Your Trusted Partner in Automation

Moxa is a leading manufacturer of industrial networking, computing, and automation solutions. With over 25 years of industry experience, Moxa has connected more than 30 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 automation systems.
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 traffic 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, embedded computers, and HD surveillance products. All solution ingredients address extreme reliability, smart redundancy, easy manageability, and a lower total cost of ownership.

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

Expert applications
- ATMS (Advanced Transportation Management Systems)
- ETC (Electronic Toll Collection)
- Tunnels
- E-Bus and Trams
- Railways
- E-Bus
- Railways

Comprehensive Coverage of Industrial Networking Solutions

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High-Bandwidth

To support constantly growing 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 1GbE and 10GbE speeds, as well as Turbo Chain topology that allows flexible expansion and guarantees fast Ethernet recovery under 20 ms before connection fail. The rich media alternatives, including coaxial, fiber-optic, twisted-pair, and DSL cabling, help customers formulate optimal performance while lowering deployment cost.

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

Extreme Reliability

Intelligent highway systems need to perform long distance communication under extreme weather and environmental conditions. With over 20 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 the 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.

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 easily edge-to-core network status and traceable event history of all connected SNMP devices and physically wired links quickly and easily.
Today’s road corridors are faced with many challenges. For example, better management of the often crowded travel on highways and city streets can improve safety and reduce travel times and greenhouse gas emissions. In addition, resolving free-speedway capacity issues requires the right infrastructure and technology to support and operate efficiently. Commuter, holiday, and event related traffic flows need the right tools and systems to manage and control traffic efficiently. Advanced Transportation Management Systems (ATMS) need a multi-layered network to interconnect the large number of managed and serviced using a straightforward management platform that can be remotely operated from a central control location.

Real-Time Advanced Traffic Management System

Central controllers digest data from sensors monitoring current traffic and road conditions to operate variable message signs, automatically reassign conflicting traffic splits, and the dispatch of the 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, inclement weather conditions, and heavy traffic, resulting in safer driving conditions and more efficient and comfortable travel. Over-utilization of roadways can be prevented using coordinated freeway control, which can also prevent the accidents that often accompany stop-and-go traffic.

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 shown should optimize video compression for efficient transmission over high capacity Gigabit Ethernet networks, with features such as H.265 encoding and multistream filtering.

Network Requirements

Reliable, High Capacity Hierarchical IP Network

An ATMS needs a multi-layered network to interconnect the large number of managed endpoints 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 warehouse cabinets onto high capacity 1G 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 manageable and survivable using a straightforward management platform that can be remotely operated from a central control location.
**INTELLIGENT TRANSPORTATION SYSTEMS**

**Tunnels**

**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 time 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.

**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.

**Live Traffic Video Monitoring**

Continual monitoring of traffic within a tunnel requires visual information from CCTV cameras placed along the tunnel interior, and at the entrance and exit. Traffic density, accidents, and speeds need to be monitored and controlled to prevent safety issues from arising. The cameras employed need to be rugged, and sensitive to the darker conditions of the tunnel interior. Eventually, intelligent HD IP video and management become a necessity for low-light tunnel applications with image enhancement and bandwidth optimization technologies.

**Highly Reliable Alarm System**

The atmosphere inside a tunnel must be continuously monitored, not only to raise alarms, 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. The devices used need reliable and uninterrupted access to the tunnel’s data communication system and a separate VO control functionality should be provided to operate the devices remotely.

**Key Products**

- **V2401**: x86-Based Alarm Embedded Computer
- **UC-8100**: Communication-Centric RISC Computing Platform
- **EDS-619**: 16-32 Port Compact Modular Managed Switch
- **EDS-P510**: 7-32 Port Gigabit PoE Managed Ethernet Switch
- **EDS-510A**: 7-32 Port Gigabit Managed Switch
- **VPort 36-1MP**: HD H.264 Rugged PoE IP Box Camera
- **ioLogik E1200**: Ethernet Remote I/O with 2-port Ethernet Switch
- **iEX-402**: Managed DSL Ethernet Extender

**Moxa Solutions**

- Unique, reliable, and flexible Turbo Ring / Turbo Chain Ethernet redundancy technologies with under 20 ms recovery time
- 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 HVA 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

