Network Testing and Emulation Solutions

sales@candelatech.com
support@candelatech.com
+1 (360) 380-1618 [PST, GMT -8]

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 | LinkedIn

CTO, Candela Technologies Inc.

GM, Candela Technologies India Pvt Ltd
Email: sitarama@candelatech.com

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:

Module 1: Introduction and History of Wi-Fi		
Week 1	**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
	Session 1b: Wi-Fi Network Topologies Infrastructure/Mesh/Bridge/Adhoc Modes, Various Backhaul Mechanisms, Various Deployment Use cases	Slides | Video | Quiz | Q&A | Notes
Week 2	**Session 1c: WLAN Standards and Amendments Alphabet Soup** IEEE Standards Bodies, Wi-Fi Alliance, Standards and their extensions	Slides | Video | Quiz | Q&A | Notes
	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		
Week 3	**Session 2a: Frequency Allocation** ISM and UNII Bands, unlicensed spectrum allocation, channels, Channel BW	Slides | Video | Quiz | Q&A | Notes
	Session 2b: Modulation/Coding, MIMO Basics Basics of Digital Modulation and Coding, Multipath, MIMO, OFDMA, Spectral Efficiency	Slides | Video | Quiz | Q&A | Notes
Week 4	**Session 2c: MCS Table, PHY Data Rates** PHY Data rates, MCS Table, Theoretical Throughput	Slides | Video | Quiz | Q&A | Notes
	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		
Week 5	**Session 3a: Basic AP Management and Control Functions** Beaconing, BSSID, Scanning, Basic Service Set and its Capabilities	Slides | Video | Quiz | Q&A | Notes
	Session 3b: MAC Framing, Headers and Key Functions MAC headers and key functions, Management/Control/Data Frames	Slides | Video | Quiz | Q&A | Notes
Week 6	**Session 3c: Carrier Sense and Medium Access** Physical/Virtual Carrier Sensing, DCF, Random Backoff, Interframe Spacing, EDCA Parameters	Slides | Video | Quiz | Q&A | Notes
	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		
Week	**Session 4a: Various Wi-Fi Security Protocols** WEP, WPA/WPA2, Enterprise/Personal, Radius, Captive Portal, WPS	Slides | Video | Quiz | Q&A | Notes

7	**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
Week 8	**Session 4c: Attacks and Vulnerabilities** DoS Attacks, Man in the Middle Attacks, Cracking Security Keys, PMF	Slides | Video | Quiz | Q&A | Notes
	Session 4d: Seamless connectivity/OpenRoaming OpenRoaming Technology, Wi-Fi to Cellular Handover, EAP-SIM/AKA	Slides | Video | Quiz | Q&A | Notes
Module 5: Other Advanced Topics		
Week 9	**Session 5a: WLAN AP/Controller Architectures** Thick AP, Thin AP models, Physical Controller, Cloud Controller	Slides | Video | Quiz | Q&A | Notes
	Session 5b: RRM, QoS, Mobility, Power Save Load Balancing, Band Steering, ACS, DFS, TPC, Various Roaming Techniques, Legacy/WMM Power Save	Slides | Video | Quiz | Q&A | Notes
Week 10	**Session 5c: Wi-Fi6 new features** OFDMA, Mu-MIMO, BSS Coloring, 1024 QAM, WPA3	Slides | Video | Quiz | Q&A | Notes
	Session 5d: Wi-Fi6E new features 6GHz spectrum allocation, 320Mhz channels, AFC	Slides | Video | Quiz | Q&A | Notes
Week 11	**Session 5e: Wi-Fi7 new features** 4K QAM, MLO, Preamble Puncturing	Slides | Video | Quiz | Q&A | Notes
	Session 5f: Smart Wi-Fi Features Traffic Shaping/Policing, Parental Controls, Advanced Analytics, AI/ML	Slides | Video | Quiz | Q&A | Notes
Week 12	**Session 5g: Wi-Fi Mesh Networks** Mesh Topologies, Various deployment models, Mesh Access/Backhaul/Roaming	Slides | Video | Quiz | Q&A | Notes
	Session 5h: Wi-Fi Monetization Location-Based Analytics, Wi-Fi Sensing, Information Technology to Operational Technology	Slides | Video | Quiz | Q&A | Notes
Module 6: Troubleshooting and Tools		
Week 13	**Session 6a: Wireshark Capture Analysis** Wireshark WLAN filters, Radiotap headers, Information Element Analysis, I/O Charts	Slides | Video | Quiz | Q&A | Notes
	Session 6b: Basic test/debug/spectrum analysis tools iPerf, Ping, Wi-Fi scanner tools, Kali Linux tools, Site Survey/Planning Tools, Heatmapping Tools	Slides | Video | Quiz | Q&A | Notes
Week 14	**Session 6c: Suppliant logs, AP logs, basic debug commands** APIs and Interfaces to AP config, Serial/Telnet/restAPIs, Supplicant and AP debug logs	Slides | Video | Quiz | Q&A | Notes
	Session 6d: Wi-Fi Testing Basics Functional/Performance/Compliance/Interoperability/Stress/Scale Testing basics.	Slides | Video | Quiz | Q&A | Notes