Intelligent RTU：ADAM-3600

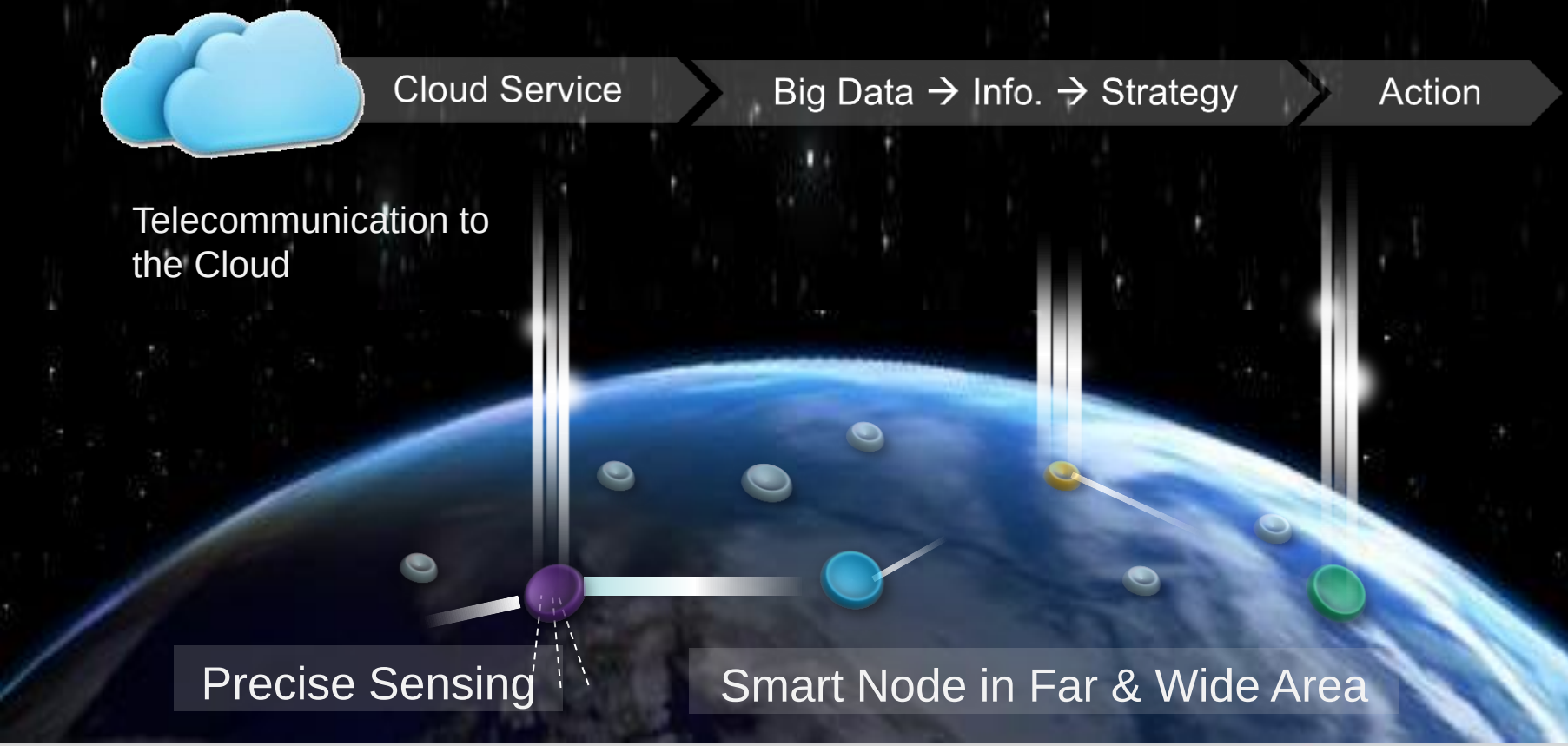
Powers Industrial IoT Solutions

Enabling an Intelligent Planet

ADVANTECH

Intelligent RTU in the IoT Era

High Adaptability to Environment
Self-diagnosis / healing
Big Data Pretreatments
Part of Telemetry / SCADA system



iRTU Powers Industrial IoT Solutions

Engineer
Remote diagnosis & maintenance

Operator
Easy monitoring & intuitive control

Executives
Visual management & strategy development

Scene of Oil Production

iRTU, Seamless Integrated with SCADA

Meets all your Remote Monitoring & Control needs

One-stop shopping for IoT S/W & H/W, Minimize purchasing and support effort

Advantech
Web-based SCADA Software

Advantech
All-in-One Intelligent RTU

ADAM-3600-C2G : New ADAM for IoT

All-in-One design, Reduces integration effort

Computing

Powerful Platform
- 32-bit Cortex A8 600MHz
- (TI AM3352)
- 256MB DDR3L RAM
- 32K Battery Backup RAM
- 1GB Micro SD Built-in
- RT Linux V3.12
- SD Card Slot x1
- USB 2.0 + VGA

PC/PLC Programming
- SDK for C Prog.
- IEC-61131-3 SoftLogic

Multiple Protocols
- Modbus/RTU
- Modbus/TCP
- DNP3
- IEC-60870-5 (Developing)
- OpenVPN
- NTP
- RESTful
- HTML5 Webservice
- IPV4/IPV6

Wireless Communication
- Modular Design (PCIe-mini Card Module x2)
- Support Wi-Fi/3G/GPRS/ZigBee

I/O System
- Built-in 8AI / 8DI / 4DO
- 4 Flexible expansion slots
- LED Indicators

Wired Communication
- 1x RS-232/485 (DB9) + 2x RS-485 (Terminal)
- 2x RJ-45 10/100Base-T Ethernet

Modularized Wireless Communication

Explore Wireless Possibility with 2x PCIe-mini slots

- Easy upgrade to the latest wireless & mobile technology
- Building local preferred modules without any struggle

