Jumpstart IoT Innovation with Pre-integrated Gateway Starter Kit

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IoT Application Challenges

2016 is going to be a booming year for the IoT industry. Most company executives and managers are targeting IoT as their key strategy to help their future business growth. This could be for new market development, or it could be for improving production efficiency. Whatever the purpose, a key challenge is to close the "technical gap" between engineers and managers. Facility managers have expert knowledge of their equipment but suffer from IT departments' reluctance to "open up" their data gathered from equipment. IT departments have different challenges and ideas about "industrial automation", and there are no universal standards like in the regular IT world.

As the figure 1 below shows, the first challenge to overcome relates to the various types of serial communication and I/O interface that are available. The second challenge relates to the many different protocol standards for industrial and private use—this is the main hurdle facing Industrial IoT application development. The final challenge relates to data service. Since IT departments are the project owners for application development, and their familiar development tools and skills are all Internet based, they need to use global standard data services to build their interactive dashboards, store IoT data for data analytics, and use big data learning tools for data prediction etc.
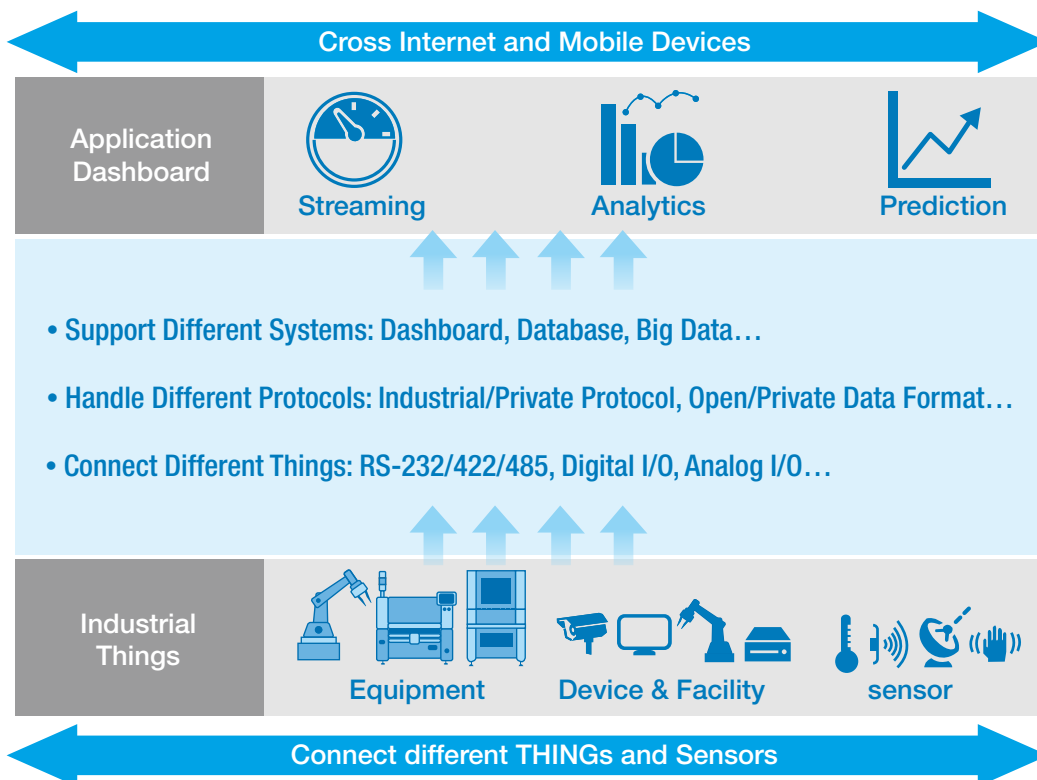

Figure 1: IoT Data Management Challenges

Crossing the Hurdles of IoT

The best solution for overcoming IoT application challenges is to use a "bottom-up" strategy. As the bottom areas show in Figure 2, those are the "things" that use different interface as described earlier. In the diagram, wire/wireless serial communication or analog/digital I/O controller based communication provides the connectivity, and local data protocols are enabled as Ethernet TCP based and transferred to the IoT Gateway. The next step is to unify all the different protocols as one global standard IoT protocol – MQTT. MQTT is a reliable protocol for IoT data that was defined by IBM in 1996 and has now been published as open source. This is a key reason why Advantech chose it as the bridging protocol to cross different gateways. RESTful APIs also play a key role in transporting data to top level applications. RESTful API's are the most recent and widely used data service for IT and internet based applications. Using this standard data service, IT departments can easily build web based interactive dashboards, data roaming information on network based displays, and mobile devices as shown in Figure 2.

