

 Intel® Technology Provider

Deploying the Internet of Things

Philip van de Mortel
IoTG Intel Corporation.

Your solutions. Our technology.
Smarter together.



A look Ahead: Confident Predictions





Social



Mobile

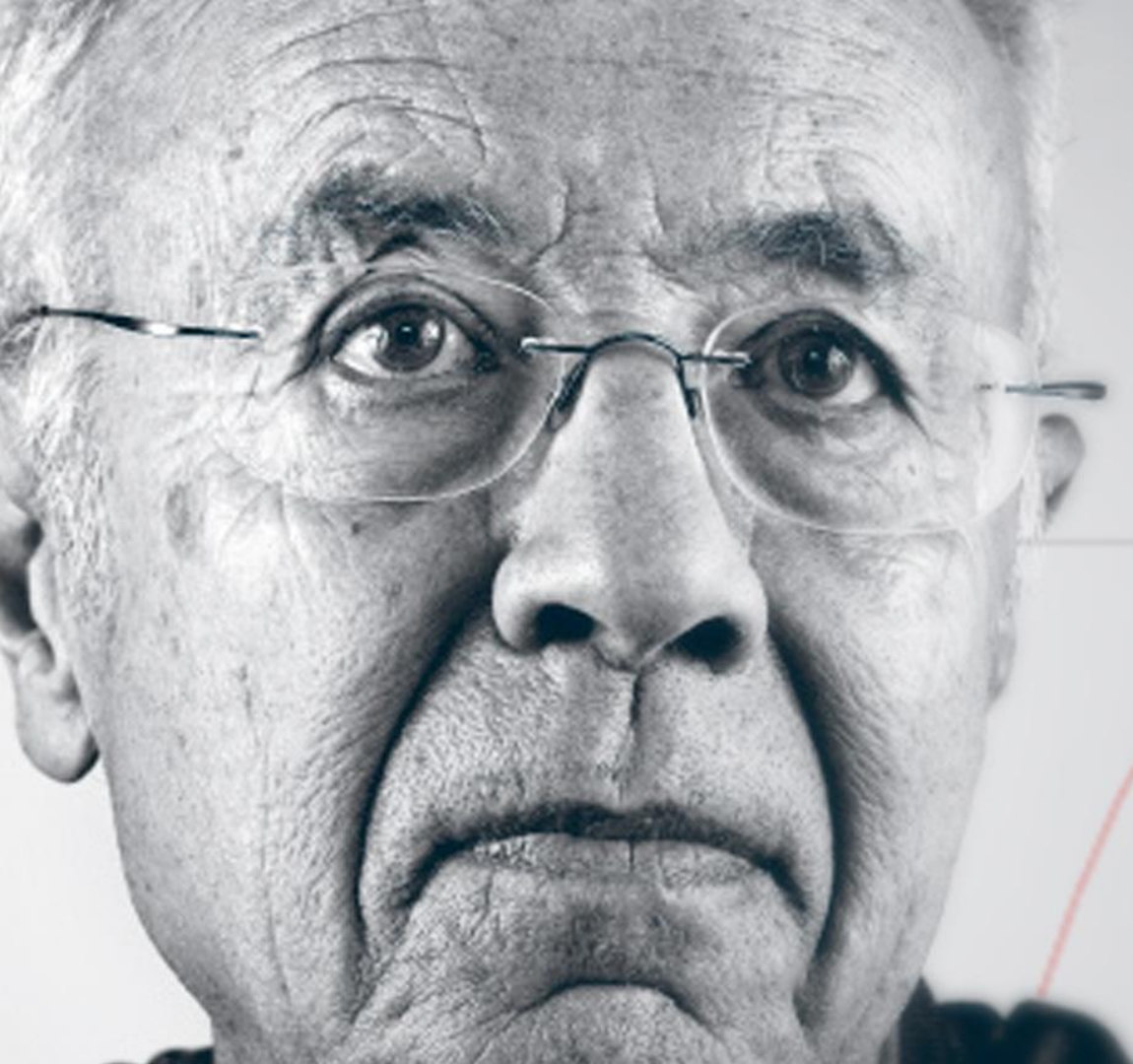
The
What's making **SMAC** II possible?
Stack