a/b/g WiFi n DRAFT CERTIFIED®
EWM-W150H02E Module

3G / GPRS
EWM-C109F601E Module

ZigBee®
Project Support

... and more

* Antenna is suggested to install outside the control cabinet

iRTU, Born for Remote Automation

Smart Oil Fields with ADAM-3600

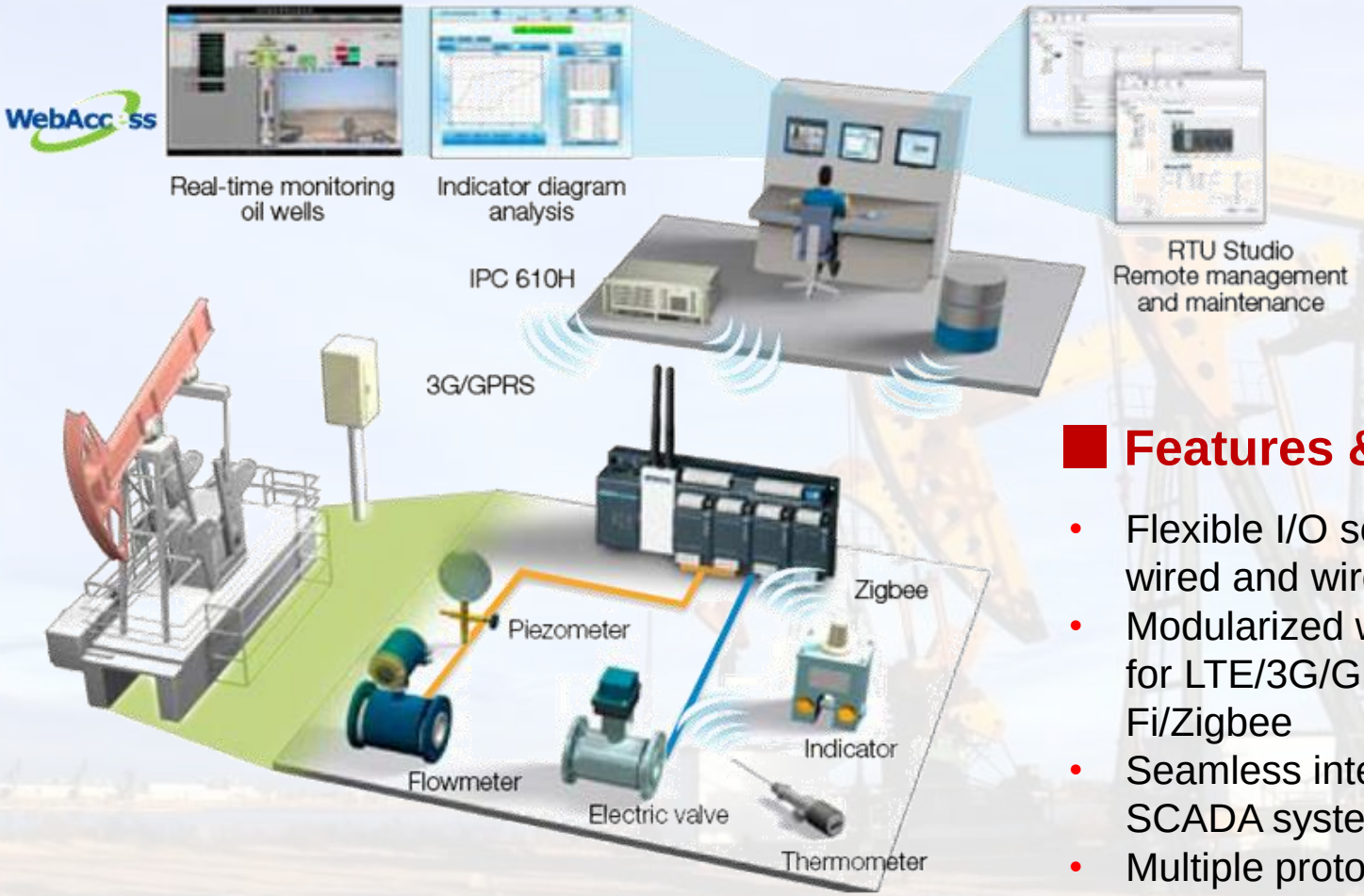
Oil well monitoring & control

North-West oil field @ China

Soft PID control for oil pump

North oil field @ China

Smart Oil Fields with ADAM-3600



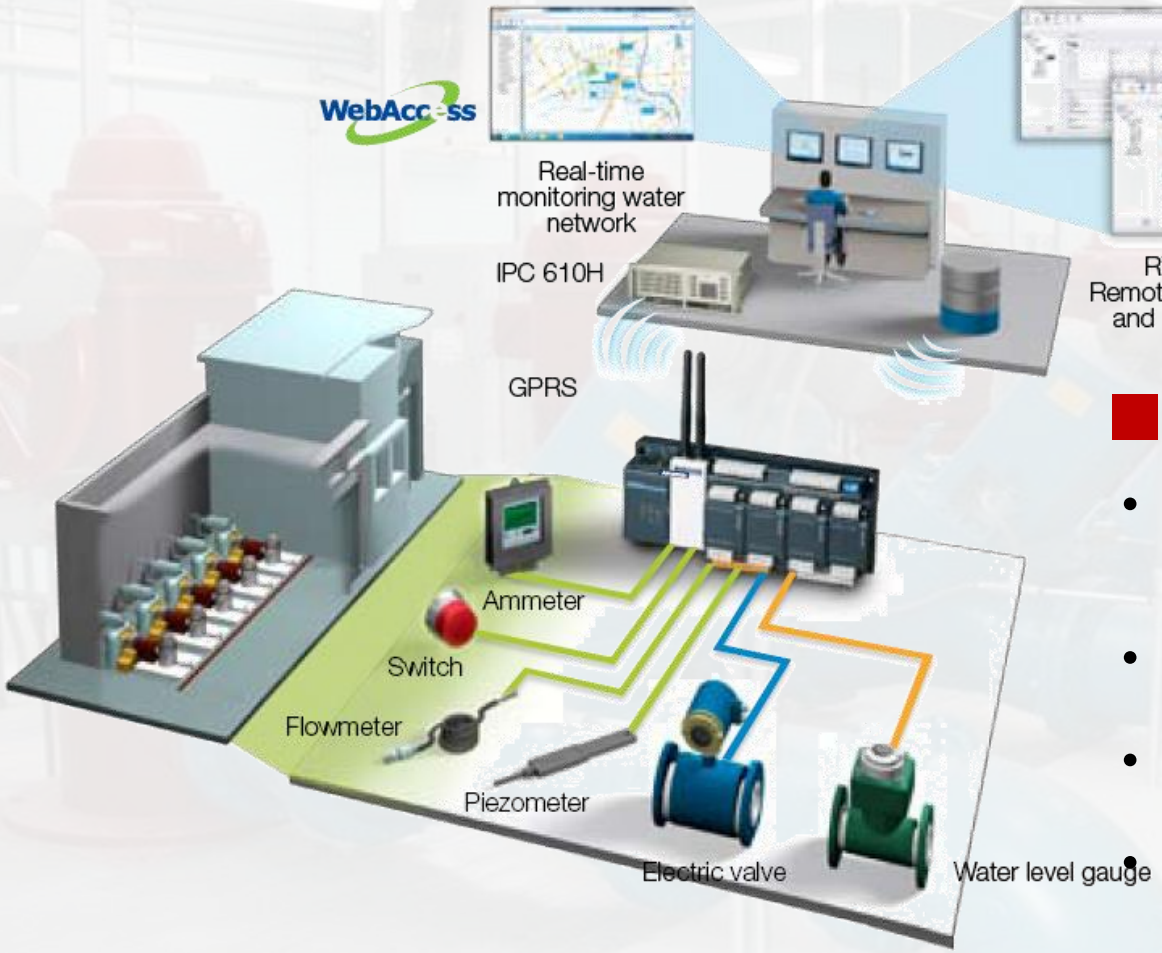
Features & Benefits

- Flexible I/O solutions, both wired and wireless
- Modularized wireless design for LTE/3G/GPRS/Wi-Fi/Zigbee
- Seamless integration with SCADA system
- Multiple protocols support

Pipeline Monitoring with ADAM-3600

South–North Water Transfer Project @ Beijing

Pipeline Monitoring with ADAM-3600



Features & Benefits

- Flexible IO solutions, supports various device protocols
- Seamless integration with SCADA systems
- Remote diagnosis and firmware upgrade
- Built-in webpage for on-line monitoring

Smart Agriculture with ADAM-3600

Economical Controller w/ Flexible IO

Green House @ South-West China

Wireless DAQ Solution

Through EWM-W150H02E Module

WISE-4000 Wireless I/O Module

ZigBee

Through ADAM-3692Z

WISE-M500 Wireless Meter

Max 3000 tags
CPU capacity

ADAM-3600-C2G

Serial /RS-485

ADAM-4000 I/O Modules

Wired DAQ Solution

Ethernet

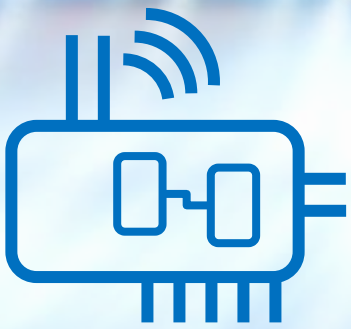
ADAM-6000 Smart I/O Modules

ADAM-5000/TCP Slot IO

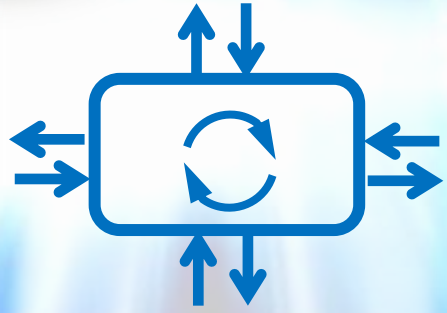
iRTU Equips Key IoT Technology

#TagLink

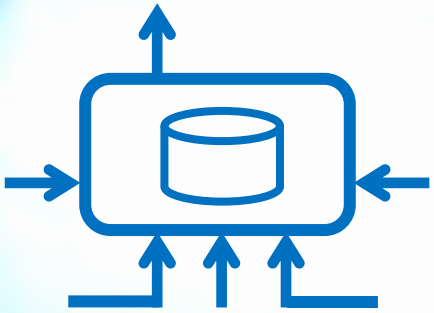
Transfer Physical Value to be Tags, and secure the linkage with cloud and each node. Targets 3 typical applications shown below.



RTU
(Remote Terminal Unit)

