Your Trusted Partner in Automation

Moxa is a leading provider of edge connectivity, industrial computing, and network infrastructure solutions for enabling connectivity for the Industrial Internet of Things. With over 30 years of industry experience, Moxa has connected more than 50 million devices worldwide and has a distribution and service network that reaches customers in more than 70 countries. Moxa delivers lasting business value by empowering industry with reliable networks and sincere service for industrial communications infrastructures.

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MOXA®
Reliable Networks ▲ Sincere Service

Integrated Network Solutions for Intelligent Transportation

MOXA®
Reliable Networks ▲ Sincere Service

Real-Time Convergence for Non-Stop Safety

Roadway safety and efficiency depend on real-time information and communication more than ever. To increase traffic flow, reduce congestion, and improve incident response times, Moxa provides Intelligent Transportation System (ITS) solutions that collect and transmit real-time information about traffic conditions to traffic management centers and motorists.

From roads to tunnels to bridges, intelligent transportation systems rely on a myriad of data about traffic flow, speed, and density, as well as weather conditions, and surveillance video. Moxa's industrial Ethernet solutions facilitate real-time convergence of various sensor data, voice, and video by providing high-speed throughputs and a wide range of network interfaces, such as Ethernet, WLAN, serial, PoE, DSL, and various video compressions.

The comprehensive solutions employ a wide array of Ethernet connectivity, I/O data acquisition, and embedded computers. All solution ingredients address the need for extreme reliability, smart redundancy, easy manageability, and a lower total cost of ownership.

▶ High-Bandwidth

To support the constant increase in traffic, many transportation authorities leverage information networks to improve road utilization, safety, and efficiency.

Moxa solutions offer high-bandwidth wired, wireless, and secure connectivity to support flexible expansion, real-time convergence, and fast growing data services, especially for demanding HD video surveillance applications.

Moxa's industrial networking solutions offer a robust combination of voice, video, and data in up to 10GbE and 1GbE speeds, as well as Turbo Chain topology that allows flexible expansion and guarantees fast Ethernet recovery under 20 ms* to prevent connection failures. Rich media alternatives, including coaxial, fiber optic, twisted-pair, and DSL cabling, help customers formulate optimal performance while reducing deployment cost.

**Note: 10G/1G Ethernet recovery time < 50 ms*

Features

- 1GbE/10GbE switching and routing
- Up to 300 Mbps wireless transmission
- Up to 500 Mbps router throughput
- Up to 150 Mbps VPN traffic

Benefits

- High density 1GbE/10GbE capability
- Millisecond-scale resilience
- Versatile I/O solutions
- User-friendly management suite
- Industrial-grade reliability

Expert applications

- ATMS (Advanced Transportation Management Systems)
- ETC (Electronic Toll Collection)
- Tunnels
- E-Bus and Tramways

▶ Extreme Reliability

Intelligent highway systems need to perform long distance communication under extreme weather and environmental conditions. With over 30 years of experience in hardened networks, Moxa brings seamless redundancy and extreme reliability to intelligent transportation networks around the world.

For seamless operation in harsh outdoor environments, Moxa's transportation networking devices provide superior network reliability with high levels of EMI shielding and an extreme operating temperature range from -40 to 75°C without relying on a fan or heater.

All Moxa managed switches ensure non-stop availability with dual power supplies and innovative Turbo Ring and Turbo Chain technologies, both of which enable fast Ethernet recovery of less than 20 ms* at a full load of 250 switches. Wireless connections are reinforced with concurrent dual-radio transmissions and Turbo Roaming technology for millisecond-scale handovers. System integrators can be assured of non-stop continuity and low-cost maintenance for smart ITS deployment in challenging roadway conditions.

**Note: 10G/1G Ethernet recovery time < 50 ms*

▶ Ease and Efficiency

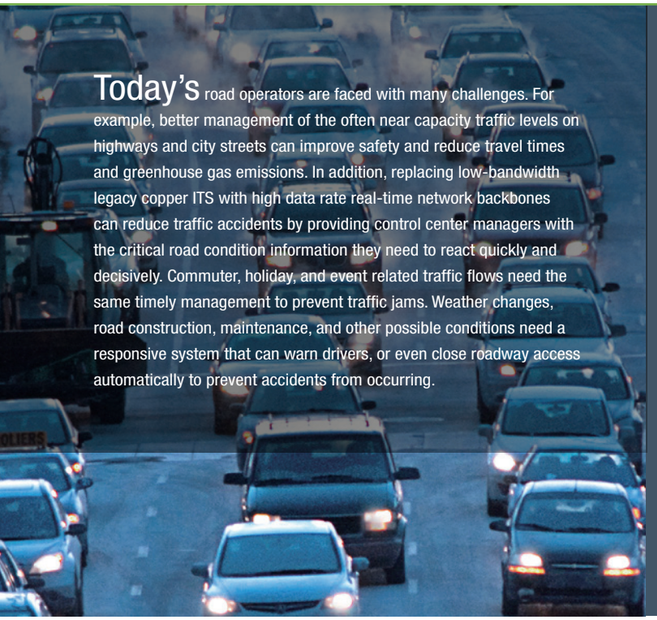
Moxa's ITS solutions offer highly versatile and collaborative capabilities to control and monitor traffic conditions, including road signs and signals, video surveillance, weather and air condition measurements, IP surveillance, fire detection, and emergency systems.

To meet dynamic transportation network requirements, Moxa facilitates layer-by-layer, edge-to-core strategic deployment to make the network infrastructure easy, fast, and flexible to deploy and upgrade.

Moreover, Moxa offers MXstudio, a suite of industrial network management software that provides easy and fast operations from installation to monitoring to maintenance to failure diagnostics. Non-IT staff can read the edge-to-core network status and traceable event history of all connected SNMP devices and physically wired links quickly and easily.

▶ Comprehensive Coverage of Industrial Networking Solutions

Industrial Ethernet					Industrial Wireless		Serial Connectivity	Remote I/O	Industrial Computing
									
Industrial Ethernet Switches	Industrial DSL Extenders	Ethernet Fieldbus Gateways	Industrial VPN Secure Routers	MXstudio Industrial Network Management Suite (includes MXconfig, MXview, and N-Snap)	Industrial Wireless AP/Bridge/Client	Industrial LTE Cellular Gateways	Serial-to-Ethernet Device Servers	Smart Remote I/O with Click&Go Plus	Embedded Computers



Today's road operators are faced with many challenges. For example, better management of the often near capacity traffic levels on highways and city streets can improve safety and reduce travel times and greenhouse gas emissions. In addition, replacing low-bandwidth legacy copper ITS with high data rate real-time network backbones can reduce traffic accidents by providing control center managers with the critical road condition information they need to react quickly and decisively. Commuter, holiday, and event related traffic flows need the same timely management to prevent traffic jams. Weather changes, road construction, maintenance, and other possible conditions need a responsive system that can warn drivers, or even close roadway access automatically to prevent accidents from occurring.

Advanced Transportation Management Systems

Network Requirements

Reliable, High Capacity Hierarchical IP Network

An ATMS needs a multi-layered network to interconnect the large number of monitoring nodes that deliver traffic and road condition data and signaling information to and from centralized controllers. Top layer full-Gigabit Ethernet switches can be used to aggregate multiple lower level 10/100 Fast Ethernet switches housed in wayside cabinets onto high capacity SDH or 10G links. The entire network needs to be resilient and redundant enough to ensure that data gets transmitted even when faced with network failures or unanticipated data bursts that exceed the network's capacity. Furthermore, the entire network needs to be easily managed and serviced using a straightforward management platform that can be remotely operated from a central control location.

Efficient Video Surveillance System

Traffic engineers need access to a reliable video feed to see current traffic levels, road incidents, and weather hazards. The video stream should use optimal video compression for efficient transmission over high capacity Gigabit Ethernet networks, with features such as IGMP snooping and multicast filtering.

