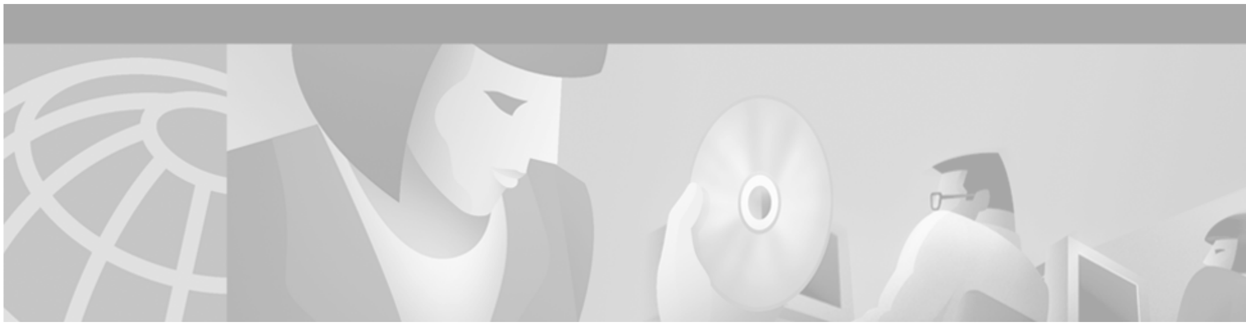


Configuring IP Security Options

Cisco provides IP Security Option (IPSO) support as described in RFC 1108. Cisco's implementation is only minimally compliant with RFC 1108 because the Cisco IOS software only accepts and generates a 4-byte IPSO.

IPSO is generally used to comply with the U.S. government's Department of Defense security policy.

For a complete description of IPSO commands, refer to the chapter "IP Security Options Commands" of the *Cisco IOS Security Command Reference*. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.

To identify the hardware platform or software image information associated with a feature, use the Feature Navigator on Cisco.com to search for information about the feature or refer to the software release notes for a specific release. For more information, see the "Identifying Supported Platforms" section in the chapter "Using Cisco IOS Software."

In This Chapter

This chapter describes how to configure IPSO for both the basic and extended security options described in RFC 1108. This chapter also describes how to configure auditing for IPSO. This chapter includes the following sections:

- IPSO Configuration Task List
- IPSO Configuration Examples

IPSO Configuration Task List

This section describes the following configuration tasks:

- Configuring Basic IP Security Options
- Configuring Extended IP Security Options
- Configuring the DNSIX Audit Trail Facility

Configuring Basic IP Security Options

Cisco's basic IPSO support provides the following features:

- Defines security level on a per-interface basis
- Defines single-level or multilevel interfaces
- Provides a label for incoming packets
- Strips labels on a per-interface basis
- Reorders options to put any basic security options first

To configure basic IPSO, complete the tasks in the following sections:

- Enabling IPSO and Setting the Security Classifications
- Specifying How IP Security Options Are Processed

Enabling IPSO and Setting the Security Classifications

To enable IPSO and set security classifications on an interface, use either of the following commands in interface configuration mode:

Command	Purpose
`Router(config-if)# ip security dedicated level authority [authority...]`	Sets an interface to the requested IPSO classification and authorities.
`Router(config-if)# ip security multilevel level1 [authority1...] to level2 authority2 [authority2...]`	Sets an interface to the requested IPSO range of classifications and authorities.

Use the **no ip security** command to reset an interface to its default state.

Specifying How IP Security Options Are Processed

To specify how IP security options are processed, use any of the following optional commands in interface configuration mode:

Command	Purpose
`Router(config-if)# ip security ignore-authorities`	Enables an interface to ignore the authorities field of all incoming packets.
`Router(config-if)# ip security implicit-labelling [level authority [authority...]]`	Classifies packets that have no IPSO with an implicit security label.
`Router(config-if)# ip security extended-allowed`	Accepts packets on an interface that has an extended security option present.
`Router(config-if)# ip security ad`	Ensures that all packets leaving the router on an interface contain a basic security option.
`Router(config-if)# ip security strip`	Removes any basic security option that might be present on a packet leaving the router through an interface.

