BRKIOT-2028: Driving the Future

Enhancing Safety for Emergency Responders with Cisco at the Edge

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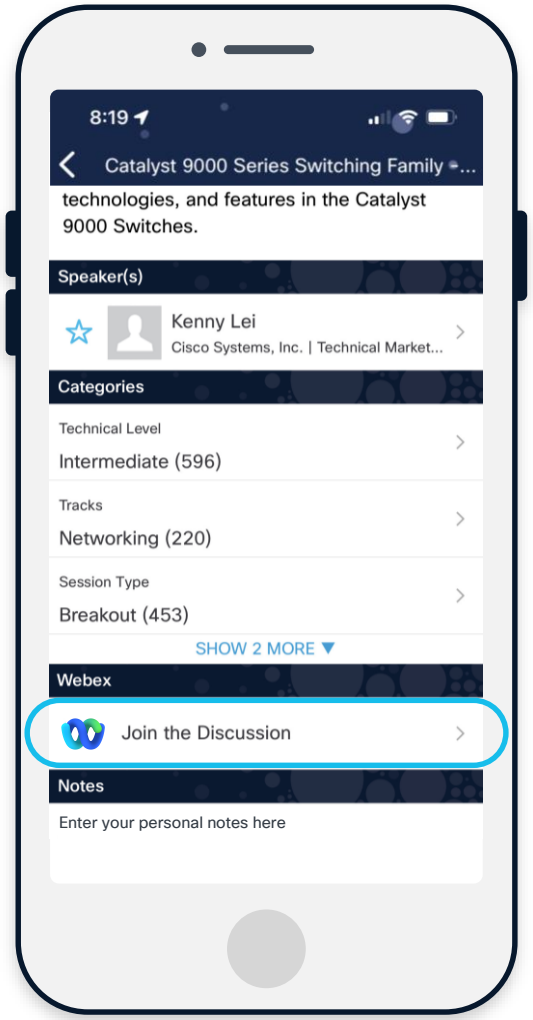


City of Franklin

City of Franklin, TN

FORTUNE

Best Places to Live (#6)

Fortune Magazine 2024

GARDEN & GUN

Best Southern Town

Garden and Gun Magazine

USA TODAY

Most Beautiful Town Top 5 Finalist

Rand McNally/USA Today Poll

Top 5 Most Romantic Main Streets

National Trust for Historic Preservation

TRAVEL+ LEISURE

America's Favorite Towns (#8)

Travel and Leisure Magazine

Franklin All-America City NATIONAL CIVIC LEAGUE 2020

All-American City 2020 (#1)

National Civic League

Money

Best Places to Live

Money Magazine

Founded in 1799, Franklin is known for its pivotal role in the Civil War but has evolved into a thriving, highly sought after community, balancing historic preservation with exciting innovation

Transportation Goals

The City of Franklin Encourages “Smart Growth”

- Mix of uses for land development – less reliance on vehicle trips
- Develop where infrastructure can support growth – roadway capacity
- Think ‘Outside of the box’ for transportation improvements
- Embrace Technology

City of Franklin

Fire Department
- Needs to fix Emergency Vehicle Preemption
- Precision location and dynamic routing
- Multi-Jurisdictional Preemption

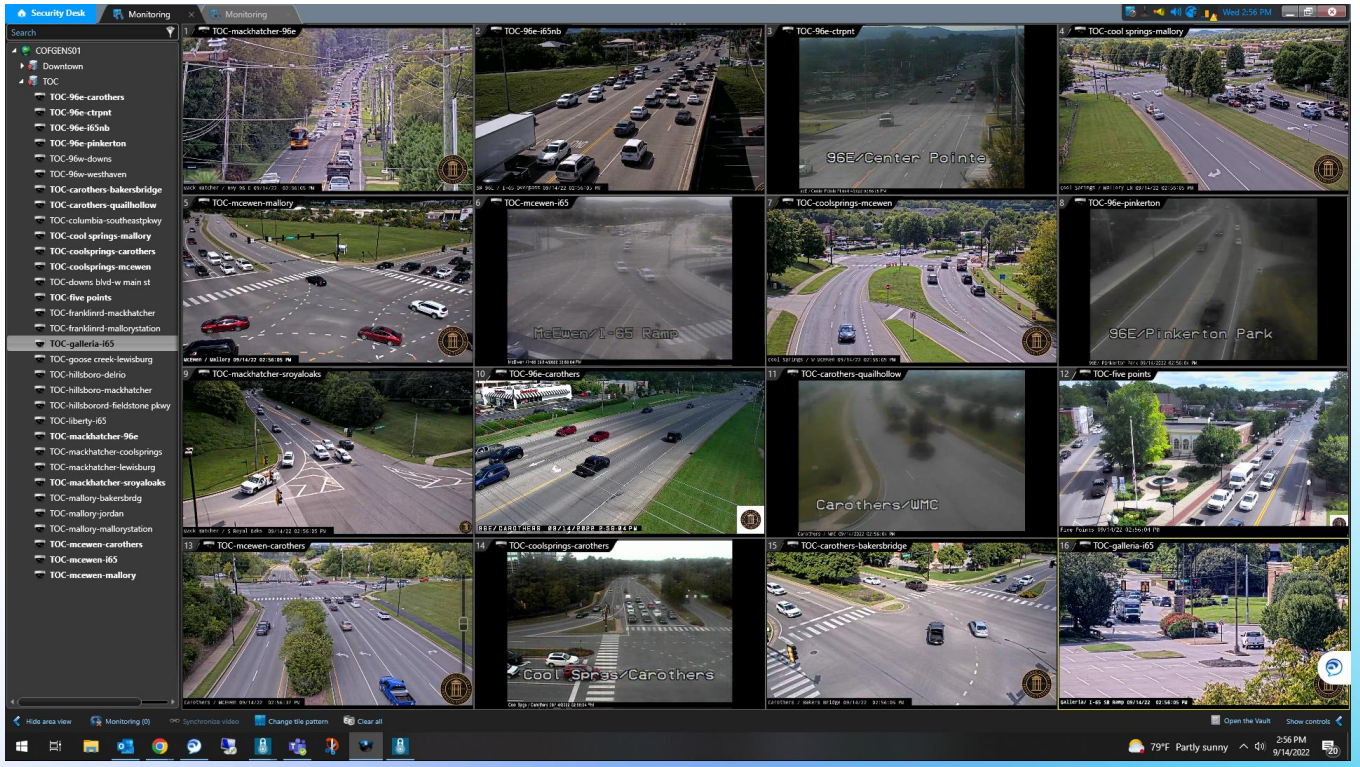
City IT
- Network refresh of old gear
- Cybersecurity

