Deploying Cisco Advanced Wireless LANs

WDawl v1.2; 2 days, Instructor-led

Course Description

The goal of this course is to enable network planners and administrators to deploy an efficient wireless LAN (WLAN) advanced enterprise solution. To accomplish this, the course is designed to provide the learner a better understanding and appreciation of the complexities involved in efficiently supporting, client mobility, network efficiency, areas of high client density, high availability, advanced guest networking, and IPv6 support.

Course Objectives

Upon completing this course, the learner will be able to meet these overall objectives:

• Detail the differences in client mobility between Layer 2 and Layer 3
• Configure the controller to appropriately mark priority traffic for transmission first in times of network congestion and avoid introducing unnecessary IPv6 which could lead to network congestion
• Discuss the challenges faced in providing a quality user experience in a high density wireless network deployment scenario
• Design, install, and maintain a wireless mesh network both as an add-on to an existing WLAN and as a new installation

Audience

The primary audience for this course is as follows:

• Channel field engineers
• Cisco Network Consulting Engineers
• New Cisco Unified Communications partners
• Customer network engineers

The secondary audience for this course is as follows:

• Customer network managers
Prerequisites

The knowledge and skills that a learner must have before attending this course are as follows:

- Cisco CCNA or equivalent work experience
- Familiarity with Microsoft Windows and Windows networking
- Prior completion of the Cisco Wireless LAN Essentials eLearning course

Course Outline

Module 1: Client Mobility Between Subnets

Objective: Detail the differences in client mobility between Layer 2 and Layer 3

Lesson 1: Understanding Same Subnet Roaming

Objective: Describe the wireless LAN terms and concepts involved in client mobility. This lesson includes these topics:

Terminology of Roaming

- Objective: Define the terms that are used to describe client mobility in a Cisco Wireless network

Guided Lab 1: Connecting to the remote labs

- Objective: Establish connectivity between the student in the classroom and the remote lab equipment and connect to the allocated Pod laptop.
- Activity Objective
- Visual Objective
- Required Resources
- Task 1: Establishing a Remote Desktop Protocol (RDP) Connection to the Lab

Function of the Mobility Group

- Objective: Describe client-roaming behavior across multiple mobility groups and how to configure mobility groups on the Cisco WLC

Mobility Messaging

- Objective: Identify the types of mobility messages that are used between WLCs

Auto-anchor Mobility

- Objective: Describe the auto-anchor functionality and operation at Layer 2
Lesson 2: Understanding Inter-subnet Mobility

Objective: Identify and describe the differences between mobility at layer 2 and mobility at layer 3. This lesson includes these topics:

Autonomous AP Mobility

- Objective: Describe the client mobility options and limitations of client mobility between autonomous access points

Intra-controller Mobility

- Objective: Describe the actions which occur in providing client mobility across subnet boundaries while changing association between APs joined to the same WLC

Inter-controller Mobility Layer 2

- Objective: Describe the actions required to provide client mobility across subnet boundaries while changing association between APs joined to different controllers

Impact of AP Groups on Mobility

- Objective: Describe how the use of AP groups can affect client mobility

Interface Groups and Mobility

- Objective: Describe how the use of Interface groups and their configuration can affect client mobility

Dynamic Anchoring of Clients with Static IP

- Objective: Describe how mobility is provided for clients that use a static IP address

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Lesson 3: Identifying Advanced Mobility Issues

Objective: Describe how Cisco wireless networks assist clients to ensure a higher level of performance and longer battery times for mobile devices. This lesson includes these topics:
Wi-Fi Alliance Voice Enterprise Certification

• Objective: Describes the main 802.11 amendments used in Voice Enterprise

802.11v Support with Apple Devices

• Objective: Describe the benefits of 802.11v as they apply to Apple devices

RX-SOP

• Objective: Describe how RX - Start of Packet (SOP) enhances mobility

Optimized Roaming

• Objective: Describes how Optimized Roaming enhances the users Wi-Fi experience

Summary

• Objective: Summarizes the key points that were discussed in this lesson

**Module 2: Network Efficiency**

Objective: This module provides instruction on optimizing the network through Quality of Service (QoS), VideoStream enablement, and utilization of Cisco WLC MS Lync SDN operation in a Cisco Unified Wireless Network environment

