Cloud-Enabled Edge Gateways for Industrial IoT

Powering Edge Intelligence with Advantech WISE-EdgeLink

Microsoft Azure

Allen-Bradley

CUMULOCITY IoT

ABB

Honeywell SIEME

Public Cloud & Private Cloud

amazon web services

ERICSSON

YOKOGAWA

Panasonic

Schneider

OMRON

ADVANTECH
WISE-PaaS
AIoT Solutions & Marketplace

WISE-EdgeLink

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

Transmit Data to the Cloud and Enable Edge Intelligence with WISE-EdgeLink

With the emergence of industrial IoT, companies are seeking solutions that facilitate the use of data analytics to improve service levels, create superior products, and reduce operating costs. The first step in this process is the digitalization of all assets, which means increasing amounts of data collected from different equipment must be analyzed. Equipment manufacturers, owners, and maintenance personnel require an easy and reliable method for collecting data from field-based equipment. Advantech's WISE-EdgeLink provides a data acquisition solution that does not require frequent on-site maintenance and service trips. With this solution, users can monitor critical assets, track equipment performance, receive alarm notifications, and perform system management and configuration using handheld devices. This will substantially reduce costs and ensure field equipment and facilities are better monitored and controlled.

Advantages of WISE-EdgeLink

Optimizing Efficiency with Connected Equipment

For industrial boilers, air compressors, chillers, power distribution cabinets, and other equipment, WISE-EdgeLink serves as a hub for data acquisition, storage, and reports, as well as alarm notifications, maximizing equipment efficiency with the provision of accurate data.

Plug-and-Play Cloud Access for Rapid Deployment

Plug-and-play functionality for data transmissions to the cloud eliminates complex programming and configuration. This ensures data can be easily uploaded for analysis and visualization to provide a useful reference for operational optimization.

Secure Data Conversion for Integrating Data with Third-Party Systems

WISE-EdgeLink supports data conversion, enabling equipment used for mass production, such as PLCs, sensors, and inverters, to be directly integrated with SCADA, MESs, and ERP systems for convenient operation and maintenance.

Fanless Embedded PC   **Industrial Protocol Gateway**

Machine-to-Intelligence
- Leasing equipment management
- Overall equipment efficiency
- Pump status monitoring
- Flow pressure monitoring
- HVAC system operating status analysis

Factory Environment
- Facility energy management
- Wastewater discharge
- Continuous emissions monitoring systems
- Volatile organic compounds monitoring
- Industrial park energy management

Public Cloud & Private Cloud

Microsoft Azure
CUMULOCITY IoT
Allen-Bradley
ABB
GE
WAGO
Honeywell
SIEMENS
amazon web services
ERICSSON
YOKOGAWA
MITSUBISHI ELECTRIC
Panasonic
Schneider Electric
OMRON

ADVANTECH
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LightweightM2M
MQTT
AMQP

WISE-EdgeLink
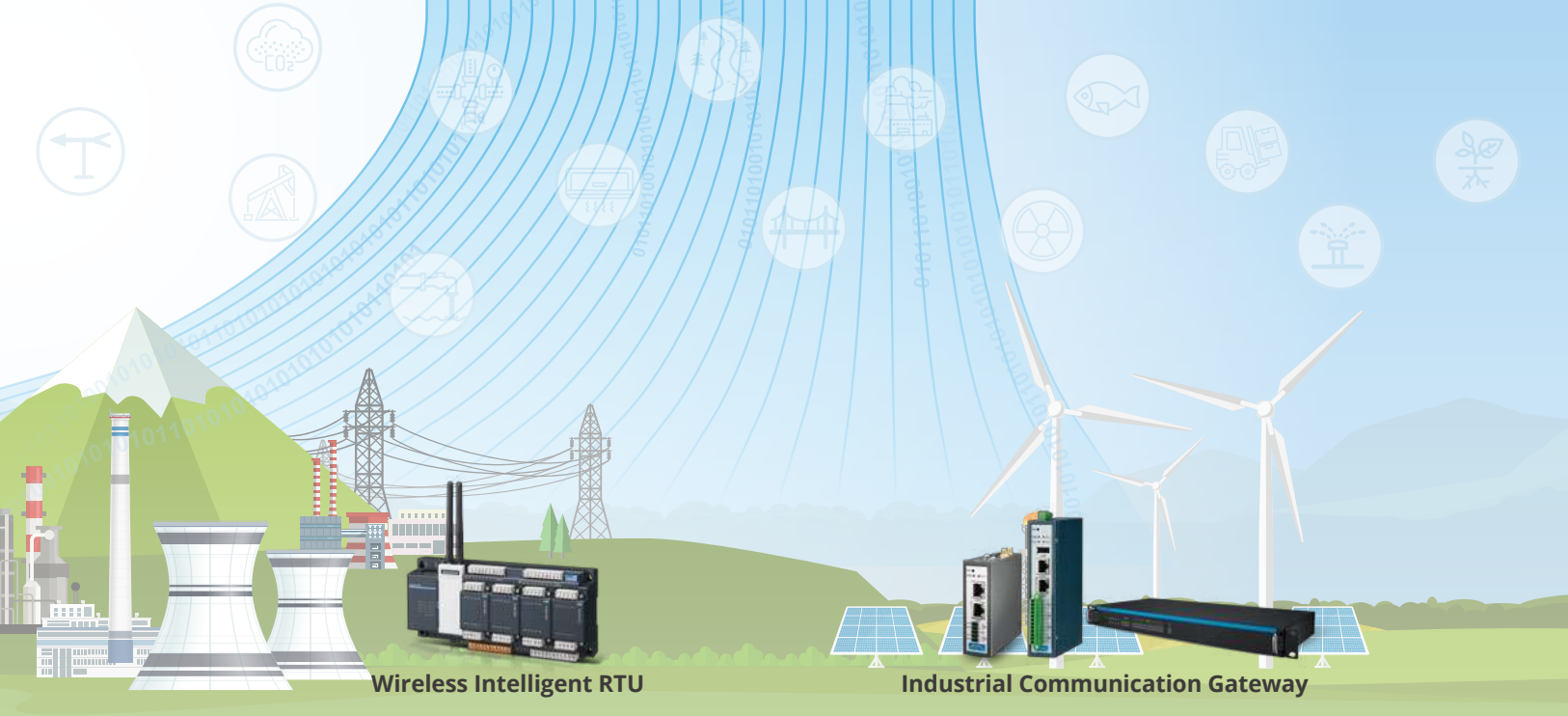
Wireless Intelligent RTU

Industrial Communication Gateway

Urban Construction

• Air quality monitoring
• Flood control systems
• Levee monitoring
• Wastewater systems
• Hazardous materials control