Analytics



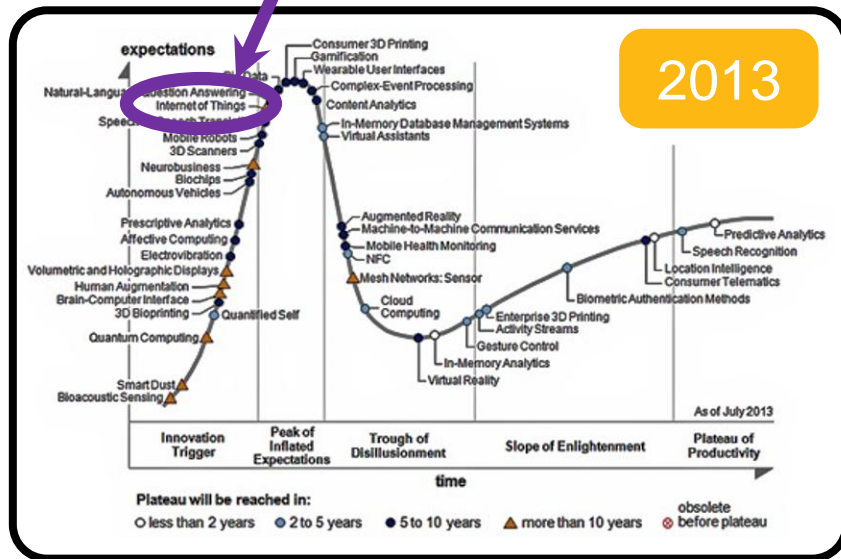
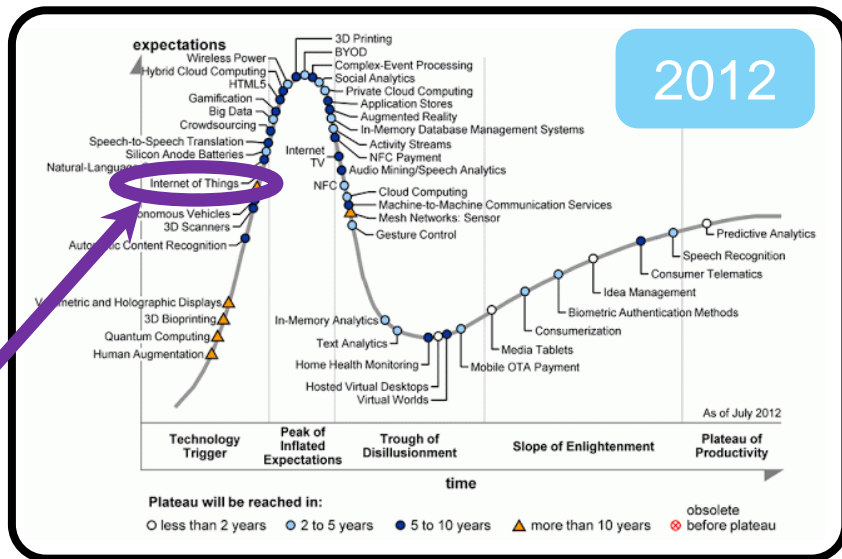
Cloud



“A strategic inflection point is an event that changes the way we think and act.”

Andrew Grove
Entrepreneur, Former Intel CEO

Gartner's Hype Cycle



Are we heading into trough of disillusionment ?

Convergence...