Traffic
- Lead V2X innovation
- Capture Vanderbilt research arm

City
- Visibility
- Leverage investments
- Capture research and grant money

Traffic Operations Infrastructure and Support

- Managed by IT, Streets, and Engineering/Traffic Operations
- 130 Traffic Signals
- **<u>100% CONNECTIVITY</u>** to the TOC (Traffic Operations Center)



Connecting Critical Infrastructure

130 Traffic Intersections

IE 3300 – 4000 series switches located at traffic intersections

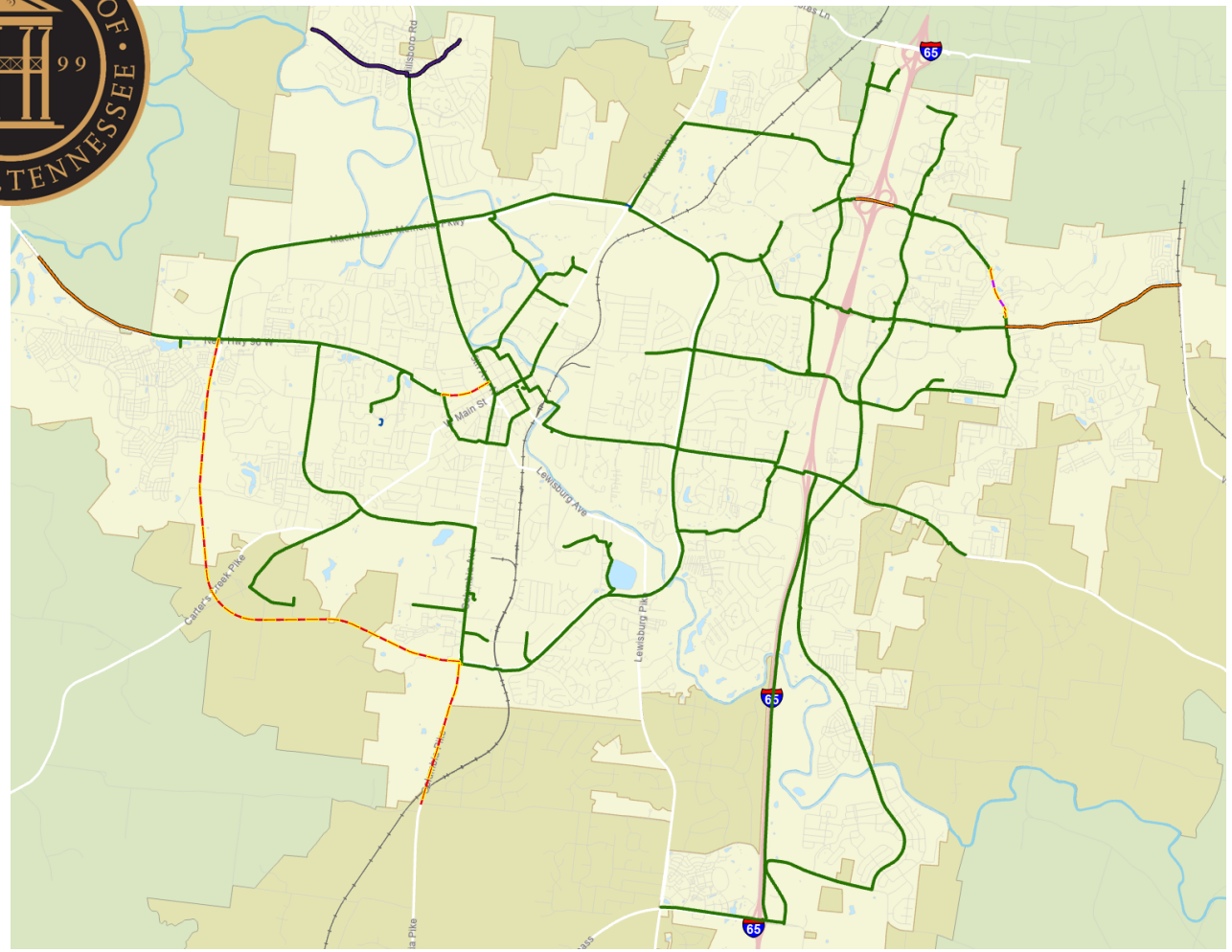
IR 1101 Edge Intelligence devices

30 City Facilities

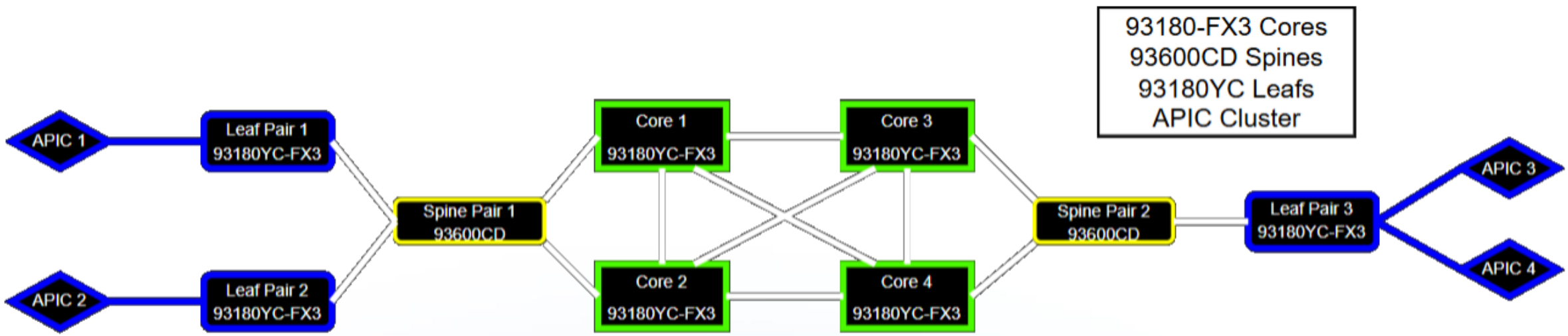
Catalyst 9300 Series Switches

Franklin Fiber Infrastructure

- City owned dark fiber (60 count)
- 90 Miles of Fiber
- Challenge 1 – CSX Railroad Crossings
- Challenge 2 – Redundancy



Redundant – Resilient Data Center Network



Partnering with Cisco

Building solutions that add value, provide safer environments, and most importantly accelerated times for emergency personnel to save lives.