Advantech WISE-PaaS/RMM is a reliable data and gateway management software platform services that supports MQTT and provides 100+ RESTful APIs. It provides data storage, data management, and gateway management services to connect gateways at the bottom to the applications at the top. WISE-PaaS/RMM plays a critical role in the middle tier, connecting different gateways, and transporting the filtered data to different applications. As the diagram shows, the MQTT protocol bridges the communication gap across the gateways with WISE-PaaS/RMM in the middle. WISE-PaaS/RMM provides 100+RESTful APIs and plays a key role in transporting data to top level applications. They are a widely used popular web service standard now, used by all the major internet companies. RESTful API's transport data to all the different web services and systems like dashboards used for monitoring, big data storage, and much more. WISE-PaaS/RMM performs key functions for both gateway connectivity and application integration. These cloud-based building blocks can help businesses to cross the critical "technical gap" in IoT application development.
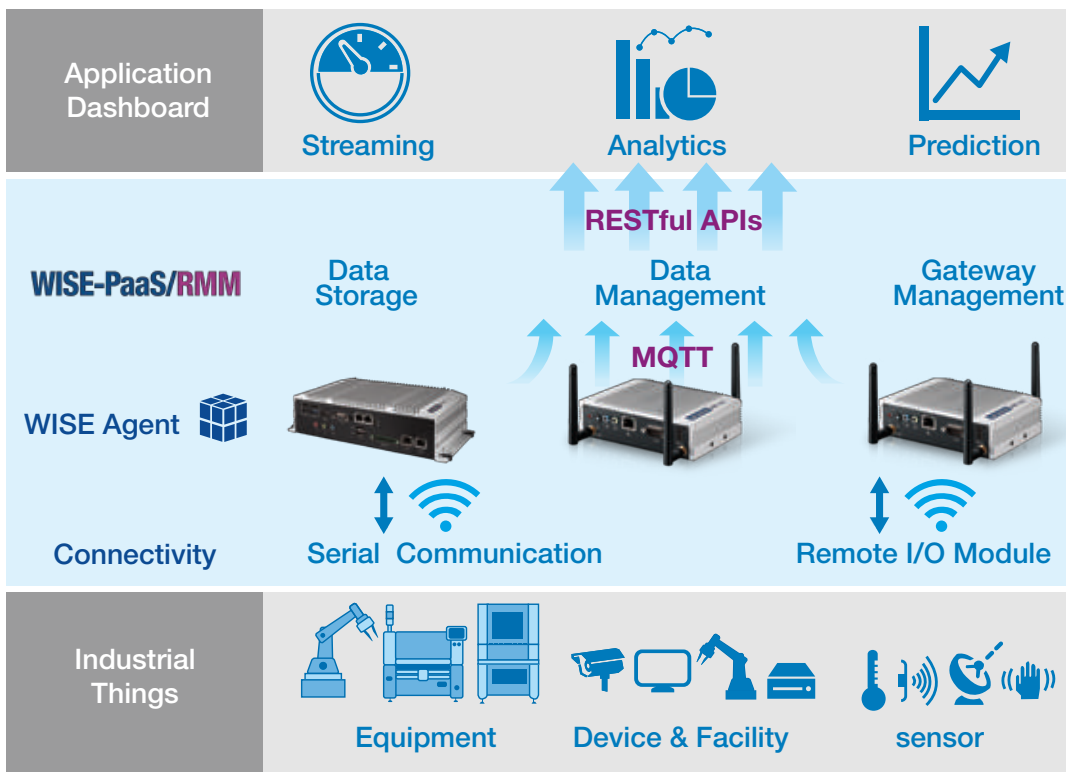

Figure 2: Empower IoT Applications with WISE-PaaS/RMM

Full Range IoT Gateway Solutions

An IoT gateway solution is another top priority when we take connectivity, processing, networking, robustness and cost into consideration. There are no universal standard IoT gateways that can fit all different environments. Generally, we can classify three types of gateway as: "Energy Saving Gateways", "Multifunction Gateways", and "Application Gateways". "Multifunction Gateways" can operate in harsh industrial environments with wide temperature design. They provide scalable I/O interface for a wide range of connectivity for target machines and facility devices. "Energy Saving Gateways" do not focus on harsh environments; they are dedicated connectivity solutions for general types of facilities and equipment. "Application Gateways" are specialized for vertical applications, like in-vehicle transportation, they require specialized system design with vertical market certification to ensure the system is stable and reliable. Advantech provides full range IoT gateway solutions to fulfill various requirements of customers.

