Mobile and Wireless Technology

CT090-3-2-MWT Version VD01

WLAN Infrastructure Devices

Topic & Structure of The Lesson

Access Points (AP)

Autonomous Access Points

Lightweight Access Points

Mesh Access Points

Wireless LAN Routers

Wireless Bridges

Wireless Repeaters

Wireless LAN Controller/Switch

Learning Outcomes

- **At the end of this topic, You should be able to**
  - Remember the function and features of three different access point technologies.
  - Understand differences in various infrastructure devices.
  - Explain the function of other infrastructure devices.

Key Terms You Must Be Able To Use

If you have mastered this topic, you should be able to use the following terms correctly in your assignments and exams:

Access point - autonomous and Light weight

Wireless bridges

Wireless controllers/switches

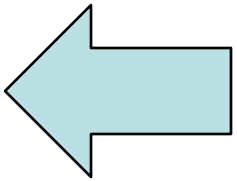
Wireless LAN routers

Wireless mesh networking

Wireless repeaters

Topic & Structure of The Lesson

Access Points (AP)



Autonomous Access Points

Lightweight Access Points

Mesh Access Points

Wireless LAN Routers

Wireless Bridges

Wireless Repeaters

Wireless LAN Controller/Switch

Access Point

In order for computers and other network devices to communicate with one another, a communication infrastructure of some type is necessary.

In a wired network, such an infrastructure consists of cables, repeaters, bridges, and Layer 2 switches.

In a wireless network, these devices are access points, bridges, and repeaters. All will be discussed in more detail in this chapter.

The **AP provides computers and other wireless devices access to the local area network using RF (Radio Frequency)** as the connection medium.

Access Point

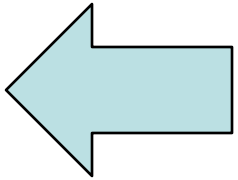
The *access point* (AP) is a major player in the wireless LAN network infrastructure. Access points are available in three types that are:

- Autonomous
- Lightweight
- Mesh

Topic & Structure of The Lesson

Access Points (AP)

Autonomous Access Points



Lightweight Access Points

Mesh Access Points

Wireless LAN Routers

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Wireless LAN Controller/Switch

Access Point – Autonomous Access Point

Autonomous AP's were the **first type of access points** that were introduced onto the wireless market.

These were **perfect for small scale** wireless network solutions that needed **no more than 10-15** clients per access point or were just providing "hot-spot" type of services.

Each fat AP needs to be manually configured for the network and security settings you would want running on your network. This is a great solution if you only plan on having a few AP's.

Access Point – Autonomous Access Point

Any more than that just was not scalable.

No administrator wants to have to manually configure multiple devices – thus the need for a change.

Access Point – Autonomous Access Point

Listed here are **some of the features in SOHO-grade access points**:

- IEEE 8 NN 02.11 standards support
- Wi-Fi certifications
- Removable antennas
- Static output power
- Security
- Bridge functionality
- Repeater functionality
- DHCP server
- Configuration and settings options

Access Point – Autonomous Access Point (SOHO Access Point)

DLink DWL-2100AP SOHO access point

Access Point – Autonomous Access Point

Enterprise access points typically have a much more extensive feature set than the **previously mentioned SOHO access points.**

Enterprise-grade access points can include the following features:

- IEEE 8 NN 02.11 standards support
- Wi-Fi certifications
- Removable or expandable antennas
- Adjustable transmit output power
- Advanced security
- Multiple operation modes, including root, bridge, and repeater capabilities
- Command-line interface (CLI) configuration

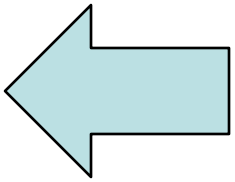
Access Point – Autonomous Access Point (Enterprise Access Point)

Topic & Structure of The Lesson

Access Points (AP)

Autonomous Access Points

Lightweight Access Points



Mesh Access Points

Wireless LAN Routers

Wireless Bridges

Wireless Repeaters

Wireless LAN Controller/Switch

Access Point – Lightweight Access Point

Lightweight access points **differ from autonomous access points** in that they are **used with wireless LAN controllers/switches** and **not as standalone devices**.

