Towards a Smarter World with Moxa's I/O Solutions

About Moxa

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 in more than 70 countries. Moxa delivers lasting business value by empowering industry with reliable networks and sincere service for automation systems. Information about Moxa's solutions is available at www.moxa.com. You may also contact Moxa by email at info@moxa.com.

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Moxa's Smart I/O Solutions

Create business growth with a cost saving design and optimize operations with easy-to-use automation software.

ioLogik E1200
Ethernet Remote I/O with 2 Ethernet Switch Ports

ioLogik E2200
Ethernet Micro RTU Controller

ioLogik W5340
GPRS Micro RTU Controller

www.moxa.com

Creating a Smart World for a Smarter Future

The "smart world" we live in—made possible by the ever-present Internet and millions of local area networks—enables the type of global communication that people of yesteryear could only dream of. Not only can people communicate with people, engineers also have ready access to devices, and with the right kind of products, devices can communicate with each other to take automation networks to the next level of intelligence.

We live in an age where we can capture more data, more quickly, about more things, than ever before. Information about buildings, roads, vehicles, and processes, such as the temperature, location, and condition of a single item in a global supply chain, can be made readily available. In fact, with seemingly everything in the world on its way to being cataloged, identified, tracked, and interconnected via the Internet, these "things" can be searched, controlled, and accessed over the web—by computer, smart phone, and other devices.

Industry is always on the lookout for smarter solutions to integrate with existing systems to help them effectively process and organize data so that decisions can be based on facts rather than intuition. This is where Moxa comes in. Moxa's solutions create smarter, more complete industrial automation networks by offering products and software that treat the system as a whole.

Moxa is Leading the Way

As a world-class leader and trusted partner in industrial-grade networking solutions for automation, Moxa provides quality products and value-added service to establish win-win business relationships based on mutual trust and integrity. Moxa's smart world solutions are centered on creating smarter, more complete industrial automation networks—from the control center to field sites.

Moxa realized early on that the key to creating a smart world lies in field site data acquisition devices, which serve as an important connection between sensors and control computers for a wide variety of applications. Moxa's data acquisition devices are equipped with the latest technology, and are designed to world-class standards for capacity, reliability, and flexibility. Moxa's devices help enterprises work smarter by using a more efficient and cost-saving method of receiving and processing data, leaving control center engineers with more time to perform important data analyses, and determine the best way to optimize system performance.

Moxa's smart data acquisition solutions include redundant features, hazardous location certifications, and a rugged design to keep automation systems running continuously. Moxa's devices can be used with applications that run in extreme environments, including factory automation, transportation automation, utility automation, building automation, and surveillance automation.

Smarter Factory Automation

Although the drive to create smarter automation systems has fueled intense competition among manufacturers, achieving truly reliable communications between the control room and field devices is still difficult. Time-dependent control is a particularly important factor for process control systems, and for many systems integrators around the world Moxa's remote I/O and "push" technology have been the key to creating a successful operation. Users can easily and seamlessly expand control systems for production automation and process control to simplify management, reduce the response time of SCADA systems, and improve operational efficiency.

Smarter Transportation Automation

Smarter transportation systems aim to offer communication and transportation platforms that are safe, convenient, comfortable, efficient, and environmentally friendly. Efficient and reliable highway management, for example, requires products like Moxa's remote I/O solutions that ensure safer and smoother road travel. Moxa's remote I/O solutions are already playing an essential role in smart transportation solutions by helping reduce congestion at electronic toll collection gates, and making automatic streetlight control systems even simpler with front-end control logic. Moxa's remote I/O solutions can also be used to monitor the temperature in a roadside cabinet, detect vandalism and monitor assets, and reduce unexpected break-ins and breakdowns.

Smarter Utility Management

Smart utilities deliver services that are now essential to modern society, and for this reason it is critical that such systems are absolutely reliable and easy to maintain. Water and wastewater treatment plants, for example, which involve treatment pools, mixers, pH control pools, and precipitation pools, require the monitoring and control of an array of process functions and equipment. Moxa's remote I/O products can also be used to monitor pipeline pressure, temperature, flow, and leakage as water flows through pipelines.

Smarter Building Automation

Many smart homes and buildings are being equipped with automated lighting, temperature sensors, and other electronic devices that provide a wide range of intelligent features. Moxa's remote I/O devices are capable of monitoring environmental changes and managing devices to automatically optimize heating, control lighting, and handle other tasks.

Smarter Surveillance Automation

Most industrial surveillance applications are safety-critical and located in harsh remote environments where the failure of a system, or even unplanned system downtime, can lead to catastrophic results. Moxa's remote I/O devices support multiple protocols, simplifying the integration of a variety of devices into modern surveillance networks, and Moxa's remote I/O solutions provide the industrial reliability and smart interoperability needed to meet the mission-critical requirements of industrial applications.

