

V2I Safety

- **Red Light Violation Warning**
 - An application that broadcasts signal phase and timing (SPat) and other data to the in-vehicle device, allowing warnings for impending red light violations
- **Curve Speed Warning**
 - An application where alerts are provided to the driver who is approaching a curve at a speed that may be too high for safe travel through that curve.
- **Stop Sign Gap Assist**
 - An application that utilizes traffic information broadcasting from roadside equipment to warn drivers of potential collisions at stop sign intersections
- **Spot Weather Impact Warning**
 - An application that warns drivers of local hazardous weather conditions by relaying management center and other weather data to roadside equipment, which then re-broadcasts to nearby vehicles
- **Reduced Speed/Work Zone Warning**
 - An application that utilizes roadside equipment to broadcast alerts to drivers warning them to reduce speed, change lanes, or come to a stop within work zones
- **Pedestrian in Signalized Crosswalk Warning (Transit)**
 - An application that warns transit bus operators when pedestrians, within the crosswalk of a signalized intersection, are in the intended path of the bus

V2V Safety

- **Emergency Electronic Brake Lights (EEBL)**
 - An application where the driver is alerted to hard braking in the traffic stream ahead. This provides the driver with additional time to look for, and assess situations developing ahead
- **Forward Collision Warning (FCW)**
 - An application where alerts are presented to the driver in order to help avoid or mitigate the severity of crashes into the rear end of other vehicles on the road. Forward crash warning responds to a direct and imminent threat ahead of the host vehicle
- **Intersection Movement Assist (IMA)**
 - An application that warns the driver when it is not safe to enter an intersection—for example, when something is blocking the driver's view of opposing or crossing traffic. This application only functions when the involved vehicles are each V2V-equipped.
- **Left Turn Assist (LTA)**
 - An application where alerts are given to the driver as they attempt an unprotected left turn across traffic, to help them avoid crashes with opposite direction traffic

- **Blind Spot/Lane Change Warning (BSW/LCW)**
 - An application where alerts are displayed to the driver that indicate the presence of same-direction traffic in an adjacent lane (Blind Spot Warning), or alerts given to drivers during host vehicle lane changes (Lane Change Warning) to help the driver avoid crashes associated with potentially unsafe lane changes
- **Do Not Pass Warning (DNPW)**
 - An application where alerts are given to drivers to help avoid a head-on crash resulting from passing maneuvers
- **Vehicle Turning Right in Front of Bus Warning**
 - An application that warns transit bus operators of the presence of vehicles attempting to go around the bus to make a right turn as the bus departs from a bus stop

Mobility

- **EnableATIS (Advanced Traveler Information System 2.0)**
 - Enhanced traveler information services that record or infer user decisions and other contextual trip data that, when suitably processed can improve or transform system management functions
- **Intelligent Traffic Signal System (I-SIG)**
 - An overarching system optimization application accommodating signal priority, preemption and pedestrian movements
- **Transit Signal Priority (TSP) and Freight Signal Priority (FSP)**
 - Two applications that provide signal priority to transit at intersections and along arterial corridors as well as signal priority to freight vehicles along an arterial corridor near a freight facility
- **Mobile Accessible Pedestrian Signal System (PED-SIG)**
 - An application that allows for an automated call from the smart phone of a visually impaired pedestrian to the traffic signal, as well as audio cues to safely navigate the crosswalk
- **Emergency Vehicle Preemption (PREEMPT)**
 - An application that provides signal preemption to emergency vehicles, and accommodates multiple emergency requests
- **Dynamic Speed Harmonization (SPD-HARM)**
 - An application that aims to recommend target speeds in response to congestion, incidents, and road conditions to maximize throughput and reduce crashes
- **Queue Warning (Q-WARN)**
 - An application that aims to provide drivers timely warnings of existing and impending queues
- **Cooperative Adaptive Cruise Control (CACC)**
 - An application that aims to dynamically adjust and coordinate cruise control speeds among platooning vehicles to improve traffic flow stability and increase throughput

- **Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG)**
 - An application that provides input to responder vehicle routing, staging and secondary dispatch decisions
- **Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE)**
 - An application that warns on-scene workers of vehicles with trajectories or speeds that pose a high risk to their safety. It also warns drivers passing an incident zone if they need to slow down, stop, or change lanes.
- **Emergency Communications and Evacuation (EVAC)**
 - An application that addresses needs of evacuees with and without special needs or their own transportation
- **Connection Protection (T-CONNECT)**
 - An application that enables coordination among public transportation providers and travelers to improve the probability of successful transit transfers
- **Dynamic Transit Operations (T-DISP)**
 - An application that links available transportation service resources with travelers through dynamic transit vehicle scheduling, dispatching and routing capabilities
- **Dynamic Ridesharing (D-RIDE)**
 - An application that uses dynamic ridesharing technology, personal mobile devices, and voice activated on-board equipment to match riders and drivers
- **Freight-Specific Dynamic Travel Planning and Performance**
 - An application that enhances traveler information systems to address specific freight needs. Provides information such as wait times at ports, road closures, work zones, and route restrictions.
- **Drayage Optimization (DR-OPT)**
 - An application that optimizes truck/load movements between freight facilities, balancing early and late arrivals