**Lesson 1: Configuring Quality of Service**

Objective: Describe the Cisco Unified Wireless Network features designed to provide network efficiency and how they can improve performance with QoS, VideoStream, and MS Lync SDN support. This lesson includes these topics:

QoS Overview

• Objective: Define QoS in a wireless LAN (WLAN) environment

802.11e/WMM

• Objective: Describe how wireless QoS is implemented under 802.11e and Wi-Fi Multi Media

QoS Packet Marking Mappings

• Objective: Describes the mappings that are used in QoS packet marking between the wired and wireless segments of the network
QoS Process

- Objective: Explain how QoS markings are used and their role in prioritizing packets in the endtoendnetwork delivery

Implementing QoS

- Objective: Describes QoS implementation and configuration on a WLC using both static metallevels and Alloy profiles

QoS Roles for Guest Users

- Objective: Describes the creation and application of QoS roles to limit bandwidth contention

Parameters Affecting Voice and Video Quality

- Objective: Identifies WLC parameters that impact voice and video applications

VoIP Phone Support Features

- Objective: Identifies the WLC settings that impact VoIP functionality

Enhanced EDCA Support

- Objective: Describes how to implement 802.11e EDCA for third-party voice and video devices

Configuring Video Parameters

- Objective: Describe the configuration and application of Call Admission Control for video clients

Guided Lab 2: Monitoring WLC QoS on the Switch Infrastructure (Optional dependent on time and equipment)

- Objective: Configure and verify QoS markings from the WLC to the AP.
  - Activity Objective
  - Required Resources
  - Task 1: Configure Switch QoS Settings
  - Task 2: Configure the Frame Capture on the Switch
  - Task 3: Configure the Traffic Generator
  - Task 4: Analyze the Data

Summary

- Objective: Summarizes the key points that were discussed in this lesson
Lesson 2: Implementing Video over Wi-Fi

Objective: Describe Video requirements for delivery over an IP network and how a wireless network affects these requirements. This lesson includes these topics:

Multicast Review

• Objective: Describes the configuration of the WLC to support multicast traffic in the wireless network

Cisco VideoStream Technology

• Objective: Describe the set of features which enable consistent and reliable delivery of high quality video over the wireless network

Summary

• Objective: Summarizes the key points that were discussed in this lesson

Lesson 3: Implementing VideoStream in A FlexConnect Deployment

Objective: Identify VideoStream requirements and issues over FlexConnect wireless networks. This lesson includes these topics:

VideoStream in FlexConnect Environments

• Objective: Describes the VideoStream features available and their implementation in a FlexConnect deployment

Summary

• Objective: Summarizes the key points that were discussed in this lesson

Lesson 4: Integrating the WLC with MS Lync SDN

Objective: Describe the Cisco WLC Lync SDN integration features and its operation. This lesson includes these topics:

WLC MS Lync SDN Integration Overview

• Objective: Describe the Cisco MS Lync SDN Integration

WLC MS Lync SDN Integration Configuration

• Objective: Describe MS Lync integration configuration
WLC MS Lync SDN Integration Verification

- Objective: Describe how to validate a WLC MS Lync integration

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Module 3: High Density Deployment Challenges

Objective: Identify and discuss the challenges faced in providing a quality user experience in a high density wireless network. This includes identifying when a wireless network becomes a high density deployment scenario, and the five critical design points that must be addressed in the deployment to support high client densities.

Lesson 1: Understanding the Effects of Client Density on a Wireless Network

Objective: Identify when a wireless network, or portion of one, becomes a high-density deployment scenario and identify some of the challenges an administrator will face in providing a quality user experience. This lesson includes these topics:

What is a High Density Deployment?

- Objective: Describe when an area of deployment moves from a common wireless environment to one considered an area of high-density

Client Density

- Objective: Describe the effects of multiple clients in close proximity to each other have on the wireless network environment

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Lesson 2: Planning for Areas of High Client Density

Objective: Discuss the five critical design points that are within an administrator's control which must be addressed in the deployment of a wireless network designed to provide a quality user experience in a higher density wireless environment. This lesson includes these topics:

Determine the True Per-Connection Bandwidth Requirement

- Objective: Describe the importance of determining the true per-client bandwidth requirements
Determining Throughput Requirements for a Coverage Area

- Objective: Describe factors affecting the throughput that can be delivered in any single cell in a higher-density deployment

Higher Data Rates Increase Efficiency and Reduce the Effective Size of the Cell

- Objective: Describe the effects of data rates on cell sizing in a higher-density environment

5 GHz Support is Critical for High-Density Deployments

- Objective: Describe the effects of clients and their capabilities in delivering a successful higher density WLAN deployment

RF Spectrum is a Finite Resource

- Objective: Describe the impact that RF interference has on a high-density wireless deployment

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Module 4: Introduction to Mesh Networks

Objective: Describe, at a high-level, wireless mesh networks both as an add-on to an existing WLAN and as a new installation.