City safety outcomes required using technology to solve problems, while developing relationships that collaborate and overcome hurdles for the betterment of all.

Fire Services

Franklin Fire Department Overview

- 8 stations + Training Center | 158 firefighters | 13 Advanced Life Support (ALS) equipped frontline units
- 2024 incident responses: 11,502 (Current avg. 32 calls/day)
- Franklin is one of 498 Fire Departments nationwide with an Insurance Services Office (ISO) rating of 1
- Special Operations include Swiftwater and Hazmat units

Aging Emergency Vehicle Preemption Infrastructure

- Infrared/GPS system
- The solution was **NOT SCALABLE!**
- Emergency vehicle routing was **NOT AN OPTION!**
- The system was **NOT MAINTAINED!**

Optimizing Emergency Response

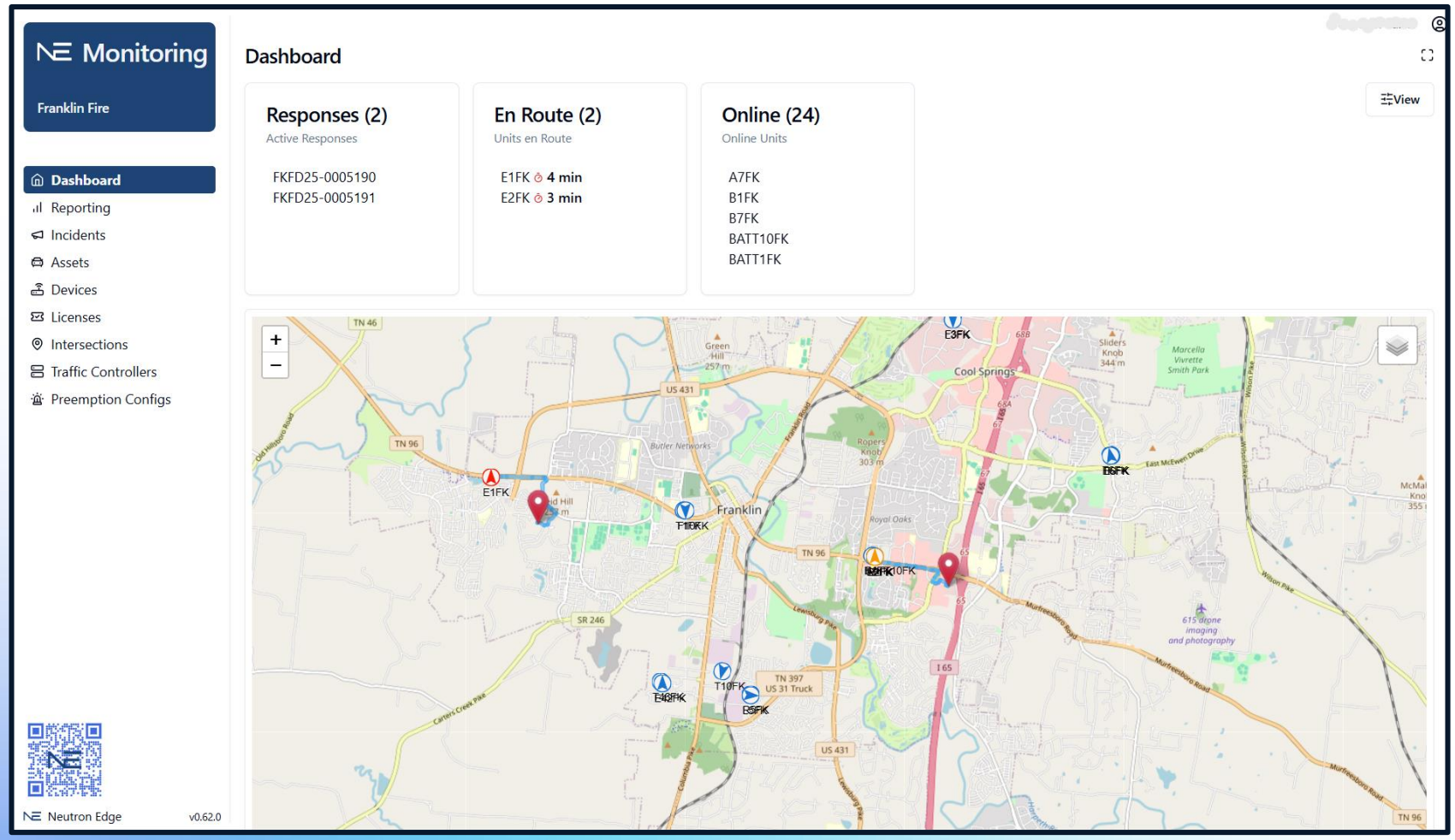
Our Needs:

- **Smarter Dispatching:** Identify responding units, location and speed instantly
- **Emergency Vehicle Preemption** – Clear intersections using real-time GPS data.
- **Proactive Light Cycle Management** – Adjust signals ahead of emergency vehicles
- **Uncompromised Reliability** – Ensure seamless response.
- **Scalability** – Expand Deployment across jurisdictions and emergency services