Create Business Growth with a Cost Saving Design

For the past decade, Moxa's data acquisition engineers have created a number of innovative designs, including I/O devices with dual Ethernet ports and peer-to-peer data transmission functionality. The innovation of Moxa's engineers is reflected in Moxa's latest I/O products, which are helping companies around the world simplify the management of distributed control systems, and as a result reduce costs and create business growth.
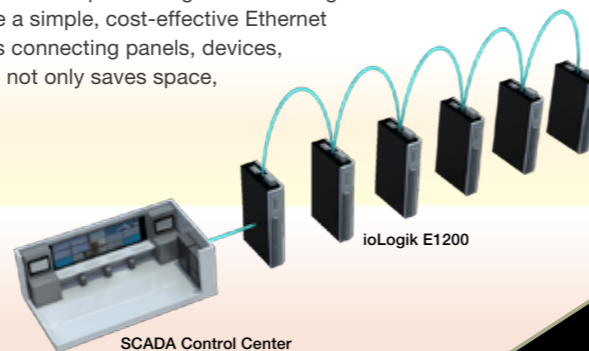
Cut Cabling Costs and Increase Efficiency with Dual Ethernet Switch Ports

With dual Ethernet switch ports on each device, Moxa's ioLogik E1200 series of remote I/O products give control engineers a huge advantage since the E1200 devices can be daisy chained together to create a simple, cost-effective Ethernet network. Since the typical distributed Ethernet data acquisition application requires connecting panels, devices, and cabinets located at remote sites where space is limited, the daisy chain option not only saves space, it also reduces cabling, deployment time, and installation effort.

▶ **The Star vs. Daisy Chain Dilemma**
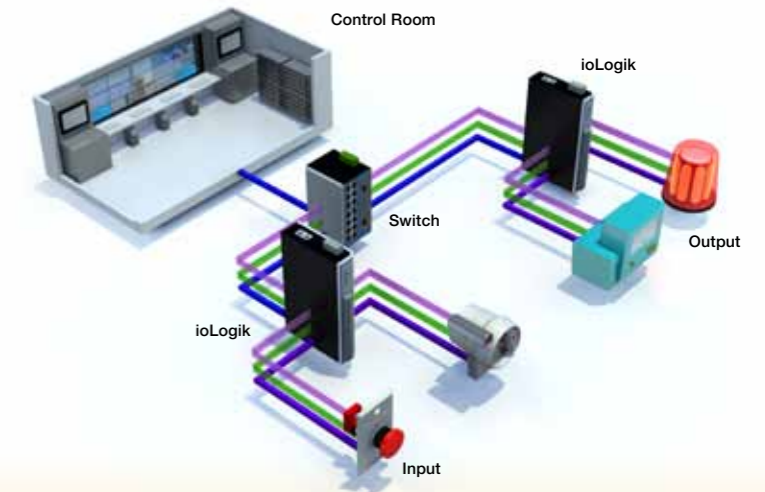Compared with a star topology, a daisy chain topology offers the following benefits

- Saves space and reduces wiring costs
- Reduces deployment time and labor effort
- New devices can be easily added to the network

ioLogik E1200

SCADA Control Center

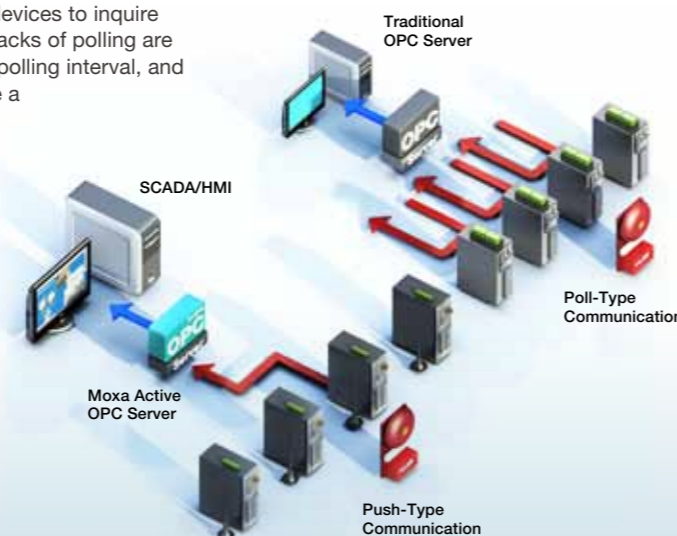# Optimize Operation with Easy-to-Use Automation Software

Moxa's innovative data acquisition software helps businesses simplify the process of integrating I/O devices with an existing network. Active OPC Server and DA-Center help users gather data faster and more efficiently, and are used to identify, assess, and monitor potential risks. In addition, Moxa's patented Click&Go front-end control logic makes it extremely easy for even novice users to program Moxa's data acquisition products.

Increase Efficiency with Moxa's Patented Active OPC Server

Traditional OPC servers use the "poll/response" architecture to connect to remote IO devices. With "polling," an HMI/SCADA system continuously sends commands to remote devices to inquire whether or not the devices have relevant data to report. The two main drawbacks of polling are (1) the response time could be longer than desired since it is affected by the polling interval, and (2) continuously sending signals to large numbers of remote devices can take a huge bite out of your network bandwidth.

