

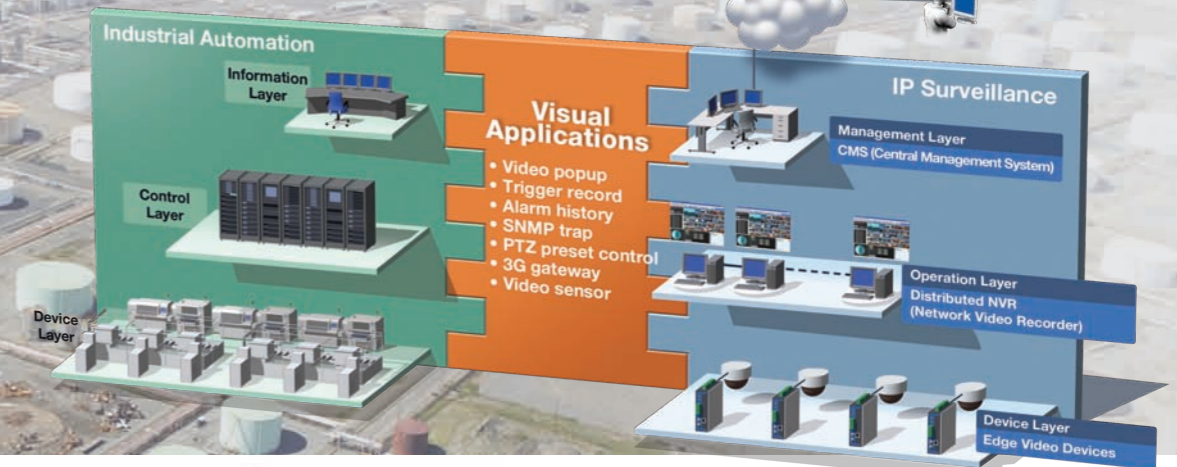


Activate Your SCADA Surveillance

# Activate Your SCADA Surveillance

## Visually capture events on your SCADA system to improve security and safety

During an emergency, time is of the essence and it is important to see what has happened as soon as possible. A SCADA system might be the first to raise an alarm over the control and monitoring network, but without linked video, there is not enough detail about the event at the site for an effective immediate response. Moxa's SCADA surveillance solution provides synchronized video information to SCADA systems in order to automatically provide more comprehensive system monitoring and improved response time.



## A Case Study

### SCADA Surveillance in the Real World:

The following case study illustrates the factors an actual user considered in developing a tailor-made SCADA surveillance solution for a large-scale and widely distributed industrial application.

### Participant Profiles

#### King User ("User")

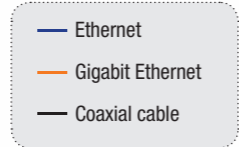
A leading oil and gas production energy company, who wants to upgrade the surveillance system of its oil and gas wells spread over a vast desert. The primary objective is to find a video surveillance solution that can be interconnected with their SCADA system to deliver SCADA-triggered surveillance images for improved event monitoring.

