

Configure VLANs on Wireless LAN Controllers

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Introduction

This document describes how to configure Virtual LANs (VLANs) on Wireless LAN controllers (WLCs).

Prerequisites

Requirements

This procedure assumes that there is a functional DHCP server to provide IP addresses to the access points (APs) that are registered to the controller.

Components Used

- Catalyst switch that runs Cisco IOS[®] Software.
- Cisco WLC 8540 that runs software version 8.10.190.0.
- Access Points

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

Dynamic Interfaces on WLCs

Dynamic interfaces, also known as VLAN interfaces, are created by users and designed to be analogous to VLANs for wireless LAN clients.

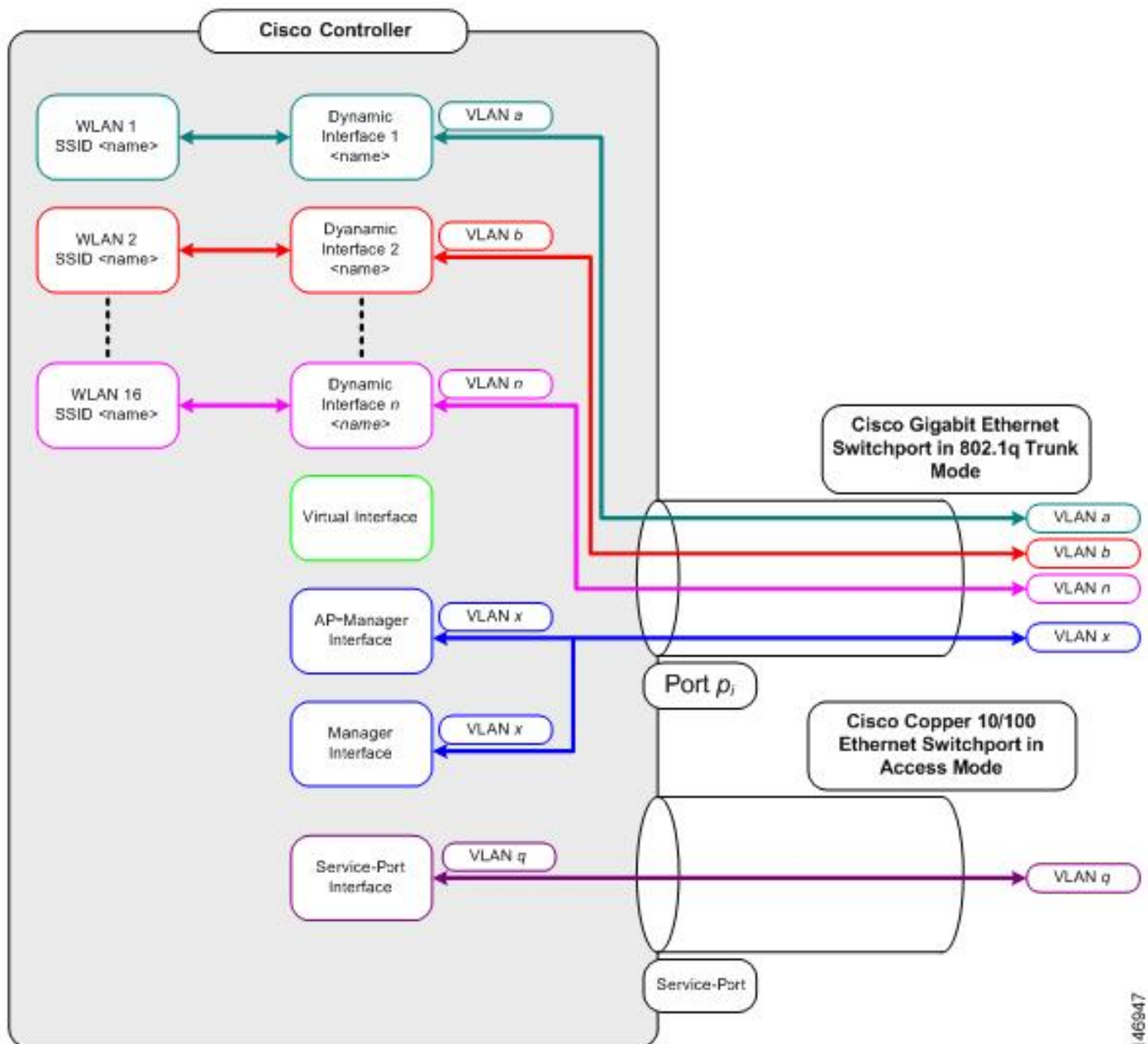
A controller can support up to 512 dynamic interfaces (VLANs). Each dynamic interface is individually configured and allows separate communication streams to exist on any or all of a controller's distribution system ports. Each dynamic interface controls VLANs and other communications between controllers and all other network devices, and each acts as a DHCP relay for wireless clients associated to Wireless LANs (WLANs) mapped to the interface.

