

Essential ZigBee for engineers

A 2 day **Hands on** training course



Description

A hands on course covering the entire ZigBee protocol stack. ZigBee operation, primitives and frame formats are covered in detail using software tools to test and analyse ZigBee commands and demonstrate how these affect the 802.15.4 MAC. Analysers are used to decode packet formats.



Key outcomes

By the end of the course delegates will be able to:

- ✓ Describe the ZigBee architecture & applications.
- ✓ Explain the workings of ZigBee protocol stack including the 802.15.4, NWK, APS and ZDO sub layers.
- ✓ Describe in detail the ZigBee primitives and how they are used to pass data; make networks; join networks and repair networks.
- ✓ Secure ZigBee networks.



Training approach

This structured course uses Instructor Led Training to provide the best possible learning experience. Small class sizes ensure students benefit from our engaging and interactive style of teaching with delegates encouraged to ask questions throughout the course. Quizzes follow each major section allowing checking of learning. Hands on sessions are used throughout to allow delegates to consolidate their new skills.



Details

Who will benefit?

Technical staff requiring grounding in ZigBee including application engineers.

Prerequisites

RF fundamentals

Duration: 2 days

Customer rating: ★★★★★

Generic training



Generic training compliments product specific courses covering the complete picture of all relevant devices including the protocols "on the wire".

"Friendly environment with expert teaching that teaches the why before the how."
G.C. Fasthosts

Small class sizes



We limit our maximum class size to 8 delegates; often we have less than this. This ensures optimal interactivity between delegates and instructor.

"Excellent course. The small class size was a great benefit..."
M.B. IBM

Hands On training



The majority of our courses use hands on sessions to reinforce the theory.

"Not many courses have practice added to it. Normally just the theoretical stuff is covered."
J.W. Vodafone

Our courseware



We write our own courses; courseware does not just consist of slides and our slides are diagrams not bullet point text.

"Comprehensive materials that made the course easy to follow and will be used as a reference point."
V.B. Rockwell Collins

Customise your course



Please contact us if you would like a course to be customised to meet your specific requirements. Have the course your way.

"I was very impressed by the combination of practical and theory. Very informative. Friendly approachable environment, lots of hands on."
S.R. Qinetiq

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Course content

Wireless data overview

What is 802.15.4 and ZigBee? WLAN, WPAN, Bluetooth vs. ZigBee. Markets. Applications and architecture. ZigBee demonstration.

ZigBee Standards and technology

The 7-layer model, IEEE WPAN standards overview, 802.15.4 & ZigBee, ZigBee alliance.

ZigBee Protocol stack

The ZigBee 5 layer model, The network (NWK) sub layer, Application support sub layer (APS), the ZigBee Device Object (ZDO).

802.15.4 Radio

Frequencies, modulation, power, DSSS, BPSK/ O-QPSK, channels, symbols, chips and bit rate.

802.15.4 PHY

PHY data transfer primitives. The PHY packet. PHY PIB management.

802.15.4 MAC layer

The MAC layer overview, CSMA/CA, addresses, frame types, super frames, MAC layer: Data, Data control, Scan and join, PAN maintenance, MAC PIB. Hands on: 802.15.4 frame analysis.

ZigBee Topologies

Point to point topology, star topology, cluster tree, wired integration. Hands on: Building a ZigBee network.

ZigBee frame formats

General frame format, data frames, command frames. Hands on: Analysing ZigBee frames.

ZigBee NWK

NWK data primitives: Request. Confirm. Indication. NWK management primitives: Network discovery, network formation. Permit joining. Start router. Join. Direct join. Leave. Reset. Sync. NWK database management. Hands on: NWK analysis

ZigBee APS

Address mapping, matching devices, binding devices, binding tables. Hands on: APS analysis.

ZigBee ZDO

Device roles, binding requests, initiating and responding, device discovery, service discovery, network management. ZDO Endpoint 0.

ZigBee Security

Security issues, security modes, MAC security, NWK security, APS security.

Applications

Writing ZigBee applications, application profiles, End points, Endpoint addressing, clusters of attributes, broadcasts. Hands on: Sample ZigBee application.