#### Automation System Integrator ("SI")

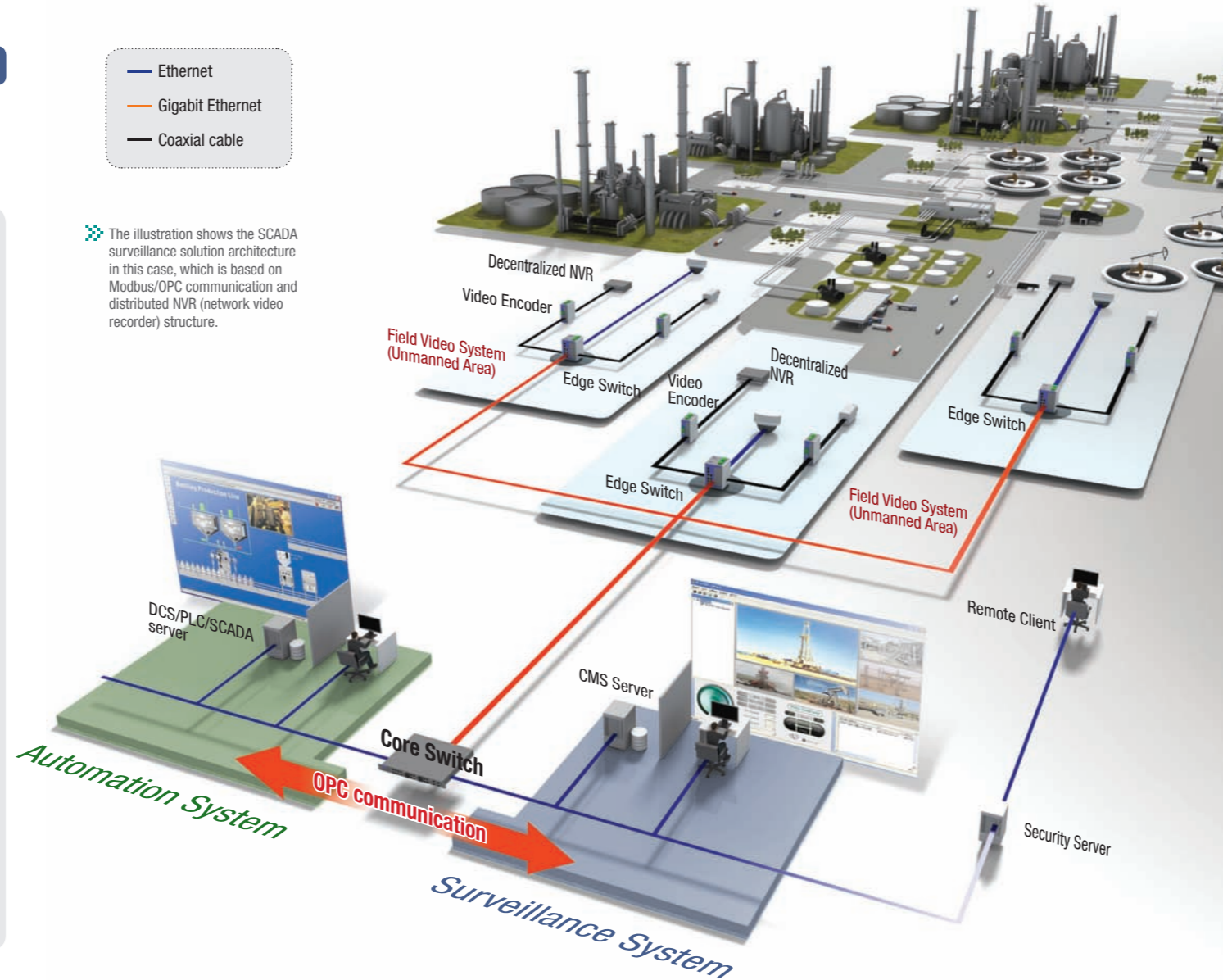
A global leader in industrial automation system development, who has a variety of successful industrial SCADA projects under their belt. Not only do they possess a solid industrial SCADA project credentials, they also are experts in product and service integration solutions that fully satisfy their customers' needs and requirements.

#### Moxa

A leading manufacturer of device networking products for industrial automation. Moxa not only provides comprehensive industrial communication hardware and software, but also offers future-proof IP video surveillance solutions that can be easily integrated with SCADA systems.



The illustration shows the SCADA surveillance solution architecture in this case, which is based on Modbus/OPC communication and distributed NVR (network video recorder) structure.



### Solution Testimonials

"We are satisfied with this unprecedented SCADA surveillance solution," said the User.

#### User:

We are satisfied with this unprecedented SCADA surveillance solution that delivered the following valuable benefits:

- The new surveillance solution saves a great amount of time and cost in labor resources with automatic system communication services.
- The SCADA surveillance significantly shortens the response time to mere seconds, and dramatically improves the operation efficiency of event identification and handling.
- The deployment of additional network infrastructure is not necessary thanks to the smart bandwidth control that allows the IP video transmission to share resources on the existing network without affecting SCADA performance.

"We'll definitely continue our collaboration with Moxa," said the SI.