Moxa's smart Active OPC Server software operates as an OPC driver for an HMI or SCADA system. It offers seamless connection from ioLogik products to a number of different SCADA systems, including Wonderware, Citect, and iFix. With the smart (and free!) Active OPC Server, Moxa's remote IO devices can achieve faster communication with SCADA systems. Active OPC server uses smart event driven "active tags" to deliver instant I/O status reports to SCADA systems much faster than other OPC Server packages.

- OPC DA 3.0 supported, up to 5,000 tags
- Event-driven tag updates by I/O response or time change
- Automatic tag generation
- Firewall-friendly connection from remote ioLogik devices

Traditional OPC Server

SCADA/HMI

Moxa Active OPC Server

Poll-Type Communication

Push-Type Communication

Save Time and Reduce Cabling Costs with Peer-to-Peer I/O

One of the challenges of designing a data transmission network for remote automation applications is deciding which type of network topology to use. Peer-to-peer is the fastest, simplest, and smartest way to transfer input directly to output in an existing IP infrastructure. With peer-to-peer, digital and analog signals can be repeated over virtually unlimited distances without using a host PC, PLC, or controller, and (with Moxa's products) response time is kept well below industry average.

- Direct input-to-output signal communication over IP networks
- High-speed peer-to-peer I/O response time
- Quick and easy-to-use utility with web-based configuration

Control Room

ioLogik

Switch

Output

ioLogik

Input

Anticipate Unforeseen Events with DA-Center

In traditional remote data acquisition applications, users need additional human resources to collect data manually from remote storage and also to perform data logging and other analyses during daily operations. Moxa DA-Center, a ready-to-run data gateway, makes it much easier to perform these types of tasks. DA-Center provides a standard OPC interface that interacts with Moxa Active OPC Server for real-time data collection. The interface acts as a bridge between field data and IT databases or spreadsheets, and a trend chart tool is also provided to perform historical analyses.

The DA-Center package includes several stock charts for basic data analysis. Users can retrieve data from a database table or a spreadsheet and automatically convert it into chart format. Being able to zoom in and out along the different axes makes it extremely easy to display and analyze historical data. In a smarter remote I/O world, DA-Center is an essential tool that turns information into insight, helping users make informed decisions rapidly.

- Convert field data to ODBC compliant databases
- Convert field data to Excel or Access spreadsheets
- Flexible dataset configuration for connecting to multiple remote devices
- Embedded trend charts for historical analysis

Database

DA-Center

SCADA

Moxa Active OPC Server

Excel or Access

ioLogik Series

Programming Free Control Logic with Click&Go

Moxa's patented Click&Go software provides a smart, front-end intelligent control logic that implements local control without needing to communicate with a remote host. Click&Go's intuitive, graphical interface and simple IF-THEN-ELSE control logic, which defines how Moxa's remote IO devices respond to different events, is easy and straightforward to set up. Click&Go supports active alarming and communication methods, including TCP, UDP, SNMP Trap, email, and CGI commands, making it extremely easy to integrate Click&Go with any monitoring system.

- IF-THEN-ELSE code-free configuration
- PC-free control intelligence
- Active alarm messaging via email, SMS, SNMP Trap, and TCP/UDP messaging

Active Alarm

Local Intelligence

Event Trigger

CLICK&GO™ LOGIC

Dual Ethernet Switch Ports:
Smart Daisy Chain Topology

Cut cabling costs and increase efficiency with dual Ethernet ports

Project Name / The Monitoring and Control of Australia's Gateway
Bridge LED Lighting System

Country / Australia

Products / ioLogik E1212: Ethernet remote I/O with 2 Ethernet switch ports and 8DIs and 8DIOs

V462: Fanless embedded computer with 4 serial ports, dual LAN ports, and 4 USB 2.0 ports

Dual Ethernet Switch Ports | Peer-to-Peer | Active OPC | DA-Center

Project Background

One of the world's leading LED lighting designer has chosen Moxa's ioLogik E1212 for their Gateway Bridge lighting project in Australia. The city government in charge of the bridge decided to use an Ethernet-based architecture for the bridge's lighting control system. The total length of the bridge is 1.2 miles, it stands 250 feet off the ground, and the lighting system uses 2500 customized LED strips made up of 90,000 individual LEDs and over 45,000 meters of cable. The challenge for this project was to develop a cost-effective design that satisfied strict cabling layout criteria and was guaranteed to provide long-term performance.

Why Moxa?

Moxa's ioLogik E1212 Ethernet remote I/O products have a 2-port embedded Ethernet switch with 16 I/O channels, providing users with a very attractive cost-to-performance ratio. Thanks to its two embedded Ethernet switch ports, the ioLogik E1212 gives users the option of creating a daisy-chain Ethernet topology that can be deployed quickly and reduce costs. The simplicity of the daisy-chain architecture makes it easy to wire and maintain, and the cascading connections make it easy to create multi-drop I/O control networks, which are perfect for applications that extend over a distance of 1.2 miles. In addition, the two Ethernet ports can be used to construct a backup link to ensure network redundancy and stability.

