Street Smarts 101

5 best practices for connected roadways

What it all means

You've probably heard the term " connected roadways" quite a bit lately. But did you know it all starts with the Internet of Things (IoT)? The IoT lets government agencies like yours secure and connect technologies embedded within vehicles, roadways, and traffic management systems. This connectivity can even extend to drivers. You can then share and act upon all the data they create in real time, to benefit your community, including:

- Enhanced safety and mobility
- Increased efficiency
- Curtailed carbon emissions
- Lower total cost of ownership.

Quick tips to remember as you start

- Think integrated, validated, and secure.
- Think industry leading and innovative.
- Think use cases and services you'll need as you grow.

Maximizing your investment up front

At their core, connected roadways are data-centric. And tremendous value can be gained long-term from that data (think urban planning and economic development). So be sure to maximize your data investment for the future up front by:

- Selecting an architecture based on an open-standards platform. This increases interoperability, lets you use more of your existing infrastructure, and improves performance.
- Including Vehicle to Infrastructure (V2I) communications capabilities that let cars talk to infrastructure, which is key to enhancing overall mobility and safety.
- Aligning with US DoT architecture interoperability guidelines for how intelligent transportation systems (ITS) networks (vehicles, field, centers, travelers) communicate.
- Deploying a threat-centric, end-to-end security that is open, simple, and automated. This will help reduce threats before they happen and help ensure the security and privacy of your data.

As you read the 5 best practices, keep in mind

Your goals:	How you can achieve them:
Safety	Prioritizing traffic signals • Lets public safety vehicles change signals/alert drivers Digital signage management • Automate digital signs using sensors to detect conditions
Safety/Mobility	V2V communications • Share data between private and government vehicles Traffic incident management • Reduce time to detect, verify, and categorize incidents Smart parking • Monitor needs in real-time and simplify payment
Mobility/Efficiency	Traffic signal efficiency • Optimize signaling based on number/location of vehicles
Efficiency	Streetlight management • Control (on/off, dim), maintain individually
Safety/Mobility/ Efficiency	Smarter vehicles • Share environmental and traffic data in real-time, dynamically re-route, connect in-car sensors


1
Start small then scale

Start small

By starting small, you take a lot of stress out of the system, especially for budgets and personnel. But it can also improve quality over the long-term by giving your team a chance to learn from their mistakes and tweak systems before deploying at a larger scale. Try one of the options below for your first project and learn as you grow.

Connect an intersection. Create smarter traffic signals by connecting them to vehicles and sensors for Signal Phase and Timing (SPaT) and other safety apps. As you become comfortable with the technology, add more layers of data from nearby locations like office, retail, and parking. This can create value for users beyond their vehicles.

Connect a corridor (or two). Create a smarter road by linking it to vehicles and IoT sensors. Automate time consuming or dangerous duties like changing signage and closing gates. You'll learn how to leverage real-time data for improved safety, congestion, and performance management.

Trending: Subscription-based solutions and services let you scale as to fit your needs. Plus, they let you optimize CapEx and OpEx, lowering total cost of ownership and simplifying maintenance. Check out what's available.

Take the load off early

Let your IT department get a taste for the technologies and workloads involved. If they have too much on their plate already, consider managed services to take the load off. This can also help you overcome knowledge gaps and budget limitations. In the end, managed services can also help streamline deployment processes while improving the scalability of your solution. Dive deeper.

> " Once tweaked, your first connected intersection design can be applied to others, creating a string of data hubs for your community."
>
> Kenn Dodson, Subject Matter Expert
>
> Cisco Public Sector

Use a layered approach to scale

Grow your connected roadways network in layers, each adding new functionalities and capabilities. This approach will create a natural scalability that lets you expand to almost any size. From neighborhood to city, to county or even state, layering lets you grow in a functional and manageable way.


