

Understanding and Troubleshooting the Autostate Feature in Catalyst Switches

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Introduction

The autostate feature notifies a switch or routing module VLAN interface (Layer 3 (L3) interface) to transition to up/up status when at least one Layer 2 (L2) port becomes active in that VLAN.

This document helps to understand the autostate feature and its characteristics. After configuring the **interface** `<vlan-id>` command on routers, the interface stays in the up/down or down/down status, depending on the platform. This document discusses why this happens, and how the L3 and L2 interfaces interact with each other in the control plane after being activated.

Before You Begin

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

Prerequisites

There are no specific prerequisites for this document.

Components Used

This document is not restricted to specific software and hardware versions.

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

Understanding Autostate

Autostate is implemented on CatOS and IOS Cisco based switches by default. On some CatOS platforms, this feature can be disabled in order to allow redundancy in special scenarios. On IOS based switches, this feature cannot be disabled.

The router VLAN interfaces have to fulfill the following general conditions to be up/up:

- VLAN exists and is in `active` status on the switch VLAN database.
- VLAN interface exists on the router and is not administratively down.
- At least one L2 (access port or trunk) port exists and has a link up on this VLAN. The latest implementation of the autostate feature allows synchronization to Spanning-Tree Protocol (STP) port status.

A VLAN interface will be brought up after the L2 port has had time to converge (that is, transition from `listening-learning` to `forwarding`). This will prevent routing protocols and other features from using the VLAN interface as if it were fully operational. This also prevents other problems, such as routing black holes, from occurring.

- At least one L2 (access port or trunk) port is in `spanning-tree forwarding` state on the VLAN.

Autostate Configuration on Catalyst Switches

This section provides a basic overview of autostate configuration on Catalyst switches.

Catalyst 6000 Native IOS / Catalyst 4000 Cisco IOS (Supervisor III and IV) / Catalyst 3550

For these switches, the autostate feature is enabled by default. The autostate feature is synchronized with the STP state.

The protocol line state for the VLAN interfaces will come up when the first switchport belonging to the corresponding VLAN link comes up and is in `spanning-tree forwarding` state.

Issue the following commands to check the status of all conditions during troubleshooting:

- **sh vlan**
- **sh int vlan <vlan-id>**
- **sh int <fast / gig> mod/port** (L2 port)
- **sh int <fast / gig> mod/port trunk** (if L2 port is trunk)
- **sh spanningtree vlan <vlan-id>**

Note: Autostate synchronized with STP was introduced in code 12.1(8a)E and later. Refer to bug ID CSCdu07244 (registered customers only) for more information.

Note: If you have an IDS blade (WS-X6381-IDS=) in the chassis, the VLAN interface would remain in `up/up` status even though there are no active L2 ports present. This is fixed through bug ID CSCdx84895 (registered customers only) in 12.1.13E and later releases. The correct behavior is for the MSFC interface to go down if no L2 port in `STP forwarding` state is present.

Catalyst 6000 Hybrid Running CatOS with MSFC card (SUP IA, SUP II, MSFC, MSFC 2)

For these switches, the following additional conditions must be fulfilled, in addition to the `up/up` status general conditions:

- The router (Multilayer Switch Feature Card (MSFC)) port (15/1,16/1) must be in `trunking` mode.
- The VLAN must be allowed on the trunk to the MSFC.

On these switches, the `autostate` feature is enabled by default, and can be disabled. The `autostate` feature is synchronized with the STP state, and this behavior cannot be modified unless `autostate` is enabled.

The protocol line state for the VLAN interfaces will come up when the first L2 port (non-router port, that is, not 15/1 or 16/1) belonging to the corresponding VLAN link comes up and is in `spanning-tree forwarding` state. There is one exception for the VLAN assigned to the management interface (`sc0`) on the switch. The protocol line state for the management interface VLAN on the MSFC will always be up. The `sc0` should always be up after the switch boots. This interface, however, can be forced to administratively down.

Issue the following commands to check the status of all conditions during troubleshooting:

- On MSFC, issue the `show int vlan <vlan-id>` command.
- On the switch, issue the `sh vlan`, `sh port mod/port` (L2 port), `sh trunk mod/port` (if the L2 port is a trunk), and `sh spantree <vlan-id>` commands.

Disable the Autostate Feature

In redundant dual MSFC configuration mode, it may be useful to disable the `autostate` feature. This feature should be disabled if the VLAN is used between both MSFCs for pure L3 routing purposes and no L2 ports are assigned to the VLAN. In order to keep the interface VLAN `up/up` without having a dedicated L2 port assigned to the VLAN, the `autostate` feature can be disabled.

