Configuring Port-Based Traffic Control

This chapter describes how to configure port-based traffic control on the Catalyst 4500 series switch.

Note Storm control is supported in hardware on non-blocking gigabit ports on all supervisor engines (WS-X4014, WS-X4015, WS-X4013+) and in software on all other ports, implying that the counters for these interfaces are approximate and computed.

Note For complete syntax and usage information for the switch commands used in this chapter, refer to the *Catalyst 4500 Series Switch Cisco IOS Command Reference* and related publications at http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/index.htm

This chapter consists of these sections:

Overview of Storm Control

Storm control prevents LAN interfaces from being disrupted by a broadcast storm. A broadcast storm occurs when broadcast packets flood the subnet, creating excessive traffic and degrading network performance. Errors in the protocol-stack implementation or in the network configuration can cause a broadcast storm.

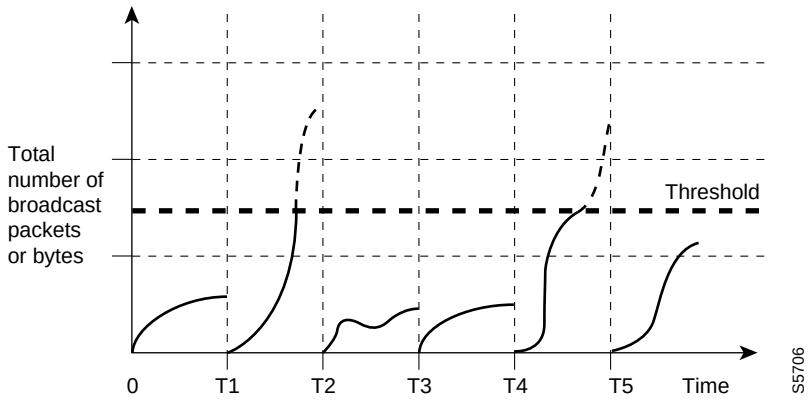
Note Some ports support hardware-based broadcast suppression, whereas others support software-based broadcast suppression.

Hardware-based Storm Control Implementation

Broadcast suppression uses filtering that measures broadcast activity in a subnet over a one-second interval and compares the measurement with a predefined threshold. If the threshold is reached, further broadcast activity is suppressed for the duration of the interval. Broadcast suppression is disabled by default.

Figure 28-1 shows the broadcast traffic patterns on a LAN interface over a given interval. In this example, broadcast suppression occurs between times T1 and T2 and between T4 and T5. During those intervals, the amount of broadcast traffic exceeded the configured threshold.

Figure 28-1 Storm Control Example - Hardware-based Implementation



The broadcast suppression threshold numbers and the time interval combination make the broadcast suppression algorithm work with different levels of granularity. A higher threshold allows more broadcast packets to pass through.

Broadcast suppression on the Catalyst 4500 series switches is implemented in hardware. The suppression circuitry monitors packets passing from a LAN interface to the switching bus. If the packet destination address is broadcast, then the broadcast suppression circuitry tracks the current count of broadcasts within the one-second interval, and when a threshold is reached, it filters out subsequent broadcast packets.

Because hardware broadcast suppression uses a bandwidth-based method to measure broadcast activity, the most significant implementation factor is setting the percentage of total available bandwidth that can be used by broadcast traffic. Because packets do not arrive at uniform intervals, the one-second interval during which broadcast activity is measured can affect the behavior of broadcast suppression.

Software-based Storm Control Implementation

When storm control is enabled on an interface, the switch monitors packets received on the interface and determines whether or not the packets are broadcast. The switch monitors the number of broadcast packets received within a one-second time interval. When the interface threshold is met, all incoming data traffic on the interface is dropped. This threshold is specified as a percentage of total available bandwidth that can be used by broadcast traffic. If the lower threshold is specified, all data traffic is forwarded as soon as the incoming traffic falls below that threshold.

Enabling Storm Control

Note You cannot configure Storm Control on some of the members of an EtherChannel; Storm Control must be configured on all or none of the ports. If you configure Storm Control on only some of the ports, those ports will be dropped from the EtherChannel interface (put in suspended state). Therefore, you should configure Storm Control at the EtherChannel Interface level, and not at the physical interface level.

To enable storm control, perform this task:

	Command	Purpose
Step 1	`Switch# configure terminal`	Enters global configuration mode.
Step 2	`Switch(config)# interface interface-id`	Enters interface configuration mode and enter the port to configure.
Step 3	`Switch(config-if)# storm-control broadcast level [high level] [lower level]`	Configures broadcast storm control. Specifies the upper threshold levels for broadcast traffic. The storm control action occurs when traffic utilization reaches this level. (Optional) Specifies the falling threshold level. The normal transmission restarts (if the action is filtering) when traffic drops below this level for interfaces that support software-based suppression. **Note** For ports that perform hardware-based suppression, the lower threshold is ignored.
Step 4	`Switch(config-if)# storm-control action {shutdown | trap}`	Specifies the action to be taken when a storm is detected. The default is to filter out the broadcast traffic and not to send out traps. The **shutdown** keyword sets the port to error-disable state during a storm. If the recover interval is not set, the port remains in shutdown state. **Note** The **trap** keyword generates an SNMP trap when a storm is detected. This keyword is available but not supported in the 12.1(19) EW release.
Step 5	`Switch(config-if)# exit`	Returns to configuration mode.
Step 6	`Switch(config)# end`	Returns to privileged EXEC mode.
Step 7	`Switch# show storm-control [interface] broadcast`	Displays the number of packets suppressed.
Step 8	`Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