Command	Purpose
`Router(config-if)# ip security first`	Prioritizes security options on a packet.
`Router(config-if)# ip security reserved-allowed`	Treats as valid any packets that have Reserved1 through Reserved4 security levels.

Default Values for Command Keywords

To fully comply with IPSO, the default values for the minor keywords have become complex. Default value usages include the following:

- The default for all of the minor keywords is *off*, with the exception of **implicit-labelling** and **add**.
- The default value of **implicit-labelling** is *on* if the interface is “unclassified Genser;” otherwise, it is *off*.
- The default value for **add** is *on* if the interface is not “unclassified Genser;” otherwise, it is *off*.

Table 30 provides a list of all default values.

Table 30 Default Security Keyword Values

Interface Type	Level	Authority	Implicit Labeling	Add IPSO
None	None	None	On	Off
Dedicated	Unclassified	Genser	On	Off
Dedicated	Any	Any	Off	On
Multilevel	Any	Any	Off	On

The default value for any interface is “dedicated, unclassified Genser.” Note that this implies implicit labeling. This might seem unusual, but it makes the system entirely transparent to packets without options. This is the setting generated when you specify the **no ip security** interface configuration command.

Configuring Extended IP Security Options

Cisco’s extended IPSO support is compliant with the Department of Defense Intelligence Information System Network Security for Information Exchange (DNSIX) specification documents. Extended IPSO functionality can unconditionally accept or reject Internet traffic that contains extended security options by comparing those options to configured allowable values. This support allows DNSIX networks to use additional security information to achieve a higher level of security than that achievable with basic IPSO.

Cisco also supports a subset of the security features defined in the DNSIX version 2.1 specification. Specifically, Cisco supports DNSIX definitions of the following:

- How extended IPSO is processed
- Audit trail facility

There are two kinds of extended IPSO fields defined by the DNSIX 2.1 specification and supported by Cisco’s implementation of extended IPSO—Network-level Extended Security Option (NLESO) and Auxiliary Extended Security Option (AESO) fields.

NLESO processing requires that security options be checked against configured allowable information, source, and compartment bit values, and requires that the router be capable of inserting extended security options in the IP header.

AESO is similar to NLESO, except that its contents are not checked and are assumed to be valid if its source is listed in the AESO table.

To configure extended IPSO, complete the tasks in the following sections:

- Configuring Global Default Settings
- Attaching ESOs to an Interface
- Attaching AESOs to an Interface

Configuring Global Default Settings

To configure global default setting for extended IPSO, including AESOs, use the following command in global configuration mode:

Command	Purpose
Router(config)# **ip security eso-info** *source compartment-size default-bit*	Configures system-wide default settings.

Attaching ESOs to an Interface

To specify the minimum and maximum sensitivity levels for an interface, use the following commands in interface configuration mode:

	Command	Purpose
Step 1	Router(config-if)# **ip security eso-min** *source compartment-bits*	Sets the minimum sensitivity level for an interface.
Step 2	Router(config-if)# **ip security eso-max** *source compartment-bits*	Sets the maximum sensitivity level for an interface.

Attaching AESOs to an Interface

To specify the extended IPSO sources that are to be treated as AESO sources, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# **ip security aeso** *source compartment-bits*	Specifies AESO sources.

DNSIX version 2.1 causes slow-switching code.

See the "IPSO Configuration Examples" section at the end of this chapter.

Configuring the DNSIX Audit Trail Facility

The audit trail facility is a UDP-based protocol that generates an audit trail of IPSO security violations. This facility allows the system to report security failures on incoming and outgoing packets. The Audit Trail Facility sends DNSIX audit trail messages when a datagram is rejected because of IPSO security violations. This feature allows you to configure organization-specific security information.

The DNSIX audit trail facility consists of two protocols:

- DNSIX Message Deliver Protocol (DMDP) provides a basic message-delivery mechanism for all DNSIX elements.
- Network Audit Trail Protocol provides a buffered logging facility for applications to use to generate auditing information. This information is then passed on to DMDP.

To configure the DNSIX auditing facility, complete the tasks in the following sections:

- Enabling the DNSIX Audit Trail Facility
- Specifying Hosts to Receive Audit Trail Messages
- Specifying Transmission Parameters

Enabling the DNSIX Audit Trail Facility

To enable the DNSIX audit trail facility, use the following command in global configuration mode:

Command	Purpose
`Router(config)# dnsix-nat source ip-address`	Starts the audit writing module.