Lesson 1: Describing Wireless Mesh Networks - Overview

Objective: Describe components that make up a wireless mesh network and concepts that facilitate deployment of an Enterprise Mesh architecture. This lesson includes these topics:

The Mesh Architecture

- Objective: Describe the components and concepts that facilitate deployment of an Enterprise Mesh architecture

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Lesson 2: Implementing Wireless Mesh Networks - Overview

Objective: Describe benefits mesh networks provide to an enterprise with difficult networking environments and some of the scalability features provided by the mesh network architecture. This lesson includes these topics:
Why Use a Mesh Architecture?

- Objective: Describe the benefits mesh networks provide to an enterprise with difficult networking environments along with some of the scalability features provided by the mesh network architecture.

Summary

- Objective: Summarizes the key points that were discussed in this lesson.

**Module 5: Wireless Guest Networks**

Objective: Describe the options available to configure guest access in a Cisco Unified Wireless Network (CUWN) environment.

**Lesson 1: Providing Advanced Guest Access**

Objective: Able to use the controller GUI to configure guest access in a Cisco Unified Wireless Network environment. This lesson includes these topics:

Defining Guest Access with a Cisco WLC

- Objective: Define what a guest network is and presents the technical requirements for a guest access solution using a Cisco WLC.

Methods for Providing Guest Access

- Objective: Differentiate the methods available for providing guest access in the wired and wireless network.

Configuring Guest Access

- Objective: Describe the configuration of guest access capabilities on the WLC.

Sleeping Clients Guest Enhancements

- Objective: Describe the sleeping client feature introduced to enhance support for guest clients which exercise battery saving behaviors.

Guest Networking Enhancements

Objective: Describe the enhancements to the guest network features that were introduced in WLC code version 7.6.

Additional Guest Networking Capabilities

- Objective: Describe the enhancements to the guest network features which were introduced in
Lesson 2: Implementing Local Policies and Client Profiling

Objective: Define what Local Profiling provides and what Local Policies are and describe the enhancements to the features in the latest code revisions. This lesson includes these topics:

Local Policies and Client Profiling

- Objective: Define what Local Profiling provides and what Local Policies are

Local Profiling Enhancements

- Objective: Describe enhancements to the features in the latest code revisions

Lesson 3: Implementing Cisco CMX Visitor Connect

Objective: Describe the operation and configuration of the CMX Visitor Connect service, and how it interfaces with Facebook connectivity. This lesson includes these topics:

Visitor Connect

- Objective: Describe the operation of the CMX Visitor Connect B2C guest access solution

Visitor Connect Configuration

- Objective: Describe the actions required to configure Cisco Visitor Connect for use

Guided Lab 3: Implementing CMX Visitor Connect

- Objective: Use the redirect capabilities of the WLC and the visitor portal capabilities of the MSE to implement a basic registration B2C Guest LAN solution
- Activity Objective
- Required Resources
- Task 1: Define the Guest WLAN on the WLC
- Task 2: Define a Portal on the CMX
- Task 3: Portal Verification
Guided Lab 4: Implementing Social Auth CMX Visitor Connect

- Objective: Implement a basic B2C Guest WLAN using Social Authentication to authenticate on the CMX service on the MSE
- Activity Objective
- Required Resources
- Task 1: Define the Guest WLAN on the WLC
- Task 2: Define a Portal on the CMX
- Task 3: Portal Verification

CMX Facebook Wi-Fi Overview

- Objective: Describe the operation of the CMX Facebook Wi-Fi business-to-consumer (B2C) guest access solution

Facebook Wi-Fi Configuration

- Objective: Describe the CMX Facebook Wi-Fi configuration process

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Module 6: Wireless High Availability

Objective: Describe the evolution of redundancy built into the Cisco Unified Wireless Network architecture, and how it has evolved over recent years.

