



## Configuring Port Security

This chapter describes how to configure the port security feature.



### 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:

- [Understanding Port Security, page 26-1](#)
- [Default Port Security Configuration, page 26-2](#)
- [Port Security Guidelines and Restrictions, page 26-3](#)
- [Configuring Port Security, page 26-3](#)
- [Displaying Port Security Settings, page 26-7](#)

## Understanding Port Security

You can use the port security feature to restrict input to an interface by limiting and identifying MAC addresses of the workstations that are allowed to access the port. When you assign secure MAC addresses to a secure port, the port does not forward packets with source addresses outside the group of defined addresses. If you limit the number of secure MAC addresses to one and assign a single secure MAC address, the workstation attached to that port is assured the full bandwidth of the port.

If a port is configured as a secure port and the maximum number of secure MAC addresses is reached, when the MAC address of a workstation attempting to access the port is different from any of the identified secure MAC addresses, a security violation occurs.

After you have set the maximum number of secure MAC addresses on a port, the secure addresses are included in an address table in one of these ways:

- You can configure all secure MAC addresses by using the **switchport port-security mac-address mac\_address** interface configuration command.
- You can allow the port to dynamically configure secure MAC addresses with the MAC addresses of connected devices.
- You can configure a number of addresses and allow the rest to be dynamically configured.

**Note**

If the port shuts down, all dynamically learned addresses are removed.

After the maximum number of secure MAC addresses is configured, they are stored in an address table. To ensure that an attached device has the full bandwidth of the port, configure the MAC address of the attached device and set the maximum number of addresses to one, which is the default.

**Note**

When a Catalyst 4000 switch port is configured to support voice as well as port security, the maximum number of allowable MAC addresses on this port should be changed to three.

A security violation occurs if the maximum number of secure MAC addresses has been added to the address table and a workstation whose MAC address is not in the address table attempts to access the interface.

You can configure the interface for one of these violation modes, based on the action to be taken if a violation occurs:

- **Restrict**—A port security violation restricts data, causes the SecurityViolation counter to increment, and causes an SNMP Notification to be generated. The rate at which SNMP traps are generated can be controlled by the **snmp-server enable traps port-security trap-rate** command. The default value (“0”) causes an SNMP trap to be generated for every security violation.
- **Shutdown**—A port security violation causes the interface to shut down immediately. When a secure port is in the error-disabled state, you can bring it out of this state by entering the **errdisable recovery cause psecure-violation** global configuration command or you can manually reenabling it by entering the **shutdown** and **no shut down** interface configuration commands. This is the default mode.

You can also customize the time to recover from the specified error disable cause (default is 300 seconds) by entering the **errdisable recovery interval interval** command.

## Default Port Security Configuration

Table 26-1 shows the default port security configuration for an interface.

**Table 26-1 Default Port Security Configuration**

Feature	Default Setting
Port security	Disabled on a port
Maximum number of secure MAC addresses	1
Violation mode	Shutdown. The port shuts down when the maximum number of secure MAC addresses is exceeded, and an SNMP trap notification is sent.
Aging	Disabled
Aging type	Absolute
Static Aging	Disabled

# Port Security Guidelines and Restrictions

Follow these guidelines when configuring port security:

- A secure port cannot be a trunk port.
- A secure port cannot be a destination port for Switch Port Analyzer (SPAN).
- A secure port cannot belong to an EtherChannel port-channel interface.
- A secure port cannot be an 802.1X port. If you try to enable 802.1X on a secure port, an error message appears, and 802.1X is not enabled. If you try to change an 802.1X-enabled port to a secure port, an error message appears, and the security settings are not changed.
- A secure port and static MAC address configuration are mutually exclusive.

## Configuring Port Security

These sections describe how to configure port security:

- [Configuring Port Security on an Interface, page 26-3](#)
- [Configuring Port Security Aging, page 26-5](#)

## Configuring Port Security on an Interface

To restrict traffic through a port by limiting and identifying MAC addresses of the stations allowed to access the port, perform this task:

	Command	Purpose
Step 1	Switch(config)# <b>interface</b> <i>interface_id</i>	Enters interface configuration mode and enters the physical interface to configure, for example <b>gigabitethernet 3/1</b> .
Step 2	Switch(config-if)# <b>switchport mode access</b>	Sets the interface mode as access; an interface in the default mode (dynamic desirable) cannot be configured as a secure port.
Step 3	Switch(config-if)# <b>switchport port-security</b>	Enables port security on the interface.
Step 4	Switch(config-if)# <b>switchport port-security maximum</b> <i>value</i>	(Optional) Sets the maximum number of secure MAC addresses for the interface. The range is 1 to 1024; the default is 1.

