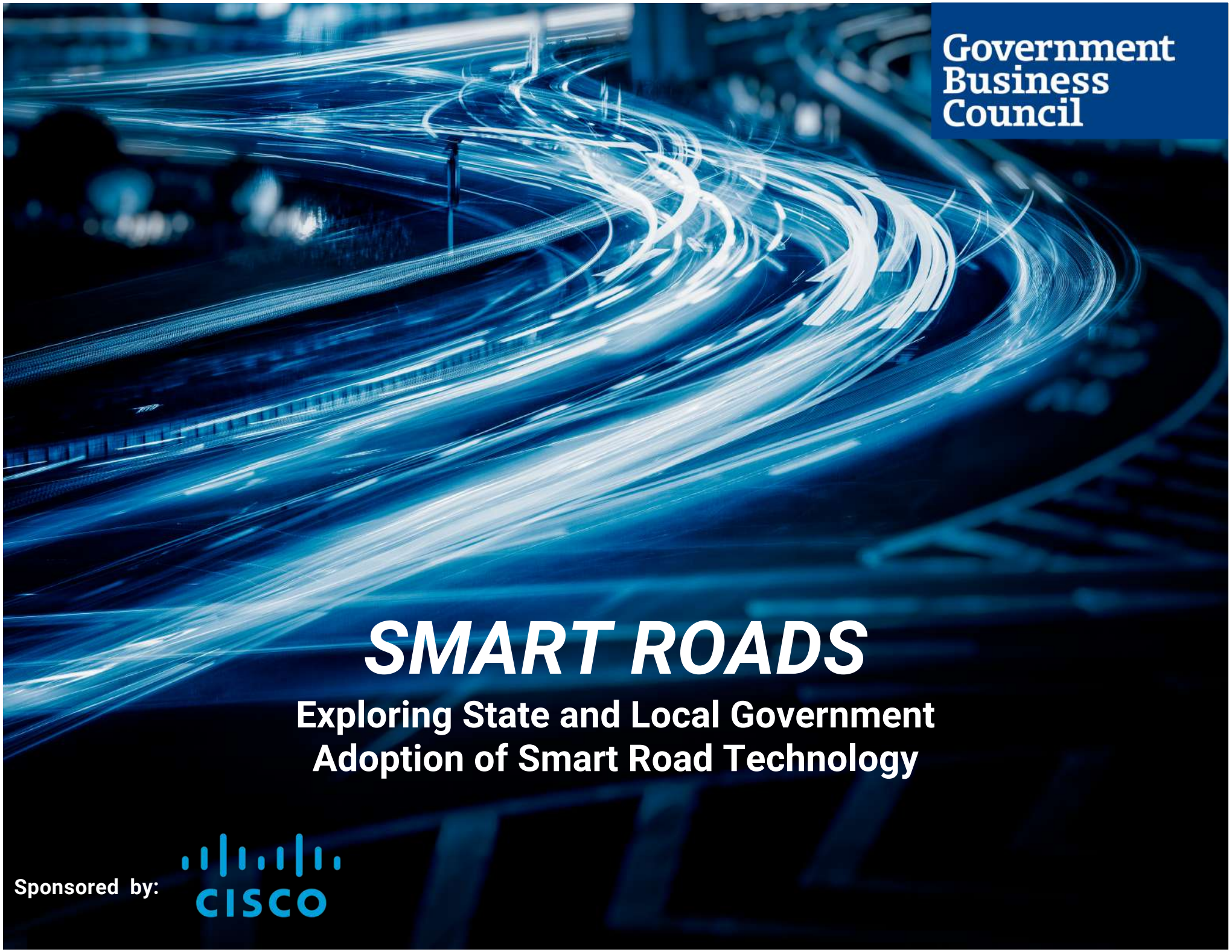


Government Business Council

SMART ROADS

Exploring State and Local Government Adoption of Smart Road Technology

Sponsored by: CISCO

THE BIG ISSUE

Increasing demands on our aging road infrastructure warrant the development and adoption of smart road technologies.

WHY IT MATTERS

A dispersed population, rising road use, and the resulting escalation of traffic misuses time, wastes fuel, and can stall first responders and emergency vehicles. Smart road technologies have the potential to solve the economic, environmental, and safety issues caused by the country's present transportation system.

WHO NEEDS TO KNOW

Federal and State CIOs, CISOs, CTOs, and private-sector stakeholders

PLAYERS AND POLICIES TO KNOW

- **Fixing America's Surface Transportation (FAST) Act:** This 2015 law[1] "authorizes $305 billion over fiscal years 2016 through 2020 for highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs."[2]

- **Federal Highway Association (FHWA's) Automated Highway System:** After receiving Congressional funds in 1991, this program's goal was to develop driverless cars and install Intelligent Transportation Systems (ITS) technologies along U.S. expressways by 1997. Ultimately, the program failed to yield these products, largely due to overly-broad goals and a lack of direction.[3] In order to achieve success in future smart road programs that involve information sharing between vehicles and infrastructure,[4] policy makers should be familiar with the shortcomings of the AHS.

