



Wi-Fi Technology Fundamentals Course

Course Objective:

While most technology courses may take a bottoms-up academic approach of explaining the subject matter with definitions and formulas, this course would attempt to explain all the concepts in as simple and as practical way as possible by providing real work examples and industry applications and showing real demos and visualizations of the concepts where ever possible. Our goal with this course is to make the complex world of Wi-Fi very easy to understand for beginners and also hopefully generate more interest among young engineers and college students to get inspired to develop a strong interest and build a successful career in this amazing and rapidly growing field of Wi-Fi. This course is fundamentally different from other Wi-Fi-related certifications and courses like CWNA as this course is more for engineers working on R&D of Wi-Fi technology and products and not related to deployment and or network administration.

How to access/Attend this course?

- All sessions will be delivered live via Webinar links for anyone to attend live and the sessions will also be recorded and all the material including slides, class notes, and reference material will be posted on this page.
- Sessions are usually planned for Tuesdays and Thursdays at 4 p.m. IST and will last for about 45 minutes.
- Anyone interested in getting meeting invites for the live classes and getting updates about the availability of material, can fill in a simple registration form and provide your information.
- Below are the QA codes/Link for Registration form and to join our Whatsapp group.

Scan OR Click here To Register



Scan OR Click For Whatsapp Group



Instructor:



Sitarama Penumetsa has 23 years of academic, research, and Industry experience in the field of Wi-Fi. Starting his career as a junior researcher in WLAN standards and moving on to becoming a Subject Matter Expert, Sitarama developed a strong interest and deep knowledge of Wi-Fi technology.

Transitioning to the Industry, Sitarama started as a software developer of WLAN test solutions and over the past 20 years, moved on to Technical Marketing, Project Management, and Business Development roles which allowed him to work with 100s of companies worldwide building products in the field of Wi-Fi and helped him develop deep understanding of the industry applications and ecosystem of Wi-Fi Technology.

Sitarama also has the experience of conducting several Wi-Fi technology training sessions, bootcamps, seminars, etc...to his colleagues and team members in the industry over the years and through this process developed and updated lots of training material in the field of Wi-Fi.

Sitarama currently serves as the CTO of Candela Technologies and also heads the India division of the same company.

This course is for?

- Junior/Mid-Level engineers working in any form of technical roles in the Wi-Fi Industry.
- Bachelors/Masters Degree Engineering students pursuing a career in the computer networking / wireless networking industry
- Academicians interested in developing industry-focused coursework.

Pre-requisites:

- Basics of Computer Networking, Any prior academic courses or certifications like CCNA.
- Nice to have a basic understanding of wireless communications, Digital Communications.
- Nice to have some prior academic knowledge of Wi-Fi standards and protocols or industry experience and a Wi-Fi developer or test engineer.

What Does each Session Cover?

- Basic theoretical concepts of each topic.
- Real-world / Industry applications of the topic.
- Practical Demos of the concepts of each topic using any tools available.
- A short fun quiz at the end of each session.
- Each session is expected to be 45min-60mins of duration.

Course Fee and Copyright Policy

- This course is completely free for anyone attending. The material can also be downloaded and can be used for free.
- Several images in the presentations will be copied from the internet and books and credit will be given to the source of the information wherever possible.
- The presenter does not intend to use this material commercially.

Course Delivery

- The course is entirely delivered online over webinar sessions.

