Cloud-Enabled Edge Gateways for Industrial IoT

Powering Edge Intelligence with Advantech WebAccess/TagLink

ADVANTECH

Enabling an Intelligent Planet

Machine-to-Intelligence (M2I)
Ensures Future Business Success

In the Industrial IoT era, companies are seeking solutions that can help them to utilize data analytics to raise service levels, create better products, and reduce operational costs. Ideally, the first step is the digitalization of assets. This means that increasingly more data need to be analyzed, and both the volume and diversity of such data from different equipment are also increasing. Equipment manufacturers, owners, and maintainers require an easy and reliable way to collect equipment data from field sites. Advantech WebAccess/TagLink provides a solution for M2I. Without frequent on-site maintenance and service trips incurring time and financial costs, users will be able to monitor critical assets, track equipment performance, receive alarm notifications in the event of a problem, and perform system management and configuration using handheld devices. Thus, costs can be substantially reduced and field equipment and facilities can be better monitored and controlled.

Optimizing Efficiency with Connected Equipment

For industrial boilers, air compressors, chillers, power distribution cabinets, and other equipment, Advantech WebAccess/TagLink serves as a hub for data acquisition, data storage, alarm notification, data reporting, and other functions, maximizing equipment efficiency with reliable data.

"Click-and-Go" Cloud Access Deployment

Advantech WebAccess/TagLink Studio offers a "click-and-go" function for sending data to the cloud. Acquired data can be easily and effortlessly uploaded for analysis and visualization to serve as a more useful reference for management.

ECU-1152

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

Agriculture
- Granary monitoring
- Greenhouse regulation

Renewable Energy
- Power generation efficiency monitoring
- Weather station monitoring
- Equipment status monitoring

Microsoft Azure

amazon web services

百度云 cloud.baidu.com

ADVANTECH WISE-PaaS
Edge Intelligence Platform

WebAccess

IEC-60870-5-104

DNP3.0　　Modbus　　BACNet

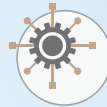MQTT　　RESTful　　ODBC　　HTTP

LoRaWAN　　LTE　　Zigbee　　GPRS
RS-485　　3G　　Ethernet　　Wi-Fi　　NB-IOT

Integrating Equipment Data into Cloud Middleware with Secure Data Conversion

In the industrial IoT era, the requirements for connecting equipment are becoming increasingly more diverse and complex. Advantech WebAccess/TagLink Studio supports data conversion, which enables equipment used in mass production, such as programmable logic controllers (PLCs), sensors, inverters, and so on, to be directly integrated with SCADA, manufacturing execution systems (MESs), and ERP systems, thus facilitating equipment operation and maintenance.

ADAM-3600

ECU-1251

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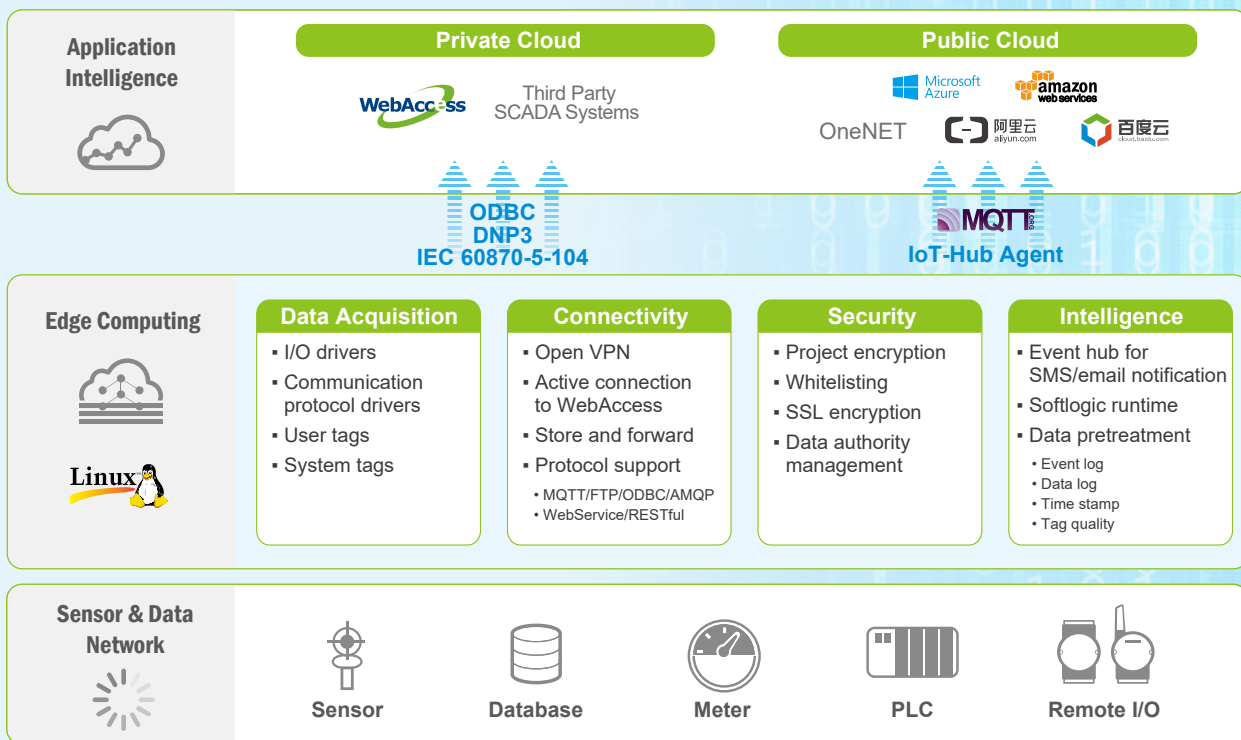• Hazardous materials control

Factory Environment
• Energy management
• Wastewater discharge
• Continuous emission monitoring systems
• Volatile organic compounds

3

Industrial IoT Data: From the Field to the Cloud

Before the data are ready for analysis, they must undergo several stages of processing. Without complicated and time-consuming programming, Advantech WebAccess/TagLink organizes the acquired data for the cloud. The data need to be pretreated and sent to server/cloud securely and using specific protocols. Advantech WebAccess/TagLink studio provides an efficient interface that allows you to perform this complex task with just several clicks.

