(intel®)

Intel® Gateway Solutions for the Internet of Things

By 2015, more than 15 billion compute- and Internet-enabled devices will be connected to the cloud and each other[1] in what is commonly called the Internet of Things (IoT). Connectivity is imperative to realizing the power of the IoT, which can allow gaining insight from data provided by these connected devices.

Today's industrial devices and other systems are often designed with interconnectivity and the ability to share data in mind. That leaves a lot of useful data locked away in a massive array of equipment, like HVAC units, vending machines, fleet management, and much more. The ability to process that data and gain useful information from it exists today with Big Data clusters and other types of computing. But the data remains inaccessible. Thus, there is a definite need to address interoperability of legacy systems in order to avoid the incredibly large cost of replacing all existing infrastructure with Internet-enabled components.

Intel® Gateway Solutions for the Internet of Things (IoT) is a family of platforms that enables companies to seamlessly interconnect industrial infrastructure devices and secure data flow between devices and the cloud. Intel Gateway Solutions for IoT enables customers to securely aggregate, share, and filter data for analysis. It helps ensure federated data generated by devices and systems can travel securely and safely from the edge to the cloud and back—without replacing existing infrastructure. This new availability of previously hidden data can be valuable to a wide range of businesses and organizations:

- Operators, such as building maintenance personnel, can track real-time operations of various systems and optimize them for particular times of day, types of work, etc.

- Managers, such as property owners and business managers, can correlate data across entire holdings and analyze and optimize the cost of systems operations.

- Manufacturers and service agencies can analyze real-time and trended data from systems to optimize them for power efficiency, performance, operational life, and more.

- Governments and researchers can perform larger analyses on data from seemingly disparate but related systems to correlate impacts and effects of these systems on each other.

Intel® Gateway Solutions for the Internet of Things (IoT)

The Intel Gateway Solutions for IoT offers companies a key building block to enable the connectivity of legacy industrial devices and next generation intelligent infrastructure to the IoT. It integrates technologies and protocols for networking, embedded control, enterprise-grade security, and easy manageability on which application-specific software can run.

The Intel Gateway Solutions for IoT enables:

- Connectivity up to the cloud and enterprises.
- Connectivity down to sensors and existing controllers embedded in the system.
- Pre-process filtering of selected data for delivery.
- Local decision making, enabling easy connectivity to legacy systems.
- A hardware root of trust, data encryption, attestation, and software lockdown for security.
- Local computing for in-device analytics.

An Integrated, Pre-Validated, and Complete Solution

The Intel Gateway Solutions for IoT offers a proven solution—pre-validated on industry-leading software—that delivers an application-ready platform. The solution includes:

- Choice of Intel® processors for the production kits: Intel® Quark™ SoC X1021 or Intel® Atom™ processor E3826
- Wind River Intelligent Device Platform XT 2.1* development environment
- McAfee Embedded Control* security technologies

The Intel Gateway Solutions for IoT is built on open architecture to ensure interoperability between systems, enable wide application development, and allow easy services deployment. Integrated and validated components allow maximum flexibility and fast application development and deployment to the field.
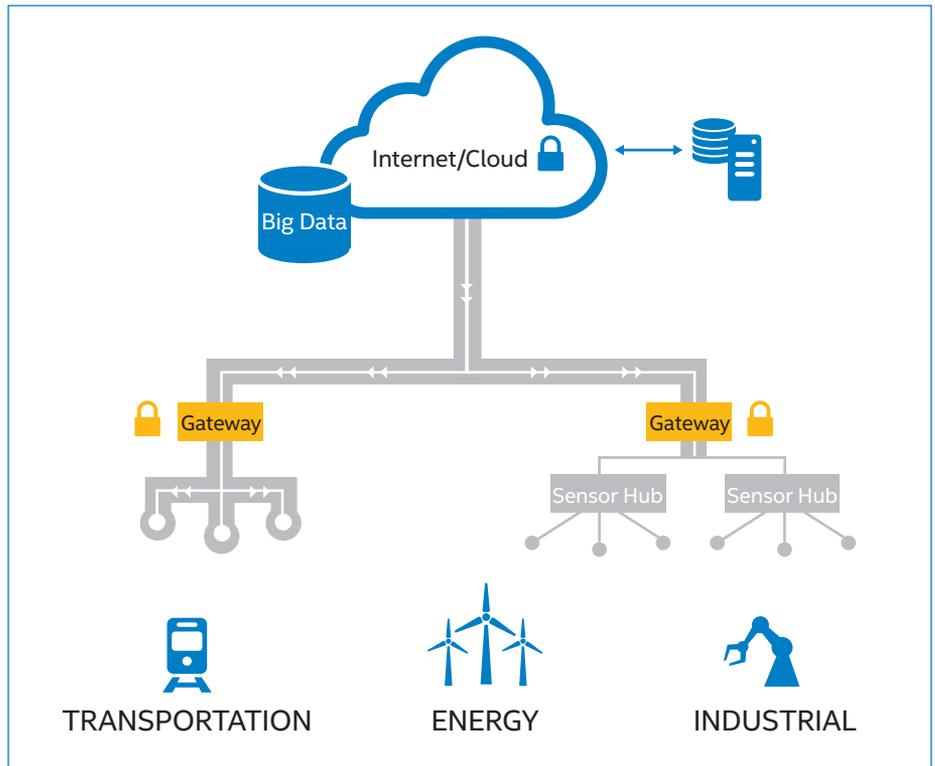

