and supplemental solar equipment acquisitions—have been continuously documented and submitted to USDOT/Federal Highway Administration (FHWA) through these monthly Acquisition Reports throughout the project.

2.2 Standards and Certifications

To ensure reliable interoperability across V2X Accelerator program sites in Utah, Colorado, and Wyoming, the CTW team will identify any required device standards and certifications. This will verify compliance with applicable Intelligent Transportation Systems (ITS) and V2X standards, including messaging, timing, security, and interface protocols. Certification requirements will be considered during procurement and delivery, with priority given to devices that support the message types and standards identified in the CTW deployment framework. Devices and products will be procured using the standards and certifications shown in Table 1.

Table 1. Equipment Inventory

Source: UDOT, 2025

Site-Specific Description	Common Configuration Items	Standards and Certifications
Utah SI RSUs	RSUs, Power over Ethernet (PoE) Switches	SAE J2735 (BSM, Signal Phase and Timing [SPaT], MAP, TIM) - SAE J2945/1 (BSM processing) - SAE J3161 (C-V2X interoperability) - Connected Transportation Interoperability (CTI) 4501, CTI 4001, National Transportation Communications for ITS Protocol (NTCIP) 1218 (RSU control) - Institute of Electrical and Electronics Engineers (IEEE) 1609.x (security)
UDOT Vehicle On-board Units (OBUs)	OBUs, Global Navigation Satellite System (GNSS), Security Stack	SAE J2735 (BSM, MAP) - SAE J2945/1B (OBU behavior) - SAE J3161/1 (OBU-RSU comms) - SAE J5001 (Cyclist OBUs) - IEEE 1609.x (Security stack compatibility)
Utah IRC RSUs	RSUs, Switches, Enclosures	SAE J2735 (BSM, SPaT, MAP, TIM) - SAE J2945/1 (BSM processing) - SAE J3161 (C-V2X interoperability) - CTI 4501, CTI 4001, NTCIP 1218 (RSU control) - IEEE 1609.x (security) - SAE J3258 (RTCM GNSS support) - SAE J2935/3 (Road Weather Messages)
Utah VRU Safety Equipment	Light Detection and Ranging (LiDAR), RSUs, OBU/VRU sensors	SAE J3224 (Sensor Data Sharing Message [SDSM]) - SAE J5001 (OBU for VRUs) - SAE J2735 (RSM, SDSM, BSM) - NTCIP 1202, 1218

Site-Specific Description	Common Configuration Items	Standards and Certifications
GM Test Vehicle	OEM Test Vehicle, OBU	SAE J2945 (OEM V2X behavior) - SAE J2735 (BSM, SPaT, MAP, TIM) - SAE J3315 (event logging) - SAE J3161 (C-V2X interoperability)
CO I-70 Expansion RSUs	RSUs, Supporting Comms	SAE J2735 (BSM, SPaT, MAP, TIM) - SAE J2945/1 (BSM processing) - SAE J3161 (C-V2X interoperability) - CTI 4501, CTI 4001, NTCIP 1218 (RSU control) - IEEE 1609.x (security) - SAE J2945/3 (RWM) - SAE J2540-2 (TIM encoding/decoding)

2.3 Vendor Outreach Plan

During previous CV deployments (which are currently operational and are being expanded to additional sites through this CTW Program), UDOT and CDOT established contractual relationships with vendors that met the original requirements for software, hardware, and services. For some equipment and services, these previously identified vendors will be utilized for CTW acquisitions in order to expand the existing functionality of and interoperability with in-place deployments.

For this CTW effort, UDOT and CDOT are utilizing existing mechanisms such as pre-approved product lists, master agreements, and other established agency procurement processes to initiate equipment and software purchases for expanding the existing systems to additional sites through this CTW Program. Existing mechanisms available to identify potential vendors, make purchases, and procure products and services include:

- Existing UDOT and CDOT procurement contracts in place with vendors.
- UDOT and CDOT procurement processes, with request for proposals, invitation to bid, and agency contracting mechanisms.
- UDOT and Utah Division of Technology Services (DTS) purchasing contracts.
- CDOT purchasing contracts.
- [UDOT Authorized Products List](#).
- [CDOT Approved Products List](#).