Advantech WebAccess/TagLinkRuntime Kernel Architecture

Advantech WebAccess/TagLink is equipped key functionalities for edge applications. With the integrated abilities of downlink for data acquisition and uplink with connectivity, security, and intelligent functionalities, sending field data to the cloud becomes an easy task.

Application Intelligence

Private Cloud

WebAccess
Third Party SCADA Systems

ODBC
DNP3
IEC 60870-5-104

Public Cloud

Microsoft Azure   amazon web services
OneNET   阿里云 aliyun.com   百度云 cloud.baidu.com

MQTT
IoT-Hub Agent

Edge Computing

Linux

Data Acquisition	Connectivity	Security	Intelligence
▪ I/O drivers	▪ Open VPN	▪ Project encryption	▪ Event hub for SMS/email notification
▪ Communication protocol drivers	▪ Active connection to WebAccess	▪ Whitelisting	▪ Softlogic runtime
▪ User tags	▪ Store and forward	▪ SSL encryption	▪ Data pretreatment
▪ System tags	▪ Protocol support	▪ Data authority management	• Event log
	• MQTT/FTP/ODBC/AMQP		• Data log
	• WebService/RESTful		• Time stamp
			• Tag quality

Sensor & Data Network

Sensor   Database   Meter   PLC   Remote I/O

Advantech WebAccess/TagLink Studio

• Administer all gateways that support Advantech WebAccess/TagLink
• Gateway status monitoring
• Event alert configuration
• Cloud access rights administration
• Custom integration
• Supports both 32- and 64-bit Windows
• No license required

Sensor Data
Handles I/O tags for data acquisition:

• Sensor voltage/ current signals
• Limit switch ON/OFF status
• Alarms/buzzers

• Flow level
• Pressure
• Frequency
• Valve control
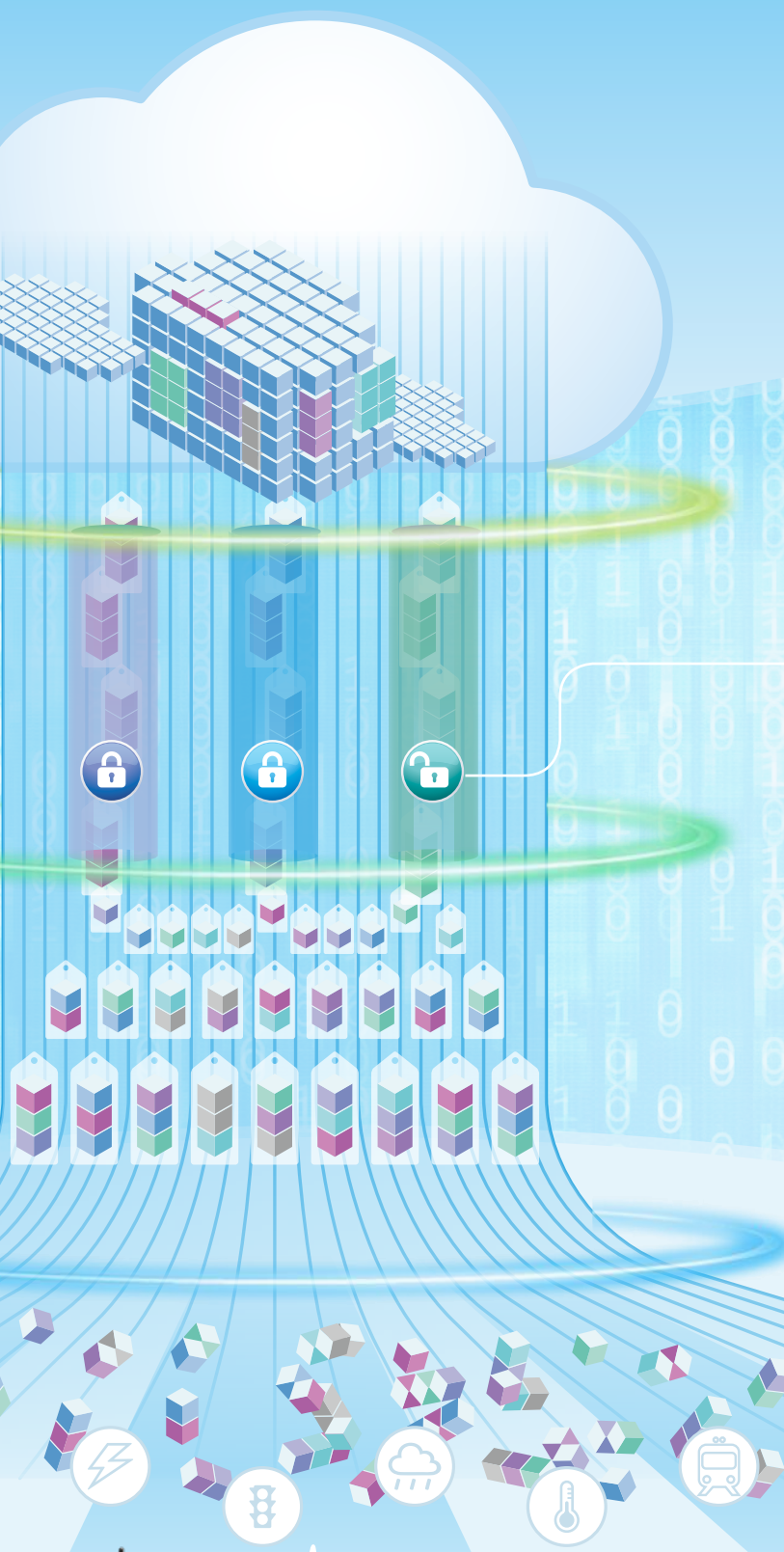
Protocols