Lesson 1: Describing Wireless High Availability

Objective: Describe the evolution of redundancy built into the Cisco Unified Wireless Network architecture. This lesson includes these topics:

Basic High Availability

- Objective: Describe basic WLC redundancy and failover concepts

The Initial WLC High Availability Mechanisms

- Objective: Describes the high availability mechanisms available for the WLC prior to code version 7.3

AP Failover Process

- Objective: Describes the AP failover process and how to make this a deterministic process rather than a dynamic one by configuring the failover priority for APs
Initial High Availability Improvements

- Objective: Describes the HA features introduced with the WLC code version 7.3

HA Continues to Improve

- Objective: Describes the HA features introduced in the WLC code versions 7.4 and 7.5

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Lesson 2: Enhancing Wireless High Availability

Objective: Provides an explanation of the recent enhancements made to Cisco High Availability. This lesson includes these topics:

The Latest HA Enhancements

- Objective: Describes the HA features and improvements introduced in WLC code version 8.0

The Latest HA Enhancements

- Objective: Describes the HA features introduced in 8.1 version of the WLC code

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Module 7: Implementing IPv6 Support

Objective: Provides instruction on implementing support for IPv6 in a Cisco Unified Wireless Network environment.

Lesson 1: Configuring Clients for IPv6

Objective: Describes how IPv6 can be implemented in a Cisco Unified Wireless Network environment. This lesson includes these topics:

IPv6 Support

- Objective: Introduce IPv6 operation
IPv6 Support in a Cisco Unified Wireless Network Environment prior to WLC code version 8.0

- Objective: Describe the evolution of IPv6 support in the Cisco WLC from its introduction through controller code version 7.6

Protecting an IPv6 Network

- Objective: Describe the additional steps which can be taken to protect the network from possible disruption by the addition of new client types

Improving the efficiency of an IPv6 network

- Objective: Describe the features added to eliminate unnecessary traffic reduces CPU utilization and provides greater network efficiency

Cisco WLC Configuration to Support IPv6 Clients

- Objective: Describe how to configure the Cisco WLC for efficient support of IPv6 clients

Guided Lab 5: Configuring IPv6

- Objective: Configure IPv6 on the WLC and test connectivity to your WLC using ping and a web browser
  - Activity Objective
  - Required Resources
  - Task 1: Configure IPv6 on your WLC
  - Task 2: Check IPv6 on your Class Laptop
  - Task 3: Test IPv6 Connectivity

Summary

- Objective: Summarizes the key points that were discussed in this lesson

Lesson 2: Configuring the Infrastructure for IPv6

Objective: Describe how IPv6 can be implemented in a controller-based deployment. This lesson includes these topics:

IPv6 Support for Infrastructure Connections

- Objective: Describe how WLC code version 8.0 enhances IPv6 support by allowing the wireless network infrastructure to leverage IPv6 addressing

Guided Lab 6: IPv6 First Hop Security Configuration (Optional)

- Objective: To configure IPv6 support for your wireless clients in the most optimal and secure manner
  - Required Resources
• Activity Objective
• Required Resources
• Task 1: Configure IPv6 on your WLC

Summary

• Objective: Summarizes the key points that were discussed in this lesson

Module 8: Appendix

Objective: The material in the appendix is for reference only and is not intended to be covered in class. Rather they are to provide the instructor with a ready source of materials they may point a student to for information on these Service Provider centric capabilities.

Lesson 1: Service Provider and PMIPv6. This lesson includes these topics:

• SP Features CAPWAP Data Tunnel Keep-Alive Support
• SP Features CAPWAP PPoE Client on FlexConnect
• HTTPS Support for WebAuth
• RADIUS Selection by REALM
• DHCP Relay option 151 and 152
• QinQ Tagging
• PMIPv6
• PMIPv6 Integration Deployment Model
• PMIPv6 on 8.0
• 8.1 EoGRE

Lab Outline

Lab 1-1 Connecting to the remote labs

Lab 2-1: Monitoring WLC QoS on the Switch Infrastructure (Optional)

Lab 3-1: Implementing CMX Visitor Connect

Lab 3-2: Implementing Social Auth Visitor Connect

Lab 4-1 Configuring IPv6

Lab 4-2: IPv6 First Hop Security Configuration (Optional)