	Command	Purpose (continued)
Step 5	Switch(config-if)# <b>switchport port-security violation {restrict   shutdown}</b>	<p>(Optional) Sets the violation mode, the action to be taken when a security violation is detected, as one of these:</p> <ul style="list-style-type: none"> <li>• <b>restrict</b>—A port security violation restricts data and causes the SecurityViolation counter to increment and send an SNMP trap notification.</li> <li>• <b>shutdown</b>—The interface is error-disabled when a security violation occurs.</li> </ul> <p><b>Note</b> When a secure port is in the error-disabled state, you can bring it out of this state by entering the <b>errdisable recovery cause psecure-violation</b> global configuration command or you can manually reenable it by entering the <b>shutdown</b> and <b>no shut down</b> interface configuration commands.</p>
Step 6	Switch(config-if)# <b>switchport port-security limit rate invalid-source-mac</b>	Sets the rate limit for bad packets.
Step 7	Switch(config-if)# <b>switchport port-security mac-address mac_address</b>	(Optional) Enters a secure MAC address for the interface. You can use this command to enter the maximum number of secure MAC addresses. If you configure fewer secure MAC addresses than the maximum, the remaining MAC addresses are dynamically learned.
Step 8	Switch(config-if)# <b>end</b>	Returns to privileged EXEC mode.
Step 9	Switch# <b>show port-security address interface interface_id</b> Switch# <b>show port-security address</b>	Verifies your entries.

- To return the interface to the default condition as not a secure port, use the **no switchport port-security** interface configuration command.
- To return the interface to the default number of secure MAC addresses, use the **no switchport port-security maximum value**.
- To delete a MAC address from the address table, use the **no switchport port-security mac-address mac\_address** command.
- To return the violation mode to the default condition (shutdown mode), use the **no switchport port-security violation {restrict | shutdown}** command.

This example shows how to enable port security on Fast Ethernet port 12 and how to set the maximum number of secure addresses to 5. The violation mode is the default, and no secure MAC addresses are configured.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 3/12
Switch(config-if)# switchport mode access
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security maximum 5
Switch(config-if)# end
Switch# show port-security interface fastethernet 3/12
Port Security           :Enabled
Port Status             :Secure-up
Violation Mode          :Shutdown
Aging Time              :0
Aging Type              :Absolute
SecureStatic Address Aging :Enabled
Maximum MAC Addresses   :5
Total MAC Addresses     :0
Configured MAC Addresses :0
Last Source Address     :0000.0000.0401
Security Violation Count :0
```

This example shows how to configure a secure MAC address on Fast Ethernet port 12 and verify the configuration:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 5/12
Switch(config-if)# switchport mode access
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security mac-address 1000.2000.3000
Switch(config-if)# end
Switch#sh port-security address
      Secure Mac Address Table
-----
Vlan    Mac Address      Type                Ports    Remaining Age
      (mins)
-----
      1    1000.2000.3000   SecureConfigured   Fa5/12    15 (I)
```

## Configuring Port Security Aging

You can use port security aging to set the aging time and aging type for all secure addresses on a port. Use this feature to remove and add PCs on a secure port without manually deleting the existing secure MAC addresses while still limiting the number of secure addresses on a port.

To configure port security aging, perform this task:

	Command	Purpose
Step 1	Switch(config)# <b>interface</b> <i>interface_id</i>	Enters interface configuration mode for the port on which you want to enable port security aging.
Step 2	Switch(config-if)# <b>switchport port-security</b> [ <b>aging</b> { <b>static</b>   <b>time</b> <i>aging_time</i>   <b>type</b> { <b>absolute</b>   <b>inactivity</b> } ]	Sets the aging time for the secure port.  The <b>static</b> keyword enables aging for statically configured secure addresses on this port.  The <b>time</b> <i>aging_time</i> keyword specifies the aging time for this port. Valid range for <i>aging_time</i> is from 0 to 1440 minutes. If the time is equal to 0, aging is disabled for this port.  The <b>type</b> keyword sets the aging type as <b>absolute</b> or <b>inactive</b> . For absolute aging, all the secure addresses on this port ago out exactly after the time (minutes) specified and are removed from the secure address list. For inactive aging, the secure addresses on this port ago out only if there is no data traffic from the secure source address for the specified time period.
Step 3	Switch(config-if)# <b>end</b>	Returns to privileged EXEC mode.
Step 4	Switch# <b>show port security</b> [ <b>interface</b> <i>interface_id</i> ] [ <b>address</b> ]	Verifies your entries.