#### SI:

It is a big step for industrial automation to integrate with IP video surveillance through innovative network communications. We will continue to collaborate with Moxa to accomplish a "visualization factory" system structure that delivers the following advantages:

- Interconnect real-time video surveillance with the SCADA system to provide simultaneous visual information to enhance event and alarm management efficiency.
- Event triggered IP video display and recording deliver a truly automatic video service that leads to further unmanned operations for mission-critical control and monitoring systems.
- Excellent bandwidth control allows IP video transmission through one shared network backbone with no bandwidth congestion issues.



# Analysis of project requirements



## :- Going Forward with an IP Surveillance Upgrade

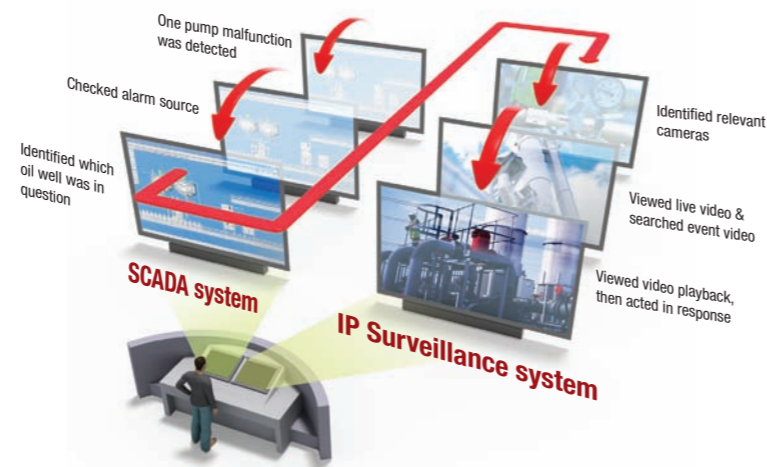
**User:**  
We intend to upgrade the CCTV surveillance system for our oil and gas wells in the desert. What do you suggest?

**SI:**  
The best solution is to migrate the CCTV to an IP video surveillance network.

Why? Because it allows you to access data from any camera or recording device for complete CCTV coverage from anywhere in the world through an Internet-connected computer. Aside from saving time and costs, with IP accessibility, alarms or critical snapshots can be sent to multiple users or emergency personnel in a blink of an eye. With all the advantages in time and cost efficiency, effective alarms, flexible and protected accessibility, why not move to IP surveillance?

**User:**  
It sounds good. But will such an upgrade cost a lot of money?

**SI:**  
Not really. You simply add video servers to connect existing analog cameras to your IP network, and network video recording (NVR) servers for network storage and sharing. There is no need to replace your existing analog CCTV equipment. Additional costs are limited, and IP video surveillance is a far more flexible and expandable system with lower deployment costs and fewer maintenance hassles down the road.



**Parallel SCADA and Surveillance Systems**  
The manually operated communication flow of existing systems: the surveillance system is independent from the SCADA system, which creates constant manual operations that slow down data exchange.

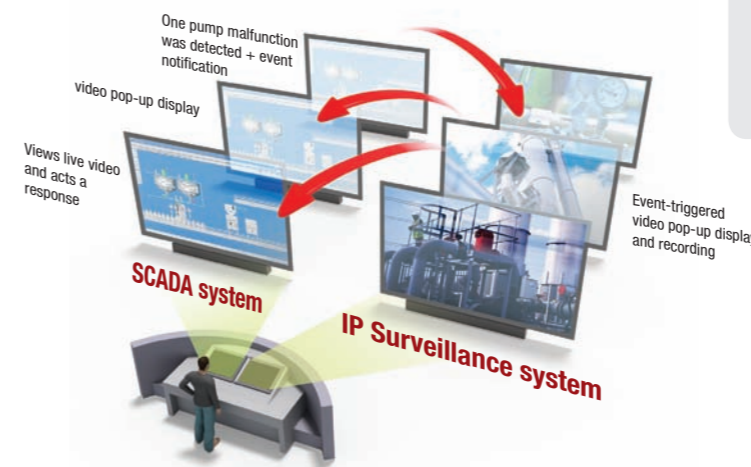
## :- Why SCADA Surveillance?