Issue the following command for the current `autostate` feature setting:

```
Switch (enable) sh msfcautostate
MSFC Auto port state: enabled
```

Issue the following command to disable the `autostate` feature:

```
Switch (enable) set msfcautostate disable
Switch (enable) sh msfcautostate
MSFC Auto port state: disabled
Switch (enable)
```

Note: `Autostate` synchronized with STP for Catalyst hybrid switches is supported starting with 5.5(10) and 6.3(1). Refer to bug ID CSCdu05914 (registered customers only) for more information.

Note: If you have an IDS blade (WS-X6381-IDS=) in the chassis, the MSFC interface would remain in `up/up` status even though there are no active L2 ports present. This is fixed through bug ID CSCdt75094 (registered customers only) in 6.2.2, 6.3.1 and later releases. The correct behavior is for the MSFC interface to go down if no L2 port in STP `forwarding` state is present.

Catalyst 5000 with RSM/RSFC Card

For these switches, the following additional conditions must be fulfilled, in addition to the `up/up` general

conditions:

- The router (Route Switch Module (RSM) / Route Switch Feature Card (RSFC)) port must be in trunking mode.
- The VLAN must be allowed on the router trunk.

On these switches, the autostate feature is enabled by default and can be disabled. The autostate feature is *not* synchronized with the STP state.

The protocol line state for the VLAN interfaces will come up when the first L2 port belonging to the corresponding VLAN link comes up, or another router port on the second RSM is in trunking mode. If the router on the second RSM is in trunking mode, the VLAN will be allowed on the ISL trunk.

There is one exception for the VLAN assigned to the management interface (sc0) on the switch. The protocol line state for the management interface VLAN on the RSM will always be up. The sc0 should always be up after the switch boots. This interface, however, can be forced to administratively down.

Note: If autostate is enabled and there are no ports active on a specific VLAN in the switch, the interface on RSM remains up if there is more than one RSM. This allows traffic to flow between the two RSMs on that VLAN without disabling the autostate feature. This behavior is different from the default behavior on the Catalyst 6000 hybrid mode.

Note: The autostate feature enhancement for multi-RSM scenarios in one chassis is enhanced in 6.1.2. (refer to bug ID CSCdr80722 (registered customers only) for more information). Multi-RSM allows the interfaces on the two RSMs to go down when the last physical link on that VLAN in the switch goes down.

Issue the following commands to check the status of all conditions during troubleshooting:

- On the RSM, issue the **show int <vlan-id>** command.
- On the switch, issue the **sh vlan**, **sh port mod/port** (L2 port), **sh trunk mod/port** (if the L2 port is a trunk), and **sh spantree <vlan-id>** commands.

Issue the following command to view the current autostate feature setting:

```
Switch (enable) sh rsmautostate
RSM Auto port state: enabled
Multi-RSM Option: enabled
```

Issue the following command to disable the autostate feature:

```
Switch (enable) set rsmautostate disable
RSM port auto state disabled.
Switch (enable) sh rsmautostate
RSM Auto port state: disabled
Multi-RSM Option: enabled
Switch (enable)
```

Issue the following command to disable the multi-RSM feature in autostate:

```
Switch (enable) sh rsmautostate
RSM Auto port state: enabled
Multi-RSM Option: enabled
Switch (enable) set rsmautosta multirsm disable
RSM port auto state multiple RSM disabled.
Switch (enable) sh rsmautostate
RSM Auto port state: enabled
Multi-RSM Option: disabled
```

Switch (enable)

Note: Disabling multi-RSM is an additional feature of autostate. To use this feature, autostate must be enabled.

Catalyst 4000 (Supervisor I and II) with Layer 3 Modules

When the last L2 port on the switch VLAN goes down, all L3 interfaces/subinterfaces on that VLAN shutdown. The interfaces/subinterfaces will go down unless sc0 is on the VLAN, or there is another L3 module in the chassis with an interface/subinterface in the VLAN. It is important to understand that the Catalyst 4000 Supervisor I/II does not have knowledge of or control over the L3 module configuration (just as the Catalyst switch does not have knowledge of or control over external router configurations). Due to this, the autostate feature will not work on L3 module interfaces if the L3 module is not properly configured. Refer to the following guidelines:

- The autostate feature is enabled by default. Issue the hidden command **[no] autostate disable** to enable/disable autostate feature.
- The autostate feature is not synchronized with the STP state.

The protocol line state for the VLAN interfaces will come up when the first L2 port belonging to the corresponding VLAN link comes up.