2.4 Acquisition Risk Management Approach

The CTW team has anticipated possible risks associated with equipment and software acquisitions. The risk management approach summarized in this section provides possible risks specific to acquisition as well as mitigation strategies to minimize or resolve each risk.

- **Acquisition Risk #1: Weather and Build Season**

- Description of Risk: Utah, Colorado, and Wyoming have limitations on building and installations that can reasonably occur during winter months. There is a risk that a limited construction season in 2025 could delay some installations. The vast majority of CTW equipment installations are on existing poles or equipment; however, pull boxes are at grade and may be covered with snow and ice.
- Mitigation Strategy: The CTW team has planned for summer and fall installations and will purchase some equipment early so installations can begin as early as possible.

- **Acquisition Risk #2: Hardware Vendor Instability**

- Description of Risk: The evolving nature of the V2X Business Model presents a risk that hardware vendors may not remain in business for the duration of the deployment, limiting the ability to purchase RSUs or OBUs and receive support of those devices, resulting in operational disruptions and cost increases.
- Mitigation Strategy: The CTW states will continue to foster relationships and procure equipment from multiple vendors. The CTW team plans to make early purchases of equipment to help reduce this risk.

- **Acquisition Risk #3: Possible Delays with New Contractual Relationships**

- Description of Risk: The acquisition process will, at times, require CTW states to establish new contractual relationships with vendors. This process could introduce delays associated with request for proposal (RFP) processes and responses, administrative processes, and negotiating contract terms.
- Mitigation Strategy: The CTW states will work diligently to issue RFPs, review responses and select vendors, and negotiate contract terms as expeditiously as possible to adhere to the overall CTW project schedule.

The CTW team will monitor acquisition risks, implement mitigation strategies, and provide details (e.g., description of specific risks, risk analysis, response planning, and status updates) in the Risk Register submitted with the CTW monthly reports to FHWA.

3 CTW Project #1: Utah SI RSUs

This section provides details for acquiring equipment and software for Project #1 of the CTW Program: Utah SI RSUs.

3.1 Utah SI RSUs: Field Equipment

The Utah SI Field Equipment includes the RSU, PoE Fiber Switch, mounting hardware, and CAT6 communication cable.

3.1.1 Technical Description/Specification

UDOT plans to purchase and install a fully functioning RSU site mounted to existing ITS infrastructure that includes traffic signal poles, mast arms, cabinets, and related features.

The RSU will be a dual-channel C-V2X communication system and antenna within an outdoor weatherproof enclosure.

See Table 1 for applicable standards and certifications.

3.1.2 Ancillary Equipment

In addition to the RSU, ancillary equipment for UDOT's CI installation includes:

- Signal Command Module (SCM) – 4 Channel
- GNSS card for time and location
- GNSS chip with built-in Radio Technical Commission for Maritime Services (RTCM) base station
- Network switch
- Fiber connectivity
- Mounting hardware
- CAT6 cable

3.1.3 Parts Numbers and Quantities

Table 2 provides the description and quantity of equipment to be acquired. Note that the quantity of RSUs and (SCMs) includes an addition of approximately 5% of devices to be used for spare parts, to account for replacement of devices as damage or malfunctions occur during the operational period.

Table 2. Utah SI Field Equipment*Source: UDOT, 2026*

Description	Part Number or Name	Quantity
RSU	Commsignia ITS-RS4	476
SCM	Helix Innovations HI-SCM-4G4	476
60-Watt Network Switch (8 ports)	Fortinet FSR-112D-POE-BUN	300*
90-Watt Network Switches (16 ports) – Only needed at intersections with closed circuit television (CCTV)	Fortinet FSR-216F-POE-491-BUN	150*
TRENDnet Industrial 95W Gigabit PoE++ Injector	TI-IG90	232*
GNSS Chip with Built-In RTCM Base Station (RTCM v3.x)	HI-SCM-4-UBP	20
GNSS Antenna Kit (includes cable)	HI-SCM-4-ANT	20
Fiber Jumpers (2 per switch)	Warehouse purchase of various vendors. Connection Type: Fiber Jumper, SMF, LC-ST, Duplex, 3'	900
Standalone Enclosure with Harness	HI-SCM-4G4-TB	450
CAT6 Cable (100 ft / intersection)	Paige® GameChanger, 25834080	45,000 ft

* Utah will use two approaches for network switches: either a 90 Watt switch or a 60 Watt switch plus an injector. A final decision on the exact number of 90 Watt vs. 60 Watt plus injector will be reached as final site inspections and installations occur and just in time (JIT) incremental purchases are performed. The breakdown of approach for the 450 intersections is an estimate currently.