Real-Time Advanced Traffic Management System

Central controllers digest data from sensors monitoring current traffic and road conditions to operate variable message signs, roadway access controllers, traffic lights, and the dispatch of emergency vehicles. Advanced sensors that actively respond to pre-defined events can be used to update variable message signs in real time to warn drivers of accidents, treacherous weather conditions, and heavy traffic, resulting in safer driving conditions and more efficient and comfortable travel. Over-utilization of roadways can be prevented using controlled roadway access, which can also prevent the accidents that often accompany stop-and-go traffic.

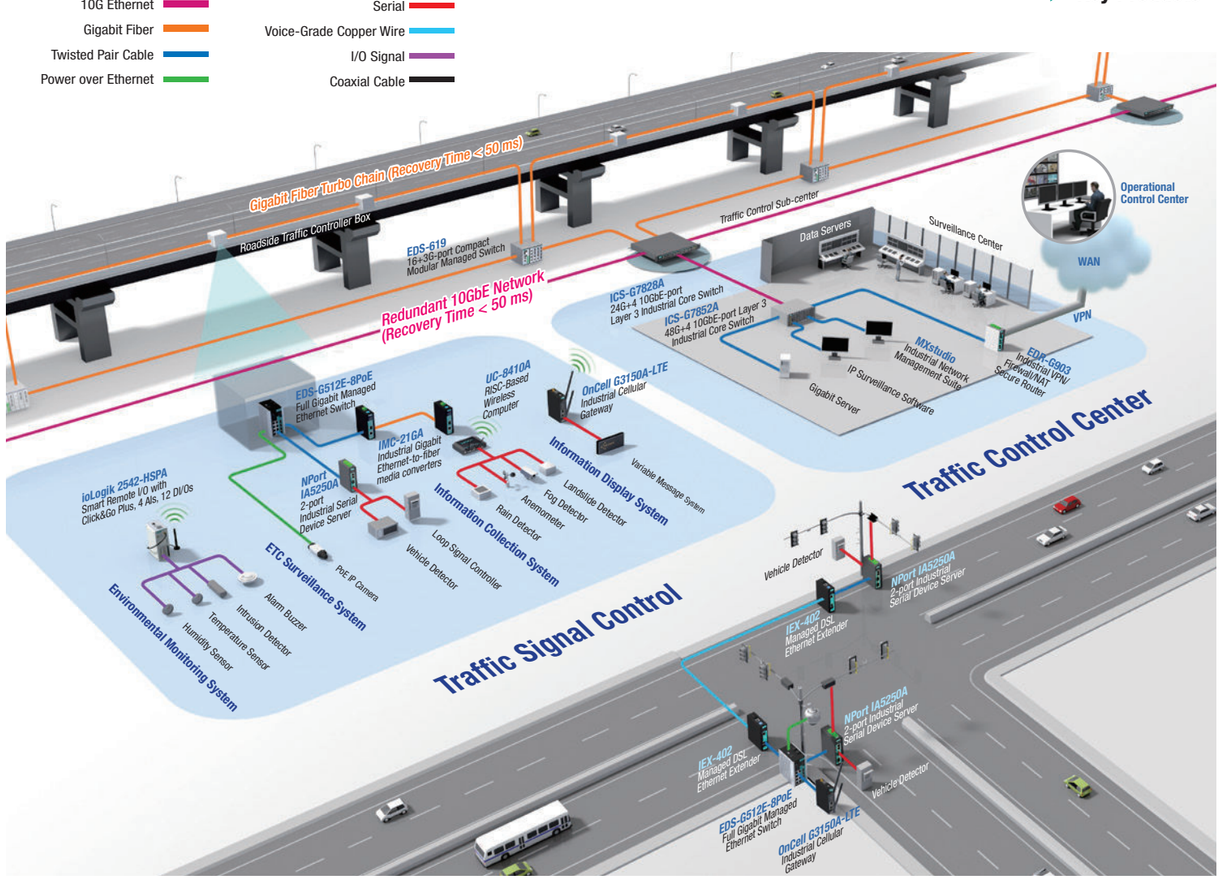
Reliable and Secure Control and Monitoring of City Traffic

Traffic controllers and network cameras in any city or street intersection must be rugged enough for wide temperature environments to provide constant remote traffic flow information for automated traffic signal control. Network encryption and authentication over public wired and wireless networks are essential to protect information access and provide asset security against cyber-attacks.

Moxa Solutions

- **Comprehensive portfolio, including wired and wireless devices, remote I/Os, and serial-to-Ethernet devices**
- **Up to 1GbE/10GbE speed edge-to-core industrial switches**
- **Redundant technologies: Turbo Ring and Turbo Chain (recovery time < 20 ms*), GuaranLink (wireless)**
- **Easy-to-use, complete software: MXstudio network management suite, and open OS platforms**
- **High speed firewall and VPNs for uncompromised cybersecurity**
- **Rugged operation in harsh, -40 to 75°C conditions**
- **Active OPC-enabled I/Os reduce the loading of networks and control centers**
- **Complete management and security features: Modbus/TCP, LLDP, QoS, VLAN, IGMP snooping, IEEE 802.1X, SSH, and more**

Note: 10G/1G Ethernet recovery time < 50 ms



Key Products



MXstudio

Industrial Network Management Suite

- All-in-one management suite, composed of MXconfig, MXview, and N-Snap
- 10-times faster configuration
- Smart visualized monitoring
- Easy backup and maintenance
- Quick diagnostics

ICS-G7852A

48G+4 10GbE-Port Layer 3 Industrial Core Switch

- Up to 52 SFP connections
- Turbo Ring, Turbo Chain, and RSTP/STP for Ethernet redundancy
- Two isolated redundant power supplies (110/220 VAC)
- Fanless, 0 to 60°C operating temperature
- Hot-swappable media modules for continuous operation

IKS-G6824A

24G-port Layer 3 Full Gigabit Managed Ethernet Switches

- Layer 3 routing interconnects multiple LAN segments
- 24 Gigabit Ethernet ports
- Up to 24 optical fiber connections (SFP slots)
- Fanless, -40 to 75°C operating temperature range (T models)

EDS-611/619

8+3G/16+3G-Port Compact Modular Managed Switches

- Up to 3 Gigabit ports for Gigabit redundant ring and uplink and up to 19 fiber connections
- Modular form factor supports multiple fiber connections
- Hot-swappable media modules for continuous operation

EDR-810/G903

Industrial VPN Secure Router

- All-in-one Firewall/NAT/VPN/Router capability
- Multiport secure router with switch functions (EDR-810)
- Dual WAN redundancy (EDR-G903)
- Up to 500 Mbps router throughput and 150 Mbps VPN traffic (EDR-G903)
- Built-in PacketGuard™ for Modbus TCP packet inspection


EDS-P506E-4PoE

4+2G-port Gigabit PoE+ managed Ethernet switches with 4 PoE+ ports

- Up to 60 W output per PoE+ port
- PoE diagnostics for powered device mode analysis
- 2 Gigabit combo ports for high-bandwidth and long-distance communication
- 4 kV LAN surge protection for extreme outdoor environments

EDS-G512E-8PoE

8-Port PoE+ Full Gigabit Managed Switch

- Built-in 8 PoE+ full Gigabit ports compliant with IEEE 802.3af/at standards
- Up to 36 W output per PoE+ port
- 3 kV LAN surge protection for extreme outdoor environments
- PoE diagnostics for powered device mode analysis