**User:**  
Is it possible to integrate video surveillance with SCADA/HMI for a single-system monitoring solution?

**SI:**  
Do you mean a surveillance system that can activate the SCADA system? Why?

**User:**  
The current SCADA system relies on I/O signals, and not video, for remote control and monitoring of the vast oil and gas production process. Not only do we need extra IT engineers to keep an eye on the CCTV video 24/7, the alarm notification are terribly slow. We need to conduct a manual cross-system operation to acquire a complete picture of an event that includes both SCADA measurements and video surveillance images.

For example, the SCADA system detects a pump malfunction. The on-duty staff first checks the SCADA system to identify the oil/gas well in question, then checks the CCTV system to locate cameras corresponding to the specific oil/gas well, and then searches the recorded video streams out of the cameras, and finally appraises the situation on-site. This manual response might be too slow if this was a serious emergency, such as a fire. We need to improve our process in order to secure manufacturing, facility, and personnel safety across our large-scale and widely distributed oil and gas application in extreme environment.



**Interconnected SCADA and Surveillance Systems**  
The ideal: a system-operated communication flow, where an interconnected SCADA and surveillance system allows event-triggered video alerts to automate many tasks.

## :- Challenges of Creating a SCADA-interconnected Surveillance System

**SI:**  
The SI performed a thorough study of the User's requirements to get a complete picture of the customer's needs and concerns. The SI was able to outline the fundamental requirements of this extraordinary surveillance solution:

- 1 Hazardous, high-risk environment**  
The oil and gas wells are distributed in the desert across wide temperature extremes that exacerbate the hazardous nature of oil and gas production and pipeline transportation.
- 2 Importance of real-time operations**  
The distances between workstations are huge, not to mention that many locations are unmanned. This makes real-time monitoring and data acquisition essential for event notification and response.
- 3 Prompt crisis response**  
In a crisis, it's not possible to spare precious seconds in order to manually integrate the information provided by the SCADA and CCTV systems. Even in ideal circumstances, the manual search-and-match of information from these two systems is error-prone and time-consuming.
- 4 Event management that includes video**  
Video adds important visual information to alarm and event monitoring, but it is inefficient to locate specific video clips related to SCADA events when the surveillance operation is independent from the SCADA system. Also, if the video data is not automatically logged with other data, it cannot be used for event and trend analysis on the SCADA system.



# Evaluation of the solution options

## :- SCADA Surveillance Solution Development

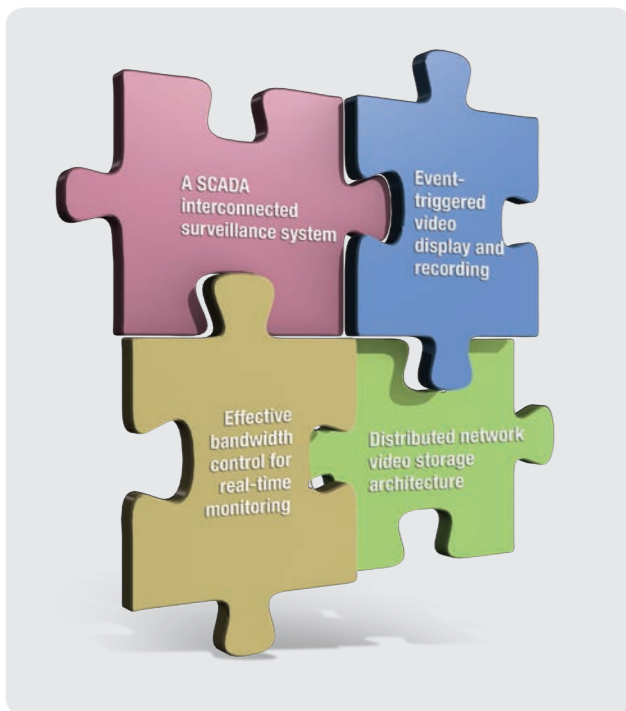
The User's surveillance and SCADA integration requirements were unprecedented. The SI needed a partner with practical experience and relevant technology in both industrial automation and IP surveillance. From their years of experience, the SI quickly recognized that MOXA was the right partner to work with.