- Modbus
- DNP3
- RESTful
- MQTT
- IEC 61850-5-104
- WASCADA

Security

Data encryption by AES-256 and access control
- Whitelist
- Web service encryption by SSL
- User authorization management

Connectivity

- Active connection
- Store and forward
- OpenVPN

Pretreatment

- Scaling/calculation
- Time stamp
- Data buffering
- Quality index for data protocols

Self-Diagnosis Information
System information can be easily accessed as system tags:

- CPU loading
- Memory and storage usage
- Serial/LAN ports quality index
- Location information (GPS)
- Cellular network quality
- Hardware operating status

Equipment Status
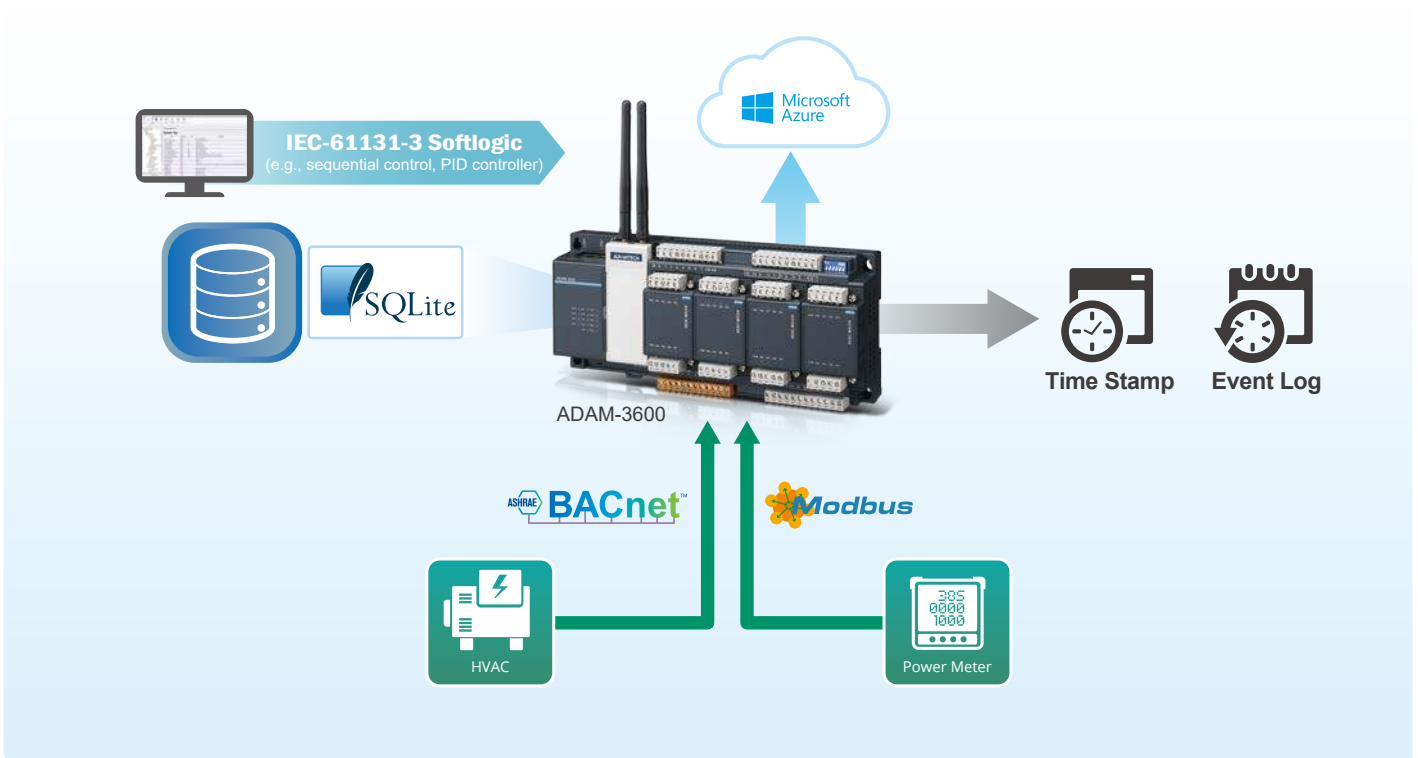Acquire data using various communication protocols:

- Modbus RTU/ Modbus TCP
- PLC protocols for SIEMENS, Allen-Bradley, OMRON, etc.
- Open SDK for ASCII command

Remote Equipment Monitoring for Equipment Builders

System 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.