Issue the following command to see what Catalyst 4000 L3 services module interfaces have been shut down or brought up by the autostate feature:

```
Router#sh autostate entries
Autostate Feature is currently enabled on the system.
```

Issue the following command to disable the autostate feature (this is a hidden command):

```
Router#autostate disable
Disabling Autostate
Router#sh autostate entries
Autostate Feature is currently disabled on the system.
```

Issue the following command to re-enable the autostate feature:

```
Router#no autostate disable
Enabling Autostate
Router#sh autostate entries
Autostate Feature is currently enabled on the system.
```

Troubleshooting the Autostate Feature on IOS Based Switches

Perform these troubleshooting steps if the VLAN interface is down.

1. This is the symptom of a VLAN interface being in up/down status.

```
Corgon-6000#sh int vlan 151
Vlan151 is up, line protocol is down
```

```
!--- Line protocol on interface VLAN 151 is down.
!--- You need to investigate why this line protocol is not up
!--- (at least one L2 port exists, and there should be a
```

```
!--- link up on this VLAN).
```

2. Check to make sure that VLAN 151 exists in the VLAN database and is active. The command below shows that the VLAN exists and is active on the switch.

```
Corgon-6000#sh vlan 151 | i 151
151 VLAN151          active      Gi4/10
151 enet 100151      1500 - - - - - 0 0
Corgon-6000#
```

```
!--- VLAN 151 exists in VLAN database and is active.
!--- L2 port Gig4/10 is assigned to VLAN 151.
```

3. Check the status of interface gig 4/10 assigned to VLAN 151.

```
Corgon-6000#sh int gig 4/10
GigabitEthernet4/10 is up, line protocol is down (notconnect)
```

```
Corgon-6000#sh run int gig 4/10
Building configuration...
Current configuration : 182 bytes
!
interface GigabitEthernet4/10
no ip address
logging event link-status
logging event bundle-status
switchport
switchport access vlan 151
switchport mode access
end
```

4. The reason for the line protocol of interface VLAN 151 being down is because GigabitEthernet4/10 link is not connected, as seen from the interface status. It is possible that no device is connected to the interface or that the link has cabling or auto-negotiation issues preventing the link from being up.
5. Connect the device to GigabitEthernet4/10 to bring the interface link up.

```
Mar 11 12:10:52.340: %LINK-3-UPDOWN: Interface GigabitEthernet4/10,changed state to
Mar 11 12:10:53.156: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet
Corgon-6000#
Corgon-6000#
Corgon-6000#sh int vlan 151
Vlan151 is up, line protocol is down
```

6. Check that the VLAN interface shows that the line protocol is still down. You need to investigate why this line protocol is not up. Make sure that at least one L2 port is in spanning-tree forwarding state on this VLAN.

```
Corgon-6000#sh spanning-tree vlan 151
VLAN0151
Spanning tree enabled protocol rstp
Root ID    Priority    32768
           Address    00d0.003f.8897
           This bridge is the root
           Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
Bridge ID  Priority    32768
           Address    00d0.003f.8897
           Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time 300
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi4/10	Desg	LRN	4	128.202	P2p

```
Corgon-6000#
```

7. The Spanning-tree port status is LRN, which means learning state. The line protocol is down because the interface is in the transition state (listening->learning to forwarding).

```
Corgon-6000#
```

```
Mar 11 12:11:23.406: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan151,
changed state to up
```

Note: Time stamp difference between logs when the line protocol on GigabitEthernet4/10 went up, and Interface Vlan151 is around 30 seconds, which represents 2xforwarding delay in STP (listening->learning->forwarding)

```
Corgon-6000#sh int vlan 151
```

```
Vlan151 is up, line protocol is up
```

8. The line protocol is up. You need to verify spanning-tree port status on the L2 port (should be forwarding).

```
Corgon-6000#sh spanning-tree vlan 151
```

```
VLAN0151
```

```
Spanning tree enabled protocol rstp
```

```
Root ID    Priority    32768
Address    00d0.003f.8897
```

```
This bridge is the root
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID  Priority    32768
```

```
Address    00d0.003f.8897
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Aging Time 300
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi4/10	Desg	FWD	4	128.202	P2p

```
!--- Verified spanning-tree port status on L2 port
!--- is FWN = forwarding.
```

Troubleshooting the Autostate Feature on CatOS Based Switches

Perform these troubleshooting steps if the VLAN interface is down.