UC-8410A

RISC-Based Wireless Computer

- ARMv7 Cortex-A7 dual-core 1 GHz processor
- Wireless-enabled with PCIe mini slot
- 4 digital input channels and 4 digital output channels
- -40 to 75°C wide operating temperature range

ioLogik 2542-HSPA

Smart Remote I/O with Click&Go Plus, 4 AIs, 12 DI/Os

- Supports SNMPv1/v2c/v3 and SNMP Traps
- Front-end intelligence with Click&Go Plus control logic, up to 48 rules
- Active communication with MX-AOPC UA Server
- I/O expansion port for daisy chaining up to 8 ioLogik E1200 units

NPort IA5000A

1, 2, and 4-Port Industrial Serial Device Servers

- Enhanced surge protection for serial, LAN, and power
- 2 kV isolation for serial signals
- Rugged screw-type terminal blocks for power and serial connectors
- -40 to 75°C operating temperature range (T models)
- Relay output or email alert notifications


IEX-402

Managed DSL Ethernet Extender

- G.SHDSL/VDSL2 standards
- Up to 8 km @ 15.3 Mbps (G.SHDSL); Up to 3 km @ 100 Mbps (VDSL2)
- Auto CO/CPE negotiation for zero configuration
- LFP for quick failure recovery
- Web UI and LED indicators

IMC-21GA

Industrial Gigabit Ethernet-to-Fiber Media Converters

- Supports 1000Base-SX/LX through a SC connector or SFP slot
- Link Fault Pass-through (LFP)
- Redundant power input
- -40 to 75°C operating temperature range (T models)
- Supports Energy Efficient Ethernet (IEEE 802.3az)

OnCell G3150A-LTE

Industrial LTE Cellular Gateway

- Dual-SIM GuaranLink for reliable cellular connectivity
- VPN secure connection capability with IPSec, GRE, and OpenVPN protocols
- Power isolation design for device protection against harmful electrical interference
- Rugged hardware design for hazardous locations (ATEX Zone 2/ IECEx)

Intelligent transportation solutions for tunnels require an integrated solution with total reliability. Tunnels not only require management of vehicle traffic, but also control of multiple infrastructure systems. For very long tunnels, this means an integrated system that can control ventilation, road and signage lighting, fire detection and alarms, redundant power systems, air quality measurements, water drainage systems, and emergency communications such as emergency telephones. To meet tunnel safety requirements, an operator needs to both monitor and control traffic. The operator must be able to detect tunnel incidents immediately to minimize risk and to determine if vehicles must be prevented from entering danger zones, or to clear traffic from the tunnel as quickly as possible.

Intelligent Tunnels

Network Requirements

High Resiliency and Responsiveness

Since tunnel safety is top priority, an operator needs rugged network switches that can provide resiliency and redundancy, such as those using Turbo Ring redundancy with less than 20 ms* recovery from faults. In addition, control centers need all tunnel sensor data to be delivered with a minimum delay so that action can be taken as soon as adverse tunnel conditions arise.

**Note: 10G/1G Ethernet recovery time < 50 ms*

Centralized Traffic Gate Control

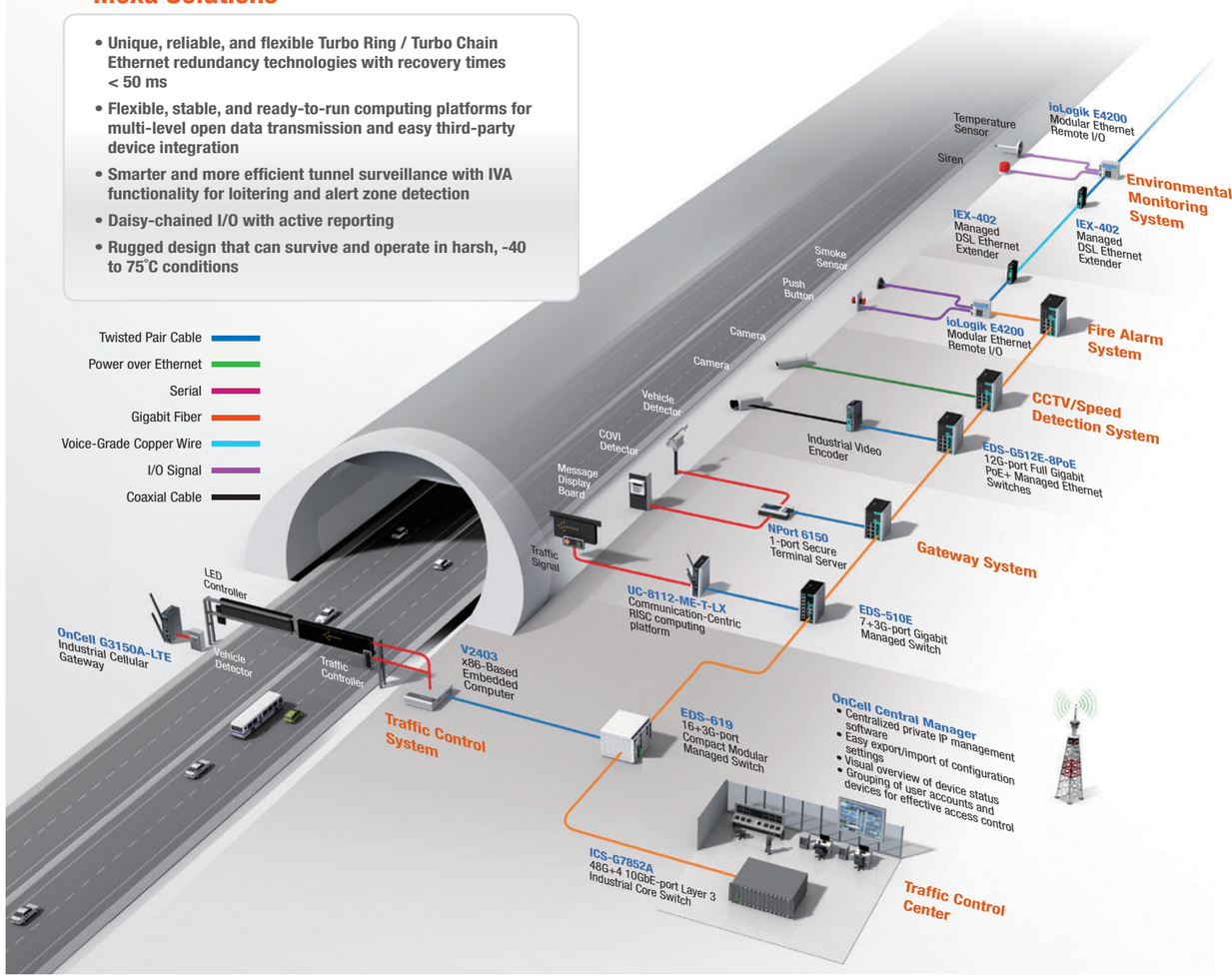
Depending on the length of the tunnel, gateways need to be deployed at tunnel entrances and predefined locations inside the tunnel. The gateway controllers need access to robust serial-to-Ethernet devices to provide connectivity to the tunnel control center to automatically or manually lower and raise traffic access gates for both safety and incident management.

Highly Reliable Alarm System

The atmosphere inside a tunnel must be continuously monitored, not only to raise alarms when needed, but also to control the tunnel's automatic ventilation system. In addition, although tunnel fires may be rare, when they do occur it should be possible to detect them immediately so that vehicles and passengers can be evacuated from the tunnel as quickly as possible. Devices need reliable and uninterrupted access to the tunnel's data communication system, and separate I/O control functionality should be provided to operate devices remotely.

