Introduction

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

Prerequisites

Requirements

There are no specific requirements for this document. However, this document assumes that there is a working 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 8.5.120.0.
- 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, make sure that you understand the potential impact of any command.
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.

You can assign dynamic interfaces to distribution system ports, WLANs, the Layer 2 management interface, and the Layer 3 AP-manager interface, and you can map the dynamic interface to a backup port.

You can 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's datasheet.

Cisco recommends using tagged VLANs for dynamic interfaces.

VLANs with WLAN controllers use this model:

Prerequisites for Configuring Dynamic Interfaces

While configuring on the dynamic interface of the controller, you must use tagged VLANs for dynamic interfaces.

Restrictions on Configuring Dynamic Interfaces

The following restrictions apply for configuring the dynamic interfaces on the controller:

- Wired clients cannot access management interface of the Cisco 2504 WLC using 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 you are using DHCP proxy and/or a RADIUS source interface, ensure that the dynamic interface has a valid routable address. Duplicate or overlapping addresses across controller interfaces are not supported.
- You must not use `ap-manager` as the interface name while configuring dynamic interfaces as `ap-manager` is a reserved name.

Configure

In this section, you are presented with the information to configure the features described in this document.

**Note**: Use the [Command Lookup Tool](registered) (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 arriving to the WLC port will come 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, choose **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**.
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 DHCP server IP address, and click **Apply**.
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 (see 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 will not be used unless you have DHCP proxy or "radius interface overwrite" (under WLAN config) enabled. Note: The "Interface Name" or Vlan name is what you can use 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.
5. Click the WLAN tab in the menu at the top of the window, and click Create New.

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

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.

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_name vlan_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_name IP_address netmask gateway`.

(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`.

(W-8540-1) > show interface summary

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Port</th>
<th>Vlan Id</th>
<th>IP Address</th>
<th>Type</th>
<th>Ap Mgr</th>
<th>Guest</th>
</tr>
</thead>
<tbody>
<tr>
<td>171</td>
<td>1</td>
<td>171</td>
<td>192.168.171.30 Dynamic</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>management</td>
<td>1</td>
<td>1</td>
<td>10.48.39.46 Static</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>redundancy-management</td>
<td>1</td>
<td>1</td>
<td>10.48.39.52 Static</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>redundancy-port</td>
<td>-</td>
<td>untagged</td>
<td>169.254.39.52 Static</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>service-port</td>
<td>N/A</td>
<td>N/A</td>
<td>0.0.0.0 DHCP</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>virtual</td>
<td>N/A</td>
<td>N/A</td>
<td>1.2.3.4 Static</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>vlan 81</td>
<td>1</td>
<td>81</td>
<td>192.168.81.46 Dynamic</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>vlan 82</td>
<td>1</td>
<td>82</td>
<td>192.168.82.46 Dynamic</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

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

(W-8540-1) > show interface summary

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Port</th>
<th>Vlan Id</th>
<th>IP Address</th>
<th>Type</th>
<th>Ap Mgr</th>
<th>Guest</th>
</tr>
</thead>
<tbody>
<tr>
<td>171</td>
<td>1</td>
<td>171</td>
<td>192.168.171.30 Dynamic</td>
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<td>No</td>
<td></td>
</tr>
<tr>
<td>management</td>
<td>1</td>
<td>1</td>
<td>10.48.39.46 Static</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>redundancy-management</td>
<td>1</td>
<td>1</td>
<td>10.48.39.52 Static</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>redundancy-port</td>
<td>-</td>
<td>untagged</td>
<td>169.254.39.52 Static</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>service-port</td>
<td>N/A</td>
<td>N/A</td>
<td>0.0.0.0 DHCP</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>virtual</td>
<td>N/A</td>
<td>N/A</td>
<td>1.2.3.4 Static</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>vlan 81</td>
<td>1</td>
<td>81</td>
<td>192.168.81.46 Dynamic</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>vlan 82</td>
<td>1</td>
<td>82</td>
<td>192.168.82.46 Dynamic</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

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

(W-8540-1) > show interface summary

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

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Port</th>
<th>Vlan Id</th>
<th>IP Address</th>
<th>Type</th>
<th>Ap Mgr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guest</td>
<td>1</td>
<td>171</td>
<td>192.168.171.30</td>
<td>Dynamic</td>
<td>No</td>
</tr>
<tr>
<td>management</td>
<td>1</td>
<td>1</td>
<td>10.48.39.46</td>
<td>Static</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>redundant-management</td>
<td>1</td>
<td>1</td>
<td>10.48.39.52</td>
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</tr>
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</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>service-port</td>
<td>N/A</td>
<td>N/A</td>
<td>0.0.0.0</td>
<td>DHCP</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>virtual</td>
<td>N/A</td>
<td>N/A</td>
<td>1.2.3.4</td>
<td>Static</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td></td>
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<tr>
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<td>No</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>vlan 82</td>
<td>1</td>
<td>82</td>
<td>192.168.82.46</td>
<td>Dynamic</td>
<td>No</td>
</tr>
</tbody>
</table>

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

(W-8540-1) > show wlan summary

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

<table>
<thead>
<tr>
<th>WLAN ID</th>
<th>WLAN Profile Name / SSID</th>
<th>Status</th>
<th>Interface Name</th>
<th>PMIPv6 Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>self-anchor / self-anchor</td>
<td>Disabled</td>
<td>management</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>Students / Students</td>
<td>Enabled</td>
<td>vlan 81</td>
<td>none</td>
</tr>
</tbody>
</table>

(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

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`.

(W-8540-1) > show interface summary

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Port</th>
<th>Vlan Id</th>
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<tr>
<td>management</td>
<td>1</td>
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<td>10.48.39.46</td>
<td>Static</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>redundancy-management</td>
<td>1</td>
<td>1</td>
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<td>vlan 82</td>
<td>1</td>
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<td>Dynamic</td>
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<td>No</td>
</tr>
</tbody>
</table>

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

(W-8540-1) > show wlan summary

<table>
<thead>
<tr>
<th>WLAN ID</th>
<th>WLAN Profile Name / SSID</th>
<th>Status</th>
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</tr>
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<tbody>
<tr>
<td>1</td>
<td>self-anchor / self-anchor</td>
<td>Disabled</td>
<td>management</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>Students / Students</td>
<td>Enabled</td>
<td>vlan 81</td>
<td>none</td>
</tr>
</tbody>
</table>

Troubleshoot

Use this section to troubleshoot your configuration.

Troubleshooting 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) > show wlan summary

<table>
<thead>
<tr>
<th>WLAN ID</th>
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<td>Disabled</td>
<td>management</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>Students / Students</td>
<td>Enabled</td>
<td>vlan 81</td>
<td>none</td>
</tr>
</tbody>
</table>

VLAN routed interface:

(W-8540-1) > show wlan summary

<table>
<thead>
<tr>
<th>WLAN ID</th>
<th>WLAN Profile Name / SSID</th>
<th>Status</th>
<th>Interface Name</th>
<th>PMIPv6 Mobility</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>self-anchor / self-anchor</td>
<td>Disabled</td>
<td>management</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>Students / Students</td>
<td>Enabled</td>
<td>vlan 81</td>
<td>none</td>
</tr>
</tbody>
</table>
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.