G-MAC

Document ID: 05102009

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Cisco Certified Network Professional (CCNP) Wireless

No. of Course(s): 4
Duration per Course: 60 Hours
Total Duration: 240 Hours

Course: Conducting Cisco Unified Wireless Site Survey

Content:

I. Prepare for the Site Survey
A. Identify customer requirements:
- RF application needs (voice, data, location, etc.)
- Type of facility
- Type of client devices
- Industry vertical
- Customer questionnaire

B. Identify regulatory issues:
- Country codes (-e, -i, -a, -n)

C. Identify safety and aesthetic considerations:
- NEC Ratings
- Fire Codes
- OSHA
- MSHA
- Site specific hazard awareness

D. Assess existing network infrastructure
E. Understand logistical considerations (resources, time, access, deployment requirements, etc.)

F. Comprehend 802.11n impact.

II. Plan for the Site Survey

A. Select proper survey model:

- Data
- Voice
- Video
- Location Bridging (Point-to-point; point-to-multipoint)

B. Determine proper deployment characteristics:

- Dense deployment
- Highly mobile (Many cells; high-reliability; fast-moving clients) vs. nomadic (temporary position)
- Internal meshing
- Predictive vs. actual

C. Specify the tools to complete the survey:

- Obtain digital floor plans from customer

D. Demonstrate understanding of material attenuation

E. Define survey documentation deliverables

III. Conduct the Site Survey

A. Produce a predictive site survey (WCS Planner)

B. Conduct a layer 1 survey (Cisco Spectrum Expert)

C. Integrate site survey best practices

D. Use proper antenna to conduct the site survey

E. Conduct the physical site survey:

- Use proper access point to conduct the site survey (use what is purchased)
- Use proper radio, power, and data rate
- User proper client

IV. Design the RF Network

A. Determine infrastructure requirements:

- Power
- Understand cableplant considerations
- PoE

- Mounting considerations (NEMA)
- Outdoor grounding and lightning protection
- Rack capacity
- Switch port capacity
- Consider placement of additional APs for monitorying and sniffing

B. Determine the AP count and subsequent controller and licenses requirements

C. Generate the survey documentation

V. Post Deployment Assessment

A. Verify RF coverage:

- Use tools (i.e. AirMagnet) for audit
- RRM, controller, network appliance tweaks

B. Verify networks applications and performance:

- Apply WCS tools (voice readiness, location readiness, site calibration, etc.)

C. Reconcile actual deployment based on plan

D. Present installation report to customer

Course: Implementing Cisco Unified Wireless Voice Networks

Content:

I. Describe voice over wireless architecture

A. Describe voice as it applies to the wireless network

- Components (hardware, software)
- Call setup and data flow overview
- Standards
- WMM

- UAPSD
- Codecs
- SCCP and SIP

B. Design wireless for voice

- RSSI and SNR
- Cell overlap requirements
- Cell separations
- Traffic separation
- Delay, jitter, and QoS
- CAC,TSPEC
- Verify voice readiness:
- WCS voice readiness tool

II. Implement VoWLAN

A. Configure wireless client devices

- Device security considerations

B. Configure the WLAN for VoWLAN

- Best practice guidelines
- Security configurations (PEAP, EAP-TLS, EAP-FAST)
- CCKM/PKC, 802.11r

C. Describe hardware/software requirements

D. Configure infrastructure devices

E. Troubleshoot VoWLAN implementation

- Spectrum Expert
- AirMagnet VoFi analyzer
- Traffic stream Metrics (TSM)

III.Implement QoS for wireless applications

A. Identify general considerations for wired QoS:

- Configurations
- DSCP/802.1p
- Voice VLAN

B. Describe Wireless QoS deployment schemes:

- WMM
- 802.11e
- Mapping -- wired to wireless

C. Configure WCS/WLC for QoS:

- CAC
- TSPEC
- QBSS
- Queues

IV.Implement multicast over wireless

A. Understand general multicast concepts:

- PIM modes
- CGMP
- IGMP snooping
- RP

B. Describe implications for multicast in 802.11

- Data rates
- Unicast/multicast modes
- Roaming
- Mesh
- Controllers multicast groups

