

ADVANTECH

Advantech EtherIO Ready Platform

**Real-time, Distributed, Comprehensive
Data Acquisition Technology for Embedded IPC**

**Advantech
Industrial Automation Group**

MES & Traceability

- Information between the front-end equipment & MES application
- Production Traceability

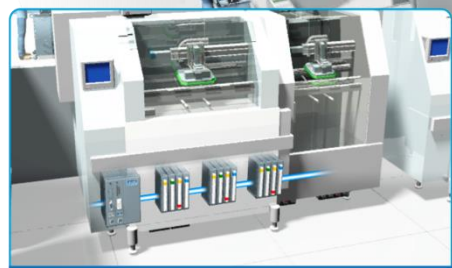


Predictive Maintenance

- Production Performance Analysis
- Machine Status
- Abnormal Diagnosis
- Sensor Measurement

For **Smarter Factory** Evolution, Real-time Data Collection / Handling Become the Key for Better Productivity and Quality.

Big Data



Machine Automation

- Industrial Robots
- Automated Guided Vehicle
- Industrial Machinery



Environmental Monitoring & Optimization

- Machine Vision
- Motion I/O Cards
- Computing Platform
- Controller



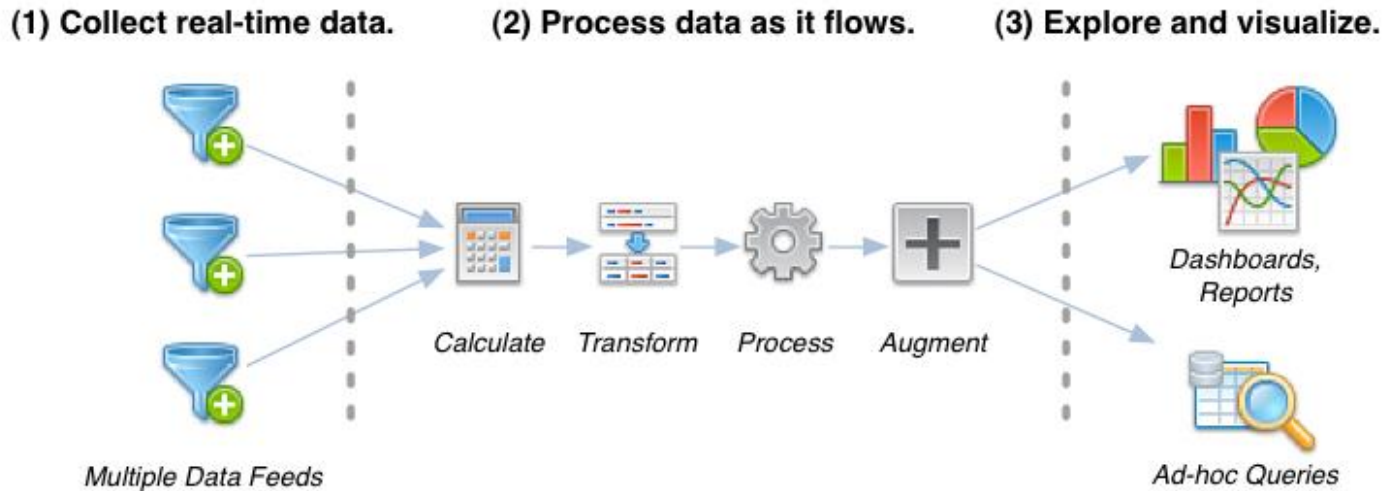
Factory Environmental Monitoring

- Electricity Monitoring
- Factory Waste Water
- Energy Management

Why Real-time Matters ?