It is possible to assign dynamic interfaces to distribution system ports, WLANs, the Layer 2 management interface, and the Layer 3 ap-manager interface. It is also possible to map the dynamic interface to a backup port.

Configure zero, one, or multiple dynamic interfaces on a distribution system port. However, all dynamic interfaces must be on a different VLAN or IP subnet from all other interfaces configured on the port. If the port is untagged, all dynamic interfaces must be on a different IP subnet from any other interface configured on the port.

For information about maximum number of VLANs supported on a Cisco WLC platform, see the respective Cisco WLC platform datasheet. Cisco recommends the use of tagged VLANs for dynamic interfaces.

VLANs with WLAN controllers use this model:



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Prerequisites for Configuration of Dynamic Interfaces

To configure the dynamic interface of the controller, use tagged VLANs for dynamic interfaces.

Restrictions on Configuration Dynamic Interfaces

These restrictions apply for the configuration of dynamic interfaces on the controller:

- Wired clients cannot access management interface of the Cisco 2504 WLC with the IP address of the AP Manager interface.
- For SNMP requests that come from a subnet that is configured as a dynamic interface, the controller responds but the response does not reach the device that initiated the conversation.
- If a DHCP proxy and/or a RADIUS source interface is used, ensure that the dynamic interface has a valid routable address. Duplicate or overlapped addresses across controller interfaces are not supported.
- Do not use ap-manager as the interface name to configure dynamic interfaces as ap-manager is a reserved name.


Configure

This section presents the information to configure the features described in this document.

 **Note:** Use the [Command Lookup Tool](#) ([registered](#) customers only) to find more information on the commands used in this document.

Catalyst Switch that Runs Cisco IOS Software

```
w-backbone-6#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
w-backbone-6(config)#interface gigabitethernet 8/25
w-backbone-6(config-if)#switchport
w-backbone-6(config-if)#switchport trunk encapsulation dot1q
w-backbone-6(config-if)#switchport trunk native vlan 999
w-backbone-6(config-if)#switchport trunk allowed vlan 1,81,82,171,999
w-backbone-6(config-if)#switchport mode trunk
w-backbone-6(config-if)#end
w-backbone-6#
```

 **Note:** VLAN number 999 is used as native VLAN here. This means the untagged traffic that arrives at the WLC port comes from vlan 999. In this document, the WLC has management port with tagged VLAN 1, which means traffic to/from the WLC management interface goes on VLAN 1 and VLAN 999 is not used by the WLC.

WLAN Controller VLAN Configuration in GUI

Complete these steps on the WLAN controller.

1. From the WLC GUI, navigate to **Controller > Interfaces**. The interfaces page lists all the interfaces that are configured on the WLC. In order to create a new dynamic interface, click **New**.



The screenshot shows the Cisco WLAN Controller GUI. The top navigation bar includes 'MONITOR', 'WLANs', 'CONTROLLER', 'WIRELESS', 'SECURITY', 'MANAGEMENT', 'COMMANDS', 'HELP', and 'FEEDBACK'. The 'CONTROLLER' tab is active. On the left, a sidebar menu lists various configuration categories, with 'Interfaces' selected. The main content area displays a table of configured interfaces. A 'New...' button is visible in the top right corner of the table area, highlighted with a red box.

Interface Name	VLAN Identifier	IP Address	Interface Type	Dynamic AP Management	IPv6 Address
171	171	192.168.171.30	Dynamic	Disabled	
management	1	10.48.39.46	Static	Enabled	2001::46/64
redundancy-management	1	10.48.39.52	Static	Not Supported	
redundancy-port	untagged	172.16.39.52	Static	Not Supported	
service-port	N/A	0.0.0.0	DHCP	Disabled	::128
virtual	N/A	10.2.3.4	Static	Not Supported	

2. Enter the **Interface Name** and **VLAN Identifier**, and click **Apply**.



3. Enter the parameters specific to this VLAN. Some of the parameters include the **IP Address**, **Netmask**, **Gateway**, and the **Primary DHCP Server IP** address, and click **Apply**.