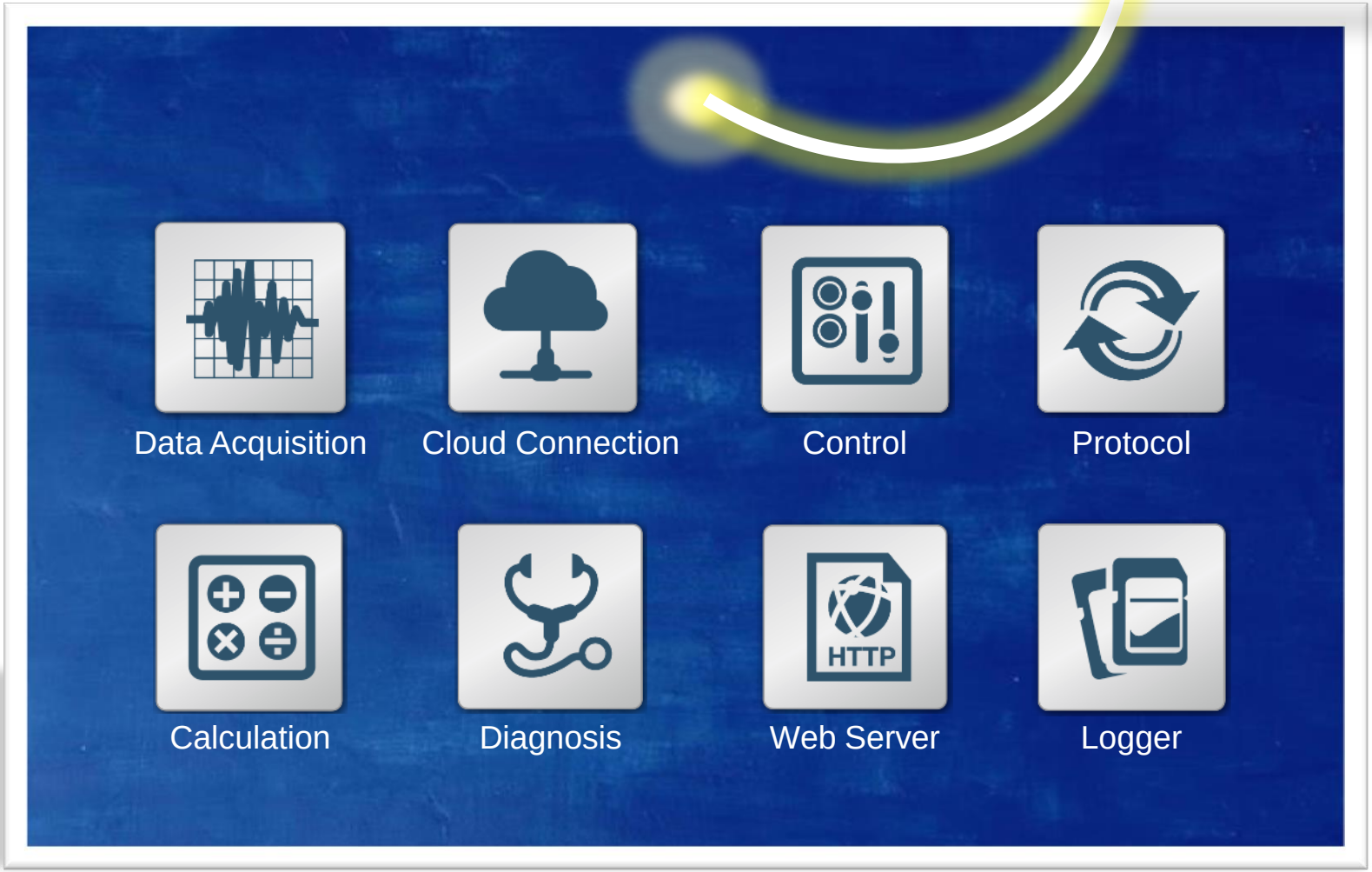


Gateway

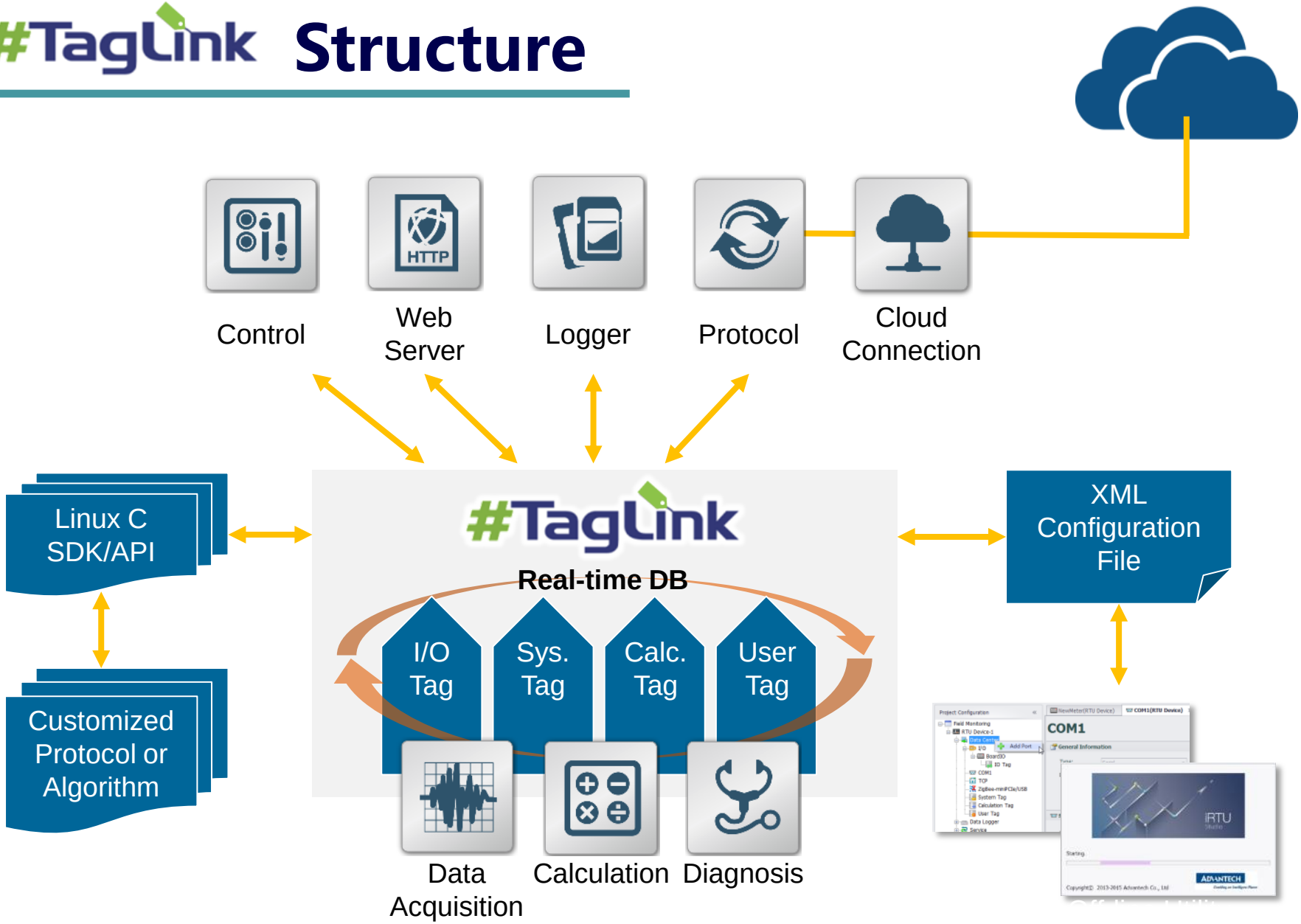


Concentrator

8 Key Functions Empowered by #TagLink



#TagLink Structure



Data Acquisition

Flexible DAQ Solution

Rich on-board I/O with 4-slot I/O expansion capability

- Cost-effective design with high adaptability for various applications
- Expansion without occupying extra space in the cabinet
- No need to prepare many RTU models for different I/O requirements

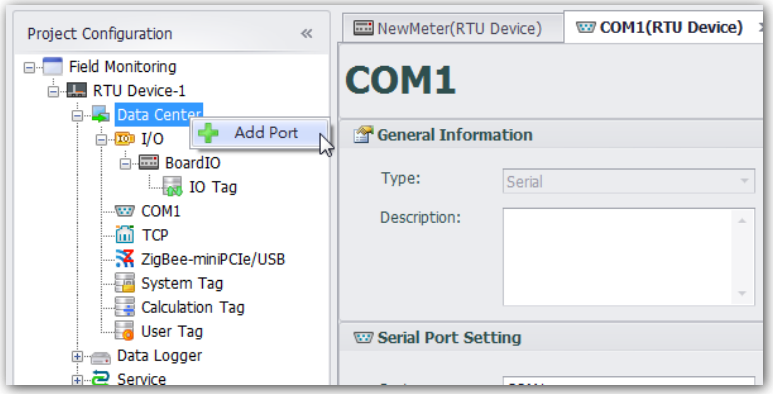
Channel No.	AI	T/C	AO	DI	DO
ADAM-3600-C2G -- On-board I/O	8			8	4
ADAM-3617 -Voltage/Current, 16-bit	4				
ADAM-3618 -J/K/T/E/R/S/B, 16-bit		3			
ADAM-3624 -Voltage/Current, 12-bit			4		
ADAM-3651 -Isolation, Sink Type				8	
ADAM-3656 -Isolation, 8~30VDC					8

* Ref . Max AI Ch No. =24, Max AO Ch No. =16, Max DI Ch No. =40, Max DO Ch No. =36, Max T/C Ch No. =12, in one unit.

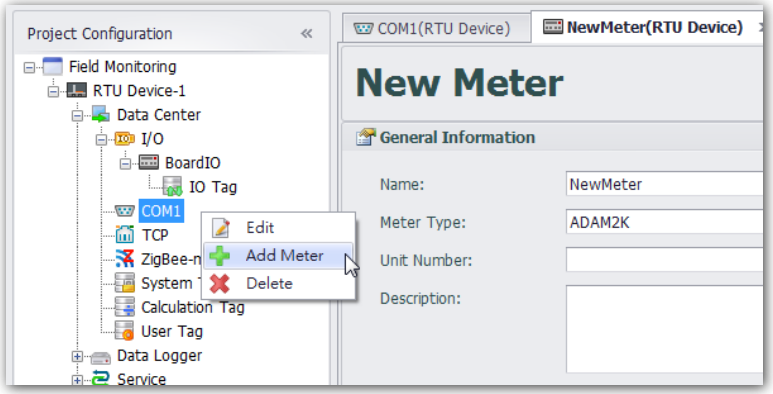
* Expansion through standard SPI interface. Ready to open to any customization request