Moxa Solutions

- **Unique, reliable, and flexible Turbo Ring / Turbo Chain Ethernet redundancy technologies with recovery times < 50 ms**
- **Flexible, stable, and ready-to-run computing platforms for multi-level open data transmission and easy third-party device integration**
- **Smarter and more efficient tunnel surveillance with IVA functionality for loitering and alert zone detection**
- **Daisy-chained I/O with active reporting**
- **Rugged design that can survive and operate in harsh, -40 to 75°C conditions**



Key Products

V2403

x86-Based Celeron/Core Embedded Computer

- -40 to 70°C (system+LTE) operating temperature
- Variety of interfaces: 4 serial ports, 2 Ethernet LAN ports, 4 DIs, 4 DOs, USB, HDMI, wireless
- Triple mini-PCIe sockets for storage and wireless modules; supports mSATA, Wi-Fi, 3G, LTE, GPS, and Bluetooth

UC-8112-ME-T-LX

Communication-Centric RISC Computing Platform

- TI AM3352 1Ghz processor
- Dual auto-sensing 10/100 Mbps Ethernet port
- Industrial grade fanless design
- -40 to 70°C wide operating temperature with LTE

EDS-619

16+3G-Port Compact Modular Managed Switch

- Up to 3 Gigabit ports for Gigabit redundant ring and uplink and up to 19 fiber connections
- Hot-swappable media modules for continuous operation
- Complete management and security features: Turbo Ring, Turbo Chain, Modbus/TCP, LLDP, QoS, VLAN, IGMP snooping, IEEE 802.1X, SSH, and more
- -40 to 75°C operating temperature range

EDS-510E

7+3G-Port Gigabit Managed Switch

- 3 Gigabit Ethernet ports for redundant ring or uplink solutions
- Gigabit fiber Turbo Ring and Turbo Chain (recovery time < 20 ms), and RSTP/STP
- Long-distance fiber transmission up to 120 km
- -40 to 75° operating temperature range

EDS-G512E-8PoE

12G-port Full Gigabit PoE+ Managed Ethernet Switches

- 8 IEEE 802.3af and IEEE 802.3at PoE+ standard ports
- 36-watt output per PoE+ port in high-power mode
- Intelligent PoE power management functions
- Operate with 240 watts full PoE+ loading at -40 to 75°C
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches), RSTP/STP, and MSTP for network redundancy

NPort 6000

1 to 32-port RS-232/422/485 Secure Terminal Servers

- Secure operation modes
- Supports IPv6
- Port buffers for storing serial data when the Ethernet is offline
- -40 to 75°C operating temperature range (T models)

ioLogik E4200

Modular Ethernet Remote I/O

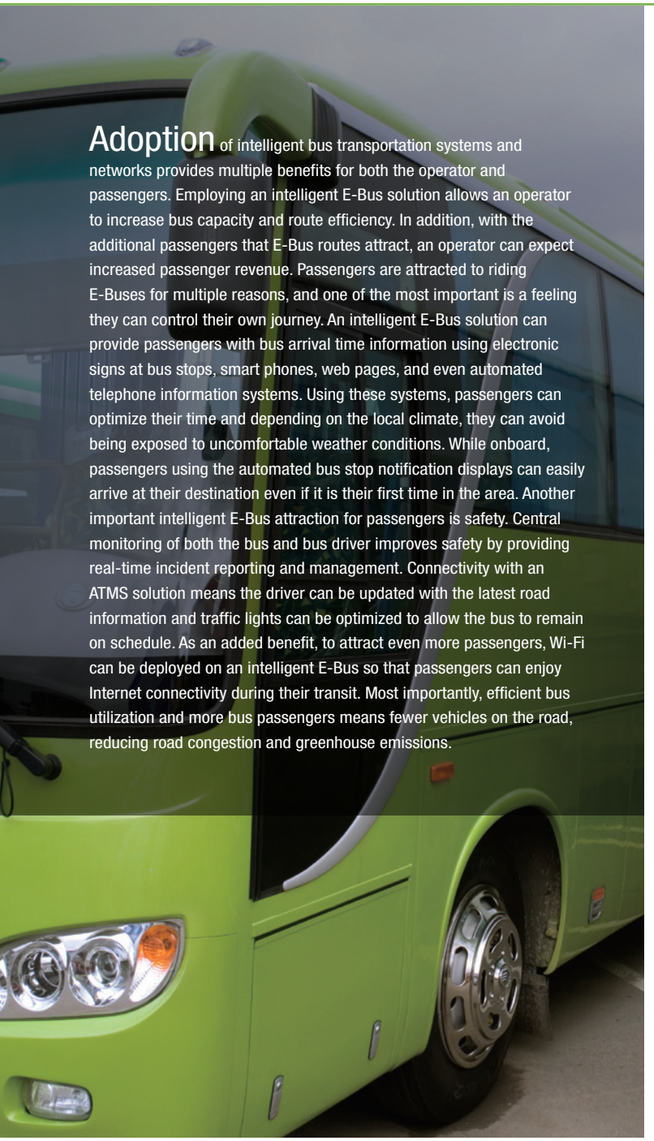
- Supports SNMPv1/v2c protocol and SNMP Traps
- Front-end intelligence with patented Click&Go control logic, up to 80 rules
- Active communication with patented Active OPC Server
- Up to 16 expansion modules without needing a backplane

IEX-402/IEX-408E

Managed DSL Ethernet Extender

- Up to 15.3 Mbps data rates at distances of up to 8 km (G.SHDSL); up to 100 Mbps at distances of up to 3 km (VDSL2)*
- Automatic CO/CPE negotiation
- LFP for quick failure recovery
- Web UI and LED indicators

** IEX-408E only supports VDSL2*



Adoption of intelligent bus transportation systems and networks provides multiple benefits for both the operator and passengers. Employing an intelligent E-Bus solution allows an operator to increase bus capacity and route efficiency. In addition, with the additional passengers that E-Bus routes attract, an operator can expect increased passenger revenue. Passengers are attracted to riding E-Buses for multiple reasons, and one of the most important is a feeling they can control their own journey. An intelligent E-Bus solution can provide passengers with bus arrival time information using electronic signs at bus stops, smart phones, web pages, and even automated telephone information systems. Using these systems, passengers can optimize their time and depending on the local climate, they can avoid being exposed to uncomfortable weather conditions. While onboard, passengers using the automated bus stop notification displays can easily arrive at their destination even if it is their first time in the area. Another important intelligent E-Bus attraction for passengers is safety. Central monitoring of both the bus and bus driver improves safety by providing real-time incident reporting and management. Connectivity with an ATMS solution means the driver can be updated with the latest road information and traffic lights can be optimized to allow the bus to remain on schedule. As an added benefit, to attract even more passengers, Wi-Fi can be deployed on an intelligent E-Bus so that passengers can enjoy Internet connectivity during their transit. Most importantly, efficient bus utilization and more bus passengers means fewer vehicles on the road, reducing road congestion and greenhouse emissions.

Intelligent E-Bus

Network Requirements

Shock and Vibration Resistant

All nodes in an intelligent E-Bus, including embedded controllers, switches, and I/O devices, must be able to withstand the constant vibration and occasional heavy shocks that inevitably occur. The nodes should be reliable enough to continue providing surveillance and data communication despite being continually exposed to mechanical stresses.

Rugged Embedded Computers

ITS applications require self-contained embedded computers that can stand up to all types of harsh weather conditions. Despite being exposed to wide temperatures and wet humid conditions, the computers need to provide constant control of the surveillance nodes and continual output for information display panels.

