

Hands-On

# Advanced Wi-Fi Installation, Testing & Troubleshooting



## Course Description

This Advanced Hands-On course is an expansion of our Residential WiFi Best Practices with comprehensive coverage of past, current, and emerging wireless technologies a takes an in-depth look at RF and Wireless LANs.

This is an excellent course for those who would like a better understanding of WiFi or for anyone thinking of pursuing a wireless certification, this course is a perfect Bootcamp to start you on your path. This course (and a little studying) will provide you with the information you will require to challenge WiFi industry certification tests.

This Advanced WiFi course covers aspects of design, installation, and testing of Wireless LANs (WLANs) with a focus on residential installations and covers the basics of the business and enterprise WLAN installation and troubleshooting.

Upon completion of this course, there is a 75-question knowledge assessment which closely follows current industry certification requirements.

Our instructors have actual field experience and have faced the same obstacles as your team. Our Real World Experience allows us to provide the participants with the answers and the skills to overcome their daily challenges.

## Students Will Learn

- **Networking Refresher**
- **The OSI Model**
- **Radio Frequency (RF) Fundamentals**
- **IEEE 802.11 Standards**
- **802.11 Channels**
- **Modulation Coding Schemes**
- **Antennas and Accessories**
- **WLAN Clients**
- **Client Configuration and Management**
- **Access Point Configuration and Management**
- **Basic RF Channel Plans**
- **WLAN Security**
- **Wi-Fi Analysis and spectral disturbers**
- **Troubleshooting Signal and Connection Issues**
- **Question and Answer Sessions**
- **And more...**

## Target Audience

Broadband Installers and Technicians, IT Staff, IT Managers, Wireless Network Support Personnel and personnel interested in learning more about Installing, configuring and maintaining WiFi networks.

## Prerequisites

An understanding of Telecommunications and basic wired and wireless networking. Prerequisite training is available in additional BTS courses.

## Course Outline

### Module I: RF Principles for Wi-Fi

- RF Characteristics
- RF Signal Propagation
- Effects of Reflection, Refraction, Diffraction, Scattering
- IEEE 802.11 (Wi-Fi) standards
- IEEE 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac
- Types of Antennas and Patterns
- RF Tools (Scanners, Wi-Fi Analyzers, Spectral Analyzers)
- Signal Strength (RSSI)
- Noise Levels
- Signal to Noise Ratio
- Multipath Signal
- RF Shadows

### Module II: Wireless Networking Client

- Networking Refresher ?
- Client Capabilities ?
- Locating the WLAN ?
- WLAN Connection Process ?
- Association and Authentication ?
- Residential / SOHO vs. Enterprise ?
- Client Signal Support (2.4GHz / 5GHz / a,b,g,n,ac) ?
- Spatial Streams (MIMO, MU-MIMO) ?
- Client Configuration ?

### **Module III: Access Point Features and Configurations**

- Physical Path (PHY) Support
- Dual vs. Single Bands 2.4GHz vs. 5GHz
- Impacts of Multiple SSID
- Guest Networks
- AP Installations (Residential and Business)
- Testing AP Wired Connections
- Testing AP Configurations
- Validate Client Connectivity
- Security Configurations
- Meshed WLANs

### **Module IV: Wi-Fi Security**

- WPA vs. WPA2
- Personal and Enterprise Security
- PSK Pre-Shared Key
- Shared Key Authentication
- Enterprise 802.11X/EAP (RADIUS Requirements)
- 4 Way Handshake Authentication Process
- Legacy Security Methods (WEP)
- Hidden SSID
- MAC Filtering
- TKIP (Temporal Key Integrity Protocol) Impact
- IEEE Security Protocol Depreciation

### **Module V: Troubleshooting Wi-Fi Issues**

- Connection Issues
- Client Issues
- Causes of Interference
- Low Signal Strength
- Co-Channel Interferes
- Adjacent Channel
- Overlapping Channel
- Slow Speeds / Low Throughput
- Performance Problems
- Troubleshooting
- Poor Wi-Fi coverage

## Notes

Our courses focus on understanding the values presented by the various test meters and analysis software used to troubleshoot Wi-Fi networks it is not the Buttonology training that is provided by the manufacturer reps and equipment manufacturers. Our goal is for the attendees to understand what the analysis is telling them and to understand why a circuit or the access point may not work even though the Auto Test functions states that all tests pass.

### Featured Equipment

Viavi OneExpert ONX580

Viavi Wireless Far End Device WFED-300AC

RF Explorer Spectrum Analyzer

PC Based Wi-Fi Analysis Software

Discussion of Greenlee Airscout

Various Wi-Fi Scanners and Analyzers

## Delivery Method

Instructor led with numerous Hands-On labs and exercises.

## Equipment Requirements

**(This apply's to our hands-on courses only)**

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

## Course Length

3 Days