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Certified Wireless Network Administrator (CWNA) PW0-105

Chapter 10
WLAN Architecture

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Chapter 10 Overview

- Wireless LAN client devices
  - Radio Card Formats
  - Radio Card Chipsets
  - Client Utilities
  - Management, Control, and Data Planes
- WLAN Architecture
  - Autonomous WLAN Architecture
  - Wireless Network Management System (WNMS)
  - Centralized WLAN Architecture
  - Distributed WLAN Architecture
  - Unified WLAN Architecture

Chapter 10 Overview (continued)

- Specialty WLAN Infrastructure
  - Wireless Workgroup Bridge
  - Wireless LAN Bridges
  - Enterprise Wireless Gateway
  - Home Wi-Fi Router
  - Wireless LAN Mesh Access Points
  - WLAN Array
  - Virtual AP System
  - Real-Time Location Systems
  - VoWiFi

Wireless LAN Client Devices

- Half-duplex radio transceiver
- Many hardware formats and chipsets
- Requires drivers to communicate with OS
- Requires software utility to interface with user, allowing user to set WLAN, security, and performance settings

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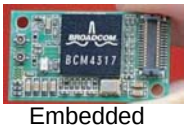
Radio Card Formats

- External
  - PCMCIA (PC Card)
  - ExpressCard
  - Secure Digital (SD)
  - CompactFlash (CF)
  - USB
- Internal
  - Mini PCI
  - Mini PCI Express
  - Half Mini PCI Express
  - Embedded 802.11 radio

PCMCIA

USB

ExpressCard



Embedded 802.11 radio

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Radio Card Chipsets

- Group of integrated circuits working together to act as a transceiver
- Numerous manufacturers
- Sold to radio card manufacterer
- May support 2.4 Ghz or 5 Ghz only, or both
- May support 802.11n HT technology or only legacy transmission methods

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Client Utilities

- Allows configuration of wireless NIC (such as)
  - SSID
  - Transmit power
  - Security settings
  - WMM QoS capabilities
  - Power management
- Three types of client utilities
  - Integrated operating system client utilities
  - Vendor specific client utilities
  - Third-party client utilities

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Management, Control, and Data Planes

- Three logical planes of operation
  - Management – Management, administration and monitoring
  - Control – Protocols that provide the intelligence and interaction between network equipment.
  - Data – Also known as the user plane, where traffic is actually forwarded
- Planes may be divided between
  - Access points
  - WLAN controllers
  - Wireless network management servers (WNMS)

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WLAN Architecture

- Main purpose is to provide a wireless portal into a typical 802.3 Ethernet infrastructure
- Three primary WLAN architectures
  - Autonomous WLAN architecture
  - Centralized WLAN architecture
  - Distributed WLAN architecture

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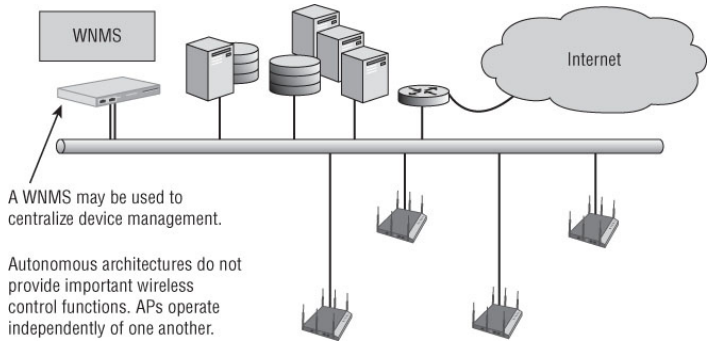
Autonomous WLAN Architecture

- Autonomous, fat, or standalone AP
- Configuration is performed on each individual AP

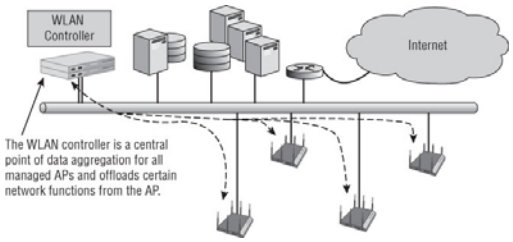


Wireless Network Management System (WNMS)

- Provides central point of management for autonomous APs
- Moves the management plane out of the autonomous AP
- Can be software or hardware appliance
- Can be vendor specific or vendor neutral
- Deployed at the core layer of the wired network
- Most solutions use *Simple Network Management Protocol (SNMP)* to manage and monitor the WLAN

Centralized WLAN Architecture

- WLAN controller that resides in the core
- Utilizes *controller-based APs*, also known as *lightweight* or *thin* APs
- All three logical planes of operation have been moved out of the APs to the WLAN controller
- Some tasks may still be handled by the AP under the direction of the controller



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Distributed WLAN Architecture

- Network nodes provide independent distributed intelligence
- Multiple standalone APs are organized into groups
- APs Work together to provide control mechanism
- Most of the intelligence and capabilities of a WLAN controller
- Each AP is responsible for local forwarding of user traffic (data plane resides in the AP)
- Management is provided centrally utilizing a WNMS server

