



Boost Your IIoT Development

An intelligent platform for data acquisition and device management

The Key to Boosting IIoT Development in Your Projects

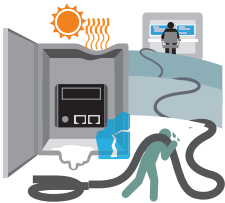
Data is at the heart of the Internet of things (IoT). To make critical data-informed decisions, businesses first need to capture and collect data from all sorts of devices over the Internet before converting the data into valuable business information. However, implementing an Industrial IoT application is even less straightforward. When putting an Industrial IoT strategy into action, businesses are faced with a number of critical challenges.

Critical Challenges and Moxa's Solutions



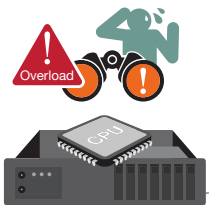
► How to simplify complex integration of devices for mass deployment in industrial IoT environment?

Moxa's ThingsPro Suite enables the integration of edge-device management, data acquisition using Modbus, and data upload to your private cloud server or third-party cloud services using MQTT and RESTful APIs.



► How to maintain a stable data transmission in extreme environments with cabling constraints?

Moxa offers industrial IoT gateways that support 4G LTE connectivity with a wide operating temperature range from -40 to 70°C. In addition, Moxa's ThingsPro Suite offers 4G keep-alive function to ensure a reliable data transmission.



► How to maintain your system uptime in unstaffed or remote sites?

In a typical Industrial IoT environment, the IoT gateways are often located at unstaffed or remote sites, which make troubleshooting and maintenance extremely difficult and expensive. Moxa's ThingsPro Server enables remote device management tasks, such as remote access and configuration, firmware upgrade, and device reboot, for easy maintenance of your IIoT devices.



► How to keep your valuable business data secure?

To prevent unauthorized access, Moxa provides enhanced security for every communication level of your IIoT system, including device, kernel, and API, using secure boot, data encryption, VPN tunneling, and API security tokens.

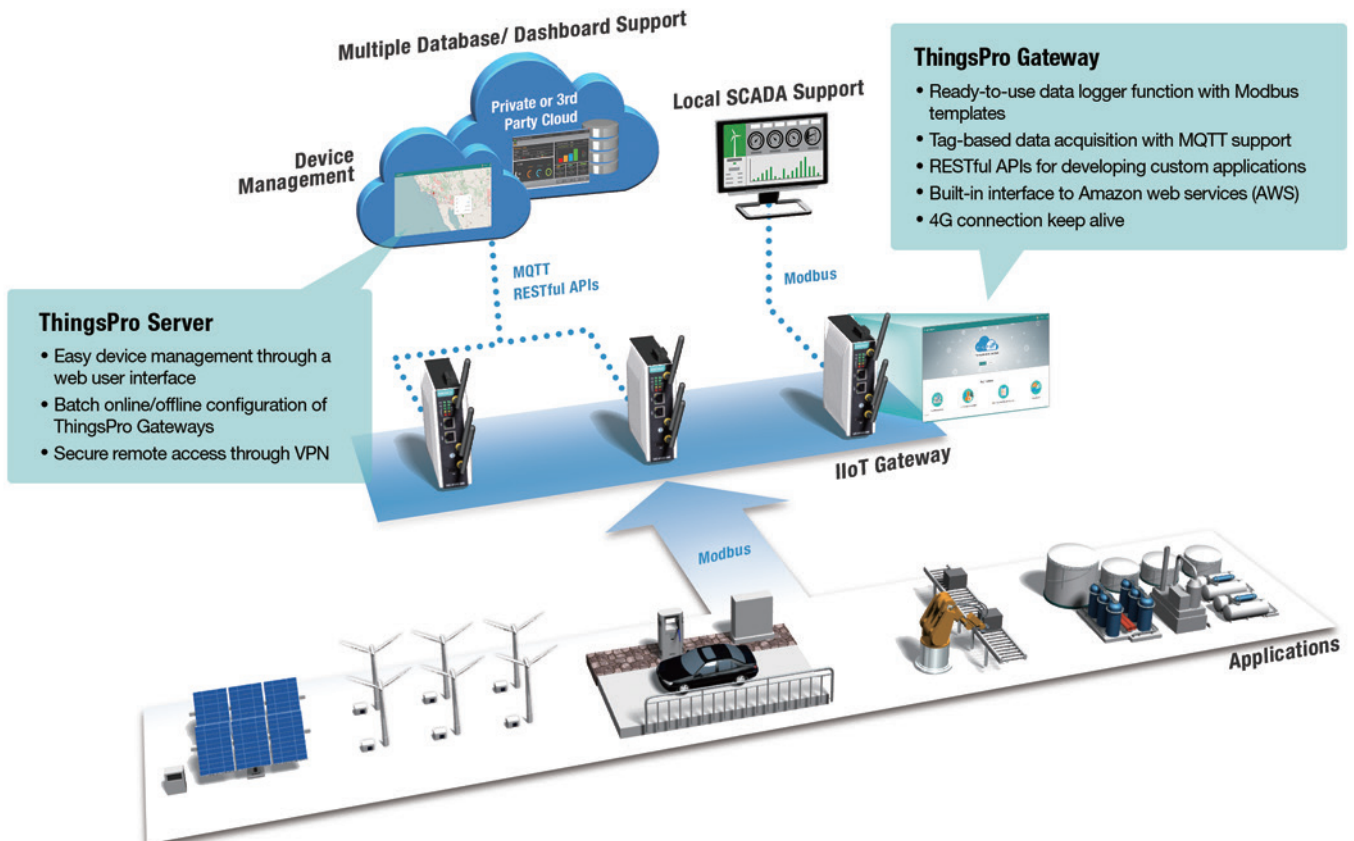


ThingsPro™ Suite 2 - An Intelligent Data Acquisition and Device Management Platform

The ThingsPro Suite enables fast integration of field devices with the cloud by providing a ready-to-run Modbus polling engine and client interfaces to IIoT cloud services, such as Amazon Web Services (AWS).