- **Real-time Monitoring**

- Enable real-time analytics for quick decision making



- **Garneted Response Time**

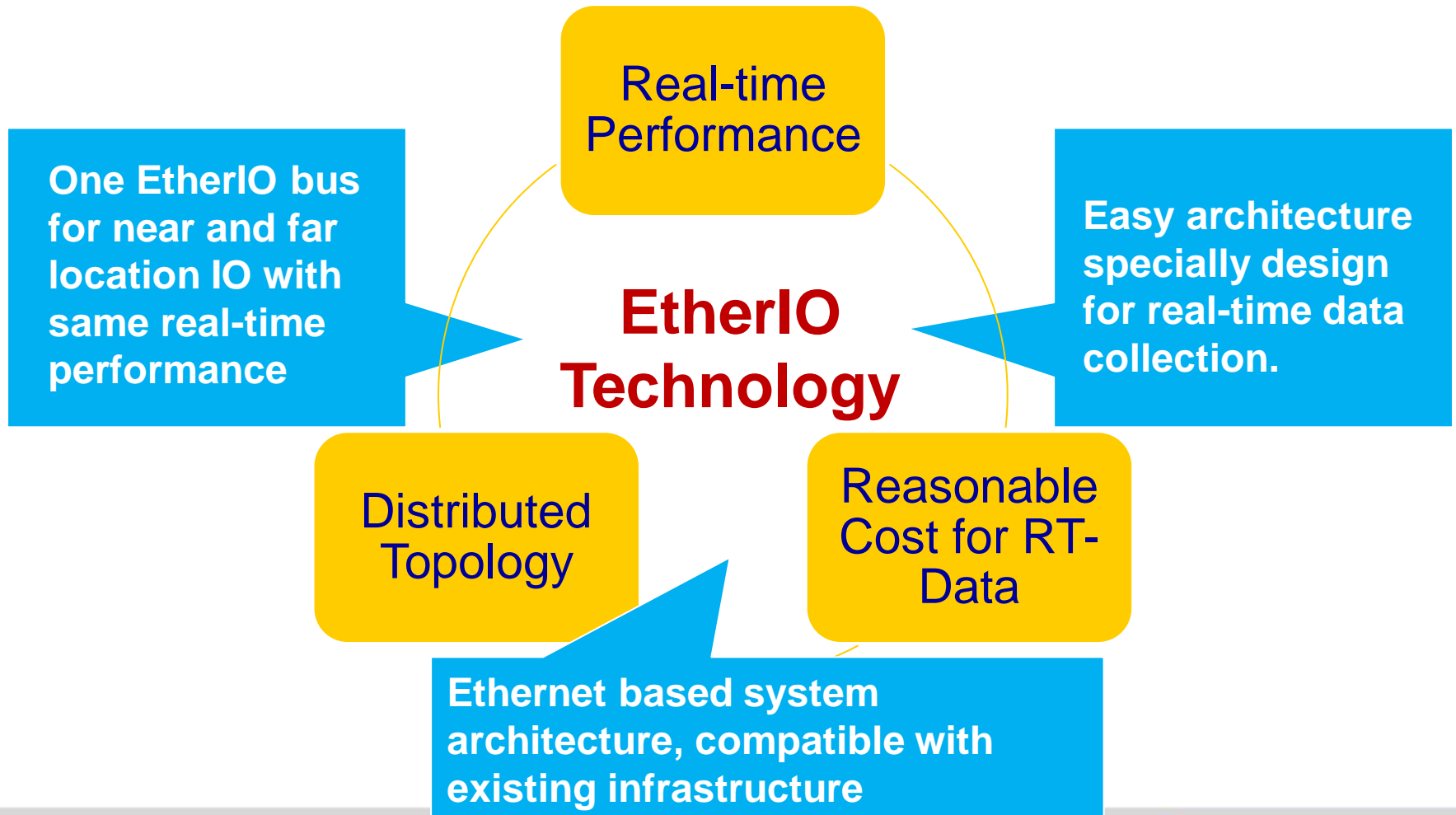
- Event can be handled in a garneted short duration

Considerations of Adopting Real-time Solution

- **How to reach same Real-time Performance in near and far locations ?**
 - Serial polling behavior is not easy to reach real-time performance
 - Ethernet-based module consume too many IP, and difficult for programming handling
- **Should I adopt the famous Fieldbus only for real-time data collection?**
 - Famous fieldbus usually with higher system cost to guarantee the performance for Control application
 - Not easy to construct the system and programming
- **Can I leverage existing computing power to extend real-time IO ?**
 - Most of the smart factory application equipped embedded IPC for data gateway / visualization, however the CPU resource is not fully used.

Advantech EtherIO Features #1

Cost-effective solution to have both real-time performance and distributed topology



Advantech EtherIO Features #2

No need special hardware. Leverage the Specific LAN port and CPU power to enable the Real-time IO



EtherIO driver Fully occupied one LAN port and transfer it to dedicated port for real-time IO

* Currently compatible HW:
- Intel i210 NIC

Maximum occupied **10 %** CPU loading for 768 real-time IO handling



**EtherIO
Technology**



Advantech EtherIO Features #3

Support Remote Virtual COM ports in same bus, for data collection from Serial Devices.