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

SQLite

Microsoft Azure

ADAM-3600

Time Stamp   Event Log
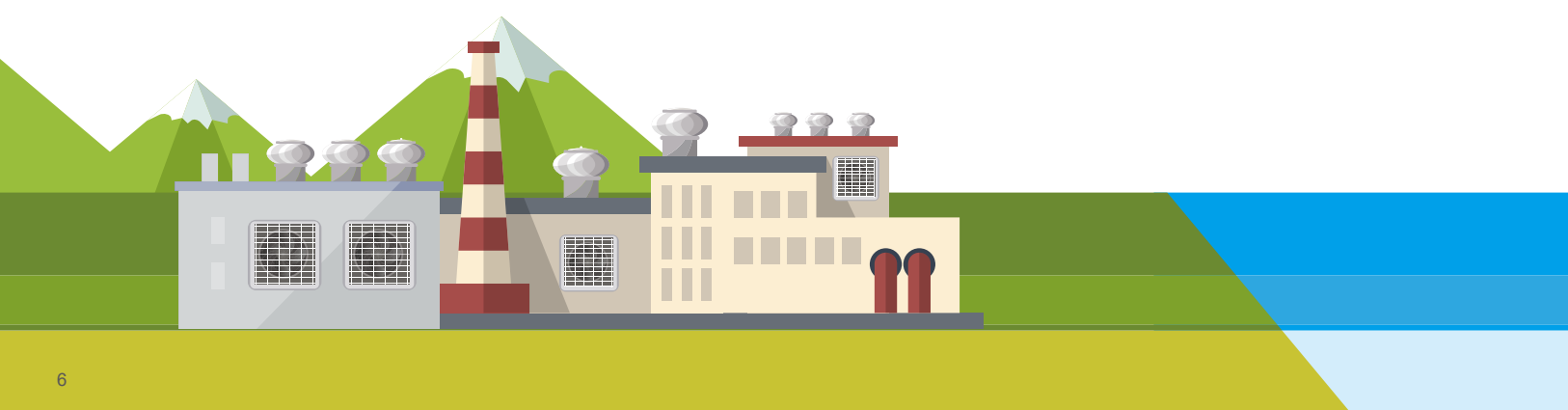
BACnet™   Modbus

HVAC   Power Meter

System 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

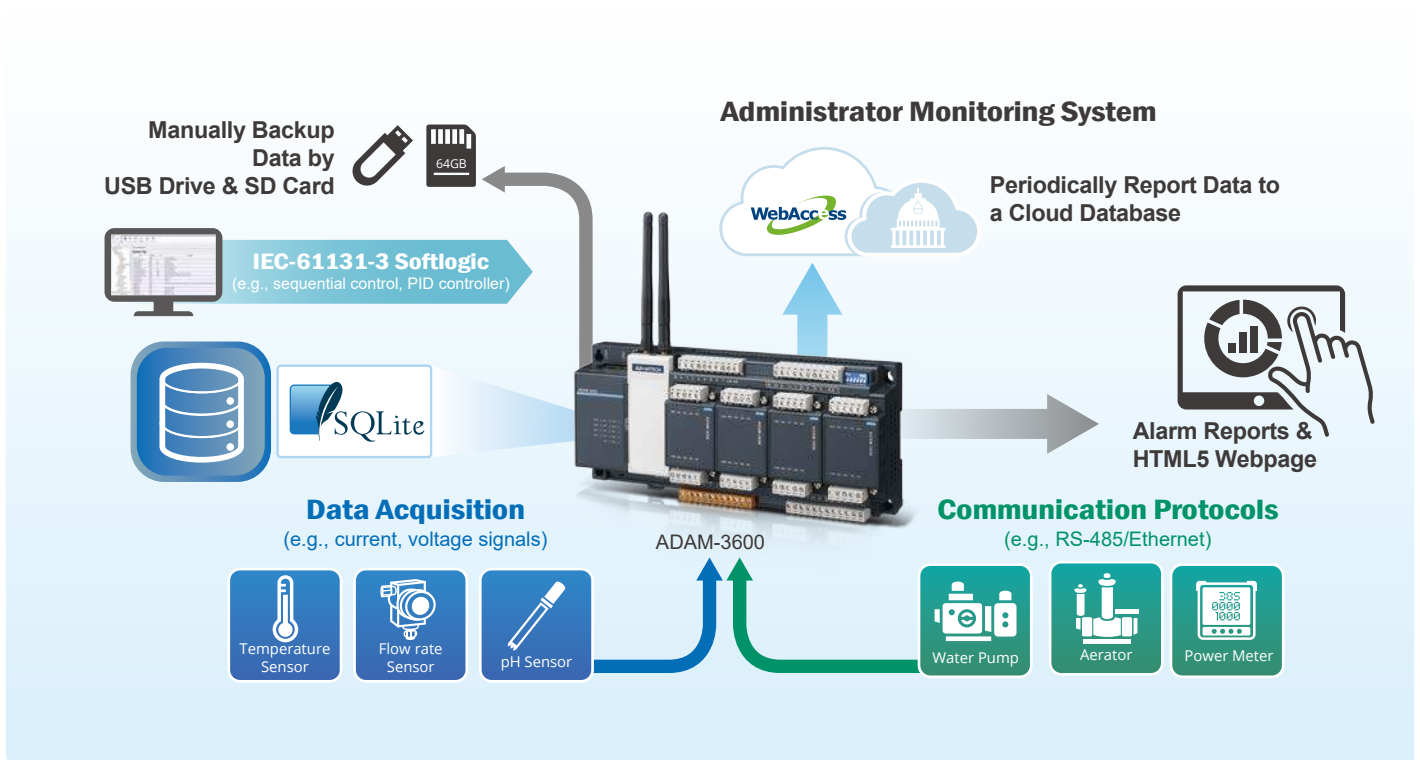• Scalable I/O & Comm. interface to different projects

Monitoring System for Waste Water Treatment and Reclamation Infrastructure

System Requirements

The monitoring of a water pump station requires fully wireless connectivity with reliable data transmission to a surveillance center. Using PLCs to control and monitor pump stations can incur a high lifetime cost, and complex system integration procedures can be frustrating; hence, many customers prefer to use all-in-one devices for data collection and transmission as well as system monitoring and alarm reporting.