- **FHWA's Center for Accelerating Innovation:** Established in 2012, this body allows public and private entities to coordinate in smart road technology development. Additionally, the center's Technology and Innovation Deployment Program works to quickly advertise and implement vetted technologies that are ready for deployment.[5]

- **State Transportation Innovation Councils (STICs):** Transportation projects are often carried out at the state level. STICs are state-specific groups of public and private transportation partners that assess new technologies and implement them in the state. By engaging with STICs, the federal government is able to institute successful, state-specific programs at the federal level.[6]

THE STATUS QUO IS *OBSOLETE*

In its *2018 Transportation Statistics Annual Report*, the Department of Transportation revealed that—aside from a slight dip during the 2008 recession—the number of vehicles on American roads has continually increased each year since 1985.[7] Unfortunately, America's roads have suffered neglect, and they have been unable to keep up with the growing traffic volume.[8]

As a result of the road network's condition, the amount of hours spent in traffic and fuel wasted due to road congestion have steadily risen since 1982. Nationally, this equated to $166 billion dollars lost due to traffic in 2017 alone.[9]

Advances in smart road technology have the potential to remedy America's road and traffic-related issues.

SMART ROAD SOLUTIONS

Smart road technologies can solve many of the problems plaguing the current road system.

TRAFFIC FLOW: Current road infrastructure cannot efficiently handle the amount of vehicles that utilize it. By leveraging sensors, comprehensive data on traffic patterns can be collected and analyzed. This data then can be used by civil engineers to develop better road systems. Addionally, the integration of communication between vehicles and infrastructure and real-time data collection can enable emergency vehicles to avoid traffic jams and reach their destinations in the quickest way possible.[10]

AUTONOMOUS VEHICLES: Self-driving vehicles rely on sensors and external information updates in order to navigate traffic. Improving the "smartness" of roads by allowing vehicles to communicate with other vehicles and roadway assets would improve the efficiency of transit systems everywhere. Smarter roads will enable autonomous cars to "sync," drive at the same speed, and travel closer together with less risk of collision.[11]

ENERGY USAGE: There are two main ways in which smart roads can diminish fuel waste. First, smart road technology can shrink the frequency of traffic jams, thereby eliminating fuel waste from vehicles idling in traffic. The second method involves the ability of smart roads to produce or collect renewable energy, primarily via solar panels.[12]

THE BOTTOM LINE:

Roadway infrastructure in the United States is aging and unable to accommodate today's traffic volume. Smart road technology allows for the collection and communication of traffic data, allowing individuals and autonomous vehicles to make safer and more efficient decisions.

FOLLOW THE DATA

Agencies can begin benefiting from smart road technology by first understanding the importance of an effecive transportation network in their jurisdiction, identifying current roadway problems, and raising awareness of factors that limit smart road implementation.

A 2019 Government Business Council survey of over 240 federal employees underscores these findings.[13]

85%

of urban respondents feel that transportation is very or extremely important to the economic development of your jurisdiction.

44%

of those surveyed say their jurisdiction has fallen behind in the use of information technology in managing its transportation services.

MORE THAN

3 in 4

of respondents believe that their jurisdiction would benefit from additional transportation funding.

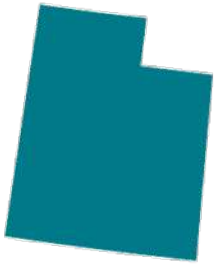
These findings show that transportation is economically important, many jurisdictions are falling behind the pace of technological advances, and a lack of funding is a limilation to smart road adoption.

Smart Road Case Studies

Several state-level agencies have tested and employed smart road technologies.