We have an extraordinary project to develop a SCADA-interconnected surveillance system for an oil and gas operator. After reviewing the system requirements we have outlined, what do you suggest?



Your timing couldn't be better. Our latest innovation is a SCADA surveillance solution that integrates IP surveillance with SCADA systems to activate event/alarm-triggered video display and recording. Let us share with you our system architecture and preliminary approaches that could very well fit these application requirements.



## :- Strategic Features



The following key features are needed to meet the established project requirements:

### 1 A SCADA interconnected surveillance system

The new solution must interconnect the SCADA and surveillance system to streamline video surveillance from a SCADA interface. The SCADA/HMI users can then directly link to a live feed or playback recorded video upon event detection from the SCADA/HMI console.

### 2 Event-triggered video display and recording

The solution should also be able to generate video alerts in response to SCADA events within surveillance coverage. The SCADA operators be able to use the SCADA event settings to trigger surveillance video alerts that link directly to the relevant cameras for live video monitoring and recording.

### 3 Effective bandwidth control for real-time monitoring

In emergencies, even one second of video lag is unacceptable. The system must reserve sufficient bandwidth for real-time transmissions of video and other data in order to achieve QoS guarantees for this critical application.

### 4 Distributed network video storage architecture

Constant, always-on transmission is a wasteful bandwidth hog. A network surveillance solution with a distributed network video storage architecture along with a video-on-demand mechanism helps adjust video streaming while conserving bandwidth and avoiding network congestions.

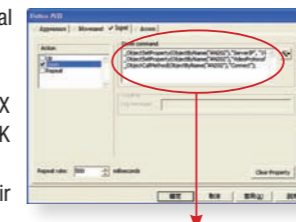
## :- Solution Scenarios

### Solution Scenario 1:

Solution deployment with open architecture SCADA systems



We can feasibly create add-on visual controls for open-standard SCADA systems, such as InTouch, CiTect, and Cimplicity, by leveraging ActiveX technology. Moxa bundles VPort SDK PLUS for free with our products to help SCADA customers develop their own embedded visual applications, such as video popup, triggered recording, alarm history, and PTZ preset control over their SCADA platforms. SCADA customers that adopt this approach can easily integrate visual controls with a SCADA/HMI system to achieve video-converged automation management.



Using VPort ActiveX Control SDK to embed a video control component takes time and skill.

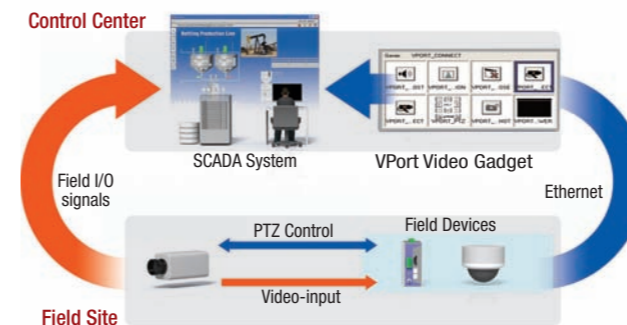
### A Code-free Shortcut Gadget



Is there any way to accomplish this solution with less coding and programming?



Try our new VPort Video Gadget, which is a code-free programming tool. It takes only three steps to insert the available video components into SCADA operations. This VPort Video Gadget already contains the necessary code to embed several video function objects with supported SCADA systems, including Citect, InTouch, Cimplicity, and Elipse. It can be downloaded free from Moxa's website, and it is also a part of the VPort SDK PLUS package.



Moxa VPort Gadget provides a code-free tool to deploy video control component in SCADA systems.

## :- Solution Scenarios

### Solution Scenario 2:

Solution deployment with OPC communications on any SCADA platform



What about SCADA software that doesn't support ActiveX Control? How do we avoid possible impact on the SCADA network performance from the increased video traffic? Can you provide a second scenario that can take the reliability of the SCADA system into account?