Course Contents and Schedule

- The entire course is planned to be delivered over 14 calendar weeks with the schedule as below.
- The high-level summary of the topics and sub-topics planned to be covered in each session of each module are also listed below:

Part-1: WiFi Technology Fundamentals - Basics

Module 1: Introduction and History of Wi-Fi		
Tue - 26th Sept 2023	Session 1a: Evolution of Wi-Fi Wi-Fi Generations, Residential Wi-Fi Applications, Enterprise Wi-Fi Applications, Business Evolution	Slides Video Quiz Q&A Notes
Thu - 28th Sept 2023	Session 1b: Wi-Fi Network Topologies Infrastructure/Mesh/Bridge/Adhoc Modes, Various Backhaul Mechanisms, Various Deployment Use cases	Slides Video Quiz Q&A Notes
Tue - 3rd Oct 2023	Session 1c: WLAN Standards and Amendments Alphabet Soup IEEE Standards Bodies, Wi-Fi Alliance, Standards and their extensions	Slides Video Quiz Q&A Notes
Thu - 5th Oct 2023	Session 1d: Basic Functional building blocks of a Wi-Fi AP/Router PHY, Baseband, Lower MAC, Upper MAC, various Interfaces, key functional blocks	Slides Video Quiz Q&A Notes
Module 2: WLAN PHY Layer		
Tue - 10th Oct 2023	Session 2a: Frequency Allocation ISM and UNII Bands, unlicensed spectrum allocation, channels, Channel BW	Slides Video Quiz Q&A Notes
Thu - 12th Oct 2023	Session 2b: Modulation/Coding, MIMO Basics Basics of Digital Modulation and Coding, Multipath, MIMO, OFDMA, Spectral Efficiency	Slides Video Quiz Q&A Notes
Tue - 17th Oct 2023	Session 2c: MCS Table, PHY Data Rates PHY Data rates, MCS Table, Theoretical Throughput	Slides Video Quiz Q&A Notes
Thu - 19th Oct 2023	Session 2d: PHY Headers and key functions PHY Headers, PCLP and PMD Sub Layers, Key PHY layer functions	Slides Video Quiz Q&A Notes
Module 3: WLAN MAC Layer		
Tue - 24th Oct 2023	Session 3a: Basic AP Management and Control Functions Beaconing, BSSID, Scanning, Basic Service Set and its Capabilities	Slides Video Quiz Q&A Notes
Thu - 26th Oct 2023	Session 3b: MAC Framing, Headers and Key Functions MAC headers and key functions, Management/Control/Data Frames	Slides Video Quiz Q&A Notes
Tue - 31st Oct 2023	Session 3c: Carrier Sense and Medium Access Physical/Virtual Carrier Sensing, DCF, Random Backoff, Interframe Spacing, EDCA Parameters	Slides Video Quiz Q&A Notes
Tue - 7th Nov 2023	Session 3d: Basic connection and Data Transfer Basic Client Connection, BSS Capabilities, Data Transfer Mechanism, Aggregation, Rate Adaptation	Slides Video Quiz Q&A Notes

Module 4: Security in Wi-Fi		
Tue - 14th Nov 2023	Session 4a: Various Wi-Fi Security Protocols WEP, WPA/WPA2, Enterprise/Personal, Radius, Captive Portal, WPS	Slides Video Quiz Q&A Notes
Tue - 21st Nov 2023	Session 4b: Basics of Authentication and Encryption EAP Methods, TKIP/CCMP, 802.1X connection, Key Generations, 4-way Handshake	Slides Video Quiz Q&A Notes
Tue - 28th Nov 2023	Session 4c: Attacks and Vulnerabilities DoS Attacks, Man in the Middle Attacks, Cracking Security Keys, PMF	Slides Video Quiz Q&A Notes
Tue - 5th Dec 2023	Session 4d: Seamless connectivity/OpenRoaming OpenRoaming Technology, Wi-Fi to Cellular Handover, EAP-SIM/AKA	Slides Video Quiz Q&A Notes
Exam Preparation, Exam and Certificates		
Fri - 22th Dec 2023	Online Exam Registration Link The registration will be closed by 29 DEC 2023 5:00PM IST	Exam Registration Link
Sat - 30th Dec 2023	Online Exam Registrants will receive online exam link by mail.	
Fri - 5th Jan 2024	Presenting the Excellence, Merit and Participation Certificates.	Certificates