Renewable Energy

• Solar power management
• Wind power management
• Geothermal energy management
• Weather station monitoring
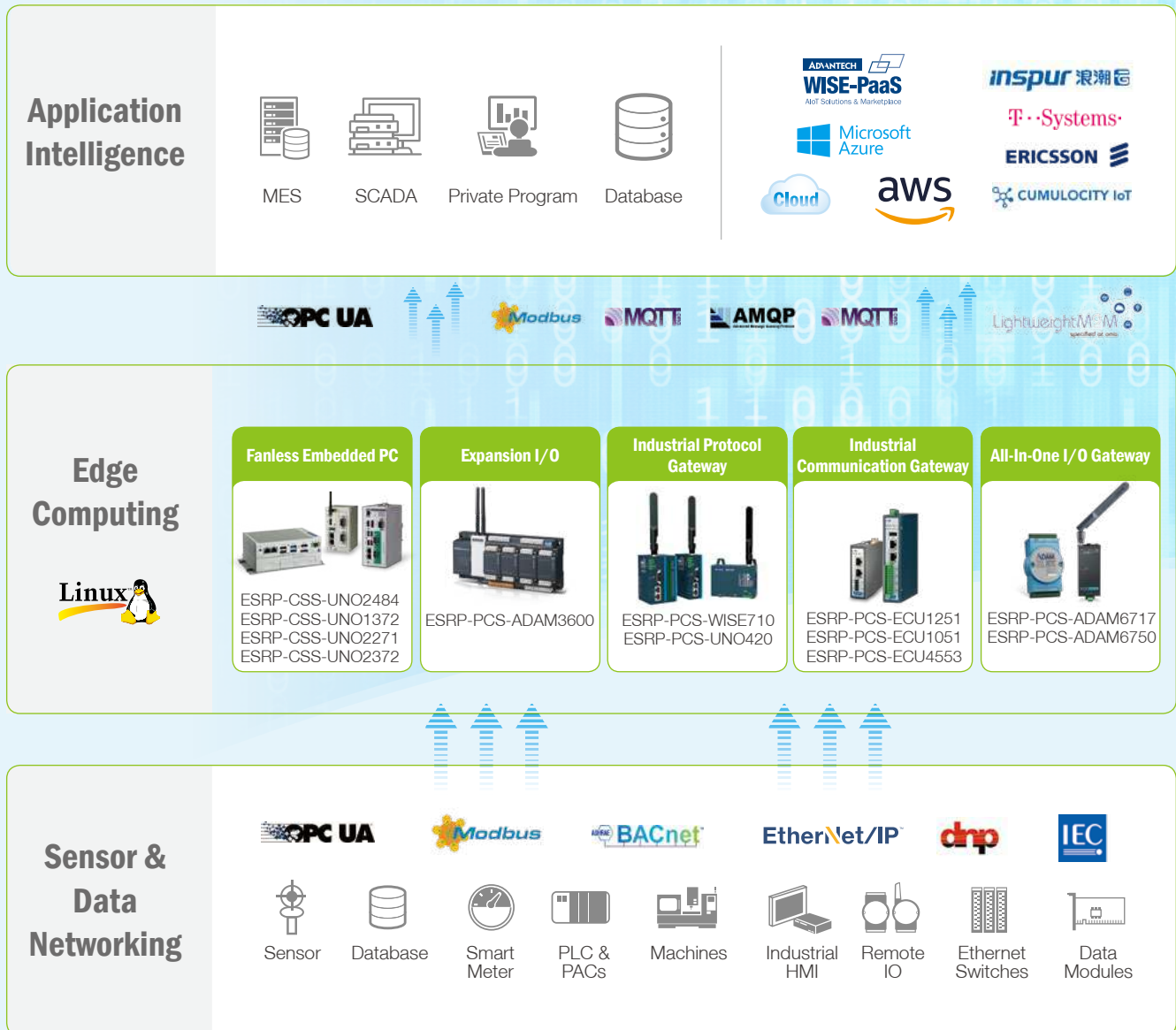• Power generation efficiency monitoring

Transmitting IoT Data from the Edge to the Cloud

Before data is ready for analysis, it must be preprocessed and transmitted to a server or the cloud using specific protocols. Advantech's WISE-EdgeLink solutions are designed to convert and process acquired data without complex and time-consuming programming.

The WISE-EdgeLink Studio software provides an efficient interface that allows users to preprocess data with just a few clicks of the mouse. After configuration, data can be downloaded to hardware equipped with WISE-EdgeLink Runtime. This software enables users to easily obtain and transmit equipment data to the cloud and third-party systems.

WISE-EdgeLink Architecture

Advantech's WISE-EdgeLink is equipped with key functionalities aimed at edge applications. With downlink data acquisition capabilities integrated with uplink connectivity, security, and intelligence functions, transmitting field data to the cloud becomes an easy task.

Application Intelligence

MES   SCADA   Private Program   Database

WISE-PaaS   inspur 浪潮云
AIoT Solutions & Marketplace   T··Systems·
Microsoft Azure   ERICSSON
Cloud   aws   CUMULOCITY IoT

OPC UA   Modbus   MQTT   AMQP   MQTT   LightweightM2M
specified at omg

Edge Computing

Linux

Fanless Embedded PC	Expansion I/O	Industrial Protocol Gateway	Industrial Communication Gateway	All-In-One I/O Gateway
ESRP-CSS-UNO2484 ESRP-CSS-UNO1372 ESRP-CSS-UNO2271 ESRP-CSS-UNO2372	ESRP-PCS-ADAM3600	ESRP-PCS-WISE710 ESRP-PCS-UNO420	ESRP-PCS-ECU1251 ESRP-PCS-ECU1051 ESRP-PCS-ECU4553	ESRP-PCS-ADAM6717 ESRP-PCS-ADAM6750

Sensor & Data Networking

OPC UA   Modbus   BACnet   EtherNet/IP   dnp   IEC

Sensor	Database	Smart Meter	PLC & PACs	Machines	Industrial HMI	Remote IO	Ethernet Switches	Data Modules

WISE-EdgeLink Benefits Data Management

Data Acquisition
- I/O drivers
- WISE-EdgeLink Benefits Data Management
- User tags
- System tags

Connectivity
- Open VPN
- Active connection to WebAccess
- Store and forward
- Protocol support
  - MQTT/FTP/ODBC/AMQP
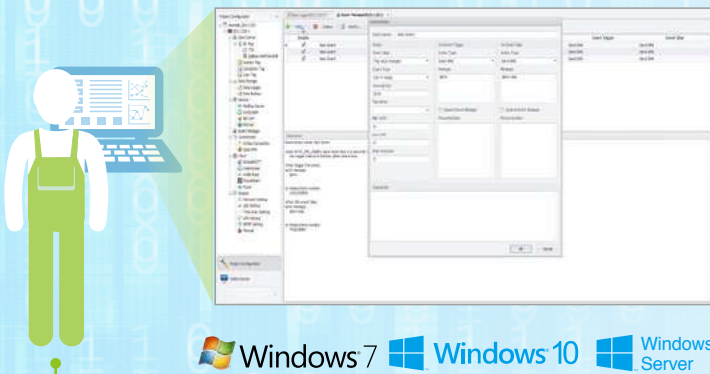 - WebService/RESTful

Security
- Project encryption
- Whitelisting
- SSL encryption
- Data authority management

Intelligence
- Event hub for SMS/email alerts
- SoftLogic runtime
- Data pretreatment

  - Event log   • Time stamp
  - Data log   • Tag quality

WISE-EdgeLink Components

EdgeLink Studio
(for Windows)

- Project configuration
- Online device monitoring
- Device communication setup
- Data forwarding settings
- System settings

Windows 7   Windows 10   Windows Server

Download projects to the platform via a network

Configuration files

EdgeLink Runtime
(for Linux)

- Connect end devices to network
- Data acquisition and transmission
- Supports 200+ device drivers
- Real-time/historical data log
- Connectivity to the cloud and third-party systems

