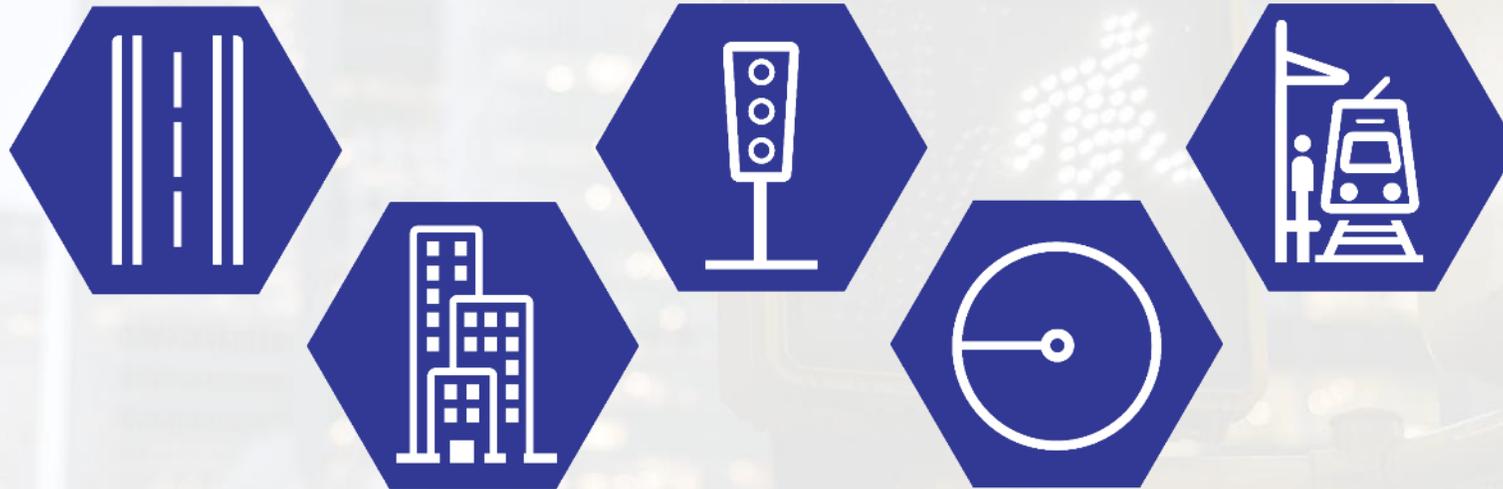


# Networking in ITS



# Agenda

## **Networking and ITS**

When networking meets traffic and how does it impact your day to day.

## **Applications**

Every city is different. Understanding applications and the high level approach on where the networking is important.

## **System Security and Reliability**

Understand the importance of the levels of vulnerability in a traffic application. Learn best practices on how to mitigate the vulnerability and create a reliable network.

## **Networking Topology Best Practices**

Learn how to design your cities network for scalability and ease of use. Discover the different options you have to develop your network.



# Who We Are

- Founded in 1996
- Started by NASA Engineers in the Jet Propulsion Lab
- Ultimate Goal: **Public Safety** through communications
- Backed by the strength of Phoenix Contact
- ITS Experts for over 20 Years