ThingsPro leverages the IoT-recognized MQTT protocol as a communication backbone. MQTT is known for its efficiency for WAN communication and is widely adopted by multiple industries. Amazon Web Services (AWS) and Microsoft Azure, for example, use this protocol as the predominant communication interface for their cloud web services. MQTT is also known for its easy integration into databases. Users can easily use open source plug-ins to convert MQTT data into common formats used by commercial databases.

ThingsPro System Architecture



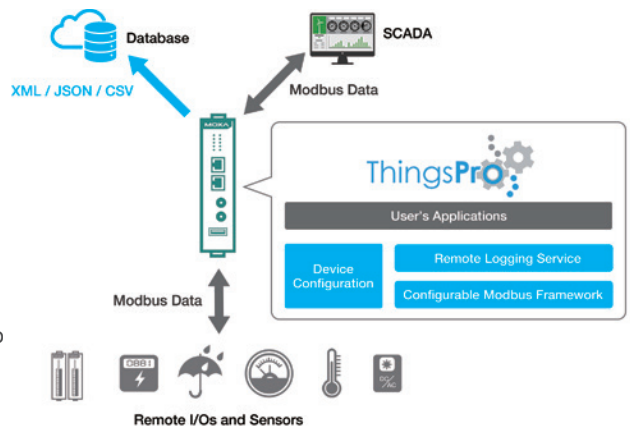
Key Features

ThingsPro Suite is a set of software packages built on an open Debian Linux platform that enables the integration of Modbus communications, computing, data acquisition, and wireless networking in a few simple steps. Featuring the Gateway and Server tools, the ThingsPro Suite empowers users to easily deploy, manage, and integrate field devices with services and applications in the local SCADA or on the cloud.

ThingsPro™ 2 Gateway

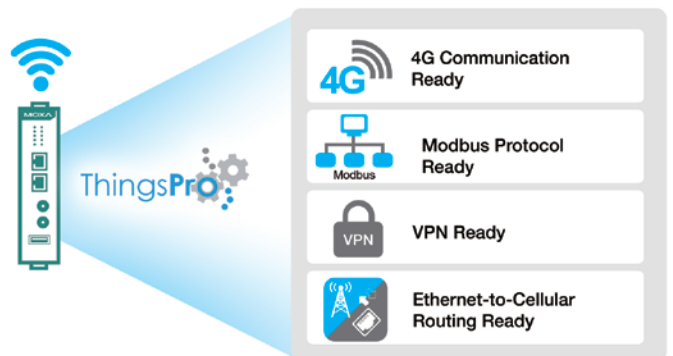
► Programmable Modbus Data Logger between Field Devices and a Database

For users who develop their own data acquisition and asset management software programs, the ThingsPro Gateway provides the ability to transfer field data directly to remote databases without any additional programming on the gateway. Because ThingsPro Gateway includes generic Modbus protocol support, users can easily configure protocol polling tables and upload data to the back-end database. This way, users can focus on developing applications without having to worry about how to get and transfer their data to back-end databases.



► A Communication-Ready Programmable Platform

An Industrial IoT environment comprises of several areas, each of which requires a different type of expertise. For example, many people in the automation industry are knowledgeable about industrial protocols such as Modbus, but they are not familiar with Information Technology and 4G LTE. ThingsPro Gateway assists users and experts in automation technology in connecting their field devices to a wide area network (WAN) by performing all the necessary conversion tasks for them. The result is that engineers don't have to spend extra effort to familiarize themselves with wireless technology and can focus more on application development.



► RESTful APIs Provide Access to ThingsPro Functions Specifically Designed for You

All software functions on the ThingsPro Gateway are made available in an API format. Programmers can save considerable time and effort by integrating ThingsPro APIs into their custom programs and applications.



ThingsPro™ 2 Server

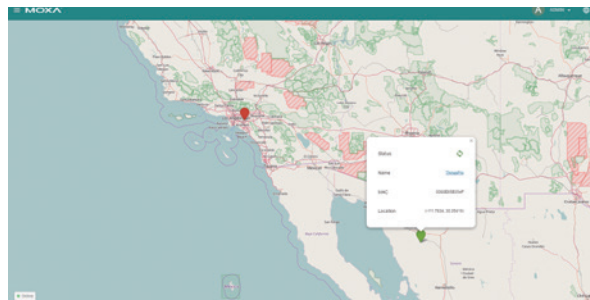
▶ A Device Management Tool to Help You Manage Remote Assets

ThingsPro Server is a software service for device management, which can be hosted on common cloud service providers, such as Amazon Web Services (AWS). The ThingsPro Server provides a map view to locate and manage your ThingsPro Gateways. You can also perform remote firmware upgrades, configuration changes, or user application upgrades on demand or as per a schedule that you define.