Remote Equipment Monitoring for Equipment Builders

▍Requirements

Equipment builders who thrive on improving equipment efficiency understand the importance of quality data in the analysis of component status. Given the high level of energy consumption for heating and cooling, being able to monitor and control heating, ventilation, and air conditioning (HVAC) systems can have a sizable effect on operation costs. Energy controllers can be used to monitor and control HVAC systems via a mobile or cloud system. With customizable software, they also accommodate customers who require customized functionality and input assemblies as well as cloud access.
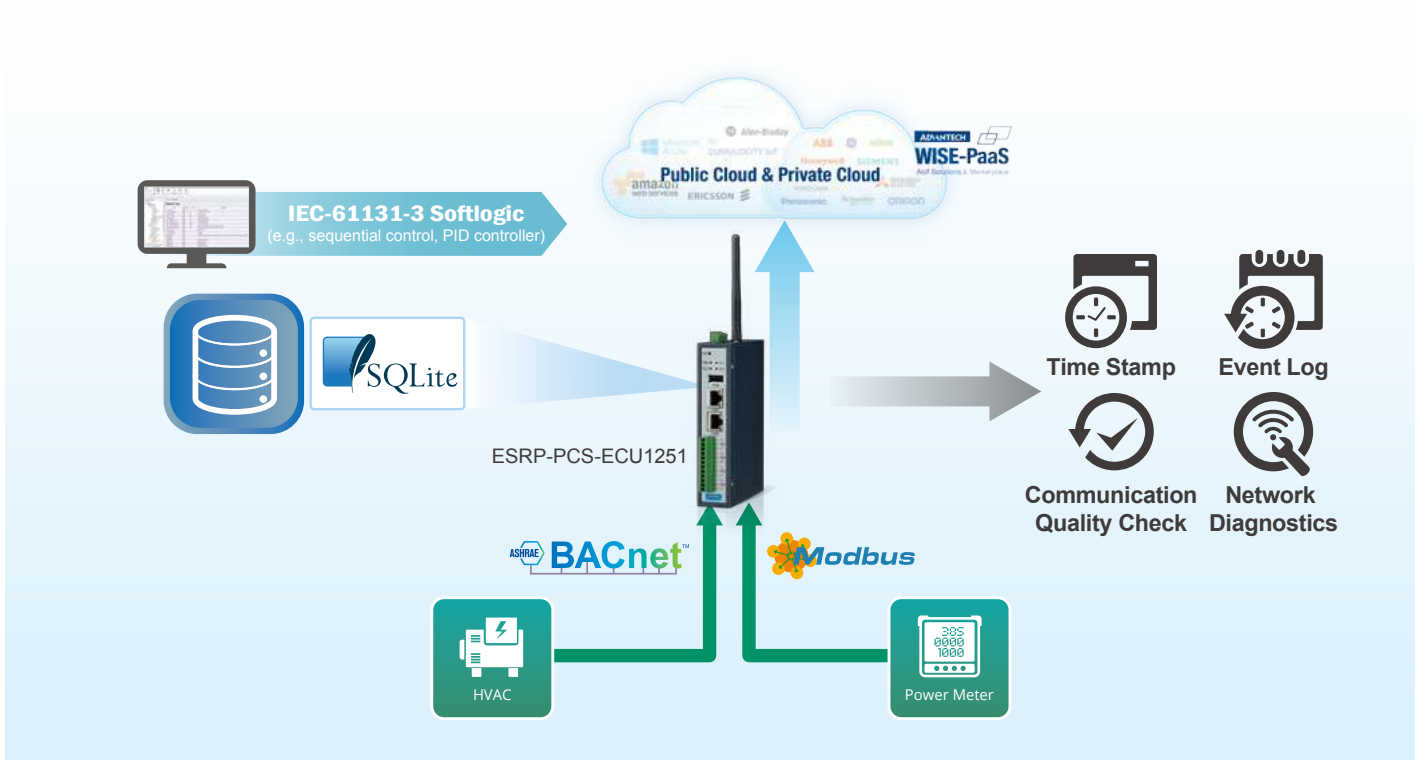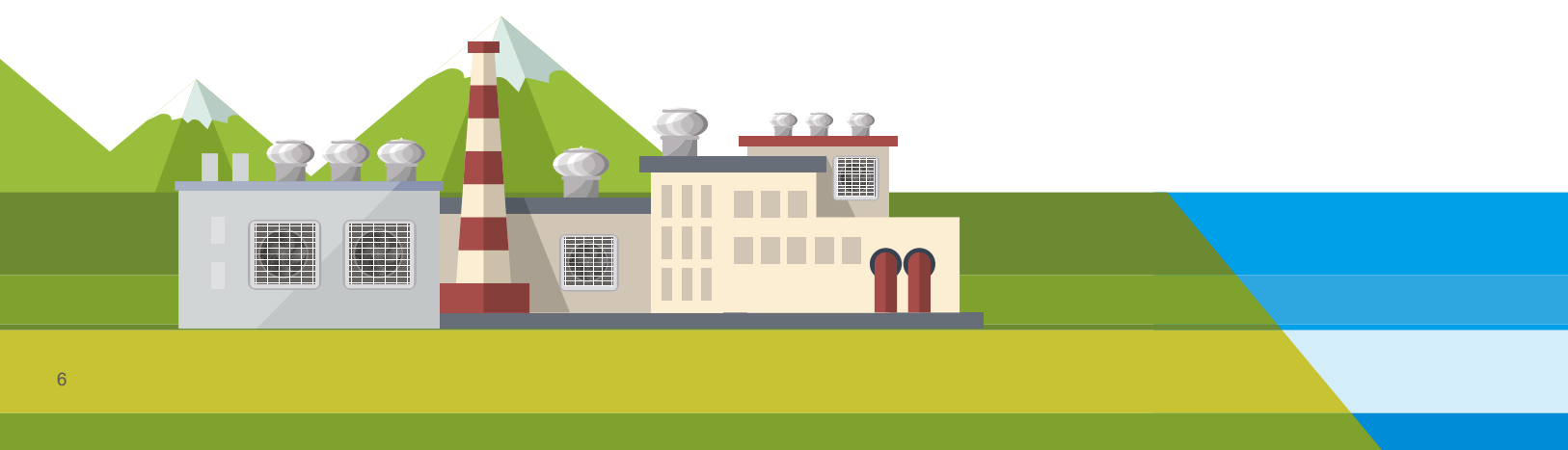

▍Features

• Communication protocols: BACNet & Modbus
• Data time stamping and event logging
• Cloud solution with Microsoft Azure & MQTT
• Various I/O options

