

IoT in Roadways

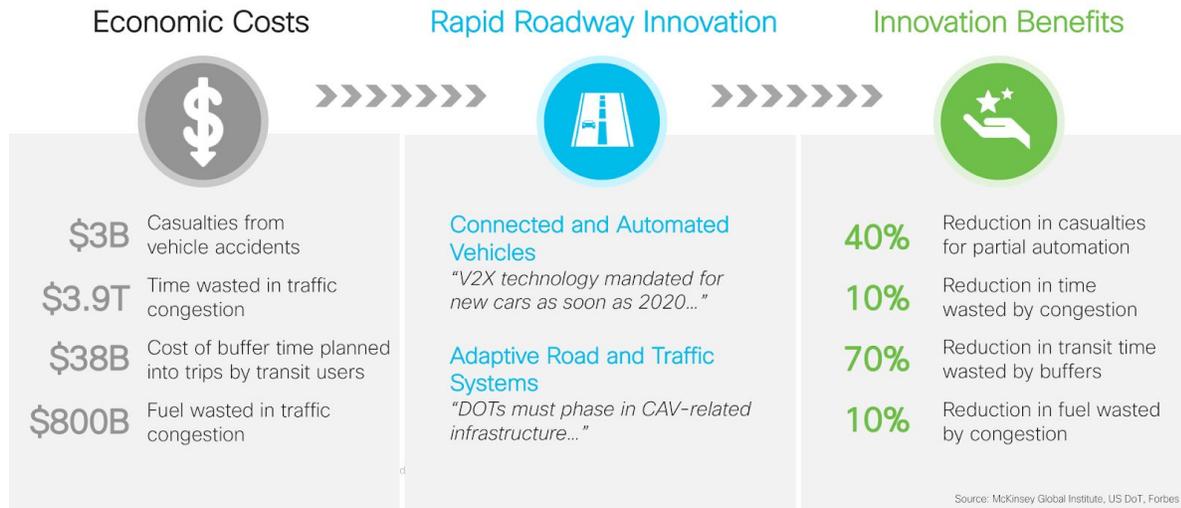
Wastage of time and fuel due to traffic congestion costing billions of dollars and, millions of people dying in road accidents are some of the real challenges. Connected and autonomous vehicles is the future of roadways; which promises to address these challenges head on.

In future, the vehicles will talk to other vehicles to detect braking, lane changes, incidents and take proactive actions to avoid accidents. The roadside will help autonomous vehicles make better decisions by providing context of the physical, social and environmental surroundings. Connected vehicles will enrich the experience of travelers with data, information and entertainment.

Curve speed warning (V2I), forward collision warning (V2V), work zone traveler information (I2V), Eco-traffic signal timing (environmental), motorist advisory and warnings (road weather), Emergency vehicle preemption (Mobility) are some of the categories and examples of IoT use cases in smart roadways.

North American (DSRC) and European (ITS-G5) standards for V2X communication are evolving; countries like China and South Korea have their flavor of the standards. Many government agencies including departments of transportation in many developed countries are investing in proof of value and pilot programs for the IoT use cases. Many car manufacturers are investing heavily in building connected and autonomous car technologies working closely with software and hardware technology companies. Network backbone service providers are investing in building the infrastructure with optical fibers and cell towers to support the need for bigger and reliable data pipes. Consumers, although skeptical at times, have started to trust in the technology by buying connected and semi-autonomous cars. Some examples of ecosystem stakeholders are – Car OEMs (e.g. Tesla, Hyundai), Government agencies (e.g. DOT, NHTSA), road side infrastructure vendor (e.g. Cisco, Huawei), automation technology vendor (e.g. NVIDIA, Google), Network infrastructure (e.g. ATT), Vehicle owner (Citizen or Fleet operations company).

IoT in roadways is a big market opportunity which has many players; it is an ecosystem play as no one player is dominant in the market.



Applications Based on Agency Goals

V2I Safety	Environment	Mobility
Red Light Violation Warning Curve Speed Warning Stop Sign Gap Assist Spot Weather Impact Warning Reduced Speed/Work Zone Warning Pedestrian in Signalized Crosswalk Warning (Transit)	Eco-Approach and Departure at Signalized Intersections Eco-Traffic Signal Timing Eco-Traffic Signal Priority Connected Eco-Driving Wireless Inductive/Resonance Charging Eco-Lanes Management Eco-Speed Harmonization Eco-Cooperative Adaptive Cruise Control Eco-Traveler Information Eco-Ramp Metering Low Emissions Zone Management AFV Charging / Fueling Information Eco-Smart Parking Dynamic Eco-Routing (light vehicle, transit, freight) Eco-ICM Decision Support System	Advanced Traveler Information System Intelligent Traffic Signal System (I-SIG) Signal Priority (transit, freight) Mobile Accessible Pedestrian Signal System (PED-SIG) Emergency Vehicle Preemption (PREEMPT) Dynamic Speed Harmonization (SPD-HARM) Queue Warning (Q-WARN) Cooperative Adaptive Cruise Control (CACC) Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG) Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE) Emergency Communications and Evacuation (EVAC) Connection Protection (T-CONNECT) Dynamic Transit Operations (T-DISP) Dynamic Ridesharing (D-RIDE) Freight-Specific Dynamic Travel Planning and Performance Drayage Optimization
V2V Safety	Road Weather	Smart Roadside
Emergency Electronic Brake Lights (EEBL) Forward Collision Warning (FCW) Intersection Movement Assist (IMA) Left Turn Assist (LTA) Blind Spot/Lane Change Warning (BSW/LCW) Do Not Pass Warning (DNPW) Vehicle Turning Right in Front of Bus Warning (Transit)	Motorist Advisories and Warnings (MAW) Enhanced MDSS Vehicle Data Translator (VDT) Weather Response Traffic Information (WxTINFO)	Wireless Inspection Smart Truck Parking
Agency Data		
Probe-based Pavement Maintenance Probe-enabled Traffic Monitoring Vehicle Classification-based Traffic Studies CV-enabled Turning Movement & Intersection Analysis CV-enabled Origin-Destination Studies Work Zone Traveler Information		

Applications

- Real-time Traffic Management
- Bridge - Pavement - Culvert Asset Monitoring and Surveillance
- Predictive Analytics for Traffic and Asset Management
- Self-service Portal for Operations and Planning
- Collaboration Platform for Engineering and Maintenance

References:

- www.cisco.com/go/transportation
- www.cisco.com/go/iot
- [Cisco Connected Roadways](#)

Questions:

1. What is the Cisco services play ? How should Cisco services position itself to win the mindshare of the market.
2. Although in short term the DOTs are investing in the pilots; who is the real buyer of the IoT solution ? In other words, what is the business model ?
3. In case of an incident (accident) – Given that there are many stakeholders, which party is ultimately liable. What does the process look like to determine the liability.