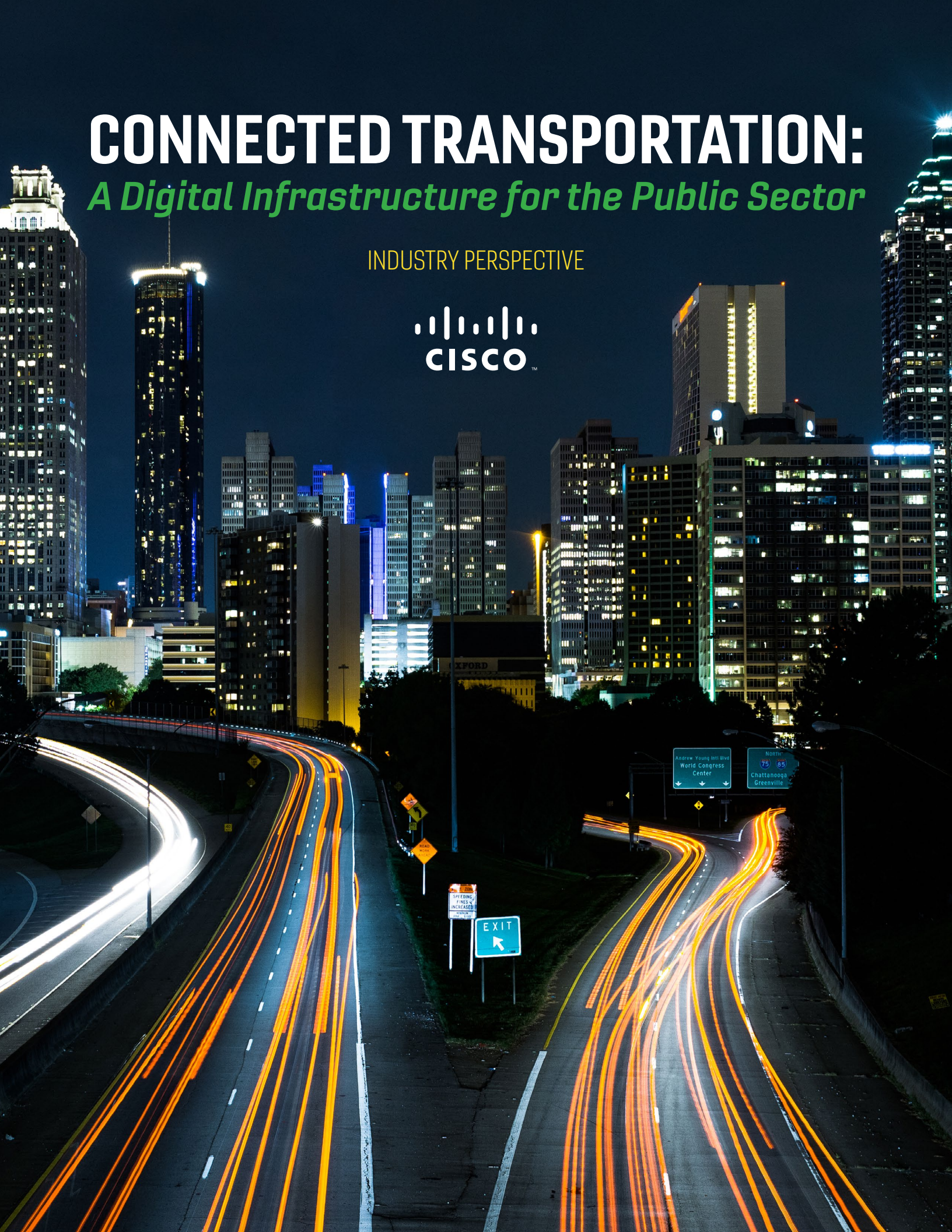


CONNECTED TRANSPORTATION:

A Digital Infrastructure for the Public Sector

INDUSTRY PERSPECTIVE



Introduction

Imagine this scenario: It's a regular week day, and you're running a bit late for work – which is a real problem, considering you've got an important morning meeting to get to. It's time for you to consider your transportation choices, and which might get you there fastest. You may want to drive in, but you'd need to first check the traffic on your smartphone, or if the parking lot is filled up yet via an app. Or maybe you can bikeshare down to work, but only if your phone lets you know if there are free bikes available – and a bike-friendly route to work. Perhaps public transit is the best option, but you're not quite sure yet when the next bus will arrive because your county hasn't yet implemented any bus route-tracking technology. Faced with these myriad choices, you have a variety of options to get you to your workplace on time – but only if the transportation options have the technical ability to let you know what might be the best way to go.

