



Cisco Connected Roadways

High-level overview of our future roadways

Roadways are safer and more efficient with Cisco Connected Roadways

Roads help us be more productive. They help us get to work, see our family, and get more out of life. But even with its advantages, wouldn't we want our roads to be more efficient and safer?

The good news is that recent advances in roadway infrastructure now make this possible. In fact, Cisco® Connected Roadways helps secure and connect intelligent transportation systems, allowing vehicles, roadways, travelers, and traffic management centers to all communicate with one another in real time. **It also allows cities and transportation agencies to simplify operations and maintenance without necessarily replacing existing legacy infrastructure.** The solution is based on a proven architecture and provides a secure, converged, standards-based infrastructure that can replace redundant, proprietary, and single application solutions with limited or no interconnectivity. Consequently, operators can optimize both capital and operating expenditures for their network infrastructure. Moreover, it offers agencies the extra benefit of reducing traffic congestion and accidents, helping make our roads more efficient and safer.

Connected Roadways solves common safety, mobility, and operational challenges

By enabling vehicle-to-infrastructure (V2I) communications, Cisco Connected Roadways can help transportation organizations set the stage for immediate, as well as future, improvements:

- Reduce roadway congestion to curtail carbon emissions and improve traffic flow
- Reduce response times for emergency vehicles and first responders
- Reduce the number of accidents and collision-related deaths as well as secondary accidents resulting from traffic congestion
- Improve cities' and municipalities' compliance with air pollution and other regulations
- Improve work zone safety through vehicle location and real-time roadway updates to drivers
- Establish communication and data sharing between existing, proprietary systems that have limited or no interconnectivity, simplifying maintenance and operations
- Establish a foundation for the imminent arrival of connected, autonomous vehicles (CAVs) that require vehicle-to-everything (V2X) communication

Benefits

- **Enhanced safety** through fewer accidents and collision-related deaths, faster incident response, and automated real-time weather and traffic alerts
- **Improved mobility** through traffic incident management and intelligent traffic signals that can optimize vehicles' fuel/energy efficiency by prioritizing directional right-of-ways
- **Increased efficiency** through fewer human error and update delays with automated software actions
- **Curtailed carbon emissions** from mitigating idling time and passenger commute time as well as increasing fuel efficiency through smart intersections
- **Lower total cost of ownership** through incorporating existing infrastructure and eliminating redundant, proprietary systems with limited or no interconnectivity



Case study

- Situation:** A US state’s DOT faced ongoing safety issues, as fog constantly caused hazardous driving conditions. Additionally the agency’s fog sensors and terminal servers failed, leading to missed fog events, unreliable fog gates, and the need for manual intervention.
- Solution:** Cisco produced a solution that used much of the transportation agency’s existing infrastructure while still delivering expected results. The catalyst was Cisco Kinetic™ Edge Fog Module (EFM).
- Results:** The state’s transportation agency has seen a reduction vehicle collisions and deaths, simplified and enhanced management through a “single-pane-of-glass” interface, and real-time automation of previously manual processes thanks to Cisco Kinetic EFM. Additionally, Cisco Connected Roadways helped eliminate high-maintenance, unreliable equipment and the need for ongoing, often emergency, maintenance.

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Table 1. Use cases for Cisco Connected Roadways

Cisco product	Description
Cisco 829 Industrial Integrated Services Routers	<ul style="list-style-type: none"> Vehicle router connect onboard systems to wireless DSRC onboard unit (OBU) and roadside unit (RSU)
Cisco IE 4000 Ethernet Series Switches	<ul style="list-style-type: none"> Ruggedized Ethernet switches provide transport connectivity to the roadside equipment components
Cisco® Catalyst 3850 Series Switches	<ul style="list-style-type: none"> Hub switches for maintenance yard networks
Cisco ASR 900 Series Aggregation Services Routers	<ul style="list-style-type: none"> Provides scalable and resilient Unified MPLS transport infrastructure and interconnectivity between roadside, yard, data center, and operations center networks.
Cisco ASR 1000 Series Aggregation Services Routers	<ul style="list-style-type: none"> Provides hub routing functionality management of mobility for and communications to and from vehicles
Cisco Nexus® switches	<ul style="list-style-type: none"> Network foundation of the Cisco Virtualized Multiservice Data Center (VDMC) solution, which provides the data center platform for all Connected Roadways back-office and centralized systems
Cisco Kinetic †	<ul style="list-style-type: none"> Makes it easy to connect distributed devices (“things”) to the network, then extract, normalize, and securely move data from those devices to distributed applications. Consists of three modules: <ul style="list-style-type: none"> Gateway Management Module (GMM): provides cloud-based management and provisioning of the IR 829 gateways Edge Fog Module (EFM): Open architecture platform that enables immediate processing of data from the fog to the edge of the network Data Control Module (DCM): Enforces policy and is responsible for getting the right data to the right apps at the right time

† Cisco Kinetic has been used in many Cisco Connected Roadways solutions but it has not yet been validated through our Cisco Validated Designs program because it was only recently released.