Save Configuration | Ping | Logout | Refresh

CISCO MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK Home

Controller

General
Icons
Inventory
Interfaces
Interface Groups
Multicast
Network Routes
Redundancy
Mobility Management
Ports
NTP
CDP
PMIPv6
Tunneling
IPv6
mDNS
Advanced

Interfaces > Edit < Back Apply

General Information

Interface Name: vlan 81
MAC Address: 74:a0:2f:2a:75:7e

Configuration

Guest Lan:
Quarantine:
Quarantine Vlan Id: 0
NAS-ID: none

Physical Information

Port Number: 1
Backup Port: 0
Active Port: 1
Enable Dynamic AP Management:

Interface Address

VLAN Identifier: 81
IP Address: 192.168.81.46
Netmask: 255.255.255.0
Gateway: 192.168.81.1

DHCP Information

Primary DHCP Server: 10.48.39.5
Secondary DHCP Server:
DHCP Proxy Mode: Global
Enable DHCP Option 82:

Access Control List

ACL Name: none


mDNS


mDNS Profile: none


External Module

3G VLAN:

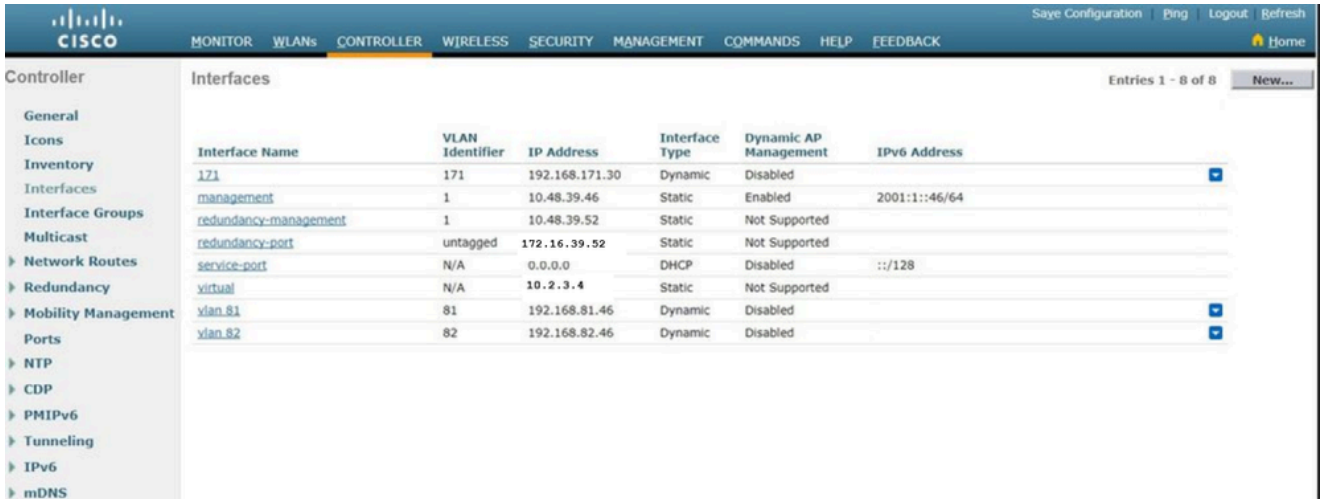
Note: Changing the Interface parameters causes the WLANs to be temporarily disabled and thus may result in loss of connectivity for

 **Note:** The IP address assigned to this interface acts as the DHCP relay for a client to obtain an IP address from the DHCP server. For example, when a client attempts to associate to a WLAN/SSID (step 5 in this configuration) mapped to this dynamic interface, it performs a local subnet broadcast to identify the DHCP server. The controller sends a request to the DHCP server (or to itself if it is the DHCP server for the segment) with the IP address of this dynamic interface as relay IP to the DHCP server configured for this interface. The DHCP server assigns an IP address to the client from the configured DHCP scope.

 **Note:** It is mandatory to have a valid IP address for technical reasons, but this IP address is not used unless DHCP proxy or radius interface overwrite (under WLAN config) are enabled.

 **Note:** The Interface Name or VLAN name is used as radius attribute (airespace-interface-name) to return a VLAN name instead of number.