Emergency Vehicle Dashboard

Administrative Interface

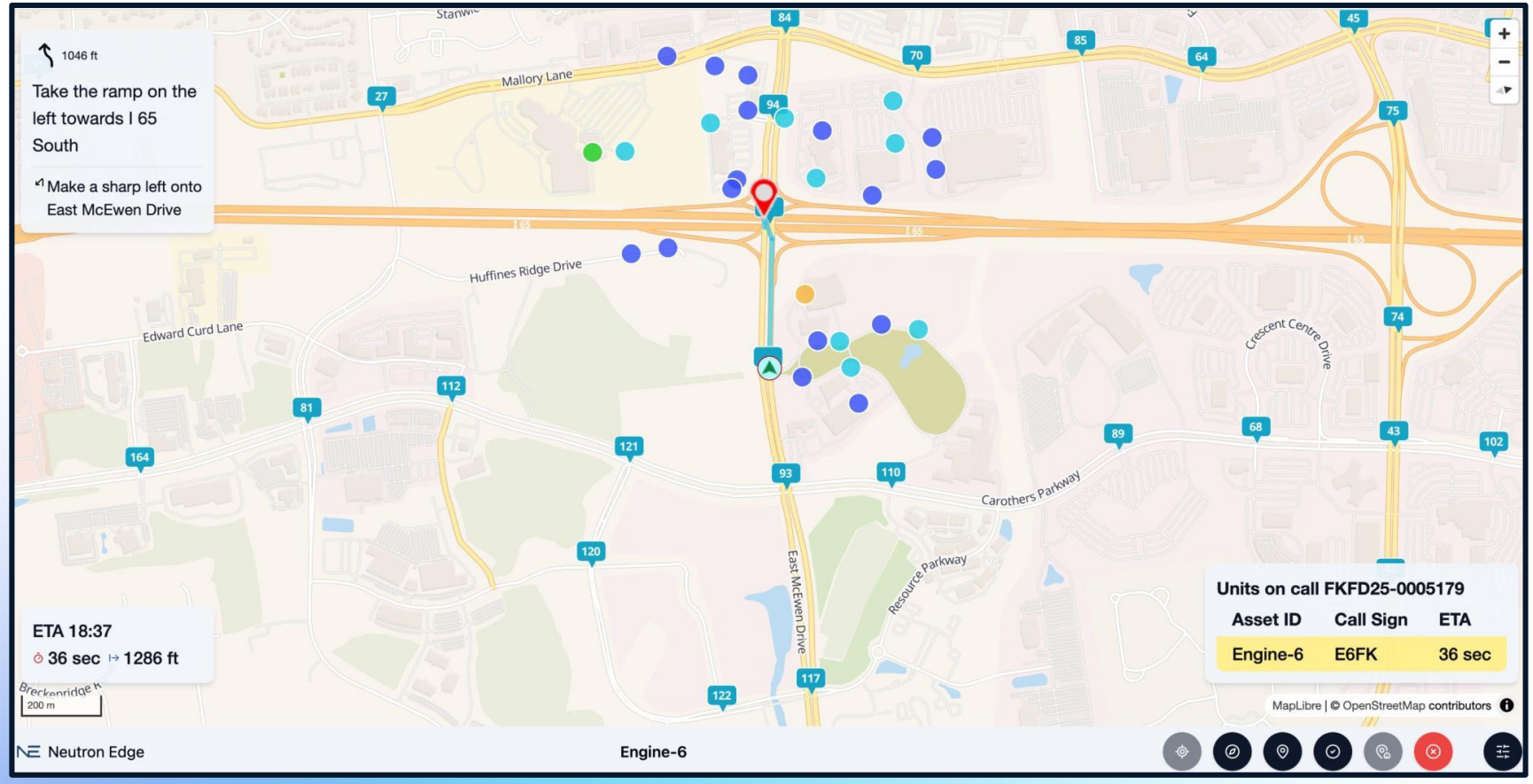
- Displays routes, calls, vehicles and intersections
- Unit status
- Active dispatch incidents
- Traffic controller configurations
- Vehicle software management



EVP Vehicle Routing Engine

In-Vehicle Display

- Route and directions
- Fire Hydrant locations and flow rates
- ETA for units on the same call
- Warns of other approaching units to the same intersection



Transforming Emergency Response: Real-World Results

Key Benefits

- Travel Time Improvements: Reductions ranging from 20 seconds to 2 minutes.
- Streamline Emergency Response: Faster dispatch and improved coordination
- Enhanced Safety: Optimized traffic flow for emergency personnel and the public.
- Fewer Traffic Related Incidents: Minimizing risks at intersections and critical corridors.
- Improved Reliable: Improving service times, predictability, reduced pressure on first responders and improved coordination

Scaling the Vision:
Regional Coordination & Future Potential

Regional Partnership: Brentwood, Williamson County EMS

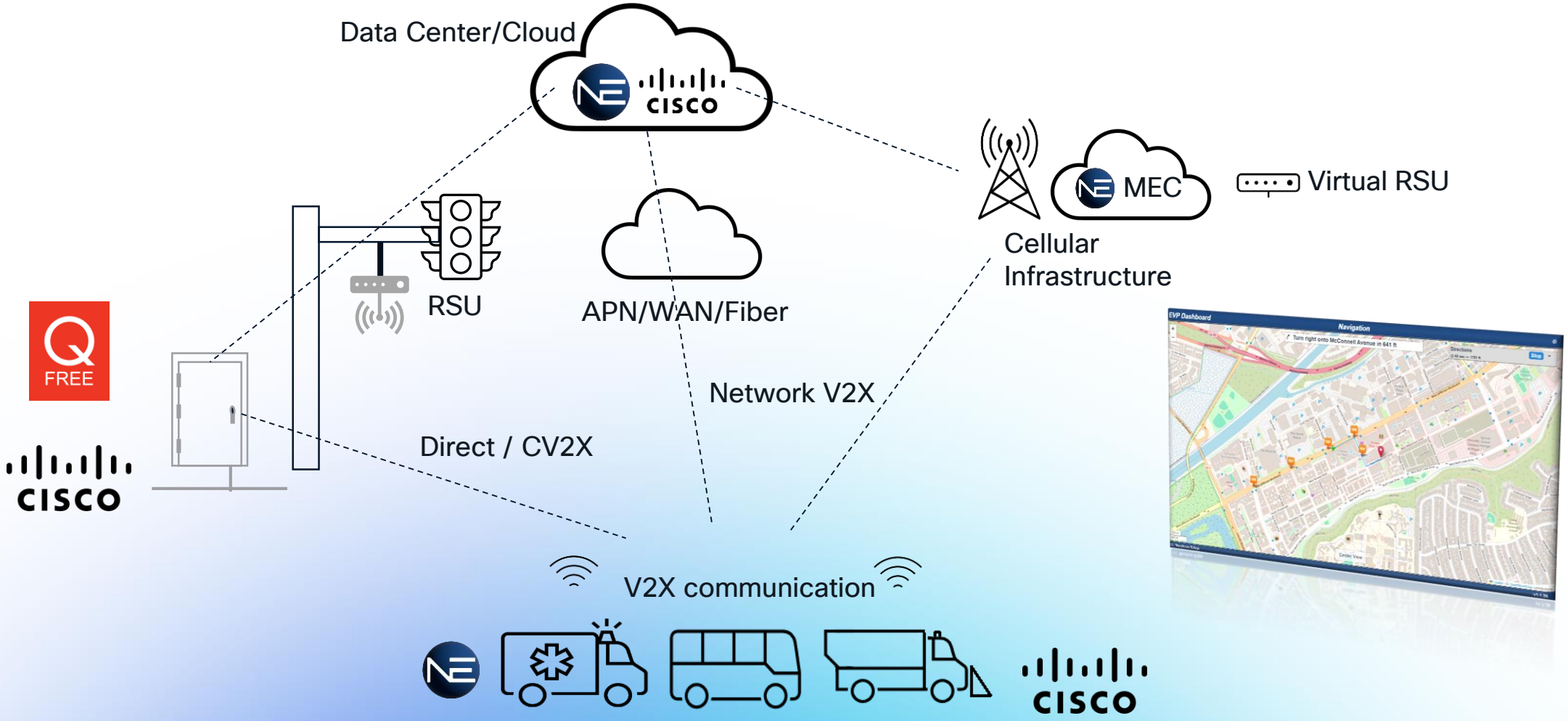
- Neighbor to the north; Shared border; Automatic Aid Agreement
- Frequent cross-jurisdictional responses
- Systems are federated for seamless operation across cities