3.1.4 Associated Software

The UDOT SIs will require associated software that includes SW-V2X-SS-WAVE-msD-2018 – Commsignia WAVE/DSRC V2X Software Stack and Security Stack License for Dedicated Short-Range Communications (DSRC) and C-V2X.

3.1.5 Acquisition Method

The Utah SI Field Equipment will be ordered by the UDOT acquisition team via existing UDOT and the Utah DTS purchasing contracts.

3.1.6 Potential Vendors

The vendor for the RSUs is Commsignia. UDOT has successfully used Commsignia RSUs for current CV deployments and understands the product capabilities.

For any other equipment, the potential vendors are:

- Helix SCM
- Fiber Switches: 60 Watt Fortinet FSR-112D-POE and 90 Watt Fortinet FSR-216F-POE-491-BUN
- PoE Injectors: TRENDnet Industrial 95W Gigabit PoE++ Injector
- Mounting Hardware
- CAT6 Cable: Paige® GameChanger, 25834080

The basis for this purchase mechanism is to use existing UDOT and DTS purchasing contracts.

3.1.7 Acquisition Schedule

The acquisition schedule is presented in Table 3.

Table 3. Acquisition Schedule for Utah SI Field Equipment

Source: UDOT, 2025

Description	Date	Quantity
RSU	June 2025	476
SCM	September 2025	476
60-Watt Network Switch (8 ports)	June 2025	300*
90-Watt Network Switches (16 ports) – Only needed at intersections with CCTV	September 2025	150*
TRENDnet Industrial 95W Gigabit PoE++ Injector	October 2025	232*
GNSS Chip with Built-In RTCM Base Station (RTCM v3.x)	October 2025	20
GNSS Antenna Kit (includes cable)	October 2025	20
Fiber Jumpers (2 per switch)	October 2025	900
Standalone Enclosure with Harness	October 2025	450
CAT6 Cable (100 ft / intersection)	October 2025	45,000 ft

* Utah will use two approaches for network switches: either a 90-Watt switch or a 60-Watt switch plus an injector. A final decision on the exact number of 90 Watt vs. 60 Watt plus injector will be reached as final site inspections and installations occur and JIT incremental purchases are performed. The breakdown of approach for the 450 intersections is an estimate at this time.

3.2 Utah SI RSUs: Vehicle Systems

The Utah SI Vehicle Systems include equipment that will be installed on Utah Transit Authority (UTA) transit vehicles, UDOT snowplows, UDOT general fleet vehicles, and emergency vehicles in Utah. This equipment will include OBUs for CIPT vehicles.

3.2.1 Technical Description/Specification

The OBUs being purchased include:

- Transit vehicle OBUs
- Snowplow OBUs
- Emergency vehicle OBUs.

See Table 1 for applicable standards and certifications.

3.2.2 Ancillary Equipment

The ancillary equipment associated with the UDOT Vehicle Systems that will support the OBUs listed above include:

- On-board processors (OBP) (transit vehicles)
- Snowplow OBPs

3.2.3 Part Numbers and Quantities

Table 4 provides the description and quantity of equipment to be acquired. Note that the quantity of OBUs includes an addition of approximately 5% of devices to be used for spare parts, to account for replacement of devices as damage or malfunctions occur during the operational period.