And yet despite how critical transportation is to citizens and the communities they live in, today's modes of transport are often not efficient, connected to one another, complementary in the way they work or even safe 100 percent of the time. Think about it: In today's communities, many roads are suffering, highway fatalities are on the rise and citizen satisfaction with public transportation offerings is faltering. And when transportation is not performing at satisfactory levels, it affects literally every facet of a place – from the happiness of its citizens, to efficiency of the economy, to safety, to livability. In short, if a community's state of transportation is suffering, then the health of a community is suffering along with it.

But despite challenges facing the modernization of transportation, it doesn't have to be this way. Connected and digital transportation offers a way to improve the efficiency, safety and livability of

communities in a time when government is dealing with highway fatalities, increasing congestion, trends like autonomous vehicles and rising citizen expectations. And that's why, now more than ever, it is time for the public sector to invest in an infrastructure that digitizes transportation and increases the health, happiness and success of communities.

To discuss why it's time for transportation to evolve to the digital realm, GovLoop partnered with Cisco, a leader in digital infrastructure, for this industry perspective. In the following pages, we'll discuss a vision for connected and digital transportation, discuss current trends and challenges in transportation and how to overcome them and gain insights from Cisco experts Michelle Maggiore, PE, Cisco Smart+Connected Communities, Transportation Consultant, and Barry Einsig, Global Transportation Executive.

Challenges & Opportunities for Transportation Today

It's clear that transportation affects everybody's lives, no matter what community you live in. In fact, it's become crucial for government organizations at all levels to create excellent transportation for their communities as an economic imperative. When transportation is seamless, easy to use and efficient, it creates happier citizens, provides more efficient services, offers a better quality of living overall and attracts a talented workforce – all of which lead to an improved economy.

But several trends and challenges in transportation today make achieving seamless and efficient transportation a challenge for many places. In fact, according to the U.S. Department of Transportation, traffic congestion in the United States alone results in more than 4 billion hours of travel delay and nearly 3 billion gallons of gas used, at a cost of \$80 billion a year. Studies also show that for every minute spent clearing an accident from a road, there is a four-minute delay to get traffic moving again.

“The big challenge in transportation is a lot of it is not connected,” said Barry Einsig, Global Transportation Executive at Cisco. “Or if it is connected, it's connected over a poorly constructed proprietary network. And it doesn't offer a seamless experience for a citizen.”

That's where a connected and digitized transportation infrastructure comes in. **Generally, digitized transportation means the realignment of and new investment in technology, innovation and practices to more effectively connect siloed transportation technologies into a seamless flow, where different aspects can connect and talk to one another.** Many of the challenges faced by today's transportation agencies can be solved when the transportation approached is digitized. Let's take a look at a few examples.

THE CHALLENGE: SAFETY

According to a report in the New York Times, 40,200 people died in accidents involving motor vehicles in 2016, a 6 percent rise from the year before. This is the first time since 2007 that more than 40,000 people have died in motor vehicle accidents in a single year. The 2016 total comes after a 7 percent rise in 2015 and means the two-year increase — 14 percent — is the largest in more than a half a century.

THE OPPORTUNITY:

An increase in the amount of miles driven by motorists, as well as contributing factors like a suspected rise in distracted driving, is making America roadways deadlier than ever. But if safe technology like automated vehicles or smart stoplights continues to be deployed, roadway fatalities caused by human error are likely to go down.

“We've done all we can from a physical perspective to reduce the number of deaths and accidents in the United States,” Einsig said. “The only thing left is technology.”

THE CHALLENGE: CREATING A SEAMLESS USER EXPERIENCE

Today, a citizen's transportation journey might start with an Uber or a Lyft. Then they may get on a train, and when they're off the train they may want to take a bike share to the office. "But you have to schedule all those separately, and then pay separately as well," Einsig said. "And you have to worry about whether or not you'll be on time for all of those things. None of them talk to each other to help you have a seamless journey."