C. Configure multicast in a wireless network

- Infrastructure multicast group
- IGMP snooping on the controller

D. Troubleshoot multicast in a wireless network

- Packet captures
- Show IPM route
- Controller logs
- Debugs

V.Prepare the wireless network for video or high-bandwidth applications

A. Implement QoS for latency-sensitive applications

B. Describe benefits of 802.11n for video

C. Determine bandwidth requirements

D. Understand interconnectivity for devices on the wired side (QoS):

- WLC to wired network

Course: Implementing Cisco Unified Wireless Mobility Services

Content:

I. Implement Location Based Services

A. Describe the impact of DAS for location based services

B. Tracking mobile clients

- Either active RFID tag or WiFi devices

C. Understand the applications of RFID

- Compare and contrast WCS and MobileView

D. Calibrate RSSI for the Cisco and AeroScout implementation

E. Configure, generate, interpret location and event notifications

F. Configure and tune the location appliance

- Understand WCS/MSE/WLC traffic patterns impact on design

- NMSP

G. Understand AP/antenna deployment model for location

H. Understand location techniques:

- Angulations
- Cell of origin
- TDoA/ToA Lateration
- RSS Lateration
- Pattern Recognition
- RF Fingerprinting

II. Design WLAN infrastructure for mobility

A. Understand single SSID designs w/ mobility

- AP group VLANs
- IBN
- Single SSID/Multiple WLAN

B. Understand implications of L2 and L3 roaming:

- Avoid salt and pepper
- Minimize intercontroller roaming
- Symmetric and asymmetric tunneling

C. Design for high availability

- Legacy primary/secondary/tertiary
- Backup primary/backup secondary outside of mobility group
- Enhanced timers
- AP fallback
- AP prioritization
- Anchor controller redundancy
- RF redundancy - coverage hole, RRM, double AP

D. Understand and utilize best practices:

- LAG vs. Port-based
- RF groups
- H-REAP
- AP count; per-subnet limitation
- Client subnet sizing considerations

E. Define and implement mobility groups/domain:

- AP regulatory domain flexibility
- 24/48/72 WLC mobility size

F. Understand workgroup bridges

- WCS managements
- Differences between workgroup and universal bridges
- Considerations for using workgroup bridges

III. Implement MSE architecture

A. Describe MSE architecture:

- Context aware
- Adaptive wireless IPS
- Secure client manager
- Mobile intelligent roaming (dual mode phone)
- Voice
- Guest access
- Spectrum intelligence
- Scalability

B. Load MSE application

C. Integrate third party applications

- Server engines

- Licensing
- Common API

D. Integrate and manage MSE with WCS

- Location
- Enable tracking
- Define the MSE parameters
- Understand advanced parameters

E. Troubleshoot MSE

- Debug of Network Mobility Services Protocol (NMSP)
- Debug of controller

IV. Implement and manage Enterprise Mesh (indoor)

A. Describe Mesh and benefits

B. Describe Mesh operation modes

- RAP
- MAP
- Ethernet bridge functionality for mesh

C. Implement Mesh:

- Hop count
- Backhaul caveats (throughput rates, QoS?, path properties,…)
- Secondary backhaul
- AP authorization (MAC filter entry)
- Utilize WLC CLI

D. Describe Mesh formation:

- Cisco adaptive wireless path protocol (AWPP)
- Bridge group names
- Parent selection

- Understand reconvergence

E. Configure WCS - Mesh focus:

- New map for APs
- Utilize mesh tree view
- Utilize WCS mesh tools

V. Implement advanced services and manage with WCS and Navigator

A. Understand Navigator's role, features, and functions

B. Implement WCS partitioning

C. Implement time of day AP power savings

D. Implement scheduled WLAN availability

E. Configure reporting

F. Configure background tasks

G. Configure controller and access point templates

H. Monitor and convert autonomous APs

I. Configure WLC auto-provisioning

VI. Utilize Advanced Tuning and Troubleshooting

A. Adjust authentication/EAP timers

B. Tune RF environment:

- Data rates
- Transmit power levels and thresholds
- Channels/DCA

C. Describe Location Appliance Maintenance:

- Database clean-up
- Database back-up/restore
- Upgrade

D. Troubleshoot AP join process:

- AP console debug
- AP console config
- WLC debug
- WLC logs
- Switchport/DHCP/VLAN

E. Troubleshooting intercontroller communications

- Mobility group formation
- RF group formation
- Intercontroller roaming

F. Troubleshoot Location-based Services:

- Location accuracy tool
- Mixed-use environments
    - Complex RF environments
- Small areas
- Timing issues
- Adjusting history/location parameters
- Multifloor facilities
- Re-calibration
- Debug RFID

