Enabling AVB on Cisco Catalyst Switches

This article describes how to enable AVB on supported Cisco® Catalyst® switches. This article does not detail Cisco firmware upgrade or initial switch setup procedure. Please see Cisco Catalyst documentation for more detail. Biamp recommends a Cisco certified technician performs switch configuration.

Supported Catalyst models

AVB is supported on select models of the following Catalyst series.

Please always check Cisco AVB for all current information and updates.

Please always reach out to Cisco Support for assistance and further information.

<table>
<thead>
<tr>
<th>Catalyst 3650 Series</th>
<th>Catalyst 3850 Series</th>
<th>Catalyst 9300 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required license level:</td>
<td>Required license level:</td>
<td>Required license level:</td>
</tr>
<tr>
<td>ipbase or ipsevices</td>
<td>ipbase or ipsevices</td>
<td>Network Advantage</td>
</tr>
<tr>
<td>Cisco minimum:</td>
<td>Cisco minimum:</td>
<td>Cisco minimum:</td>
</tr>
<tr>
<td>IOS XE Gibraltar 16.12.7</td>
<td>IOS XE Gibraltar 16.12.7</td>
<td>IOS XE Bengaluru 17.6.3</td>
</tr>
<tr>
<td>C3650-24PDM</td>
<td>C3850-12X48U</td>
<td>All models.</td>
</tr>
<tr>
<td>C3650-48FQDM</td>
<td>C3850-24XU</td>
<td></td>
</tr>
<tr>
<td>C3650-8X24PD</td>
<td>C3850-12XS</td>
<td></td>
</tr>
<tr>
<td>C3650-8X24UQ</td>
<td>C3850-16XS</td>
<td></td>
</tr>
<tr>
<td>C3650-12X48FD</td>
<td>C3850-24XS</td>
<td></td>
</tr>
<tr>
<td>C3650-12X48UQ</td>
<td>C3850-32XS</td>
<td></td>
</tr>
<tr>
<td>C3650-12X48UR</td>
<td>C3850-48XS</td>
<td></td>
</tr>
<tr>
<td>C3650-12X48UZ</td>
<td></td>
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</tbody>
</table>

**NOTE:** For the following Cisco models, PTP is not supported on all ports.

- C9300-48UXM only ports 1-16, 18-34, 36, 38, 44 support PTP.
- C9300-48UN only ports 1-36, 38 support PTP.

Catalyst 3650 and 3850 series switches have been certified by the Avnu Alliance.

Catalyst 9300 and 9500 series switches have been certified by the Avnu Alliance.
The following Cisco license levels are required for AVB support.

- ipbase or ipservices license level for Catalyst 3000 family.
- Network Advantage for Catalyst 9000 family.
- DNA Subscription license not required for AVB support.

Cisco recommends the following minimum Cisco IOS® XE Software release versions are required for AVB support.

- IOS XE Gibraltar 16.12.7 for Catalyst 3000 family.
- IOS XE Bengaluru 17.6.3 for the Catalyst 9000 family

Please always follow Cisco recommendations for newer versions of IOS.

Limitations

Cisco Catalyst IOS applies following limitations apply when AVB is enabled:

- AVB is not supported on StackWise connected switches. Fiber and copper uplinks are supported.
- AVB is not supported on ports that are combined using link aggregation (EtherChannel).

Enabling AVB

Prerequisites:

- Cisco IOS XE Software with AVB support.
- Switches have appropriate license levels.
- User has access to CLI with configure permissions.
- Switches are not in stacking mode
- Interfaces are not configured for Etherchannel
- Default VLAN 1 / Native VLAN 1 must be enabled on AVB ports
- Default username cisco. The default password is the serial number of the switch chassis.

Step 1 - Enable AVB feature

Enter the following commands to enable AVB and MVRP (automatic VLAN) on the switch.

<table>
<thead>
<tr>
<th>Command</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch&gt; enable</td>
<td>Enable EXEC mode.</td>
</tr>
<tr>
<td>Switch# configure terminal</td>
<td>Enter global configuration mode.</td>
</tr>
<tr>
<td>Switch(config)# avb vlan 2</td>
<td>Enable AVB vlan 2</td>
</tr>
</tbody>
</table>
Command

Switch(config)# avb
Enable AVB.

Switch(config)# mvrp global
Enter MVPR global configuration.

Switch(config)# vtp mode off
VLAN Trunking Protocol (VTP) can be configured for operation.

Switch(config)# mvrp vlan create
Enable MVRP to create VLANs

Switch(config)# avb msrp-join-timer 200
Set MSRP join timer to expected value

Switch(config)# avb msrp-leave-timer 1200
Set MSRP leave timer to expected value

Switch(config)# avb msrp-leaveall-timer 25000
Set MSRP leave-all timer to expected value

Switch(config)# qos queue-softmax-multiplier 1200
QOS increase this buffer requested by Cisco

Switch(config)# end
End global configuration mode and return to EXEC mode.

Switch# write memory
Save the switch configuration.

For further details, see the Cisco IOS XE command reference guide for configuring Audio Video Bridging.

Step 2 - Configure interfaces with AVB connections to VLAN trunk mode.

Any ports with AVB devices attached must be configured for VLAN trunking mode. The port must also not be administratively shutdown. The following commands show enabling trunk mode for interface GigabitEthernet1/0/1.

Command

Switch> enable
Enable EXEC mode.