THE OPPORTUNITY:

Today's transit systems are often based on single-purpose, proprietary, non-interoperable subsystems that are individually sourced from vendors. These systems are costly and time-consuming to acquire, operate and maintain. But with a connected and digitized solution, you can converge aging, disparate and proprietary networks into a single resilient, secure, multiservice, standards-based communication infrastructure. Some benefits of a digitized network are improved wayfinding, accurate real-time information for passengers, a network infrastructure that can securely transport wireless payments through third-party mobile applications and the ability to increase operational efficiency and reduce operating and capital expenses with interconnectivity and information-sharing between vehicles, bus stops, stations and more.

THE CHALLENGE: ADAPTING TO THE FUTURE OF TRANSPORTATION

Trends like the Internet of Things (IoT) and autonomous vehicles are coming fast. But aging infrastructures and roadways, as well as weak networks and other challenges, make incorporation of them into modern transportation potentially difficult.

THE OPPORTUNITY:

"Connected and autonomous vehicles are coming, and there's an immense opportunity to improve system operation and performance," said Maggiore. "Now is the time to get the approach to these right, with an eye toward what's coming in the future."

With connected and autonomous vehicles, for example, an advanced driver-assistance system could communicate with cameras and sensors to control the brakes and change lanes while delivering information to the driver's dashboard. Constant cloud connectivity will also be required for cars to communicate with road infrastructure and for vehicle problems to be remotely diagnosed. The opportunity here is for a broadband network that can support these vehicles going forward.

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Michelle Maggiore, PE, Cisco Smart+Connected Communities

THE CHALLENGE: ECONOMIC GAIN

As cities grow, traffic congestion increases, imposing costs on economies and impacting both the environment and quality of life for citizens who end up paying more to get where they need to go. Additionally, those communities with poor transit systems or imposing traffic issues have problems persuading citizens, business and tourists to invest in or visit their community.

THE OPPORTUNITY:

"About 27 percent of household income in the United States is spent on transportation," Einsig said. "When transportation overall is improved, and it becomes easier and more seamless for people to travel, the net economic benefit of that is they don't have to invest as much of their income in transportation cost." Additionally, communities that do invest up front in a modern, digital transportation infrastructure can expect to see other economic gains, like more tourism and a talented workforce who wants to move to their community.

It's becoming clearer that communities need to learn how to adjust to the critical needs of their transportation networks as population centers continue their evolution as places of human coalescence and interaction. This can empower mass transit to become a key building block for smart communities and enable them to support greater economic growth, attract more industry and increase workforce talent - all while improving the quality of life for everyone.

So how can communities make this smart communities vision a reality? The solution is a focus on the digitization of transportation – and the infrastructure that can support it.

The Solution: An Infrastructure for the Digitization of Transportation

What if you could securely and reliably connect your entire transit ecosystem (vehicles, stations, stops, maintenance yards, operations centers, workers, passengers) to deliver a safe, efficient and enjoyable transportation infrastructure and experience? What if you could increase ridership and create greater loyalty among your existing customers? What if you could reduce both capital and operational expenditures? What if you could improve road safety and reduce traffic congestion? With a digital transportation infrastructure, it's no longer just a vision but a real possibility.

The key is that in order to implement the opportunities discussed earlier, cities must think of digitizing their transportation like any other infrastructure that's underpinning a community. "There's actually a lot that needs to be done from the public perspective to insure the sort of safety, security, accountability, and cost effectiveness we expect from other infrastructure," Maggiore said.

What's critical to the execution and vision of this, though, is an enterprise infrastructure. "We need to think of the network for the digitization of transportation like we think of anything else related to transportation," Einsig said. "It's critical infrastructure, like a bridge or tunnel, that we have to have in place in order to digitize."

Currently, many transit operators manage their digital objectives individually through different communication systems and networks. But now, with increasing migration toward digital solutions, government no longer has to incur the costs – or work around the inefficiencies – of managing and maintaining duplicate network and communication functions. Operations, passenger safety and communications no longer need to be siloed in closed, single-purpose, proprietary systems. And that's where Cisco transit solutions come in.