Specifying Hosts to Receive Audit Trail Messages

To define and change primary and secondary addresses of the host to receive audit messages, use the following commands in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# dnsix-nat primary ip-address`	Specifies the primary address for the audit trail.
Step 2	`Router(config)# dnsix-nat secondary ip-address`	Specifies the secondary address for the audit trail.
Step 3	`Router(config)# dnsix-nat authorized-redirection ip-address`	Specifies the address of a collection center that is authorized to change primary and secondary addresses. Specified hosts are authorized to change the destination of audit messages.

Specifying Transmission Parameters

To specify transmission parameters, use the following commands in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# dnsix-nat transmit-count count`	Specifies the number of records in a packet before it is sent to a collection center.
Step 2	`Router(config)# dnsix-dmdp retries count`	Specifies the number of transmit retries for DMDP.

IPSO Configuration Examples

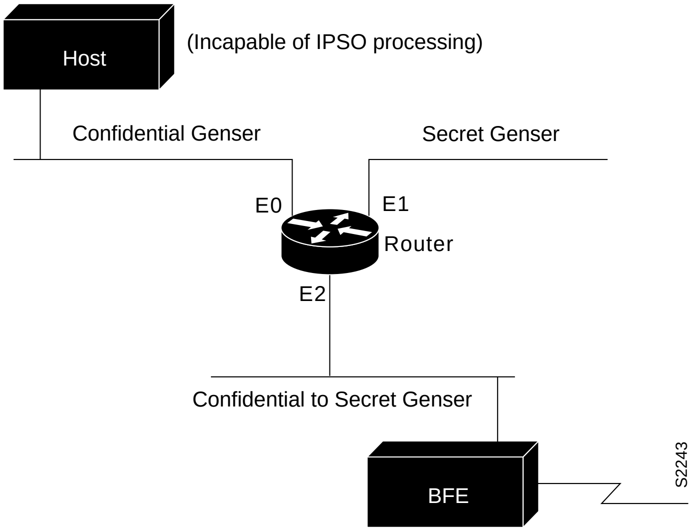
The following sections provide IPSO configuration examples:

- Example 1
- Example 2
- Example 3

Example 1

In this example, three Ethernet interfaces are presented. These interfaces are running at security levels of Confidential Genser, Secret Genser, and Confidential to Secret Genser, as shown in Figure 37.

Figure 37 IPSO Security Levels



The following commands set up interfaces for the configuration in Figure 37:

```
interface ethernet 0
 ip security dedicated confidential genser
interface ethernet 1
 ip security dedicated secret genser
interface ethernet 2
 ip security multilevel confidential genser to secret genser
```

It is possible for the setup to be much more complex.

Example 2

In the following example, there are devices on Ethernet 0 that cannot generate a security option, and so must accept packets without a security option. These hosts do not understand security options; therefore, never place one on such interfaces. Furthermore, there are hosts on the other two networks that are using the extended security option to communicate information, so you must allow these to pass through the system. Finally, there also is a host (a Blacker Front End; see the "Configuring X.25 and LABP" chapter of the *Cisco IOS Wide-Area Networking Configuration Guide* for more information about Blacker emergency mode) on Ethernet 2 that requires the security option to be the first option present, and this condition also must be specified. The new configuration follows.

```
interface ethernet 0
 ip security dedicated confidential genser
 ip security implicit-labelling
 ip security strip
interface ethernet 1
 ip security dedicated secret genser
 ip security extended-allowed
!
interface ethernet 2
 ip security multilevel confidential genser to secret genser
 ip security extended-allowed
 ip security first
```

Example 3

This example shows how to configure a Cisco router with HP-UX CMW DNSIX hosts. The following commands should be configured on each LAN interface of the router for two DNSIX hosts to communicate:

```
ip security multilevel unclassified nsa to top secret nsa
ip security extended allowed
```

DNSIX hosts do not need to know the router's IP addresses, and DNSIX hosts do not need to set up M6RHDB entries for the routers.