▍Benefits

• Compact design and customized service
• Operational technology engineers can easily establish cloud access
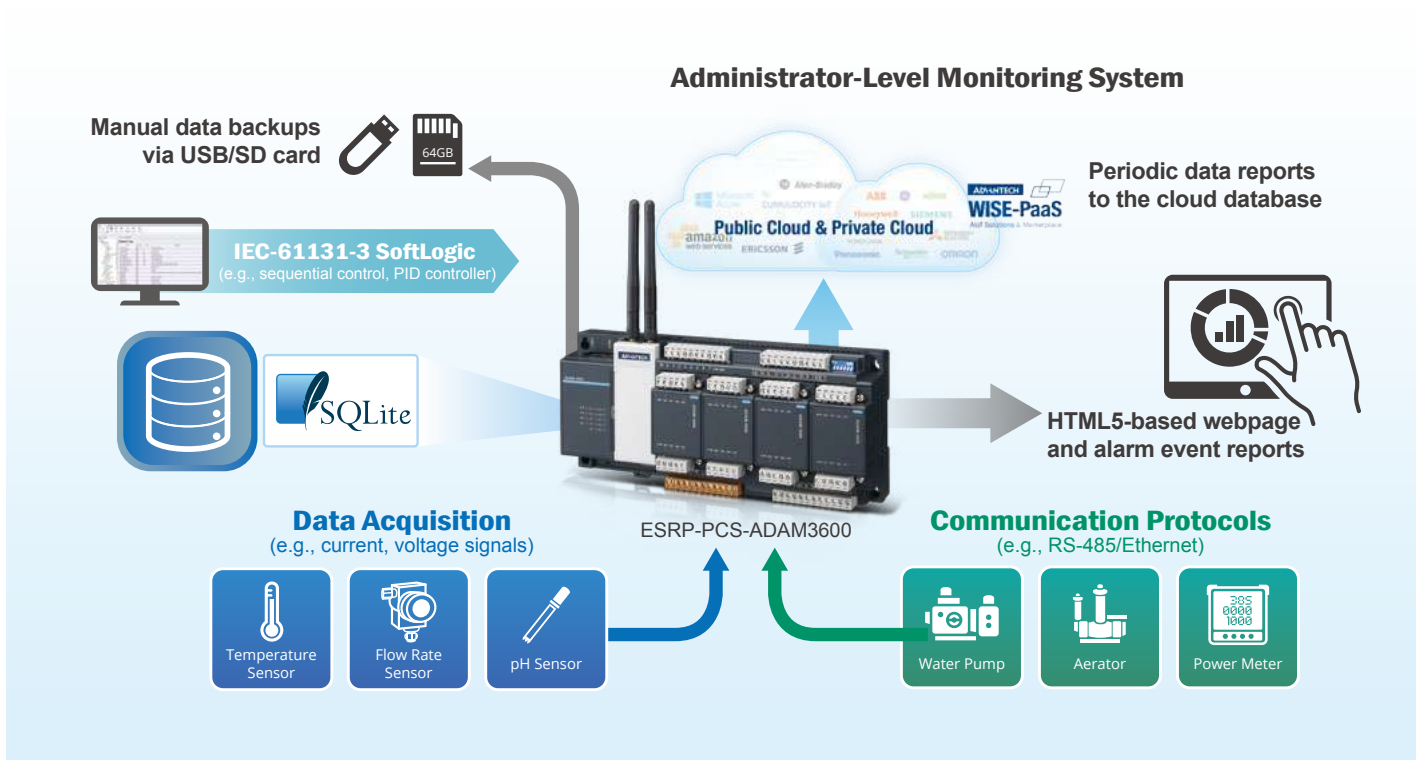• Scalable I/O & Comm. interface to different projects

Monitoring System for Waste Water Treatment and Reclamation Infrastructure

Requirements

Wireless connectivity is required for monitoring a water pump station to enable reliable data transmissions to a surveillance center. The use of PLCs for monitoring and controlling pump stations is expensive and necessitates complex system integration procedures. Accordingly, many customers prefer to use all-in-one devices for data collection and transmission, as well as system monitoring and alarm reporting.

Manual data backups via USB/SD card

IEC-61131-3 SoftLogic
(e.g., sequential control, PID controller)

SQLite

Data Acquisition
(e.g., current, voltage signals)

Temperature Sensor | Flow Rate Sensor | pH Sensor

Administrator-Level Monitoring System

Public Cloud & Private Cloud
WISE-PaaS

Periodic data reports to the cloud database

HTML5-based webpage and alarm event reports

ESRP-PCS-ADAM3600

Communication Protocols
(e.g., RS-485/Ethernet)

Water Pump | Aerator | Power Meter

Features

• Supports uplinking with DNP3 and Modbus protocols
• Supports downlinking to various PLC or meter protocols
• Multiple I/O interfaces
• Provides alarm notifications and reports
• Data storage and forwarding ensures completeness and accuracy
• EdgeLink data is directly mapped to SCADA (WebAccess)

Benefits

• Eliminates programming for increased efficiency
• Cost-effective solution for site-wide monitoring
• Uses a single integrated platform for data acquisition, communication, and transmission
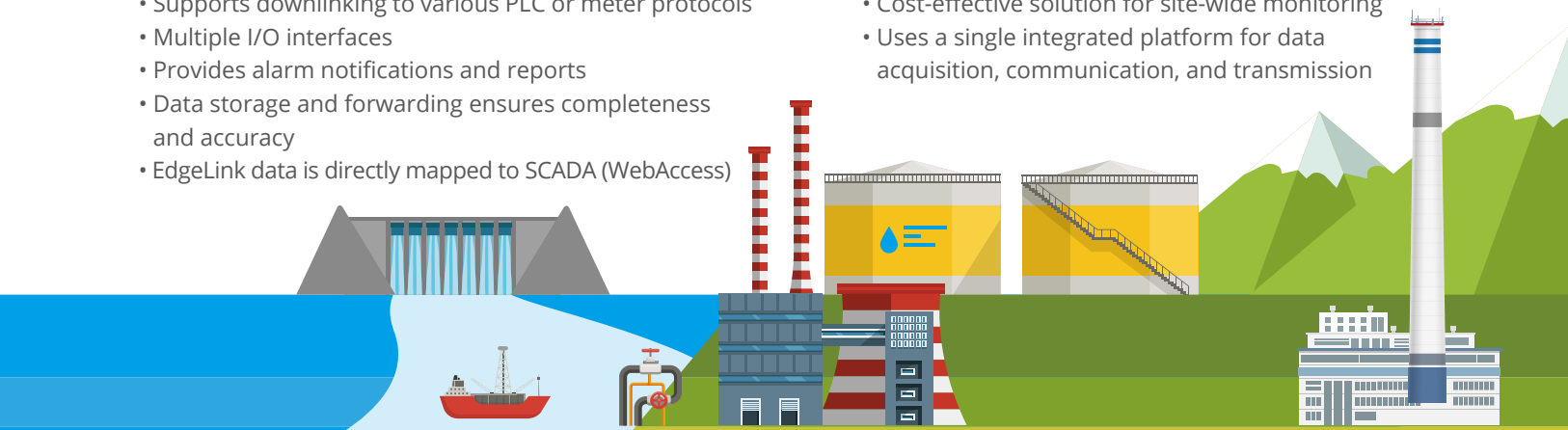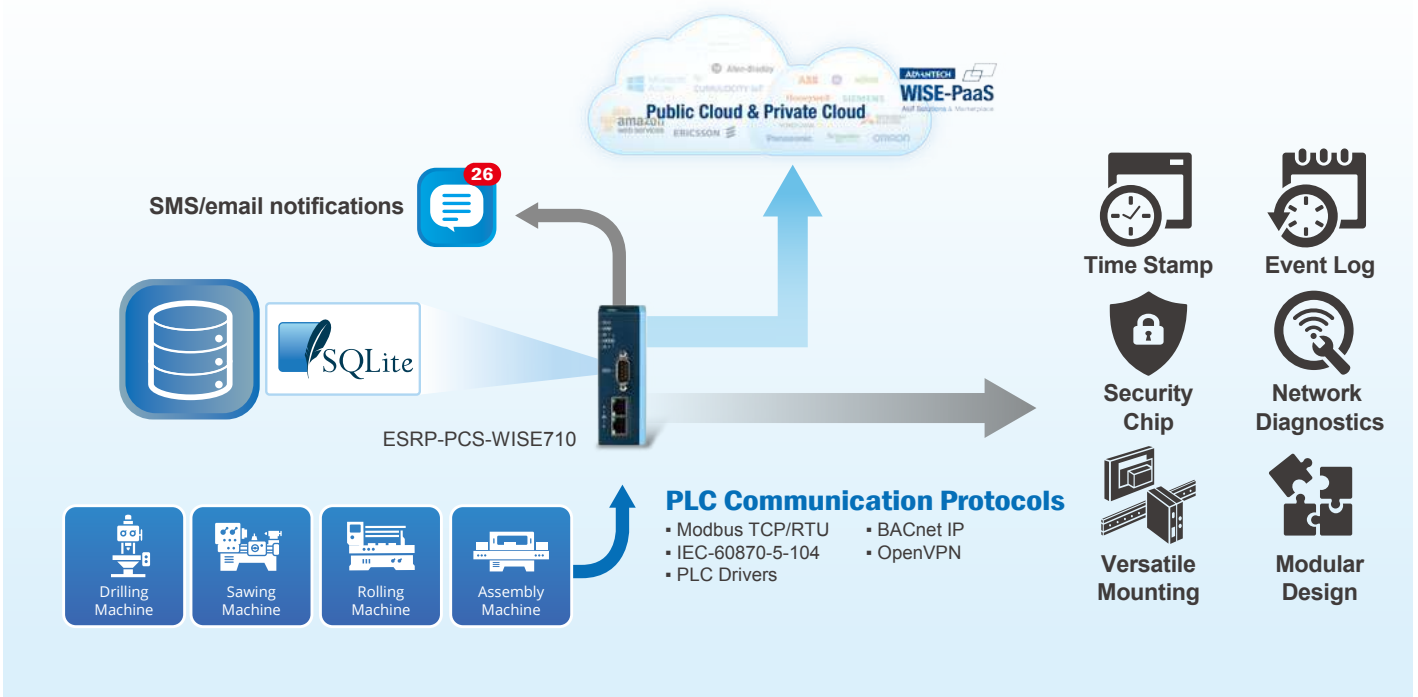
Connecting Machines and Equipment to the Cloud