Flexible DAQ Solution

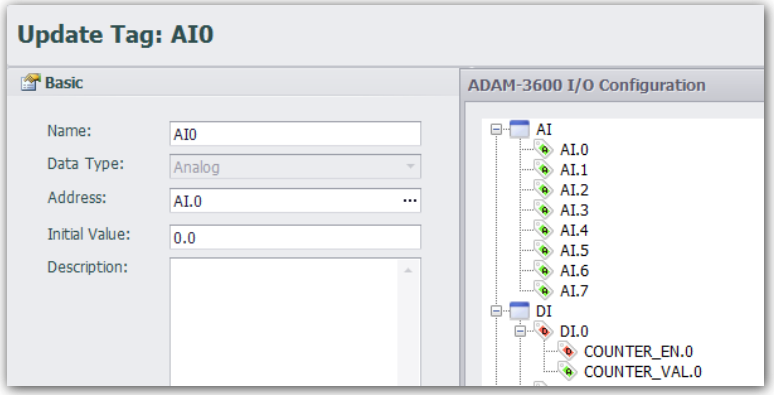
Unified interface, easy for engineering



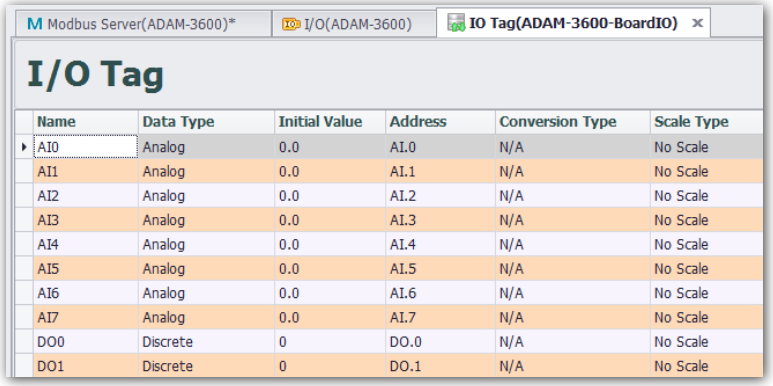
Add Resource (Serial / TCPIP / Zigbee)



Add Meter (PLC / ADAM / Meters)



Select IO from a Pop-up Tree-view



Name	Data Type	Initial Value	Address	Conversion Type	Scale Type
AI0	Analog	0.0	AI.0	N/A	No Scale
AI1	Analog	0.0	AI.1	N/A	No Scale
AI2	Analog	0.0	AI.2	N/A	No Scale
AI3	Analog	0.0	AI.3	N/A	No Scale
AI4	Analog	0.0	AI.4	N/A	No Scale
AI5	Analog	0.0	AI.5	N/A	No Scale
AI6	Analog	0.0	AI.6	N/A	No Scale
AI7	Analog	0.0	AI.7	N/A	No Scale
DO0	Discrete	0	DO.0	N/A	No Scale
DO1	Discrete	0	DO.1	N/A	No Scale

Table Provide Overview of Configured Tags

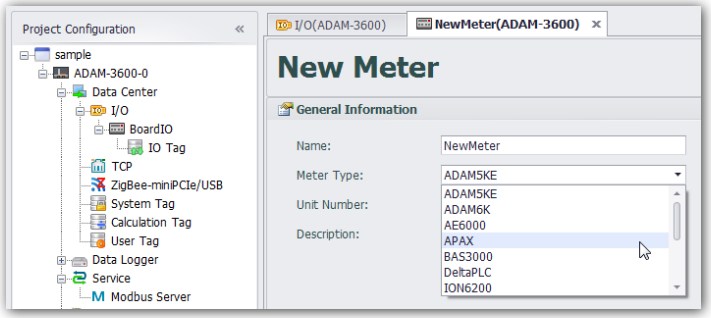
Data Acquisition

Flexible DAQ Solution

Open interface for any possibility

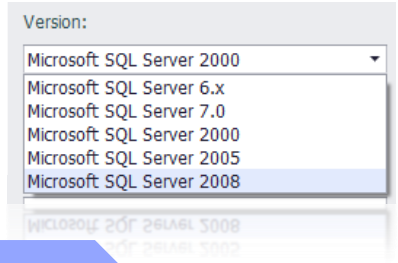
TagLink supports more than 200 I/O Drivers

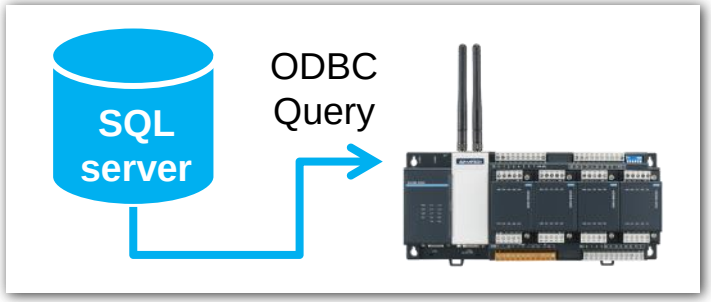
- Share the same driver structure as WebAccess.
- Transfer WebAccess I/O Driver to TagLink platform by request (Takes 2 weeks for transferring and testing)



Support ODBC Query for MS SQL Server

- Standard query through Ethernet
- No need for extra S/W on server
- Bridging data cross LAN

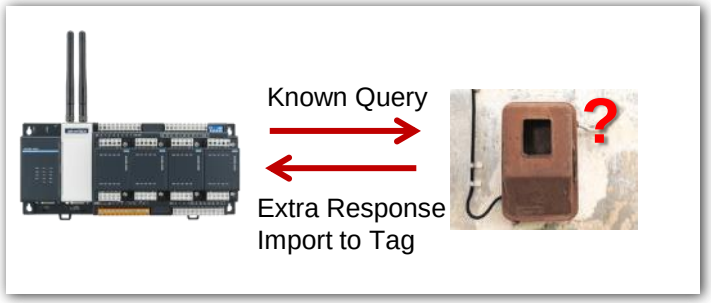




Frame Editor for non-standard meter

- Supports serial polling mode
  Sending a known command/query
  Extract data from responses and import as tags

** Planned function on Image V1.2.0 @ 2015/Q4



Translate Raw Data Locally

Calculation

Traditional Way

SCADA

Calculation

Query by Address

Raw Data

RTU

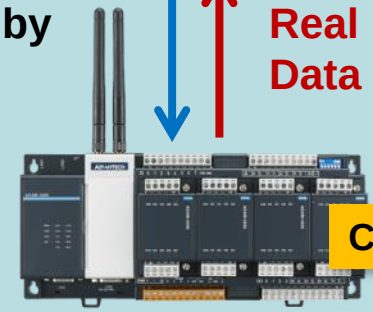
- X Address mapping table is mandatory
- X Redundant scaling task for multi-access
- X Not IT friendly for Big Data analysis
- X Re-programming for IO changes

New IoT Way

SCADA

Query by Tag

Real Physical Data



Calculation

iRTU + #TagLink

- ✓ Intuitive data access
- ✓ Tags saved in iRTU as XML format
- ✓ RESTful support for IT friendliness
- ✓ Data with quality and time-stamp

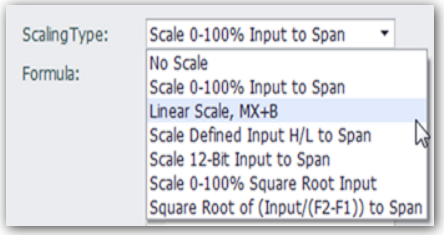
Calculation

Translate Raw Data Locally

Get the meaningful data you really care

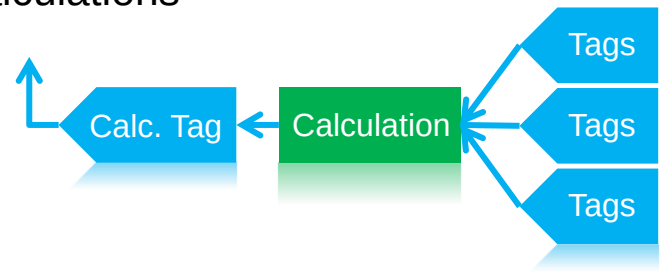
Analog I/O Tag Scaling

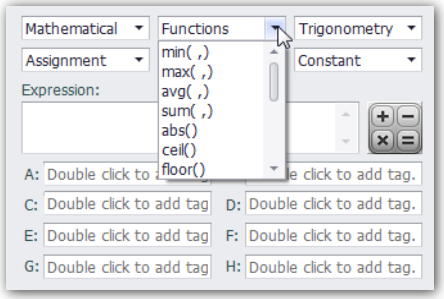
- Supports 6 popular formulas for data scaling
- Ex. Transfer 10mA to 100˚C



Calculation Tag

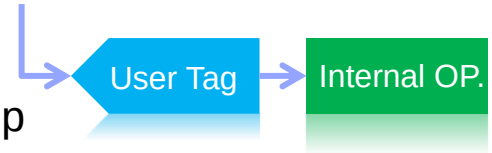
- No need to program for simple calculations
- Max. 8 inputs for one Calc. Tag
- Ex. Calculate flow rate from temperature and pressure

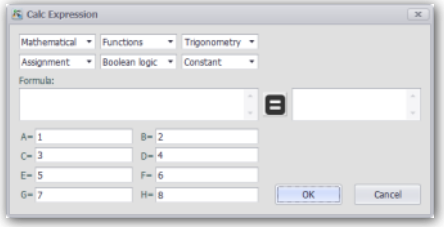




User Tags

- Transfer parameters to RTU
- Assigned Constant Value
- Ex. Assign a set point of PID loop