2
Push processing to the edge

Go where the data is

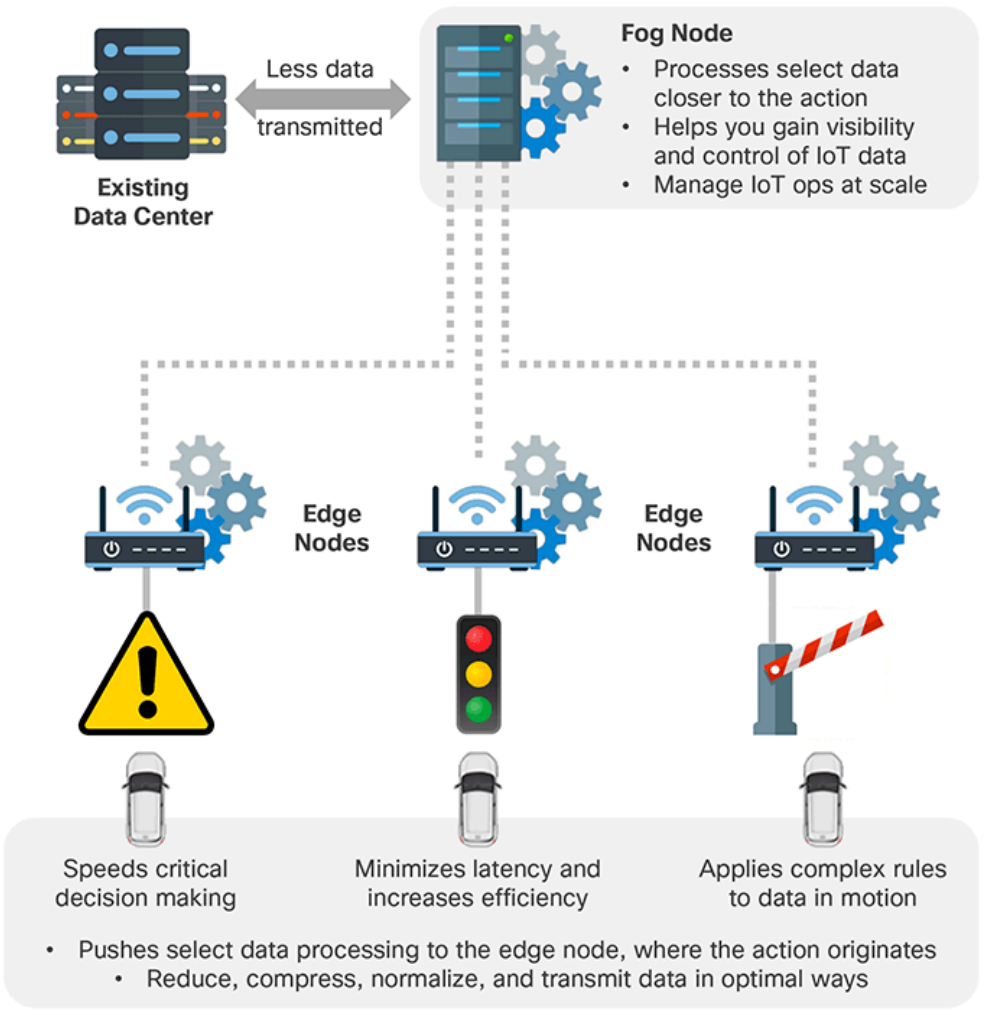
Your connected roadway solution will produce a waterfall of data. So start asking some hard questions about your agency's true data processing capabilities now to reduce issues later on. Questions like can your data center handle the added load or do you have enough staff and the right knowledge base?

Edge and fog computing. The answers may mean moving data processing from your data center to where the action is. For connected roadways, that works best anyway, reducing bandwidth usage and latency while empowering real-time predictive apps. That's where edge and fog computing comes into play (read the infamous Westworld comparison here). But it needs to work across standards, be capable of filtering for valuable messages, and be able to apply logic based on rules and analytics.

TIP: Have some fun sketching out network topology to help you visualize data flows, explore spatial relationships, and find missed opportunities. Check out these 5 Free Tools to get started.