UBC-221 WISE-3310 UTX-3115	ARK-1123 ARK-2121	ARK-2151S ARK-2151V
Energy Saving Gateway	**Multifunction Gateway**	**Application Gateway**
• General Environment • Dedicated I/O and Serial • Low Power	• Anti Harsh Environment • Scalable I/O and Serial • High Performance	• Specialize Environment • Dedicated I/O and Serial • High Performance
Retail iBuilding Medical	FA/MA Harbor Mining Oil &Gas...	Transportation Surveillance Environmental

Pre-integrated IoT Gateway Starter Kit

Advantech collaborated with Intel and Microsoft to announce IoT Gateway Starter kit. It will empower your IoT application with a reliable platform and open gateway technologies. The whole package includes a ready-to-run system based on an Intel Celeron J1900 processor configured with RAM and HDD, pre-installed with Windows 7 embedded OS by default. There are 2 models selected for the starter kit, they are ARK-1123H and ARK-2121L. They are designed for harsh environments, with good scalability for networking and versatile I/O communication. Besides the ready-to-run gateway system, a software solution is also included in our package. This includes WISE-PaaS/RMM pro version for developing your own private cloud backed by Microsoft's Azure technology. The WISE Agent handler SDK is available for easy data protocol integration with serial and I/O communication. For data management and smart data flow creation, Node RED is an application logic designer with drag-and-drop no-coding designer tools. This powerful tool can build up an IoT automation and data flow quickly and easily. The final offering in the software package is our professional technical support. Any partner or customer who purchases the starter kit is eligible to become a VIP member in our IoT developer forum community. On the forum there are dedicated Advantech technical experts for technical Q&A, and the latest technical tools and documents for download. Members can also submit solution design blueprints for a 3 hour technical consultancy service—technical information sharing in a face to face training workshop.

With Advantech's IoT Gateway Starter Kit, IoT developers can easily build data collection and remote controlled I/O applications with minimum effort. You can build your Industrial IoT system for harsh environments with extended wide temperature support, and empower it expandable I/O modules for scalable I/O connectivity, and remote I/O control. Advantech's IoT Gateway Starter Kit includes WISE-PaaS/RMM and Microsoft AZURE. WISE-PaaS/RMM provides data management and gateway management services so IoT developers can create services for advanced data analytics and data prediction applications. Advantech's IoT Gateway Starter Kit can save up to 65% on application development resources. With Advantech IoT Gateway Solution and starter kit, we firmly believe IoT developers will have at their fingertips the best IoT application building blocks for the future.

IoT Data & Gateway Management

Data Management — Provide data acquisition and protocol unification with standard MQTT to cloud for data analytic and prediction.

Remote Control — Remote control connected gateway system and I/O with dashboard console and RESTful APIs.

Gateway Monitoring — Inspects the condition of connected devices and software through dashboard and system management console.

Application Intelligence — 100+ RESTful APIs for IoT application development with advanced Application Logic Designer (Node RED).

WISE-PaaS/RMM

Enable Data Analytic Services

Virtual Machines — Access WISE-PaaS/RMM configured to run in Azure Virtual Machines. Deploy with confidence knowing that each solution has been vetted through Microsoft Azure.

Machine Learning — Bring your own data and leverage a variety of machine learning services such as forecasting, product recommendations for predict maintenance.

Power BI — Azure and PowerBI provide a complete set of services for data analytics from data processing through visualization.

Event Hubs — Cloud-scale telemetry ingestion from websites, apps, and devices.

Microsoft Azure official site provides free trial for customer to sign up and get $200 to spend on all Azure services.

Microsoft Azure

Software Development Kit

Gateway SDK
- 12+ WISE Agent Handler
- Development Tools
- Technical White Paper
- Developer Training Guide

Gateway Security
- OpenSSL
- Microsoft BitLocker
- Advantech Security ID (iManager)
- Intel® McAfee Security Support

Application Logic
- RESTful APIs Packages
- Node RED Application Logic Editor

Board Level SDK
- Yocto Linux BSP (x86/ARM)
- Win10 IoT Core BSP
- Library: Alljoyn, IoTivity, MQTT
- SUSI API, SQL Lite,

Technical Support Service

Online Consulting — Provides 3 hours of online consulting service. Online technical support system is ready to serve 24/7. You can use your exclusive account to submit, manage, and track issues.

Online Forum — When you join the IoT Developer forum, you will receive the latest versions of software resources and video training courses.
iotforum.advatech.com

Discussion   Resource Download   FAQs

Figure 3: IoT Gateway Starter Kit Software Package