With 8 DIs and 8 DIOs, the ioLogik E1212 provides the flexibility needed for this type of application. The ioLogik E1212 is compact, and when used together with Moxa's V462 embedded computer, it gives users local control capability for managing the bridge's complex lighting system.

- Open Ethernet-based protocol
- Effortless and easy-to-deploy I/O extension
- Easy-to-wire daisy chain connectivity
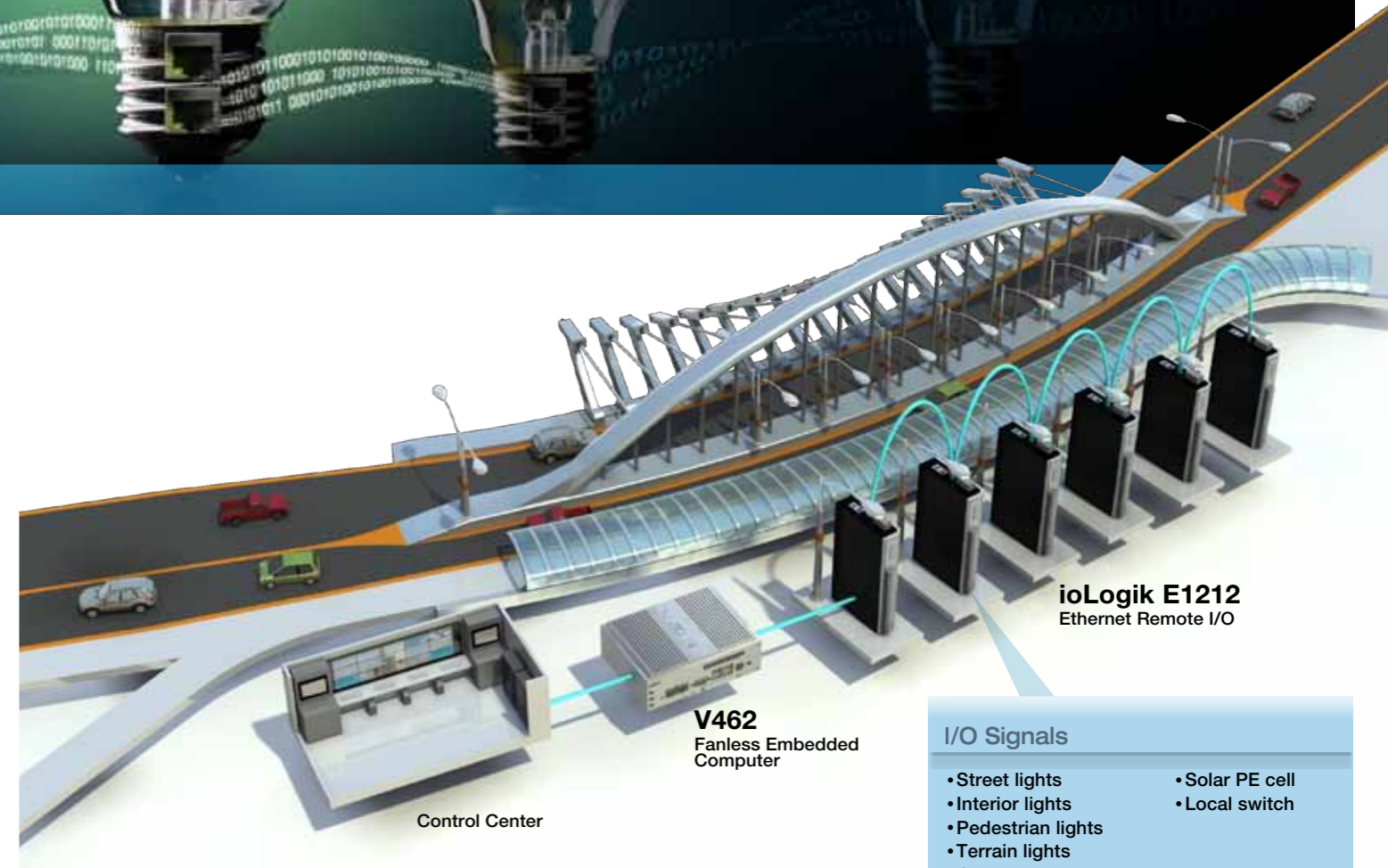
ioLogik E1212
Ethernet Remote I/O

V462
Fanless Embedded Computer

Control Center

I/O Signals

- Street lights
- Interior lights
- Pedestrian lights
- Terrain lights
- Column lights
- Flood lights
- Feature lights
- Solar PE cell
- Local switch

Other Applications

Smart Factory Automation

- Heating system for gas pipeline monitoring – Taiwan
- Gas cabinet status monitoring system – Taiwan