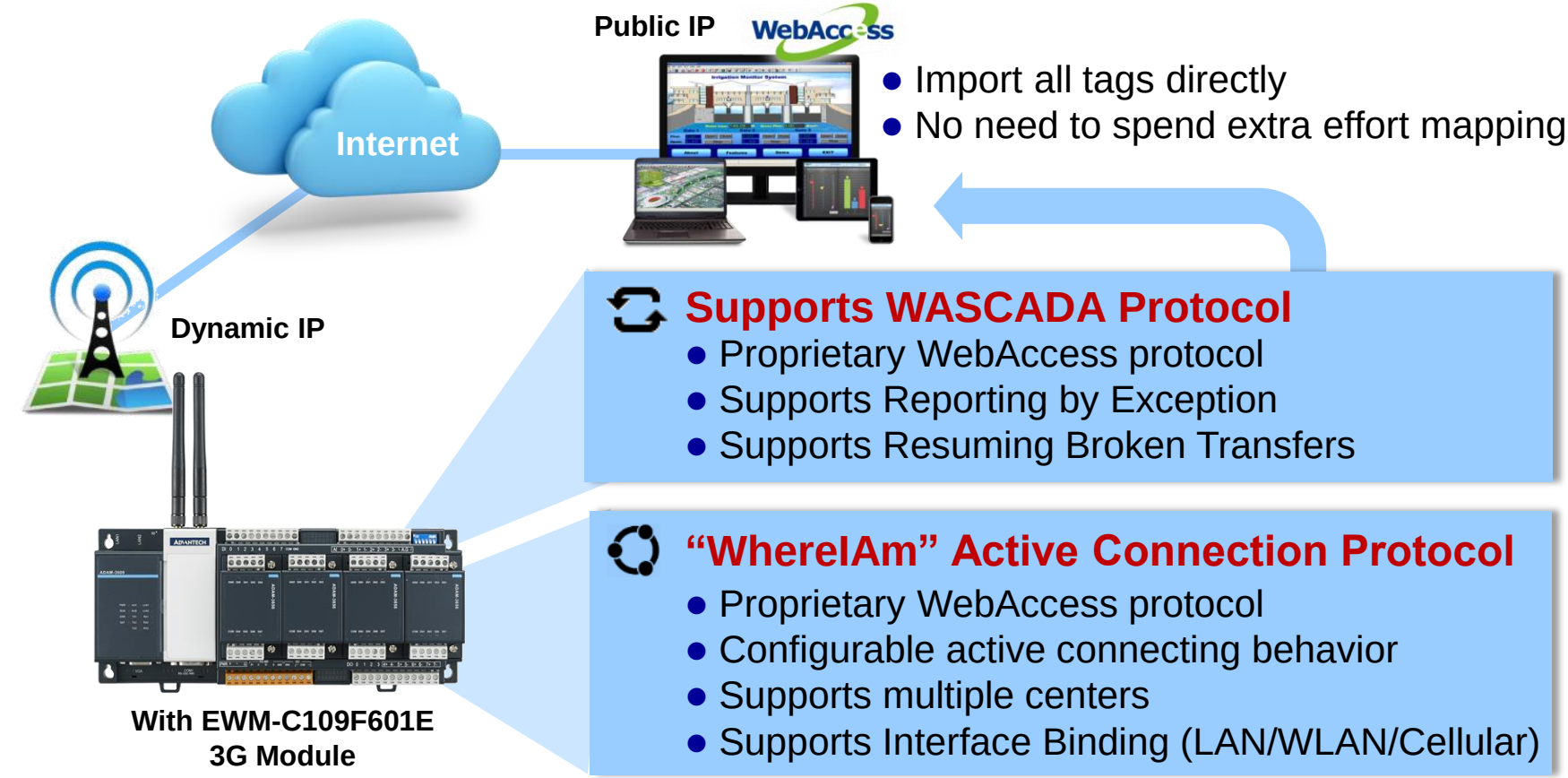




Highway to the Cloud

Quick and easy connection with WebAccess

Resolve Dynamic IP and Bandwidth Issue of Mobile Network



- Import all tags directly
- No need to spend extra effort mapping tags

Supports WASCADA Protocol

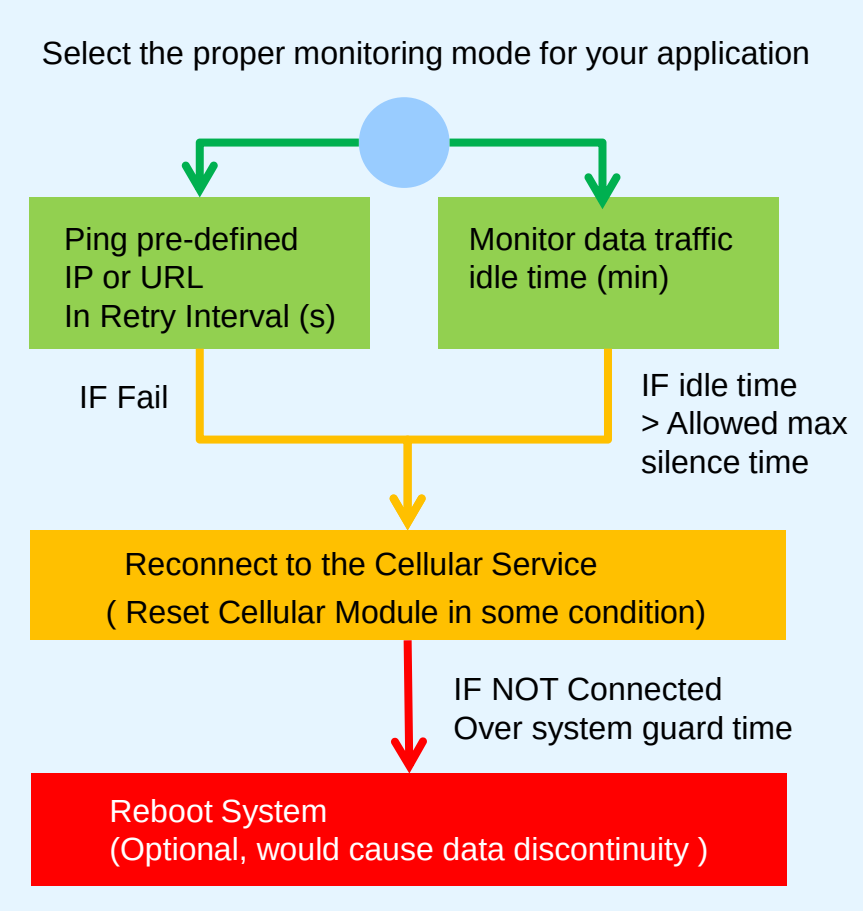
- Proprietary WebAccess protocol
- Supports Reporting by Exception
- Supports Resuming Broken Transfers

"WhereIAm" Active Connection Protocol

- Proprietary WebAccess protocol
- Configurable active connecting behavior
- Supports multiple centers
- Supports Interface Binding (LAN/WLAN/Cellular)

Highway to the Cloud

Keep your cellular service always on-line

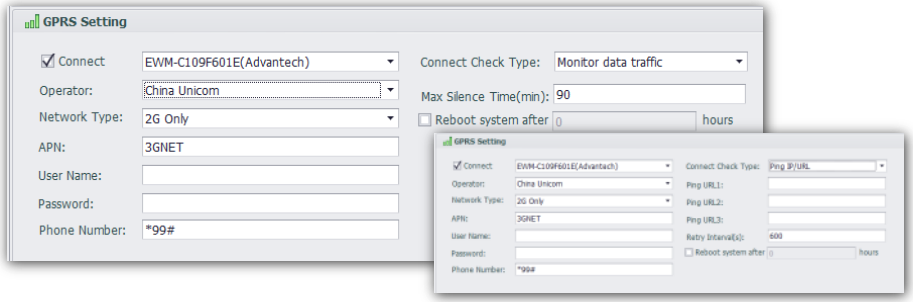


Monitor by Ping

- The unit plan to be always on-line
- Supports multi-center checking (at least one response to pass the checking)
- Auto recover mobile module failure

Monitor by Data Traffic

- The unit is not always on line
- Server block “ping” service
- There should be data traffic within allowed max. silence time
- No extra cost for data flow



Monitor, Alert, and Recover

iCDManager monitor comm. quality remotely

Function Leveraged from Power Substation

- Digital Acquisition to the Port
- Compare and score by pre-set application mode

4 Application Modes for Serial

Mode	User Behavior
1	Data Exchange (Polling)
2	Heart Bit
3	Time Synchronization
4	Active Msg. for Alarm

4 Application Modes for Ethernet

Mode	User Behavior
1	Data Exchange (Polling)
2	Heart Bit
3	Active Msg. for Alarm
4	Device Discovery

