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How the Adaptive Network Can Help **Save America's Roadways**

Departments of Transportation (DOTs) manage **Intelligent Transportation System (ITS) devices** across thousands of miles of highway throughout their states to improve safety and solve other issues. These devices are constantly generating data, which varies in volume, priority, and latency-sensitivity. The network that connects these devices to operations centers needs to be scalable, resilient, automated, and flexible. In short, it needs to be adaptive.

Critical issues with critical infrastructure

Aging infrastructure and an onslaught of motorists have made it increasingly difficult for DOTs to maintain our roadways and keep them safe. This has led to an unwieldy backlog in capital needs, safety issues, and lost time and money for motorists.

38,000

The number of people who lost their lives in motor vehicle crashes in 2019.[1]

25%

Percentage of CO_2 emissions attributed to transportation in the United States.[2]

$50B

The annual cost to truckers due to traffic congestion.[3]

99hrs

The average number of hours lost per American due to traffic congestion in 2019, costing nearly $88 billion.[4]

A safer, more efficient future

ITS devices include high-definition pan-tilt-zoom video cameras, vibration and weather sensors, speed monitors, and digital signage. The data from these devices needs to be transmitted to remote operations centers where it is analyzed and acted upon—often in real time. The goal of these ITS devices is to enable faster, more accurate action that can reduce car crashes, decrease traffic congestion, and improve the motorist experience.

$26.58B

The size of the global ITS market in 2019.[5]

70%-90%

The projected range by which fully automated highway systems could reduce accidents.[6]

90%

Percentage of states that have ITS technology in place; nearly 30% have autonomous vehicle support infrastructure in place.[7]

26%

The percentage by which smart traffic lights could enable faster commutes.[8]

21%

The percentage by which smart traffic lights could reduce emissions.[9]

The Adaptive Network provides a resilient foundation

Traditional network architecture supporting ITS devices is complex and time-consuming to manage. Ciena's Adaptive Network™ provides the technology foundation DOTs need to simplify, scale, and automate today's ITS and make our roads smarter and safer. It is built on three key components:

Programmable Infrastructure

A programmable packet and optical infrastructure supports existing bandwidth requirements and can scale to accommodate future capacity needs. It also eliminates the need for unused legacy protocols, thus simplifying the network. The infrastructure is accessed and configured via common open interfaces; is highly instrumented, with the ability to export real-time network performance data to enable rapid decision-making by central operations personnel; and can adjust its resources as needed to meet the demands of the applications running on top of it.

Analytics and Intelligence

Collecting network performance data, and analyzing this data using machine learning and Artificial Intelligence (AI), gives DOTs the resiliency required to more accurately predict and resolve potential network problems and anticipate trends by turning mountains of data into actionable insights. Leveraging these insights can help DOTs develop smarter, data-driven network policies that enable them to securely adapt to network fluctuations and traffic abnormalities in real time.

Software Control and Automation

DOTs can automate network management and control tasks and virtualize network functions through the implementation of Software-Defined Networking (SDN) and Network Functions Virtualization (NFV). Multi-Domain Service Orchestration (MDSO) enables an open, vendor-agnostic control capability across multiple network domains and vendors, reducing the workload of IT staff and freeing them to focus on higher-value tasks.

1. https://www.nsc.org/road-safety/safety-topics/fatality-estimates#:~:text=In%202019%2C%20an%20estimated%2038%2C800,2%25%20decrease%20over%202018%20figures.
2. https://transportgeography.org/?page_id=5711
3. https://drivewyze.com/blog/trucking-industry/delays-traffic-congestion-cost-truckers-nearly-50-billion/
4. https://inrix.com/press-releases/2019-traffic-scorecard-us/
5. https://www.grandviewresearch.com/industry-analysis/intelligent-transportation-systems-industry
6. https://www.seminarsonly.com/Civil_Engineering/automated-highway-systems.php
7. 2018 Center for Digital Government Digital States Survey
8. https://www.ibisworld.com/industry-insider/analyst-insights/how-5g-could-start-a-transportation-revolution-in-smart-cities/
9. Ibid.

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