Lightweight access points have shifted much of the intelligence to the wireless LAN controller/switch.

Since a lightweight access point contains less intelligence than an autonomous access point, the cost of a lightweight access point can be significantly lower.

Access Point – Lightweight Access Point

Depending on the manufacturer, lightweight access points may have a more extensive feature set than autonomous access points, and include many of the features of those devices. Lightweight access points are centrally managed from the wireless LAN controller/ switch.

Access Point – Lightweight Access Point

Aruba Dual-radio 802.11a/n + 802.11b/g/n using 3 antennas

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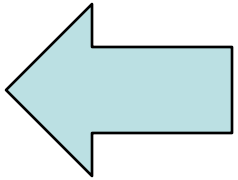

Wireless LAN Routers

Wireless Bridges

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Wireless LAN Controller/Switch

Access Point – Mesh Access Point

Wireless mesh networking is growing at a steady pace. The term *mesh networking* has been in existence for many years. **In a full mesh network, all nodes connect together with at least two paths for every node.**

This allows for reliable communications in the event of a device or path failure.

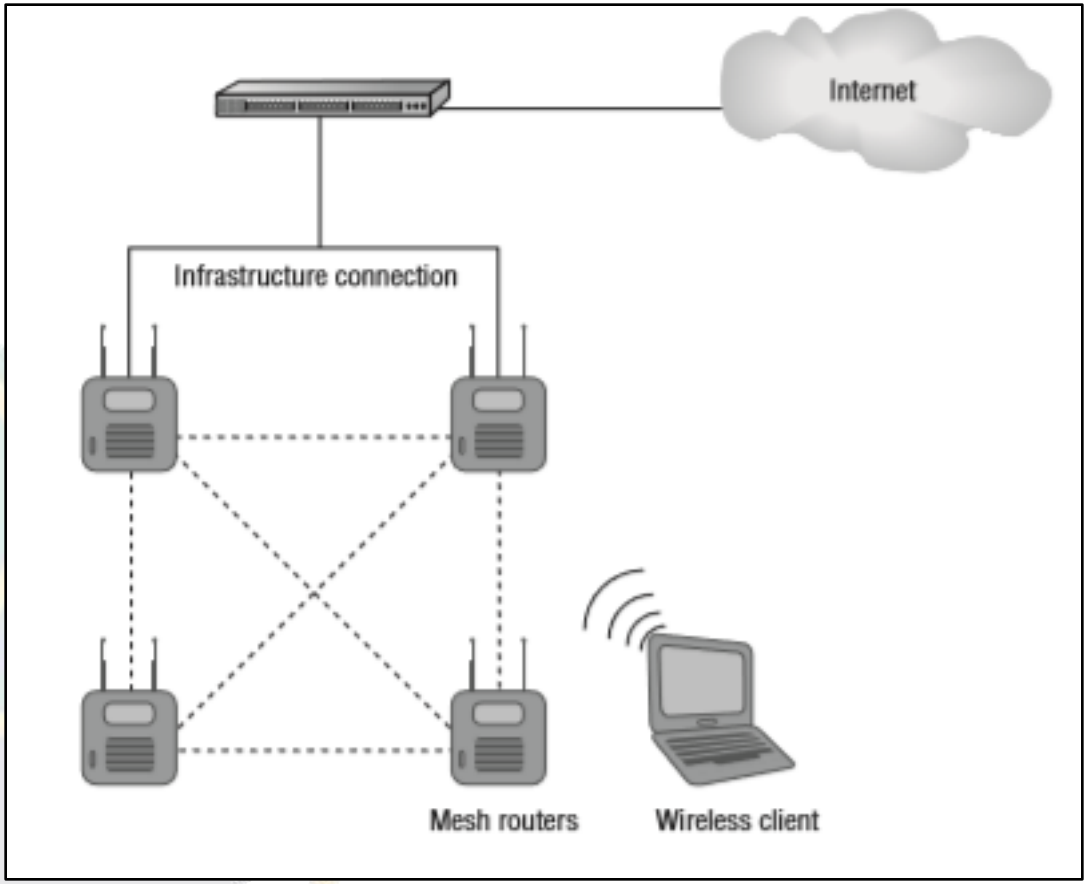
Wireless mesh networking is very popular in the outdoor market. Some examples where **wireless mesh networks are currently utilized are:**

