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Wi-Fi System Engineering

Course Description

As service providers try to deal with our unquenchable thirst for Internet connectivity, the role of Wi-Fi has grown from a simple wireless LAN technology to a critical element of the communication mix. This course therefore focuses on the IEEE 802.11 family of technologies; 802.11n (Wi-Fi 4), 802.11ac (Wi-Fi 5) and 802.11ax (Wi-Fi 6) and in so doing, explains the architecture and operation of a Wi-Fi network.

This course has no prerequisites.

1 day
(LiveOnsite,
LiveOnline)

6 hours
learning
(OnlineAnytime)

6

CPD Learning
Credits



Level: 2
(Intermediate)

This course will contain the following sections:

1. Wi-Fi Architecture

Topic areas covered include:

- The Building Blocks of a Wi-Fi Network:
 - Basic Service Set.
 - Extended Service Set.
- Wi-Fi and the IEEE:
 - IEEE and the Wi-Fi Alliance.
 - Wi-Fi and Radio Frequency.
 - Wi-Fi Capabilities.
- Wi-Fi Frames and Addressing:
 - Wi-Fi and the OSI Model.
 - Wi-Fi Frame Structure.
 - Wi-Fi Addressing in Operation.
- Wi-Fi and Cellular Interworking:
 - Interworking with 4G.
 - Interworking with 5G.
 - Wi-Fi Calling.

2. Wi-Fi Operation

Topic areas covered include:

- Finding the Wi-Fi Network:
 - 802.11 Frame Types.
 - Scanning for Wi-Fi.
 - Probing for Wi-Fi.
 - Tracking Stations.
- Wi-Fi Security – Part 1:
 - Authentication.
 - Open System.
 - Simultaneous Authentication of Equals.

Wi-Fi Operation (cont.)

- Joining the Wi-Fi Network:
 - Association.
 - Wi-Fi Hotspots.
 - Wi-Fi Enhanced Open.
 - Wi-Fi Passpoint.
- Wi-Fi Security Part 2:
 - 802.1x.
 - PSK and SAE.
 - EAPOL.
- Mobility in the Wi-Fi Network:
 - Reassociation.
 - Fast BSS Transition.

3. Wi-Fi Channel Access

Topic areas covered include:

- Carrier Sensing Multiple Access:
 - Contention Resolution.
 - Network Allocation Vector.
- Access Coordination:
 - The Coordination Functions.
 - Interframe Spacing.
 - Random Back Off.
- Enhanced Distributed Channel Access:
 - Hybrid Coordination Function.
 - Arbitration Interframe Space.
 - Transmission Opportunity.
 - EDCA Parameter Set.

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learning
(OnlineAnytime)

ITP

ITP accredited
course



LiveOnsite, LiveOnline,
OnlineAnytime

4. Wi-Fi 4, 5 and 6

Topic areas covered include:

- Technology Evolution:
 - Wi-Fi 4, 5 and 6 Capabilities.
 - OFDM Principles.
- Wi-Fi 4:
 - Wi-Fi 4 Characteristics.
 - MIMO Principles.
- Wi-Fi 5:
 - Wi-Fi 5 Characteristics.
 - MU-MIMO.
- Wi-Fi 6:
 - Wi-Fi 6 Characteristics.
 - OFDMA.
 - Target Wake Time.
 - BSS Colouring.



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