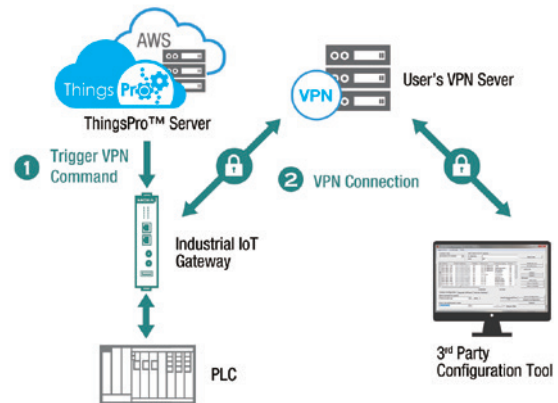
▶ Interactive Map View for Easy Management

Once the devices are deployed to the field, you will need a convenient way to remotely manage the gateways and connected devices. ThingsPro Server is a cloud-based device management tool that allows you to remotely conduct firmware upgrades, configuration changes, and user-program updates both on-demand or using a preset schedule. It provides a map view to allow you to identify device locations by dropping pings on a map. You can then use the interactive map to view the status of a device or change the configuration of Moxa's Industrial IoT gateways.



▶ Securing Remote Communication

ThingsPro Server comes with multiple security functions, including user group and sub-group login authentication, token authentication to secure API calls, and TLS v1.2 data encryption. ThingsPro Server can open a secure VPN tunnel to a VPN server, which enables you to set up secure VPN connections to access remote devices behind an Industrial IoT gateway using third-party tools.



▶ Account Management Tool for Access Control

When it comes to system management, ThingsPro allows system administrators to create administrator level and user level accounts limiting user access to the Industrial IoT gateways in their network.



- Developer Administrator (Root)**
- Token management for device identification
 - All Administrator tasks



- Administrator**
- Manage devices
 - Schedule batch jobs
 - Manage user accounts



- User**
- Read only

Solar Energy Management Systems

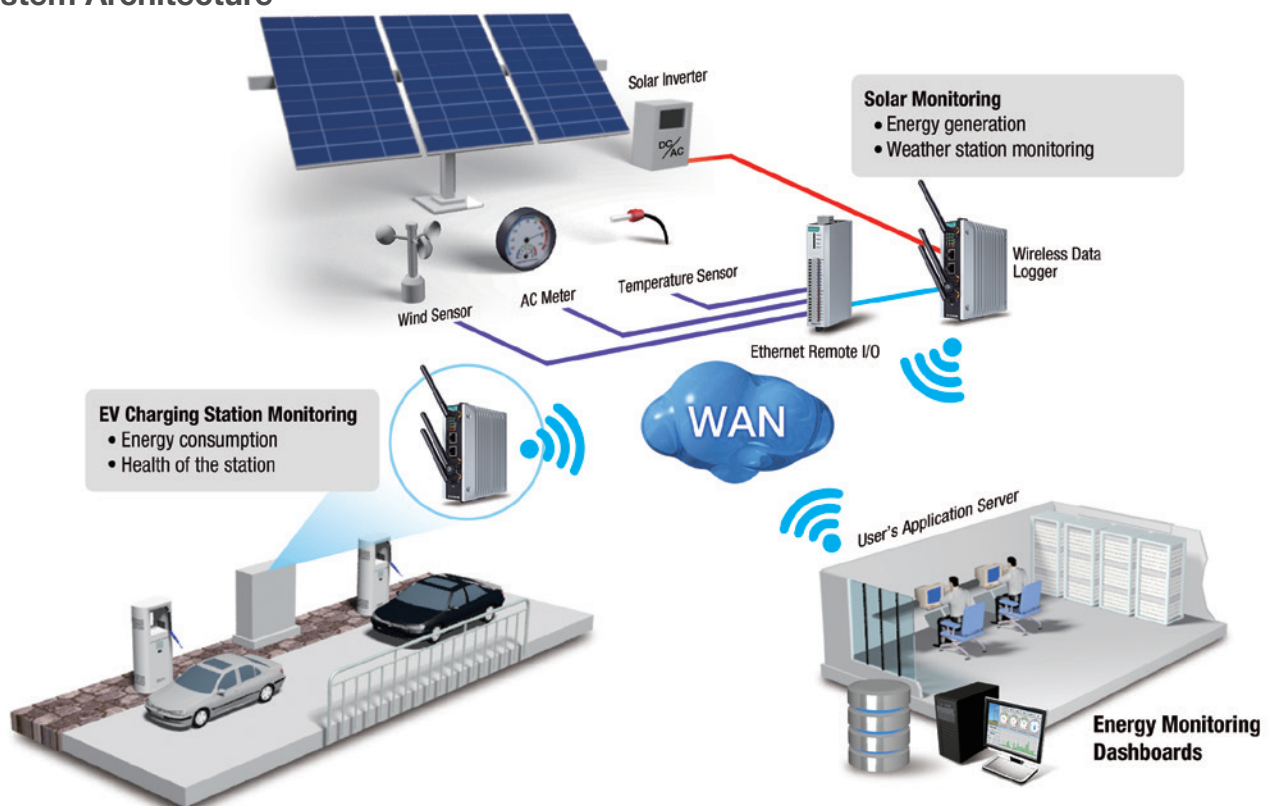
Industry Background

In order for solar energy firms to be successful, they must provide scalable solutions that can cater to the needs of all their customers starting with small residential solar installations all the way up to large buildings and power plants. A system that can monitor the solar energy production and consumption and present the data on an easy-to-understand dashboard can empower the solar energy companies increase efficiency in their production and distribution cycles. The system can also help solar energy companies monitor field equipment so that they can reduce system downtime.

Users' Needs and Requirements

Users require a solar energy management company with expertise in data processing and the ability to display information on dashboards. Solar energy management companies must allocate their engineering resources on how to display the information on dashboards, instead of taking care of remote device management and data transmission from the field to the central server. Thus, solutions that can help businesses take care of data acquisition and device management are going to be the most beneficial for them.