APAX-5090

- 4 COM ports Extension on EtherIO
- Operation Mode : Virtual COM
- COM 1~COM 4 : RS-232/422/485
- Baud Rate : 600 bps ~ 115.2 kbps
- 15 kV ESD protection
- 2500 VDC EFT protection
- 2500 VDC isolation protection (between COM ports and backplane)

Max. 32 Virtual COMs on EtherIO Bus



**EtherIO
Technology**

Equipment



PLC



Meters

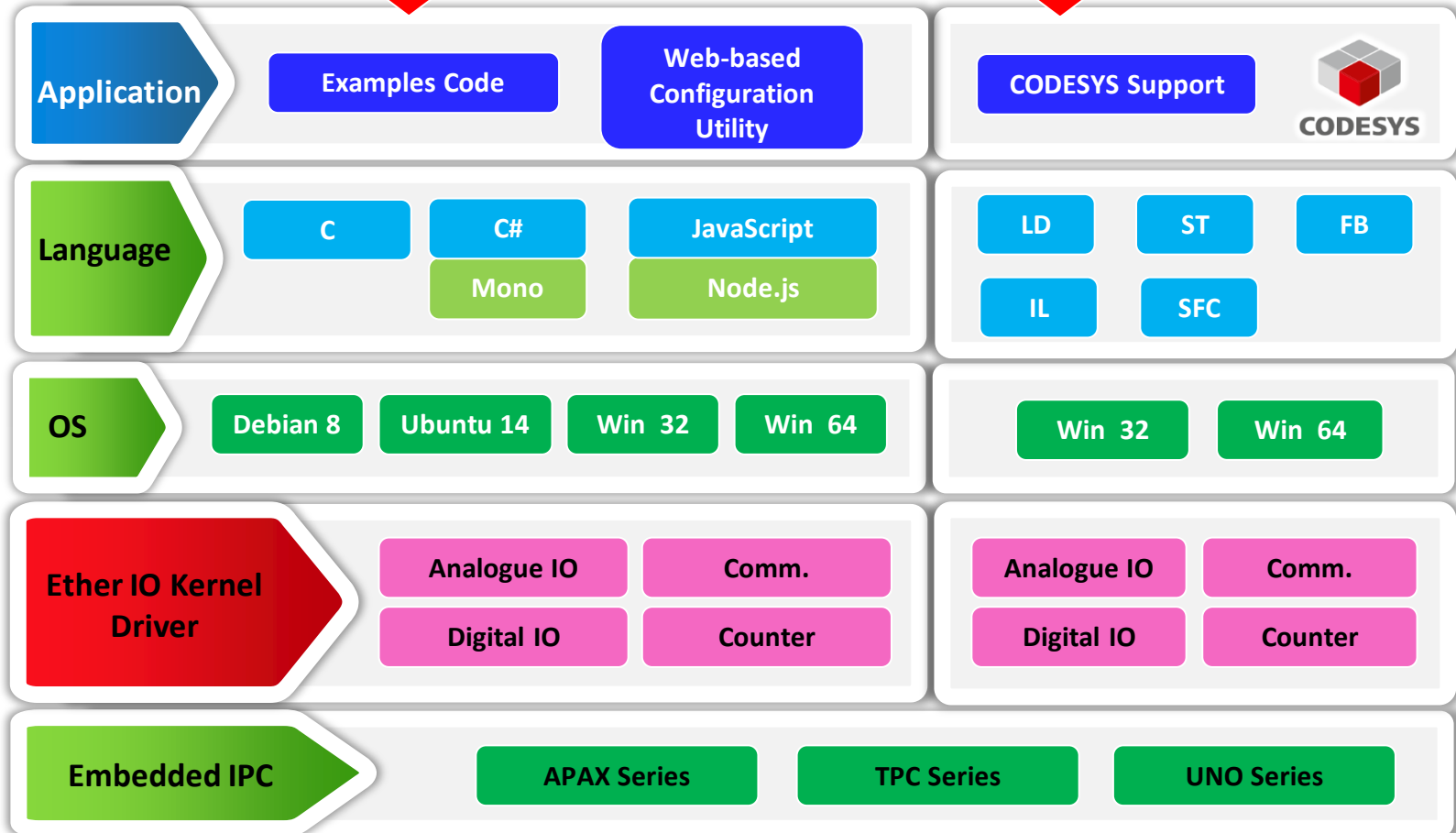


Advantech EtherIO Features #4

Open Architecture and Easy Interface for Real-time IO Programming

IT/ IPC User

OT/ PLC User



Real-time Bus Ready Embedded IPC

Distributed Real-time IO Platform

Machine Automation

- Equipment Connectivity
- Predictive Maintenance

Factory Automation

- Product Traceability
- Rapid Quality Feedback

Fanless
Embedded
Platforms



TPC / Panel PC



APAX / Open PAC



UNO / Embedded PC



APAX EtherIO Bus - 1ms Real-time Bus



Max 32x RS-232/422/485 virtual port



AI / DI / RTD / TC Acquisition

Engineer Friendly

Free Topology

Fail Safe IO

Equipment



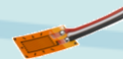
PLC



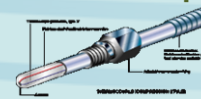
Meters



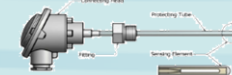
Strain Gauge



Thermocouple



RTD



Enabling an Intelligent Planet

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APAX System : Sensing and Control I/O

High Density Distributed IO Modules Easy for Installation and Debugging



Model	APAX-5013	APAX-5017	APAX-5017H	APAX-5018	APAX-5028