Market Trends Driving IoT

EVERYTHING
CONNECTED

Pervasive

Inexpensive

COMPUTE
ECONOMICS

Moore's Law

Storage to Sensors

BIG DATA AND
ANALYTICS

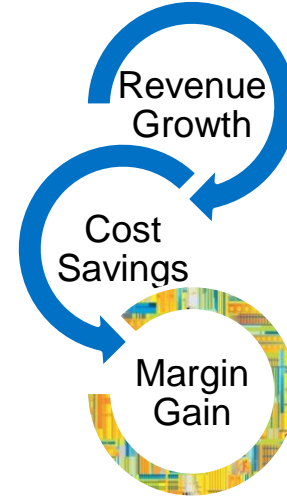
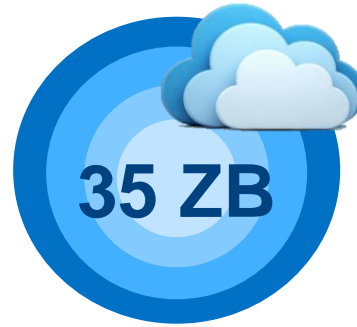
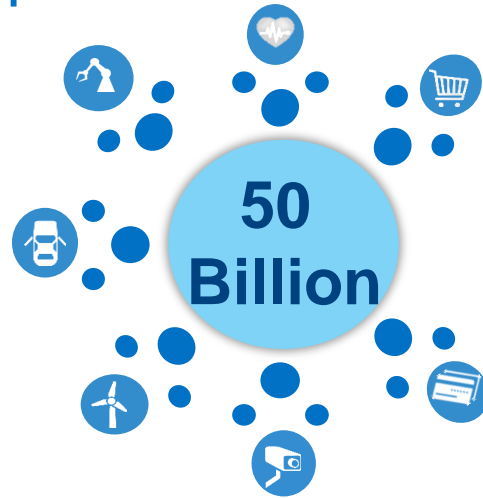
Data Science

Cloud

Intel - Delivering Device to Cloud

INTERNET OF THINGS X BIG DATA:

Unprecedented Value



New devices being added every day – In 2013, .5 Billion “non-personal” devices were added to the network. *

85% of deployed systems are unconnected, do not share data with each other or the cloud. *

\$2.7 to \$6.2 **trillion** of estimated global economic impact in 2025*

THINGS

DATA

VALUE

Connected Devices: Depend on Data Centers



SMARTPHONES

~400 DEVICES
drives
1 SERVER¹



CONNECTED FACTORY TOOLS

~40 DEVICES
drives
1 SERVER²



MEDICAL WEARABLE DEVICES

~100 DEVICES
drives
1 SERVER²



DIGITAL SIGNS

~20 DEVICES
drives
1 SERVER²

1: Intel and 3rd party analysis

2: Intel estimate based on various end user proofs of concepts

What is the Internet of Things?



The Internet of Things is...

MOBILE



HOME



INDUSTRIAL



Devices that are connecting to the internet, integrating greater compute capabilities, and using data analytics and decision engines to extract meaningful information.

Network
Infrastructure

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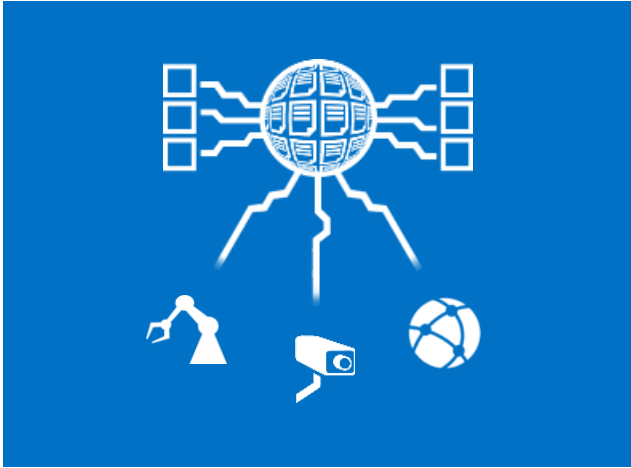
Gateways

Network

Data Center

Things

What is a Gateway?