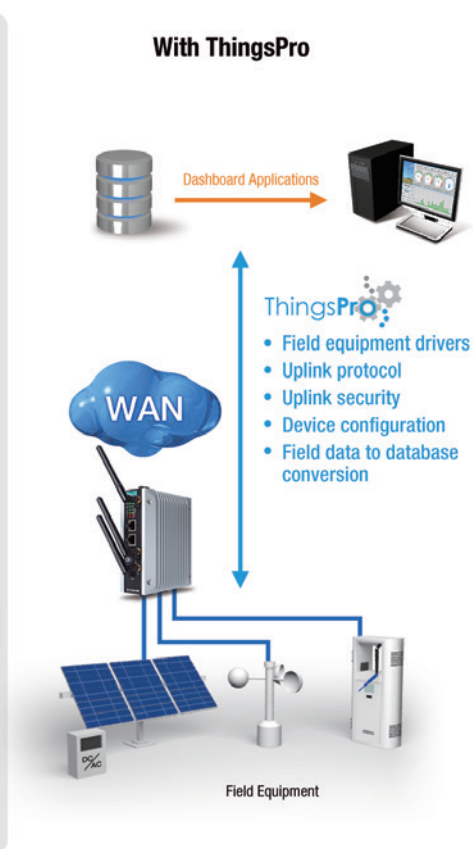
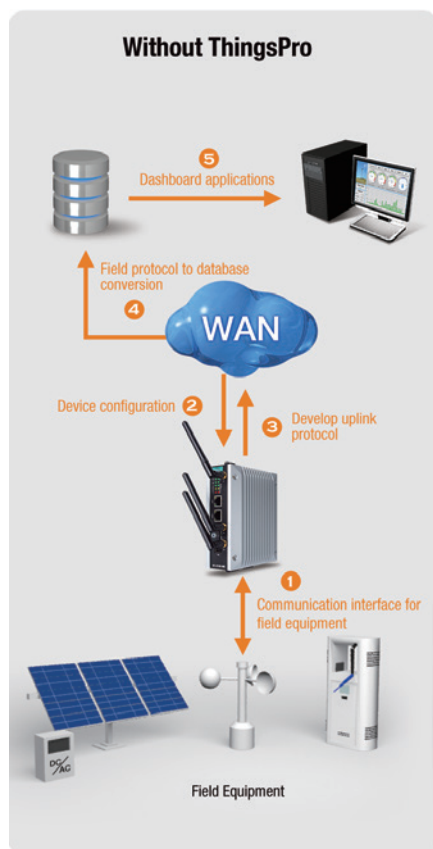
System Architecture





Why ThingsPro™ Works for the Customer

ThingsPro is an integrated Modbus communications, computing, data acquisition, and wireless networking solution. ThingsPro has ready-to-run field-device management capabilities for both field sites and the control center. You can use ThingsPro's RESTful APIs to build an on-site dashboard or use the device management server utility to mass configure or manage field gateways and connected devices. One of the major challenges faced by users in this regard is that field device protocols are industrial protocols that were not designed for remote data transmission and are not compatible with IT-based SQL protocols. The ThingsPro Gateway tool, hosted on field-device gateways, supports generic Modbus/TCP and Modbus RTU protocols for data acquisition and uses MQTT to communicate with IT applications and databases on the cloud, without the need for you to develop protocol-conversion solutions.



Related Products

UC-8100-ME-T Series Industrial IoT Gateway

- Supports 4G LTE connectivity
- -40 to 70°C wide operating temperature range
- ARM Cortex-A8 1GHz processor
- Dual auto-sensing 10/100 Mbps Ethernet ports



ioLogik E1200 Series Ethernet Remote I/O

- 2-port Ethernet switch for daisy-chain topologies
- -40 to 75°C wide operating temperature range
- Wide selection of models with combinations of AI, AO, DI, DO, DIO, and relay outputs



Benefits

- Ready-to-run tool for field-data acquisition, device management, and protocol conversion for data transfer
- Debian Linux platform support to enable creation of custom drivers
- Application development support with RESTful APIs

Weather Station Monitoring Systems

Industry Background

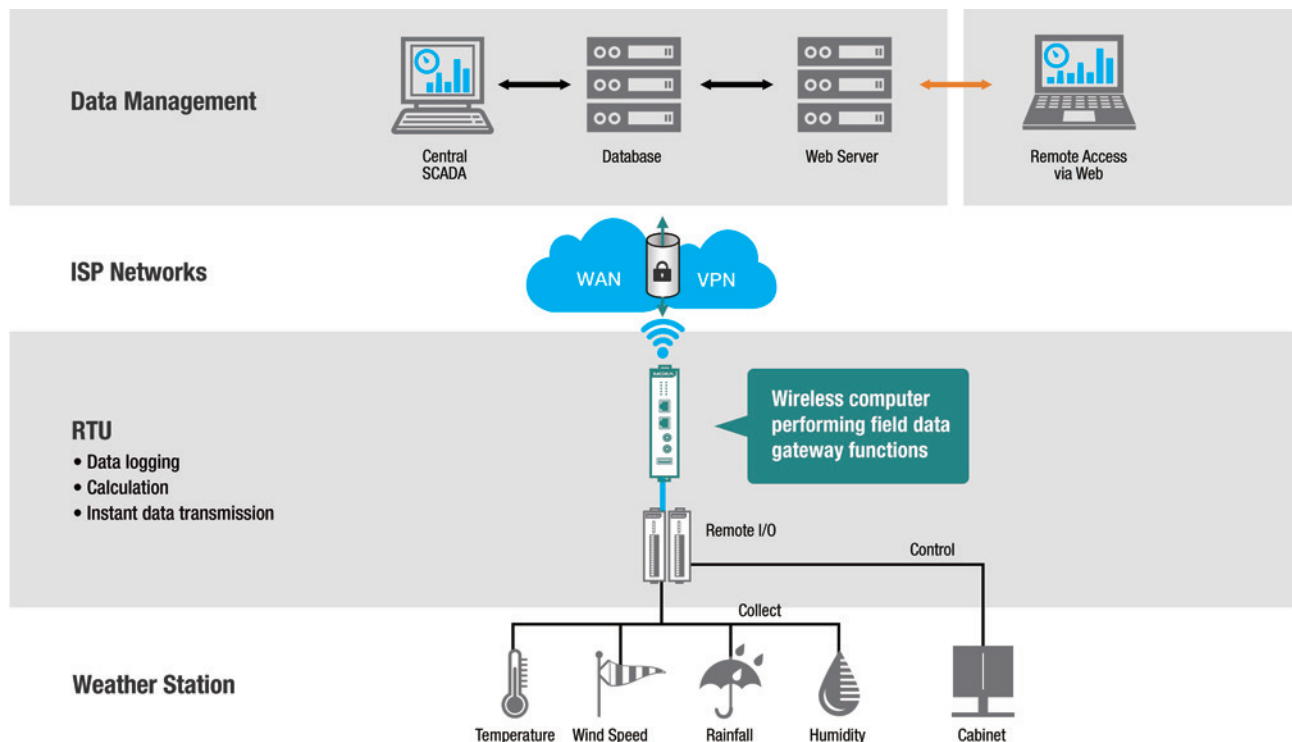
National weather monitoring systems are very important for countries that experience monsoon seasons. National weather monitoring installation projects must have an experienced and professional team who know how to customize the systems. The monitoring systems should provide the government agency with a mechanism to provide an early warning alert to the general population when an emergency situation arises in order to prevent catastrophe.