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www.moxa.com/ITS
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, 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 that 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 depend on the local climate, they can avoid being exposed to uncomfortable weather conditions. While onboard, passengers utilizing the automated bus stop notification displays can easily arrive at their destination even if it is their first time in the destination area. Another 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 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 signs, can be optimized to allow the bus to remain on schedule. As an added benefit, to attract even more passengers, WiFi attracts passengers. Employing an intelligent E-Bus solution allows an operator to provide reliable connectivity and be tough enough to withstand the rough road and-embled vehicles on the road, and endure 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 continuously 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 that 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**
- **MBRF (Moxa Intelligent Routing Framework) WAN management software AP for seamless wireless service**
- **Reliable moving vehicle anti-vibration KFMs with cost-effective hot-replaceable SSD or HDD hard disks**
- **Cellular connections with dependable GuardLink technology**
- **Versatile Ethernet or serial device connectivity over cellular networks**

### Key Products

**V2616A**

- x86-Based Core i5/i7 Embedded Computer
- RAID 1 mirroring for full data redundancy
- Two hot-swappable storage trays for 2.5” SSDs or HDDs
- IEC 61373 certified for shock and vibration resistance
- EN 50155/50121-4 compliant
- X86-Based Atom Embedded Computer

**V2401**

- Dual independent displays (AGA, OVA, or UOS)
- Various connection options: 2 Gb Ethernet and 8 W-CDMA metal parts, 2 Gigabit L44 parts, 6 I/O ports, and 4 USBs
- Flexible storage expansion
- 25 to 75°C wide temperature range
- 10-year demand for future redundancy

**MAR-2000**

- Industrial Multi-Radio Programmable Router
- IEEE 802.11a/b/g/n wireless AP/bridge/client
- MIRF (Moxa Intelligent Routing Framework) WAN management software AP for seamless wireless service
- Built-in 32-channel GPS for location-based applications
- -40 to 75°C wide temperature range

**OnCell G3111-HSPA**

- Industrial High-Speed HSPA Router
- Industrial grade reliability
- Five-band UMTS/HSPA+ and quad-band GSM/GPRS/EDGE industrial IP modems

**TN-5308-4PoE**

- 8-Port M12 PoE Unmanaged Switch
- MI12 connectors and IP40 metal housing
- 8 x 10/100/1000BASET PoE and Ethernet combo ports
- Up to 15.4 watts at 48VDC per PoE port
- EN 50155/50121-4 compliant

**MxNVR-M04**

- 4-Channel H.264/MJPEG Industrial Video Recorder
- Analog EN 61373 vibration criteria with a built-in 2.5-inch hard disk
- Anti-vibration design with MI12 Ethernet and IP onboard alarm connections
- 48 to 75°C operating temperature range
- 4 AIs, 4 DIs, 4 DIOs
- Active OPC Server for seamless connection to SCADA systems
- User-defined Modbus/TCP addressing
- Moxa-Specific drivers for Windows/ Linux/ VxWorks/TCP and Linux/CPUs

**VPort 26A-1MP**

- 4-Port M24 PoE Industrial Camera
- Supports DMR and WBZ
- OnVIF supported

**ioLogik E1242**

- Ethernet Remote I/O with 4 AIs, 4 DIs, 4 DIOs
- Built-in 2-port Ethernet switch for ring-chain topology
- Active OPC Server for seamless connection to SCADA systems
- User-defined Modbus/TCP addressing
- Moxa-Specific drivers for Windows/Linux/VxWorks/TCP and Linux/CPUs

**Industrial Multi-Port High-Speed PoE Gateway**

- Five-band UMTS/HSPA+ and quad-band GSM/GPRS/EDGE industrial IP modems
- Ethernet, serial, and cellular connectivity
- Standardization and data communications equipment onboard an E-Bus must be compatible with the existing ATMS and bus dispatch systems so that 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.
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.

Key Products

- **EDS-G509**
  - 9G-Port Full Gigabit Managed Ethernet Switch
  - Isolated redundant power inputs with universal 24/48 VDC or 110/220 VAC power supply
  - Easy network management by web browser, CLI, Telnet/serial console, Windows utility, and TACACS+, SNMPv3, IEEE 802.1X, HTTPS, and SSH to enhance network security
  - Link Fault Pass-Through (LFP), MSTP for network redundancy
  - Gigabit Ethernet for massive video and data transmissions
  - Gigabit Ethernet to Fiber Media Converter

