

Duration: 4 Days (30 Hours)
Course Code: DEC80211

Overview:

Linux® Wireless (DEC80211) teaches experienced C programmers already familiar with the Linux kernel architecture and Module programming skills and strategies they need to understand Linux Wireless Networking subsystem and Wifi Driver development.

Target Audience:

Experienced C programmers with a good understanding of the Linux kernel who want to learn how to develop wifi device drivers for linux system and maintain protocol stack or Who wants understand whole data flow in networking and wireless subsystem.

Objectives:

- Introduction and Review of Kernel Programming
- Module programming
- Network Basics
- WLAN Basics
- WIFI Standards
- Protocol Layers
- PCI , USB Based Devices
- User to Kernel Interaction
- User space wifi applications
- CFG80211, MAC80211
- WIFI Hardware (Chipsets basics)

Prerequisites:

- Experience in C programming
- Knowledge of Linux Kernel Internals or Equivalent

WiFi – 802.11

<p>Introduction to Linux Kernel</p> <ul style="list-style-type: none"> What is a Linux Kernel? Kernel Programming Module Programming <p>Network and WiFi Basics</p> <ul style="list-style-type: none"> What is network Linux Network Subsystem 802 standard WLAN network topology Infrastructure Mode Repeater Mode Bridge Mode Ad-hoc Mode Channel scanning and synchronization Passive Scan Active Scan Authentication and association Open Authentication Shared Key Authentication Data transfer mechanism <p>802.3 Standard</p> <ul style="list-style-type: none"> 802.3 standards More details <p>Wireless Standards</p> <ul style="list-style-type: none"> 802.11 standards 802.15 standards 802.16 standards etc <p>WLAN and WiFi</p> <ul style="list-style-type: none"> Difference between WLAN and WiFi Examples <p>Networking Device</p> <ul style="list-style-type: none"> NIC Card, WiFi cards, Routes, Bridges, Repeaters, Switches etc <p>Network Topology</p> <ul style="list-style-type: none"> Mesh, Star etc <p>WiFi Device</p> <ul style="list-style-type: none"> Chipset Details <p>WiFi Standards</p> <ul style="list-style-type: none"> 802.11 Terms used BSS, iBSS, SSID, ESSID, BSSID Stations, Clinets, Access Point, ESS etc <p>Wifi User space application</p> <ul style="list-style-type: none"> wpa_supplicant wicd connmon hostapd NetworkMangers nm_cli wpa_cli ip ifconfig iwconfig ifup/ifdown route arp iptunnel ipmaddr 	<p>Protocol Architecture</p> <ul style="list-style-type: none"> OSI Modle The Physical Medium Dependent Layer The Data Link Layer The Network Layer The Transport Layer <p>802.11 PHY</p> <ul style="list-style-type: none"> 802.11 802.11 a/b/g/n/ac etc Comparisions Radio channels and frequencies Frequency Channel Allocation for 802.11a/b/g Modulation technologies Direct Sequence Spread Spectrum Orthogonal Frequency Division Multiplexing (OFDM) MSDU MPDU PSDU PPDU LLC MAC PLCP PMD MLME <p>802.11 MAC</p> <ul style="list-style-type: none"> Access <u>Management Frame</u> Beacon Probe request Probe response Authentication De-Authentication Association Request Association Response Disassociation Re-Association Request Re-Association Response <u>Control Frames</u> Control Wrapper Acknowledge (ACK) Request to Send (RTS) Clear to Send (CTS) <u>Data Frames</u> Data frame formats Details <p>802.11 Details</p> <ul style="list-style-type: none"> 802.11 802.11 b 802.11 a 802.11 g 802.11 n 802.11 ac 	<p>Security Protocols in WLANs</p> <ul style="list-style-type: none"> Common WLAN Attacks Passive Attacks: eavesdropping PHY Layer attacks: RF Jammin Active Attacks: hacking WLAN Security Solutions WEP-SharedKey WPA-PSK WPA-Open Server Based Authentication Server-based security: 802.1x / 802.11i <p>User to Kernel interface</p> <ul style="list-style-type: none"> system calls netlink Other ways to interact with kernel <p>Linux Kernel Side</p> <ul style="list-style-type: none"> nl80211 cfg80211 subsystem mac80211 subsystem <p>Wifi Drivers</p> <ul style="list-style-type: none"> Coding Details <p>Wifi Hardware</p> <ul style="list-style-type: none"> Chipsets <p>WIFI flow</p> <ul style="list-style-type: none"> Data Path Control Path <p>Source Code Analysis</p> <ul style="list-style-type: none"> Driver source PCIe, USB based <p>Administraction**</p> <ul style="list-style-type: none"> Commands Configurations Setups AP , stations <p>Testing **</p> <ul style="list-style-type: none"> How to Tools in market wireshark <p>Case Study**</p> <ul style="list-style-type: none"> Coding Details <p>More on WIFI**</p> <ul style="list-style-type: none"> Coding Load Balancing and Rate Adaptation <ul style="list-style-type: none"> – Load Balancing – Rate Adaptation (dynamic rate shifting) Power Management Roaming Quality of Service The next-generation WLAN
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** If time permits or Extras