Users' Needs and Requirements

Due to the fact that weather stations are often in remote locations, if there is a system failure, site visits are often not a feasible option. Therefore, system administrators must be able to remotely apply preventive maintenance or restore the systems in case of failure. This remote monitoring and control is critical for the success of any project.

Another challenge is that despite their familiarity with Fieldbus protocols, implementing a lightweight WAN protocol to reduce data usage is a big concern for industrial automation users. Furthermore, they must also translate the industrial protocols to an IT-based protocol and vice versa in order to give users the ability to remotely activate an I/O control signal.

System Architecture

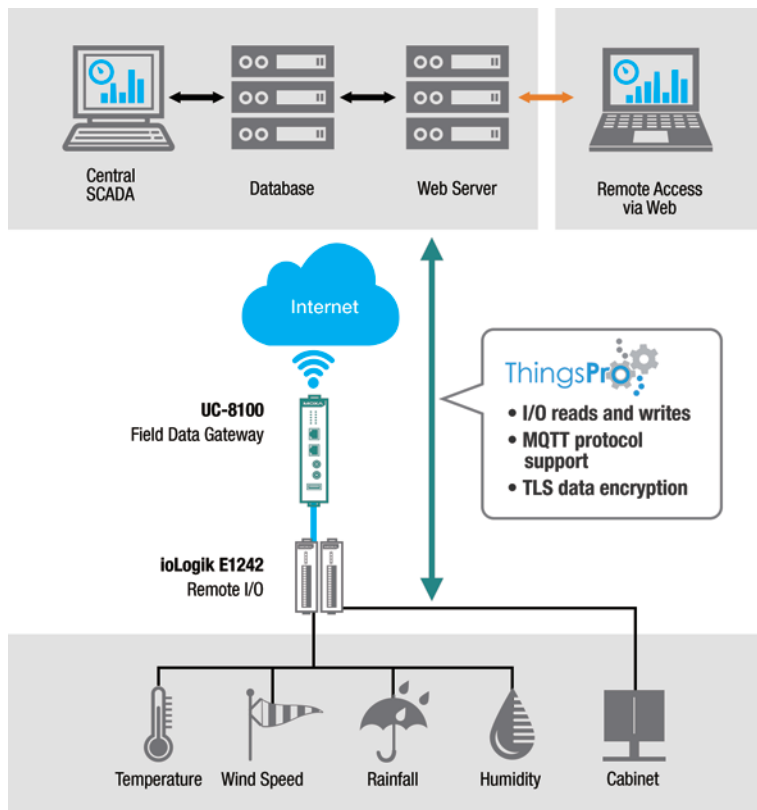




Why ThingsPro™ Works for the Customer

The UC-8100 field data gateway that runs the ThingsPro Suite is equipped with drivers for the ioLogik E1242 remote I/O device. When the ioLogik driver is selected, all I/Os will be available for the data-logging program to use. Weather monitoring system manufacturers can build the logging and control logic per the government's request, and use the pre-packaged MQTT and TLS tunneling API to push the data back to the central site. MQTT is a proven lightweight protocol that is used by many mobile devices to reduce wireless overheads.

ThingsPro automatically takes care of the data conversion to and from the database. Therefore, the end user's software program can easily use the APIs that ThingsPro provides to read and write the data from the remote field sites. The device management capability of ThingsPro also allows the system administrator to remotely access the field data gateway and ioLogik remote I/Os to monitor the health of their devices and reboot the system in case of failure.