What's Next:

- Scalable to other municipalities
- Built on open standards
- Ready to connect with autonomous/connected vehicle technology

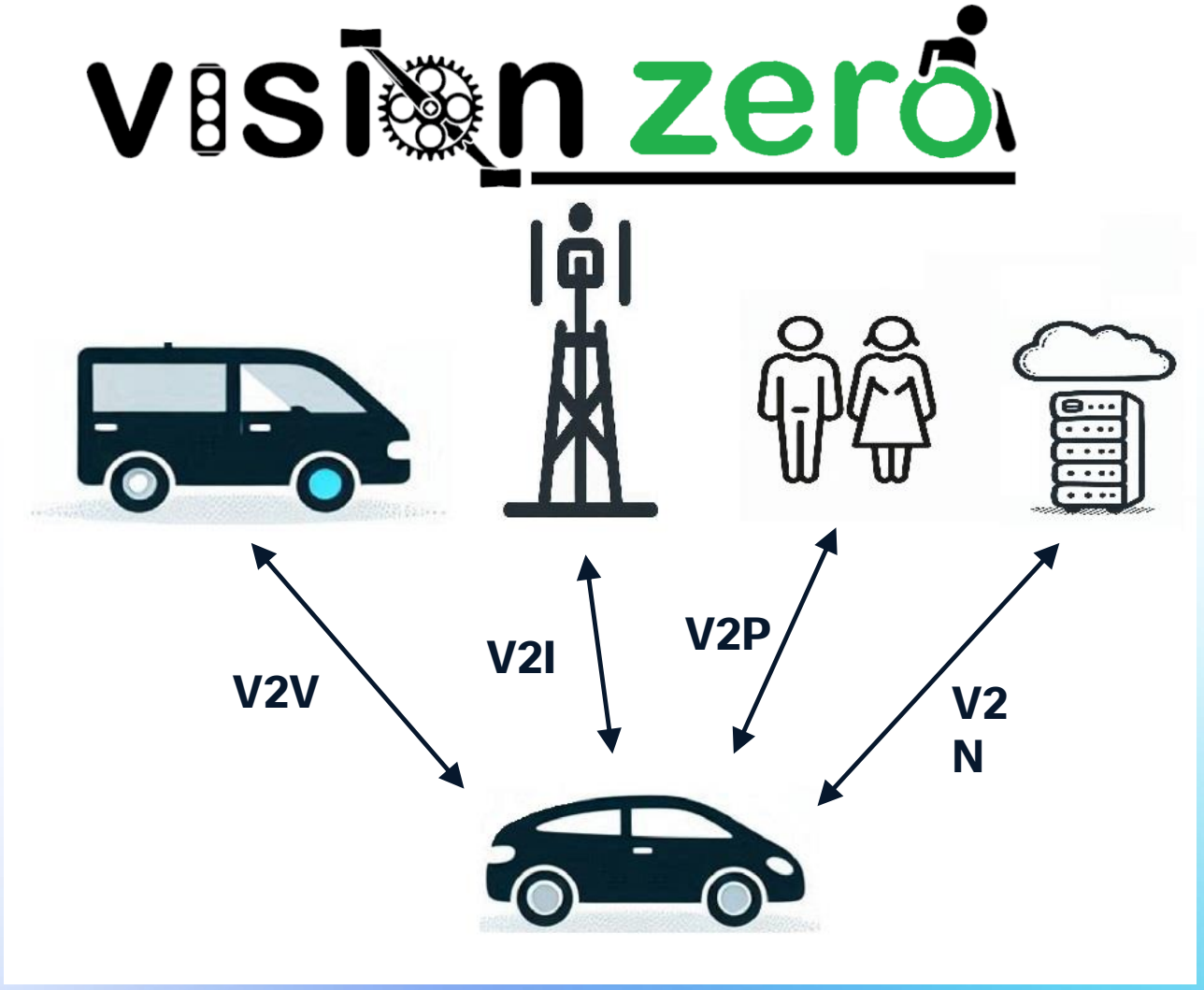
Traffic Operations

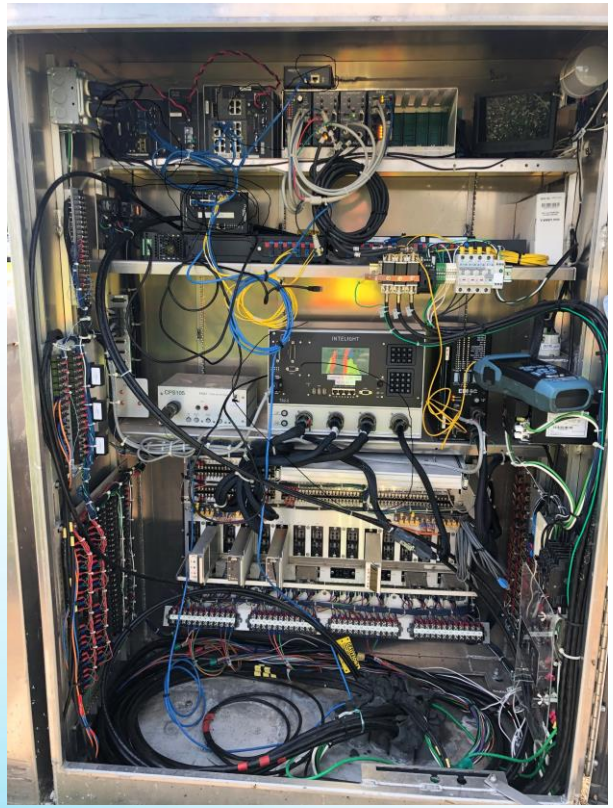
EVP Solution with cisco & NEUTRON EDGE



Innovation and impact with

cisco & NEUTRON EDGE





The Future of Safety - Transportation Use Cases

- Pedestrian Protection
- Vulnerable Road User Safety
- Connected and Autonomous Vehicle Enablement Applications
- Wrong Way Driver Detection and Alerting
- Driver Weather Alerting
- Road Condition Warnings
- Work Zone Warnings
- Large Event Response
- Curve Speed Warnings
- Queue Detection
- Bridge Strike Prevention
- Dynamic Pedestrian Scramble
- Emergency Vehicle Preemption
- Transit Signal Priority
- Abandoned Object Detection
- People Movement and Sentiment