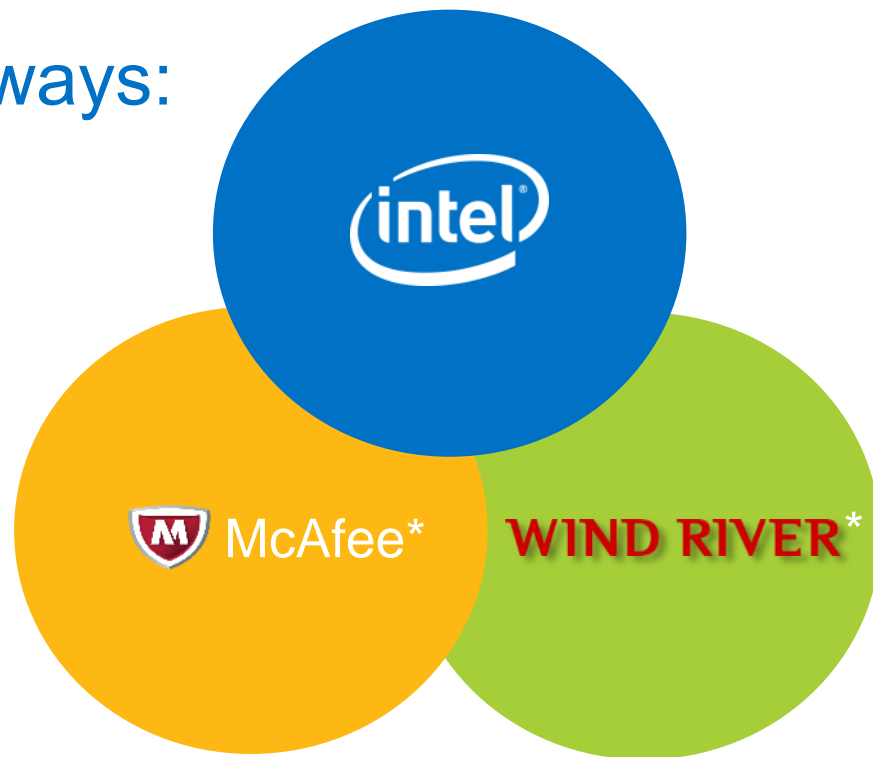
Intel definition:

- Bolt on: Connect existing systems
- Aggregate sensor data
- Analyze data locally: filtering, real-time response
- Provide security to deliver trust, reliability

Intel Solutions

Intel's Approach to IoT Gateways:

Aligning
Assets to Deliver
Value



Integrated, highly optimized platforms

Essential Tenets of Edge to Cloud IoT Solutions



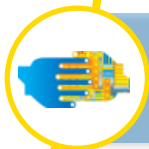
Monetize HW, SW, and Data Management



Actionable Analytics



Data Normalization



Discovery and Provisioning



Security as the Foundation - HW and SW

Benefits of Intel Gateway Solutions



Connectivity

- Pre-integrated connected capabilities enable rich network options to save development time and costs.
- Provides an extensive network of connectivity
 - Wired
 - Wireless
 - Cellular
 - Short-range