- Metropolitan
- University campuses

Access Point – Mesh Access Point

- Public safety
- Transportation
- Government
- Amphitheaters

Access Point – Mesh Access Point



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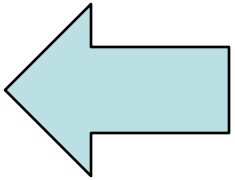
Wireless LAN Routers

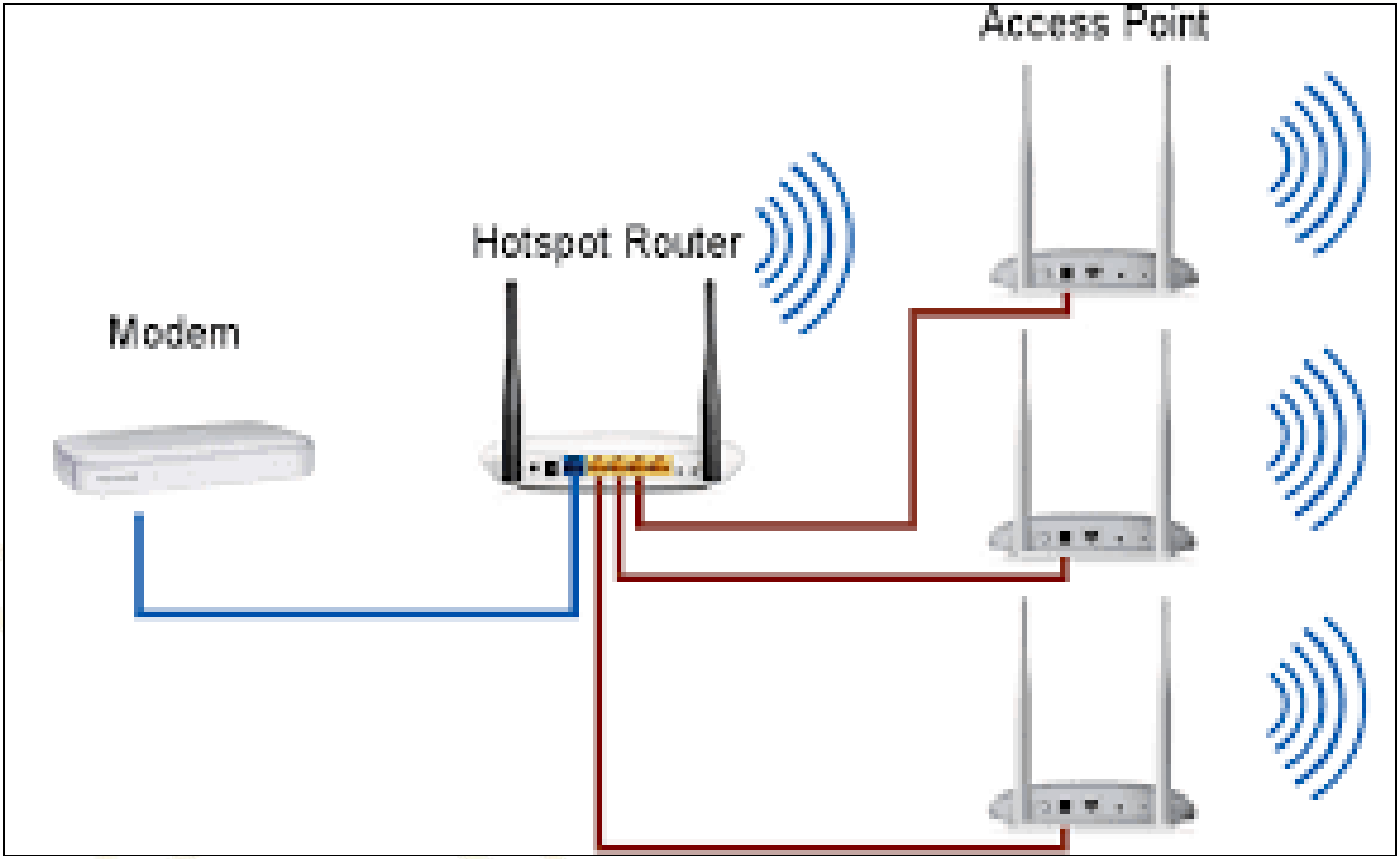


Wireless Bridges

Wireless Repeaters

Wireless LAN Controller/Switch

Wireless LAN Routers



Wireless LAN Routers

Wireless LAN routers can be defined differently depending upon the application. In the SOHO or home market, a wireless LAN router may also be known as a **wireless broadband router.**

The CWNP program and associated material refer to these devices as **wireless residential gateways.**

In the enterprise environment, a wireless LAN router may have similar functionality plus extended features, and may be known as a wireless VPN router.

Wireless LAN Routers

Wireless LAN Routers- Wireless Residential Gateway

SOHO or home broadband routers (also known as wireless residential gateways) are usually equipped with an **Internet port, several ports for an Ethernet switch, and a wireless access point.**