Architecting the Future

City of Franklin

- Fire Department
  - Needs to fix Emergency Vehicle Preemption
  - Precision location and dynamic routing
  - Multi-Jurisdictional Preemption
- City IT
  - Network refresh of old gear
  - Cybersecurity
- Traffic
  - Lead V2X innovation
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- City
  - Visibility
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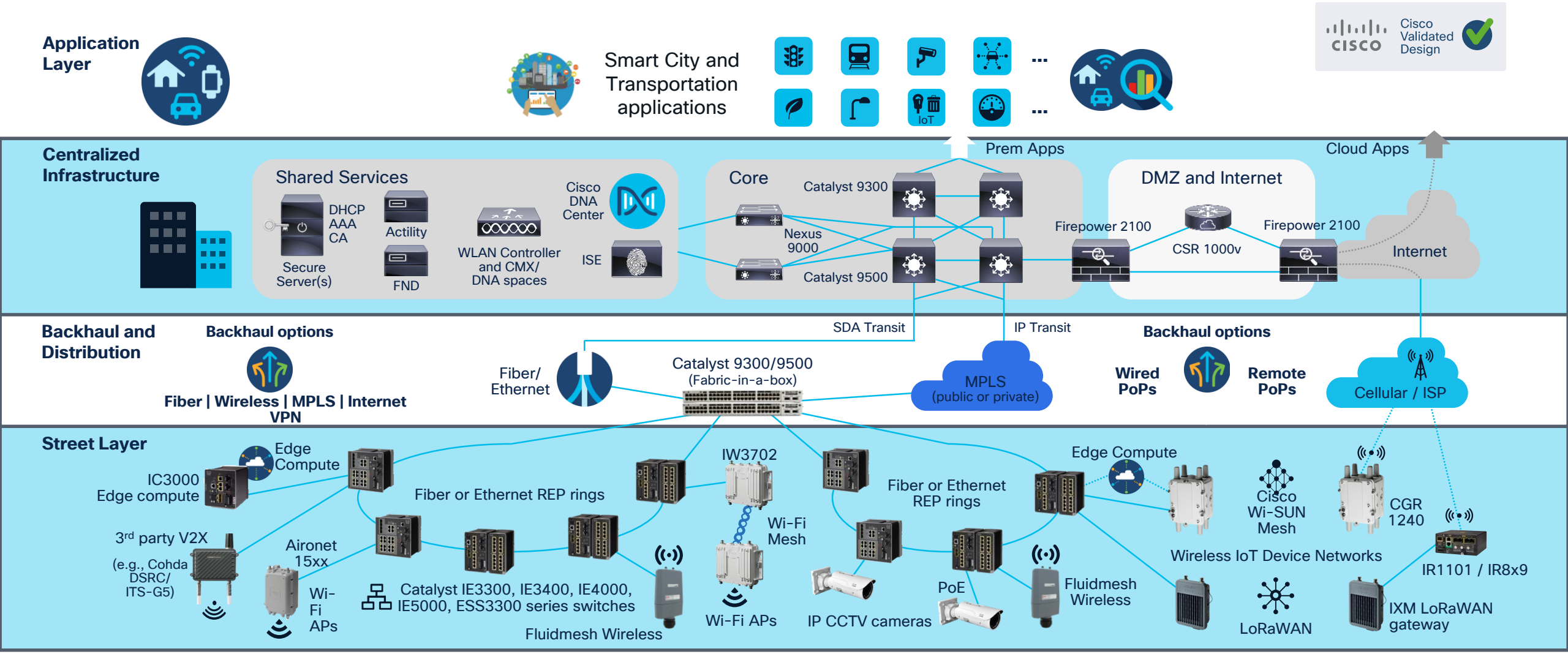
Cisco Connected Communities Infrastructure

High-level architecture



Connected Intersections

Deploying to connect, secure, and drive outcomes

- Technology
  - Fiber, Cellular, Broadband, Wireless Backhaul
- Equipment
  - IR1101 Cellular router
  - IE3300, IE3400, IE3500 Switch
- Software
  - SDWAN – Deploy, Manage, Encrypt
  - Secure Equipment Access – Manage 3rd Party Access
  - Thousand Eyes – Application Performance
  - Cybervision – OT protocol behavior and cyber security
  - Edge Intelligence Software – Applications and outcomes

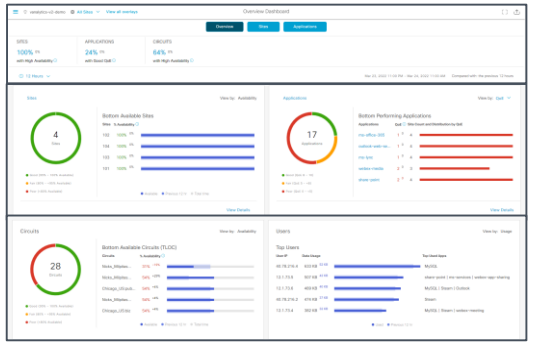
SDWAN

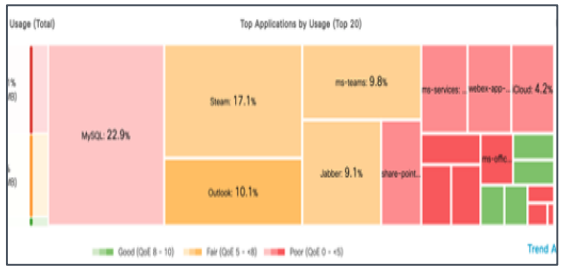
Connect and Secure: Deploy, encrypt, monitor and analyze network traffic