Manually Backup Data by USB Drive & SD Card

64GB

Administrator Monitoring System

WebAccess

Periodically Report Data to a Cloud Database

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

SQLite

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

ADAM-3600

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

Alarm Reports & HTML5 Webpage

Temperature Sensor

Flow rate Sensor

pH Sensor

Water Pump

Aerator

Power Meter

System Features

- Uplink with DNP3 & Modbus protocols
- Downlink to various PLC or meter protocols
- Various I/O options
- Store and forward to ensure data completeness
- TagLink data directly maps to SCADA (WebAccess)

Benefits

- Requires no programming, thus improving engineers' working efficiency
- Cost-effective solution for monitoring one single site with one integrated platform for data acquisition, communication, and transmission
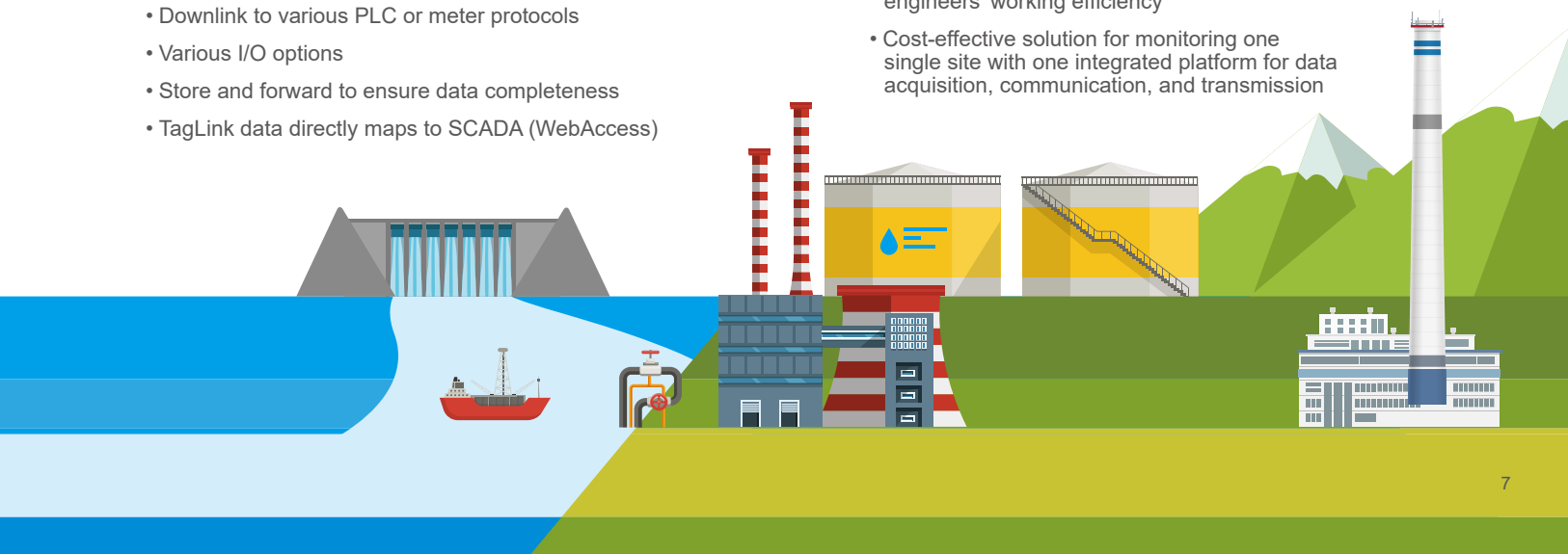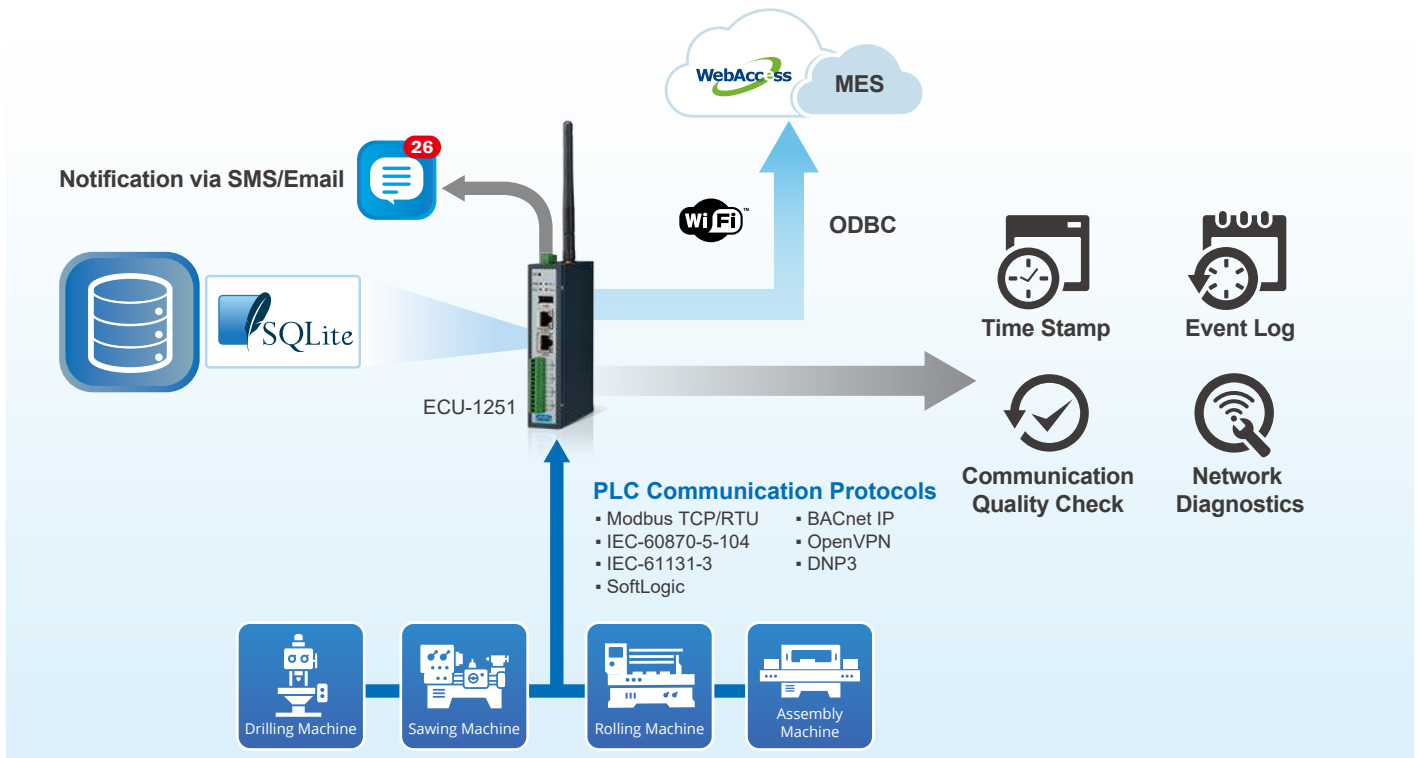
Connecting Machines & Equipment to the Cloud

