Configuring DHCP for WLANs

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

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Prerequisites for Configuring DHCP for WLANs

- To be able to use the DHCP option 82, you must configure DHCP on Cisco IOS software. By default, DHCP option 82 is enabled for all clients. You can control the wireless client behavior using the WLAN suboptions.

- We recommend that you use external DHCP server instead of internal DHCP server.

- DHCP Snooping Configuration—DHCP snooping configuration is the required best practices configuration on switch for rapid client join function. DHCP snooping needs to be enabled on each client VLAN including the override VLAN if override is applied on the WLAN.

Example of DHCP snooping configuration

1. Global DHCP snooping configuration:

   a. `Switch(config)#ip dhcp snooping`

```
Switch(config)#ip dhcp snooping vlan 100
```

b. Enable `bootp-broadcast` command. This is required for clients that send DHCP messages with broadcast addresses and broadcast bit is set in the DHCP message:

```
Switch(config)#ip dhcp snooping wireless bootp-broadcast enable
```

c. To not append DHCP Option information, enter this command:

```
Switch(config)#no ip dhcp snooping information option
```

2. On the interface:

> **Note** IP DHCP snooping trust is required on Port-Channel interface in addition to member link of the Port-Channel interface.

```
Switch(config)#interface range TenGigabitEthernet 1/0/1 – 2

Switch(config-if)#switchport mode trunk

Switch(config-if)#switchport trunk allowed vlan 100

Switch(config-if)#ip dhcp snooping trust


Switch(config)#interface port-channel 1

Switch(config-if)#switchport mode trunk

Switch(config-if)#switchport trunk allowed vlan 100

Switch(config-if)#ip dhcp snooping trust
```

> **Note** DHCP snooping must be configured on the Guest Anchor switch for guest access similar to the Config above.

Related Topics

Restrictions for Configuring DHCP for WLANs

- If you override the DHCP server in a WLAN, you must ensure that you configure the underlying Cisco IOS configuration to make sure that the DHCP server is reachable.

- WLAN DHCP override works only if DHCP service is enabled on the switch.

  You can configure DHCP service in the following ways:

    - Configuring the DHCP pool on the switch.

    - Configuring a DHCP relay agent on the SVI. Note: the VLAN of the SVI must be mapped to the WLAN where DHCP override is configured.

Related Topics

Information About the Dynamic Host Configuration Protocol

You can configure WLANs to use the same or different Dynamic Host Configuration Protocol (DHCP) servers or no DHCP server. Two types of DHCP servers are available: internal and external.

Related Topics

Internal DHCP Servers

The switches contain an internal DHCP server. This server is typically used in branch offices that do not already have a DHCP server. The wireless network generally contains a maximum of 10 access points or fewer, with the access points on the same IP subnet as the switch. The internal server provides DHCP addresses to wireless clients, direct-connect access points, and DHCP requests that are relayed from access points. Only lightweight access points are supported. When you want to use the internal DHCP server, you must set the management interface IP address of the switch as the DHCP server IP address.

DHCP option 43 is not supported on the internal server. Therefore, the access point must use an alternative method to locate the management interface IP address of the switch, such as local subnet broadcast, Domain Name System (DNS), or priming.

An internal DHCP server pool only serves the wireless clients of that switch, not clients of other switches. Also, an internal DHCP server can serve only wireless clients, not wired clients.

When clients use the internal DHCP server of the switch, IP addresses are not preserved across reboots. As a result, multiple clients can be assigned with the same IP address. To resolve any IP address conflicts, clients must release their existing IP address and request a new one. Wired guest clients are always on a Layer 2 network connected to a local or foreign switch.

Note DHCPv6 is not supported in the internal DHCP servers.

Related Topics

Configuring DHCP for WLANs (CLI), on page 6

Prerequisites for Configuring DHCP for WLANs, on page 1

Restrictions for Configuring DHCP for WLANs, on page 3

External DHCP Servers

The operating system is designed to appear as a DHCP Relay to the network and as a DHCP server to clients with industry-standard external DHCP servers that support DHCP Relay, which means that each switch appears as a DHCP Relay agent to the DHCP server and as a DHCP server at the virtual IP address to wireless clients.

Because the switch captures the client IP address that is obtained from a DHCP server, it maintains the same IP address for that client during intra switch, inter switch, and inter-subnet client roaming.

Note External DHCP servers can support DHCPv6.