Reliable Mobile Connectivity

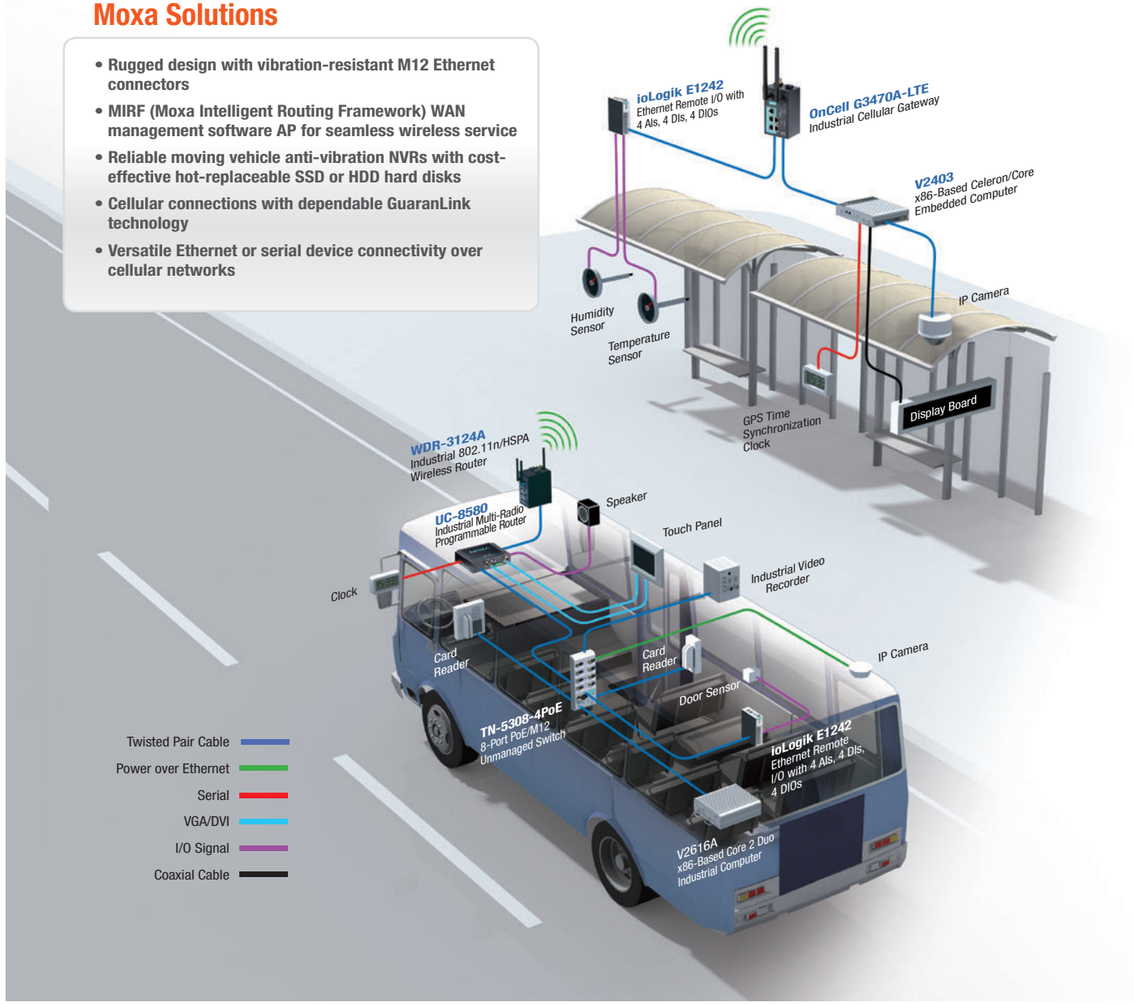
Providing network communication to and from moving intelligent E-Buses and multiple remote bus stops requires mobile connectivity. Cellular IP gateways need to provide reliable connectivity and be tough enough to withstand the rough environment of both buses and bus stops.

Integrating ATMS with Dispatch Systems, and Information Distribution Systems

The data produced by the surveillance and data communications equipment onboard an E-Bus must be compatible with the existing ATMS and bus dispatch systems so the systems can be integrated with the intelligent E-Bus solution. In addition, bus location data needs to be integrated with multiple information distribution systems to provide convenient passenger access.

Moxa Solutions

- Rugged design with vibration-resistant M12 Ethernet connectors
- MIRF (Moxa Intelligent Routing Framework) WAN management software AP for seamless wireless service
- Reliable moving vehicle anti-vibration NVRs with cost-effective hot-replaceable SSD or HDD hard disks
- Cellular connections with dependable GuaranLink technology
- Versatile Ethernet or serial device connectivity over cellular networks



Key Products

V2616A

x86-Based Core i5/i7 Embedded Computer

- High-performance network video recorder for rolling stock applications
- Compliant with EN 50121-4 and essential sections of EN 50155
- IEC 61373 certified for shock and vibration resistance
- Two hot-swappable storage trays for 2.5" SSDs or HDDs
- RAID 1 mirroring for full data redundancy

V2403

x86-Based Celeron/Core Embedded Computer

- -40 to 70°C (system+LTE) operating temperature
- Variety of interfaces: 4 serial ports, 2 Ethernet LAN ports, 4 DIs, 4 DOs, USB, HDMI, wireless
- Triple mini-PCIe sockets for storage and wireless modules; supports mSATA, Wi-Fi, 3G, LTE, GPS, and Bluetooth

UC-8580

Industrial Multi-Radio Programmable Router

- ARMv7 Cortex-A7 dual-core 1 GHz processor
- 4 PCIe mini slots (1 x PCIe and 3 x USB 2.0)
- Up to 8 SIMs
- Single-end access
- EN50155 Tx compliant
- Ignition supported for graceful shutdown

WDR-3124A

Industrial 802.11n/HSPA Wireless Router

- Universal GSM/GPRS/HSPA 2G/3G cellular communication
- 2.4 GHz/5 GHz 300 Mbps Wi-Fi communication
- Built-in high-speed 4-port Ethernet switch
- Industrial design with dual power inputs and built-in DI/DO support
- Dual cellular operator backup with dual-SIM GuaranLink Support
- Antenna and power isolation design for improved device protection against harmful electrical interference

OnCell G3470A-LTE

Industrial LTE Cellular Gateway

- Built-in 4-port Gigabit switch
- Dual-SIM and GuaranLink for reliable cellular connectivity
- Antenna and power isolation for device protection
- VPN, port forwarding, IP/MAC/Port filtering for secure routing

TN-5308-4/8PoE

8-Port M12/PoE Unmanaged Switch

- M12 connectors and IP40 metal housing
- 4/8 IEEE 802.3af compliant PoE and Ethernet combo ports
- Provides up to 15.4 watts at 48 VDC per PoE port
- EN 50155/50121-4 compliant
- -40 to 75°C operating temperature range

ioLogik E1242

Ethernet Remote I/O with 4 AIs, 4 DIs, 4 DIOs

- Supports SNMPv1/v2c, RESTful API
- User-definable Modbus/TCP Slave addressing
- Supports EtherNet/IP adapter mode
- 2-port Ethernet switch for daisy-chain topologies

Traditional toll plazas are costly to construct and incur labor costs from collection booth personnel, but more importantly, they have become traffic bottlenecks for many highway systems. Because of this, instead of renovating old toll plazas, many governments have chosen to construct intelligent ETC gantries to make toll collection more efficient, and keep highway congestion to a minimum for commuters and travelers.

ETC gantries make use of open road tolling (ORT) to allow travelers to pay tolls without stopping at toll booths. When a vehicle enters the toll road, sensors installed atop the gantry detect the transponder or GPS device already installed on the vehicle, and then use the vehicle's ID to debit their account. When a non-compliant vehicle enters the toll road, cameras mounted on the gantry send the license plate image of the offending vehicle to the control room for payment collection processing.

Electronic Toll Collection (ETC)

Network Requirements

High Bandwidth for Video/Data Transmission

With multiple vehicles entering the toll road every second at high speeds, network latency is unacceptable. Large amounts of traffic data from sophisticated gantry devices, such as cameras, scanners, and sensors, will require Gigabit transmission speeds across the ETC network backbone, especially for the transmission of high-resolution images from multiple cameras atop every gantry.