Description	8-ch RTD module	12-ch AI module	12-ch high speed AI module	12-ch thermocouple module	8-ch AO module



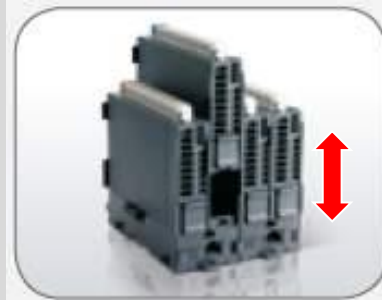
Model	APAX-5040	APAX-5045	APAX-5046/ APAX-5046SO	APAX-5060	APAX-5080
Description	24-ch DI module	24-ch DI/O module	24-ch/20-ch DO module	12-ch Relay module	4/8-ch Counter module

APAX System : Sensing and Control I/O



Easy for Installation and Debugging

Hot Swappable
I/O Module
Design



Clamp Type
Terminal Block

Easy Identification
by Color-matched
Connector



Writable Label
with Wiring
Information

EtherIO Ready Embedded IPC Offering



Positioning

APAX Series
DIN-Rail mounted
Control IPC

Value proposition/Messages

Target on Smart Factory Application.
- Consistent form factor, easy for installation and maintenance in the control cabinet
- Expand through APAX-5402L for 2xiDoor or 2xSSD and EtherIO



TPC Series
Automation Panels

Target on Real-time Data Visualization
- Expand EtherIO through one Ethernet port, integrate real-time data collection and visualization in one piece.
- Support different size for various application



UNO Series
Embedded Automation
IPC

Target on Gateway Application for IIoT
- Collect Real-time data through one Ethernet port (EtherIO), and handle the pre-treatment for big data locally.
- High CP ratio platform with various interfaces supported

How to Equip the EtherIO Technology ?



APAX Series



APAX-5580



APAX-5402L
(+APAX-5002 x N)