System Requirements

Digitalizing factory equipment is the first step for Industry 4.0. While the transformation covers assembly, machining, and rolling workshops, production lines, and more, the variety of equipment and machines increases the complexity of the project and diversity of protocols and communication ports that are required. In this MES transformation project, the equipment was scattered and there was limited space for installation. The need for distributed, compact, wireless, and multiprotocol gateways solution was clear. The customer needed to connect PLCs to their MES for data transmission to a host computer via Wi-Fi. Due to the space limitations, the customer required a compact wireless device for data acquisition.

Notification via SMS/Email

SQLite

ECU-1251

WebAccess **MES**

Wi-Fi **ODBC**

Time Stamp   **Event Log**

Communication Quality Check   **Network Diagnostics**

PLC Communication Protocols
- Modbus TCP/RTU
- IEC-60870-5-104
- IEC-61131-3
- SoftLogic
- BACnet IP
- OpenVPN
- DNP3

Drilling Machine   Sawing Machine   Rolling Machine   Assembly Machine

System Features

- Uplink with ODBC
- Data time stamping and event logging
- Downlink to PLCs using various protocols
- Supports Wi-Fi and network diagnostics

Benefits

- Easy access to the MES using ODBC
- Data tagged for easy reading and comprehension
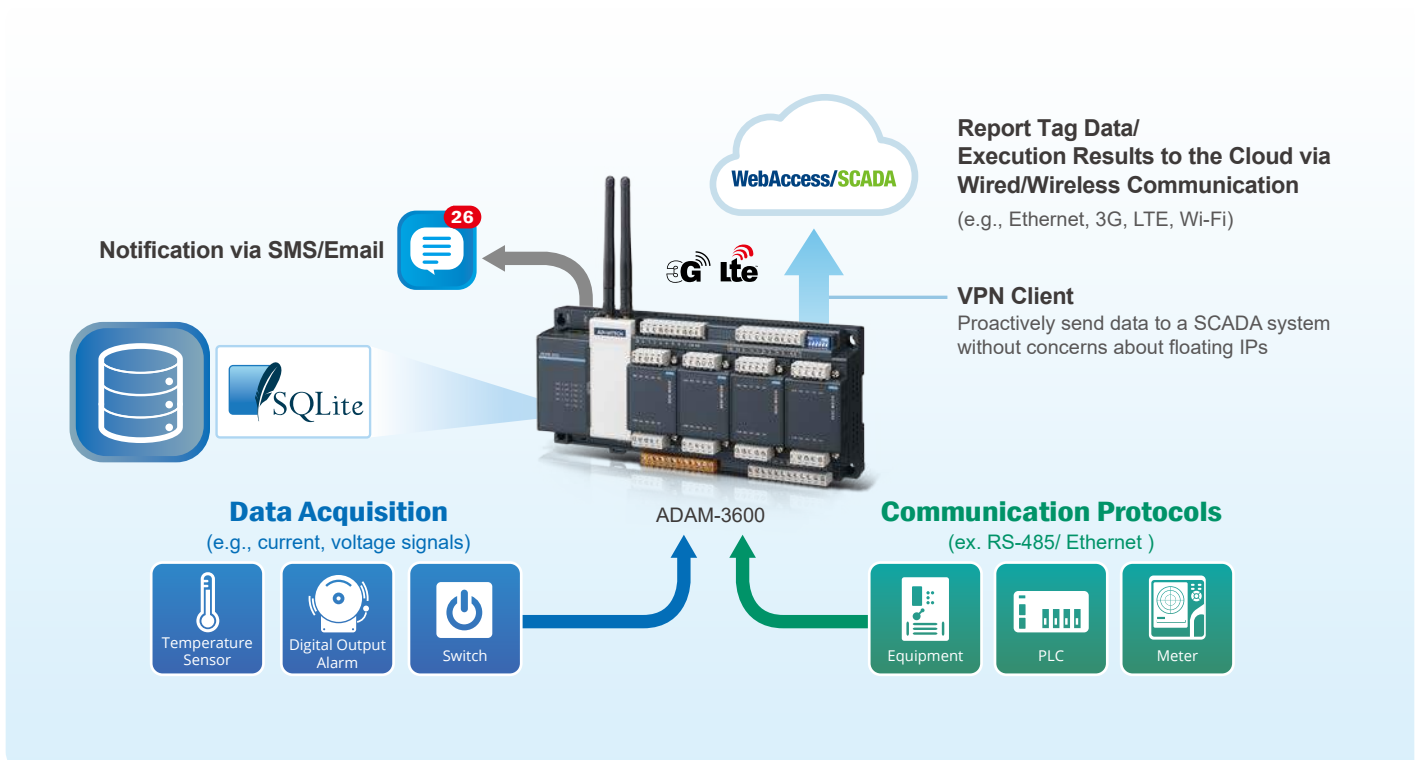- Cost-effective system integration solutions