Wide-Temperature Operation

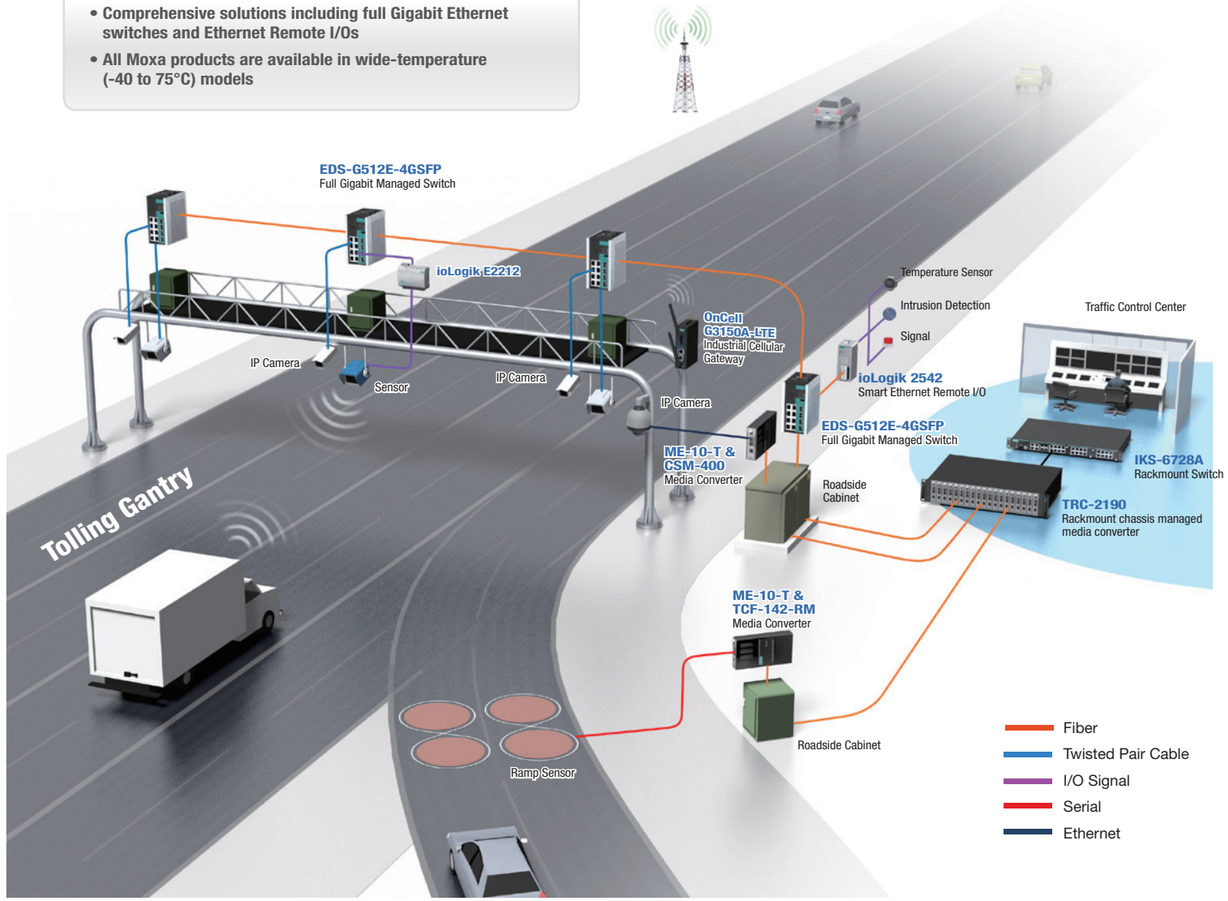
Network devices must have a wide operating temperature range to ensure network reliability. For outdoor applications, temperatures can dip well below freezing at night, and exceed 120°F (49°C) during the day. Temperatures can even reach extreme temperatures of over 140°F (60°C) inside roadside cabinets.

Compact Dimensions for Gantry Installation

Each lane of the highway requires a camera, sensor, scanner, and cabinet for ETC detection and traffic monitoring. Although cabinets have a limited amount of space, they must house a variety of ETC equipment and network devices. Network equipment housed in the cabinets must be compact, and should also be DIN-rail mountable.

Moxa Solutions

- Gigabit Ethernet for massive volumes of video data
- Fiber interface for long distance transmission
- Comprehensive solutions including full Gigabit Ethernet switches and Ethernet Remote I/Os
- All Moxa products are available in wide-temperature (-40 to 75°C) models



Key Products

EDS-G512E-4GSFP

12G-Port Full Gigabit Managed Ethernet Switches

- Superior Level 4 EMS protection against harsh environmental interference
- Supports Turbo Ring and Turbo Chain (recovery time < 50 ms @ 250 full-Gigabit switches), RSTP/STP, and MSTP for fast recovery
- -40 to 75°C operating temperature range

IKS-G6824A

24G-Port Layer 3 Full Gigabit Managed Ethernet Switches

- Layer 3 routing interconnects multiple LAN segments
- 24 Gigabit Ethernet ports
- Up to 24 optical fiber connections (SFP slots)
- Fanless, -40 to 75°C operating temperature range (T models)

OnCell G3150A-LTE

Industrial LTE Cellular Gateway

- Dual-SIM GuaranLink for reliable cellular connectivity
- VPN secure connection capability with IPSec, GRE, and OpenVPN protocols.
- Power isolation design for device protection against harmful electrical interference
- Rugged hardware design for hazardous locations (ATEX Zone 2/IECEx)

ioLogik E2212

Smart Ethernet Remote I/O with 8 DIs, 8 DOs, 4 DIOs

- Supports SNMPv1/v2c/v3 and SNMP Trap v1
- Front-end intelligence with Click&Go logic, up to 24 rules
- Active communication with MX-AOPC UA Server

ioLogik 2542

Smart Ethernet Remote I/O with Click&Go Logic

- Supports SNMPv1/v2c/v3 and SNMP Trap
- Front-end intelligence with Click&Go Plus control logic, up to 48 rules
- Active communication with MX-AOPC UA Server
- I/O expansion port for daisy chaining up to 8 ioLogik E1200 units
- Bulit-in Modbus Gateway for collecting data from serial devices

TRC-2190

18-Slot Rackmount Chassis Managed Media Converter

- Supports dual power input with redundancy
- Fanless chassis design reduces servicing costs
- SNMP/web console for easy management

ME-10-T

1-Slot Media Converter Chassis

- Dual power inputs for redundancy
- -40 to 75ºC wide operating temperature range models available for harsh environments
- Supports alarm relay contact

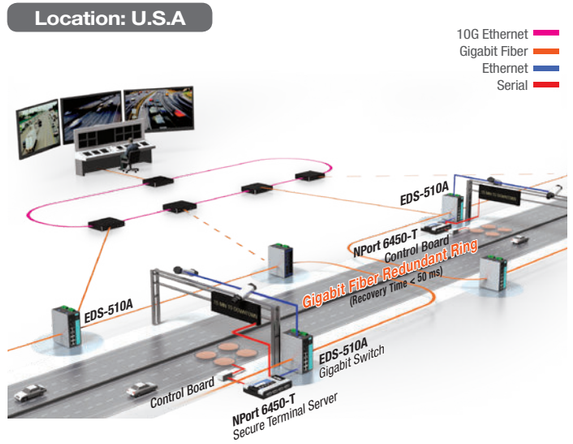
CSM-400/TCF-142-RM

Ethernet-to-Fiber/Serial-to-Fiber Slide-In Modules

- IP-based remote management (only for CSM-400)
- Supports WDM type modules (only for CSM-400)
- Ring and Point-to-Point transmission supported (only for TCF-142-RM)

Centralized Traffic Control over Fiber Gigabit Ethernet

Location: U.S.A



System Introduction

The third largest state-owned highway system in the United States is maintained by that state's DOT (Department of Transportation). The DOT planned to centralize traffic control and monitoring of highways (including roads, bridges, and tunnels) across the state's five central TMCs (traffic management centers). These TMCs serve as hubs for regional emergency response and incident management operations of traffic-related events. TMC operators will have access to real-time traffic information from DOT personnel, state police, emergency response agencies, cameras, sensors, and other tools to ensure traveler safety by notifying drivers of traffic conditions and emergency events via VMS (variable message sign) broadcasts and other public media.