Requirements

Digitalizing factory equipment is the first step to realizing Industry 4.0. Since this transformation affects all aspects of assembly, machining, rolling workshops, and production line processes, a wide variety of equipment and machines are involved and diverse protocols and communication ports are required. Equipment is geographically dispersed and located in environments with limited space for installation. To allow the customer to collect information from PLCs in proprietary system to information system or cloud space, a compact, distributed, multi-protocol convertor solution is required. Advantech's WISE-710 protocol converter provides the ideal solution for collecting data from PLC-controlled equipment and performing protocol conversion that enable the data to be used for machine intelligence. The modularity design of WISE-710 also provides the flexibility of functionality expansion for diverse applications.

SMS/email notifications

Public Cloud & Private Cloud
WISE-PaaS

SQLite

ESRP-PCS-WISE710

Drilling Machine | Sawing Machine | Rolling Machine | Assembly Machine

PLC Communication Protocols
- Modbus TCP/RTU
- IEC-60870-5-104
- PLC Drivers
- BACnet IP
- OpenVPN

Time Stamp | Event Log

Security Chip | Network Diagnostics

Versatile Mounting | Modular Design

Features

- Supports various public clouds or private cloud connection
- Provides data time stamping and event logging
- Supports downlinking to PLCs with various protocols
- Modular design for flexible configuration and customization of functionality
- Enhanced cyber security with an embedded security chip

Benefits

- Easy deployment to cross the barrier of OT and IT integration
- Data tagging ensures readability and comprehension
- Cost-effective system integration solutions
- Enables convenient tracking of historical data

PoE-Powered Sensing Gateway Solution

Requirements

For enabling intelligence of industrial infrastructure and facility, sensors and controllers are widely deployed to detect operating information for remote monitoring and controlling. Advantech's rugged UNO-420 edge sensing gateway acts as a bridge between sensors/controllers and the control center or cloud. The sensing gateway supports a wide operating temperature range and power input via POE, making it suitable for installing in harsh environment and easy for power distribution.
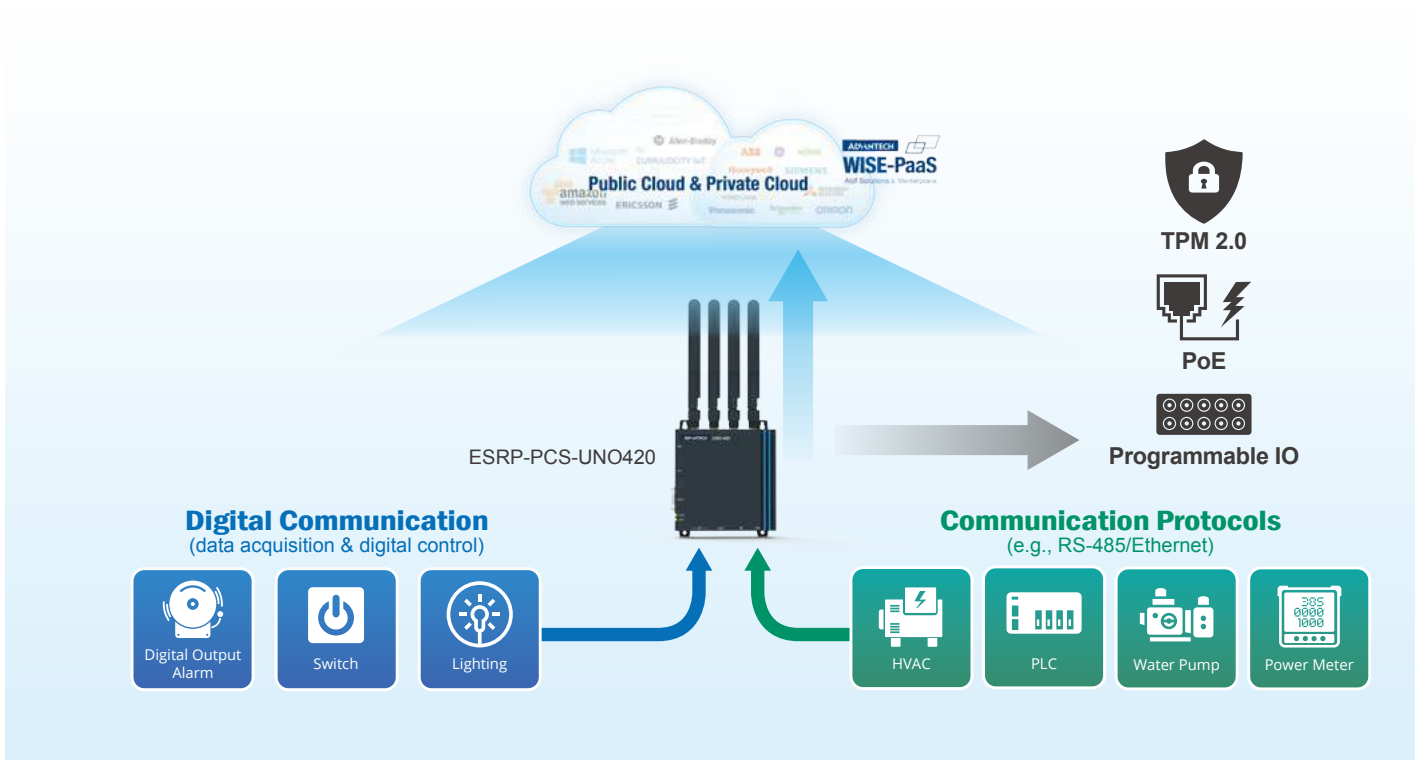
Features