Switch# configure terminal
Enter global configuration mode.

Switch(config)# interface GigabitEthernet1/0/1
Enter interface configuration mode.

Switch(config-if)# switchport mode trunk
Configure VLAN mode to trunk.

Switch(config-if)# spanning-tree portfast trunk
Interface moves directly to spanning-tree forwarding state.

Switch(config-if)# ptp sync interval -2
Set PTP sync interval to be suitable for AVB

Switch(config-if)# no shutdown
Ensure the port is not administratively shutdown.

Switch(config-if)# end
End configuration mode and return to EXEC mode.
Configuring port by port is time consuming. The following is an example for configuring all ports 1-24 using the interface range command:

```
Switch>enable
Switch#configure terminal
Switch(config)#interface range GigabitEthernet1/0/1 - 24
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#spanning-tree portfast trunk
Switch(config-if-range)#ptp sync interval -2
Switch(config-if-range)#no shutdown
Switch(config-if-range)#end
Switch#write memory
Switch#exit
```

**Step 3 - Optional Configuration of interfaces connecting to devices requiring class 4 (POE+ and PPoE).**

Biamp class 4 devices will require additional 2-event classification commands to negotiate with Cisco Power Sourcing Equipment (PSE).

Cisco indicates 2-event classification allows class 4 Powered devices (PDs) to detect a PSE capability of providing 30W from hardware then register itself moving upward to PoE+ level without waiting for any CDP/LLDP packet exchange.

After 2-event is enabled on a port, you must manually shut/un-shut the port or re-connect the PD again to re-start the IEEE detection process.

Note that power budget allocation for a class-4 device will be 30W when 2-event classification is enabled on the port; otherwise it will be 15.4W.

The following is an example for configuring all ports 1-24 using the interface range command, 2-event POE configuration with additional easy to identify interface description of BIAMP on the ports:

```
Switch>enable
Switch#configure terminal
Switch(config)#interface range GigabitEthernet1/0/1 - 24
Switch(config)#description BIAMP
Switch(config)#power inline port 2-event
Switch(config-if-range)#shutdown
```
Switch(config-if-range)#no shutdown
Switch(config-if-range)#end
Switch#write memory
Switch#exit

The switch does not require a reboot. Connected AVB enabled end points will begin transmitting protocol messages within moments of configuring the switch. Many other specific configuration options are available for the AVB protocols. Please see the IOS XE command reference guides for further details.

AVB status and monitoring commands

The following commands are used to view the status of AVB on the switch and for assisting with diagnosing issues.

<table>
<thead>
<tr>
<th>Command</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>show msrp stream</td>
<td>Shows the total amount of AVB streams.</td>
</tr>
<tr>
<td>show msrp stream</td>
<td>Shows a high level overview of AVB operation on the switch, stream reservation domain active ports, gPTP neighbor delay, VLAN membership.</td>
</tr>
<tr>
<td>show avb domain</td>
<td>Displays a high level overview of all AVB streams advertised on the network.</td>
</tr>
<tr>
<td>show avb stream</td>
<td>Provides a brief view of AVB streams on the network.</td>
</tr>
<tr>
<td>show mvrp summary</td>
<td>Provides a detailed output of AVB streams and reservations on the network.</td>
</tr>
<tr>
<td>show mvrp interface</td>
<td>Shows current stream reservation consumption on the switch.</td>
</tr>
<tr>
<td>show mvrp interface</td>
<td>Shows a summary of VLANs created automatically.</td>
</tr>
<tr>
<td>show ptp brief</td>
<td>Displays interface specific MVRP details.</td>
</tr>
<tr>
<td>show ptp brief</td>
<td>Shows a brief overview of gPTP operation.</td>
</tr>
<tr>
<td>show ptp clock</td>
<td>Shows the current clock details.</td>
</tr>
<tr>
<td>show ptp parent</td>
<td>Shows details of the parent clock.</td>
</tr>
<tr>
<td>show platform software fed switch active ptp if-id (interface-id)</td>
<td>Detailed output of the gPTP operation of a port. Provides neighbor delay threshold and current measured neighbor delay.</td>
</tr>
<tr>
<td>show version</td>
<td>Shows details of the switch’s software version. See Enabling Cisco Catalyst Switches</td>
</tr>
</tbody>
</table>
show license right-to-use

Shows details of the switch's enabled licenses. See Enabling AVB on Cisco Catalyst Switches

Further reading

- List of AVB-capable Ethernet switches
- Understand AVB in Catalyst 3K and Catalyst 9000 Series Switches
- Cisco.com AVB website
- Cisco.com AVB resources
- Cisco Audio Video Bridging Configuration Guide, Cisco IOS XE Gibraltar 16.12.x (Catalyst 3850 Switches)
- Release Notes for Cisco Catalyst 3850 Series Switches, Cisco IOS XE Gibraltar 16.12.x
- Cisco Audio Video Bridging Configuration Guide, Cisco IOS XE Gibraltar 16.12.x (Catalyst 3650 Switches)
- Release Notes for Cisco Catalyst 3650 Series Switches, Cisco IOS XE Gibraltar 16.12.x
- Command Reference, Cisco IOS XE Cupertino 17.7.x (Catalyst 9300 Switches)
- Configuring 2-event (PoE+) Classification
- Extensive PoE Configuration details - C3850
- "POE in depth" Biamp Cornerstone