EtherIO Driver



TPC Series



TPC-1881WF
TPC-1782H
TPC-1582H
TPC-1282T



APAX-5002 x N



EtherIO Driver

1x Intel i210 Ethernet port is fully occupied by EtherIO



UNO Series



UNO-2473G
UNO-1372G



APAX-5002 x N



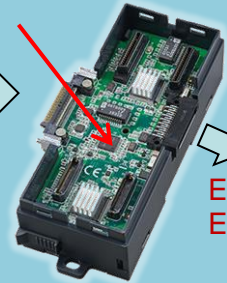
EtherIO Driver

1x Intel i210 Ethernet port is fully occupied by EtherIO


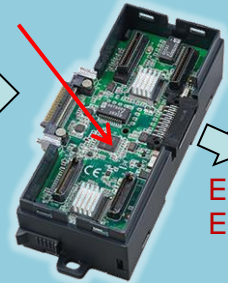
APAX Product Offering



1x Intel i210
NIC onboard







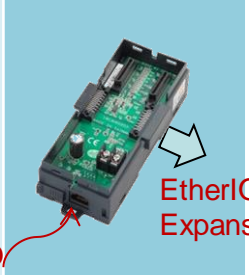
EtherIO
Expansion

Product Appearance				Product Appearance	
PN	APAX-5580-4C3A	APAX-5580-434AE	APAX-5580-474AE	PN	APAX-5402L-E2A2AE
CPU	Intel® Celeron 2980U 1.6GHz Haswell Dual Core, 2MB L2	Intel® Core™ i3-4010U 1.7GHz Haswell Dual Core, 3MB L2	Intel® Core™ i7-4650U 1.7GHz Haswell Dual Core, 4MB L2	Expansion	2x Combo Slots (High-speed / EtherIO)
Memory	DDR3L 4GB	DDR3L 4GB	DDR3L 8GB	High-speed Connector (PCIe/SATA/USB) Support Modules	APAX-5435 iDoor Module APAX-5430 SATA Module APAX-5490 4xRS-232/422/485
Ethernet Chipset	1x Intel® i210-IT GbE, 802.1Qav, IEEE1588/802.1AS, 802.3az 1x Intel® i218-LM GbE, Intel® AMT, IEEE1588/802.1AS, 802.3az			EtherIO Connector (APAX) Support Modules	APAX-501X / 502X Analogue Modules APAX-504X / 508X Digital/Counter/Pulses APAX-506X Relay Modules APAX-5090 4xRS-232/422/485 (Ether IO)
IO Interface	1 x RS-232/422/485, DB9, 50 ~ 115.2kbps 2 x RJ45, 10/100/1000 Mbps IEEE 802.3u 1000Base-T Fast Ethernet 2 x USB 2.0, 2 x USB 3.0, 1x internal USB 1 x VGA, supports 1920 X 1080 @ 60 Hz 24 bpp 1 x Audio Line Out			EtherIO Expansion Connector	APAX-5002/ 5001 EtherIO backplane
Expansion	Storage 1x mSATA (for system), 1x SD(for data), 1x SD (for OS backup) mPCIe 2.0 1 x Full-size mPCIe slot, 1 x Half-size mPCIe slot Right side expansion for APAX-5402 series				
Others	Mounting : DIN-rail, Wall mount Operation Temperature : -10 ~ 60 °C				




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TPC Product Offering


Product Appearance					Product Appearance  EtherIO Expansion
PN	TPC-1881WP-433AE TPC-1881WP-473AE	TPC-1782H-433AE TPC-1782H-473AE	TPC-1582H-433BE	TPC-1282T-533AE	PN APAX-5002-BE
CPU/	Intel® Core™ i3-4010U / i74650U 1.7GHz Haswell Dual Core	Intel® Core™ i3-4010U / i74650U 1.7GHz Haswell Dual Core	Intel® Core™ i3-4010U 1.7GHz Haswell Dual Core, 3MB L2	Intel® Core™ i3-5010U 2.10GHz Broadwell Dual Core, 3MB L2	Expansion 2x EtherIO Slots
Memory	DDR3L 4GB	DDR3L 4GB	DDR3L 4GB	DDR3L 4GB	
LCD	18.5" LCD (16:9) Max Res.1366x768 T/S:Capacitive	17" LCD (4:3) Max Res.1280 x 1024 T/S: Resistive	15" LCD (4:3) Max Res. 1024 x 768 T/S: Resistive	12.1" LCD (4:3) Max Res.1024 x 768 T/S: Resistive	
Ethernet Chipset	1x Intel® i210-IT GbE, 802.1Qav, IEEE1588/802.1AS, 802.3az ← EtherIO driver technology fully occupied this Intel i210 NIC LAN port 1x Intel® i218-LM GbE, Intel® AMT, IEEE1588/802.1AS, 802.3az				
IO Interface	1x RS-232, 1 x RS-232/422/485, DB9, 50 ~ 115.2kbps 2x RJ45, 10/100/1000 Mbps IEEE 802.3u 1000Base-T Fast Ethernet 2x USB 3.0, HDMI 1.4 x1 1x Audio Line Out				
Expansion	1x CFast slot 1x Full-size Mini PCI-E 1x 2.5" SATA SSD slot	1x CFast slot 1x Half-size PCIe 1x 1x Full-size Mini PCI-E 1x 2.5" SATA SSD slot	1x CFast slot 1x Half-size PCIe 1x 1x Full-size Mini PCI-E 1x 2.5" SATA SSD slot	1x CFast slot 1x Half-size PCIe 1x 1x Full-size Mini PCI-E 1x 2.5" SATA SSD slot	EtherIO Connector (APAX) Support Modules APAX-501X/2X AI/AO Modules APAX-504X/8X DI/DO/CNT APAX-506X Relay APAX-5090 4xRS-232/422/485 (Ether IO)
Others	Operation Temperature : 0 ~ 55 °C			0 ~ 50 °C	

