Configuring Link Aggregation

Information About Link Aggregation

Link aggregation (LAG) is a partial implementation of the 802.3ad port aggregation standard. It bundles all of the controller's distribution system ports into a single 802.3ad port channel, thereby reducing the number of IP addresses needed to configure the ports on your controller. When LAG is enabled, the system dynamically manages port redundancy and load balances access points transparently to the user.

LAG simplifies controller configuration because you no longer need to configure primary and secondary ports for each interface. If any of the controller ports fail, traffic is automatically migrated to one of the other ports. As long as at least one controller port is functioning, the system continues to operate, access points remain connected to the network, and wireless clients continue to send and receive data.

Cisco WLC does not send CDP advertisements on a LAG interface.

Note LAG is supported across switches.

Link Aggregation for Cisco Aironet 1850 Series Access Points

Cisco Aironet 1850 Series 802.11ac Wave 2 Access Points have two Gigabit Ethernet interfaces, the PoE port and the AUX port, which, by using Link Aggregation, can together accommodate the greater than 1 Gbps of throughput expected with Wave 2.

Note Only Link Aggregation Control Protocol (LACP) is supported; Port Aggregation Protocol (PAgP) is not supported.

LAG is supported on Cisco Aironet 1850 Series APs with the following switches:

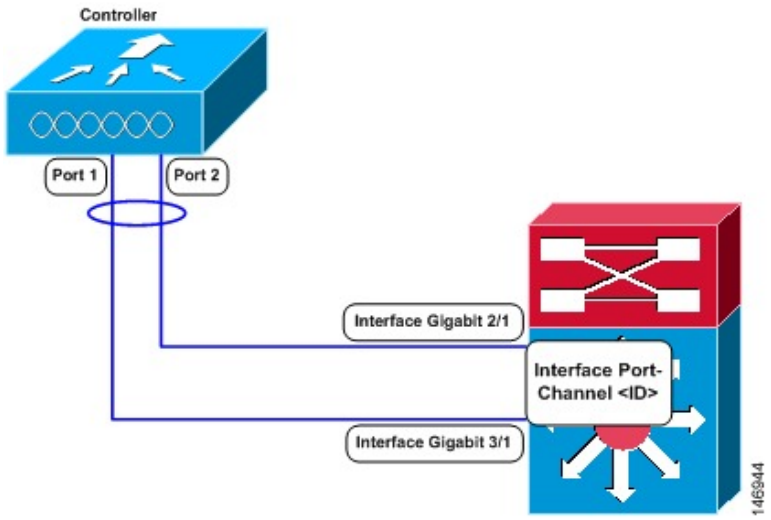
- Cisco Catalyst 3850 Series Switches—all models (non-CA mode)
- Cisco Catalyst 3650 Series Switches—all models (non-CA mode)
- Cisco Catalyst 4500E Supervisor Engine 8-E

Restrictions for Link Aggregation

- You can bundle all eight ports on a Cisco 5508 Controller into a single link.
- Terminating on two different modules within a single Catalyst 6500 series switch provides redundancy and ensures that connectivity between the switch and the controller is maintained when one module fails. The controller's port 1 is connected to Gigabit interface 3/1, and the controller's port 2 is connected to Gigabit interface 2/1 on the Catalyst 6500 series switch. Both switch ports are assigned to the same channel group.
- LAG requires the EtherChannel to be configured for 'mode on' on both the controller and the Catalyst switch.
- Once the EtherChannel is configured as on at both ends of the link, the Catalyst switch should not be configured for either Link Aggregation Control Protocol (LACP) or Cisco proprietary Port Aggregation Protocol (PAgP) but be set unconditionally to LAG. Because no channel negotiation is done between the controller and the switch, the controller does not answer to negotiation frames and the LAG is not formed if a dynamic form of LAG is set on the switch. Additionally, LACP and PAgP are not supported on the controller.

- If the recommended load-balancing method cannot be configured on the Catalyst switch, then configure the LAG connection as a single member link or disable LAG on the controller.

Figure 1: Link Aggregation with the Catalyst 6500 Series Neighbor Switch



- You cannot configure the controller's ports into separate LAG groups. Only one LAG group is supported per controller. Therefore, you can connect a controller in LAG mode to only one neighbor device.
- When you enable LAG or make any changes to the LAG configuration, you must immediately reboot the controller.
- When you enable LAG, you can configure only one AP-manager interface because only one logical port is needed. LAG removes the requirement for supporting multiple AP-manager interfaces.
- When you enable LAG, all dynamic AP-manager interfaces and untagged interfaces are deleted, and all WLANs are disabled and mapped to the management interface. Also, the management, static AP-manager, and VLAN-tagged dynamic interfaces are moved to the LAG port.
- Multiple untagged interfaces to the same port are not allowed.
- When you enable LAG, you cannot create interfaces with a primary port other than 29.
- When you enable LAG, all ports participate in LAG by default. You must configure LAG for all of the connected ports in the neighbor switch.
- When you enable LAG, if any single link goes down, traffic migrates to the other links.
- When you enable LAG, only one functional physical port is needed for the controller to pass client traffic.
- When you enable LAG, access points remain connected to the controller until you reboot the controller, which is needed to activate the LAG mode change, and data service for users continues uninterrupted.
- When you enable LAG, you eliminate the need to configure primary and secondary ports for each interface.
- When you enable LAG, the controller sends packets out on the same port on which it received them. If a CAPWAP packet from an access point enters the controller on physical port 1, the controller removes

the CAPWAP wrapper, processes the packet, and forwards it to the network on physical port 1. This may not be the case if you disable LAG.