4. Verify the interface configuration. Click the **Controller** tab in the menu at the top of the window, and choose **Interfaces** from the menu on the left.



The screenshot shows the Cisco Controller web interface. The top navigation bar includes 'MONITOR', 'WLANs', 'CONTROLLER', 'WIRELESS', 'SECURITY', 'MANAGEMENT', 'COMMANDS', 'HELP', and 'FEEDBACK'. The left sidebar lists various configuration categories like 'General', 'Icons', 'Inventory', 'Interfaces', etc. The main content area is titled 'Interfaces' and displays a table of interface configurations. The table has columns for Interface Name, VLAN Identifier, IP Address, Interface Type, Dynamic AP Management, and IPv6 Address. The table contains 8 entries, with the last two, 'vlan 81' and 'vlan 82', having expandable options indicated by blue minus signs.

Interface Name	VLAN Identifier	IP Address	Interface Type	Dynamic AP Management	IPv6 Address
171	171	192.168.171.30	Dynamic	Disabled	
management	1	10.48.39.46	Static	Enabled	2001:1::46/64
redundancy-management	1	10.48.39.52	Static	Not Supported	
redundancy-port	untagged	172.16.39.52	Static	Not Supported	
service-port	N/A	0.0.0.0	DHCP	Disabled	::/128
virtual	N/A	10.2.3.4	Static	Not Supported	
vlan 81	81	192.168.81.46	Dynamic	Disabled	
vlan 82	82	192.168.82.46	Dynamic	Disabled	

5. Click the **WLANs** tab in the menu at the top of the window, and click **Create New**.



The screenshot shows the Cisco Controller web interface with the 'WLANs' tab selected. The main content area is titled 'WLANs' and shows a table with one entry. A 'Create New' button is highlighted with a red box. The table has columns for WLAN ID, Type, Profile Name, WLAN SSID, Admin Status, and Security Policies.

WLAN ID	Type	Profile Name	WLAN SSID	Admin Status	Security Policies
1	WLAN	self-anchor	self-anchor	Disabled	None

6. Enter the **Service set identifier (SSID)** and **Profile Name** and click **Apply**. This example uses **VLAN 81** for ease of understanding.



The screenshot shows the 'WLANs > New' configuration page. It includes a 'Type' dropdown menu set to 'WLAN', a 'Profile Name' text field containing 'Students', an 'SSID' text field containing 'Students', and an 'ID' dropdown menu set to '2'. There are 'Back' and 'Apply' buttons at the bottom right.

7. Select **VLAN 81** from the **Interface Name** drop-down menu at the bottom of the window, and click **Apply**. In this case, SSID **Students** is tied to **Interface Name VLAN 81**.

The screenshot shows the Cisco WLAN Controller GUI. The top navigation bar includes 'MONITOR', 'WLANS', 'CONTROLLER', 'WIRELESS', 'SECURITY', 'MANAGEMENT', 'COMMANDS', 'HELP', and 'FEEDBACK'. The main content area is titled 'WLANS > Edit 'Students'' and has tabs for 'General', 'Security', 'QoS', 'Policy-Mapping', and 'Advanced'. The 'Advanced' tab is active. The configuration fields are as follows:


- Profile Name: Students
- Type: WLAN
- SSID: Students
- Status: Enabled
- Security Policies: [WPA2][Auth(802.1X)] (Modifications done under security tab will appear after applying the changes.)
- Radio Policy: All
- Interface/Interface Group(G): **vlan 81** (highlighted with a red box)
- Multicast Vlan Feature: Enabled
- Broadcast SSID: Enabled
- NAS-ID: W-8540-1

WLAN Controller VLAN Configuration in CLI

Use this section in order to configure your VLAN via command-line interface (CLI).