Remote Facility Management Solution

System Requirements

The client required a solution that can support various types of protocols as well as event logging. To facilitate managing system problems, the customer also needed a remote terminal unit that can trigger alarm notifications via SMS or email. A system integrator will follow up this lead to provide a fully cost-effective turnkey solution that fulfills the client's requirements.

Notification via SMS/Email

SQLite

WebAccess/SCADA

Report Tag Data/ Execution Results to the Cloud via Wired/Wireless Communication
(e.g., Ethernet, 3G, LTE, Wi-Fi)

VPN Client
Proactively send data to a SCADA system without concerns about floating IPs

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

Temperature Sensor

Digital Output Alarm

Switch

ADAM-3600

Communication Protocols
(ex. RS-485/ Ethernet)

Equipment

PLC

Meter

System Features

- All-in-one device for handling multiple sensors
- 3G/LTE network communication with VPN access
- Event logging for acquiring action information from remote sites
- SMS/email notification for changes of state

Benefits

- Easy to install and manage according to client requirements
- Cost-effective for system integration and maintenance
- Integration solution from the edge to SCADA
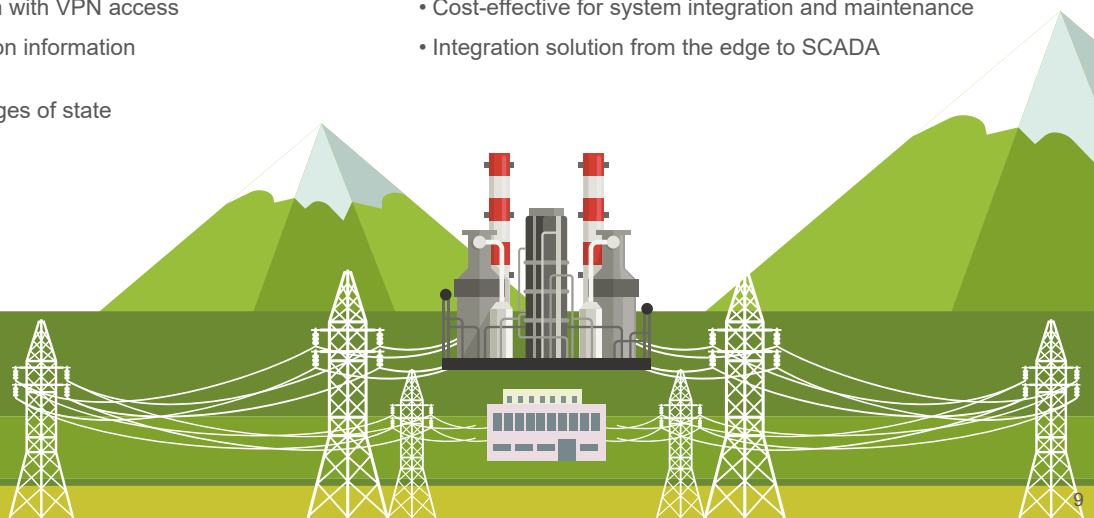
Product Selection Guide

Model Name	ADAM-3600
Description	**Open Basis Intelligent RTU**
System CPU	Cortex A8
Operating system	Linux RT 3.12
Programming interface	C (Linux) IEC-61131-3
Communication protocols	Modbus/RTU, Modbus/TCP, DNP3
Wireless communication protocols	GPRS, 3G, Wi-Fi, Zigbee
Special functions	Monitoring (iCDManager), data identification, breakpoint transmission, initiative reporting
Serial Port Number of ports	3
Type	1 x RS-232/485, 2 x RS-485
Network Port Number of channels	2
Number of independent IP addresses	2
Speed	10/100 Mbps
IP specifications	IPv4/IPv6
I/O Onboard I/O	8 analog inputs, 8 digital inputs, 4 digital outputs
Expansion slots	4
USB USB2.0	1
Display Interface VGA	1
LED	System, serial, Ethernet, digital I/O, programmable
Storage Interface SD	1 x SD slot
Operating Temperature	-40~70 °C
Certification	CE/FCC
Part Number	ADAM-3600-C2GL1A1E