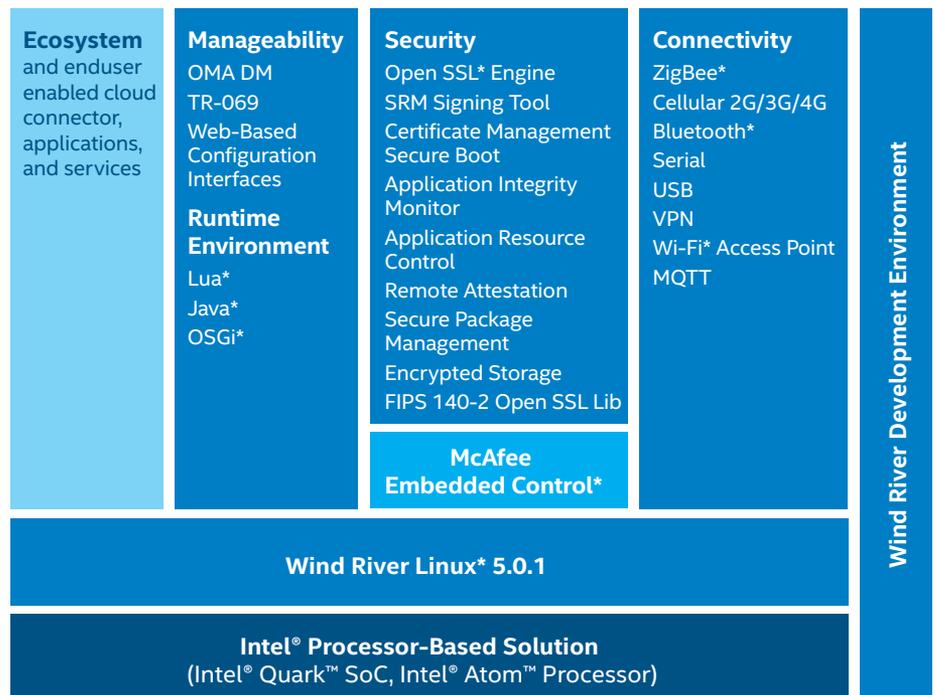**Figure 1.** Addressing Endless Use Cases.

Figure 2. Intelligent Gateway Software Stack.

Wind River Intelligent Device Platform XT 2.1*

Connectivity, manageability, and security are core building blocks to IoT. Intelligent Device Platform XT 2.1 provides an integrated, pre-validated stack of software, drivers for a wide range of hardware components, libraries, and tools to support these core services. The software enables flexibility for developers to quickly build enterprise-grade intelligent systems for a large number of applications. Intelligent Device Platform XT 2.1 supports the following:

• **Manageability –** Intelligent Device Platform XT 2.1 enables long-term secure remote manageability to simplify deployment, maintenance, and management of remote devices. The software supports industry-standard interfaces, including Open Management Alliance Device Management (OMA DM), Technical Report 069 (TR-069), and web-based configuration interfaces.

• **Communications and Connectivity –** To enable connectivity over the widest range of communications technologies, Intelligent Device Platform XT 2.1 supports both wireless and wired links. The software includes drivers for a number of hardware vendors' products and software to support ZigBee,* 2G/3G/4G, Bluetooth,* Serial, USB, Virtual Private Network (VPN), Wi-Fi* Access Point, and the MQ Telemetry Transport (MQTT) messaging protocol.

• **Security –** Intelligent Device Platform XT 2.1 provides strong support for secure image, secure data, and secure management, helping protect the device and data from boot to operations and management.[2] The software supports comprehensive device protection, from a hardware root of trust through boot and software loading,

and offers a wide array of protocols and services, including secure boot, whitelisting with McAfee Embedded Control, attestation, secure storage, and more.

• **Runtime Environments –** Intelligent Device Platform XT 2.1 supports applications written in a variety of environments, including Lua,* Java,* and OSGi,* to enable portable, scalable, and reusable application development for solutions based on the Intel Gateway Solutions for IoT platform.

Intelligent Device Platform XT 2.1 provides the foundation for fast development of intelligent system solutions on industry-standards using a proven software stack.