Table 4. Equipment for Utah SI Vehicle Systems
Source: UDOT, 2026

Description	Part Number or Name	Quantity
Transit Vehicle OBUs	Commsignia ITS-OB4-M	123
Snowplow, Emergency Vehicle, and Other Fleet Vehicle OBUs	Commsignia ITS-OB4-M	107*
OBPs (Transit Vehicles)	Helix Innovations (HI-OBP-22) OBPs	115
OBPs (Snowplows and Emergency vehicles)	Helix OBPs	100*
OBU Cabling/Wiring Harness Units	Narwhal Units (1 per vehicle)	215

* The final percentage of snowplows, emergency vehicles, and public or private fleet vehicles have not yet been determined. For this reason, a combined total is shown here.

3.2.4 Associated Software

None identified.

3.2.5 Acquisition Method

This equipment will be ordered by the UDOT acquisition team via existing UDOT and DTS purchasing contracts.

3.2.6 Potential Vendors

For the OBUs, Commsignia is a vendor for which UDOT has an agreement in place and will continue to purchase equipment from.

For the SCM and supporting cards and chips, Helix is a vendor for which UDOT has an agreement in place and will continue to purchase equipment from.

The basis for this purchase mechanism will be existing UDOT purchasing contracts.

3.2.7 Acquisition Schedule

The acquisition schedule is presented in Table 5. Note that the quantity of OBUs includes an addition of approximately 5% of devices to be used for spare parts, to account for replacement of devices as damage or malfunctions occur during the operational period.

Table 5. Acquisition Schedule for Utah SI Vehicle Systems

Source: UDOT, 2025

Description	Date	Quantity
Transit Vehicle OBUs	August 2025	123
Snowplow, Emergency Vehicle, and Other Fleet Vehicle OBUs	October 2025	107*
On-Board Processors (Transit Vehicles)	October 2025	115
On-Board Processors (Snowplows and Emergency vehicles)	October 2025	100
Cabling/Wiring Harness Units	October 2025	215

* The final percentage of snowplows, emergency vehicles, and public or private fleet vehicles have not yet been determined. For this reason, a combined total is shown here.

4 CTW Project #2: Utah IRC RSUs

This section provides details for acquiring equipment and software for Project #2 of the CTW Program: Utah IRC RSUs.

4.1 Utah IRC RSUs: Field Equipment

The Utah IRC Field Equipment being purchased and installed includes the RSU, PoE Fiber Switch, mounting hardware, and CAT6 communication cable.

4.1.1 Technical Description/Specification

UDOT is purchasing a fully functioning RSU site mounted to existing ITS infrastructure that includes CCTV poles, road weather information system (RWIS), variable message sign (VMS) structures, and traffic monitoring system (TMS) poles.

The RSU will be a dual-channel C-V2X communication system and antenna within an outdoor weatherproof enclosure.

See Table 1 for applicable standards and certifications.

4.1.2 Ancillary Equipment

In addition to the RSU, ancillary equipment at the RSU site includes:

- Network switch
- Fiber connectivity
- Mounting hardware
- CAT6 cable

4.1.3 Parts Numbers and Quantities

Table 6 provides the description and quantity of equipment to be acquired. Note that the quantity of RSUs includes an addition of approximately 5% of devices to be used for spare parts, to account for replacement of devices as damage or malfunctions occur during the operational period.

Table 6. Utah IRC Field Equipment
Source: UDOT, 2025

Description	Part Number or Name	Quantity
RSUs	Commsignia ITS-RS4	159
Fiber Connections (2 jumpers per RSU)	Warehouse purchase of various vendors. Connection Type: Fiber Jumper, SMF, LC-ST, Duplex, 1Meter	300
60 Watt Network Switches	Fortinet FSR-112D-POE-BUN	75*
90 Watt Network Switches	Fortinet FSR-216F-POE-491-BUN	75*
TRENDnet Industrial 95W Gigabit PoE++ Injector	TI-IG90 - at	75*
Mounting Hardware	Stand-Off Pole, Brackets	150
CAT6 Cable	Paige® GameChanger, 25834080	15,000 ft.

* Utah will use two approaches for network switches: either a 90 Watt switch or a 60 Watt switch plus an injector. A final decision on the exact number of 90 Watt vs. 60 Watt plus injector will be reached as final site inspections occur and JIT incremental purchases are performed. The breakdown of approach for the 450 intersections is an estimate at this time.