Smart Building Automation

- Embedded computer with daisy chain remote I/O for dynamic modeling of a chilling machine – Taiwan
- Power status monitoring system for solar panels – USA

Peer-to-Peer Communication

Save time, reduce cabling cost, and increase efficiency with peer-to-peer I/O

WAC-1001
Wireless Access Controller

Project Name / PLC Signal Extension for a Pulp Mill

Country / USA

Products / **ioLogik E1242, E1210, E1240, and E1211:** Ethernet remote I/O devices with 2-port Ethernet switch and mixed I/O combinations
WAC-1001: Industrial wireless access controller

Dual Ethernet Switch Ports | Peer-to-Peer | Active OPC | DA-Center

PLC

ioLogik E1200 Series
Ethernet Remote IO

I/O Signals

- Water meter
- Power meter
- Gas meter
- Temperature sensor
- Motor status
- Various status inputs…

Ethernet
I/O Signals

Project Background

A pulp mill originally used a PLC with I/O wiring stretching 100 feet or more over the factory floor to collect sensor data. After the system had been used for several years, it was determined that the cost of replacing the I/O and communication cables and overhauling the entire cabling system was cost-prohibitive. For this reason, the pulp mill decided to use Moxa's smart I/O products, which offer a cost-effective cable replacement solution that utilizes the factory's existing Ethernet infrastructure together with a WiFi network to transmit sensor signals as TCP/IP packets back to the PLCs.

Why Moxa?

The pulp mill decided to leverage their existing Ethernet infrastructure and cut costs by using Moxa's ioLogik E1200 active Ethernet I/O products, which support peer-to-peer input-to-output signal regeneration. The ioLogik E1200 smart remote I/O devices support channel-to-channel mapping over Ethernet by using an emitter and receiver I/O pair to simultaneously transmit to multiple targets, and allow the destination's socket ports to be specified separately for each channel map. This technology provides the flexibility needed to install ioLogik units behind a router or firewall.

In addition, the smart remote I/O devices can replicate both digital and analog input signals to remote output modules over any TCP/IP communication medium, without using an external controller or server. One of the strengths of using TCP/IP is that you can use an existing Ethernet infrastructure to build your sensor network, without needing to install additional cabling.

- Does not require programming or using a controller
- Uses an existing Ethernet infrastructure to reduce cabling and wiring costs
- Dual Ethernet ports for easy I/O cascading and expansion

Other Applications

Smart Building Automation

- Radio tower condition monitoring – Japan
- Building intrusion detection system – Taiwan
- Building access control system – UK
- Tokyo skytree condition monitoring - Japan

Smart Remote Automation

- River water level monitoring system – USA
- Gas and water metering I/O signal extension system – USA
- Water consumption metering I/O signal extension system – Malaysia
- Pump level monitoring system – Taiwan
- Water pump level monitoring system for agricultural irrigation system – South Africa

Smart Factory Automation

- Semiconductor factory PLC centralizes shut-down control system – Taiwan
- Factory PLC I/O signal extension system – USA
- Water quality monitoring system – Taiwan
- Factory fire alarm system – Belgium

Moxa Active OPC Server + DA-Center™: Real-time I/O to Database Logging Tools

Increase efficiency and anticipate unforeseen events with Active OPC Server + DA-Center

Project Name / Remote Generator Condition Monitoring

Country / Indonesia

Products / ioLogik E2242: Ethernet micro RTU controller with 4 analog inputs and 12 configurable DIOs

