The Internet of Things is...
Intelligence Everywhere

50B Devices*

COST OF SENSORS PAST 10 YEARS
2X

COST OF BANDWIDTH PAST 10 YEARS
40X

COST OF PROCESSING PAST 10 YEARS
60X***

* IDC
** IMC/EDC: The Digital Universe of Opportunities
*** Goldman Sachs

50B
DEVICES*

44
ZETABYTES**

Sensors

Home/Industrial

Gateway

Network

DC/Cloud

Mobile
A Wide Array of Applications

Sleep Monitoring
A Kimono* with sensors monitors the baby's temperature, breathing and communicates with parents.

Responsive Coaching
Running App Personalizes Workouts Based On Current Stamina

Medical Research
Bringing medical research into the 21st century

Cloud Memory
Wearable Camera Life Blogs By Snapping Photos Throughout The Day

The possibilities are endless.
“Things” have many challenges

- Different Devices & Capabilities
- Many software solution options
- Need to prototype easily

Solving these challenges requires **scale**, **tools**, and easy **adoption**.
Vision: A Flexible Framework for IoT solutions

Highly configurable, multi-architecture, strong upstream alignment
Scalable Operating System for IoT Devices

Comms Technologies
Inter-Connectivity (Open Interconnect Consortium)

Embedded Development Environment

Application Runtime
Visualization
Inter-Connectivity (Open Interconnect Consortium)
Comms Technologies

Security Framework

Kernell
Hardware

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

- Run time for web apps (HTML, CSS, JavaScript)
- Up to date version of Blink and Chromium
- Modern Web APIs with extensions
- Latest web innovations with minimal code changes
- Robust Security, Performance and web standards
- IoT support including node.js for wearables, etc.

A runtime for ambitious web apps on more devices!

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Scalable Operating System for IoT Devices

Comms Technologies
Inter-Connectivity (Open Interconnect Consortium)
Embedded Development Environment
Application Runtime
Visualization
Security Framework
Visualization (as needed)
Comms Technologies (as needed)
Scalable Operating System for IoT Devices
Kernel
Hardware

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MinnowBoard MAX

- Low-cost development board based on Intel® Atom™ processor
- Grown from an open source project
- Designed for software development
- Focus on flexibility, openness and standards
- More than a board, includes a community

With open hardware and community, innovation happens.

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Visualization
Inter-Connectivity (Open Interconnect Consortium)
Comms Technologies

Security Framework

Kernel
Hardware

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Yocto Project

- A unified framework for embedded software development
- Easy Linux customization across multiple architectures
- Many major distros are based on Yocto Project including Wind River Linux
- Continuous evolution makes Yocto Project unique
- Focus on overall developer experience and ease of use

Delivering more features for the ever-evolving IoT developer needs
Scalable Operating System for IoT Devices

- Comms Technologies
- Inter-Connectivity (Open Interconnect Consortium)
- Embedded Development Environment
- Application Runtime
- Visualization
- Security Framework
- Hardware
- Kernel

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IoT Comms Infrastructure

IoTivity FWK
- Services
- Protocol Bridge
- Device Discovery & Messaging
  - REST/CoAP
- Connectivity Abstraction Layer

Smart Home App

Media App

ZigBee Smart Home Profile

Connection Manager – ConnMan

DLNA Plugin
dleyna

Bluetooth 4.2
BlueZ (Classic + LE)

IP
ZigBee
IEEE 802.15.4
NFC
neard
WiFi

Kernel

Comprehensive comms framework for any type of implementation.

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Scalable Operating System for IoT Devices

Kernel
Hardware

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Minimizing the kernel – static and dynamic

Tinification improvements continually upstreamed

Goal to achieve Min Kernel / User space size < 1 MB

XIP support for Intel Architecture

Kernel 3.19
  - Full networking, text size is 750k
  - Non-networking, text size ~500K

Shrinking the kernel to enable the smallest devices

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Building Connectivity Standards

Open source and standards to foster innovation.

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An extensible and robust architecture for smart and thin devices.
Local Network

- Multicast Request: Get Light bulbs
- Unicast Response: I'm a Light bulb
- What's Your Status?
- Status (Off, Dim:50, ...)
- Set Status On
- Ok, Done

OIC Example

Smart Light Switch

Smart Light Bulb

Resource
- Light
- Status: On/Off
- Dimming: 0-100
- Hue: RGB
- Hue: HSV
- Colour Temp: K
Summary

Delivering a flexible framework for IoT solutions that...

- Provides ways to scale
- Delivers key tools & capabilities
- Eases creation of your solutions
Our ask of you

• Visit the Intel booth to see these solutions in action
• Attend Intel sessions to learn more about what we’re doing with open source and IoT
• Get involved with these projects and make your contributions

For more information: Intel booth #1 and Intel sessions and 01.org

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Thank You!