Recommended Products

UC-8100-ME-T Series Industrial IoT Gateway

- Supports 4G LTE connectivity
- -40 to 70°C wide operating temperature range
- ARM Cortex-A8 1GHz processor
- Dual auto-sensing 10/100 Mbps Ethernet ports



ioLogik E1200 Series Ethernet Remote I/O

- 2-port Ethernet switch for daisy-chain topologies
- -40 to 75°C wide operating temperature range
- Wide selection of AI/O and DI/O types including AI and DI/O all-in-one model-ME-T



Benefits

- Secure data transmission, from edge to central, with MQTT and TLS
- Ready-to-run drivers for analog and digital I/O modules
- Easy-to-use native APIs for data access
- Open source computing platform for data logging and control logic programs

Remote Asset Management for Intelligent Transportation Systems (ITS)

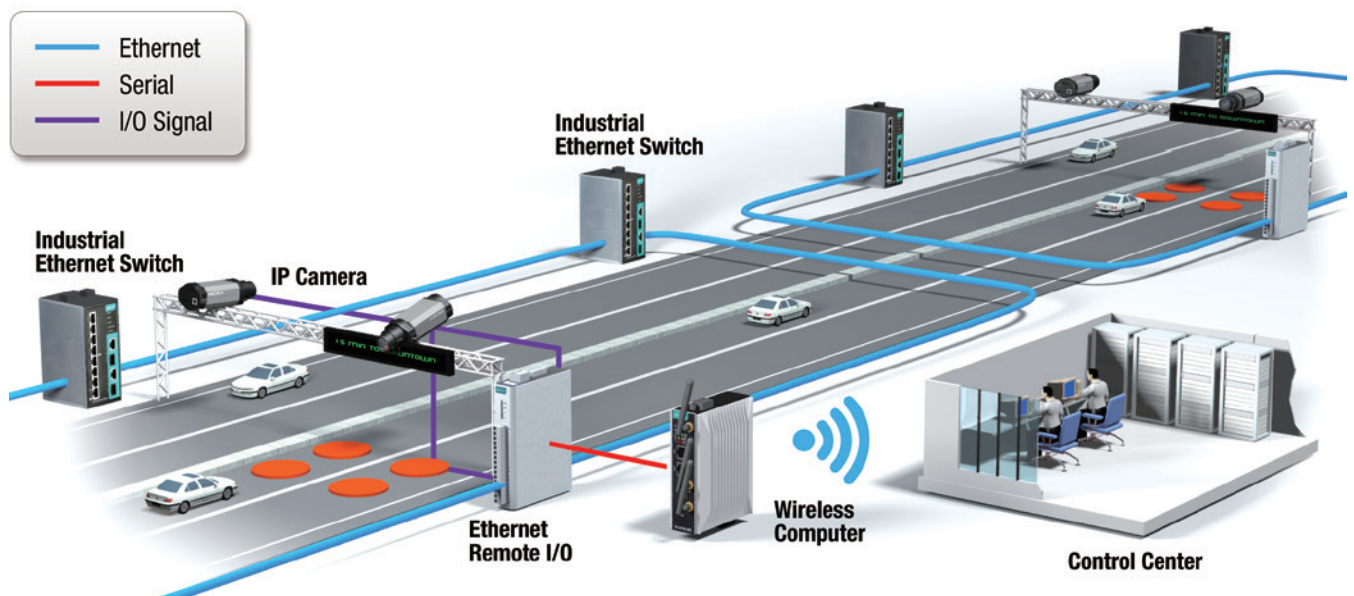
Industry Background

In smart cities, intelligent transportation systems are already an essential part of people's daily lives. Keeping such a complex system operating smoothly is a big challenge for city transportation authorities who typically incur high costs sending personnel to sites where equipment has malfunctioned. In addition, some authorities have noted that the real challenge is to know that a malfunction has occurred.

Users' Needs and Requirements

City transportation authorities need to know when there has been a system failure and be able to remotely diagnose the problem in real time. Since there are often thousands of devices deployed across the city, they also need to be able to remotely reboot systems without deploying personnel unless it is absolutely necessary. In addition, they must keep track of the health of the equipment and provide preventative maintenance to avoid system failures, and be able to remotely configure and manage onsite equipment.

System Architecture





Why ThingsPro™ Works for the Customer

ThingsPro provides the ability to use a web browser via the server and a field programmable gateway to access all of the field devices. Typically, the majority of industrial equipment, including switches, remote I/Os, RTUs, and fieldbus gateways all support Modbus/TCP. Moxa's end-to-end data conversion solution uses ThingsPro to convert the data from the Modbus devices so they can be remotely monitored on a web browser by the user.

The data captured by the gateway can be fed directly to the user's database. Users can also use the Linux programming environment and the SDKs that are provided to interact with the field devices to do advanced data processing and then use the SDK to send the data directly to the server and the database. That is, users do not have to worry about protocols used for uplink and how to convert the I/O data from the field to the database.

Benefits

- Remote device management function reduces the time and effort needed for site visits
- Easy troubleshooting capabilities reduce system downtime
- Remote control function to reboot devices and upgrade firmware

Recommended Products

UC-8100-ME-T Series

Industrial IoT Gateway

- Supports 4G LTE connectivity
- -40 to 70°C wide operating temperature range
- ARM Cortex-A8 1GHz processor
- Dual auto-sensing 10/100 Mbps Ethernet ports



ioLogik E1200 Series

Ethernet Remote I/O

- 2-port Ethernet switch for daisy-chain topologies
- -40 to 75°C wide operating temperature range
- Wide selection of AI/O and DI/O types including AI and DI/O all-in-one models



EDS-P510 Series

Managed Ethernet Switch

- SmartPoE for easy PoE links, diagnostics and monitoring
- -40 to 85°C wide operating temperature range



VPort 36-1MP Series

Rugged IP Camera

- -40 to 75°C wide operating temperature range
- HD resolution (1280 x 720)



Remotely Controlled Monitoring Systems for Digital Advertisement Boards

Industry Background

Digital Technology has taken advertising into a new era. In recent years, billboards are being replaced by digital signage advertisement boards. This trend has seen a significant increase in digital advertisement service providers' projects, who typically place their digital advertisement boards along highways, in shopping centers, or at other locations with high volumes of human traffic.