Security

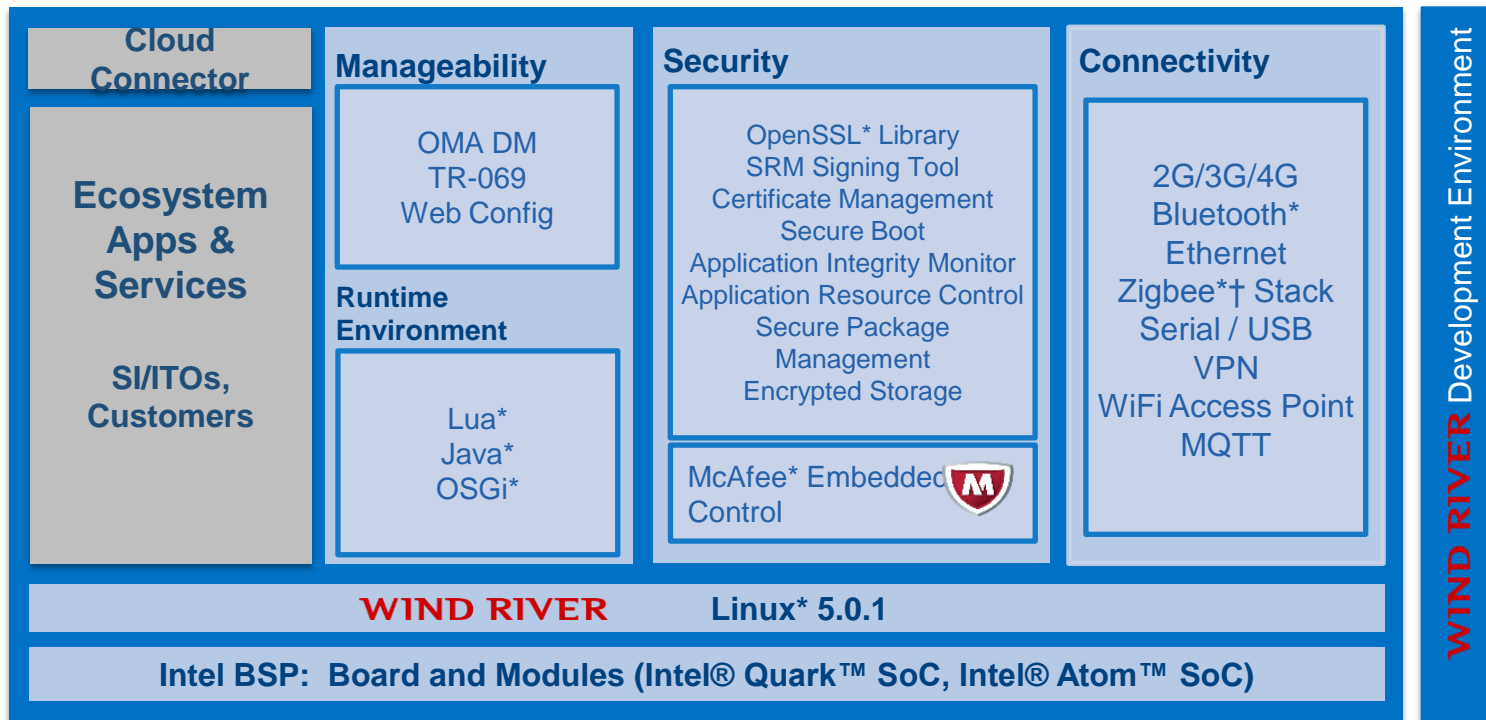
- Protect devices for trust and control
- Protect the Device
- Protect the application
- Protect the data at rest and in flight



Manageability

- Enable common provisioning frameworks
- Enable remote, secure upgrades
- Provide web-based configuration utilities

Intel Gateways Solutions for IoT Software

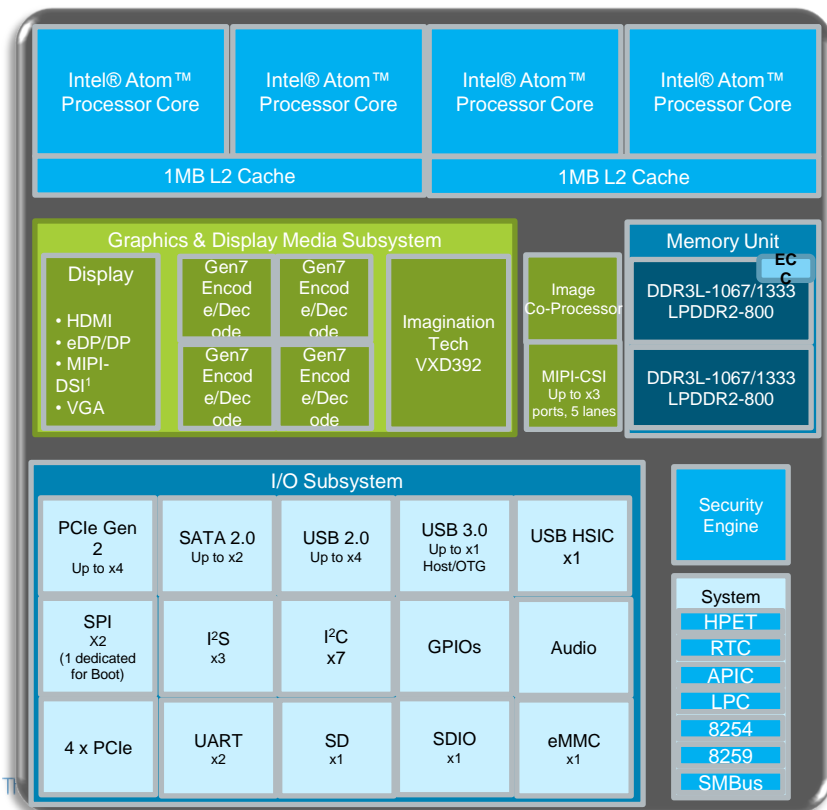


All products, dates, and figures specified are preliminary based on current expectations, and are subject to change without notice.