1. This is the symptom of a VLAN interface on the MSFC being down/down

```
Topvar-msfc>sh int vlan 151
```

```
Vlan151 is down, line protocol is down
```

```
!--- Line protocol is down (not administratively down). If so, issue the
!--- no shutdown command under the interface.
!--- Line protocol on interface VLAN 151 is down in this output.
!--- You need to investigate why this line protocol is not up
!--- (at least one L2 port exists, and there should be a
!--- link up on this VLAN).
```

2. Check to make sure that VLAN 151 exists in the VLAN database and is active. The command below shows that the VLAN exists and is active on the switch.

```

Topvar (enable) sh vlan 151
VLAN Name                               Status   IfIndex Mod/Ports, Vlans
-----
151  VLAN151                               active  284     3/1     15/1

```

3. As you can see, L2 ports 3/1 and 15/1(MSFC) are assigned to VLAN 151. Check the status of port 3/1 assigned to VLAN 15. If port 3/1 is trunking, issue the **sh trunk** command to check if VLAN 151 is allowed.

```

Topvar (enable) sh port 3/1
Port Name                               Status   Vlan     Duplex Speed Type
-----
3/1                                       disabled 151     auto   auto  10/100BaseTX

```

```

!--- Since the only port (3/1) is disabled,
!--- the line protocol for interface VLAN 151 is down.

```

4. Enable port 3/1, as shown below.

```

Topvar (enable) set port enable 3/1
Port 3/1 enabled.
2003 Mar 12 05:42:10 %PAGP-5-PORTTOSTP:Port 3/1 joined bridge port 3/1
Topvar (enable) sh port 3/1
Port Name                               Status   Vlan     Duplex Speed Type
-----
3/1                                       connected 151     a-half a-10  10/100BaseTX

```

5. Session into the MSFC and verify the status of the VLAN interface again.

```

Topvar (enable) ses 15
Trying Router-15...
Connected to Router-15.
Escape character is '^]'.

```

```

Topvar-msfc>sh int vlan 151
Vlan151 is down, line protocol is down

```

6. As you can see, the line protocol on interface VLAN 151 is still down. You need to investigate why this line protocol is not up. At least one L2 port is in spanning-tree forwarding state on this VLAN. Make sure by checking the switch, as shown below.

```

Topvar (enable) sh spantree 151
VLAN 151
Spanning tree mode           PVST+
Spanning tree type           ieee
Spanning tree enabled
Designated Root              00-07-4f-1c-e8-47
Designated Root Priority      0
Designated Root Cost         119
Designated Root Port         3/1
Root Max Age 20 sec          Hello Time 2 sec      Forward Delay 15 sec
Bridge ID MAC ADDR           00-05-00-a9-f4-96
Bridge ID Priority            32768
Bridge Max Age 20 sec          Hello Time 2 sec      Forward Delay 15 sec
Port                          Vlan Port-State      Cost      Prio Portfast Channel_id
-----
3/1                            151 listening         100       32 disabled 0

```

```

Topvar (enable)

```

7. Spanning-tree port status is in listening yet. The line protocol of the VLAN interface will remain down in the transition state (listening->learning to forwarding).

```

Topvar (enable) sh spantree 151
VLAN 151
Spanning tree mode           PVST+

```

```

Spanning tree type          ieee
Spanning tree enabled
Designated Root            00-07-4f-1c-e8-47
Designated Root Priority    0
Designated Root Cost       119
Designated Root Port       3/1
Root Max Age 20 sec        Hello Time 2 sec   Forward Delay 15 sec
Bridge ID MAC ADDR         00-05-00-a9-f4-96
Bridge ID Priority         32768
Bridge Max Age 20 sec      Hello Time 2 sec   Forward Delay 15 sec

```

```

Port                Vlan Port-State    Cost      Prio Portfast Channel_id
-----
3/1                 151 forwarding        100     32 disabled 0
15/1                151 forwarding         4     32 enabled 0

```

Topvar (enable)

8. Spanning-tree port status on the L2 port is forwarding. The line protocol on the interface VLAN should now be up. Verify that the line protocol is up, as shown below.

```

Topvar (enable) ses 15
Trying Router-15...
Connected to Router-15.
Escape character is '^]'.

```

```

Topvar-msfc>sh int vlan 151
Vlan151 is up, line protocol is up
It is up in up/up status as expected.

```

9. If there is still problem with the interface VLAN being up/up, check that the router port is in trunking mode, and that the VLAN is allowed on the router trunk. A sample output is shown below.

```

Topvar (enable) sh trunk 15/1
* - indicates vtp domain mismatch
Port      Mode          Encapsulation    Status      Native vlan
-----
15/1      nonegotiate    isl               trunking    1

```

```

Port      Vlans allowed on trunk
-----
15/1      1-1005,1025-4094

```

```

Port      Vlans allowed and active in management domain
-----
15/1      1,151

```

```

Port      Vlans in spanning tree forwarding state and not pruned
-----
15/1      1,151

```

Topvar (enable)

```

!--- VLAN 151 is allowed, and is in spanning-tree
!--- forwarding state. VLAN 151 is not pruned.

```

Related Information

- [set msfcautostate](#)
 - [set rsmautostate](#)
 - [Understanding and Configuring Spanning-Tree Protocol \(STP\) on Catalyst Switches](#)
 - [Technical Support – Cisco Systems](#)
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