Tutorial on Interconnecting Smart Objects with the Internet

The Internet Architecture Board, the IETF Internet Area, the IETF Routing Area, the IETF Applications Area, the Czech Technical University in Prague, and the European Commission will hold a *tutorial* on Saturday, 26th March 2011 in Prague on the topic "Interconnecting Smart Objects with the Internet".

Agenda

Time	Session Description
08:30 – 09:00	Last minute check (audio/beamer). Arrival of Participants
09:00 – 09:15	**Opening Remarks and Logistics (Hannes Tschofenig)**
09:15 – 10:30	**Getting Started with IPv6 in Low-Power Wireless Personal Area Networks (Carsten Bormann)** IPv6 is not exactly known to be frugal with header space and control messages. To use IPv6 in constrained nodes and networks, several optimizations have to be applied. We look at the 6LoWPAN packet encapsulation, including fragmentation and header compression, and at the optimized 6LoWPAN-ND (neighbor discovery) protocol.
10:30 – 11:45	**Understanding Routing in Low-Power and Lossy Networks (JP Vasseur)** Routing in sensor networks also referred to as LLN (Low power and Lossy Networks) or "The Internet of Things" is technically challenging due to the very specific nature of these networks and the set of routing requirements. To that end, the IETF has formed a new Working Group (ROLL) in 2008 that has specified a new routing protocol RPL along with other companions documents. The aim of this tutorial is to provide an overview of this new routing protocol for IP smart objects.
11:45 – 12:45	Lunch Break

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12:45 – 14:00	**Introduction to Resource-Oriented Applications in Constrained Networks** (Zach Shelby) In this tutorial the use of the web architecture in constrained M2M applications will be introduced. The latest work in the IETF in the Constrained RESTful Environments (CoRE) working group will be explained in detail, including the Constrained Application Protocol (CoAP) and performing resource discovery using Web Linking
14:00 – 15:15	**Service Discovery** (Stuart Cheshire) Historically, IP networks have required manual configuration and administration, in contrast to other protocols like AppleTalk, which in the 1980s allowed non-technical users to simply connect cables to computers and network printers to form a self-configuring network. With the decline of protocols like AppleTalk and the emergence of IP as the clear winner, the three technologies of link-local addressing, Multicast DNS (mDNS) and DNS-Based Service Discovery (DNS-SD) bring AppleTalk's ease-of-use to IP networking. In this talk we will explore these service discovery mechanisms.
15:15 – 15:30	Coffee Break
15:30 – 16:45	**Considerations for Constrained Devices** (Adam Dunkels) Can IPv6 be done with 1 kilobyte of RAM? Can multi-hop routing be done with 1 milliwatt of power? This talk shows how to do IP networking in severely resource-constrained systems.
16:45 – 18:00	**Putting IETF Building Blocks Together – ZigBee IP** (Robert Cragie) ZigBee IP is a specification and test specification being developed by the ZigBee Alliance. It will provide an interoperable stack based on the IEEE 802.15.4 specification for use with the ZigBee Smart Energy 2.0 protocol. The primary objective of ZigBee IP is to piece together standard protocols available or actively in development from the IEEE and IETF. These protocols will be in all layers up to the transport layer, including routing and security protocols. The key protocols from the IETF which have been specified are TCP, UDP, IPv6, ICMPv6, 6lowpan HC and ND, RPL, PANA, EAP and TLS. The aim of the session is to show how these protocols fit together in the ZigBee IP stack and to give an indication of the progress so far.

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18:00 – 19:30	Refreshment Break
20:00	Informal Dinner at Restaurant U SUPA

Meeting Notes

Spencer Dawkins took notes during the meeting and they can be downloaded here.

Goals for the Tutorial Day

This tutorial day was scheduled with the following goals in mind:

- Make IETF participants aware of work in relevant working groups
- Introduce IETF activities to engineers as well as researchers who have not been active in the IETF before
- Help everyone to get a better understanding of implications caused by performance-constrained devices
- Get to know others and make friends for future collaboration

Registration

The workshop is open to everyone but we require registration to ensure that we have a large enough room (and enough coffee/cookies). We may need to limit the number of participants. The registration deadline is closed.

Participation at the tutorial is free of charge. There is no requirement to either register or attend the attached IETF#80 meeting, nor to join the workshop on the day prior to the tutorial. Nevertheless, we strongly encourage participants to make use of the opportunity to attend the workshop day as well as the IETF#80 meeting where further discussions about technologies relevant for the workshop theme will take place. Note that there is a position paper requirement for attending the workshop.

Privacy Policy

You provide your name and your email address for the registration to the tutorial. We use this information for planning purposes (such as finding a room with the appropriate size, coffe and refreshment order, etc.). We also need to inform you about the meeting venue, or other urgent and relevant notifications.

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IPR Policy

This workshop is part of the "IETF Standards Process", as defined in [RFC 5378](#) and [RFC 3979](#) (updated by [RFC 4879](#)). The [IETF Note Well](#) statement applies.

Sponsors

We would like to thank our sponsors for their financial support.

Organizers

This tutorial is organized by members from the following groups: Internet Architecture Board (IAB), the IETF Internet Area, the IETF Routing Area, the IETF Applications Area, the Czech Technical University in Prague, and the European Commission.