Network Requirements

- Gigabit network backbone for large volumes of video data
- NEMA TS2 compliance for network components
- Network redundancy with secure data encryption
- Network traffic management for bandwidth efficiency

Why Moxa?

- Reliable Gigabit data transmission with recovery times < 50 ms (@ 250 switches)
- Secure connection for existing serial devices
- NEMA TS2 certified and -40 to 75°C operating temperatures

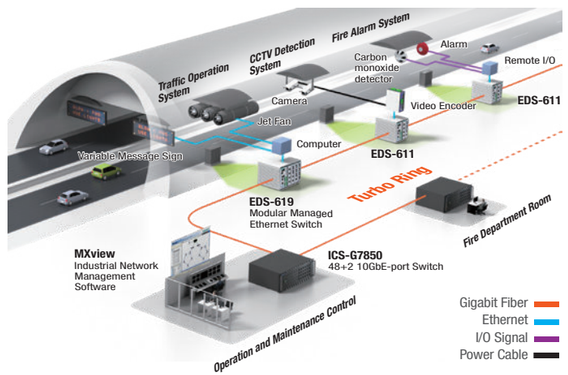
Key Products

EDS-510A-T
7+3G-Port Gigabit Managed Ethernet Switch

NPort 6450-T NEMA TS2
RS-232/422/485 Secure Terminal Server

10GbE Core Backbone for Critical Tunnel Traffic and Safety

Location: U.S.A



System Introduction

Caltrans (California Department of Transportation) planned to construct the fourth bore of the Caldecott Tunnel to relieve traffic congestion in the off-peak direction between Alameda and Contra Costa counties.

A robust communication infrastructure was planned for the Operation and Maintenance Control (OMC) center to support continuous traffic management and an emergency system composed of fire detectors, radio broadcast systems, video image detection (VID) cameras, jet fans, variable message signs, and emergency stations.

Network Requirements

- Superior bandwidth connectivity to ensure smooth video, messaging, and data transmission
- Self-healing redundancy to ensure non-stop updates and alerts
- Industrial-grade durability to withstand extreme conditions

Why Moxa?

- One-stop-shop solution makes network communication and management simple, reliable, and cost-effective
- The 10-gigabit core backbone enables real-time aggregation of massive video and data flows
- Sub-20 ms Ethernet resilience (@ 250 switch load) and wide temperature operation ensure excellent reliability

Key Products

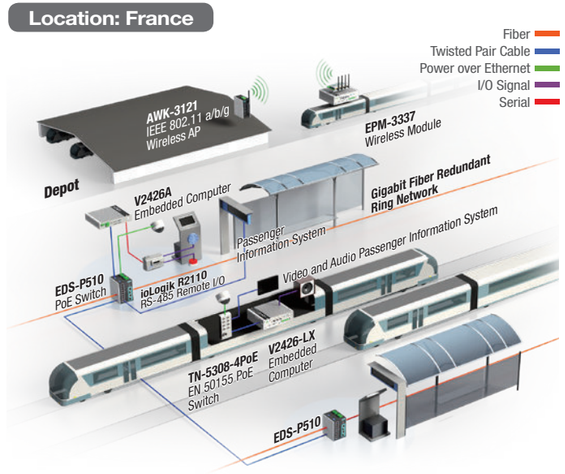
MXview
Industrial Network Management Software

ICS-G7850A
48G + 2 10GbE Modular Managed Ethernet Switches

EDS-611/619
8+3G/16+3G-Port Compact Modular Managed Switches

Tramway Integrates Ticketing and Onboard Systems over Fiber

Location: France



System Introduction

A major tramway linking northern and southern communities in a highly-populated region of France will cover 14.5 km and have 31 stations. To ensure that this transportation development project can be completed under budget, the tramway network infrastructure must be highly cost-effective and perform with industrial reliability, particularly since France has more than 20 tram networks country-wide.

Onboard passenger infotainment is delivered via audio speakers and display boards, and IP cameras are used to ensure smooth tramway operation. During maintenance, vehicles will connect with the depot via secure wireless access points, and for passenger convenience, tickets will be available at each tramway station through automated ticketing kiosks.

Network Requirements

- Long-distance data transmission between ticketing kiosks
- Redundant network connectivity to ensure system operations
- Industrial-grade durability to withstand onboard shock and vibration
- Cost-effective solution

Why Moxa?

- Turbo Ring and Turbo Chain technologies for Gigabit recovery times < 50 ms (@ 250 switches)
- Complete edge-to-core solutions for high interoperability
- EN 50155 certification for onboard applications

Key Products

TN-5308-4PoE
8-Port EN 50155 PoE Ethernet Switch

AWK-3121*
Industrial IEEE 802.11a/b/g Wireless AP/Bridge/Client

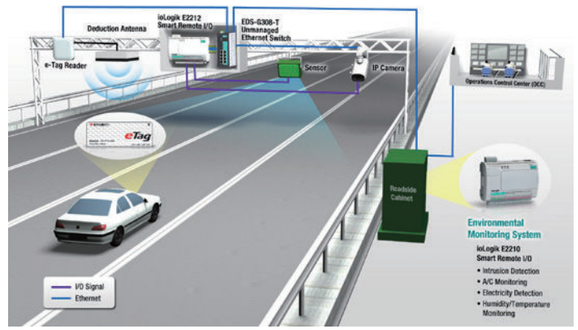
**The AWK-3121 has been phased-out and the replacement model is the AWK-1131A.*

V2426A
x86-Based Celeron/Core i7 EN50155 Embedded Computer

EDS-P510A-8PoE
8+2G-port Gigabit PoE+ Managed Ethernet Switches with 8 PoE+ ports

Enabling 99.99% Tolling Accuracy for the World's No. 1 ETC Network

Location: Taiwan



System Introduction

Commissioned by the Taiwan Area National Freeway Bureau (TANFB), FETC (Far Eastern Electronic Toll Collection Company) designed a nationwide electronic toll collection (ETC) system that allows freeway users to pay toll fees without stopping their vehicles at tollgates. The ETC system's scope included the development of an automated information system that collects distance-based toll charges and trip data within milliseconds of vehicles passing by, as well as to safeguard the roadside cabinets to ensure the integrity and accountability of vital data. Furthermore, to overcome the challenges presented across 325 gantries, the products need to be installed to work in changeable weather conditions without any support from a fan or heater.

Network Requirements

- A high-speed I/O scanning rate to capture pulse signals from laser sensors
- Broad bandwidth to transfer high volumes of data and images
- Weatherproof durability for 24/7 operation
- Easy integration with the back-end IT system
- Environmental monitoring of roadside units

Why Moxa?

- -40 to 75°C wide operating temperature range for 24/7 nonstop operation
- Fast I/O latency under 4 milliseconds for data accuracy and integrity
- Smart I/O devices for diverse environmental monitoring, including intrusion detection and sending alerts
- Gigabit data and image transmission for information efficiency
- IT-friendly SNMP communication for easy integration

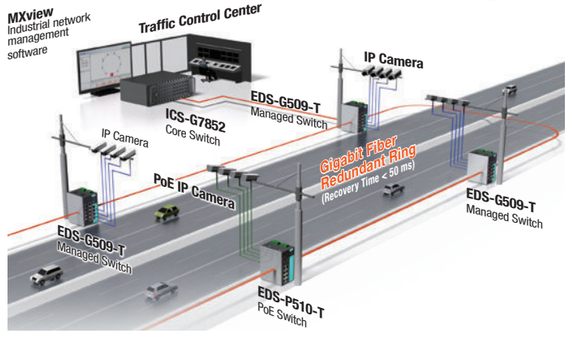
Key Products

ioLogik E2210
Smart Remote I/O with 12 DIs, 8 DOs

EDS-G308-T
8G-Port Full Gigabit Unmanaged Ethernet Switches

Highway Deployed HD IP Surveillance with Network Management

Location: China



▶ System Introduction

The "Safe City" program, launched nationwide in 2006, has triggered the installation of millions of surveillance cameras across China in over 600 cities. Surveillance systems are increasingly implementing high-definition IP cameras and many have also deployed PoE-based IP cameras to take advantage of their straightforward deployment, cost-effectiveness, and easy maintenance.

