CWTS – Enterprise Wi-Fi Fundamentals

1 - Introduction to Networking

- Understanding Network Models
- Understanding Protocols
- SDU
- PDU
- OSI – The de facto reference model
- The seven layer model
- Equipment per layer
- Mapping other protocols into the OSI model
- TCP/IP – four layer model

2 - Wi-Fi Organizations and Standards

- Regulatory Bodies
- IEEE
- Wi-Fi Alliance
- WLAN Connectivity
- WLAN Security
- WLAN QoS & Power-Save
- IEEE 802.11 Standards,
- Amendments, and Drafts
- 802.11-2007
- 802.11a/b/g
- 802.11e/h/i
- 802.11n Draft

3 - Wi-Fi Hardware & Software

- Access Points
- Lightweight
- Autonomous
- WLAN Routers
- WLAN Bridges
- WLAN Repeaters
- WLAN Controllers/Switches
- Direct-connect APs

- Distributed-connect APs
- PoE Infrastructure
- Midspan
- Endpoint
- Client hardware and software
- Antenna types and uses

4 - Wi-Fi Security & Compliance

- 802.11 Legacy Security Methods
- Encryption – TKIP/CCMP
- Authentication Passphrases & 802.1X/EAP
- WPA/WPA2-Personal
- WPA/WPA2-Enterprise
- WPS Pushbutton/ PIN
- Role-Based Access Control (RBAC)
- VPN Security
- Wireless Intrusion
- Protection Systems (WIPS)
- PCI Compliance
- HIPAA Compliance
- Enforcing Compliance

5 - Wi-Fi Site Surveying

- Information gathering and reporting
- Multiple Channel Architecture (MCA) cell planning basics
- Single Channel Architecture (SCA) cell planning basics
- Predictive Site Survey
- Manual Site Survey
- Passive Survey
- Active Survey
- Mesh Access Layers
- Use of Analyzers
- Protocol
- Survey
- Spectrum
- Identifying and locating RF interference sources
- Wi-Fi vs. Non-Wi-Fi
- Hardware placement limitations

- Best practices for antenna use

6 - Wi-Fi Operational Concepts

- Range, coverage, and capacity
- Frequencies/channels used
- Channel reuse and co-location
- Active and passive scanning
- Power saving operation
- Data rates and throughput
- Dynamic rate selection
- Authentication and association
- The distribution system and roaming
- Infrastructure and ad hoc modes
- BSSID and ESSID
- Protection mechanisms

7 - Applications, Support, and Troubleshooting

- Installation/configuration of common network types
- Small Office / Home Office (SOHO)
- Extension of existing networks into remote locations
- Building-to-building connectivity
- Public wireless hotspots
- Mobile office, classroom, industrial, and healthcare
- Municipal and law-enforcement connectivity
- Corporate data access and end-user mobility
- Last-mile data delivery (WISP)
- Transportation networks
- Recognize and troubleshoot wireless network problems
- Decreased throughput
- Intermittent or no connectivity
- Weak signal strength
- Device upgrades
- Wi-Fi Network Optimization Procedures
- Infrastructure hardware selection and placement
- Identifying, locating, and removing sources of interference
- Client load-balancing
- Analyzing infrastructure capacity and utilization
- Multipath and hidden nodes

8 - Radio Frequency (RF) Fundamentals

- Units of RF measurements
- Factors affecting network range and speed
- Environment
- Line-of-sight
- Interference
- Defining differences between physical layers
- OFDM
- HR/DSSS
- MIMO

9 - Spread Spectrum Concepts

- OFDM & HR/DSSS channels
- Co-location of HR/DSSS and OFDM systems
- Adjacent-channel and co-channel interference
- WLAN / WPAN co-existence
- CSMA/CA operation half duplex

10 - RF Antenna Concepts

- Passive gain
- Beam widths
- Simple diversity
- Polarization
- Antenna Mounting
- Pole/mast mount
- Ceiling mount
- Wall mount
- WLAN Accessories
- RF cables
- RF connectors
- Lightning arrestors and grounding rods

11 - Classroom Demonstrations

1. AP/Client Connectivity with WPA2-Personal Security and PoE Power
2. Spectrum Analysis of RF Environment
3. Protocol Analysis of RF Environment
4. Configuration Parameter Modification in an Enterprise-Class Autonomous AP