# Hardened Ethernet



Intersection Control & Monitoring



Highway Control & Monitoring



Toll Collection



Passenger Rail



Transit



Water / Waste Water

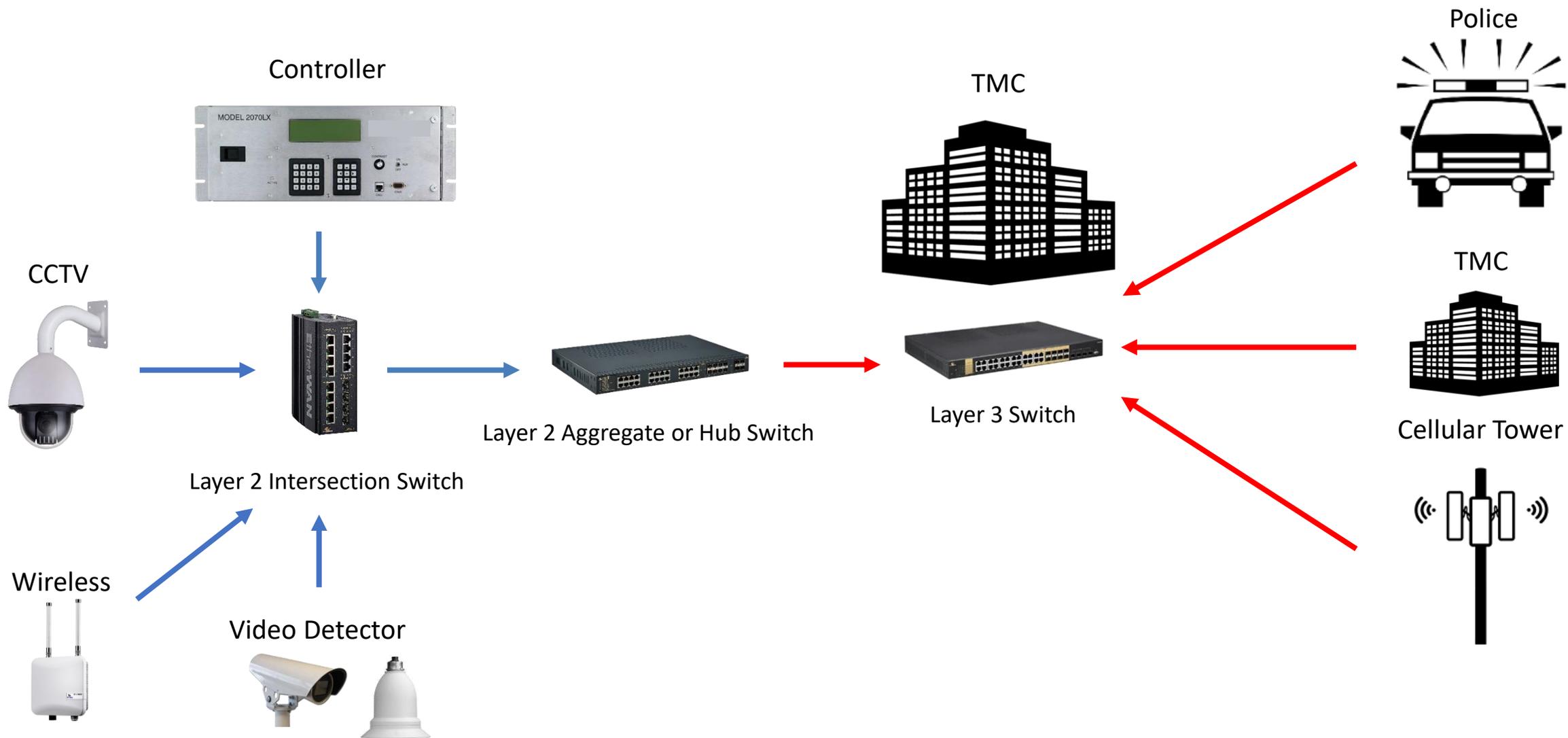
Hardened Environments.



Redundancy. Scalability.

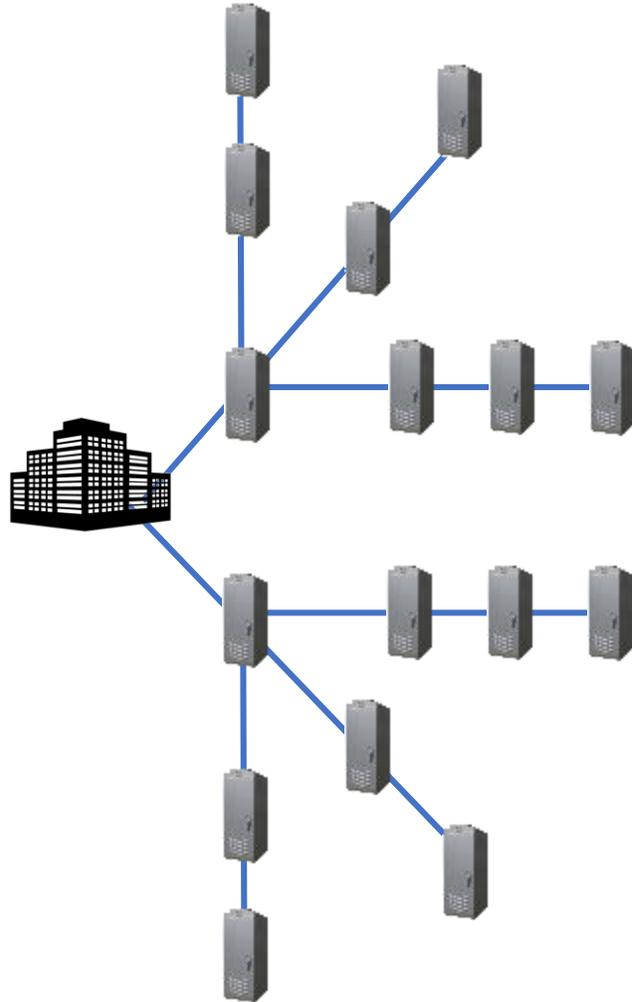
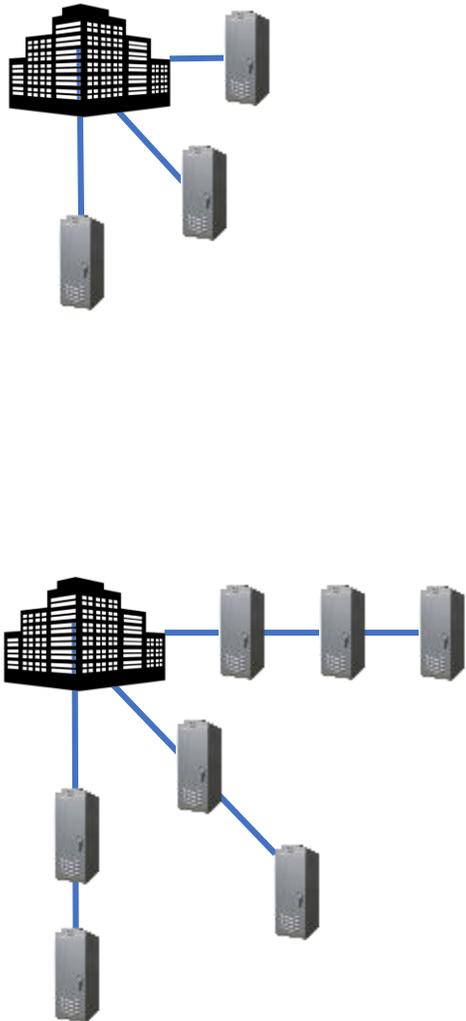