4.1.4 Associated Software

Associated software for UDOT's implementation includes SW-V2X-SS-WAVE-msD-2018 – Commsignia WAVE/DSRC V2X Software Stack and Security Stack License for DSRC and C-V2X.

4.1.5 Acquisition Method

This equipment will be ordered by the UDOT acquisition team via existing UDOT and DTS purchasing contracts.

4.1.6 Potential Vendors

The vendor for the RSUs is Commsignia. UDOT has successfully used Commsignia RSUs for current CV deployments and understands the product capabilities.

Additional equipment and the potential vendors include:

- Fiber switches: 60 Watt Fortinet FSR-112D-POE and 90 Watt Fortinet FSR-216F-POE-491-BUN

- PoE injectors: TRENDnet Industrial 95W Gigabit PoE++ Injector
- Mounting hardware
- CAT6 cable: Paige® GameChanger, 25834080.

The basis for this purchase mechanism is the existing UDOT and DTS purchasing contracts.

4.1.7 Acquisition Schedule

UDOT's acquisition schedule is presented in Table 7. Note that the quantity of RSUs includes an addition of approximately 5% of devices to be used for spare parts, to account for replacement of devices as damage or malfunctions occur during the operational period.

Table 7. Acquisition Schedule for Utah IRC Field Equipment
Source: UDOT, 2025

Description	Date	Quantity
RSUs	July 2025	159
Fiber Connections (2 jumpers per RSU)	October 2025	300
60 Watt Network Switches	September 2025	75*
90 Watt Network Switches	September 2025	75*
TRENDnet Industrial 95W Gigabit PoE++ Injector	October 2025	75*
Mounting Hardware	October 2025	150
CAT6 Cable	October 2025	15,000 ft.

*Utah will use two approaches for network switches: either a 90 Watt switch or a 60 Watt switch plus an injector. A final decision on the exact number of 90 Watt vs. 60 Watt plus injector will be reached as final site inspections and installations occur and JIT incremental purchases are performed. The breakdown of approach for the 450 intersections is an estimate at this time.

4.2 Utah IRC RSUs: Vehicle Systems

No additional fleet vehicles will be equipped specifically as part of the IRC portion of the CTW Program. Thus, no new Vehicle Systems will be acquired. UDOT will continue to operate the current fleet vehicles that are equipped with OBUs and human-machine interfaces (HMIs) to display TIM messages received and to broadcast BSMs.

4.2.1 Technical Description/Specification

N/A

4.2.2 Ancillary Equipment

N/A

4.2.3 Part Numbers and Quantities

N/A

4.2.4 Associated Software

N/A

4.2.5 Acquisition Method

N/A

4.2.6 Potential Vendors

N/A

4.2.7 Acquisition Schedule

N/A

5 CTW Project #3: Utah VRU Safety at Intersections

This section provides details for acquiring equipment and software for Project #3 of the CTW Program: Utah Vulnerable Road User (VRU) Safety at Intersections.

5.1 Utah VRU Safety at Intersections: Field Equipment

The Utah VRU Safety Systems Field Equipment includes VRU detection, RSUs, ancillary equipment (SCM, network switch, fiber connectivity), and blank-out signs.

5.1.1 Technical Description/Specification

For Utah's 20 intersections identified in this project, 12 of the 20 intersections will already have VRU detection systems purchased outside of the CTW Program. The CTW Program will acquire systems for 8 more intersections, bringing the total number of VRU intersections to 20.

Utah's VRU intersections include the following components:

- VRU Detection System
 - Ouster LiDAR detectors – two are required for every VRU Safety System-equipped intersection.
 - This system combines hardware and software components to detect and classify road users to broadcast V2X messages via RSU.
- Blank-out Signs
 - Orange Traffic – “Turning Vehicles Yield to Pedestrians” (4 per intersection).
 - Note that intersections will be selected with operational RSUs already installed; therefore, no RSUs are identified for acquisition.

See Table 1 for applicable standards and certifications.

5.1.2 Ancillary Equipment

The ancillary equipment in addition to the VRU detection (LiDAR Sensor), blank-out signs, and additional RSUs includes:

- Mounting bracket (LiDAR and blank-out signs)
- Edge computer

- PoE splitter
- Splitter mount
- CAT6 cable (Lidar sensor to Edge Computer)

5.1.3 Parts Numbers and Quantities

Table 8 provides the description and quantity of equipment to be acquired.