Course: Implementing Advanced Cisco Unified Wireless Security

Content:

I. Integrate client device security

A. Configure client for secure EAP authentication (EAP-FAST, TLS, PEAP, two factor authentication)

B. Configure the CSSC.

C. Understand impact of security configurations on application and client roaming.

D. Troubleshoot client wireless connectivity issues (packet analyzers, debugs, logs, WCS, ACS)

- Understand client security risks (driver update, MS hot fixes)

II. Design and integrate wireless network with NAC

A. Understand the architectures; inband, out-of-band

- Agent vs. agent less

B. Describe the high level authentication process flow

- NAC Appliance Server
- NAC Appliance Manager
- WLC

C. Configure the WLC for NAC

III. Implement secure wireless connectivity services

A. Configure authentication

- Controller with or without external LDAP database
- H-REAP APs for WAN failure
- 802.1X authentication for APs

B. Configure management frame protection on clients and controllers

C. Configure IBN (RADIUS based VLAN and ACLs, AAA override)

D. Configure ACS for integration with wireless network

E. Configure client and server side digital certificate services

F. Implement ACLs on controller

- CPU ACLs
- WLAN, interface, client identity ACLs

G. Troubleshoot secure wireless connectivity services:

- Packet analyzers, debugs, logs, WCS, ACS

- Firewall ports

IV. Design and implement Guest Access services

A. Understand the architectures for guest access services

- VLAN-based
- Anchor/DMZ/redundancy/scaling
- Wired guest access
- Bandwidth limiting

B. Configure guest access accounts

- Lobby ambassador (controller, WCS-based)
- Static
- NAC guest server

C. Configure controller web auth

- Pass through
- Internal/external
- Authentication
- Email
- Custom splash page (internal/external/per WLAN)
- Understand design considerations (DNS, proxy)
- Pre-authentication ACL
- Wired guest access

D. Configure the anchor and internal controllers

E. Troubleshoot guest access issues:

- Debugs, logs, WCS, ACS
- Firewall ports
- Mping and eping
- Proxies

V.Translate organizational and regulatory security policies and enforce security compliances

A. Describe regulatory compliance considerations, such as: HIPAA, PCI, SOX

- PCI Audit

B. Segment traffic into different VLANS, based upon:

- Security
- Application
- QoS

C. Configure admin security on controller:

- TACACS+
- Local
- Radius
- Access point admin credential

D. Manage WLC/WCS alarms:

- SNMP/Trap receivers
- Syslog
- SMTP
- MARS
- ACS log

E. Describe security audit tools

- AirMagnet
- Penetration testing

VI.Configure native WLC security feature sets - IPS/IDS

A. Utilize WCS or controller for IDS and threat mitigation strategies, such as:

- Signature
- Custom signature

- Rogue classification management/(auto) containment
- Rogue reporting/location (WCS only)
- Switchport tracing (WCS only)
- Integrate Cisco spectrum expert to WCS
- Client exclusion

B. Categorize and mitigate wireless vulnerabilities, such as:

- 802.11 client driver fuzzing (can't be mitigated)
- Client misconfiguration
- DoS (RF jamming)
- Anomalous behavior attacks (i.e. association/authentication attacks)
- Signature attacks (i.e. NetStumbler - undetectable at this time)
- Eavesdropping (i.e. wild packets, Honeypot)
- High jacking (mimicry) (i.e. evil Twin, HoneyPotting)
- Social engineering (i.e. human attack)

VII. Integrate wireless network with advanced security platforms - IPS/IDS

A. Understand Cisco's end-to-end security solutions and how they integrate with Cisco's wireless solutions, such as:

- CS-Mars
- NAC appliance
- NAC guest server
- Wired IPS
- ACS, CSA, etc.

B. Understand the CUWN firewall port configuration requirements

- ACLs
- IP port pass-through
- DMZ

C. Configure the controller for wired IPS/IDS

- Including adaptive IDS (MSE)

D. Configure CSA

Exam(s):

642-731 Conducting Cisco Unified Wireless Site Survey (CUWSS)
642-741 Implementing Cisco Unified Wireless Voice Networks (IUWVN)
642-746 Implementing Cisco Unified Mobility Services (IUWMS)
642-736 Implementing Advanced Cisco Unified Wireless Security (IAUWS)