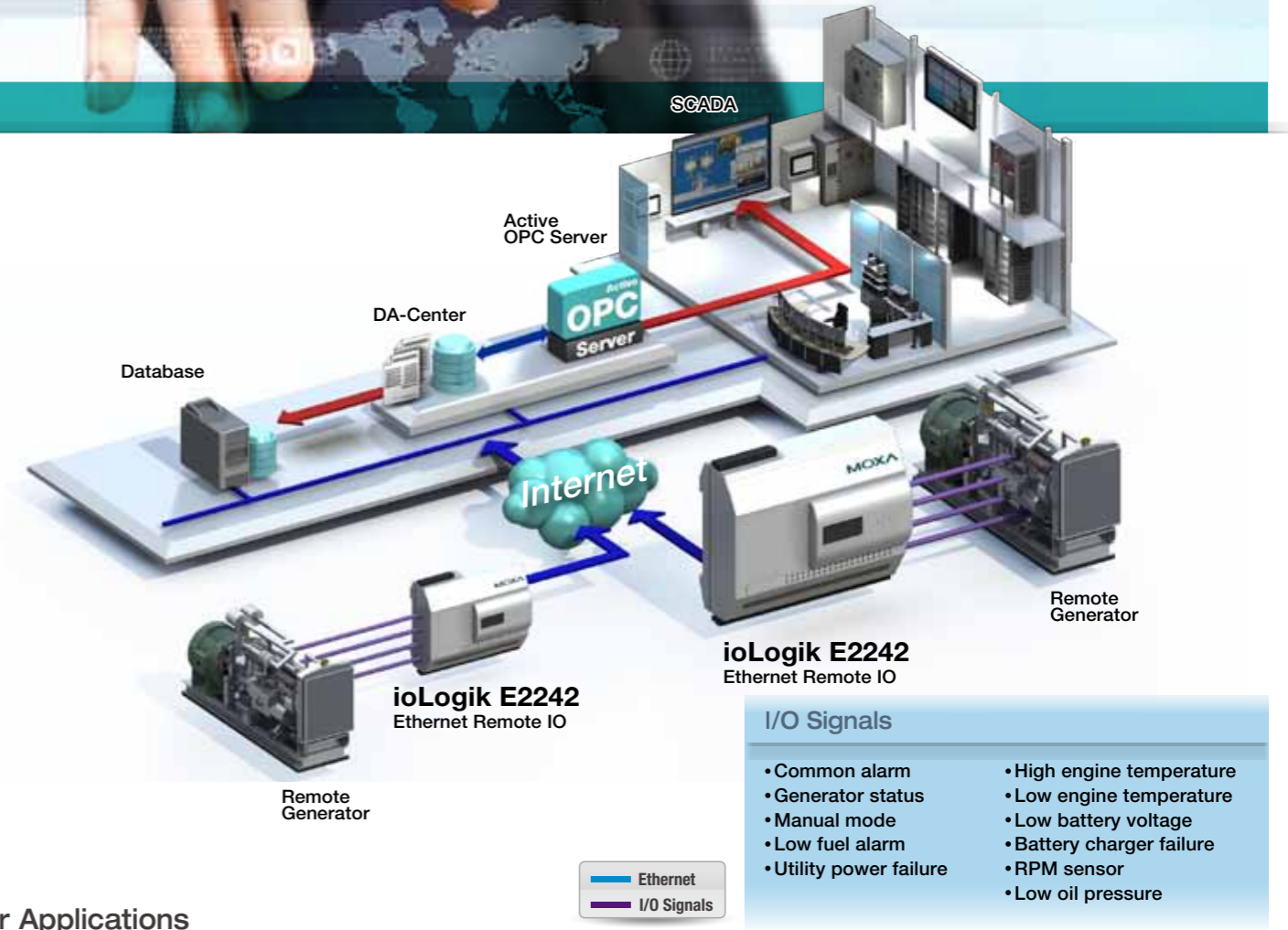Active OPC | DA-Center | Click&Go | Peer-to-Peer

Project Background

Before deploying a new automatic data acquisition system, a technician from this generator leasing company was required to remain onsite to manually record the status of the company's generators. The information was entered into the company's central database by another engineer working in the main office. Only then could the data be accessed from a web browser HMI by maintenance engineers and end-users. With the real-time online data logging suite that goes with Moxa's smart I/Os, no programming is needed, and only a few steps are required to configure the software. Moxa's DA-Center™ software will automatically convert I/O data from the generators into database format. Since the software is free, the total cost of ownership of Moxa's system is much lower than traditional SCADA historical or custom logging software.

Why Moxa?

Moxa DA-Center is an online data logging tool that works with Moxa's smart I/O solutions. With DA-Center, you can cut software and engineering costs and increase operational efficiency by automating your remote asset management system. Moxa DA-Center makes real-time data collection easier, and simplifies the conversion of historical data into a database-ready format. DA-Center's standard OPC interface interacts directly with Moxa Active OPC Server to build a bridge between field data and databases or spreadsheets.

- Cost-effective compared with traditional SCADA historical or custom logging software
- Real-time and ready-to-run—no programming required
- Event time stamping for generator set (genset) health history tracking

SCADA

Active OPC Server

DA-Center

Database

Internet

ioLogik E2242
Ethernet Remote IO

Remote Generator

ioLogik E2242
Ethernet Remote IO

Remote Generator

I/O Signals

- Common alarm
- Generator status
- Manual mode
- Low fuel alarm
- Utility power failure
- High engine temperature
- Low engine temperature
- Low battery voltage
- Battery charger failure
- RPM sensor
- Low oil pressure

— Ethernet
— I/O Signals

Other Applications

Smart Remote Automation

Remote generator monitoring – Australia

Rain gauge system – USA

Smart Building or Facility Automation

Environmental monitoring of orchid farm greenhouses – Taiwan

Building energy and water metering – Australia

Building energy and water metering – Japan

Click&Go: Programming Free Logic Control

Reduce downtime for remote base station environmental monitoring system

Project Name / 4G Base Station Environmental Monitoring
with Click&Go SNMP

Country / Taiwan

Products / E2210: Ethernet micro RTU controller with 12 digital inputs and
8 digital outputs