- **IMC-101**
  - Industrial Ethernet-to-Fiber Media Converter

- **ioLogik E2212**
  - Smart Ethernet remote I/O with Click&Go Logic
  - Active OPC Server for seamless connection to SCADA systems
  - Smart alarm management with SNMP, TCP/IP, FTP, Email, and Web server
  - ISOBUS compatible
  - Full 10/100BaseT(X) auto-negotiation and auto-MDI/MDI-X

- **VPort 36-1MP**
  - HD H.264 Rugged PoE Box-Type IP Camera
  - HD (1280x720) resolution to see finest detail
  - Built-in IVA function for more efficient surveillance
  - World’s first wide-temperature IP camera (-40 to 75°C)

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## Centralized Traffic Control over Fiber Gigabit Ethernet

**System Introduction**

The third largest state-owned highway system in the United States is maintained by the state’s DOT (Department of Transportation). The DOT planned to control traffic congestion and monitoring of highways (including roads, bridges, and tunnels) across the state’s five central TCMDs (traffic management centers). These TCMDs serve as hubs for regional emergency management. The TCMDs’ operations have access to real-time traffic information from DOT personnel at state police, emergency response agencies, cameras, sensors, and other systems to ensure driver safety by notifying drivers of traffic conditions and emergency events via VMS (variable message signs) broadcasts and other public media.

**Network Requirements**

- Gigabit network backbone for large volumes of video data
- NEMA T52 compliance for network components
- Network redundancy with secure data encryption capability
- Network traffic management for bandwidth efficiency

**Why Moxa?**

- Reliable Gigabit data transmission with recovery time <50 ms (@250 switches)
- Sub-20 ms Ethernet resilience (@250 switches)
- Secure connection for existing serial devices
- NEMA T52 certified and -40 to 75°C operating temperatures

**Key Products**

- EDS-510A-T: 7+3G-Port Gigabit Managed Ethernet Switch
- MXview: Industrial Network Software
- Variable Message Sign Management Software
- MXview: Managed Ethernet Switch
- EDS-511/619: 8+3G/16+3G-Port Compact Modular Managed Switches
- V2426-LX: Embedded Computer
- ioLogik E1212-T: Ethernet Remote I/O with 2-Port Ethernet Switch, 8 DI, and 8 DOs
- EDS-G100-T: 8-Port Gigabit Managed Ethernet Switch

## Tramway Integrates Ticketing and Onboard Systems over Fiber Network

**System Introduction**

A major tramway linking northern and southern communities in a highly-populated region of France will stretch 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 30 tram networks country-wide. Onboard passenger information 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 time <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 Secure Terminal Server
- AWK-3121: Industrial IEEE 802.11a/b/g Ethernet Secure Terminal Server
- EDS-P510: 7+3G-Port Gigabit PoE Managed Ethernet Switch
- EDS-P510: 7+3G-Port Gigabit PoE Managed Ethernet Switch

## French Road Uses Gigabit Ethernet for GPS Toll Collection

**System Introduction**

Transportation authorities in France have instituted an environmental tax for all HGVs (heavy goods vehicles) traveling on a national highway network that stretches more than 1300 km. The HGV tax for each vehicle will be determined with onboard GPS devices, and toll enforcement will be performed by a system of sensors and cameras used to capture the license plates of HGVs not in compliance with the new tax program. The system will be used to count vehicles, and can even use the contour mapping to identify vehicle types. When a violation is detected, the system will send the license plate image back to the control room to be processed for payment collection.

**Network Requirements**

- Gigabit fiber network backbone to transmit large volumes of data back to the main control center
- Wide-temperature tolerance for outdoor operation
- Robust and compact design for installation in road-side cabinets

**Why Moxa?**

- Gigabit Ethernet for massive video and data transmissions
- Fiber interface for long distance transmission
- All Moxa products are available in wide temperature (-40 to 75°C) models and feature a long MTRF for greater reliability

**Key Products**

- AWK-3121: Industrial IEEE 802.11a/b/g Ethernet Secure Terminal Server
- V2426-LX: Embedded Computer
- EDS-P510: 7+3G-Port Gigabit PoE Managed Ethernet Switch

## 10GbE Core Backbone for Critical Tunnel Traffic and Safety

**System Introduction**

Calfornia Department of Transportation planned to construct the fourth bore of the Caldecott Tunnel to relieve traffic congestion in the off-peak time. The new tunnel bypassed and combined with the new tunnel to ensure that the traffic can be handled efficiently. The new tunnel’s capacity is around 1500 vehicles per hour. The network infrastructure must be highly cost-effective and perform with industrial reliability, particularly since California has more than 100 tunnels county-wide. 10GbE fiber systems enable the large volumes of data back to the control room to be processed for payment collection.