# Communication in the cabinet

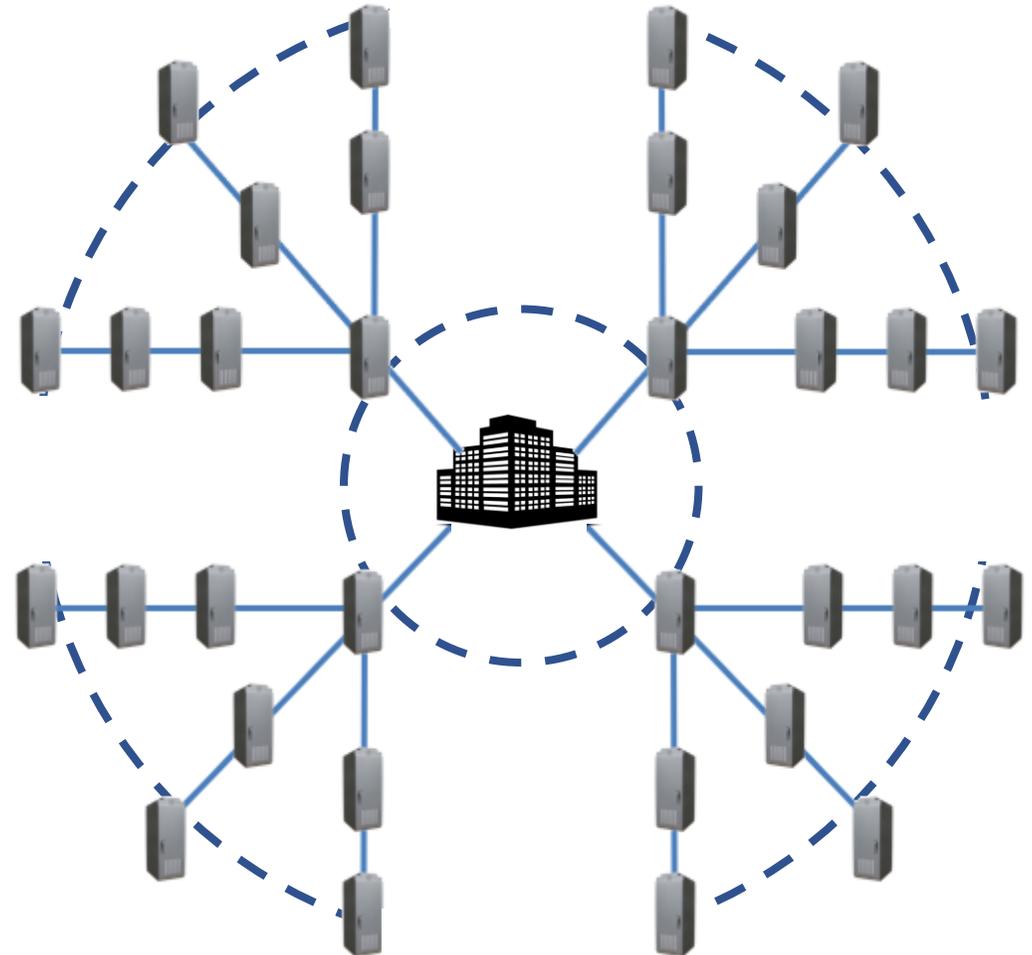


# Topologies

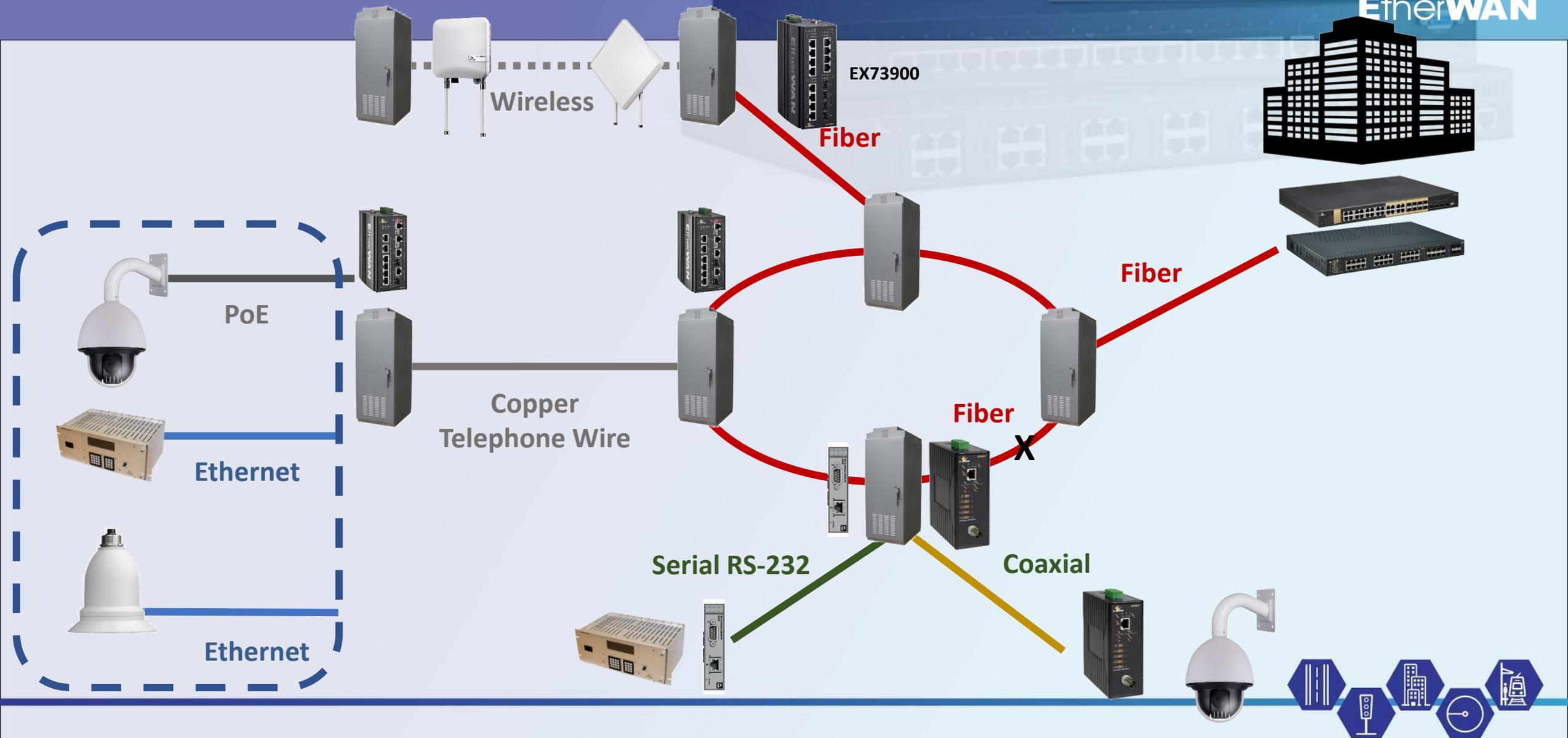
LESS COMPLEX



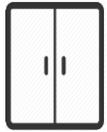
MORE COMPLEX



# Technology Convergence



# ITS Network Security



## PHYSICAL

- How can you tell when the cabinet is opened?

*DI available for sensor monitoring  
Light Detection  
Door Interlock Sensors  
Internal Camera*



## PORTS

- Are unused ports disabled?
- Using Authentication?

