

# Developing the Internet of Things at the IETF

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# The IETF View on Internet of Things



- Everything that benefits from networking will eventually be networked
- As with previous major developments, the Internet will need to evolve to meet the demand
- There are tremendous cost and other advantages to using IP for all communications; yet we'll have to make sure our technology scales to the challenge
- Not a future thing – we are already there

# What Is in Scope for the IETF on Internet of Things?



- Basic general-purpose technology (IPv6 etc)
- Routing mechanisms suitable for IOT
- "IP over Foo" specifications
- Transport protocols and middleware
- Operational considerations

Not in scope due to lack of expertise:

- Link layers, specific applications, specific network architectures, policy issues, ...

# Relevant IETF Efforts (1/2)



- CORE WG – COAP, a light weight UDP-based HTTP-like protocol, suited for sensor networks
- EMAN WG – energy measurement and management framework and MIBs for (network) devices
- MANET and ROLL – routing protocols suitable for ad hoc networks and low-power/lossy networks
  - RPL routing protocol the main recent result

# Relevant IETF Efforts (2/2)



- 6LOWPAN WG – IP over 802.15.4
  - Including header compression and ND optimizations for this very low-energy link layer
- LWIG WG – Implementation guidance for small implementations
  - Not a profile or a new protocol, just about explaining what uIP and other small implementations can do to ensure small footprint

# Upcoming IETF Efforts



## IAB IOT workshop (March 25<sup>th</sup>)

- Trying to understand the coming challenges
- Cross-pollination between researchers, practitioners, and standards engineers

<http://www.iab.org/about/workshops/smartobjects/>

## IETF IOT tutorial (March 26<sup>th</sup>)

- Tutorials on 6LOWPAN, RPL, CORE

<http://www.iab.org/about/workshops/smartobjects/tutorial.html>

# Known Pain Points

- Management and discovery
- Scalability to small devices and to large numbers
- Energy & communications efficiency in protocols
- Deployable security
- User interaction models
- Multi-purpose networks (possibly multihoming)
- Things behind NATs, or IPv6 things talking to IPv4 things