To disable port security aging for all secure addresses on a port, use the **no switchport port-security aging time** interface configuration command.

This example shows how to set the aging time as 2 hours for the secure addresses on the Fast Ethernet interface 5/1:

```
Switch(config)# interface fastethernet 5/1
Switch(config-if)# switchport port-security aging time 120
```

This example shows how to set the aging time as 2 minutes:

```
Switch(config-if)# switchport port-security aging time 2
```

You can verify the previous commands by entering the **show port-security interface** *interface\_id* privileged EXEC command.

# Displaying Port Security Settings

Use the **show port-security** command to display port-security settings for an interface or for the switch.

To display traffic control information, perform one or more of these tasks:

Command	Purpose
Switch# <b>show port-security</b> [ <b>interface</b> <i>interface_id</i> ]	Displays port security settings for the switch or for the specified interface, including the maximum allowed number of secure MAC addresses for each interface, the number of secure MAC addresses on the interface, the number of security violations that have occurred, and the violation mode.
Switch# <b>show port-security</b> [ <b>interface</b> <i>interface_id</i> ] <b>address</b>	Displays all secure MAC addresses configured on all switch interfaces or on a specified interface with aging information for each address.

This example displays output from the **show port-security** command when you do not enter an interface:

```
Switch# show port-security
Secure Port    MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
          (Count)          (Count)          (Count)
-----
      Fa3/1             2             2             0             Restrict
      Fa3/2             2             2             0             Restrict
      Fa3/3             2             2             0             Shutdown
      Fa3/4             2             2             0             Shutdown
      Fa3/5             2             2             0             Shutdown
      Fa3/6             2             2             0             Shutdown
      Fa3/7             2             2             0             Shutdown
      Fa3/8             2             2             0             Shutdown
      Fa3/10            1             0             0             Shutdown
      Fa3/11            1             0             0             Shutdown
      Fa3/12            1             0             0             Restrict
      Fa3/13            1             0             0             Shutdown
      Fa3/14            1             0             0             Shutdown
      Fa3/15            1             0             0             Shutdown
      Fa3/16            1             0             0             Shutdown
-----
Total Addresses in System (excluding one mac per port)    :8
Max Addresses limit in System (excluding one mac per port) :1024
Global SNMP trap control for port-security                :20 (traps per
second)
```

This example displays output from the **show port-security** command for a specified interface:

```
Switch# show port-security interface fastethernet 5/1
Port Security           :Enabled
Port Status             :Secure-up
Violation Mode          :Restrict
Aging Time              :15 mins
Aging Type              :Absolute
SecureStatic Address Aging :Enabled
Maximum MAC Addresses   :2
Total MAC Addresses     :2
Configured MAC Addresses :2
Last Source Address     :0000.0000.0401
Security Violation Count :0
```

This example displays output from the **show port-security address** command:

```
Switch#sh port-security address
      Secure Mac Address Table
-----
Vlan   Mac Address      Type                Ports      Remaining Age
-----
      (mins)
-----
      1   0000.0001.0000   SecureConfigured   Fa3/1      15 (I)
      1   0000.0001.0001   SecureConfigured   Fa3/1      14 (I)
      1   0000.0001.0100   SecureConfigured   Fa3/2      -
      1   0000.0001.0101   SecureConfigured   Fa3/2      -
      1   0000.0001.0200   SecureConfigured   Fa3/3      -
      1   0000.0001.0201   SecureConfigured   Fa3/3      -
      1   0000.0001.0300   SecureConfigured   Fa3/4      -
      1   0000.0001.0301   SecureConfigured   Fa3/4      -
      1   0000.0001.1000   SecureConfigured   Fa3/5      -
      1   0000.0001.1001   SecureConfigured   Fa3/5      -
      1   0000.0001.1100   SecureConfigured   Fa3/6      -
      1   0000.0001.1101   SecureConfigured   Fa3/6      -
      1   0000.0001.1200   SecureConfigured   Fa3/7      -
      1   0000.0001.1201   SecureConfigured   Fa3/7      -
      1   0000.0001.1300   SecureConfigured   Fa3/8      -
      1   0000.0001.1301   SecureConfigured   Fa3/8      -
-----
Total Addresses in System (excluding one mac per port) :8
Max Addresses limit in System (excluding one mac per port) :1024
```