The following example shows how to enable storm control on interface.

```
Switch# conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# int fa3/1
Switch(config-if)# storm-control broadcast level 50
Switch(config-if)# end
Switch# wr
```

```
Building configuration...

00:11:06: %SYS-5-CONFIG_I: Configured from console by consoleCompressed configuration from
5394 bytes to 1623 bytes[OK]
Switch#sh  stor
Switch#sh  storm-control
Interface  Filter State   Upper    Lower    Current
---------  -------------  -------  -------  -------
Fa3/1      Forwarding      50.00%   50.00%    0.00%
Switch#
```

Disabling Storm Control

To disable storm control, perform this task:

	Command	Purpose
Step 1	`Switch# configure terminal`	Enters global configuration mode.
Step 2	`Switch(config)# interface` *interface-id*	Enters interface configuration mode and enter the port to configure.
Step 3	`Switch(config-if)# no storm-control broadcast level`	Disables port storm control.
Step 4	`Switch(config-if)# no storm-control action {shutdown | trap}`	Disables the specified storm control action and returns to default filter action.
Step 5	`Switch(config-if)# exit`	Returns to configuration mode.
Step 6	`Switch(config)# end`	Returns to privileged EXEC mode.
Step 7	`Switch# show storm-control broadcast`	Verifies your entries.
Step 8	`Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

The following example shows how to disable storm control on interface.

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int fa3/1
Switch(config-if)#no storm-control broadcast level
Switch(config-if)#end
Switch#wr
Building configuration...

00:12:09: %SYS-5-CONFIG_I: Configured from console by consoleCompressed configuration from
5357 bytes to 1594 bytes[OK]
Switch#sh sto
Switch#sh storm-control
Interface  Filter State   Upper    Lower    Current
---------  -------------  -------  -------  -------
Switch#
```

Displaying Storm Control

Note Use the **show interface capabilities** command to determine the mode in which storm control is supported on an interface.

The following example shows an interface that supports broadcast suppression in software (sw).

```
Switch# show interfaces g4/4 capabilities
show interfaces g4/4 capabilities
GigabitEthernet4/4
  Model:                 WS-X4418-Gbic
  Type:                  1000BaseSX
  Speed:                 1000
  Duplex:                full
  Trunk encap. type:     802.1Q
  Trunk mode:            on,off,desirable,nonegotiate
  Channel:               yes
  Broadcast suppression: percentage(0-100), sw
  Flowcontrol:           rx-(off,on,desired),tx-(off,on,desired)
  VLAN Membership:       static, dynamic
  Fast Start:            yes
  Queuing:               rx-(N/A), tx-(4q1t, Shaping)
  CoS rewrite:           yes
  ToS rewrite:           yes
  Inline power:          no
  SPAN:                  source/destination
  UDLD:                  yes
  Link Debounce:         no
  Link Debounce Time:    no
  Port Security:         yes
  Dot1x:                 yes
  MTU Supported:         no jumbo frames, no baby giants
Switch#
```

The following example shows an interface that supports broadcast suppression in hardware (hw).

```
Switch# show interfaces g4/1 capabilities
show interfaces g4/1 capabilities
GigabitEthernet4/1
  Model:                 WS-X4418-Gbic
  Type:                  No Gbic
  Speed:                 1000
  Duplex:                full
  Trunk encap. type:     802.1Q,ISL
  Trunk mode:            on,off,desirable,nonegotiate
  Channel:               yes
  Broadcast suppression: percentage(0-100), hw
  Flowcontrol:           rx-(off,on,desired),tx-(off,on,desired)
  VLAN Membership:       static, dynamic
  Fast Start:            yes
  Queuing:               rx-(N/A), tx-(4q1t, Sharing/Shaping)
  CoS rewrite:           yes
  ToS rewrite:           yes
  Inline power:          no
```

```
  SPAN:                   source/destination
  UDLD:                   yes
  Link Debounce:          no
  Link Debounce Time:     no
  Port Security:          yes
  Dot1x:                  yes
  MTU Supported:          jumbo frames, baby giants
Switch#
```

Note Use the **show interfaces counters storm-control** command to display a count of discarded packets.

```
Switch# show interfaces counters storm-control

Port         BcastSuppLevel    TotalSuppressedPackets
Gi4/4                2.00%                        0
Switch#
```

Note Use the **show storm-control** command to display the configured thresholds and status of storm on an interface.

```
Switch# show storm-control

Interface  Filter State   Upper    Lower    Current
---------  -------------  -------  -------  -------
Gi4/4      Forwarding       2.00%    2.00%    N/A
Switch#
```

Note In the example shown above, “current” represents the percentage of traffic suppressed at a given instant, and the value is N/A for ports that perform suppression in hardware.