*Disable any unused ports.  
If you need an engineering port set it and secure it (Network Access Authentication – 802.1x)*



## DOCUMENTATION

- Are your designs secured?
- Do you use the same passwords?
- Is all the data documented?

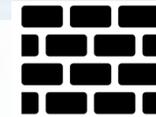
*Identify document owners  
Change default passwords or change over time*



## SENSORS

- Are the sensors actually getting the right data?
- Is hardened switch performing correctly?

*Focus on safety and validation of sensor data.*



## NETWORK

- Are the following implemented?:  
VLANs, VPNs,  
Firewalls, IDS/IPS

*VLAN – Virtual Area Network  
VPN – Virtual Private Networks  
Firewall – Allow specific devices/data in or out  
IDS/IPS – Intrusion Detection/Intrusion Prevention*



# ITS Network Security

## Legacy ITS

- GPS
- Serial
- VDSL
- Low FPS Camera

## More Intelligent ITS

- Remote Management and Monitoring
- Integrated Agency Communication
- Network Vulnerabilities
- Capacity (Increased in data demand)
  - IP Cameras
  - Adaptive
  - Connected Vehicles
- Interdepartmental Integration



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TEREX

TEREX

How do we get there?

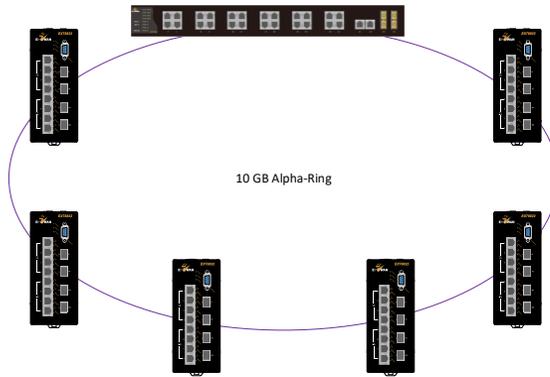
CSC

1-800-232-0043

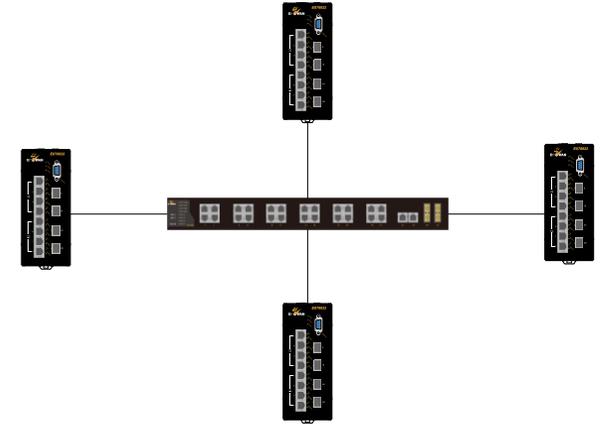
# Topologies



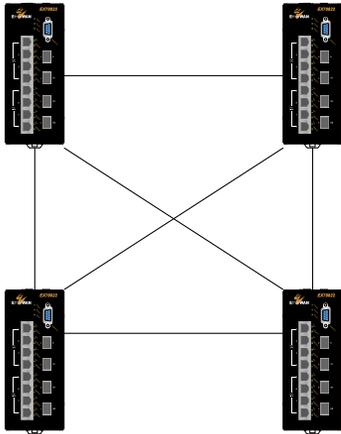
Bus



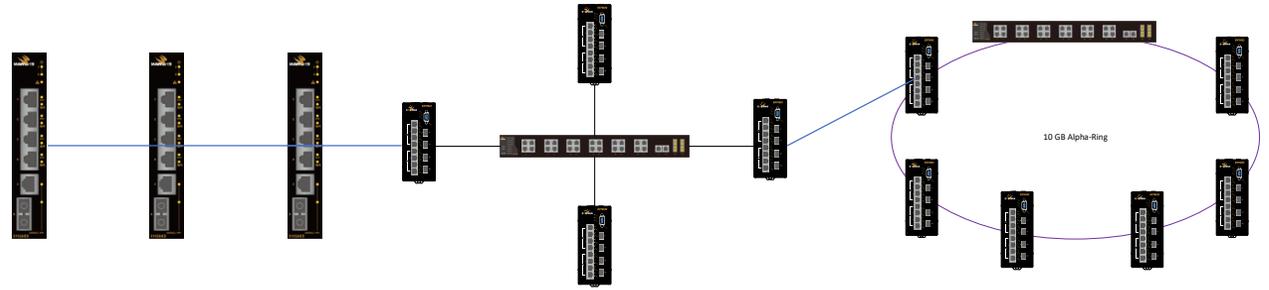
Ring



Star



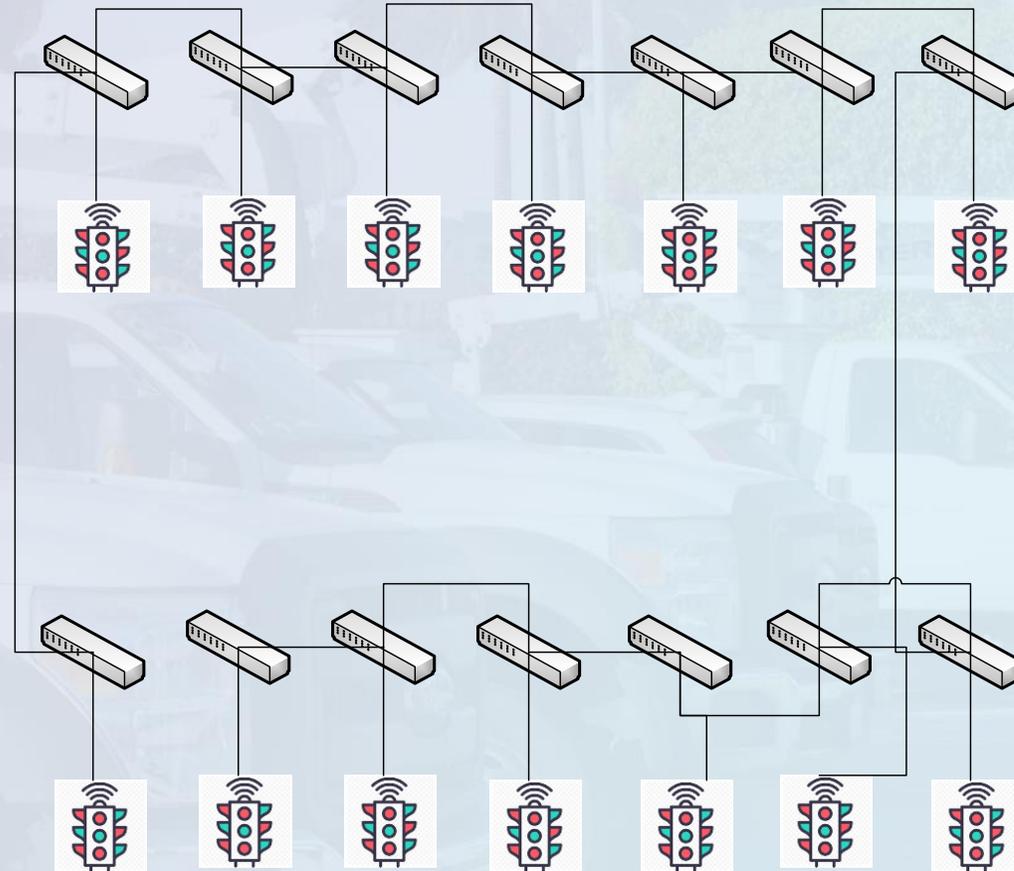
Mesh



Hybrid

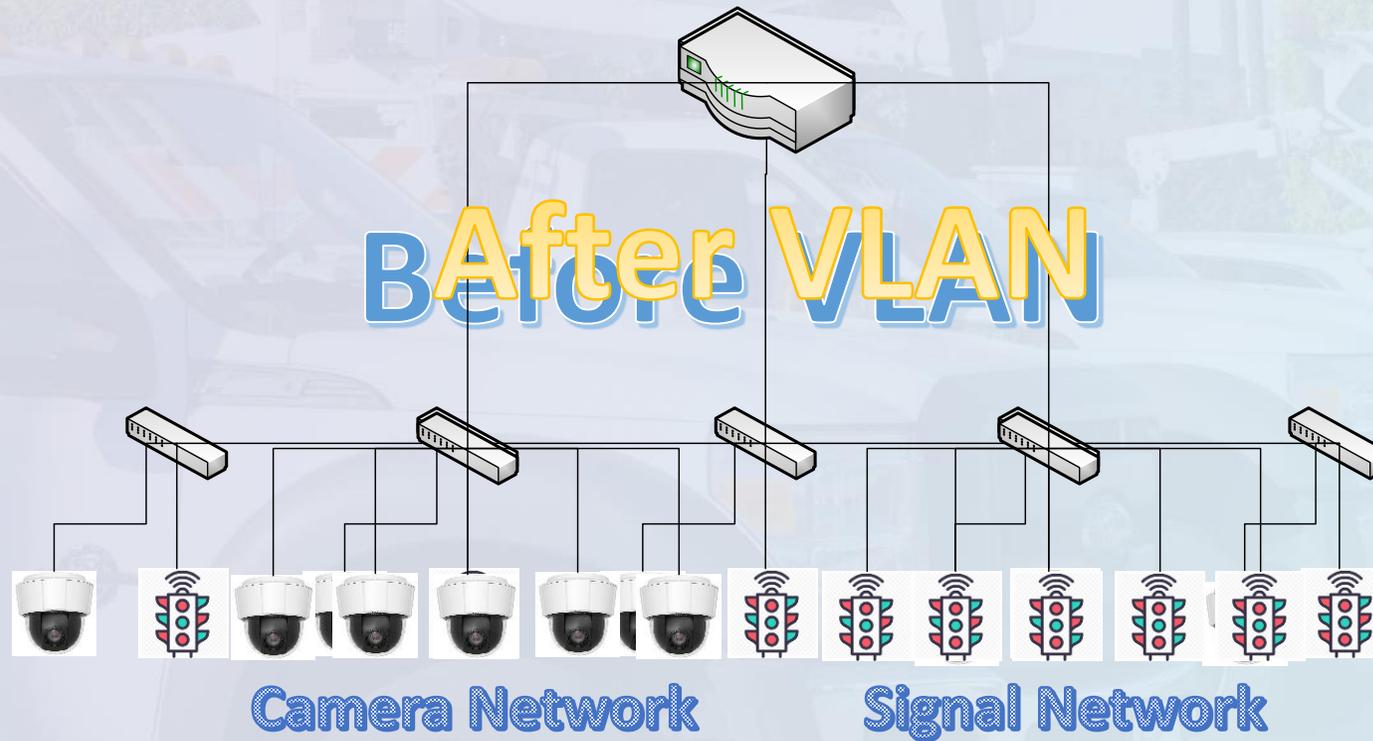