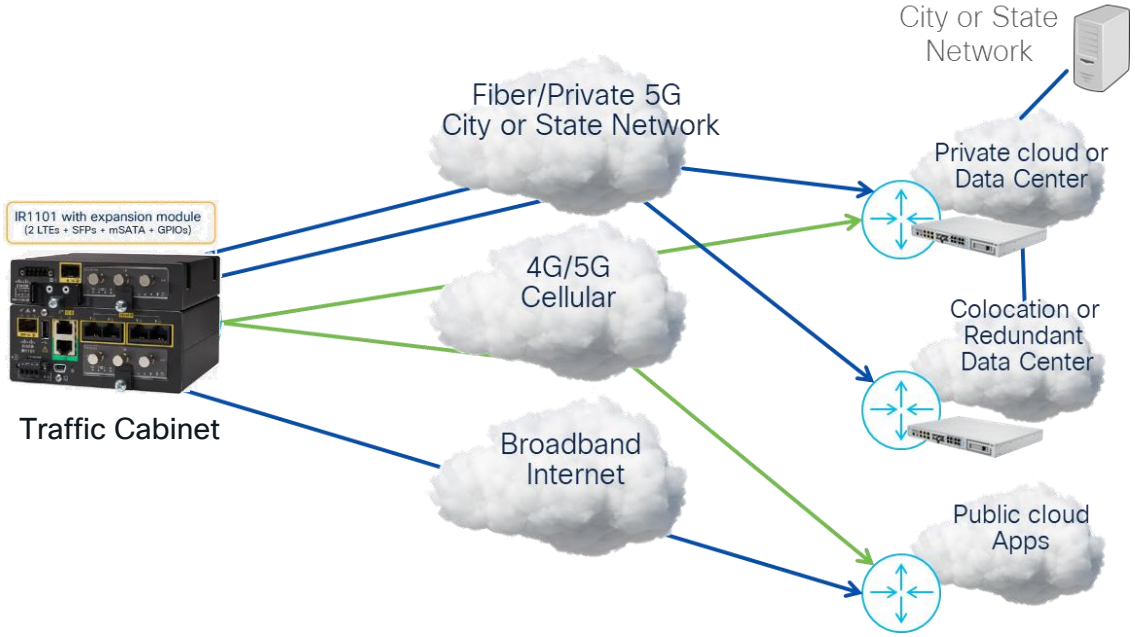
Broad perspective of your network performance

Historical trends App experience

Daily, Weekly, Monthly aggregates



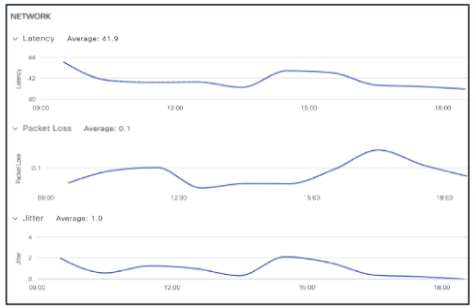


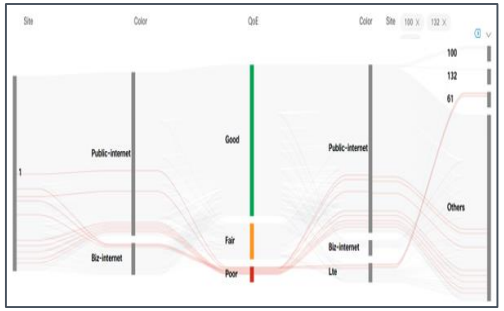


Extensive traffic analysis for troubleshooting issues

Traffic flow patterns Underlay path tracing

App distribution across circuits



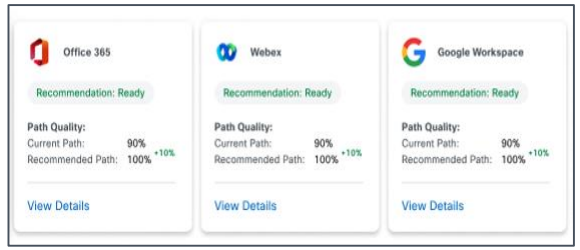


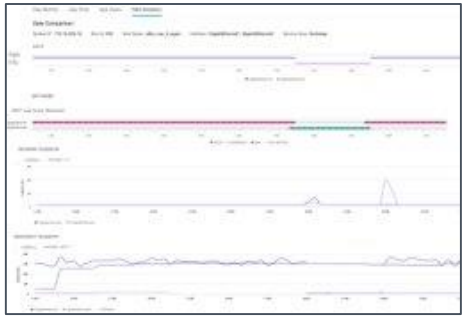
Adaptive & Predictive AI/ML networking

Cloud SaaS Optimization

Predictive Path Recommendations

AIOps use-cases





Cyber Vision

Visibility into transportation technology protocols

ICS Visibility
Asset inventory
Communication patterns
Device vulnerability

Operational Insights
Identify configuration changes
Record control system events

Threat Detection
Behavioral anomaly detection
Signature based IDS
Real-time alerting

Cisco integrations

ISE, Secure Network Analytics (formerly Stealthwatch®), Firepower®, DNA Center™

Cyber Vision Center: Centralized analytics and data visualization

Partner integrations

SIEM, CMDB
ICS vendor software

Sensor — Industrial switching

Sensor — IoT gateways / compute

Sensor — Industrial routing

Sensor — Industrial Wi-Fi

Sensor — Sensor networking (RF Mesh)

Cyber Vision Sensors: deep packet inspection built into network elements

Edge Intelligence

Data Model Enforcement and Applications

Acquisition
- Acquire millions of messages per second
- Acquire from devices with native protocols

Filtering
- Determine what messages are meaningful
- Generate baseline sampling

Normalization
- Work with standards, and protocols for all data
- Enforce a data model

Apply logic and analytics Roadways Use Cases
- Edge Applications based on logic, rules and code
- Analytics through microservices

