Course ID	Course Title
RF-IOT	**IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training**
Course Duration	
2-3 days	

Aimed At

IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training is aimed at Hardware/software engineers and technicians at manufactures of smart, connected devices that interface with the Internet of Things (IoT) including home and building automation devices.

Prerequisites

For those taking *IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training,* a technical background, especially in Telecommunications or Information Technology (IT), will be helpful.

Related Courses

- *WiFi Training in Depth: Technology, Security, Deployment ... with M2M, IoT, 5G* (WIFI-DIVE, 2-5 days)
- *Advanced Wi-Fi Training: Technology, Security, Deployment; Coexistence with LTE and 5G* (WIFI-ADV, 2-3 days)
- *WiFi Hands-on* (WIFI-LAB, 2 days)
- *BLE: Bluetooth Low Energy Training* (BLE3D, 3 days)
- *Bluetooth Course: Operation, Security, Applications, Coexistence (*BLUEOP, 4 days)
- *ZigBee Hands-on* (ZIGBLAB, 2 days)
- *IoT-enabling Technologies Training: IEEE 802.15.4, WLLN, ZigBee, WAVE, Next Gen WiFi* (EIOT5D, 5 days)

Course in a Nutshell

The *IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training* covers RF and IoT technologies from the perspective of those who design or troubleshoot devices that connect with the Internet of Things (IoT) using a wireless protocol such as Wi-Fi, Bluetooth Low Energy (Bluetooth LE or BLE), Zigbee, or Thread.

Customize It!

We can tailor the *IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training* to include the technologies pertinent to your product line or to adapt the course to the needs of less technical audiences such as marketing and sales professionals.

Course Outline

- **IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training - Introduction: Course Objectives and Overview**

- **IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training - Measurements**
  o Power: Current, Voltage, Resistance, Energy, Ohm's Law, Power, Joule's Law
  o Scattering (S-) Parameter: Balanced and Unbalanced
  o Load-pull
  o Noise Figure (NF) and Noise Factor (F)
  o 1dB Compression Point
  o Modulation Accuracy: Error Vector Magnitude (EVM) or Relative Constellation Error (RCE)
  o Gain, Efficiency
  o Bit Error Rate (BER), Packet Error Rate (PER)
  o Selectivity
  o Relative Received Signal Strength (RSSI)
  o Sensitivity
  o Harmonics, Spurious Emissions

- **IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training - System**
  o Transceiver Architectures
  o Low Noise Amplifier (LNA), Power Amplifier (PA)
  o Frequency Mixers
  o Electronic Filters: Low, High, and Band Pass
  o Intermediate Frequency (IF)
  o Modulation and Modulators
  o Eye Diagram or Eye Pattern
  o Filtering

- **IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training - Technologies**
  o Internet of Things (IoT)
    - Machine-to-Machine (M2M) Communications and Internet of Things (IoT)
    - IoT Applications
    - IoT-enabling Technologies
  o WiFi, Bluetooth Low Energy (Bluetooth LE or BLE), Zigbee, Thread
    - Basic Principles
    - Architecture and Operation
    - Protocols

- Applications

- **IoT: RF, Wi-Fi, Bluetooth LE (BLE), Zigbee & Thread Training - Demos and Discussion**
  o Course Recap
  o Site Survey Demo: Troubleshooting issues encountered by your products within a wireless network
  o Demo (and/or participant exercises): Use of the inSSIDer freeware to measure RSSI in WiFi networks.
  o Demos (optional): The instructor will demonstrate the use of Ekahau, inSSIDer, and AirPcap to design and troubleshoot WiFi networks.
  o Discussion: Questions/Answers