- Programmable GPIO and selectable COM for flexible functionality
- Supports dual wireless communication via Wi-Fi, 3G, 4G, and GPS
- Wide operating temperature range (-20 ~ 60 ˚C/-40 ~ 140 ˚F)

Benefits

- Easy installation with a combined power and data cable
- PoE functionality offers considerable cost savings
- Compact, fanless design with multiple I/O for connecting various data acquisition devices
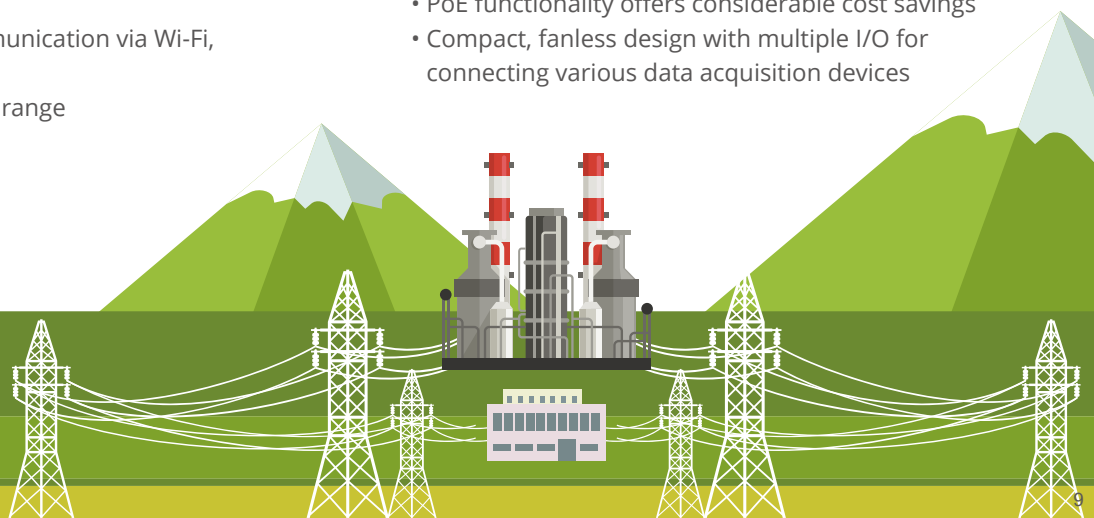
Optimize Process Manufacturing by Edge Intelligence

Requirements

Process manufacturing relies on sequential steps and most manufacturing systems utilize steady-state analysis which looks for uncertain conditions. However, manufacturing procedures can impact efficiency and quality as insignificant events may be exacerbated into extreme events. Advantech's AWS solution uses AI and data analysis to match production to demand when the real production model cannot be mathematically constructed. AWS IoT SageMaker is used to build an AI model at the edge via AWS IoT Greengrass in order to provide real-time analysis, notification, and control during manufacturing. The inclusion of Advantech's WISE-Edgelink software, which supports 200+ PLC drivers and communication protocols, enables device data to be collected from diverse sensors and PLCs for transmission between the AWS edge engine, third-party software, and the cloud.
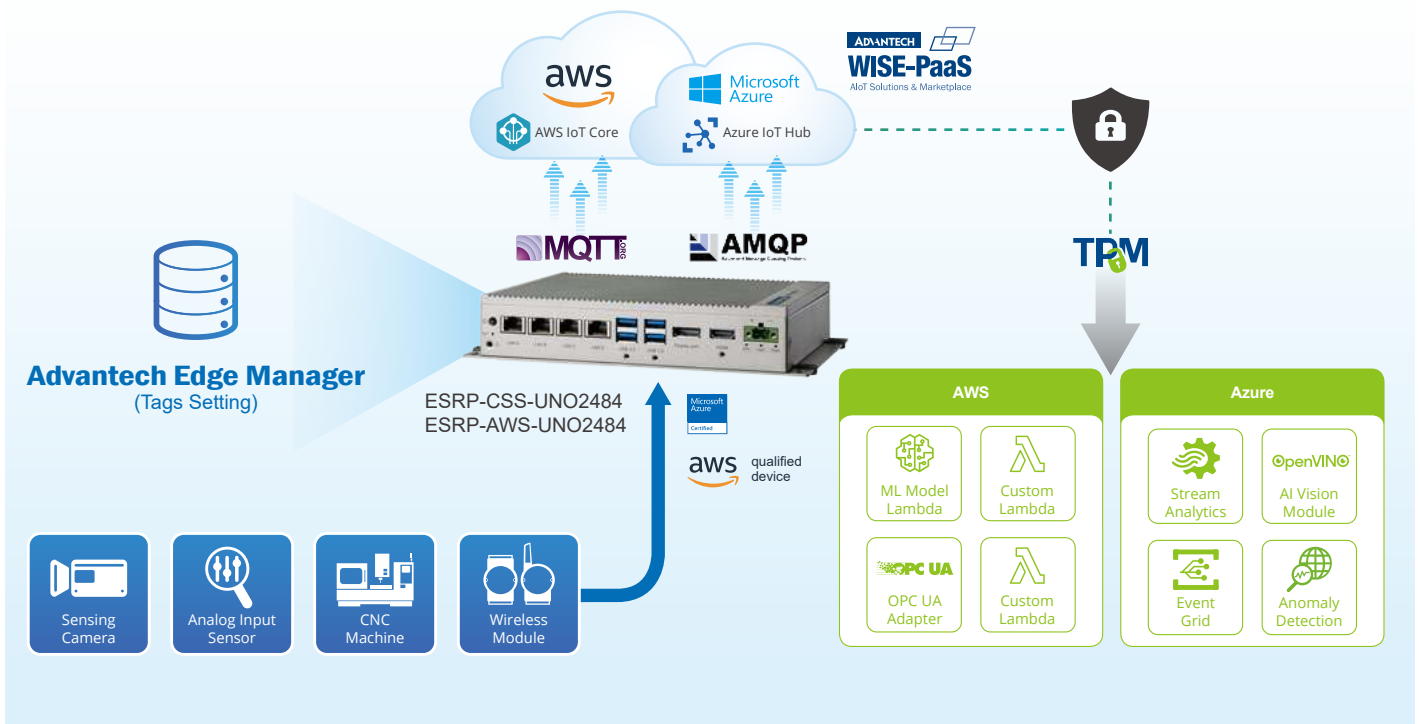
Features

- Azure IoT Edge, Azure Plug & Play and AWS IoT Greengrass certified
- The latest Docker technology

Benefits

- Stream analytics, machine learning, image recognition, and other high-value AI deployed from the cloud to the edge with other 3rd party software
- Open and well-organized containerized software architecture

Real-time Production Management

Requirements

To enable smart manufacturing, real-time data from sensors and controllers are used for advanced process control and improved operations. Advantech's compact ECU-1051TL edge communication gateway acts as a bridge between field controller/machines and SCADA devices or database. The gateway supports wide-temperature operation and multiple protocol drivers via Ethernet and serial interface, making it suitable for installing in harsh environments.

