IP Switching: Configuring Fast Switching Configuration Guide, Cisco IOS Release 12.2SX

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CONTENTS

Configuring Fast Switching

This module describes how to configure fast switching on Cisco IOS devices and provides configuration guidelines for switching paths and tuning guidelines.

Note IP unicast fast switching is no longer supported on Cisco IOS Releases 12.2(25)S, 12.2(28)SB, 12.2(33)SRA, 12.2(33)SXH, 12.4(20)T and later releases. For these and later releases, components that do not support Cisco Express Forwarding will only work in Process Switched mode.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About Configuring Fast Switching

Benefits of Fast Switching

Fast switching allows higher throughput by switching a packet using a cache created by the initial packet sent to a particular destination. Destination addresses are stored in the high-speed cache to expedite

forwarding. Routers offer better packet-transfer performance when fast switching is enabled. Fast switching is enabled by default on all interfaces that support fast switching.

When packets are fast switched, the first packet is copied to packet memory and the destination network or host is found in the fast-switching cache. The frame is rewritten and sent to the outgoing interface that services the destination. Subsequent packets for the same destination use the same switching path. The interface processor computes the CRC.

Note IP unicast fast switching is no longer supported on Cisco IOS Releases 12.2(25)S, 12.2(28)SB, 12.2(33)SRA, 12.2(33)SXH, 12.4(20)T and later releases. For these and later releases, components that do not support Cisco Express Forwarding will only work in Process Switched mode.

Reasons for Disabling Fast Switching

Fast switching uses a cache created by previous packets to achieve a higher packet throughput. Packet transfer performance is generally better when fast switching is enabled. Fast switching also provides load sharing on a per-destination basis.

By default, fast switching is enabled on all interfaces that support fast switching. However, you may want to disable fast switching to save memory space on interface cards and to help avoid congestion when high-bandwidth interfaces are writing large amounts of information to low-bandwidth interfaces. This is especially important when using rates slower than T1.

Fast switching is not supported on serial interfaces using encapsulations other than HDLC.

Note Turning off fast switching increases system overhead because the packets are then process switched by the system's CPU.

For some diagnostics, such as debugging and packet-level tracing, you need to disable fast switching. Disabling fast switching causes the router to fall back to process switching the packets. If fast switching is running, you might only see the first packet to each destination in the output of any packet-level debugging commands. Subsequent packets to the same destination are fast switched. Many packet level debugging commands cannot process packets that are fast switched. You might want to turn off fast switching temporarily to use process switching instead while you are trying to capture information to diagnose a problem.

AppleTalk Access Lists Automatically Fast Switched

AppleTalk access lists are automatically fast switched. Access list fast switching improves the performance of AppleTalk traffic when access lists are defined on an interface.

Refer to the "Configuring AppleTalk" chapter in the *Cisco IOS AppleTalk and Novell IPX Configuration Guide*for guidelines on creating and using access lists and configuring AppleTalk.

How to Configure Fast Switching

By default, fast switching is enabled on all interfaces that support fast switching. However, you may have reasons to disable fast switching (see the Reasons for Disabling Fast Switching, page 2).

The tasks in this section include enabling fast switching for some software applications, disabling fast switching for other software applications, and managing the route cache associated with fast switching on the device:

Note Fast switching is not supported for the X.25 encapsulations.

Enabling Fast Switching of IPX Directed Broadcast Packets

To enable fast switching of Internet Packet Exchange (IPX) directed broadcast packets, perform the following task. This may be useful in certain broadcast-based applications that rely on helpering.

By default, Cisco IOS software switches IPX packets that are directed to the broadcast address. Fast switching of these packets is disabled. The default behavior is to process switch directed broadcast packets.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipx broadcast-fastswitching**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**ipx broadcast-fastswitching** **Example:** `Router(config)# ipx broadcast-fastswitching`	Enables the router to fast switch IPX directed broadcast packets,
Step 4	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

Disabling IPX Fast Switching

To disable IPX fast switching, perform the following task. IPX fast switching is enabled by default. You might want to disable fast switching for the following reasons:

- To save memory on the interface cards: fast-switching caches require more memory than those used for standard switching
- To avoid congestion on interface cards when a high-bandwidth interface is writing large amounts of information to a low-bandwidth interface

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **no ipx route-cache**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**interface** *type number* **Example:** `Router(config)# interface ethernet 0`	Configures an interface type and enters interface configuration mode. • The *type* argument is the type of interface to be configured. • The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command.
Step 4	**no ipx route-cache** **Example:** `Router(config-if)# no ipx route-cache`	Disables IPX fast switching on an interface.
Step 5	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

Adjusting the Route Cache for IPX

Adjusting the route cache allows you to control the size of the route cache, reduce memory consumption, and improve router performance. You accomplish these tasks by controlling the route cache size and route cache invalidation. The following sections describe these optional tasks:

- Controlling IPX Route Cache Size, page 5
- Controlling IPX Route Cache Entry Invalidation, page 6

Controlling IPX Route Cache Size

You can limit the number of entries stored in the IPX route cache to free up router memory and aid router processing.