**Network Requirements**

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

**Why Moxa?**

- One-stop-shop solution makes simple, reliable, and also cost-efficient network communication and management
- The 10-gigabit core backbone enables real-time aggregation of massive video and data flows
- Sub-20 ms Ethernet resilience (49 250 switches) load and wide temperature operation ensure excellent reliability

**Key Products**

- EDS-611/619: 8+3G/16+3G-Port Compact Modular Managed Switches
- MXview: Industrial Network Management Software
- ioLogik E1212-T: Ethernet Remote I/O with 2-Port Ethernet Switch, 8 DI, and 8 DOs
- EDS-G100-T: 8-Port Gigabit Managed Ethernet Switch
**Highways Deployed HD IP Surveillance with Network Management**

**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 simple deployment, cost-effectiveness, and easy maintenance. These high-definition IP cameras will provide real-time traffic information via fiber transmission for traffic management teams at the central command center and 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 capability
- Intelligent network management software to monitor all network nodes
- Wide-temperature tolerance for outdoor operation
- Rugged and compact design for installation in roadside cabinets
- Network redundancy with secure data encryption capability
- Gigabit fiber network backbone for large volumes of video transmissions

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

**Key Products**
- EDS-G509-T 10GbE-Port Layer 3 Core Switch
- EDS-P510-T Redundant Ring (Recovery Time < 50 ms)
- IP Camera
- AWK-3131 Mini Dome Camera
- IKS-6728-8PoE Modular PoE+ Managed Switch
- ioLogik E2242-T Smart Ethernet Remote I/O with Click&Go™ Logic

**Video Transmission over IEEE 802.11n WLAN for Bus Surveillance**

**System Introduction**
A transportation company in Hawaii serves thousands of commuters each day across over 100 routes with 50 bus vehicles. The administration wanted to implement an intelligent surveillance system to provide standard video recordings (300 dpi) during normal operating conditions but also be able to capture high-definition (720 dpi) video footage. The enhanced recording of the event will be stored on the bus during normal operating conditions but also able to capture high-definition (720 dpi) video footage. The administration wanted to implement an intelligent surveillance system to provide standard video recordings (300 dpi) during normal operating conditions but also be able to capture high-definition (720 dpi) video footage. The enhanced recording of the event will be stored on the bus during normal operating conditions but also able to capture high-definition (720 dpi) video footage. The enhanced recording of the event will be stored on the bus during normal operating conditions but also able to capture high-definition (720 dpi) video footage. The enhanced recording of the event will be stored on the bus during normal operating conditions but also able to capture high-definition (720 dpi) video footage.

**Network Requirements**
- Substantial bandwidth will be required to upload high-definition video via a wireless connection to the depot command center
- Wireless access points will need to withstand against humidity, constant downpour and the rusting effects caused by the 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 720 dpi video footage from the bus to the command center
- IP68-rated AWK-4131: only for outdoor protection against severe rain, and corrosion-resistant connectors against the salty precipitation to reduce maintenance efforts

**Key Products**
- AWK-4131 IEEE 802.11a/b/g/n WLAN AP/Bridge/Client
- AWK-3131 IEEE 802.11a/b/g/n WLAN AP/Bridge/Client

**Secure Traffic Signal Controls over Public Networks**

**System Introduction**
Henrico County, USA, wanted to upgrade existing closed-loop traffic signaling control systems to a distributed traffic management system comprised of 140 signalized intersections. Before upgrading, only 25 intersections were interconnected while the remaining 115 intersections were isolated signal control circuits. The new signaling network will have a distributed architecture, where 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 that offers Firewall, NAT, VPN, and switch functions all in one device
- 8+2G ports for Ethernet and IP connections
- Secure data connection with 20 Mbps VPN bandwidth for remote communication and centralized control
- Dual-power inputs for redundancy
- NEMA TS2 compliance

**Key Products**
- EDR-810 Industrial 8+2G Port All-in-One Firewall/NAT/VPN/Router/Switch
Your Trusted Partner in Automation

Moxa is a leading manufacturer of industrial networking, computing, and automation solutions. With over 25 years of industry experience, Moxa has connected more than 30 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 automation systems.