Expansion Module for ADAM-3600

Model	Category	Channel	Part Number
ADAM-3617	Analog input module	4	ADAM-3617-AE
ADAM-3618	Analog input module	4, thermocouple	ADAM-3618-AE
ADAM-3624	Analog output module	4	ADAM-3624-AE
ADAM-3651	Digital input module	8	ADAM-3651-AE
ADAM-3656	Digital output module	8	ADAM-3656-AE
ADAM-3613	Analog input module	4, RTD	ADAM-3613-AE

Analog Input	
Signal Input	Differential
Sampling Rate	10 Hz
Voltage Input	+/- 10 V, +/- 2.5 V
Input Current	0~20 mA, 4~20 mA
Sensor Input	Thermocouple (type J, K, T, E, R, S, B) RTD (Pt100, Pt1000, Balco 500, Ni 518)
Resolution	16-bit

Analog Output	
Output Voltage	0~10 V
Output Current	0~20 mA, 4~20 mA
Resolution	12-bit

Digital Input	
Input Type	Sink
Rated Voltage	12/24 VDC
Logic "0" Voltage	0~5 VDC
Logic "1" Voltage	11~30 VDC

Digital Output	
Output Type	Open collect
Output Voltage	8~30 VDC @ max 200 mA

Product Selection

EWM-W150H2E
Half-sized mini card, supports 802.11bgn

1750006043	SMA(M) cable, 15 cm
1750000318	2-dBi antenna, 11 cm

Model Name	ECU-1152TL	ECU-1251TL
Description	**Industrial Communication Gateway**	**Industrial Communication Gateway**
System		
CPU	Cortex A8	Cortex A8
Operating system	Linux RT 3.12	Linux RT 3.12
Programming interface	C (Linux)	C (Linux)
Wireless communication protocols	Modbus/RTU, Modbus/TCP, IEC-60870-101/104	Modbus/RTU, Modbus/TCP, IEC-60870-101/104
Wireless communication	GPRS, 3G, Wi-Fi, 4G	GPRS, 3G, Wi-Fi, 4G
Special functions	Monitoring, data identification, breakpoint transmission, initiative reporting	Monitoring, data identification, breakpoint transmission, initiative reporting
Serial Port		
Number of ports	6	4
Type	RS-232/485	RS-232/485
Network Port		
Number of channels	2	2
Independent IP number	2	2
Speed	10/100 Mbps	10/100 Mbps
IP specifications	IPv4/IPv6	IPv4/IPv6
I/O		
Onboard I/O	-	-
Expansion slots	-	-
USB		
USB2.0	1	1
Display Interface		
VGA	-	-
LED	PWR/Serial/Prog	PWR/Serial/Prog
Storage Interface		
SD	1 x micro SD slot	1 x micro SD slot
Operating Temperature	-40~70 °C	-40~70 °C
Certification	CE/FCC	CE/FCC
Part Number	ECU-1152TL-R11ABE	ECU-1251TL-R10AAE

EWMC109F601E
6-band HSPA cellular module with SIM holder

1750006264 SMA(F) cable, 15 cm
1750005865 Dipole antenna, 11 cm

EWM-G108H01E
GPS/GNSS half-sized mini PCIe card

1750006264 SMA(F) cable, 15 cm
1750006432 4.5-dBi antenna, 5 m

Regional Service & Customization Centers

China Kunshan 86-512-5777-5666	**Taiwan** Taipei 886-2-2792-7818	**Netherlands** Eindhoven 31-40-267-7000	**Poland** Warsaw 00800-2426-8080	**USA** Milpitas, CA 1-408-519-3898	

Worldwide Offices

Greater China

China
Toll Free	800-810-0345
Beijing	86-10-6298-4346
Shanghai	86-21-3632-1616
Shenzhen	86-755-8212-4222
Chengdu	86-28-8545-0198
Hong Kong	852-2720-5118

Taiwan
Toll Free	0800-777-111
Taipei & IoT Campus	886-2-2792-7818
Taichung	886-4-2329-0371
Kaohsiung	886-7-229-3600

Middle East and Africa
Israel	072-2410527

Asia

Japan
Toll Free	0800-500-1055
Tokyo	81-3-6802-1021
Osaka	81-6-6267-1887
Nagoya	81-0800-500-1055

Korea
Toll Free	080-363-9494
Seoul	82-2-3663-9494

Singapore
Singapore	65-6442-1000

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

Thailand
Bangkok	66-2-248-3140

India
Bangalore	91-80-2545-0206
Pune	91-20-3948-2075

Indonesia
Jakarta	62-21-751-1939

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

Europe

Germany
Toll Free	00800-2426-8080/81
Munich	49-89-12599-0
Düsseldorf	49-2103-97-855-0

France
Paris	33-1-4119-4666

Italy
Milano	39-02-9544-961

Benelux & Nordics
Breda	31-76-523-3100

UK
Newcastle	44-0-191-262-4844
London	44-0-870-493-1433

Poland
Warsaw	48-22-31-51-100

Russia
Moscow	8-800-555-01-50
St. Petersburg	8-800-555-81-20

Czech Republic
Ústí nad Orlicí	420-465-521-020

Ireland
Oranmore	353-91-792444

Americas

North America
Toll Free	1-888-576-9668
Cincinnati	1-513-742-8895
Milpitas	1-408-519-3898
Irvine	1-949-420-2500
Ottawa	1-815-434-8731

Brazil
Toll Free	0800-770-5355
São Paulo	55-11-5592-5355

Mexico
Toll Free	1-800-467-2415
Mexico City	52-55-6275-2727

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

8600000382