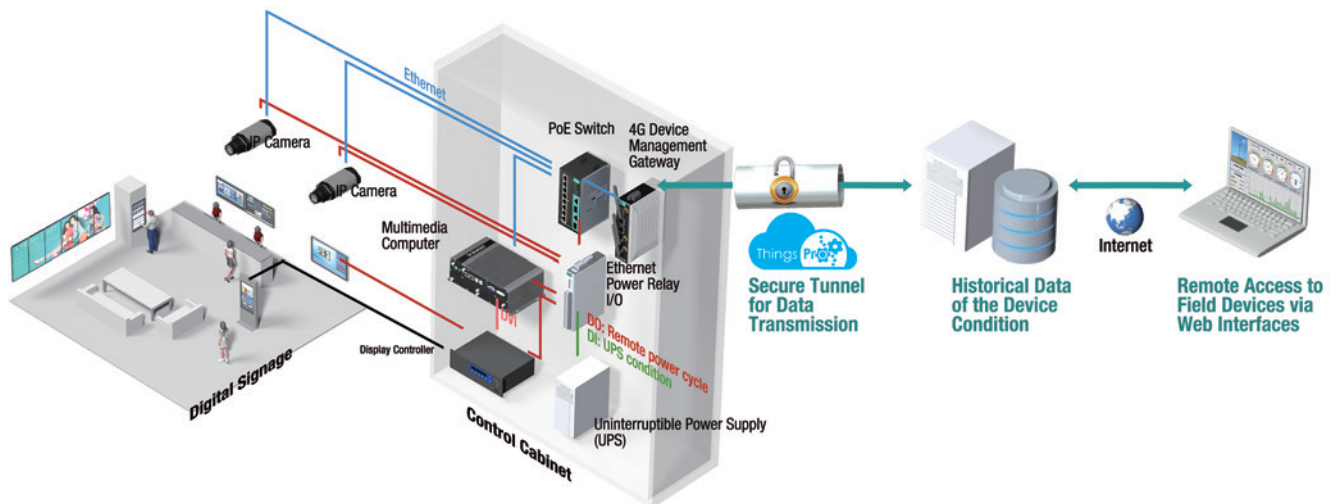
Users' Needs and Requirements

The digital signage system consists of an outgoing leased line that allows the system administrator to remotely upload the multimedia content. The multimedia computer is responsible for receiving the video data and then sending it via the display ports to the display controller that controls the digital signage.

Digital advertisement service providers' sales are often hampered by the short response time required by their clients. It is often part of their service contract with their clients that if the system goes down, they must restore it within 24 to 48 hours. The fact that displays must be physically checked means that clients are limited to advertisement locations that are easily reachable by service crews.

To address these issues and to extend their business reach to areas outside the current capabilities of their service crews, many advertisement companies install IP cameras to allow remote visual checkups and also add cellular links to increase the flexibility of communications methods. Moreover, they also want to be able to remotely monitor the conditions of all the onsite equipment and have the ability to remotely reset the system to see if it recovers before deploying service crews.

System Architecture





Why ThingsPro™ Works for the Customer

Moxa's total solution for remote control, networking, monitoring systems, and asset management has been designed to work for most projects. First, almost all of Moxa's equipment, including switches and I/Os, support Modbus/TCP protocols for monitoring or controlling field devices. Thus, the user can use Modbus/TCP as the generic protocol to allow the UC-8100, a 4G LTE industrial IoT gateway, to monitor or control the field devices. For example, when the UC-8100 detects a failure in one of the PoE ports, an IP camera, or the UPS, it will send an alert to the server. The UC-8100 can also be used to remotely send relay power cycle commands to the Ethernet power relay to power on devices remotely, as a first attempt at system recovery.

The UC-8100 can store the device status in a local database, and then later synchronize the data with the central database for overall system optimization analysis. ThingsPro also supports secure connections and data transmission between the device management gateway and the server. That is, users can rest assured that the kind of communication protocol and the data sent between the field devices and the server are compatible. Finally, in order to make the set up easier, the UC-8100 system can be set up and ready-to-run with a few simple configuration steps.

Benefits

- Ready-to-use Modbus/TCP frameworks for field device monitoring and control
- Secure data transmission, from edge to central, with MQTT & SSL
- Ready-to-use web user interface to remotely trigger power-on to reduce service crew overhead

Recommended Products

UC-8100-ME-T Series

Industrial IoT Gateway

- Supports 4G LTE connectivity
- -40 to 70°C wide operating temperature range
- ARM Cortex-A8 1GHz processor
- Dual auto-sensing 10/100 Mbps Ethernet ports



MC-7270-DC-CP Series

x86 Fanless Computer

- Intel® Core™ i7/i3 processor
- -40 to 70°C wide operating temperature range
- 3 video outputs with 2 DVI-I and 1 VGA ports



EDS-P510 Series

Managed Ethernet Switch

- SmartPoE for easy PoE links, diagnostics and monitoring
- -40 to 85°C wide operating temperature range



ioLogik E1200 Series

Ethernet Remote I/O

- 2-port Ethernet switch for daisy-chain topologies
- -40 to 75°C wide operating temperature range



VPort 36-1MP Series

Rugged IP Camera

- -40 to 75°C wide operating temperature range
- HD resolution (1280 x 720)