Active OPC   DA-Center   Click&Go   Peer-to-Peer
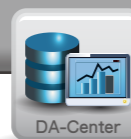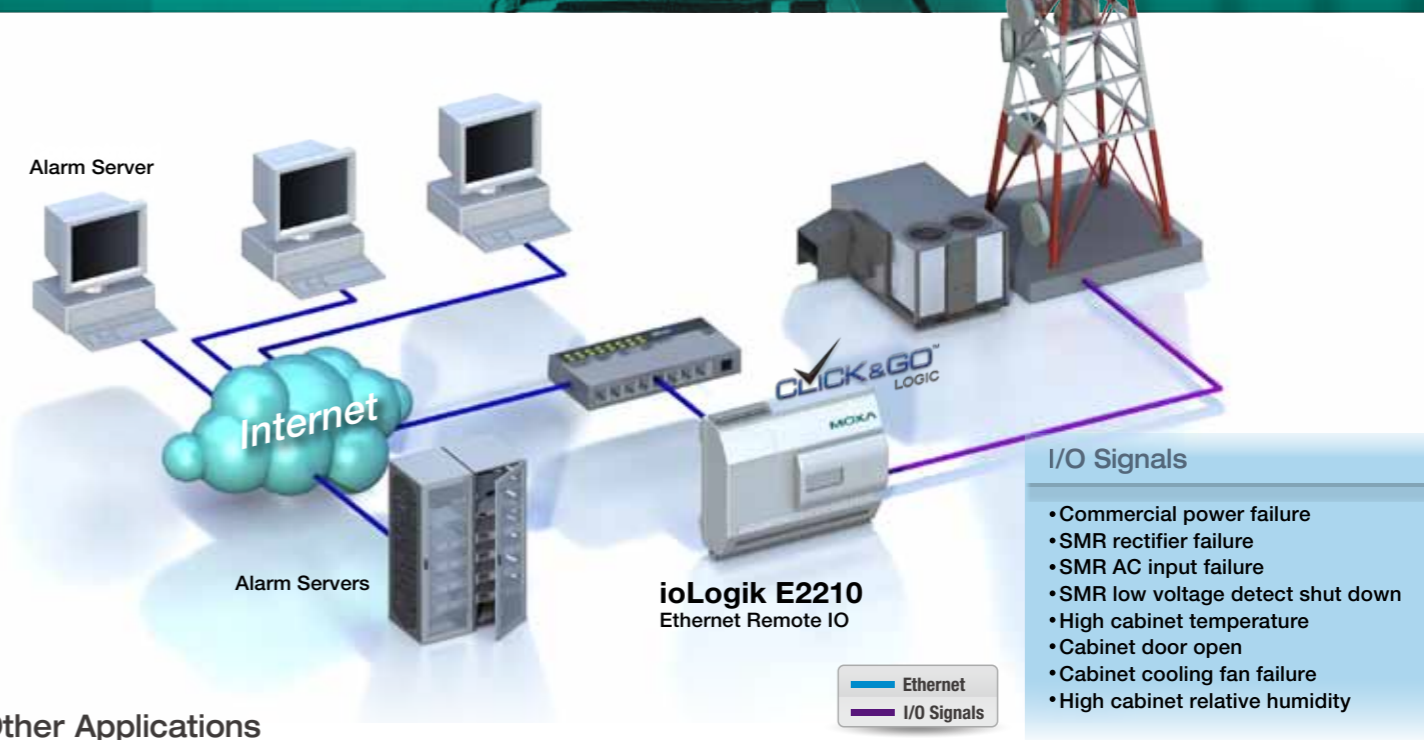
Project Background

An ISP (Internet service provider) was looking for an industrial-grade environmental monitoring device that did not require a lot of programming and configuration. One of the key requirements was a high MTBF (mean time between failures) so the monitoring device itself did not become the failure point. In addition, the EMS device was required to support SNMPv3 to guarantee data transmission security, and the operator must be able to edit the location, time, and alarm status for the SNMP trap so that when trap alarms are received the SNMP agent does not need to interpret the signals.

Why Moxa?

Moxa's ioLogik E2200 series offers complete support for SNMPv1/v2c/v3, providing the flexibility needed when using SNMP to manage environmental monitoring systems. The ioLogik also supports SNMP to I/O functions, making it easy to read the sensor status and set DO alarms with SNMP. Trap content can be edited to include information such as time stamps, contact status, scaled AI readings, and server locations. With the ioLogik E2200, what you see is what you get—being able to edit trap content means you do not need to spend time setting up the SNMP manager for trap interpretation.

Moxa's patented Click&Go control logic bridges the gap between information technology and industrial automation. Learning how to use Click&Go is easy and straightforward. All that's needed is a basic understanding of how to create IF-THEN-ELSE logic statements, so even engineers with no formal training in computer programming will be able to format an I/O configuration—in under five minutes.