ERP   MES

Wi-Fi   OPC UA

IEC-61131-3 Softlogic
(e.g., sequential control, local interaction)

ESRP-PCS-ECU1051

Time Stamp   Event Log

Communication Quality Check   Network Diagnostics

Panasonic   SIEMENS   OMRON
MITSUBISHI ELECTRIC   Schneider Electric   ABB

Water Pump   Power Inverter   Power Meter   PLCs & PACs
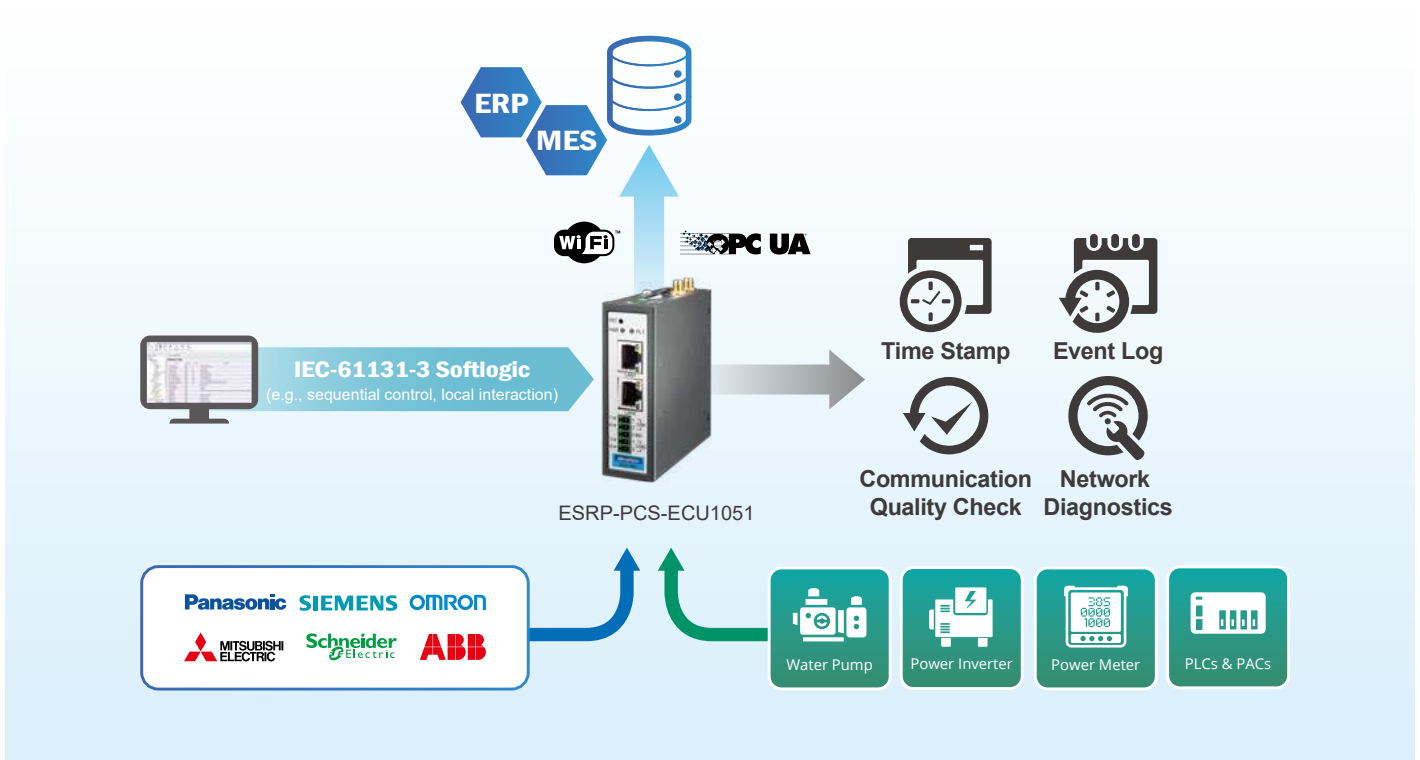
Features

- Data storage and forwarding ensures completeness and accuracy
- Supports downlinking to various PLC or meter protocols
- Direct connection to database for IT integration

Benefits

- Cost-effective solution for site-wide monitoring
- Eliminates programming for increased efficiency
- Cost-effective solution for production monitoring

WISE-EdgeLink Function List For Supported Platform

	ESRP-PCS-ADAM6750	ESRP-PCS-ADAM6717	ESRP-PCS-ADAM3600	
Hardware Specifications				
CPU	TI Cortex A8, 1GHz	TI Cortex A8, 1GHz	TI Cortex A8, 600MHz	
RAM	DDR3L 512 MB	DDR3L 512 MB	DDR3L 256 MB	
On-Board IO	12DI/12DO	8AI/5DI/4DO	8AI/8DI/4DO	
Slot	1 x Micro SD Slot	1 x Micro SD Slot	4 Expansion Slots	
Wireless Communication	Wi-Fi/Cellular (via ADAM-6700E)	Wi-Fi/Cellular (via ADAM-6700E)	Zigbee/WiFi/Cellular/ NB-IOT	
Mini-PCIe	1 x Full-Size (via ADAM-6700E)	1 x Full-Size (via ADAM-6700E)	1 x Half-Size 1 x Full-Size	
SIM Card Slot	Single SIM card slot (via ADAM-6700E)	Single SIM card slot (via ADAM-6700E)	Single SIM card slot / Dual SIM card slot	
LAN	2	2	2	
COM	RS-485 x 2	RS-485 x 2	3	
USB	1 Micro USB 1 Type A USB	1 Micro USB 1 Type A USB	1	
OS Version	Linux 3.12.10-rt15-ti2013.12.01 #9 PREEMPT RT		Yocto Linux, kernel 4.9	

		ESRP-PCS-ADAM6750	ESRP-PCS-ADAM6717	ESRP-PCS-ADAM3600	
EdgeLink Function List					
Data Center	Maximum number of IO Tag	2000	2000	3000	
	Device Model	√	√	√	
	Excel Import/Export	√	√	√	
	Data Logger	√	√	√	
	DataBackup	FTP/SQL Server			
Online Monitor	iCDManager	-	-	√	
	Device Search	√	√	√	
Data Forwarding Service	Modbus Server	√	√	√	
	IEC 60870-104 Server	√	√	√	
	DNP3 Outstation	-	-	√	
	WASCADA (WebAccess)	√	√	√	
	BACnet Server	√	√	√	
	OPC UA Server	√	√	√	
EventManager (SMS/eMail)		√	√	√	
IEC-61131-3 Softlogic		√	√	√	
OpenVPN		√	√	√	
Cloud Agent		SimpleMQTT / WebAccess / WISE-PaaS / ProudSmart			
System Setting	Support IPv4/IPv6	√	√	√	
	LED Setting	√	√	√	
	Time Sync Setting (NTP/GPS)	√	√	√	
	GPS Setting	√	√	√	
SDK		DCTag SDK/DataLogger SDK/Board Resource SDK			