*Other names and brands may be claimed as the property of others.

†Enabled by third party hardware.

Bay Trail On-A-Page



CORE

- Intel® Atom™ 22nm Process Technology
- Estimated Speeds – 1.2GHz to 2.4GHz
- 1, 2 and 4 core SKUs
- 512Kb L2 cache per core
- Intel® 64, Intel® VT, XD Bit
- Extended Temp SKUs
- AEC Q100 Auto Qualified SKUs

GRAPHICS, DISPLAY & MEDIA

- 4 Intel Gen 7 Graphics Engines, x2 Display Pipes
 - Decode - H.264, MPEG1, MPEG2, MPEG4, VC1/WMV9
 - Encode – H.264, MPEG2
- 1 Integrated Imagination Technology* VXD392 Decode Engine
 - Decode - H.264, JPEG, VP8

I/O HIGHLIGHTS

- PCI Express* Gen II - Up to x4 lanes
- Intel® HD Audio or Low Power Audio
- Image Co-Processor
- MIPI-CSI Camera Interface
- Security Engine
 - Secure Boot
 - Blu-Ray* Content Protection (*currently for automotive use*)
- Wide Range of I/O (e.g. SATA2, USB 2.0 Host, USB 3.0, SDIO, SPI, I²C, I²S, UARTs)

MEMORY

- Dual & Single Channel SKUs
- DDR3L-1067/1333, ECC capable in single channel mode
- LPDDR2-800
- Max 8GB
- 32/64 bit width

PACKAGES²

- Type-3 27x25mm, 0.593mm Ball Pitch
- Type-4 "HDI" 17x17mm, 0.4mm Ball Pitch

• **STATUS: Launched since 8-OCT13**

Intel® Quark™ “Liffy Island” (LFI) SoC – The Right Stuff

- Quark™ Processor Core

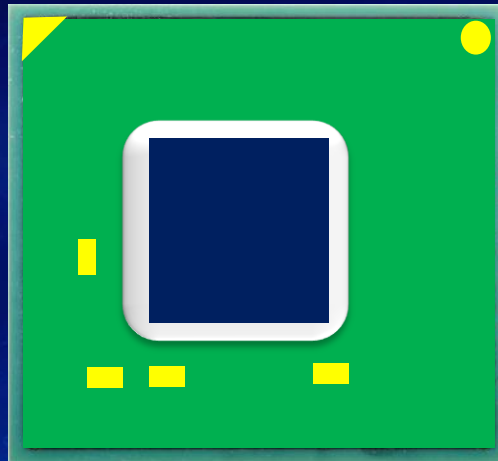
- Single Quark CPU Core, Single Thread
- 32 bit, 533MHz
- 64KB L1 with ECC
- ~1.5 DMIPs/MHz

- Processor UnCore

- 2GB DDR3/DDR3L @ 1066MTs
 - ECC-On-Chip
- 1MB Embedded SRAM
- Legacy Block
 - PC compatible IO ports, APICs, etc.
 - 50MHz Quad Legacy SPI for boot code
- Low cost 5-pin JTAG Port

- Physical

- NEW Package
- FC BGA bare die
- 0.593 Ball Pitch
- Enables FR4 SFF Board



- Industry Standard I/O Hardware

- 2 - x1 PCIe* with Root and End Point
- 2 - GbE w AVB Switch option
- 2 - USB2 host ports (EHCI, OHCI)
- 4 - HS UART controller
- 4 - 25 MHz SPI ports for peripherals
- 1 - USB2 HS Device port
- 1 - SD/SDIO/eMMC interface
- 3 - I2C Host controller
- 1 - 8 Channel ADC
- 1 - CAN bus with HS/LS port
- 1 - I2S support for Audio
- 40+ - GPIOs w prog interrupts
- Up to 24 PWM