- Easy to configure with IF-THEN-ELSE logic—no programming required
- Use SNMP to set and get the status of an alarm
- Allows users to define SNMP content with time, location, and alarm status

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Alarm Server

Internet

Alarm Servers

ioLogik E2210
Ethernet Remote IO

I/O Signals

- Commercial power failure
- SMR rectifier failure
- SMR AC input failure
- SMR low voltage detect shut down
- High cabinet temperature
- Cabinet door open
- Cabinet cooling fan failure
- High cabinet relative humidity

Ethernet
I/O Signals

Other Applications

Smart Remote Base Station Automation

- Cellular base station environmental monitoring – Pakistan
- Satellite base station environmental monitoring – Singapore
- Satellite base station environmental monitoring – Hungary
- Radio base station environmental monitoring – The UK
- Radar station environmental monitoring – Australia

Smart Data Center Automation

- Data center environmental monitoring – Kuwait
- Data center environmental monitoring – Taiwan
- Base station monitoring for the Galileo GPS system in Europe – Belgium, France, and Germany
- Satellite base station monitoring and control for Astra – Belgium and Luxembourg
- Telecom base station monitoring system – Slovakia
- WiMax base station monitoring system – Taiwan

Ethernet Remote I/O

	ioLogik E1210	ioLogik E1211	ioLogik E1212	ioLogik E1214	ioLogik E1240	ioLogik E1241	ioLogik E1242	ioLogik E1260	ioLogik E1262
Inputs and Outputs									
Number of IOs	DIs: 16	DOs: 16	DIs: 8, DIOs: 8	DIs: 6, Relays: 6	AIs: 8	AOs: 4	DIs: 4, DIOs: 4, AIs: 4	RTDs: 6	TCs: 8
Ethernet									
Ports (Connector)	2 (RJ45)								
Speed	10/100 Mbps								
Switch (Daisy Chain)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Protocols	Modbus/TCP, TCP/IP, UDP, DHCP, Bootp, HTTP								
Environmental Limits									
Standard Models	-10 to 60°C								
Wide Temp. Models	-40 to 75°C								
Storage Temp.	-40 to 85 °C								
Operating Humidity	5 to 95% RH (non-condensing)								
Software									
Active OPC Server	✓	✓	✓	✓	✓	✓	✓	✓	✓
DA-Center	✓	✓	✓	✓	✓	✓	✓	✓	✓
ioSearch	✓	✓	✓	✓	✓	✓	✓	✓	✓
MXIO	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peer-to-Peer	✓	✓	✓	✓	✓	✓	✓	–	–

Ethernet RTU Controllers

	ioLogik E2210	ioLogik E2212	ioLogik E2214	ioLogik E2240	ioLogik E2242	ioLogik E2260	ioLogik E2262
Inputs and Outputs							
Number of IOs	DIs: 12, DOs: 8	DIs: 8, DOs: 8, DIOs: 4	DIs: 6, Relays: 6	AIs: 8, AOs: 2	DIOs: 12, AIs: 4	DOs: 4, RTDs: 6	DOs: 4, TCs: 8
Ethernet							
Ports (Connector)	1 (RJ45)						
Speed	10/100 Mbps						
Protocols	Modbus/TCP, TCP/IP, UDP, DHCP, Bootp, SNMP, HTTP, CGI, SNTP, SMTP						
Serial							
Ports (Connector)	1 (terminal block)						
Interface	RS-485						
Protocols	Modbus/RTU						
Environmental Limits							
Standard Operating Temp.	-10 to 60°C						
Storage Temp.	-40 to 85°C						
Ambient Relative Humidity	5 to 95% RH (non-condensing)						
Software							
Programmability	Click&Go	Click&Go	Click&Go	Click&Go	Click&Go	Click&Go	Click&Go
Active OPC Server	✓	✓	✓	✓	✓	✓	✓
DA-Center	✓	✓	✓	✓	✓	✓	✓
MXIO	✓	✓	✓	✓	✓	✓	✓
ioAdmin	✓	✓	✓	✓	✓	✓	✓

Cellular RTU Controllers

	ioLogik W5312	ioLogik W5340
Inputs and Outputs		
Number of IOs	DIs: 8, DOs: 8, DIOs: 4	Relays: 2, DIOs: 8, AIs: 4
Cellular		
GSM/GPRS/EDGE	✓	✓
Ethernet		
Ports (Connector)	1 (RJ45)	
Speed	10/100 Mbps	
Switch (Daisy Chain)	–	–
Protocols	Modbus/TCP, TCP/IP, UDP, DHCP, Bootp, SNMP, SNTP, SMTP	
Serial		
Ports (Connector)	1 (DB9 male or terminal block)	
Interface	RS-232/422/485	
Protocols	Modbus/RTU	
Environmental Limits		
Standard Operating Temp.	-10 to 55°C	
Wide Operating Temp.	-30 to 70°C	
Storage Temp.	-40 to 85°C	
Ambient Relative Humidity	5 to 95% RH (non-condensing)	
Software		
Programmability	Click&Go	
Active OPC Server	✓	✓
DA-Center	✓	✓
MXIO	✓	✓
Configuration Utility	✓	✓

**To learn more about
Moxa's smart I/O solutions**

visit our website NOW!

www.moxa.com/io