> " Processing data where it originates reduces latency and improves outcomes, all while increasing system resilience."
>
> Marcus Moffett, SE Director
>
> Cisco/Public Sector

How an edge and fog processing module works



3

Apply automation

Video: How Las Vegas is using automation to their advantage

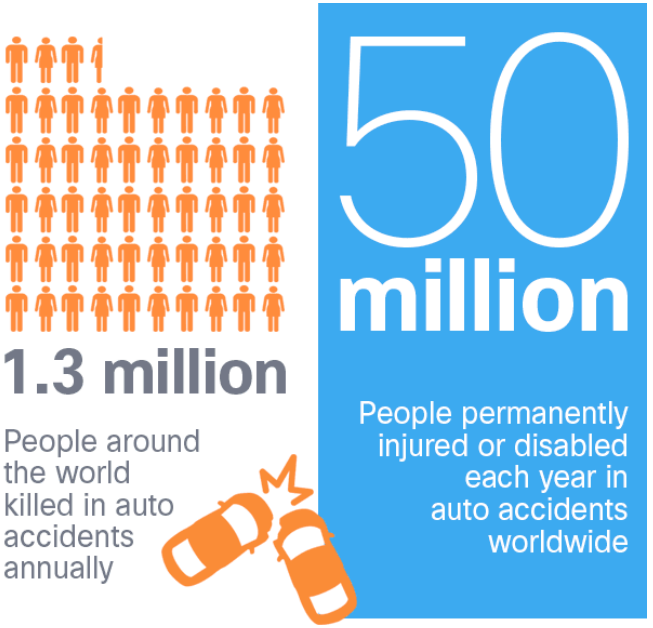
Automate actions

Automating tasks can be a key driver of your connected roadways solutions, letting staff and citizens alike do three great things.

Increase productivity. Use preset policies that are triggered based on a series of specific events. This eliminates monotonous, time-consuming, or dangerous tasks for your personnel, allowing them to focus on other issues.

Enhance safety. Automate a variety of IT functions to speed response of signalling, sensors, and communications. Also consider alerting travelers to severe weather, accidents, and other issues via digital roadside signage. You can even push alerts to smartphones and vehicles.

Embed resilience. In times of stress, such as natural or man-made disasters, preset actions that automatically engage based on set policies free your team to focus on the emergency at hand. In this way, automation can speed government's response while adding resilience.



*Association for Safe International Road Travel, 2017

You can even build your own apps!
Automation lets you easily create and deploy apps to share real-time info with your team or citizens, increase engagement, warn of changing road conditions, and help gather data to improve outcomes. Best of all, they can be created in-house, offering customization at an affordable price. Start creating now!

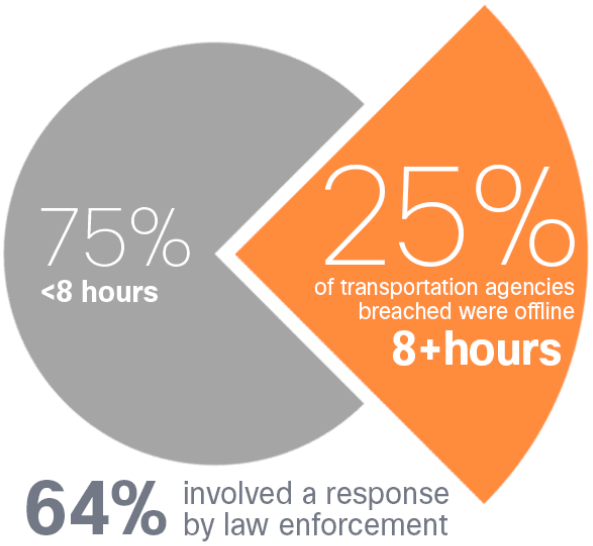

4
Embed security

Embed simple, open, and automated security

Botnets, cryptojacking, and good old fashioned ransomware. These are the things that can keep IT personnel awake at night. And as cyberthreats against government grow, your connected roadways approach must be prepared for them.