Storing too many entries in the route cache can use a substantial amount of router memory, causing router processing to slow. This situation is most common on large networks that run network management applications for NetWare.

For example, if a network management station is responsible for managing all clients and servers in a very large (greater than 50,000 nodes) Novell network, the routers on the local segment can become inundated with route cache entries. You can set a maximum number of route cache entries on these routers to free up router memory and aid router processing.

To control IPX route cache size, perform the following task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipx route-cache max-size** *size*
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ipx route-cache max-size** *size* **Example:** `Router(config)# ipx route-cache max-size 10000`	Sets a maximum limit on the number of entries in the IPX route cac he. • The *size* argument is maximum number of entries allowed in the IPX route cache. **Note** If the route cache has more entries than the specified limit, the extra entries are not deleted. However, they may be removed if route cache invalidation is in use. See the Controlling IPX Route Cache Entry Invalidation, page 6" for more information on invalidating route cache entries.
Step 4	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

Controlling IPX Route Cache Entry Invalidation

You can configure the router to invalidate inactive fast-switch cache entries. If these entries remain invalidated for 1 minute, the router purges the entries from the route cache.

Purging invalidated entries reduces the size of the route cache, reduces memory consumption, and improves router performance. Purging entries also helps ensure accurate route cache information.

You specify the period of time that valid fast switch cache entries must be inactive before the router invalidates them. You can also specify the number of cache entries that the router can invalidate per minute.

To control IPX route cache entry invalidation, perform the following task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipx route-cache inactivity-timeout** *period* [*rate*]
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ipx route-cache inactivity-timeout** *period* [*rate*] **Example:** `Router(config)# ipx route-cache inactivity-timeout 5 10`	Adjusts the period and rate of route cache invalidation because of inactivity. • The *period* argument is the number of minutes that a valid cache entry may be inactive before it is invalidated. Valid values are 0 through 65,535. A value of zero disables this feature. The default is 2. • The *rate* argument is the maximum number of inactive entries that may be invalidated per minute. Valid values are 0 through 65,535. The default rate is 0 (cache entries do not age). **Note** When you use the **ipx route-cache inactivity-timeout** command with the **ipx route-cache max-size** command, you can ensure a small route cache with fresh entries.
Step 4	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

Enabling Padding of Odd-Length IPX Packets

Some IPX end hosts accept only even-length Ethernet packets. If the length of a packet is odd, the packet must be padded with an extra byte so that end host can receive it. By default, Cisco IOS software pads odd-length Ethernet packets.

Note However, there are cases in certain topologies where nonpadded Ethernet packets are forwarded onto a remote Ethernet network. Under specific conditions, you can enable padding on intermediate media as a temporary workaround for this problem. Note that you should perform this task only under the guidance of a customer engineer or other service representative.

To enable the padding of odd-length packets, perform the following task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **no ipx route-cache**
5. **ipx pad-process-switched-packets**
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface serial 0`	Configures an interface type and enters interface configuration mode. • The *type* argument is the type of interface to be configured. • The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command.
Step 4	**no ipx route-cache** **Example:** `Router(config-if)# no ipx route-cache`	Disables IPX fast switching

	Command or Action	Purpose
Step 5	**ipx pad-process-switched-packets** **Example:** `Router(config-if)# ipx pad-process-switched-packets`	Controls whether odd-length packets are padded so as to be sent as even-length packets on an interface.
Step 6	**end** **Example:** `Router(config-if)# end`	Exits to privileged EXEC mode.

Disabling AppleTalk Fast Switching

To disable AppleTalk fast switching on an interface, perform the following task. AppleTalk fast switching is enable by default.

See the Reasons for Disabling Fast Switching, page 2 for information on when you might want to disable AppleTalk fast switching.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **no appletalk route-cache**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**interface** *type number* **Example:** `Router(config)# interface ethernet 0`	Configures an interface type and enters interface configuration mode. • The *type* argument is the type of interface to be configured. • The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command.
Step 4	**no appletalk route-cache** **Example:** `Router(config-if)# no appletalk route-cache`	Disables AppleTalk fast switching.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits to privileged EXEC mode.

Reenabling SMDS Fast Switching for IPX and AppleTalk Packets

Switched Multimegabit Data Service (SMDS) fast switching is enabled by default. To reenable SMDS fast switching on IPX and AppleTalk packets, if it has been disabled, perform the following task.

SMDS is a wide-area networking service offered by some Regional Bell Operating Companies (RBOCs). SMDS fast switching of IPX and AppleTalk packets provides faster packet transfer on serial links with speeds above 56 kbps. Use fast switching if you use high-speed, packet-switched, datagram-based WAN technologies such as Frame Relay offered by service providers.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **encapsulation smds**
5. **ipx route-cache**
6. **appletalk route-cache**
7. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface serial 0`	Configures an interface type and enters interface configuration mode. • The *type* argument is the type of interface to be configured. • The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command.
Step 4	**encapsulation smds** **Example:** `Router(config-if)# encapsulation smds`	Enables SMDS on the desired interface.
Step 5	**ipx route-cache** **Example:** `Router(config-if)# ipx route-cache`	Enables IPX fast switching on the interface.
Step 6	**appletalk route-cache** **Example:** `Router(config-if)# appletalk route-cache`	Enables AppleTalk fast switching on all supported interfaces.
Step 7	**end** **Example:** `Router(config-if)# end`	Exits to privileged EXEC mode.