UNO Product Offering

Product Appearance			
PN	UNO-2473G-E3AE	UNO-2473G-J3AE	UNO-1372G-E3AE
CPU	Intel® Atom™ Processor E3845 1.91 GHz Quad Core, 2MB L2	Intel® Celeron™ Processor J1900 2.42 GHz Quad Core, 2MB L2	Intel® Atom™ Processor E3845 1.91 GHz Quad Core, 2MB L2
Memory	DDR3L 4GB	DDR3L 4GB	DDR3L 4GB
Ethernet Chipset	4x Intel® i210-IT GbE	2x Intel® i210-IT GbE,	2x Intel® i210-IT GbE,
IO Interface	2 x RS-232, DB9, 50~115.2k 2 x RS-422/485, DB9, auto flow control, 50 ~ 115.2k 4 x RJ45, Fast Ethernet 3 x USB 2.0, 1 x USB 3.0 1 x VGA, Res. 2560 x 1600 1 x HDMI, Res. 1920 x 1080 1x HD Audio	2 x RS-232, DB9, 50~115.2k, 2 x 232/422/485, DB9, auto flow control, 50~115.2k 2 x RJ45, Fast Ethernet 4 x USB 2.0, 1 x USB 3.0 1 x VGA, Res. 2560 x 1600 1 x HDMI, Res. 1920 x 1080 1x HD Audio	1x Realtek RTL8111E GbE 1 x RS-232, DB9, 50~115.2k 1 x RS-422/485, DB9, auto flow control, 50~115.2k 3 x RJ45, Fast Ethernet 2 x USB2.0, 1 x USB 3.0 4 x Onboard Iso. DI 4 x Onboard Iso. DO 1 x VGA, Res. 1920 x 1200 1 x HDMI Res. 1920 x 1080 1 x Audio Line Out
Expansion	1x mSATA 3x Full-size Mini PCI-E 1x 2.5" SATA SSD slot	1x mSATA 1x Full-size Mini PCI-E 1x 2.5" SATA SSD slot	1x mSATA 2x Full-size Mini PCI-E 1x 2.5" SATA SSD slot
Others	Operation Temperature : - 20 ~ 60°C	Operation Temperature : - 10 ~ 60°C	Operation Temperature : - 20 ~ 60°C