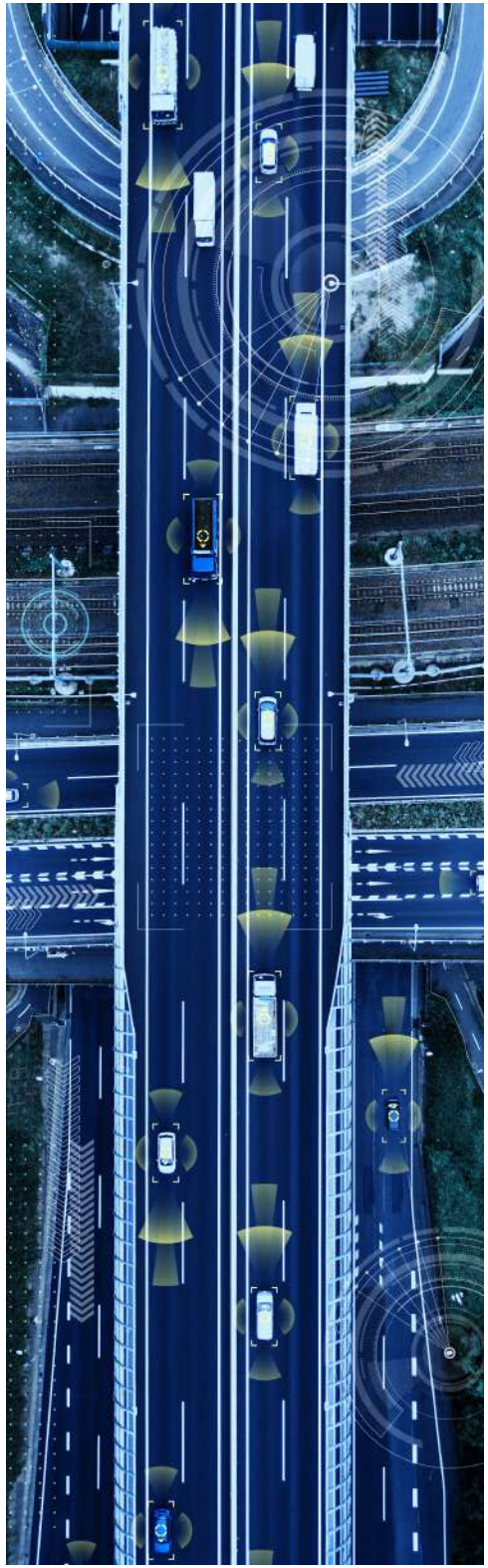
➔ COLORADO: In 2018, the Colorado DOT partnered with a private technology firm to install a block of smart roadway in Denver. This road is embedded with sensors that can "detect a vehicle's weight, speed, and pattern of travel." Data collected can be sent instantaneously to the DOT or—in the case of an emergency—first responders.[14]

➔ GEORGIA: Researchers, private companies, and the Georgia DOT are using an 18-mile stretch of roadway in western Georgia to test out several smart roadway technologies. These include solar-powered pavers, environmentally-friendly drainage ditches, the WheelWright system—a sensor system that "take[s] thousands of pictures of [passing vehicles'] tires in a few seconds." These pictures are then analyzed, and a tire-status report can be sent to the vehicle owners.[15]



➔ UTAH: The Utah DOT and a private-sector firm are partnering to install a vehicle-to-infrastructure system along the state's highways. The system is planned to use sensors and "vehicle-mounted software" to "collect and transmit data at speeds up to 10 times per second, which is then shared with a central cloud-based system."[16]

➔ VIRGINIA: With the first phase completed in 2000, the Virginia Smart Roads program is a collection of "closed test-bed research facilities managed by [the Virginia Tech Transportation Institute] in cooperation with the Virginia [DOT]." The system allows for autonomous vehicle research, and may further be utilized to test other smart road technologies.[17]



WHAT ARE THE TOP CHALLENGES?

PRIVACY: As data collection is critical to the functionality of smart roads, concerns over who can see and use this data need to be addressed. While having specific information like speed, location pinpointing, a vehicle weight is helpful to the operations of first responders, the potential for this information to be abused does exist. In order for a balance between safety and privacy to be established, it is important for those with access to the collected data to have the public's trust.[18]

FUNDING: Developing and installing smart road technology is expensive. While total government expenditures on transportation-related projects has steadily increased since 1995 to $339,507 billion in 2016 (the most recent data available from the Bureau of Transportation Statistics),[19] a 2019 Government Business Council survey showed that an overwhelming majority of public servants believe that transportation budgets need to be increased.[20]

PRIORITIZATION: The United States has a history of failing to maintain its roadways. In fact, American roads have deteriorated to such a point that they received a "D" rating by the American Society of Civil Engineers (ASCE) in 2017. In fact, there is a "$836 billion backlog of highway and bridge capital needs" that have been pushed to the side year after year. So long as American lawmakers fail to recognize the urgency needed to maintain current infrastructure, state and local transportation officials will find it difficult to rally support around smart road technologies.[21]

CYBERSECURITY: Smart road sensors, cameras, and communication systems can become targets for hackers. As more autonomous vehicles make their way to roadways and infrastructure-to-vehicle communications become more established, the ability of bad actors to interfere with the cyber network can have dangerous consequences. In order to mitigate this threat, robust cybersecurity measures must be implemented in tandem with other smart road technologies.

! Maintaining Technological Superiority

The United States is not the only country exploring smart road technologies. Notable examples include the planning of autonomous expressways in Japan,[22] the building of a smart freeway in Western Australia,[23] the development of smart roads that can wirelessly power vehicles in China,[24] the Israeli-Swedish partnership to create electric roads,[25] and the Cooperative ITS Corridor—a continuous, smart road with infrastructure-to-vehicle communications spanning the Netherlands, Germany, and Austria.[26]

For decades, America has been the global leader in technological development. In order to maintain this position, it is vital that the United States makes smart road advancement a priority.

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