These high-definition IP cameras will provide real-time traffic information via fiber for traffic management teams at the central command center and will assist government agencies with vehicle tracking when needed.

▶ Network Requirements

- Gigabit fiber network backbone for large volumes of video transmissions
- Network redundancy with secure data encryption
- Intelligent network management software to monitor all network nodes
- Wide-temperature tolerance for outdoor operation
- Rugged and compact design for installation in roadside cabinets

▶ Why Moxa?

- Redundant Gigabit Turbo Ring technology for fast recovery times < 50 ms (@ 250 switches)
- Moxa's MXview industrial network management software can monitor up to 2,000 network nodes
- All Moxa products are available in -40 to 75°C wide operating temperature models

▶ Key Products

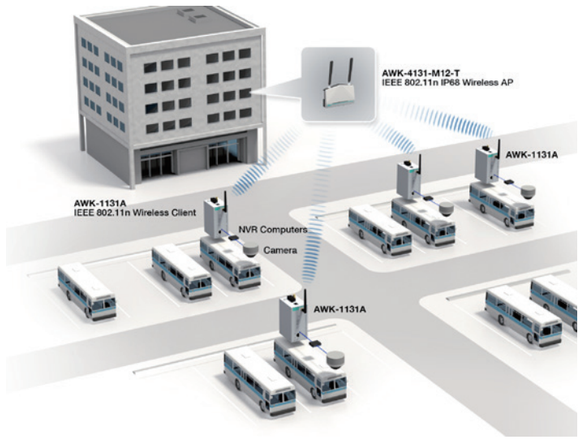
ICS-G7852A
10GbE-Port Layer 3 Full Gigabit Modular Ethernet Switch

EDS-G509-T
9G-Port Full Gigabit Managed Switch

MXview
Industrial Network Management Software

Video Transmission over IEEE 802.11n WLAN for Bus Surveillance

Location: U.S.A



▶ System Introduction

A transportation company in Hawaii serves thousands of travelers each day across over 100 routes with 50 buses. The administration wanted to implement an intelligent surveillance system to provide standard video recordings (300p) during normal operating conditions but also be able to capture high-definition (720p) video footage. The enhanced recording of the event will be stored on the bus until it can be extracted via a wireless connection when the vehicle returns to the depot. The file size for 20 minutes of 720p video is approximately 200 MB.

▶ Network Requirements

- Substantial bandwidth will be required to upload high-definition video via a wireless connection to the depot command center
- Wireless access points must work reliably when exposed to high humidity, constant downpours, and the rusting effects caused by salty sea water

▶ Why Moxa?

- IEEE 802.11n transmission with MIMO capabilities provides data rates of up to 300 Mbps to provide efficient transfer of 720p video footage from the bus to the control center
- IP68 rated (AWK-4131 only) for outdoor protection against severe rain, and corrosion-resistant connectors protect against the salty precipitation, reducing maintenance efforts

▶ Key Products

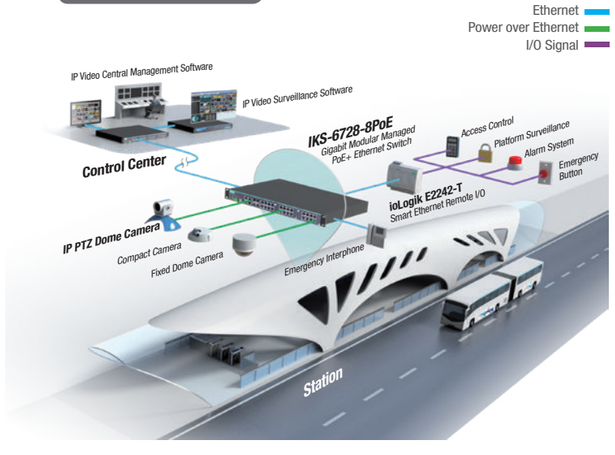
AWK-1131A
IEEE 802.11a/b/g/n WLAN AP/Client

AWK-4131*
IEEE 802.11a/b/g/n IP68 WLAN AP/Bridge/Client

**The AWK-4131 has been phased-out and the replacement model is the AWK-4131A.*

PoE-Wired Surveillance for City Bus Transportation

Location: Taiwan



▶ System Introduction

The city of Taichung, Taiwan, invested in six BRT lines that together cover the entire city, and a real-time control and monitoring system was essential to ensure safe and smooth operation for the entire BRT system. The network mainly covers all BRT stations and the control center. Taking into consideration the hierarchical nature of BRT systems, the best solution was to build a powerful Ethernet backbone to support centralized management and massive data and video aggregation from the more than 40 BRT stations.

▶ Network Requirements

- Centralized video management with multiplex operations of live display, recording, playback, and alarm reports
- Easy location awareness and event alerts
- Proven reliability for non-stop operations

▶ Why Moxa?

- Tailor-made solution offers full-function integration, cost-effective deployment, and easy management
- 24+4G-port rackmount switches offer 8 PoE ports and high-density connection to surveillance cameras, ticketing systems, security alarms, and emergency call-out systems

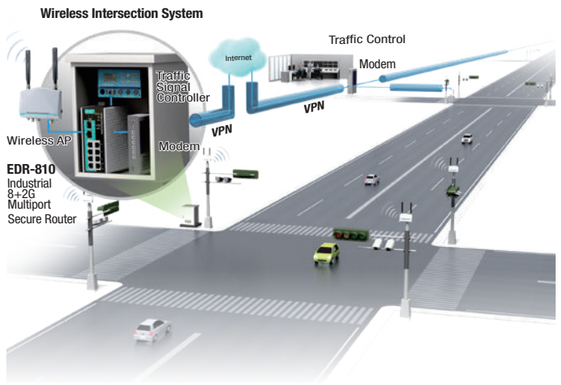
▶ Key Products

IKS-6728A-8PoE
24+4G-Port Modular PoE+ Managed Switch

ioLogik E2242-T
Smart Ethernet Remote I/O with 12 DIOs, 4 AIs

Secure Traffic Signal Controls over Public Networks

Location: U.S.A



▶ System Introduction

Henrico County, USA, wanted to upgrade their existing closed-loop traffic signaling control systems to a distributed traffic management system comprised of 140 intersections with traffic signals. Before upgrading, only 25 intersections were interconnected while the remaining 115 intersections used isolated signal control circuits.

The new signaling network would need a distributed architecture so the central operation center can communicate with each local traffic signal controller over a public network for real-time monitoring and emergency response.

▶ Network Requirements

- Real-time performance and durable outdoor connectivity
- Encrypted network connections between 140 intersections and the traffic control center
- NEMA TS2 compliance to enable coordinated-actuated traffic signal operations

▶ Why Moxa?

- Cost-effective deployment with Moxa's EDR-810 secure router, which offers firewall, NAT, VPN, and switch functions all in one device
- 8+2G ports for Ethernet and VPN connections
- Secure data connection with 20 Mbps VPN bandwidth for remote communication and centralized control
- Dual power inputs for redundancy
- NEMA TS2 certified

▶ Key Products

EDR-810 NEMA TS2
Industrial 8+2G-Port All-in-One Firewall/NAT/VPN/Router/Switch