Sure. A viable alternative is to use the OPC protocol with SCADA to build automatic communication between the SCADA and surveillance systems. Once any event is triggered, the SCADA system will send an event tag to the IP surveillance system; depending on the settings of the SCADA system this will prompt the IP surveillance system to activate a pop-up video display, record, or generate alarm notification. Ultimately this makes the IP surveillance system an extension to the SCADA system via direct OPC communications, while remaining independent functionally with no interference to SCADA system operations.



A SCADA surveillance solution with OPC communications can work with any SCADA platform



# Solution selection and implementation

## :- Solution Selection

Ultimately, the User decided on OPC communications to bridge the SCADA system and IP surveillance system.



**User:**  
We have decided on the OPC solution to achieve SCADA and video surveillance systems integration because our SCADA system is not as open as Citect, Intouch, or Cimplicity. In addition, we would prefer that this surveillance upgrade focuses on system interoperability and interconnection without any interference on SCADA operations.

## :- 5-MUST Requirements



**SI:**  
With this information, we can form a clear picture of the solution's requirements:

- The CCTV system must be upgraded to an IP video surveillance system.
- The IP surveillance system must be able to communicate with the SCADA system.
- The IP surveillance must be able to activate live-video display or video recording in response to SCADA events and alarms.
- Also, integration of the IP surveillance system must not interfere with SCADA system operations and performance.
- Finally, all of the networking devices must be rugged enough to tolerate the extreme temperature variations of the harsh desert environment.

## :- Activate Your SCADA Surveillance



**MOXA:**

### Upgrade to IP surveillance with VPort Encoders

The system can use the VPort 461 H.264 video encoder to connect existing analog PTZ cameras for video encoding and transmission over Ethernet. The VPort 461 not only delivers fast and high quality H.264 video performance with less than 200 ms latency, but also supports interoperable Modbus/TCP communications with SCADA/HMI systems.



### OPC-enabled SCADA surveillance with SoftNVR-IA

SoftNVR-IA is the top choice that meets the user's preference for OPC IP surveillance and SCADA integration. SoftNVR-IA can directly activate video display and recording with event notifications triggered by the SCADA system through the built-in OPC server. This software simplifies the integrated operations of the IP surveillance and SCADA systems, and enhances alarm efficiency by merging SCADA I/O measurements with surveillance images.



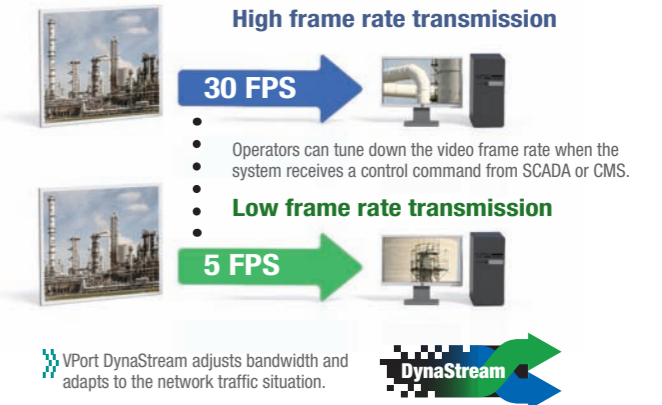
### Maximum network availability with gigabit switches

Since this surveillance system will need to monitor hundreds of drill wells and pipeline facilities, it will need a solid network backbone. The EDS-510A managed switch with three gigabit ports and seven fast Ethernet ports delivers the highly reliable backbone connection required with a rapid fault recovery of less than 20 ms. In addition, this industrial switch supports a wide operating temperature range between -40 to 75°C to guarantee non-stop operations in a desert environment.



