Putting **IPv6** to work

North American IPv6 Summit
Plaza Tower One Conference Facilities
Greenwood Village, CO
April 22-23, 2015

Rocky Mountain IPv6 Task Force

RMv6TF

Background

- Worked on ARPAnet
- Helped designed IPv6
- Created 6lowpan
- A founder of Zigbee
- A founder of IPSO
- Co-creator White House SmartAmerica Challenge
- US Representative ISO Smart & Sustainable Cities

Intro to the IoT

- Many view the IoT as:
  - Intrusive
  - Big Brother
  - Just a lot of hype
  - A way to sell us more stuff we don't need
- The term was coined in 1999
- Internet of Things, Internet of Everything, Industrial Internet, M2M, …

Why IPv6 for the IoT

- Great big address space
  - 8.37 trillion light years
- Stateless Address Auto-Configuration
- DHCP not required
- NAT not required
- Preserve end-to-end connectivity
- Stateless header compression
- No Gateways

Why eliminate Gateways

- Break end-to-end security
  - Multiple security domains
- Single point of failure / Single point of attack
- Complex to manage
  - Upgrades
  - Configuration
  - Security
- Added Cost

Protocols for the IoT

- IPv6
- 6lowpan – header compression
- RPL/Babel/IS-IS – routing
    - Route over vs Mesh Under
- TCP and UDP
- DTLS / TLS
- HTTP/COAP
- MQTT/DDS/AMQP/XMPP/SNMP
- IPSO Smart Objects

TCP vs UDP

- Conventional Wisdom suggests UDP for sensors
- UDP:
  - Simple, single message
  - App must deal with window size and Acks
- TCP:
  - Negotiated window size, Acks
  - Delays from RTT and 3way HS

HTTP vs COAP

- HTTP:
  - Complex headers can be large, uses TCP, TLS
- COAP:
  - Limited headers, uses UDP, DTLS

IPSO Smart Objects

- Data definition framework for the IoT
- Protocol agnostic
- Framework and Starter Pack available now
- Extension Pack coming soon
- Interop Event in May

IoT Alliance Landscape

- IPSO Alliance
  - Promotes use of open standards across the IoT
  - Why and How to use IP for the IoT
- Industrial Internet Consortium
  - Architecture, protocols and security for industrial application
- Open Interconnect Consortium
  - IP based, open source
  - COAP and IPSO Smart Objects
  - Certification

IoT Alliance Landscape

- Thread Group
  - IP based
  - 6lowpan, COAP, DTLS, Zigbee ZCL
- Open Mobile Alliance
  - Lightweight M2M, IPSO SO
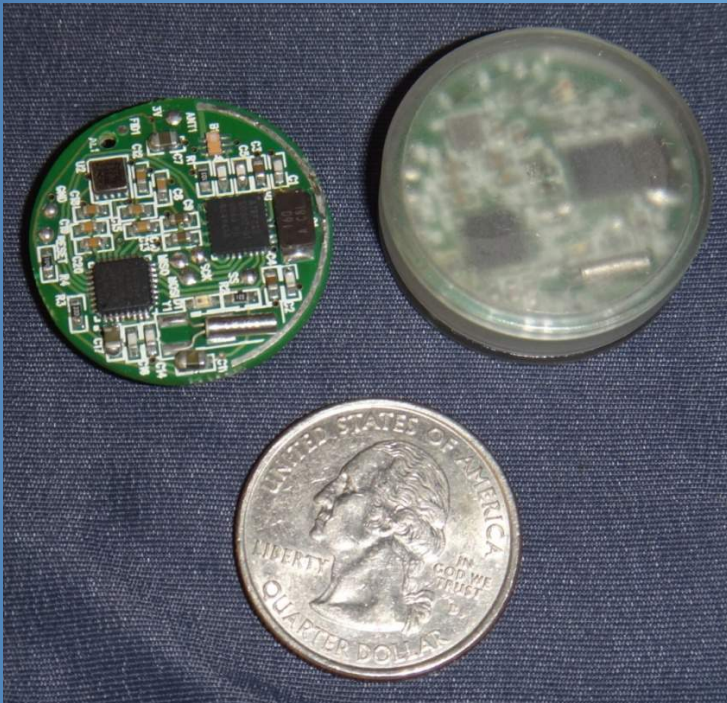- AllSeen
  - IP based
- OneM2M
  - IP maybe

IoT Privacy and Security

"You spelled 'confidential' wrong."

Security is a technology   ~   Privacy is a policy

IoT Device

- ✓ Battery Operated
- ✓ 3-D accelerometer
- ✓ Temp Sensor
- ✓ Light Sensor
- ✓ 802.15.4
- ✓ IPv6/6lowpan
- ✓ Multi-year battery life
- ✓ Coin Flip application

Getting Involved – IPSO Challenge

- Goal: To find innovative ideas, products, prototype showing benefits of IP
- Now accepting entries; completes in December
- Over $25K in prizes
- New feature this year: dev hardware and software
- http://challenge.ipso-alliance.org

Thank you

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