These routers are configured through a web browser using either the HTTP or the HTTPS protocol. Configuration of the devices is fairly simple for the novice user using web browser via a built-in web server.

In most cases, a **broadband wireless router connects to either a cable modem or a digital subscriber line (DSL) connection available from an Internet service provider (ISP).**

Wireless LAN Routers- Wireless Residential Gateway

Wireless LAN Routers- Wireless VPN Router

A *wireless VPN router* typically has three ports available: Ethernet port to connect to a LAN

Internet port to connect to the wide area network (WAN) Wireless port to allow IEEE 802.11 computers and devices to connect to a network

Wireless VPN routers have a more extensive feature set than wireless broadband routers, including Layer 3 VPN tunnels between devices and the router on each side acting as a VPN endpoint.

Wireless LAN Routers- Wireless VPN Router

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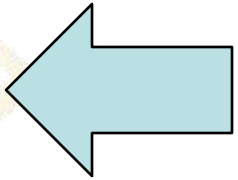


Wireless Repeaters

Wireless LAN Controller/Switch

Wireless Bridge

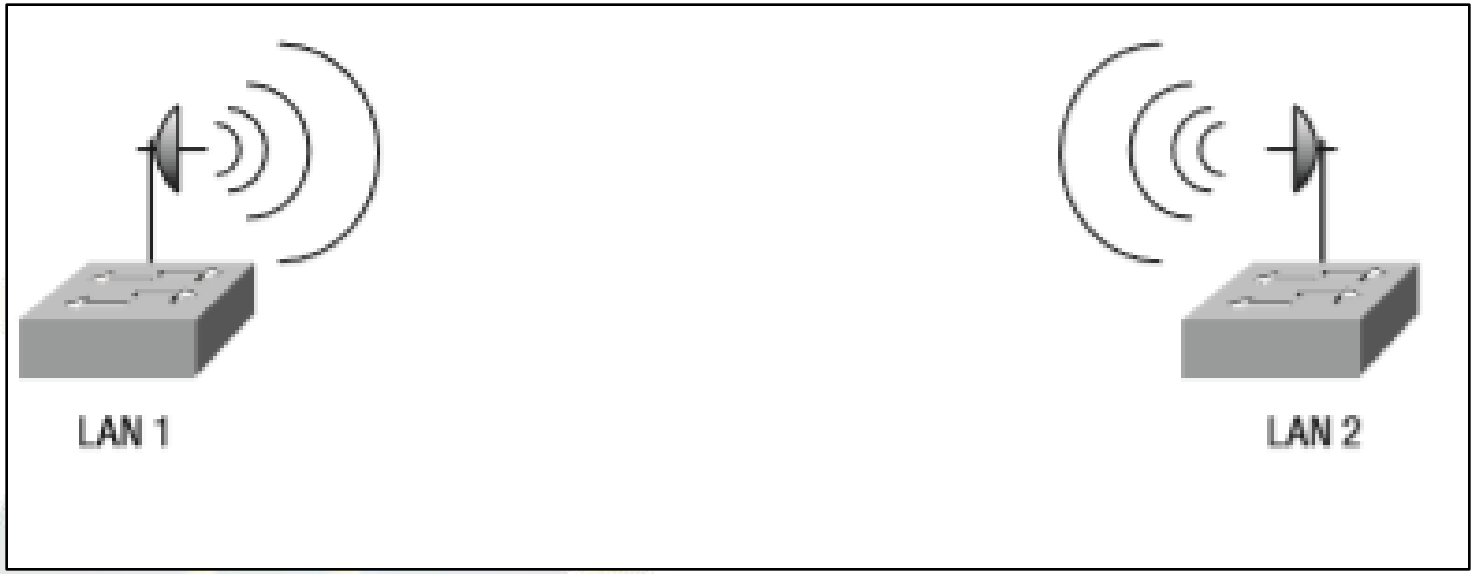
Wireless bridges **connect two or more wired LANs** together.