Table 8. Utah VRU Safety Systems Field Equipment
Source: UDOT, 2025

Description	Part Number or Name	Quantity
LiDAR Sensor (2 per intersection)	OS1 Rev7 128 OS1-070-128U-AX-BR	16
Mounting Bracket (1 per LiDAR Sensor - 2 per intersection)	Accessory, Mount Kit, Outdoor, Pole Mount OG-ACC-MNTK-OUT-PM	16
Edge Computer (1 per intersection)	Catalyst, GPU, AGX Orin, Standard Config, Revision 1 OG-CATL-GPU-AGXO-STDC-REV01	8
PoE Splitter (2 per intersection)	PoE+, Splitter, OSx 24V OG-ACC-POE-SPLT-OS24V 964-106085	16
Splitter Mount (2 per intersection)	Splitter Mount OG-ACC-MNTP-PSM 964-106084	16
Blank-out Signs (4 per intersection)	LED "Turning Vehicles" R or L Arrow Yield Icon "TO" Ped Icon P/N: LLS 3636 TVYTP (R or L)	32
Mounting Bracket for blank out signs (4 per intersection)	Complete Astro-Brac Galaxy Assembly, 1-Way, Cable Mount, 3-Section AG-0125-3-96-PNC	32
CAT6 Cable (350 ft per intersection)	Paige® GameChanger, 25834080	2,800 ft

5.1.4 Associated Software

The edge computer used as Field Equipment for Utah's VRU safety system has the following software pre-installed:

- Ouster Gemini Detect – Perception software powered by artificial intelligence.

- Ouster ITS Edge – Logic layer that receives object data from the perception and puts it into standard V2X format to send to RSU.

These are proprietary software that come with the hardware.

5.1.5 Acquisition Method

VRU Field Equipment will be ordered by UDOT through existing procurement contracts.

5.1.6 Potential Vendors

For the VRU detection, UDOT's potential vendor is Ouster Inc.

For Utah's blank-out signs, the potential vendor is Orange Traffic (purchased through state contract using Gades Sales).

No other potential vendors were identified.

The basis for this purchase mechanism is Utah's State procurement contracts.

5.1.7 Acquisition Schedule

Table 9 provides the description and quantity of equipment to be acquired.

Table 9. Utah VRU Safety Systems Acquisition Schedule

Source: UDOT, 2026

Description	Date	Quantity
LiDAR Sensor	October, 2025	16
Mounting Bracket	October, 2025	16
Edge Computer	October, 2025	8
PoE Splitter	October, 2025	16
Splitter Mount	October, 2025	16
Blank-out Signs	October, 2025	32
Mounting Brackets for Blank-out Signs	October, 2025	32
CAT6 Cable (350 ft per intersection)	October, 2025	2,800 ft

5.2 Utah VRU Safety Systems: Vehicle Systems

The Utah VRU Safety Systems Vehicle Systems include equipment that is already installed on UDOT General Fleet Vehicles through earlier activities. No additional Vehicle Systems will be purchased specific to the VRU Safety Systems.

5.2.1 Technical Description/Specification

N/A

5.2.2 Ancillary Equipment

N/A

5.2.3 Part Numbers and Quantities

None identified.

5.2.4 Associated Software

None identified.

5.2.5 Acquisition Method

None identified.

5.2.6 Potential Vendors

No potential vendors were identified.

5.2.7 Acquisition Schedule

No acquisition schedule was identified.

6 Utah GM Test Vehicle

A key aspect of the CTW Program will be the engagement and participation of GM to ensure that the CTW work conforms to their expectations, allowing their vehicles to successfully ingest and utilize the messages and data broadcast by the CTW states. This section provides details about acquiring the Utah GM Test Vehicle as part of the CTW Program.

UDOT will purchase a GM vehicle through existing UDOT purchasing agreements and supply the vehicle to GM engineers. GM engineers will add equipment and software to the base vehicle to produce a CV with GM's and UDOT's applications. CTW Program funds will be used for both the purchase of the vehicle and the addition of CV components to the vehicle.