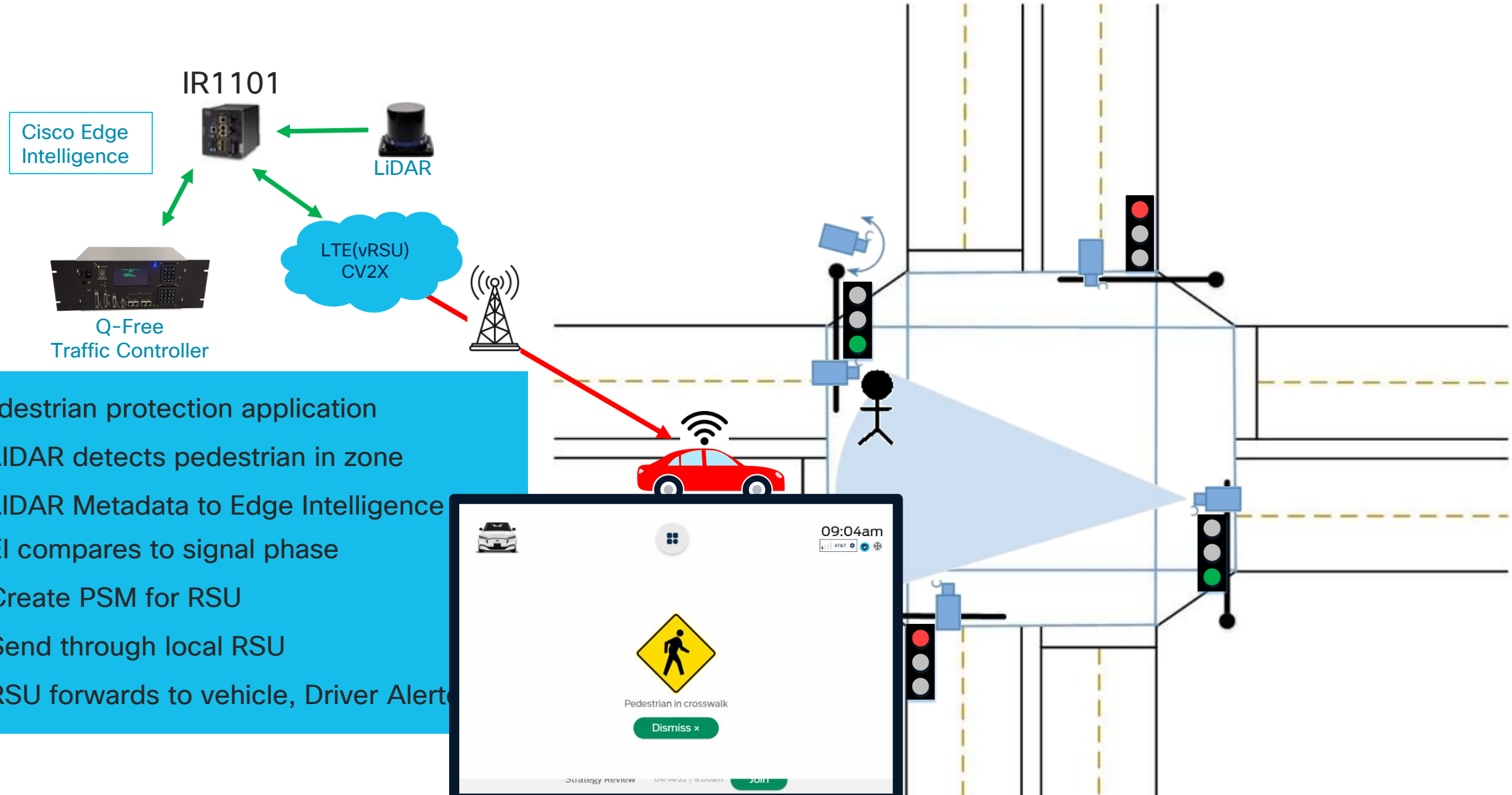
Aggregation
- Apply aggregation policy for data, sampled, alerts
- Only transmit what data is needed

Deployed Applications
- Pedestrian Protection
- EVP/TSP
- Multi-output SPAT/Dynamic MAP
- Wrong Way Driver
- Curve/Queue Warning
- Environmental Response
- Bridge Strike

Cloud Applications

ITS Applications

Edge Intelligence – Pedestrian detection use case

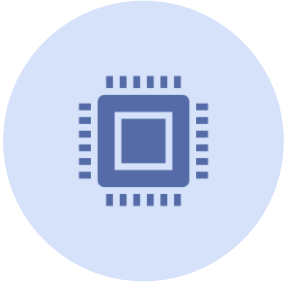


Pedestrian protection application

- LIDAR detects pedestrian in zone
- LIDAR Metadata to Edge Intelligence
- EI compares to signal phase
- Create PSM for RSU
- Send through local RSU
- RSU forwards to vehicle, Driver Alert

Data Sharing and Access – Digital Twin; AI

Edge Intelligence feeds Centralized data exchange



Allowing for all agencies access to all infrastructure, timings, sensors

Drive use cases for all departments from one infrastructure

Data normalization for ease of future integrations

Security via authorized access control

Smart Infrastructure Poles

Critical Infrastructure – Street Lights

Use cases:

- Emergency vehicle preemption and transit priority
- Smart poles help prioritize emergency vehicles and buses at signals, improving response times and bus schedules.
- Vehicle counting and characterization
- Sensors in poles collect data on vehicle types and traffic patterns, helping reduce congestion and optimizing traffic flow.
- Traffic light optimization
- Real-time data allows dynamic adjustment of signal timings, reducing travel time and emissions.
- Pedestrian safety
- Smart poles analytics monitor pedestrian activity and adjust signals, reducing accidents and improving crossings.

Inside the Smart Pole

A sleek modern design with fully integrated technology for enhanced resiliency and security

Key embedded technologies

- Cisco Industrial Routing, Switching & Cybersecurity
- Wi-Fi services
- CCTV
- LiDAR technology
- Edge compute & AI readiness
- 5G cellular
- Ultra-reliable wireless backhaul
- V2X (Cellular & CV2X)
- High bandwidth fiber connectivity

Building for Outcomes

- Cross-departmental cooperation
- Well defined goals and objectives
- Be Specific!
- Build for Future!
- Ensure investment protection
- Connect, Secure, Monitor, Deliver Applications

Questions?

Resources

Connect, Secure, Monitor, and Applications

- Cisco Live 2025 – San Diego
  - World of Solutions – Booth 3625
- Cisco Transportation Resources
  - https://www.cisco.com/site/us/en/solutions/industries/transportation/index.html
- Cisco Industrial Switching
  - https://www.cisco.com/site/us/en/products/networking/industrial-switches/index.html
- Cisco Industrial Networking
  - https://www.cisco.com/site/us/en/products/networking/industrial-iot/index.html?ccid=cc002470&oid=powit031137&dtid=odicdc000509

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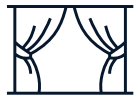

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