- Industry Standard Software Support

- Standard Compiler Support
- Pentium ISA Compatibility (.586)
- Runs unmodified Linux Kernels
- Yocto based distribution
- Validated w Moon Island and VxWorks
- Open Source UEFI EDK II
- GRUB boot loader support
- Open OCD Debugging support
- Compliant with PCIe, USB, ACPI standards

- Security

- Secure Boot Technology
- Supervisory Mode Execution Protection
- Secure Recovery for UEFI FW
- Secure Remote Upgrade w/ WR IDP
- Custom Keys (Field Programmable Fuses)
- Secure Attestation updates

- Electricals:

- Single xtal for internal/external clocks
- Enabled Single std external VR solution

- Thermals

- TDP = ~2W with LP skus available <1.5W
- Extended temp -40 to +85°C
- Programmable Thermal sensor

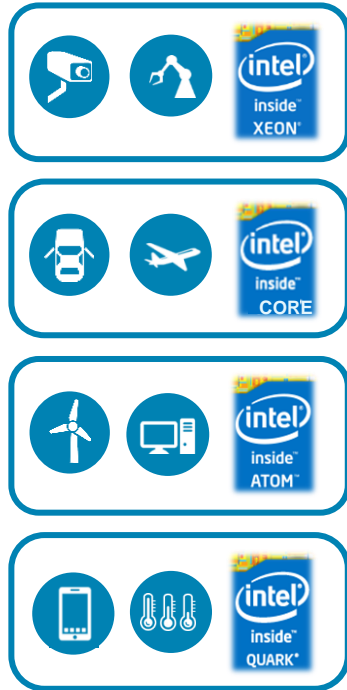
E2E Compute Scalability: Flexible Intelligence

