

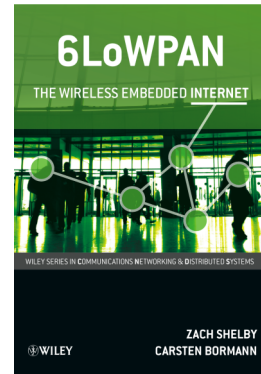
6LoWPAN: The Wireless Embedded Internet

Z. Shelby, C. Bormann "6LoWPAN: The Wireless Embedded Internet", J. Wiley & Sons, Nov 2009, 254 pg. ISBN: 978-0-470-74799-5

Suggested Course Syllabus

This book covers an important new Internet technology called IPv6 over Low-power Wireless Area Networks (6LoWPAN). This new standard is an important enabler for wireless embedded networking and is applicable for a huge range of applications from building automation to environmental monitoring.

Accompanying course material is included, and is meant for use by lecturers, students and engineers. This course material includes lecture slides, exercise slides and this suggested course syllabus. The material can be taught as an intensive 4-day course as suggested here, as a longer lecture series or integrated as part of a broader course. The course slides are available under a creative commons license, so we encourage re-use of the material with acknowledgement. And of course, we hope students will also read the book and the related IETF specifications!



The course consists of lecture slides, exercise slides and exercise code. The lecture material includes detailed information on the Internet of Things, related applications and all the technologies related to 6LoWPAN. In addition, the wireless industrial automation standard ISA100 is introduced. The exercise material covers subjects related to embedded development, microcontroller and radio models, use of the Contiki operating system, the uIPv6 6LoWPAN protocol stack along with related exercises.

Goals

The goal of this course is to:

- Motivate students regarding the Internet of Things, and the large range of exciting applications of this technology.
- Introduce the wireless embedded Internet architecture and 6LoWPAN.
- Give detailed information on 6LoWPAN and related protocol operation.
- Introduce implementation issues regarding 6LoWPAN.
- Teach 6LoWPAN network use and development hands-on.

Duration

4 day intensive course format, including 2 days lecture (16 hours) and 2 days laboratory work (16 hours) plus exercises (8 hours). 40 hours of work in total.

Recommended Background

- Basic course on computer networks

- Understanding of the Internet architecture and protocols
- Basic Linux skills
- Basic embedded C and Java programming

Syllabus – Lectures

1. Introduction
2. The Internet Architecture and Protocols
3. Introduction to 6LoWPAN
4. Link-layer Technologies
5. The 6LoWPAN Format
6. Bootstrapping
7. Security
8. Mobility and Routing
9. Application Protocols
10. System Examples including ISA100

Syllabus – Exercises

1. Introduction
2. Embedded Devices
3. Operating Systems
4. 6LoWPAN Implementation Issues
5. Laboratory Hardware
6. The Contiki Operating System
7. The uIPV6 Protocol Stack
8. Contiki Exercises

Exercise Equipment

The following equipment is recommended for the course exercise sessions and followup student exercises. The Contiki OS supports a wide variety of other hardware, which will also be suitable for most of the exercises.

The exercises cover use of the open source Contiki/uIPV6 embedded operating system. The development tools for these work best under Linux. PCs running native

Linux, Windows or Mac OS X running the Instant Contiki Virtual Machine image under e.g. VirtualBox are suitable.

For the instructor/classroom:

- VGA projector
- Instructor PC (Linux with Contiki tools installed)
- 1 USB cable
- 1 Sensinode NanoRouter USB Stick (N60x)
- 4 Sensinode NanoSensors (N7xx)

For each group of 2-3 students:

- PC (Linux with Contiki tools installed)
- 1 USB cable
- 1 Sensinode NanoRouter USB Stick (N60x)
- 4 Sensinode NanoSensors (N7xx)