1. Create the interface and the associated VLAN tag. The command is **config interface create interface_namevlan_id**.

```
(W-8540-1) >config interface create "VLAN 81" 81
```

 **Note:** If there is a space in the VLAN/WLAN name as is the case in this example, make sure the name is in quotes.

2. Define the IP address and default gateway. The command is **config interface interface_nameIP_addressnetmaskgateway**.

```
(W-8540-1) >config interface address dynamic-interface "VLAN 81" 192.168.81.46 255.255.255.0 192.168.81.1
```

3. Define the DHCP server. The command is **config interface dhcp dynamic-interface<interface-name>primary<primary-server>[secondary]<secondary-server>**.

```
(W-8540-1) >config interface dhcp dynamic-interface "VLAN 81" primary 10.48.39.5
```

4. Issue this command in order to map the interface to a physical port: **config interface port operator_defined_interface_name physical_ds_port_number**.

```
(W-8540-1) >config interface port "VLAN 81" 1
```

5. Verify the interface configuration. The command is `show interface summary`.

<#root>

(W-8540-1) >show interface summary

```
Number of Interfaces..... 8
```

Interface Name	Port	Vlan Id	IP Address	Type	Ap Mgr	Guest
171	1	171	192.168.171.30	Dynamic	No	No
management	1	1	10.48.39.46	Static	Yes	No
redundancy-management	1	1	10.48.39.52	Static	No	No
redundancy-port	-	untagged	172.16.39.52	Static	No	No
service-port	N/A	N/A	0.0.0.0	DHCP	No	No
virtual	N/A	N/A	10.2.3.4	Static	No	No
vlan 81	1	81	192.168.81.46	Dynamic	No	No
vlan 82	1	82	192.168.82.46	Dynamic	No	No

6. Define the WLAN. The command is `config wlan create wlan_idname`.

(W-8540-1) >config wlan create 2 Students Students

7. Define the interface for the WLAN. The command is `config wlan interface wlan_idinterface_name`.

(W-8540-1) >config wlan interface 2 "vlan 81"

8. Verify the WLAN and the associated interface. The command is `show wlan summary`.

<#root>

(W-8540-1) >show wlan summary

```
Number of WLANs..... 2
```

WLAN ID	WLAN Profile Name / SSID	Status	Interface Name	PMIPv6	Mobility
1	self-anchor / self-anchor	Disabled	management	none	
2	students / students	Enabled	vlan 81	none	

(W-8540-1) >

Verify

Use this section to confirm that your configuration works properly.

Catalyst Switches Verification

- Catalyst switch that runs Cisco IOS Software: **show running-config interface `interface_type` interface_number**.

```
<#root>
w-backbone-6k#
show running-config interface gigabitethernet 2/1
```

Building configuration...

```
Current configuration : 190 bytes
!
interface GigabitEthernet2/1
  no ip address
  switchport
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 999
  switchport trunk allowed vlan 1,81,82,171,999
  switchport mode trunk
end
```

WLAN Controller VLAN Verification

- Verify the interface configuration. The command is **show interface summary**.

```
<#root>
```

```
(W-8540-1) >show interface summary
```

```
Number of Interfaces..... 8
Interface Name          Port   Vlan Id   IP Address   Type        Ap Mgr  Guest
-----
171 management          1      1         192.168.171.30 Dynamic     No      No
redundancy-management 1      1         10.48.39.46  Static     Yes     No
redundancy-port        1      1         10.48.39.52  Static     No      No
service-port           -      untagged  172.16.39.52 Static     No      No
virtual                N/A    N/A       0.0.0.0      DHCP       No      No
vlan 81                1      81        192.168.81.46 Dynamic     No      No
vlan 82                1      82        192.168.82.46 Dynamic     No      No
```

- Verify the WLAN and the associated interface. The command is **show wlan summary**.

```
<#root>
```

(W-8540-1) >show wlan summary

WLAN ID	WLAN Profile Name / SSID	Status	Interface Name	PMIPv6	Mobility
1	self-anchor / self-anchor	Disabled	management	none	
2	students / Students	Enabled	vlan 81	none	

(W-8540-1) >

Troubleshoot

Use this section to troubleshoot your configuration.

Troubleshoot Procedure

Complete these instructions in order to troubleshoot your configuration.

1. Ping from the WLAN controller to the default gateway that is configured on the VLAN routed interface, and then ping in the opposite direction.

- WLAN controller:

```
(W-8540-1) >ping 192.168.81.1
```

```
Send count=3, Receive count=3 from 192.168.81.1
```

```
(W-8540-1) >
```

- VLAN routed interface:

```
w-backbone-6k#ping 192.168.81.46
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.81.46, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

```
w-backbone-6k#
```

2. If the pings are unsuccessful, deploy a packet capture/sniffer at the switch and check in order to verify proper VLAN tagging.



Note: When you initiate the ping from your controller to a Layer 3 gateway, which is on the same subnet as your dynamic interface, the controller appears to source the ping from the dynamic interface.