Diagnosis

Monitor, Alert, and Recover

28 system tags help you master your system

System Tag

Name	Data Type	Description
#SYS_UPTIME	Analog	The current uptime(UTC)
#SYS_CURRENT_TIME	Analog	The current system time(UTC)
#SYS_CPU_FREQ	Analog	CPU frequency
#SYS_MEM_SIZE	Analog	Memory size(Byte)
#SYS_CPU_USED	Analog	CPU utilization rate(%)
#SYS_MEM_USED	Analog	Memory utilization rate(%)
#SYS_TFCARD_CAPACITY	Analog	TF card capacity(Byte)
#SYS_TFCARD_FREE_SPACE	Analog	TF card free space(Byte)
#SYS_SDCARD_CAPACITY	Analog	SD card capacity(Byte),the value is 0 if there is no SD card
#SYS_SDCARD_FREE_SPACE	Analog	SD card free space(Byte),the value is 0 if there is no SD card
#SYS_NODE_ID	Analog	Node ID on RTU
#SYS_COM_COUNT	Analog	COM count
#SYS_LAN_COUNT	Analog	LAN count
#MOBILE_MNO	Analog	Mobile network operator
#MOBILE_MNT	Analog	Mobile network type
#MOBILE_MDT	Analog	Mobile data traffic
#MOBILE_MPN	Analog	Mobile phone number
#MOBILE_SIGNAL_QUALITY	Analog	Signal quality of sim card.
#MOBILE_CSQ	Analog	Received Signal Strength Indication
#WLAN0_SIGNAL_QUALITY	Analog	Signal quality of wlan0.
#WLAN0_SIGNAL_LEVEL	Analog	Signal level of wlan0.
#ICDM_COM1_SCORE	Analog	COM 1 score
#ICDM_COM2_SCORE	Analog	COM 2 score
#ICDM_COM3_SCORE	Analog	COM 3 score
#ICDM_LAN1_SCORE	Analog	LAN 1 score
#ICDM_LAN1_LINK	Analog	LAN 1 link state
#ICDM_LAN2_SCORE	Analog	LAN 2 score
#ICDM_LAN2_LINK	Analog	LAN 2 link state

Classification

- **System** : CPU / RAM / TF Card / SD Card/ NodeID
- **Wireless Connection** : Mobile / WLAN
- **Wired Connection** : Serial / Ethernet

Applications

- **Import to Logger** :
  Record system status by time
- **Link to Program** :
  Reacts to unexpected statuses
- **Link to Protocol** :
  Remotely monitor device status
- **On-line Webpage**:
  Watch device status locally through Pad or Phone

Control

Built-in PLC + PC Controller

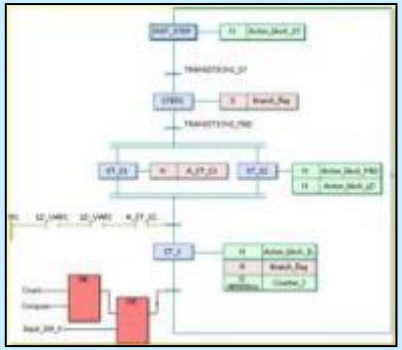
Free IEC-61131-3 IDE and robust runtime kernel

Development Environment : MultiProg Express

- Directly import Tags, no need additionally edit tags
- Off-line simulation & online download

Runtime Engine : ProConOS eCLR

- Built-in Advantech RTU controller
- No need for extra license payment



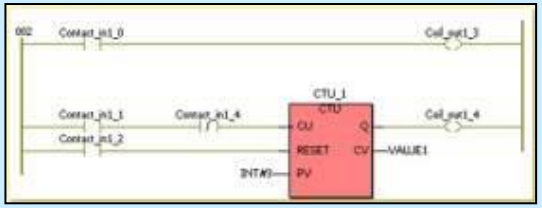
Sequential Function Chart (SFC)

```
CASE MODUS OF
1: ROBOT_X:= ROBOT_X + 200;
   ROBOT_X := ROBOT_X + ADD_ARM ;
   MODUS:=1;
   IF ROBOT_X >= RANGE_POS_1 THEN
      MODUS:=2;
   END_IF;
2: ROBOT_X:= ROBOT_X - 200;
   ROBOT_X := ROBOT_X - ADD_ARM ;
   MODUS:=2;
   IF ROBOT_X <= RANGE_NEG_1 THEN
      MODUS:=1;
   END_IF;
END_CASE;
ROBOT_Y:= ROBOT_X;
COUNTER_1 := COUNTER_1+1;
IF COUNTER_1 >1000 THEN
   COUNTER_1 :=0;
END_IF;
```

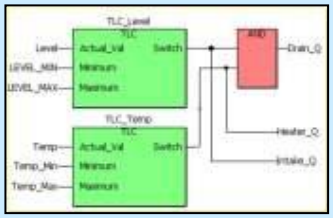
Structure Text (ST)

```
LD    %IX0.2
AND   %IX0.3
OR    Action_INIT
ST    IL_VAR

LD    Input_IX0_0
JMPC  MANUAL

(*Timer FB TON*)
LD    Timer_start
ST    TON_IL.IN
LD    PT_TON_IL
ST    TON_IL.PT
CAL   TON_IL
LD    TON_IL.Q
ST    Action_INIT
STN   Timer_start
LD    TON_IL.ET
```

Instruction List (IL)



Ladder



Function Block (FB)

Built-in PLC + PC Controller

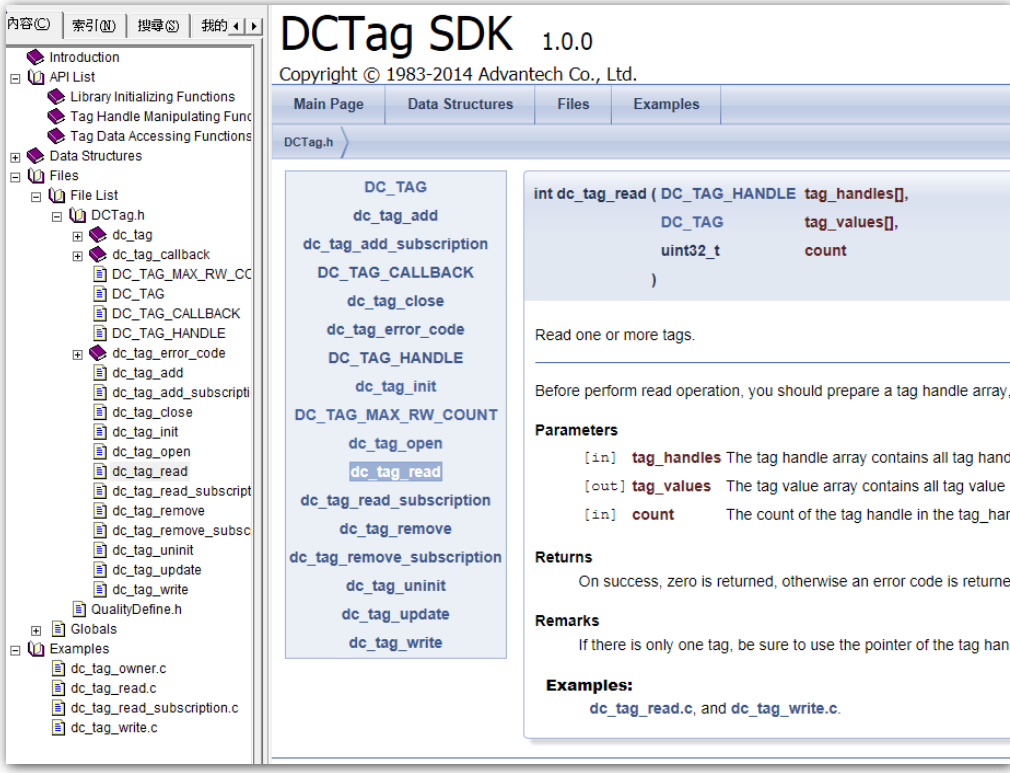
Just focus on your algorithms on Linux C programming

Development Environment

- Linux Toolchain "gcc-linaro-arm-linux-gnueabihf-4.7-2013.03-20130313_linux.tar.bz2"
- Can setup environment in Windows through "Virtualbox"

SDK Documentation

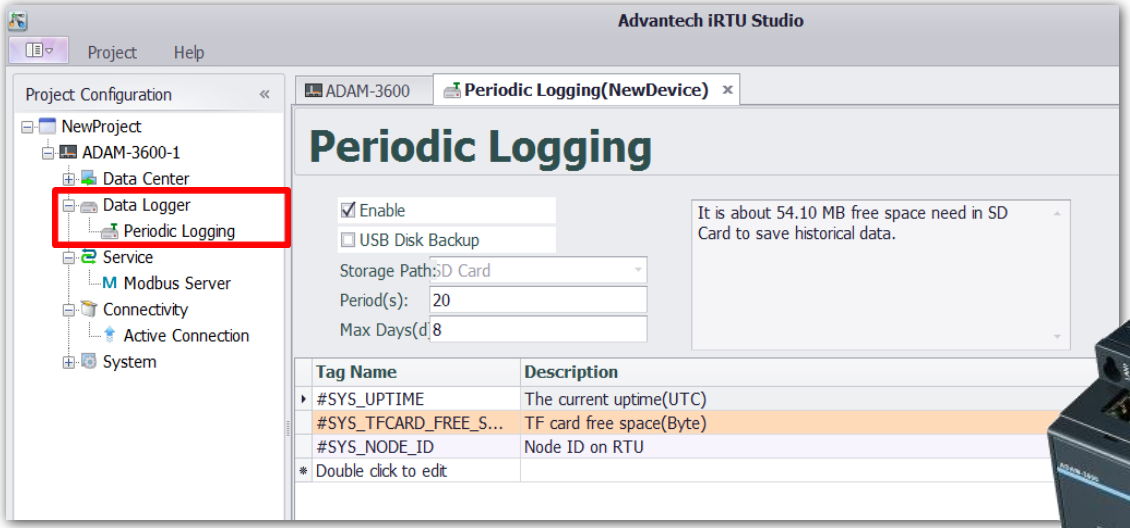
- DCTag for TagLink operation
- BoardResource for :
  1. NodeID
  2. WDT
  3. LED
- Provide : lib, include, manual, examples