Related Topics

Configuring DHCP for WLANs (CLI), on page 6

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Restrictions for Configuring DHCP for WLANs, on page 3

DHCP Assignments

You can configure DHCP on a per-interface or per-WLAN basis. We recommend that you use the primary DHCP server address that is assigned to a particular interface.

You can assign DHCP servers for individual interfaces. You can configure the management interface, AP-manager interface, and dynamic interface for a primary and secondary DHCP server, and you can configure the service-port interface to enable or disable DHCP servers. You can also define a DHCP server on a WLAN. In this case, the server overrides the DHCP server address on the interface assigned to the WLAN.

Security Considerations

For enhanced security, we recommend that you require all clients to obtain their IP addresses from a DHCP server. To enforce this requirement, you can configure all WLANs with a DHCP Addr. Assignment Required setting, which disallows client static IP addresses. If DHCP Addr. Assignment Required is selected, clients must obtain an IP address via DHCP. Any client with a static IP address is not allowed on the network. The switch monitors DHCP traffic because it acts as a DHCP proxy for the clients.

Note WLANs that support management over wireless must allow management (device-servicing) clients to obtain an IP address from a DHCP server.

If slightly less security is tolerable, you can create WLANs with DHCP Addr. Assignment Required disabled. Clients then have the option of using a static IP address or obtaining an IP address from a designated DHCP server.

Note DHCP Addr. Assignment Required is not supported for wired guest LANs.

You can create separate WLANs with DHCP Addr. Assignment Required configured as disabled. This is applicable only if DHCP proxy is enabled for the switch. You must not define the primary/secondary configuration DHCP server you should disable the DHCP proxy. These WLANs drop all DHCP requests and force clients to use a static IP address. These WLANs do not support management over wireless connections.

Related Topics

Information About DHCP Option 82

DHCP option 82 provides additional security when DHCP is used to allocate network addresses. It enables the switch to act as a DHCP relay agent to prevent DHCP client requests from untrusted sources. You can configure the switch to add option 82 information to DHCP requests from clients before forwarding the requests to the DHCP server.

Figure 1: DHCP Option 82
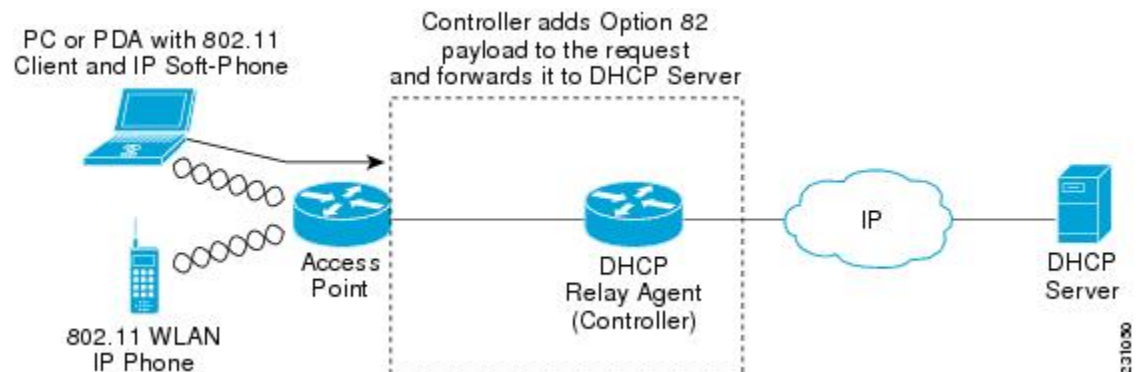
The access point forwards all DHCP requests from a client to the switch. The switch adds the DHCP option 82 payload and forwards the request to the DHCP server. The payload can contain the MAC address or the MAC address and SSID of the access point, depending on how you configure this option.

Note Any DHCP packets that already include a relay agent option are dropped at the switch.

For DHCP option 82 to operate correctly, DHCP proxy must be enabled.

Related Topics

Configuring DHCP Scopes

Related Topics

Information About DHCP Scopes

Switches have built-in DHCP relay agents. However, when you desire network segments that do not have a separate DHCP server, the switches can have built-in DHCP scopes that assign IP addresses and subnet masks to wireless clients. Typically, one switch can have one or more DHCP scopes that each provide a range of IP addresses.

DHCP scopes are needed for internal DHCP to work. Once DHCP is defined on the switch, you can then point the primary DHCP server IP address on the management, AP-manager, and dynamic interfaces to the switch's management interface.