6.1 Utah: GM Test Vehicle

GM will build a fully integrated CV complete with these V2X applications:

- V2X Safety Features
 - Intersection crash avoidance safety (red light violation, left turn, right turn, intersection movement assist, VRU safety)
 - VRU safety at designated crosswalks
 - Work zone awareness
 - In-vehicle signage, including weather, traffic conditions, high-risk curves, work zones, road closures, and crashes (based on TIM messaging)
- V2X Mobility Features
 - Green light optimal speed advisory (GLOSA)
 - Traffic signal preemption/priority
 - Red light countdown
- HMI

6.1.1 Technical Description/Specification

Utah will purchase a 2026 Chevrolet Traverse as the GM Test Vehicle for this project.

6.1.2 Ancillary Equipment

The ancillary equipment associated with the GM test vehicle includes:

- OBU

- HMI
- Other necessary equipment

6.1.3 Part Numbers and Quantities

Table 10 provides the description and quantity of equipment to be acquired. Equipment to be installed within the vehicle is the responsibility of GM and is not defined here.

Table 10. Equipment for GM Test Vehicle

Source: UDOT, 2025

Description	Part Number or Name	Quantity
GM Test Vehicle	2026 Chevrolet Traverse	1

6.1.4 Associated Software

None identified.

6.1.5 Acquisition Method

UDOT's existing procurement processes will be followed to enter into a contract between UDOT and GM. The GM vehicle will be purchased utilizing a state agency contract through a request for quotes using specifications and a pool of approved vendors.

6.1.6 Potential Vendors

The vendor for the GM test vehicle is General Motors Company.

6.1.7 Acquisition Schedule

Procurement will begin immediately following the full execution of the contract with GM. Vehicle delivery is estimated to be October 2025.

7 CTW Project #4: Colorado I-70 Expansion and Integration

This section provides details for acquiring equipment for Project #4 of the CTW Program: Colorado I-70 Expansion and Integration.

7.1 Colorado I-70 Expansion and Integration: Field Equipment

The Colorado IRC Field Equipment is comprised of the RSUs and its ancillary equipment, including PoE switch, network switch, and fiber connectivity.

7.1.1 Technical Description/Specification

CDOT is purchasing the following RSUs:

- Commsignia OmniAir Certified RSU (ITS-RS4-M) long-term evolution (LTE)-V2X

See Table 1 for applicable standards and certifications.

7.1.2 Ancillary Equipment

In addition to the RSU, the ancillary equipment includes:

- Omnitron PoE Switch (3359B-0-24-1Z)
- Ciena Service Delivery Switch (3926, 3930, or 3931) – Already present at installation sites
- Fiber and CAT6 cabling
- Lighting suppressors for CAT6

7.1.3 Parts Numbers and Quantities

Table 11 provides the description and quantity of equipment to be acquired. The quantities outlined in Table 11 include the acquisition of spare parts, to account for replacement of equipment as damage or malfunctions occur during the operational period.

Table 11. Colorado IRC Field Equipment*Source: UDOT, 2025*

Description	Part Number or Name	Quantity
Commsignia RSU	ITS-RS4-M	50
Omnitron PoE Switch	3359B-0-24-1Z	50

7.1.4 Associated Software

None identified.

7.1.5 Acquisition Method

This equipment will be ordered by the CDOT acquisition team via existing purchase agreements with Commsignia and Omnitron Systems.

7.1.6 Potential Vendors

For the RSUs, the vendor will be:

- Commsignia

For any other equipment, the vendor will be:

- Omnitron Systems (PoE)

The basis for this purchase mechanism:

- Previous RFP with Commsignia and Omnitron.

7.1.7 Acquisition Schedule

The acquisition schedule is presented in Table 12.

Table 12. Acquisition Schedule for Colorado IRC Field Equipment*Source: UDOT, 2025*

Description	Date	Quantity
Commsignia RSU	March 2025	50
Omnitron PoE Switch	May 2025	50



Acquisition Report
example.xlsx



Standards and Certs
Tracking example.xlsx

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ITS Joint Program Office – HOIT
1200 New Jersey Avenue, SE
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