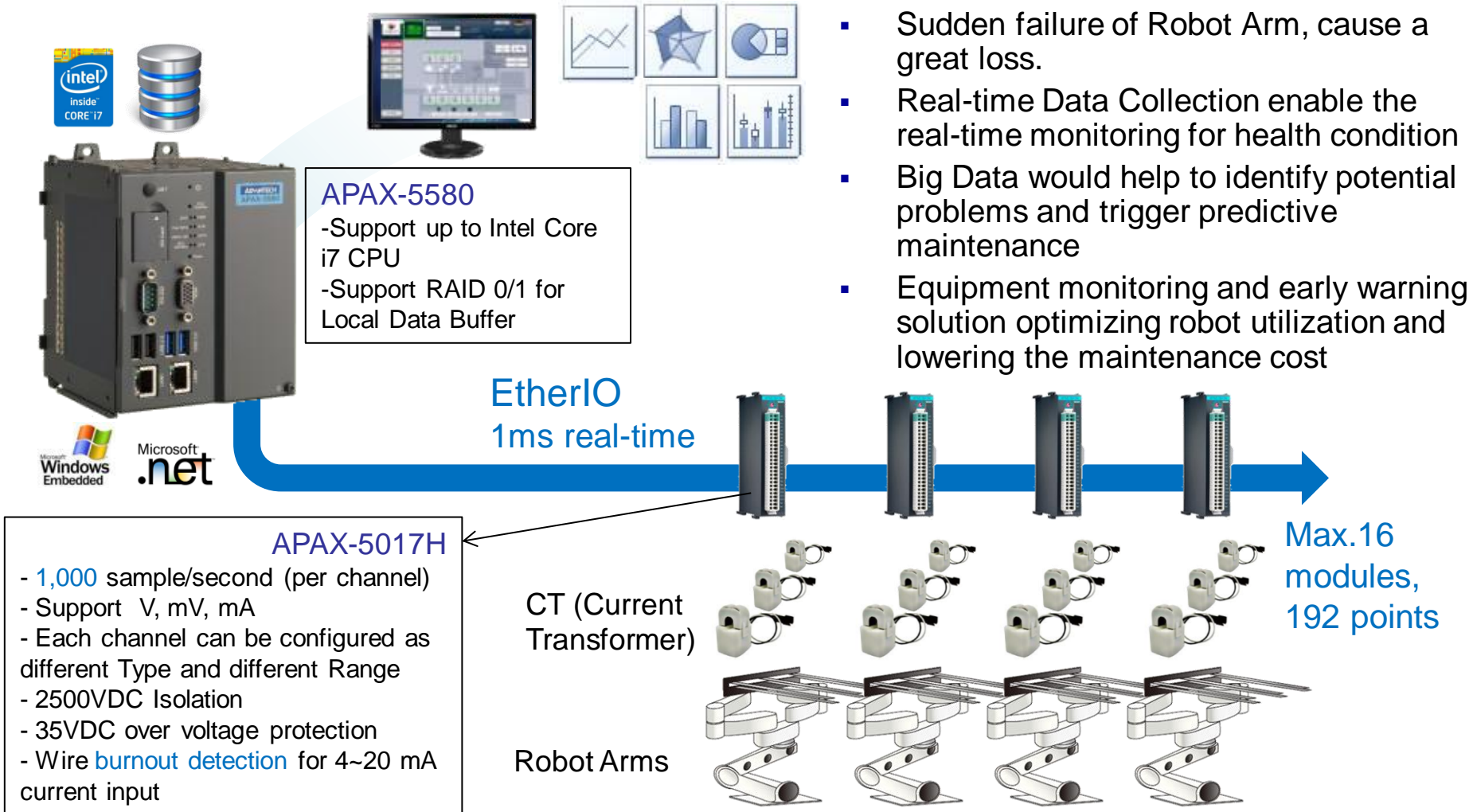
i210 NIC LAN port



Product Appearance	
PN	APAX-5002-BE
Expansion	2x EtherIO Slots
EtherIO Connector (APAX) Support Modules	APAX-501X/2X AI/AO Modules APAX-504X/8X DI/DO/CNT APAX-506X Relay APAX-5090 4xRS-232/ 422/485 (Ether IO)
EtherIO Expansion Connector	APAX-5002/ APAX-5001 EtherIO Backplane

Improve Robot Availability with EtherIO

Collecting Real-time Big Data to Enable the Predictive Maintenance



Enable Real-time I/O for HMI via EtherIO

Real-time Monitoring Enhance Productivity with Better Quality



ODBC Direct Database Connectivity



TPC-1881WP

- 18.5 " , 16:9 LCD
- IP66 front protection
- Intel Core i3/i7
- Capacitive Touch Screen

EtherIO
1ms real-time



- Modern machinery usually equip HMI for process/ condition monitoring.
- EtherIO leverage less than 10% CPU loading to enable Real-time Data Collection for real-time
- Through ODBC Direct DB connectivity, real-time data can also be update to the cloud MES for rapid quality management and feedback.