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Unified WLAN Architecture

- Fairly new architecture design
- Integrates WLAN controller capabilities into wired network infrastructure devices
- Wired switches and routers have WLAN controller capabilities at both the core and edge
- Allows for the combined management of the wireless and wired network
- Access is no longer defined by the PHY, providing seamless integration

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Specialty WLAN Infrastructure

- Typically operate outside of the defined 802.11 standards
- Wireless workgroup bridge (WGB)
- Wireless LAN bridge
- Home Wi-Fi Router
- Wireless LAN Mesh Access Points
- WLAN array
- Virtual AP System
- Real-Time Location Systems
- VoWiFi

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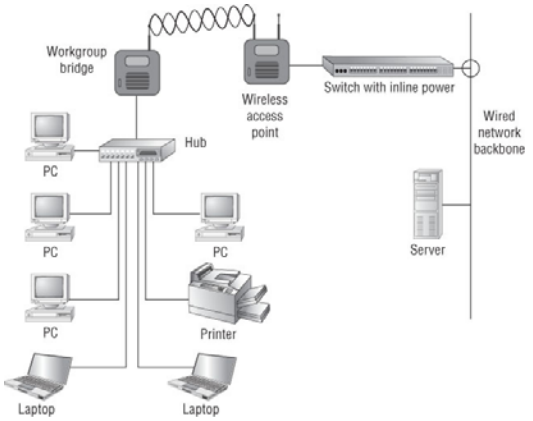
Wireless Workgroup Bridge (WGB)

- Wireless connectivity for wired infrastructure devices
- Connects to a BSS and acts as a client station



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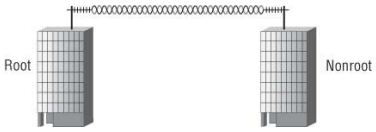
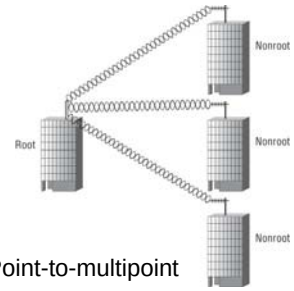
Wireless LAN Bridges

- Provides wireless connectivity between two or more wired networks
- Two major configuration settings: root and nonroot (parent/child)
- Point-to-point (PtP)
- Point-to-multipoint (PtMP)



Point-to-point



Point-to-multipoint

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Home Wi-Fi Router

- Provides shared wireless access to a SOHO Internet connection
- Provides a level of security
- Provides features such as
  - Configurable 802.11 radio card
  - Routing protocols such as RIP
  - Network and Port Address Translation (NAT and PAT)
  - Port forwarding
  - Firewall
  - L2 securiity (WEP, WPA-Personal and/or WPA2-Personal)
  - DHCP
  - Multiport Ethernet switch ports

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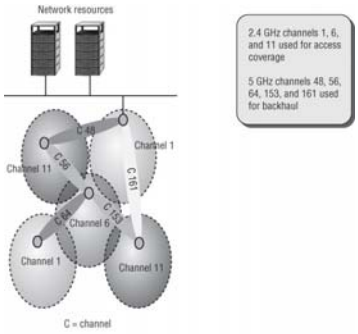
Wireless LAN Mesh Access Points

- Uses proprietary layer 2 routing protocols
- Mesh APs typically support two radios
  - 5 GHz radios usually used for mesh infrastructure
  - 2.4 GHz radios usually used to provide client access



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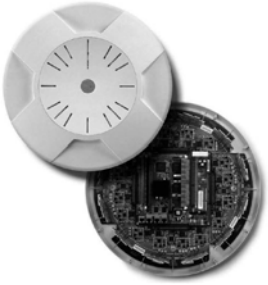
WLAN Array

- Multiple access points in a single hardware device
- Directional antennas provide sector coverage for each radio (simply a self-contained indoor sector array)
- Embedded WLAN controller technology built-in



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Virtual AP System

- Multiple APs share a single BSSID
- Utilizes proprietary methods
- Clients believe they are connected to a single AP
- Clients experience zero handoff time
- Handoff is handled by a central WLAN controller
- Uses single-channel architecture (SCA)
  - All of the access points are on the same channel
  - APs contend for airtime in a coordinated manner handled by the WLAN controller

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Real-Time Location Systems (RTLS)

- Real-time tracking of 802.11 radio devices
- Real-time tracking of active Wi-Fi RFID tags
- Uses signal strength and/or time-of-arrival algorithms to determine location coordinates
- RTLS application can display a map with the device location, alerts, or asset information

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Voice Over Wi-Fi (VoWiFi)

- VoWiFi Telephones
  - Support for wireless security
  - Support for WMM quality-of-service
  - 2.4 GHz or 5 GHz bands
  - Form factor can be non-traditional, such as a badge device utilizing speech recognition and verification
  - Commonly uses Session Initiation Protocol (SIP)
- Operates on typical WLAN infrastructure
- Private branch exchange (PBX) server to connect to the public switched telephone networks (PSTN) via trunk lines
- WMM support for QoS

Courtesy of Polycom

Courtesy of Vocera

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