Geographic Information Systems for Natural Disaster Prevention

Industry Background

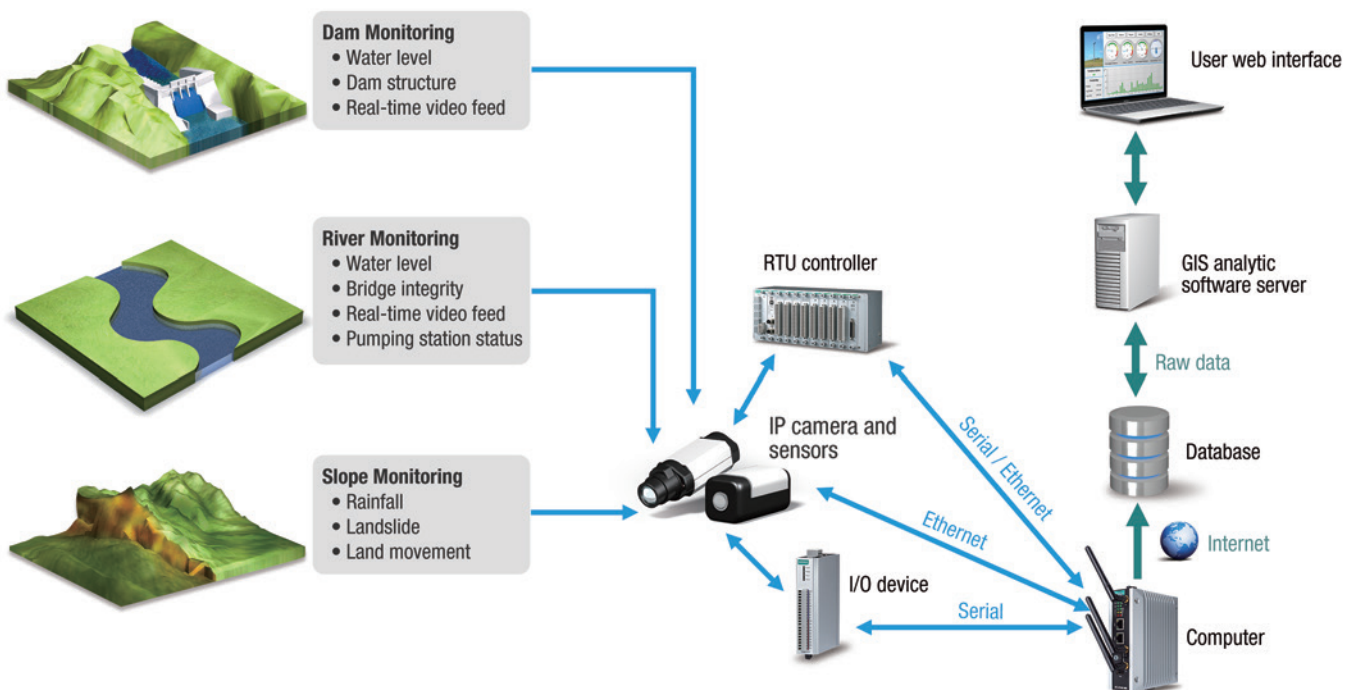
Disaster prevention is an essential consideration for smart cities. Many disaster prevention service providers and research centers are using information gathered by Geographic Information Systems (GISs) to collect all the data pertaining to rainfall, landslides, dam and river levels, and lake changes, and then transfer that data to a map-based GIS. This information will then be utilized by fire and rescue departments to limit the damage caused by natural disasters.

Users' Needs and Requirements

Disaster prevention service providers need to collect various kinds of data from remote locations. This data often comes from different devices using different formats and protocols. The fact that this data often takes a long time to process before it is usable reduces the time available for the development of the GIS. To overcome the incompatibilities of different data formats, service providers should offer a total data acquisition solution that can store the data in a database that the GIS can use.

An additional drawback is that current systems do not support remote management. Therefore, when the system settings need to be changed or a firmware upgrade must be performed, personnel have to be dispatched to the site in order to carry out their tasks.

System Architecture





Why ThingsPro™ Works for the Customer

ThingsPro provides the ability to use a web browser via the server and a field programmable gateway to access all of the field devices. Typically, the majority of industrial equipment, including switches, IP cameras, remote I/Os, RTUs, and fieldbus gateways all support Modbus/TCP. Moxa's end-to-end data conversion solution uses ThingsPro to convert the data from the Modbus devices so they can be remotely monitored on a web browser by the user.

The data captured by the gateway can be fed directly to the server, and then to the user's database. Users can also use the Linux programming environment and the SDKs that are provided to interact with the field devices to do advanced data processing and then use the SDK to send the data directly to the database. That is, users do not have to worry about protocols used for uplink and how to convert the I/O data from the field to the database. ThingsPro takes care of the data flow for you.

Benefits

- Ready-to-run device management, field device protocols and field data to database conversion
- Free up customer's software resources to focus on energy analysis dashboard development
- Open system for the customer to build customized drivers if needed

Recommended Products

UC-8100-ME-T Series

Industrial IoT Gateway

- Supports 4G LTE connectivity
- -40 to 70°C wide operating temperature range
- ARM Cortex-A8 1GHz processor



VPort 36-1MP Series

Rugged IP Camera

- -40 to 75°C wide operating temperature range
- HD resolution (1280 x 720)
- Triple video streams with H.264 and MJPEG



ioLogik E1200 Series

Ethernet Remote I/O

- 2-port Ethernet switch for daisy-chain topologies
- -40 to 75°C wide operating temperature range



EDS-405A Series

Managed Ethernet Switch

- Supports EtherNet/IP, Modbus/TCP and PROFINET protocols for device management and monitoring
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches)
- RSTP/STP for network redundancy



ioPAC 8600 Series

Modular RTU Controller

- Modular CPU/PWR/Backplane/IO design
- Supports 24 to 110 V power input range and DI/O modules
- Supports C/C++ and IEC 61131-3 programming languages



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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