# Flat Networks

- Small (<100 devices)
- **No plan to grow larger**
- Limited or no Video



# Growth – VLANs

- VLANs - >100 Devices and growing
- Video at intersections



# Growth - Quadrants

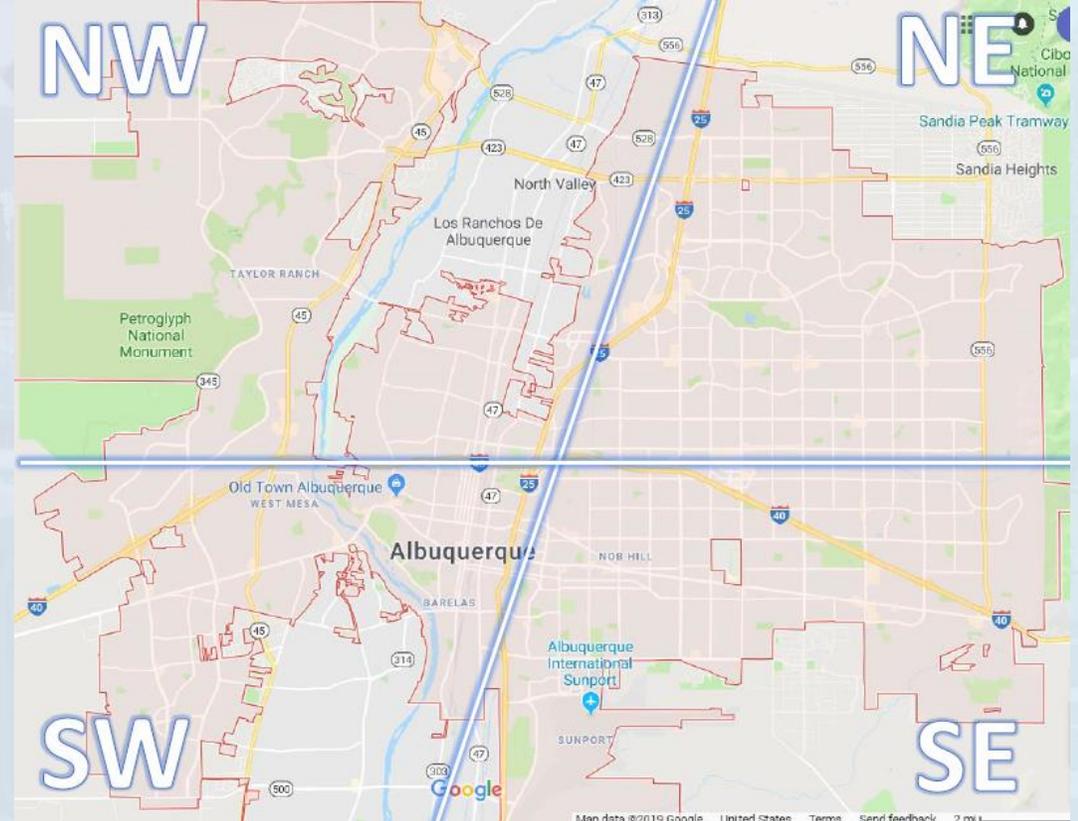
Northwest  
Quadrant

Northeast  
Quadrant

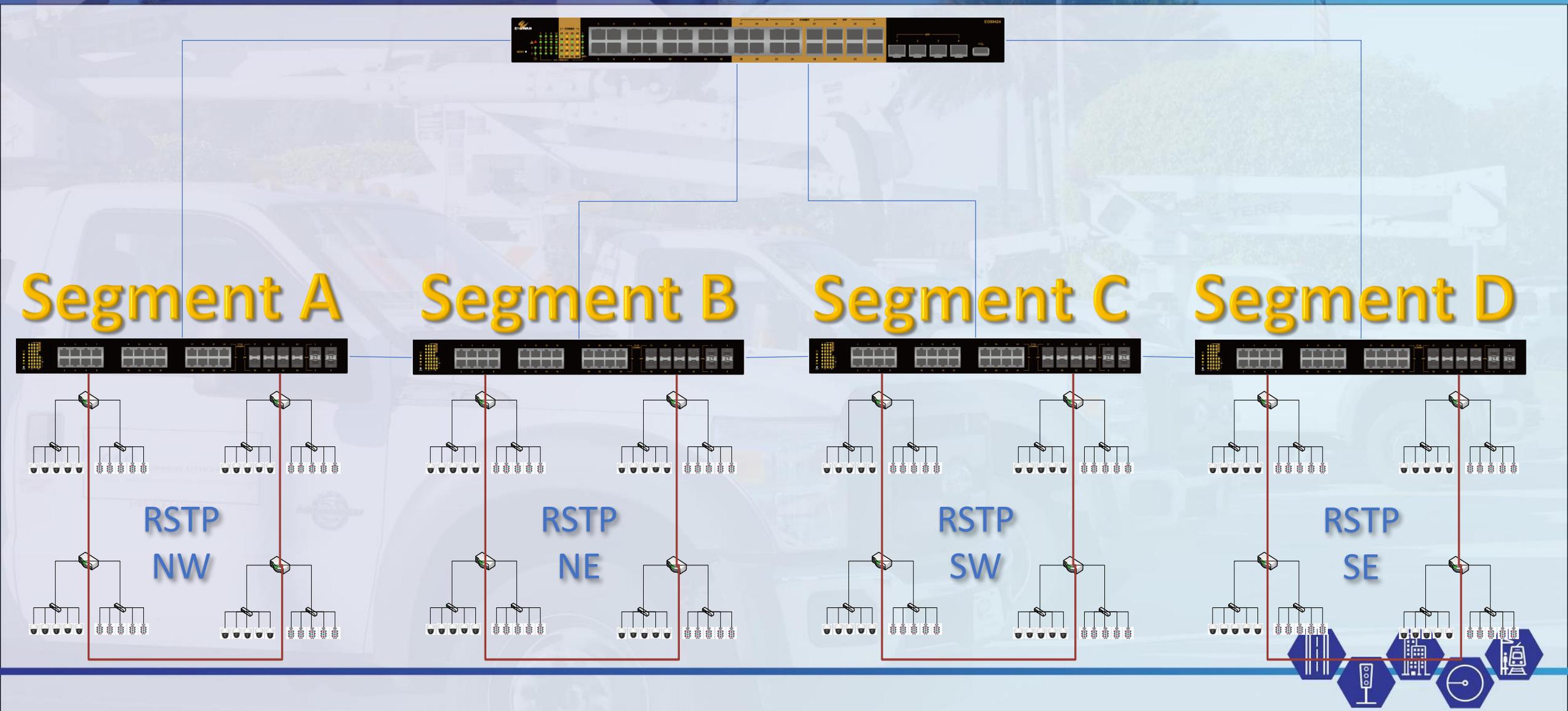
Southwest  
Quadrant

Southeast  
Quadrant

RSTP\*



# Growth - Segmentation





**EtherWAN**

**The ITS NETWORK YOUR CITY NEEDS  
FOR TODAY AND TOMORROW**