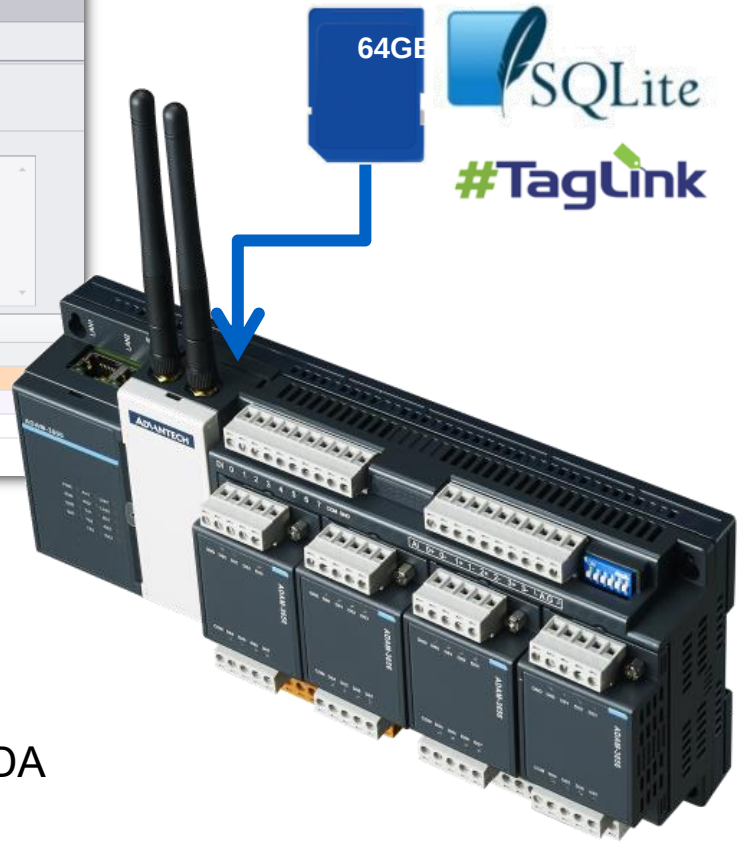


Logger

Agile Local Ring Buffer

Simply select tags and enable them



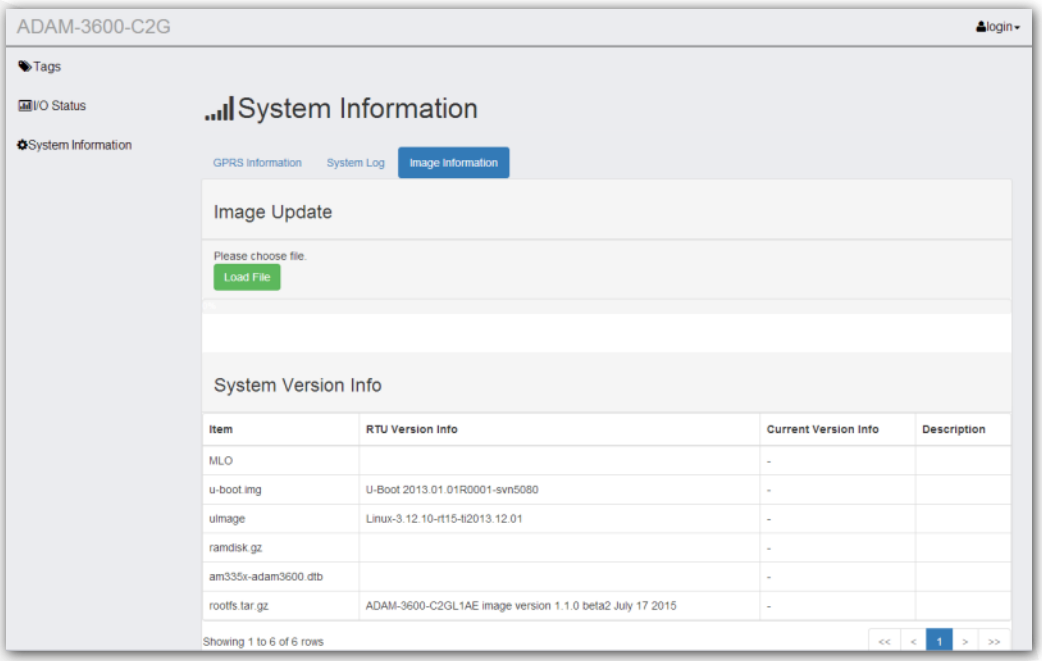


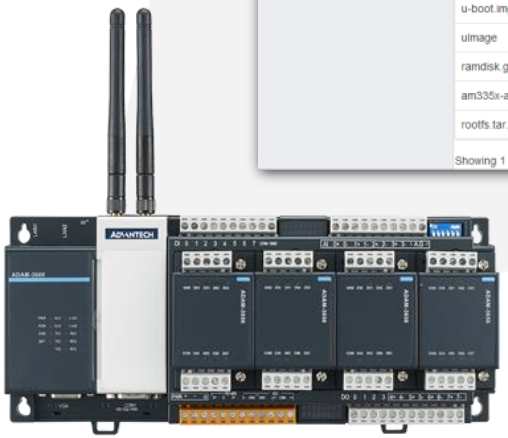
- Empowered by TagLink + SQLite
- Hint required SD Card Volume
- Remotley accessible by FTP /SSH
- Off-line Backup Function by USB Drive
- Enable it for “Resume Broken Transfer” of WASCADA

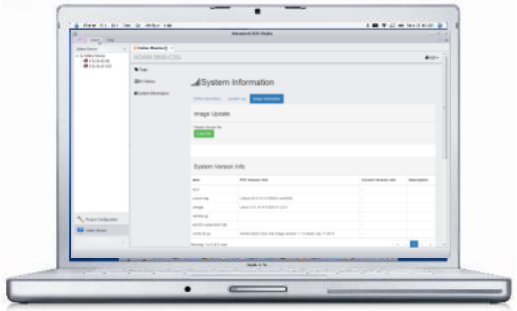
Monitor Data Comfortably

Web Page

Built-in HTML5 + RESTful for Any Browser





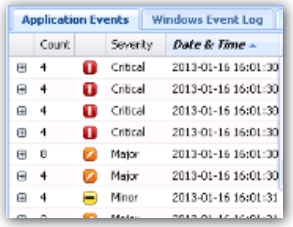


- Power by Built-in RESTful Service
- Supports On-line Image Update
- Version / Connection / System Status Information Checking

