A Paradigm Shift for the Internet of Things

• Today sensing and actuation is expensive and static with little or no economies of scale.
• μPnP changes the equation:
  – Effortless plug-and-play deployment.
  – Easy customization with sensors and actuators.
  – Instant web/cloud integration.
  – 10 year battery life and 99.999% reliability.
• μPnP empowers everyone to apply the IoT without the need for specialized knowledge.
\( \mu \text{PnP} \) minimizes Total Cost of Ownership

- Zero-configuration customization
- Instant cloud integration
- 10y battery life
- 99.999% reliability

Traditional IoT platforms
(Advantech, B+B Smartworx, Embedded Planet, …)

TCO

\[ \text{scale} \]

(# sensor/actuators)
One IoT platform that can be customized for every application.
μPlug-and-Play in action

Video online at https://youtu.be/VFWEU9t21KI
μPnP vision

• From fixed purpose IoT platforms to **instant customization**
• From embedded programming to **flexible web development**
• **Best-in-class reliability and lifetime** with open standards
• **End-to-end security** from the embedded device to the cloud
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Technical background
MicroPnP customization

1. CONNECT
Low-power peripheral identification based on IPSO identifiers

2. CONFIGURE
CoAP drivers are downloaded and installed from the cloud.

3. DISCOVER
The peripheral is registered with gateway and the cloud.
A STANDARDS-BASED SOFTWARE STACK

Cloud Integration Libraries

Smart Objects Data Model (IPSO)

CoAP (IETF)

IPv6 (IETF)

6TiSCH (IETF)

Reconfigurable Software

802.15.4e (IEEE)

PnP Hardware
Custom development support for experts and beginners.
FOR BEGINNERS: The IPSO Tag

• We introduce the IPSO tag for easy IoT/web integration.

• The IPSO tag adds IoT resources to a web page in 1 line of code.

<ipso thing="thing1", peripheral ="powercontrol">
FOR WEB EXPERTS – The JavaScript API

• Live data is made securely and globally available using the cloud.

• JavaScript libraries allow access to this data:
  – Client-side via any browser.
  – Server-side via Node.JS

• Seamlessly embed in web pages using the `<ipso-app>` tag.
FOR IOT EXPERTS - The CoAP API

- IPv6 provides seamless global connectivity.
- CoAP ensure IETF standards-based interaction with IoT devices.
- IPSO Smart Objects guarantees interoperability.
- Experts use these technologies to write powerful applications.
"Up to 10 years reliable operation on a single battery."
TECHNICAL DETAILS

• Best in class hardware from Linear Technology provides ultra-low power IPv6 networking:
  ➤ Instant integrate the IoT with standard networks.

• Time Synchronized Channel Hopping (6TiSCH) and a self-healing mesh achieve over 99.999% reliability.
  ➤ Applications include the Internet of Important Things: e.g. process control and security.
End-to-end security, from the IoT device to the cloud.
SECURITY: from things to gateway

- Link-layer encryption based on NIST certified AES-128:
  ➤ Guaranteed confidentiality, integrity and authenticity.

- Secure commissioning based on access control lists:
  ➤ Only the nodes that you authorize may join the network.
SECURITY: From gateway to the cloud

• All data is protected with Secure Sockets Layer (SSL):
  ➩ Guaranteed confidentiality, integrity and authenticity.

• Access is controlled by OAuth2 authentication:
  ➩ Easy integration with many third-party OAuth system.