“Using the data from our networks, we want to provide travel times and even predict traffic issues for a smoother travel experience.”

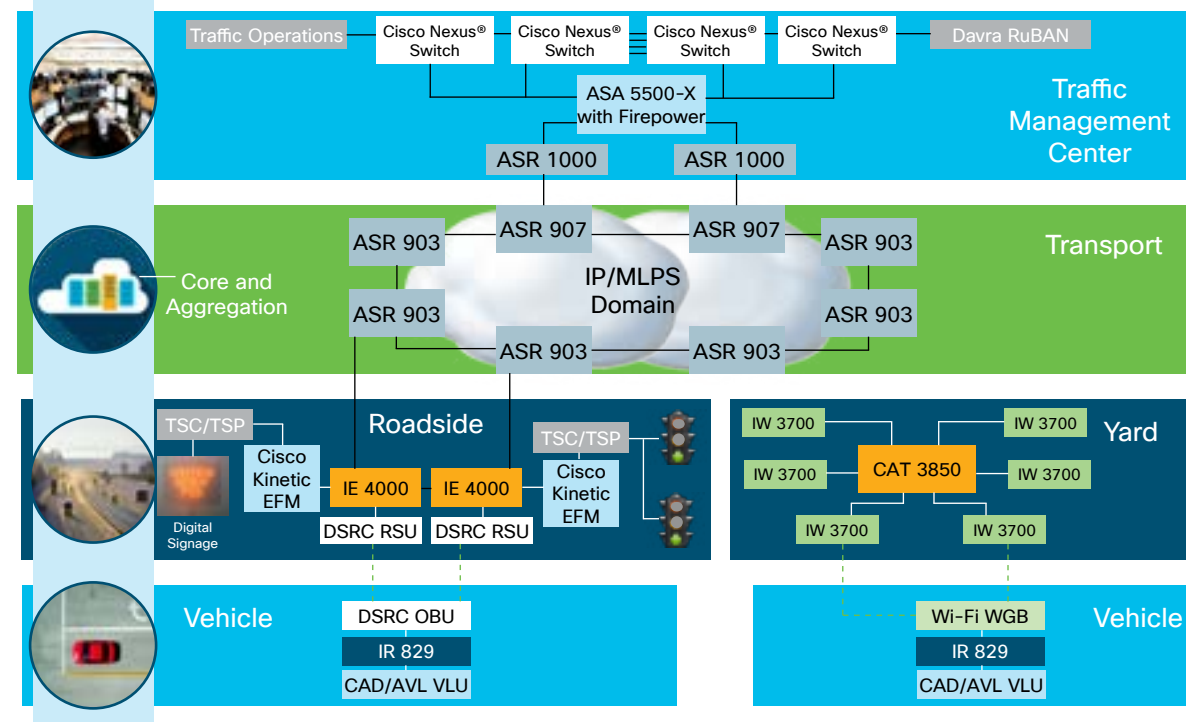
- Bernd Datler

Managing director, tolling company at ASFINAG

ASFINAG
case study

Cisco Connected Roadways solution components

Figure 1. Key elements the Cisco Connected Roadway solution



Summary

Cisco Connected Roadways helps you facilitate immediate and future benefits in safety, mobility, and efficiency initiatives. It allows for a smoother flow of traffic, reducing congestion and secondary collisions as well as overall fuel/energy consumption, and paves the way for a foundation upon which connected, autonomous vehicles can communicate with their surrounding environment. It can help simplify operations through automated, real-time updates to digital signage based on roadway and weather conditions as well as improved communication to first-responders regarding traffic injuries and collisions. Lastly, Cisco Connected Roadways can lower your total cost of ownership, as you can incorporate existing infrastructure, eliminate redundant and proprietary systems, and scale rapidly for future additions and adaptations.

More Resources

Architecture

Solution Overview

Cisco Kinetic

Cisco Roadways CVD