Edge Compute

Gateway

Network/Cloud Compute

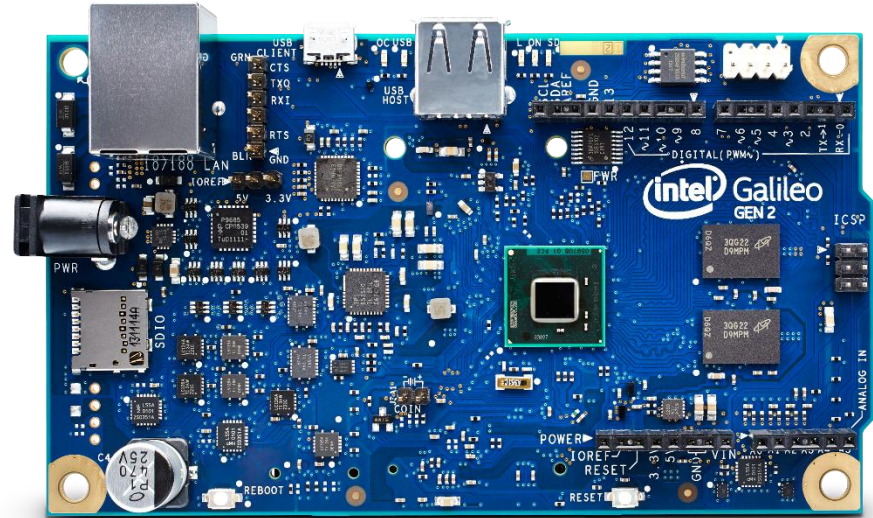
↑
Compute
Capability



↑
Compute
Capability

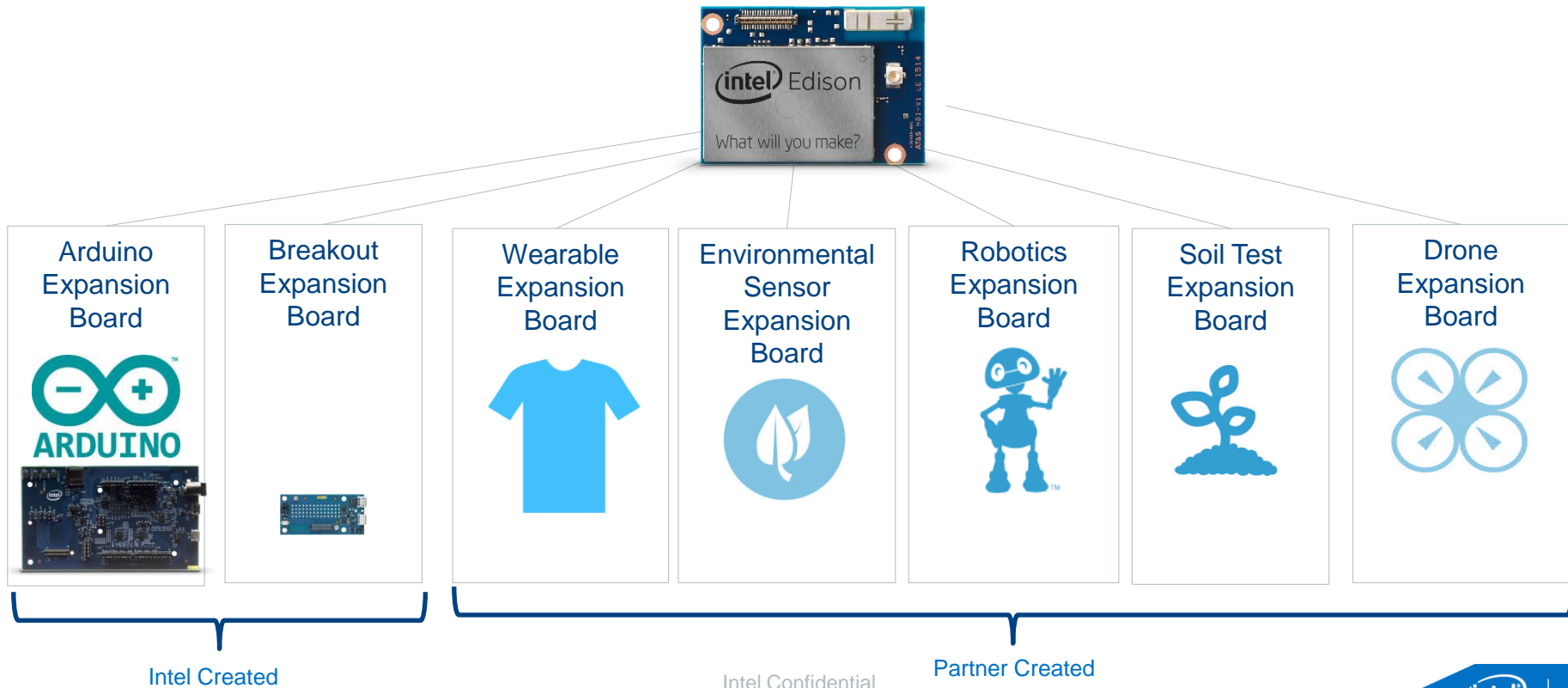


Combines the simplicity of the Arduino development environment with the performance of Intel technology and the capabilities of a full Linux software stack.



Intel® Edison Family:

Supporting the long tail via Expansion Boards



Use Cases

Industries with Highest Potential Value



Industrial Automation



Energy Grid



Transportation

...Have Long Replacement Cycles



Industrial Automation

5-25 Years



Energy Grid

10+ Years



Transportation

5-10 Years

Gateways “bolt on” to existing assets
Capture existing data and address the installed base

Fleet Management

Problem

Rising fuel costs, environmental concerns, driver safety, and unpredictable maintenance problems

How It Works



Vehicle sensor data is collected



Increased Fuel Efficiency



Reduced Maintenance Costs



Improved Driver Safety

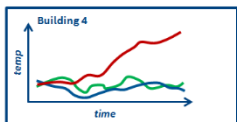
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Smart Building - HVAC

Problem

Equipment and building control are not integrated.
HVAC units require a technicians maintain and adjust the unit for optimal performance.

How It Works



Reduced
Energy
Costs



End-to-End
Security



Connecting
New and
Legacy Units

*Other names and brands may be claimed as the property of others

Connected Beer Keg



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Summary

Intel has launched scalable gateway solutions for IoT

Integrated with foundational HW, SW, and security building blocks

Securely connects and aggregates data from the edge to the cloud

Simplifies the development process and deployment of IoT gateways

Delivers value by accelerating business transformation

For More Information Go To:
www.intel.com/iot