So consider a holistic end-to-end security approach, one that can detect and defend against increasingly sophisticated adversaries and the wide array of weapons they use.

Also, be sure to deploy a 24/7 approach that enables deeper visibility and that leverages behavioral analytics and machine learning. But keep it simple to reduce complexity of management, and open to increase integration. Also be sure to seek any and every opportunity to automate security functions. This will speed detection and mitigation, and help your budget.



*2018 Cisco Annual Cybersecurity Report: Impacts on Government

Video: How to protect your workloads in the cloud using Tetration


5
Engage community

Stay up to speed

Network with peers. As you begin your journey, reach out to your peers and agency IT leadership to get their perspectives (and to educate them on connected roadways). We suggest:

- Asking your IT team about the ease of integration with your existing infrastructure
- Talking to other departments and agencies to uncover opportunities that may not seem obvious at first
- Engaging trusted vendors about innovative options and futureproofing techniques to reduce costs while increasing usability.

Engage community. Plant the seeds for strong community buy-in. This can help reduce your stress as the project grows, especially if any unforeseen issues pop up. So start talking with:

- Government agencies (state, local, and fed)
- Special interest groups
- Private businesses
- Large educational institutions
- Private citizens and community groups.

Be transparent by using social media to educate your community, understand their concerns, and keep them updated. And host a public workshop so all stakeholders can gain a sense of ownership in the process. Then post results online.

Pick up a new habit. Connected roadways are always evolving, so it's important to keep up with innovations and methodologies. Get in the habit of checking out online industry mags like SmartCities Dive, American City & County, IoT News, and GovTech on a weekly basis.

What about paying the bill? Many funding opportunities are available to help finance different aspects of your connected roadways journey. Cisco can offer you help in navigating what can sometimes seem like a very complex funding and grants process. You can find out more here. And also check out the flexible payment solutions available through Cisco Capital.

Play " follow the leader"

National and industry standards for connected roadways are already being developed, so look to public and private sector entities leading that effort to gain guidance and inspiration. Bookmark and check in regularly with:

- USDOT Intelligent Transportation Systems
- USDOT Intelligent Transport Strategic Plan
- USDOT Connected Vehicle Resources
- Jasper for Connected Vehicles
- Cisco Connected Roadways

Get social!

Social media is at the core of a new ethos in transportation. One where sharing, critiquing, and building community is defining how professionals approach connected roadways. Check out hashtags like #connectedcar, #transportation, #connectedroadways, #smartcar, #smartcity, #bigdata, #autonomousvehicles, and #AV to join the conversation.

About the author

Kenneth R. Dodson, Landscape Architect
As a licensed Landscape Architect with over fifteen years of experience in community and environmental design, including transportation and pedestrian design, Kenn helps governments better understand technology so they can improve quality of life for their citizens. From visioning future possibilities to making complex ideas more relatable, he sees the need for government to increase responsiveness and creativity as it deals with complex issues, and feels the Internet of Things (IoT) can drive this transformation.

For transportation, smart cities, and the environment, Kenn sees the IoT as a key driver of sustainability. With its power to gather and aggregate massive amounts of data for deeper analysis, the IoT can help create better outcomes at every level of a community's existence, including for individual citizens. Plus, the IoT can power the move of data processing to where actions originate, helping create a natural resilience for communities in times of stress.

" There's a reason I choose to work in the public sector at Cisco. As a landscape architect who has helped shape the fabric of my community, from multi-thousand acre developments to quiet little parks, I see the value in our local governance. It is here, in our community, that our lives unfold every day. And it is here, in the intimacy of our neighborhoods, that we can truly impact quality of life."

Join the conversation

Keep up on the latest innovations in transportation, smart cities, public safety, and more. Together, we can create communities empowered by technology with improved quality of life for everyone.

Check in with Kenn on:

Twitter - Gircom
LinkedIn - Kenneth R. Dodson

Thank you for reading

Street Smarts 101

learn more at www.cisco.com/go/transportation