Related Topics

How to Configure DHCP for WLANs

Configuring DHCP for WLANs (CLI)

Use this procedure to configure the following DHCP parameters on a WLAN:

- DHCP Option 82 Payload

- DHCP Required

- DHCP Override

Before you begin

- You must have admin privileges for configuring the WLAN.

- To configure the DHCP override, you must have the IP address of the DHCP server.

SUMMARY STEPS

1. **configure terminal**
2. **shutdown**
3. **wlan** *profile-name*
4. **ip dhcp opt82** {**ascii** | **format** {*add-ssid* | *ap-ethmac*} | **rid**}
5. **ip dhcp required**
6. **ip dhcp server** *ip-address*
7. **no shutdown**
8. **end**
9. **show wlan** *wlan-name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** Switch# **configure terminal**	Enters global configuration mode.
Step 2	**shutdown** **Example:** Switch(config)# **shutdown**	Shut down the WLAN.
Step 3	**wlan** *profile-name* **Example:** Switch# **wlan test4**	Enters the WLAN configuration submode. The *profile-name* is the profile name of the configured WLAN.

Step 4	**ip dhcp opt82** {**ascii**	**format** {*add-ssid*	*ap-ethmac*}	**rid**}
				
				Example:
				
				Switch(config)# **ip dhcp opt82 format add-ssid**
					Specifies the DHCP82 payload on the WLAN. The keyword and arguments are as follows:
					
					• **ascii**—Configures ASCII for DHCP Option 82. If this is not configured, the option 82 format is set to ASCII format.
					
					• **format**—Specifies the DHCP option 82 format. The following options are available:
					
					   • *add-ssid*—Set RemoteID format that is the AP radio MAC address and SSID.
					
					   • *ap-ethmac*—Set RemoteID format that is the AP Ethernet MAC address.
					
					Note If the format option is not configured, only the AP radio MAC address is used.
					
					• **rid**—Adds the Cisco 2 byte RID for DHCP option 82.

	Command or Action	Purpose
Step 5	**ip dhcp required** **Example:** Switch(config-wlan)# `ip dhcp required`	Makes it mandatory for clients to get their IP address from the DHCP server. Static clients are not allowed.
Step 6	**ip dhcp server** *ip-address* **Example:** Switch(config-wlan)# `ip dhcp server 200.1.1.2`	Defines a DHCP server on the WLAN that overrides the DHCP server address on the interface assigned to the WLAN.
Step 7	**no shutdown** **Example:** Switch(config-wlan)# `no shutdown`	Restarts the WLAN.
Step 8	**end** **Example:** Switch(config)# `end`	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.
Step 9	**show wlan** *wlan-name* **Example:** Switch(config-wlan)# `show wlan test-wlan`	Verifies the DHCP configuration.

Related Topics

Configuring DHCP Scopes (CLI)

SUMMARY STEPS

1. **configure terminal**
2. **ip dhcp pool** *pool-name*
3. **network** *network-name mask-address*
4. **dns-server** *hostname*
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# `**`configure terminal`**	Enters global configuration mode.
Step 2	**ip dhcp pool** *pool-name* **Example:** `Switch(config)#`**`ip dhcp pool test-pool`**	Configures the DHCP pool address.
Step 3	**network** *network-name mask-address* **Example:** `Switch(dhcp-config)#`**`network 209.165.200.224`** **`255.255.255.0`**	Specifies the network number in dotted-decimal notation and the mask address.
Step 4	**dns-server** *hostname* **Example:** `Switch(dhcp-config)#`**`dns-server example.com`**	Specifies the DNS name server. You can specify an IP address or a hostname.
Step 5	**end** **Example:** `Switch(config)# `**`end`**	Returns to privileged EXEC mode. Alternatively, you can also press **Ctrl-Z** to exit global configuration mode.

Related Topics

Information About DHCP Scopes, on page 6

Additional References

Related Documents

Related Topic	Document Title
System Management	*System Management Configuration Guide (Cisco WLC 5700 Series) System Management Configuration Guide (Catalyst 3650 Switches)*

Error Message Decoder

Description	Link
To help you research and resolve system error messages in this release, use the Error Message Decoder tool.	https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi

MIBs

MIB	MIBs Link
All supported MIBs for this release.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for DHCP for WLANs

Feature Name	Release	Feature Information
DHCP functionality for WLAN	Cisco IOS XE 3.3SECisco IOS XE 3.2SECisco IOS XE 3.2SE	This feature was introduced.