Environment

- **Eco-Approach and Departure at Signalized Intersections**
 - A V2I application where intersection traffic signals broadcast the current state of signal phasing (red, yellow, or green) and time remaining in that phase. These data are used by connected vehicles to support eco-friendly speed trajectories as vehicles approach and depart from a signalized intersection.
- **Eco-Traffic Signal Timing**
 - An application that uses data collected wirelessly from vehicles (and other sources) to optimize the performance of traffic signals, thus reducing fuel consumption and emissions.
- **Eco-Traffic Signal Priority**
 - An application that allows transit or freight vehicles approaching a signalized intersection to request signal priority, thereby adjusting the signal timing dynamically to

improve service for the vehicle. Priority decisions are optimized for the environment by considering vehicle type, passenger count, or adherence to schedule.

- **Connected Eco-Driving**
 - An application that uses V2I and V2V data to provide customized real-time driving advice to drivers, including recommended driving speeds and optimal acceleration/deceleration profiles, so that drivers can adjust their driving behavior to save fuel and reduce emissions.
- **Wireless Inductive/Resonance Charging**
 - An infrastructure application that uses magnetic fields embedded in the pavement to wirelessly transmit electric currents between metal coils thus enabling the wireless charging of electric vehicles while the vehicle is stopped or in motion.
- **Eco-Lanes Management**
 - An application that establishes parameters and defines the operations of eco-lanes. Eco-lanes similar to existing managed lanes, but optimized for the environment.
- **Eco-Speed Harmonization**
 - An application that determines speed limits optimized for the environment based on traffic conditions, weather information, and GHG and criteria pollutant information, allowing for speed harmonization in appropriate areas.
- **Eco-Cooperative Adaptive Cruise Control**
 - A V2V application that uses connected vehicle technologies to collect speed, acceleration, and location information of other vehicles and integrates these data into a vehicle's adaptive cruise control system, thus allowing for automated longitudinal control capabilities and vehicle platooning that seek to reduce fuel consumption and emissions.
- **Eco-Traveler Information Applications**
 - A group of applications that disseminate information to support transportation choices that reduce fuel consumption and emissions.
- **Eco-Ramp Metering**
 - An application that collects traffic and environmental conditions data to determine the most environmentally efficient operation of traffic signals at freeway on-ramps and to manage the rate of entering vehicles.
- **Low Emissions Zone Management**
 - An application that leverages connected vehicle technologies to enable the operation of low emissions zones. Low Emissions Zones are geographic areas that seek to incentivize green transportation choices and deter high polluting vehicles from entering the zone.
- **AFV Charging / Fueling Information**
 - An application that informs travelers of locations and availability of alternative fuel vehicle charging and fueling stations and inductive/resonance charging infrastructure, thereby alleviating "range anxiety."
- **Eco-Smart Parking**

- An application that provides users with real-time location, availability, type, and price of parking, resulting in reduced parking search times and emissions
- **Dynamic Eco-Routing (Light Vehicle, Transit, Freight)**
 - A navigation routing application that determines the most eco-friendly route, in terms of minimizing fuel consumption or emissions, for individual travelers
- **Eco-ICM Decision Support System**
 - An application that uses historical, real-time, and predictive traffic and environmental data on arterials, freeways, and transit systems to determine operational decisions by system operators that are environmentally beneficial to the corridor

Road Weather

- **Motorist Advisories and Warnings (MAW)**
 - An application that will use road-weather data from connected vehicles to provide information to travelers on deteriorating road and weather conditions on specific roadway segments
- **Enhanced MDSS**
 - An application that will acquire road-weather data from connected and other general public vehicles to recommend treatment plans and weather response plans to snow plow operators, and drivers of maintenance vehicles
- **Vehicle Data Translator (VDT)**
 - An complementary application that, when installed on road service vehicles such as snowplows, collects road and atmospheric conditions data and transmits them to other portions of the road weather management network
- **Weather Response Traffic Information (WxTINFO)**
 - An application that will use connected vehicle data and communications systems to enhance the operation of variable speed limit systems and improve work zone safety during severe weather events

Agency Data

- **Probe-based Pavement Maintenance**
 - An application that allows vehicle to automatically report potholes or other pavement anomalies
- **Probe-enabled Traffic Monitoring**
 - An application that utilizes direct short range communication technology to transmit real time traffic data between vehicles
- **Vehicle Classification-based Traffic Studies**
 - An application that would allow sorting of vehicle behavior data by vehicle type
- **CV-enabled Turning Movement & Intersection Analysis**

- An application that uses paths self-reported by vehicles to track turning ratios, delay, and other intersection metrics
- **CV-enabled Origin-Destination Studies**
 - An application that uses connected vehicle technology to monitor the beginning and end points of a vehicle's journey and extrapolate the route in between
- **Work Zone Traveler Information**
 - An application that monitors and aggregates work zone traffic data

Smart Roadside

- **Wireless Inspection**
 - An application that will utilize roadside sensors to transit identification, hours of service, and sensor data directly from trucks to carriers and government agencies
- **Smart Truck Parking**
 - An application that will provide information such as hours of service constraints, location and supply of parking, travel conditions, and loading/unloading scheduling to allow commercial drivers to make advanced route planning decisions