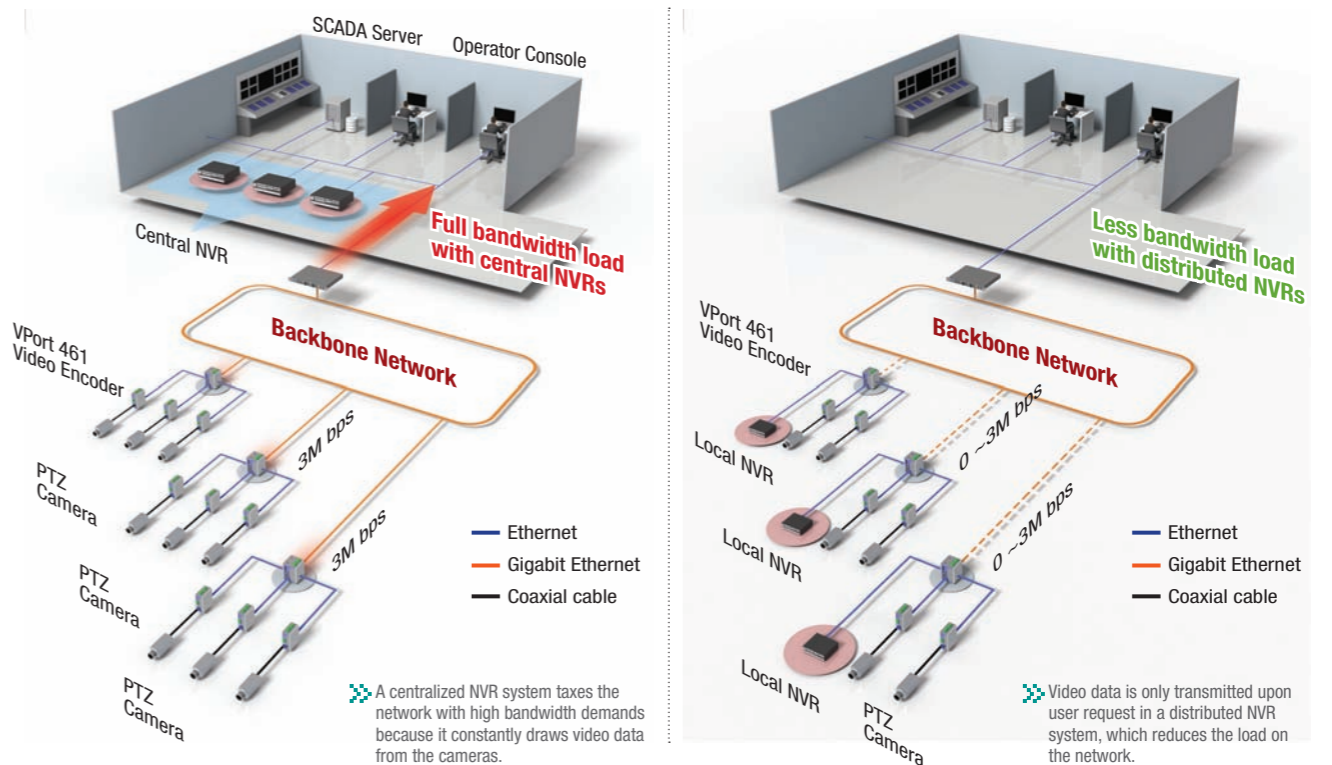
### Adjust network bandwidth with the VPort DynaStream frame rate control

With hundreds of cameras in a SCADA-linked surveillance system, it is important to control the video traffic so that it does not flood over to the common shared network and disrupt critical SCADA data traffic. Moxa has developed advanced VPort DynaStream frame rate control and introduced it to all VPort series products. VPort DynaStream helps HMI operators reduce the video frame rate whenever the operator's console receives a control command in CGI, SNMP, or Modbus issued from the SCADA's network management system. This reserves bandwidth for the SCADA system to maintain Quality of Service (QoS) and guarantees that the SCADA performance will not be impacted by video traffic.



### Balanced network traffic with distributed NVR

Moxa also provides a distributed network video recording (NVR) solution to decentralize the video storage and reduce network bandwidth demands. Instead of gathering all of the recorded video in the control center, the system uses scalable NVR products at field sites for video data storage. In this distributed approach, only video data that is specifically needed will be transmitted over the network, which conserves network resources. With NVR, SCADA or Center Management System (CMS) engineers can view live video feeds or playback recorded video while leaving more bandwidth available and improving surveillance efficiency.