A wireless bridge is a dedicated device that functions in much the same way as an access point in bridge mode.

Wireless bridges have many of the same features as enterprise access points, including removable antennas and selectable power levels.

Connecting locations together using wireless bridges has **many benefits, including fast installation, cost savings, and high data transfer rates.** Depending on the circumstances, a wireless bridge can be installed in as little as one day.

Wireless Bridge



Wireless Bridge

Wireless bridges work in either the 2.4 GHz ISM or 5 GHz UNII band. The distance can span long distances. Since wireless bridges can potentially span long distances, it is important to take security into consideration.

Cost savings can be enormous compared to installing and maintaining a physical wired connection between locations, such as copper, fiber optics, or a leased line from a service provider.

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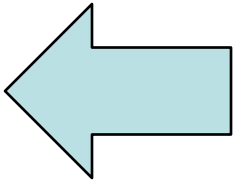
Wireless Repeaters 

Wireless LAN Controller/Switch

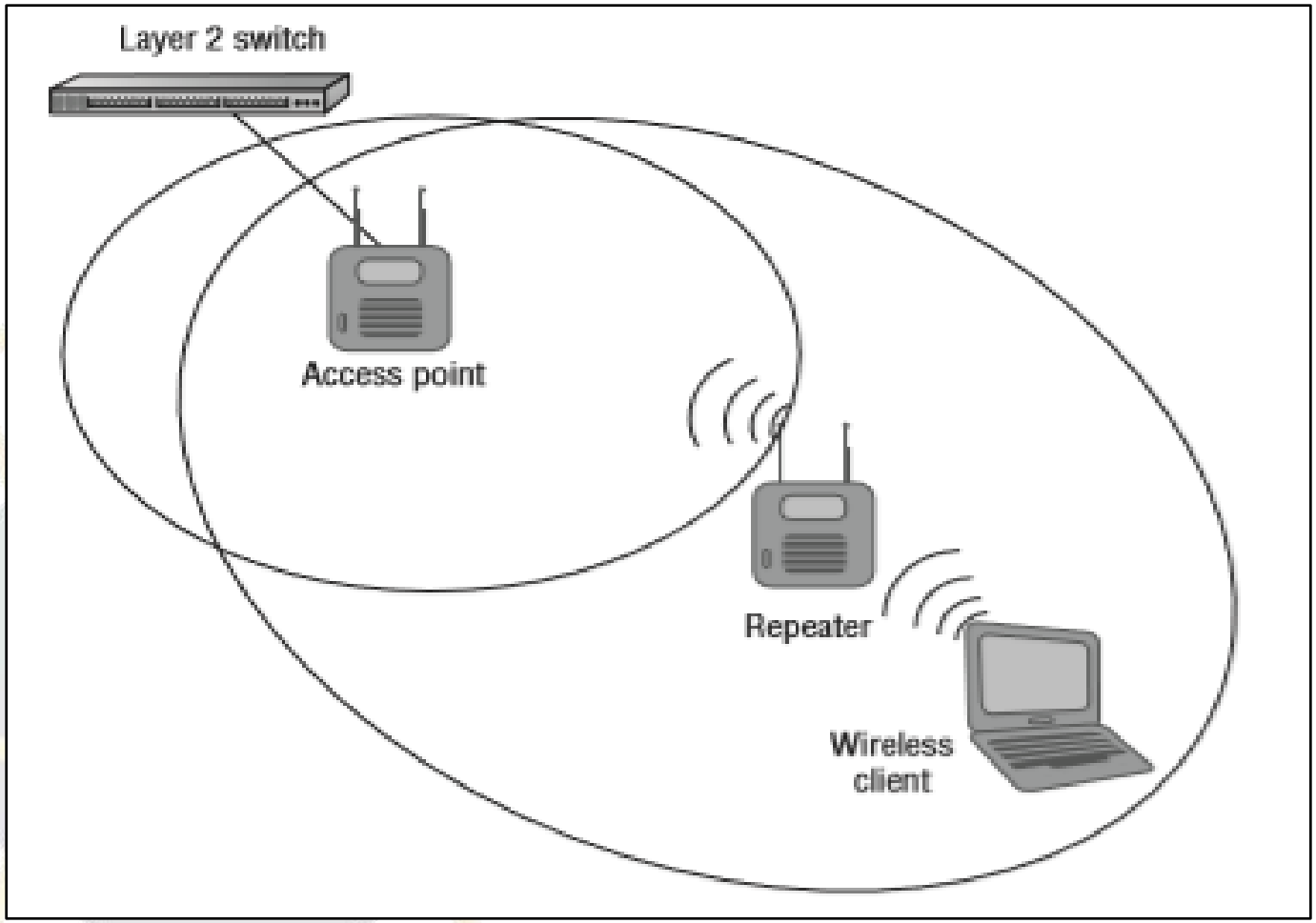
Wireless Repeaters

Wireless repeaters are used to **extend the radio frequency cell.** In a wired Ethernet network, repeaters function at Layer 1 of the OSI model to extend the Ethernet segment.

An Ethernet repeater lacks intelligence—that is, it cannot determine data traffic types and simply passes all data traffic across the device.

Just as an Ethernet segment has a maximum distance for successful data transmission, wireless LANs do as well. A wireless repeater provides the ability for computers and other devices to connect to a wireless LAN even though they are not within the normal hearing range of the access point connected to the network.

Wireless Repeaters



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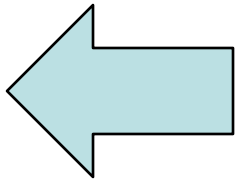


Wireless Controllers/Switches

Wireless controllers/switches are growing in popularity in wireless LAN deployments.

Wireless LAN controllers/switches range from branch office models with a few lightweight access points to large scale enterprise devices with hundreds or thousands of lightweight access points.

The branch office models are typically used in remote office installations or small/ medium business (SMB) applications with a limited number of access points.