Part-2: WiFi Technology Fundamentals - Advanced

Module 5: Advanced Features and Standard Extensions		
Week 1	Session5a: 802.11k/v/r, RRM, DFS, Fast Roaming DFS, Traditional WLAN Roaming, Evolution of roaming enhancements (802.11k, 802.11v, 802.11r)	Slides Video Quiz Q&A Notes
Week 2	Session5b: WiFi6 new features OFDMA, MU-MIMO, BSS Coloring, TWT	Slides Video Quiz Q&A Notes
Week 3	Session5c: WiFi6E new features 6GHz Channels, AFC, RNR, FILS, PCS	Slides Video Quiz Q&A Notes
Week 4	Session5d: WiFi7 new features 320MHz, 4K QAM, MLO, Multi-RU, Preamble Puncturing	Slides Video Quiz Q&A Notes
Module 6: Advanced WiFi Use Cases		
Week 5	Session6a: WLAN AP/Controller Architectures Thick AP, Thin AP models, Physical Controller, Cloud Controller	Slides Video Quiz Q&A Notes
Week 6	Session6b: Smart WiFi Features Traffic Shaping/Policing, Parental Controls, Advanced Analytics, AI/ML	Slides Video Quiz Q&A Notes
Week 7	Session6c: WiFi Mesh Networks Mesh Topologies, Various deployment models, Mesh Access/Backhaul/Roaming	Slides Video Quiz Q&A Notes
Week 8	Session6d: WiFi Monetization Location Based Analytics, WiFi Sensing, Information Technology to Operational Technology	Slides Video Quiz Q&A Notes
Module7: Basic Troubleshooting and Tools		

Week 9	Session7a: Wireshark Capture Analysis Wireshark WLAN filters, Radio tap headers, Information Element Analysis, I/O Charts	Slides Video Quiz Q&A Notes
Week 10	Session7b: Basic test/debug/spectrum analysis tools iPerf, Ping, WiFi scanner tools, Kali Linux tools, Site Survey/Planning Tools, Heatmapping Tools	Slides Video Quiz Q&A Notes
Week 11	Session7c: Suppliant logs, AP logs, basic debug commands APIs and Interfaces to AP config, Serial/Telnet/restAPIs, Suppliant and AP debug logs	Slides Video Quiz Q&A Notes
Week 12	Session7d: OpenWRT Basics Basic overview and building blocks of OpenWRT project	Slides Video Quiz Q&A Notes
Module8: WiFi Lab Testing		
Week 13	Session8a: WiFi Testing Fundamentals Basics of various approaches for WiFi testing, Lab/Field, Automation/Manual etc..	Slides Video Quiz Q&A Notes
Week 14	Session8b: Testing in the Lab Benchmarking, Scale/Stress Testing, Repeatability/Automation	Slides Video Quiz Q&A Notes
Week 15	Session8c: Testing in Test Houses Testing approach for testing in real houses/enterprise environments, testing challenges and solutions	Slides Video Quiz Q&A Notes
Week 16	Session8d: Testplan Development Basics of how to develop testplans, execute them, use various engineering tools	Slides Video Quiz Q&A Notes
Online Exam for Part-2: WiFi Technology Fundamentals - Advanced		

Online Exam Information:

- For those who are interested in receiving a course completion certificate, there will be an exam at the end of the course.
- This will be an online exam with about 60 multiple choice questions.
- All questions will be taken directly from the material presented in the course and there will be an equal distribution of the questions across all the modules and sessions.
- Participants will only be able to see one question at a time in the exam and each question will have a time limit to answer and the correct answers will not be displayed to the user after they select and submit an answer. This is done to avoid any form of collusion.

Certificates will be issued as per the following criteria:

- Certificate of Participation - Score 50% or more
- Certificate of Merit - Score 70% or more
- Certificate of Excellence - Score 90% or more
- There are no restrictions of the attendance of live sessions. The only criteria to receive the certificate is the score in the exam.
- Participants can get attend separate exams and get certificates for both the basic and advanced parts in Dec and Apr respectively.