Max.16 AI/AO
modules, 192 points

Max.32 DI/DO
modules, 768 points



On/Off



Event



Measure

APAX-5040/5045/5046

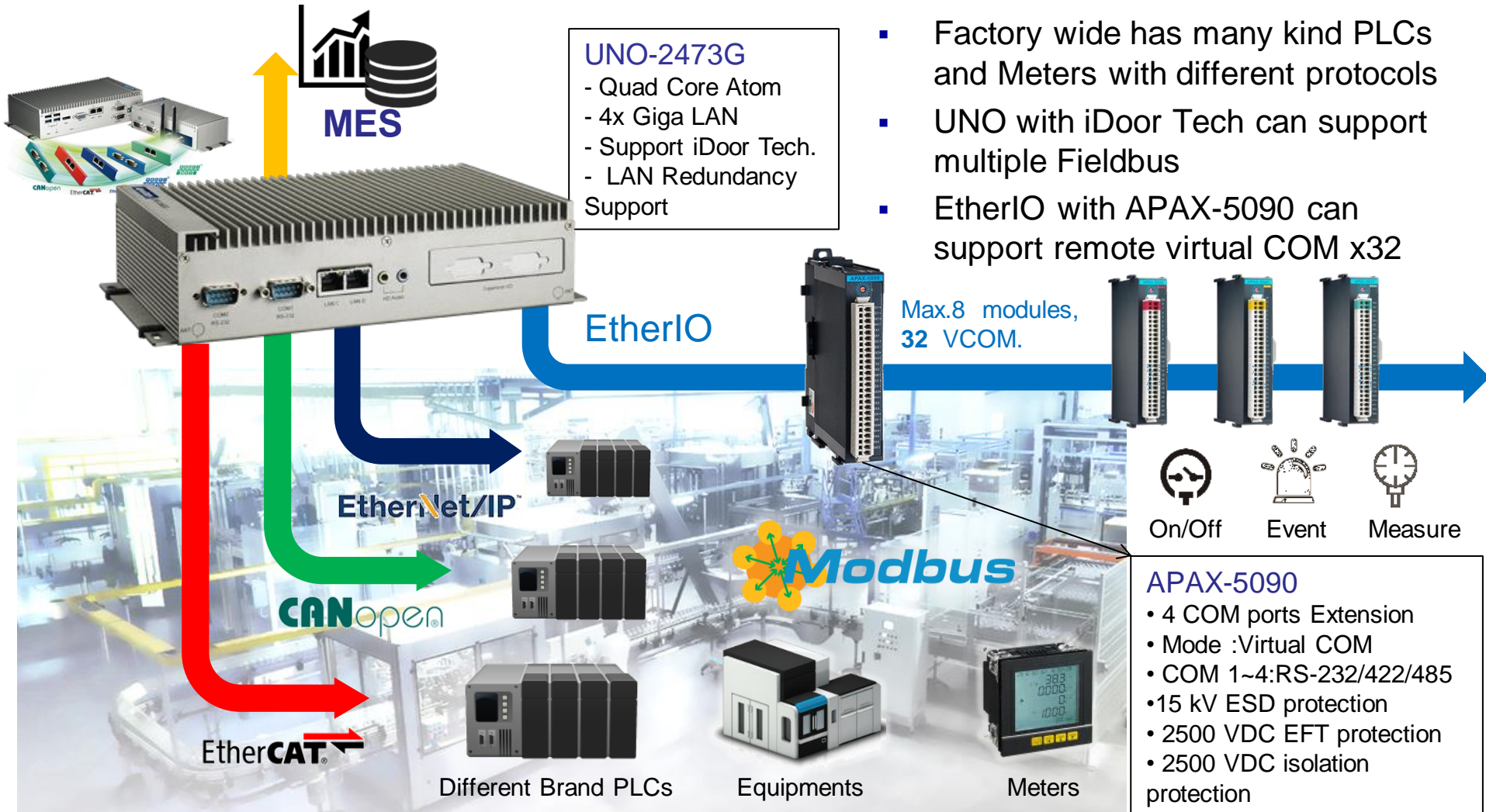
- 24-ch, High Density
- Support Hot-swap for easy maintenance
- 2500 VDC Isolation
- Short Circuit Protection (DO)
- Over Voltage Protection (DI)
- Fail-safe Protection(DO)

APAX- 5013/5017/5018/5028

- Support RTD, T/C for Temperature
- Support V/ mV / mA measurement and output
- 2500 VDC Isolation
- Resolution : AI 16-bit, AO 14-bit
- Fail-safe Protection (AO)
- Wire burn out detection for RTD/TC

Enable Powerful Gateway via EtherIO

Concentrating Factory Wide Big Data to Make Factory Smarter



Partnering for Smart City & IoT Solutions

驅動智慧城市創新 共建物聯產業典範

Industrial Cloud
& Cloud Networks

Private Cloud

iConnectivity

Transportation

IoT Devices

Computer On Modules

Video and RFID

Power & Energy

Environmental & Facility Monitoring

Embedded Software

iBuilding/BEMS

Industrial HMI

Embedded Design-in Services

Intelligent Display

Intelligent Systems

iRetail & Hospitality

iHospital

Image & Video Processing

Machine Automation

WebAccess+

Digital Healthcare

Digital Logistics

Industrial PCs