- When you disable LAG, the management, static AP-manager, and dynamic interfaces are moved to port 1.
- When you disable LAG, you must configure primary and secondary ports for all interfaces.
- When you disable LAG, you must assign an AP-manager interface to each port on the controller. Otherwise, access points are unable to join.
- Cisco 5500 Series Controllers support a single static link aggregation bundle.
- LAG is typically configured using the Startup Wizard, but you can enable or disable it at any time through either the GUI or CLI.
- When you enable LAG on Cisco 2500 Series Controller to which the direct-connect access point is associated, the direct connect access point is disconnected since LAG enabling is still in the transition state. You must reboot the controller immediately after enabling LAG.
- In 8500 when more than 1000 APs joining WLC flapping occurs, to avoid this do not add more than 1000 Aps on a single catalyst switch for Capwap IPv6.

Configuring Link Aggregation (GUI)

Step 1 Choose **Controller > General** to open the General page.

Step 2 Set the LAG Mode on Next Reboot parameter to Enabled.

Step 3 Save the configuration.

Step 4 Reboot Cisco WLC.

Step 5 Assign the WLAN to the appropriate VLAN.

Configuring Link Aggregation (CLI)

Step 1 Enter the **config lag enable** command to enable LAG.

Note Enter the **config lag disable** command if you want to disable LAG.

Step 2 Enter the **save config** command to save your settings.

Step 3 Reboot Cisco WLC.

Configuring Link Aggregation for Cisco 1850 Series APs (CLI)

- Configure the Cisco Aironet 1850 Series AP link aggregation by entering this global configuration command:
  config ap lag-mode support {**enable** | **disable**}
  Disabling global link aggregation for the APs will result in a reboot of all the lag enabled APs.
- Configure link aggregation for a specific Cisco AP by entering this command:
  config ap lag-mode support {**enable** | **disable**} *ap-name*
  Enabling or disabling link aggregation for the Cisco AP resets and reboots the specified Cisco AP.
- Enable and configure Port Channel mode on switches connected to the Cisco AP. For optimal traffic load balancing on the LAG ports to the Cisco AP, ensure that the switch supports balancing based purely on the L4 source and destination ports.
  Configuration Example:

```
interface Port-channel20
description 1852I lag
switchport access vlan 1107
switchport mode access

interface GigabitEthernet1/0/1
switchport access vlan 1107
switchport mode access
channel-group 20 mode active

interface GigabitEthernet1/0/2
switchport access vlan 1107
switchport mode access
channel-group 20 mode active
```

  For more information about this step, see the *Cisco Aironet 1850 Series Access Point Deployment Guide* at http://www.cisco.com/c/en/us/td/docs/wireless/controller/technotes/8-1/1850_DG/b_Cisco_Aironet_Series_1850_Access_Point_Deployment_Guide.html.

  After link aggregation is enabled on the Cisco AP, the Cisco WLC and the Cisco AP use multiple CAPWAP data tunnels to send and receive wireless client traffic.
- View the link aggregation status by entering these commands:
  a) View the status of link aggregation on the Cisco AP by entering this command on the AP console:
  show configuration
  b) View the status of link aggregation on Cisco WLC by entering these commands on the Cisco WLC CLI:
    - **show ap lag-mode**
    - **show ap config general** *ap-name*

Verifying Link Aggregation Settings (CLI)

To verify your LAG settings, enter this command:

show lag summary

Information similar to the following appears:

```
LAG Enabled
```

Configuring Neighbor Devices to Support Link Aggregation

The controller's neighbor devices must also be properly configured to support LAG.

- Each neighbor port to which the controller is connected should be configured as follows:

```
interface GigabitEthernet <interface id>
 switchport
 channel-group <id> mode on
 no shutdown
```

- The port channel on the neighbor switch should be configured as follows:

```
interface port-channel <id>
 switchport
 switchport trunk encapsulation dot1q
 switchport trunk native vlan <native vlan id>
 switchport trunk allowed vlan <allowed vlans>
 switchport mode trunk
 no shutdown
```

Choosing Between Link Aggregation and Multiple AP-Manager Interfaces

Cisco 5500 Series Controllers have no restrictions on the number of access points per port, but we recommend using LAG or multiple AP-manager interfaces on each Gigabit Ethernet port to automatically balance the load.

The following factors should help you decide which method to use if your controller is set for Layer 3 operation:

- With LAG, all of the controller ports need to connect to the same neighbor switch. If the neighbor switch goes down, the controller loses connectivity.
- With multiple AP-manager interfaces, you can connect your ports to different neighbor devices. If one of the neighbor switches goes down, the controller still has connectivity. However, using multiple AP-manager interfaces presents certain challenges when port redundancy is a concern.