Wireless Controllers/Switches

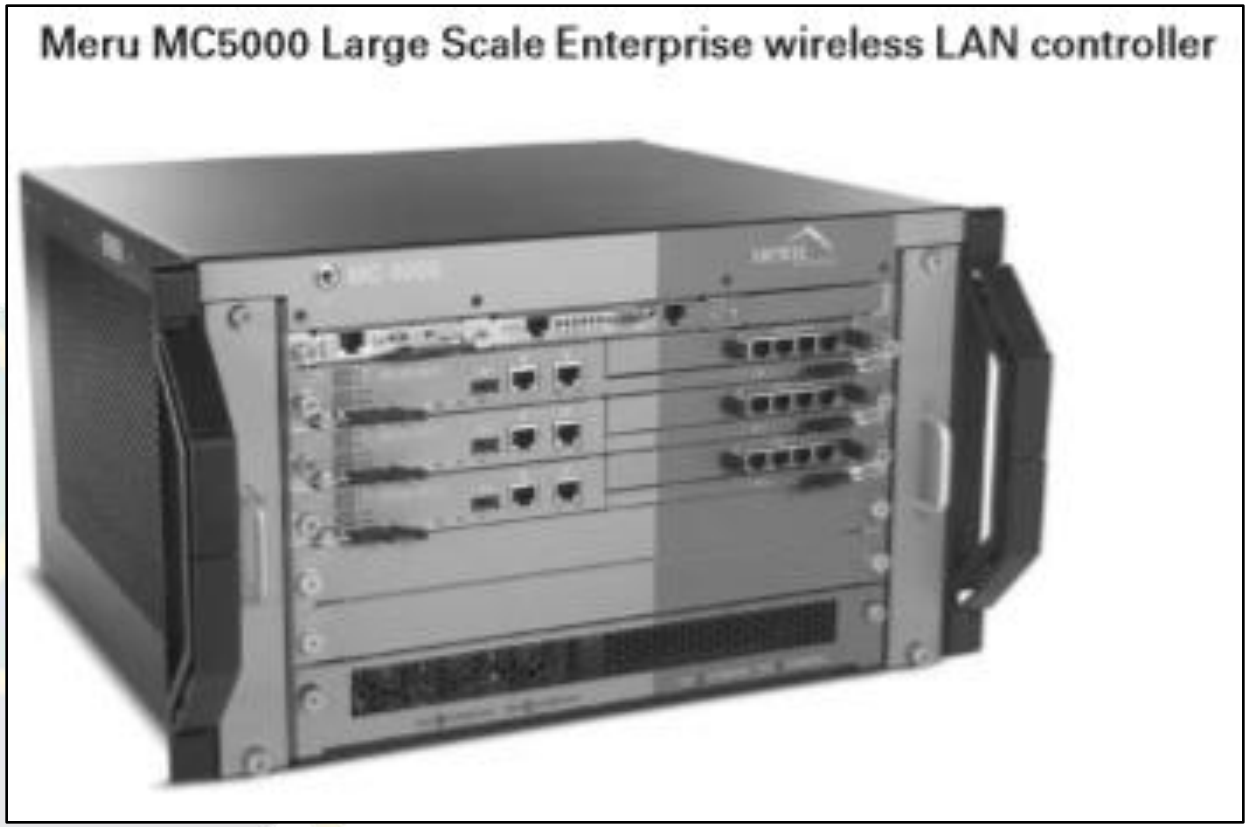
Listed here are some of the many benefits, features, and advantages that may be available on wireless LAN controllers/switches.

- Virtual LAN (VLAN)
- Power over Ethernet (PoE) capability
- Improved roaming
- Security profiles
- Captive portal
- Built-in RADIUS services
- Site survey tools

Wireless Controllers/Switches

- Radio frequency spectrum management
- Firewall
- Quality of service
- Redundancy
- Intrusion prevention system (IPS)
- Direct or distributed AP connectivity
- Layer 2 and Layer 3 AP connectivity

Wireless Controllers/Switches



Quick Review Question

- Briefly explain three types of access points.

Summary of Main Teaching Points

This chapter discussed wireless LAN infrastructure devices that are commonly used to provide wireless connectivity to a network for computers and other wireless devices.

This chapter include the access point—the heart of the wireless LAN—available either as a self contained intelligent (autonomous) device or as a lightweight device for use with a wireless

This chapter explained LAN controllers/switches providing user access to network resources, other infrastructure devices include wireless LAN routers for SOHO or home use, wireless bridges for connecting LANs together, and wireless repeaters for extending the RF cell.

Question and Answer Session

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Q & A

What we will cover next

Radio Frequency (RF) Fundamentals for Wireless LAN Technology

- Frequencies Used for Wireless LANs
- Coverage and Capacity
- Channel Reuse and Co-location
- Basic Units of RF Measurement
- RF Range and Speed
- Environment: RF Behavior