"Cisco's network is a fundamental part of being able to connect transportation," Einsig said. "We can securely and robustly connect cars, sensors, devices, traffic lights, ambulances – anything that's connected to the transportation arena. And without a robust and scalable connection, the concept of connected transportation all starts to fall apart."

Cisco architecture and validated network designs, built on open standards, let governments take advantage of commercially available products and services to lower costs while improving performance. Whether it's a transit authority, first responder, systems integrator or a public-sector agency, they'll be able gain the benefits of Cisco's proven IP networking capabilities. This offers the high capacity needed to support today's intelligent transportation applications and services with the flexibility governments need to easily adapt over time.

The digital solutions that make up Cisco's suite of digital transportation solutions provide a single, standards-based, end-to-end network architecture that supports multiple services and applications. They also help enable vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-everything (V2X) communications. These applications give rise to a wealth of capabilities that address the transportation industry's greatest challenges, including improved safety and security, and reduced operating and capital expenses.

"Don't think of technology as a bolt-on afterward. Think of the underlying connectivity and security that's necessary to pull the data out of those systems so that you can digitize."

Barry Einsig,
Global Transportation
Executive, Cisco

Case Study: *Alaska Department of Transportation & Public Facilities*

The intrepid Alaska Department of Transportation & Public Facilities connects people, process, data and equipment along the state's most remote roads. And in a state where there's constant snow, bad weather, towns accessible only by aircraft, and more challenges, that's not always easy. Ensuring safe transportation of goods and services across the vast state can be difficult, especially when there's often no communication infrastructure. For example, until recently, one couldn't get to Deadhorse in Prudhoe Bay, the third-largest oil field in the United States, without an airplane or helicopter. Satellite connected staff to the Internet, telephone service, and basic radio communication. But safety of staff was paramount, and teams needed to be able to get on a radio and call for help, whether it was to provide basic safety for staff on the road or to the public that travels it.

As the team investigated its options with assistance from the Alaska Division of Enterprise Technology Services, they also looked for ways to upgrade their phone system. With an existing Cisco network, the state looked to Cisco and solutions from the Internet of Everything. This resulted in deploying Cisco Connected Roadways solutions, Cisco Unified Communications solutions, and Cisco Instant Connect (formerly Cisco IP Interoperability and Collaboration System). By connecting people, processes, data, and things, the state would significantly improve communication, safety, and emergency response in the field.

The State of Alaska already had Cisco switching and routing solutions. By implementing Cisco Connected Roadways solutions, ADOT&PF could extend networking capabilities to connect people, process, data, and equipment in the area—whether stationary or mobile. Cisco solutions now provide reliable, highly secure operation in the most harsh environments and extreme temperatures to meet the most demanding needs.

Conclusion

In a time when citizen expectations of government's digital abilities are rising, it's more important than ever to have the ability to create an easy, friendly, seamless transportation experience. Today's passengers want reliable, predictable, easy-to-navigate transit services and safe, intelligent roadways. They expect transit operators to provide a connected experience throughout their journeys. And they require accurate, up-to-the-minute arrival and departure time information, when and where they need it.

This is all achieved by a truly holistic, digitized transportation approach. When governments have a secure, reliable and interoperable network that connects passengers, drivers, operations centers, vehicles, bus stops, stations, video cameras and digital signs, completely new possibilities emerge. **Transformation is no longer just a concept – it's a capability.**

ABOUT CISCO

Cisco designs and sells broad lines of products, provides services, and delivers integrated solutions to develop and connect networks around the world. For over 30 years, we have helped our customers build networks and automate, orchestrate, integrate, and digitize IT-based products and services. In an increasingly connected world, Cisco is helping to transform businesses, governments, and cities worldwide.

Learn more at: <http://www.cisco.com/c/en/us/solutions/industries/transportation.html>

ABOUT GOVLOOP

GovLoop's mission is to "connect government to improve government." We aim to inspire public-sector professionals by serving as the knowledge network for government. GovLoop connects more than 250,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to connect and improve government.

For more information about this report, please reach out to info@govloop.com.





1152 15th St. NW, Suite 800
Washington, DC 20005

(202) 407-7421 | F: (202) 407-7501

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