ESRP-PCS-ECU1051	ESRP-PCS-ECU4553	ESRP-PCS-ECU1251	ESRP-PCS-WISE710	ESRP-PCS-UNO420
TI Cortex A8, 600MHz	TI Cortex A8, 800MHz	TI Cortex A8, 800MHz	CPU Freescale i.MX 6 Dual Lite A9	Intel® Atom™ E3815, 1.46GHz Processor
DDR3L 256 MB	DDR3L 512 MB	DDR3L 256 MB	DDR3 1GB	DDR3L 2GB
-	-	-	4DI/4DO	8 GPIO
1x Micro SD slot	1x Micro SD slot	1x Micro SD slot	1x Micro SD slot	-
Zigbee/WiFi/Cellular/NB-IOT	Zigbee/WiFi/Cellular/NB-IOT	Zigbee/WiFi/Cellular/NB-IOT	WiFi/3G/4G/NB-IoT	-
1x Full-size	1x Full-size	1x Full-size	1x Mini-PCIe (Full-size)	1 x Full-size 1 x Half-size
Dual SIM card slot	Single SIM card slot	Single SIM card slot	-	-
2	4	2	-	2 x 10/100/1000 Mbps (with 1 x PoE 802.3at)
2	16	4	-	2 x RS232/422/485 1 x RS485
1	1	1	1x Micro USB2.0	1 x USB 3.0
Yocto Linux, kernel 4.9			Linux imx6dl 4.1.15	AdvLinux
2000	2000	2000	3000	3000
√	√	√	√	√
√	√	√	√	√
√	√	√	√	√
FTP/SQL Server				
-	-	-	-	-
√	√	√	√	√
√	√	√	√	√
√	√	√	√	√
-	-	-	-	-
√	√	√	√	√
√	√	√	-	√
√	√	√	√	√
√	√	√	√	√
√	√	√	-	-
√	√	√	√	√
/ AWS / Inspur / WLTX / T-System / OpenIoT / RootCloud / Azure / LwM2M				
√	√	√	√	√
√	-	√	-	-
√	√	√	√	√
√	√	√	√	-
DCTag SDK/DataLogger SDK/Board Resource SDK				

WISE-EdgeLink Function List For Supported Platform

	ESRP-CSS-UN01372	ESRP-AWS-UN01372	ESRP-CSS-UN02271	
Hardware Specifications				
CPU	Intel® Celeron J1900, 2.0GHz processor	Intel® Celeron J1900, 2.0GHz processor	Intel® Atom™ E3825, 1.33GHz Processor	
RAM	DDR3L 4GB	DDR3L 4GB	DDR3L 4GB	
On-Board IO	4DI/4DO	4DI/4DO	-	
Slot			-	
Wireless Communication	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	
Mini-PCIe	2 x mPCIe	2 x mPCIe	1 x mPCIe	
SIM Card Slot	Single SIM card slot	Single SIM card slot	Single SIM card slot	
LAN	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	
COM	1 x RS232 1 x RS422/485	1 x RS232 1 x RS422/485	2 x RS232/422/485	
USB	2 x USB 2.0 1 x USB 3.0	2 x USB 2.0 1 x USB 3.0	1 x USB 3.0	
OS Version	AdvLinux			

		ESRP-CSS-UN01372	ESRP-AWS-UN01372	ESRP-CSS-UN02271	
EdgeLink Function List					
Data Center	Maximum number of IO Tag	5000	5000	3000	
	Device Model	√	√	√	
	Excel Import/Export	√	√	√	
	Data Logger	√	√	√	
	DataBackup	FTP/SQL Server			
Online Monitor	iCDManager	-	-	-	
	Device Search	√	√	√	
Data Forwarding Service	Modbus Server	√	√	√	
	IEC 60870-104 Server	√	√	√	
	DNP3 Outstation	-	-	-	
	WASCADA (WebAccess)	√	√	√	
	BACnet Server	√	√	√	
	OPC UA Server	√	√	√	
EventManager (SMS/eMail)		√	√	√	
IEC-61131-3 Softlogic		-	-	-	
OpenVPN		√	√	√	
Cloud Agent		SimpleMQTT / WebAccess / WISE-PaaS / ProudSmart			
System Setting	Support IPv4/IPv6	√	√	√	
	LED Setting	-	-	-	
	Time Sync Setting (NTP/GPS)	√	√	√	
	GPS Setting	-	-	-	
SDK		DCTag SDK/DataLogger SDK/Board Resource SDK			

ESRP-AWS-UN02271	ESRP-CSS-UN02372	ESRP-AWS-UN02372	ESRP-CSS-UN02484	ESRP-AWS-UN02484
Intel® Atom™ E3825, 1.33GHz Processor	Intel® Celeron™ J1900 (2.0 GHz)	Intel® Celeron™ J1900 (2.0 GHz)	Intel® Core™ i5-7300U, 2.6GHz Processor	Intel® Core™ i5-7300U, 2.6GHz Processor
DDR3L 4GB	DDR3L 4GB	DDR3L 4GB	DDR4 8GB	DDR4 8GB
-	-	-	-	-
-	-	-	-	-
3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology	3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology
1 x mPCIe	2 x mPCIe	2 x mPCIe	1 x mPCIe	1 x mPCIe
Single SIM card slot	-	-	Single SIM card slot	Single SIM card slot
2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	4 x 10/100/1000 Mbps	4 x 10/100/1000 Mbps
2 x RS232/422/485	4 x RS232/422/485	4 x RS232/422/485	4 x RS232/422/485	4 x RS232/422/485
1 x USB 3.0	1 x USB 3.0 3 x USB 2.0	1 x USB 3.0 3 x USB 2.0	4 x USB 3.0	4 x USB 3.0
		AdvLinux		

3000	5000	5000	8000	8000
√	√	√	√	√
√	√	√	√	√
√	√	√	√	√
		FTP/SQL Server		
-	-	-	-	-
√	√	√	√	√
√	√	√	√	√
√	√	√	√	√
-	-	-	-	-
√	√	√	√	√
√	√	√	√	√
√	√	√	√	√
√	√	√	√	√
-	-	-	-	-
√	√	√	√	√
/ AWS / Inspur / WLTX / T-System / OpenIoT / RootCloud / Azure / LwM2M				
√	√	√	√	√
-	-	-	-	-
√	√	√	√	√
-	-	-	-	-
		DCTag SDK/DataLogger SDK/Board Resource SDK		

Regional Service & Customization Centers

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86-512-5777-5666

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886-2-2792-7818

Netherlands | Eindhoven
31-40-267-7000

Poland | Warsaw
00800-2426-8080

USA | Milpitas, CA
1-408-519-3898

Worldwide Offices

Asia

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Kaohsiung	886-7-392-3600

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Seoul	82-2-3660-9255

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Singapore	65-6442-1000

Malaysia
Kuala Lumpur	60-3-7725-4188
Penang	60-4-537-9188

Thailand
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Vietnam
Hanoi	84-24-3399-1155

Indonesia
Jakarta	62-21-751-1939

Australia
Toll Free	1300-308-531
Melbourne	61-3-9797-0100

India
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Pune	91-94-2260-2349

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