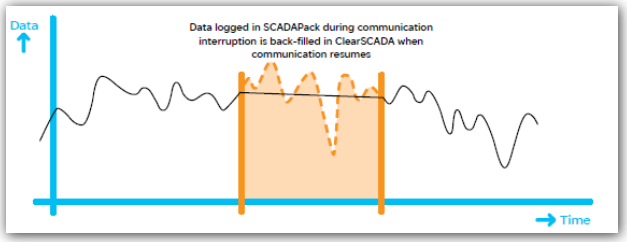
Protocol

Interface to the World

In Big Data era, we need more than Modbus…



✓Sequential of Event
✓Data with Time-stamp



✓Supplementary Report
✓Data Retrofit

DNP3 Protocol

WASCADA

Data Encryption / Authorization

Active/Scheduled Data Upload

Global Time Synchronization

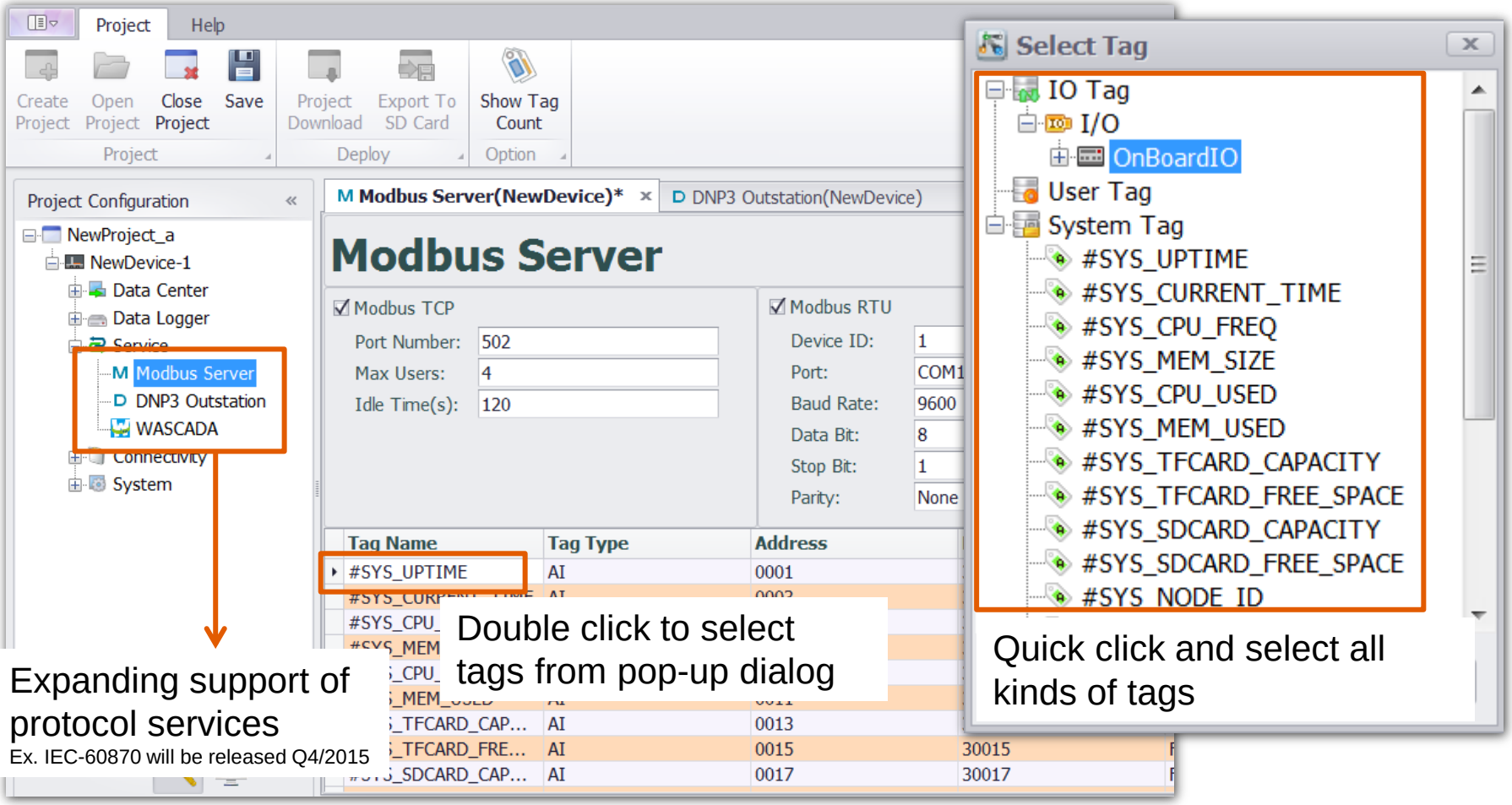
Enabling an Intelligent Planet

ADVANTECH

Protocol

Interface to the World

Intuitive interface, 3 steps manage tags to protocol



Protocol

Interface to the World

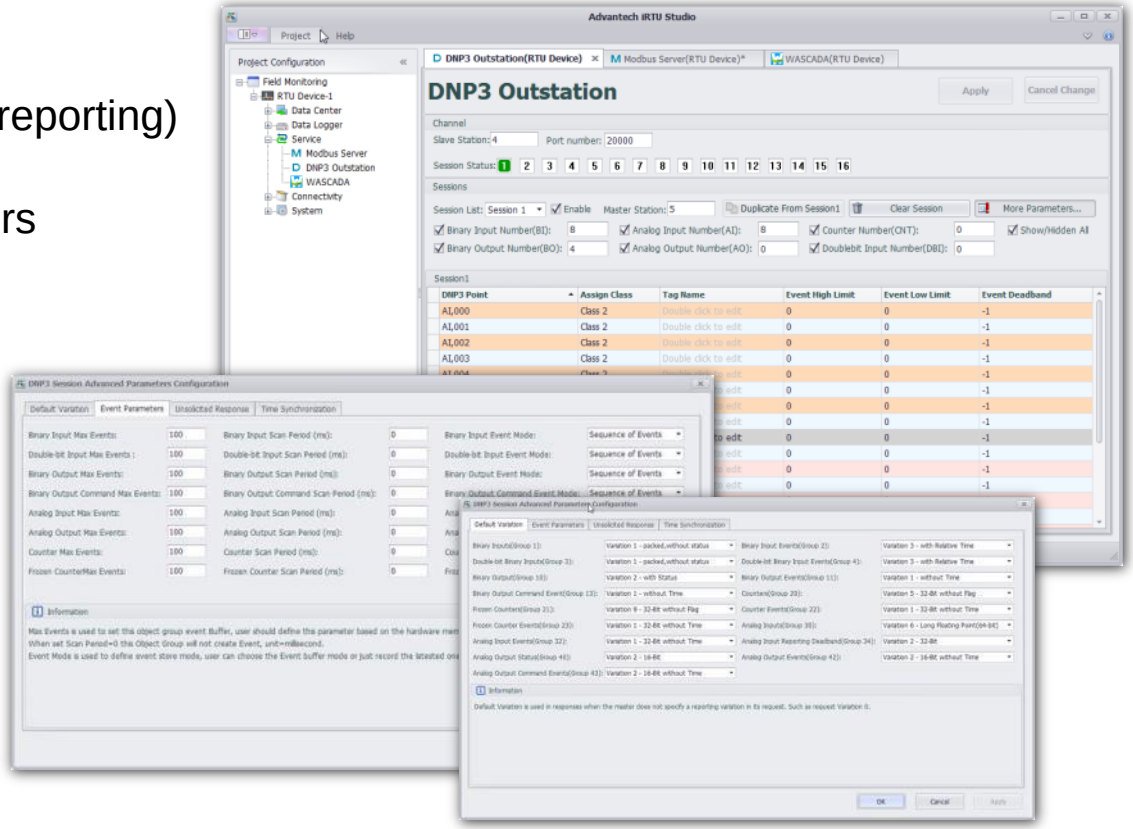
DNP3, a modern, robust, intelligent, open Protocol for RTU

Features

- Classification of field data
- Report by exception (Unsolicited reporting)
- Time-stamped data
- Communication to multiple masters

Specification

- DNP level supported : L2
- Device function : Slave
- Max data link frame size :
  Transmitted : 292
  Received : 292
- Max application fragment size :
  Transmitted : 2048
  Received : 2048

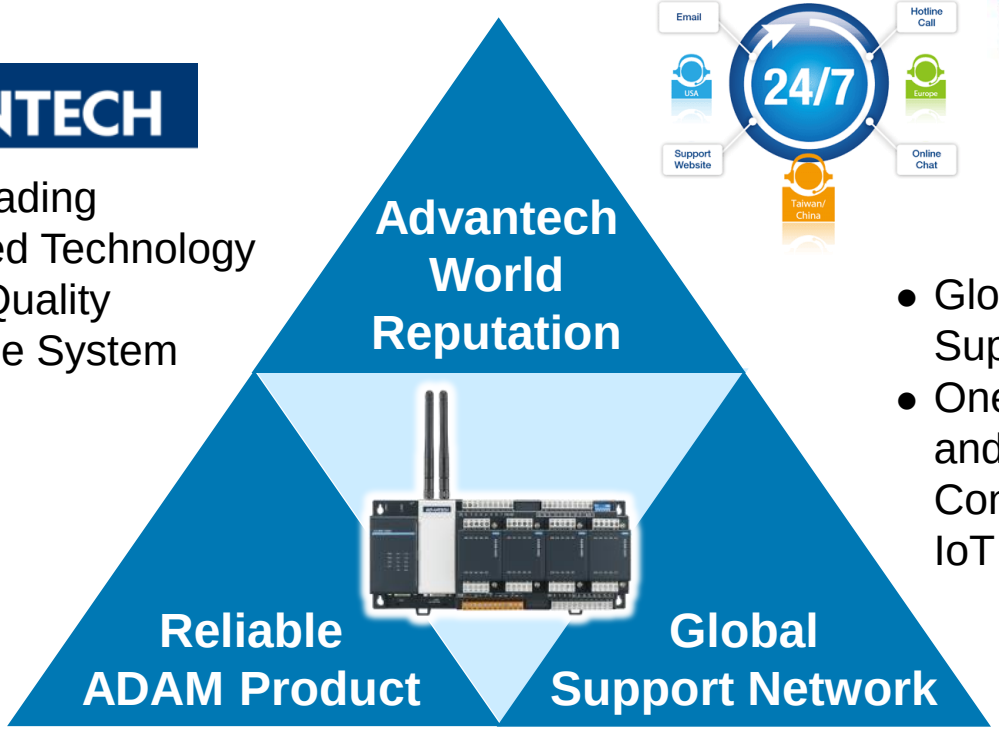


Source from : TRIANGLE MICROWORKS, INC.
SOLUTIONS FOR COMMUNICATION PROTOCOL DEVELOPMENT

Why Advantech iRTU ?

ADVANTECH

- World Leading Embedded Technology
- Trusted Quality Assurance System



- Global Technical Support & Service
- One Stop Shopping and Service for Constructing Industrial IoT Solution

- Industrial I/O Star Product
- More than 20 years Reputation
- Elegant UI with powerful functionality to serve IoT Smart Sensor Node

Partnering for Smart City & IoT Solutions
驱动智慧城市创新 共建物联产业典范
Industrial Cloud
& Cloud Networks
Private Cloud
iConnectivity
Transportation
Power & Energy
IoT Devices
Embedded Software
Computer On Modules
Video and RFID
iBuilding/BEMS
Industrial HMI
Environmental & Facility Monitoring
Intelligent Display
Intelligent Systems
Embedded Design-in Services
Image & Video Processing
Machine Automation
iHospital
Industrial PCs
iRetail & Hospitality
WebAccess+
Digital Healthcare
Digital Logistics