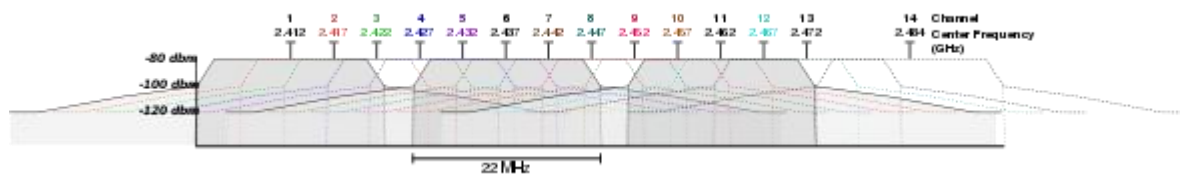


Training on Wireless LAN IEEE 802.11

Learning through live workshop/demo (5day)

The 802.11 family includes over-the-air modulation techniques that use the same basic protocol. The most popular are those defined by the 802.11b and 802.11g protocols, which are amendments to the original standard. 802.11-1997 was the first wireless networking standard, but 802.11b was the first widely accepted one, followed by 802.11g and 802.11n. Security was originally purposefully weak due to export requirements of some governments and was later enhanced via the 802.11i amendment after governmental and legislative changes. 802.11n is a new multi-streaming modulation technique. Other standards in the family (c-f, h, j) are service amendments and extensions or corrections to the previous specifications.



Spectral masks for 802.11g channels 1-14 in the 2.4 GHz band

802.11n is a recent amendment which improves upon the previous 802.11 standards by adding multiple-input multiple-output (MIMO) and many other newer features. The IEEE has approved the amendment and it was published in October 2009. Prior to the final ratification, enterprises were already migrating to 802.11n networks based on the Wi-Fi Alliance's certification of products conforming to a 2007 draft of the 802.11n proposal.

This workshop help the researchers and developers to understand the Wireless Network Standard and its layers MAC, PHY and their security aspects and Quality Of Service details.

Instructor: Dr. S. Srikanth / Mohammed Imran

Day 1

Basics of Networking

- Introduction to OSI Layers
- Network topologies
- Networking devices (Hub, Switch, ...)
- Introduction to Addressing Schemes (IP, MAC)

Wi-Fi Overview

- WLAN introduction and applications
- Relationship between IEEE 802.11 and WiFi
- BSS, IBSS, ESS, DS, BSSID, SSID
- IEEE 802.11 set of standards
- Spectrum of operation
- AP and STA hardware structure
- WLAN deployment scenarios

Workshop and Demo of Networking using Linux

Demos on Basic networking commands in Linux
Introduction to device driver
Setting up a simple wireless network (Infrastructure, Ad-hoc)

Day 2

Physical Layer of IEEE 802.11

RF fundamentals: path loss and fading
Basics of wireless channels
RSSI, data rate relationship
Key challenges for the 802.11 PHY. layer
DSSS & OFDM PHY: Fundamentals and data rate support
Use of OFDM in 802.11
Rate Adaptation in WLAN

MAC layer in 802.11

- DCF Protocol in WLAN
- CSMA/CA, BEB
- RTS/CTS and Fragmentation
- Inter frame spacing
- PCF Protocol in WLAN Polling operation

Workshop and Demos

Demo on variation of Signal strength and data rate based on mobility
Introduction to Wireshark
Exploring RTS-CTS handshake
Fragmentation in action

Day 3

WLAN framing and management

- MAC frames and fields
- MAC header
- Frames
 - Data frame
 - Control frame
 - Management frame

Network Entry Process and special features

- Network entry process
- Timing and legacy power techniques
- Necessity of Protection schemes

Workshop and Demo of Performance Measurement

- Performance Measurement using iperf/jperf

Day 4

High Speed WLAN

- Introduction to 802.11n
- Physical layer enhancements of 802.11n

QoS in WLAN

- EDCF & AC
- HCF & TS
- Block-ACK, DLS, APSD

Workshop and Demo

- Exploring beacon frame
- Observation of Network entry process

Day 5

Security in WLAN

- Basics of Network Security
 - Confidentiality, Integrity and Authentication
 - Security issues in wired and wireless LAN systems
- Introduction to WLAN Security
 - WEP – Encapsulation & Decapsulation
 - RC4 Algorithm
 - WPA, WPA2, 802.1x
 - Recent trends

802.11n MAC

- Introduction to MAC Layer Enhancements
- Aggregation (MSDU,MPDU)
- Block-ack

Workshop and Demo on Security

802.11n Demonstration

- Sniffing demo with wireshark for 802.11n frames
- performance evaluation demo