McAfee Embedded Control*

Integrated with the Intel Gateway Solutions for IoT platform, McAfee Embedded Control maintains system integrity by allowing only authorized code to run (application whitelisting) and only authorized changes to be made (change control). It simultaneously protects embedded system integrity and automates the enforcement of software change control policies.

Application Whitelisting

The software automatically creates a dynamic whitelist of the allowed code on the platform. Once the whitelist is created and enabled, the system is locked down to the known good baseline; no program or code outside the authorized set can run, and no unauthorized changes can be made. McAfee Embedded Control shields applications and related binaries at the kernel level—protecting files on disk or in memory, helping prevent malware and zero-day exploits, and minimize the need to patch the environment.

Change Control

McAfee Embedded Control only allows policy-based changes that are expected and authorized. The software monitors files and prevents unexpected changes while logging any attempts. It provides complete visibility and accountability through the automated, continuous collection of audit data. Using the data collected by McAfee Embedded Control, IT can verify that no changes have been made to critical system files, directories, or registries, and then report these findings to regulatory officials to help meet compliance requirements.

THE INTEL® GATEWAY SOLUTIONS FOR THE IoT

Open, pre-validated solution

Connect, manage, and secure SW stack

Enables seamless and secure data flow

Hosts ecosystem apps and services

Endless Potential for Industry and Business

Designed to securely connect edge devices to the cloud, the Intel Gateway Solutions for IoT is ideal for a vast array of applications including, building automation, industrial automation, and smart city infrastructure, and much more. By capturing and analyzing data from new sources, it gives management, service businesses, product manu- facturers, and their ecosystems new opportunities for accelerating business innovation, understanding the behavior and uses of their existing products, and a foundation for designing new products for the marketplace.

Intel Gateway Solutions for IoT

Key Benefits

• Delivers an integrated, pre-validated, and flexible open-compute gateway platform, including foundational hardware, software, and security building blocks to allow fast solution development and deployment.

• Enables building scalable solutions with standards-based interfaces to securely connect and aggregate data from the edge to the cloud.

• Enables business innovation on proven technologies across compute, commu- nications, manageability, and security.

	DK100 SERIES	DK200 SERIES	DK300 SERIES
TARGET MARKETS	Industrial, Energy	Transportation	Industrial, Energy, and Transportation
SoC	Intel® Quark™ SoC X1000	Intel® Quark™ SoC X1000	Intel® Atom™ Processor E3826
SOFTWARE	Wind River* Intelligent Device Platform XT 2.1, Wind River Linux* 5.0.1 (Host), McAfee Embedded Control 6.1,* Wind River Workbench*		
DATA SECURITY AND ATTESTATION	Certificate Management, Remote Attestation, OpenSSL (HW TPM for DK300), FIPS 140-2 OpenSSL Library, SRM Signing Tool, Encrypted Storage, VPN		
END POINT SECURITY	McAfee Embedded Control,* Application Integrity Monitor, Application Resource Control, Secure Package Management, Secure Boot		
MANAGEABILITY AND PROVISIONING	OMA DM, TR-069, Web-based configuration interfaces		
COMMUNICATIONS AND CONNECTIVITY	ZigBee,* Cellular 2G/3G/4G, Bluetooth,* Serial, USB, VPN, Wi-Fi* Access Point, and MQTT		
RUNTIME ENVIRONMENTS	Lua,* Java,* and OSGi*		
I/O	2x Ethernet* 10/100, USB 2.0 host & device, RS-232, RS-485, third party optional ZigBee, Wi-Fi, 3G (data), SPI (internal)	2x Ethernet 10/100, USB 2.0 host & device, RS-232, Audio line in/out, CAN,* Wi-Fi, 3G (data and voice), 3 axis accelerometer (internal)	2x Ethernet 10/100/1000, 2x USB 2.0, 1X USB 3.0, RS-232/422/485, Line in/out, Wi-Fi/Bluetooth mini PCIe Module, Cellular WAN mini PCIe module, optional third party ZigBee via USB, HDMI
MEMORY AND STORAGE	512k SRAM; 1 GB ECC DDR3, Onboard SD Card	512k SRAM; 512MB ECC DDR3, Onboard SD Card	Up to 8 GB DDR3, 2.5¨ SSD via onboard SATA

For more information on how to integrate your systems using the Intel intelligent gateways, visit **intel.com/iotgateways**

Figure 3.[3]

[1]. Intel forecast.

[2]. No computer system can provide absolute security. Requires an enabled Intel® processor, enabled chipset, firmware, software, may require a subscription with a capable service provider (may not be available in all countries). Intel assumes no liability for lost or stolen data and/or systems or any other damages resulting thereof. Consult your Service Provider for availability and functionality. For more information, visit http://www.intel.com/go/anti-theft. Consult your system manufacturer and/or software vendor for more information.

[3]. All products, dates, and figures specified are preliminary based on current expectations, and are subject to change without notice.