# About Moxa's Industrial IP Surveillance Solutions



## 24/7 security with rugged IP network surveillance

Moxa offers a full range of IP video surveillance products to help you confront a fast changing and uncertain world with comprehensive video monitoring to enhance your facilities' security and safety over IP networks—anytime, anywhere. Our complete line of products includes rugged VPort series video products, user-friendly software applications and tools, and robust industrial Ethernet switches. All of these products feature industrial-grade design, an exceptional price to performance ratio, and industrial certifications to guarantee the reliability and constant operations of your IP surveillance system.

## 23 years of experience in versatile communication integration solutions

With over twenty-three years of combined expertise, Moxa provides not only a wide range of industrial device networking solutions, but also a deep portfolio of network centric solutions that successfully bundle data, voice, and data into a single network platform to simplify operations, increase flexibility, maximize reliability, as well as saving time and costs to enhance your competitiveness.

## Robust industrial design and reliability

Industrial-grade capabilities and a high MTBF value make Moxa's IP surveillance solutions the ideal choice for industrial applications. Moxa's products can thrive in commonly encountered industrial conditions, thanks to: a wide operating temperature range of -40 to 75°C, redundant power inputs, high level enclosure protection, built-in fiber connections for electrical interference immunity, and industrial certifications and approvals (e.g., EN50155, Class I, Div 2/ ATEX Zone 2, NEMA TS2, UL508/UL60950-1, and DNV/GL/ABS/LR/NK).

## 5-year warranty and proven quality

As an ISO 9001:2000 and ISO 14001 certified company, Moxa adheres to strict quality control and environmental standards in design, production, and shipment processes. To guarantee the best service possible and deliver the world's most trustworthy solutions, Moxa offers a solid 5-year warranty across our entire range of products.

## Global scope, local service

Moxa has an extensive network of professional and experienced distributors located in more than 60 countries around the world. Moreover, we maintain branch offices on three continents to ensure direct and immediate service for our customers. Through our worldwide sales connections and global technical support windows, Moxa offers customers prompt in-country sales service, just-in-time delivery, and timely technical support.

## IP video surveillance product portfolio



### Industrial Video Servers

Moxa's industrial video servers combine 1-channel and 4-channel H.264/MJPEG/MPEG4 video capture with a unique rugged design to adapt to any mission-critical environment. Customers can simply select and add any VPort series video encoder/decoder to their existing CCTV systems to upgrade to an IP surveillance system, with no need to replace the existing equipment.



### Outdoor IP Cameras

Vandal-proof and IP66-rated, these cameras are equipped with high-quality day and night lenses to make them suitable for outdoor environments.



### Industrial Multi-service Gateways

These modular multi-service gateways are designed to speed up field-to-center data transmissions with IP interoperability for large-scale decentralized automation systems. Moxa's compact sized gateways accommodate a flexible combination of diverse communication devices, and deliver all types of received signal over the Gigabit Ethernet backbone. These gateways save costs in wiring and maintenance and are easy to deploy in outdoor control cabinets with limited space.



### Industrial Gigabit Ethernet Switches

Moxa provides a comprehensive range of IEC61850-3 rackmount Ethernet switches, Layer 2 Ethernet switches, Layer 3 Ethernet switches, full Gigabit Ethernet switches, and PoE switches to help build a highly reliable and redundant network backbone (recovery time < 20 ms) for demanding IP surveillance systems.



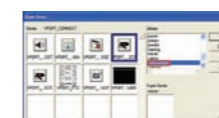
### IP Surveillance Software

SoftNVR-IA is a 32-channel IP Video Surveillance Software designed for industrial automation systems. The software features a built-in OPC server that enables direct communications between factory floor automation systems and Moxa's VPort series surveillance products.



### Software Development Kit

VPort SDK PLUS is bundled for free with VPort products to help customers develop their own custom surveillance applications. VPort SDK PLUS helps engineers integrate video management systems with monitoring and control applications, such as SCADA systems, access control systems, and fire alarm systems.



### Software Gadget

VPort Video Gadget is a code-free programming tool which takes only 3 steps to integrate surveillance video control with open standard SCADA systems, such as Citect, InTouch, and Cimplicity.