Disabling DECnet Fast Switching

To disable fast switching of DECnet packets, perform the following task.

By default, DECnet routing software implements fast switching of DECnet packets. You might want to disable fast switching to save memory space on interface cards and to help avoid congestion when high-bandwidth interfaces are writing large amounts of information to low-bandwidth interfaces. Disabling fast switching is especially important when rates slower than T1 are used.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **no decnet route-cache**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface serial 0/0`	Configures an interface type and enters interface configuration mode. • The *type* argument is the type of interface to be configured. • The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command.
Step 4	**no decnet route-cache** **Example:** `Router(config-if)# no decnet route-cache`	Disables fast switching of DECnet packets on a per-interface basis.

	Command or Action	Purpose
Step 5	**end** **Example:** `Router(config-if)# end`	Exits to privileged EXEC mode.

Disabling ISO CLNS Fast Switching Through the Cache

Perform the following task to disable See the Reasons for Disabling Fast Switching, page 2 for information on why you might want to disable ISO CLNS fast switching through the cache.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **no clns route-cache**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface ethernet 0`	Configures an interface type and enters interface configuration mode. • The *type* argument is the type of interface to be configured. • The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command.

	Command or Action	Purpose
Step 4	**no clns route-cache** **Example:** `Router(config-if)# no clns route-cache`	Disables fast switching. **Note** The cache still exists and is used after the **no clns route-cache** command is entered, but the software does not do fast switching through the cache.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits to privileged EXEC mode.

Configuration Examples for Fast Switching

Example Enabling Fast Switching of IPX Directed Broadcast Packets

The following example shows how to enable fast switching of IPX directed broadcast packets:

```
configure terminal
ipx broadcast-fastswitching
end
```

Example Disabling IPX Fast Switching

The following example shows how to disable IPX fast switching:

```
configure terminal
interface ethernet 0
 no ipx route-cache
 end
```

Example Adjusting the Route Cache for IPX

The following examples show how to adjust the route cache for IPX. This allows you to control the size of the route cache, reduce memory consumption, and improve router performance.

Example Controlling IPX Route Cache Size

The following example show how to control the IPX route cache size:

```
configure terminal
ipx route-cache max-size 10000
end
```

In this example the cache size is set to 10000 entries. If the route cache has more entries than the specified limit, the extra entries are not deleted. However, they may be removed if route cache invalidation is in use. See the "Example Controlling IPX Route Cache Entry Invalidation, page 15"for a configuration example.

Example Controlling IPX Route Cache Entry Invalidation

The following example shows how to control IPX route cache entry invalidations;

```
configure terminal
ipx route-cache inactivity-timeout 5 10
end
```

In this example, the inactivity period is set to 5 minutes and sets a maximum of 10 entries that can be invalidated per minute.

When you use the **ipx route-cache inactivity-timeout** command with the **ipx route-cache max-size** command, you can ensure a small route cache with fresh entries.

Example Enabling Padding of Odd-Length IPX Packets

Note Use the **ipx pad-process-switched-packets** command only under the guidance of a customer engineer or other service representative.

The following example shows how to enable padding of odd-length IPX packets:

```
configure terminal
interface serial 0
 no ipx route-cache
 ipx pad-process-switched-packets
 end
```

In this example, the Cisco IOS software pads odd-length packets so that they are sent as even-length packets on serial interface 0.

Example Disabling AppleTalk Fast Switching

The following example shows how to disable AppleTalk fast switching:

```
configure terminal
interface ethernet 0
 no appletalk route-cache
 end
```

Example Reenabling SMDS Fast Switching for IPX and AppleTalk Packets

The following example shows how to reenable SMDS fast switching for IPX and AppleTalk packets if fast switching is disabled:

```
configure terminal
interface serial 0
 encapsulation smds
 ipx route-cache
 appletalk route-cache
 end
```

Example Disabling DECnet Fast Switching

The following example show how to disable DECnet fast switching:

```
configure terminal
interface serial 0/0
 no decnet route-cache
 end
```

DECnet fast switching is disabled on a per-interface basis.

Example Disabling ISO CLNS Fast Switching Through the Cache

The following example shows how to disable ISO CLNS fast switching through the cache:

```
configure terminal

interface ethernet 0

 no clns route-cache
 end
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
IP switching commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples.	*Cisco IOS IP Switching Command Reference*
Overview of switching paths available on Cisco IOS devices	Cisco IOS Switching Paths Overview
Information on how to configure AppleTalk	*Cisco IOS AppleTalk Configuration Guide*
Description of AppleTalk commands	*Cisco IOS AppleTalk Command Reference*

Related Topic	Document Title
Information on how to configure Novell IPX	*Cisco IOS Novell IPX Configuration Guide*
Description of the IPX commands	*Cisco IOS Novell IPX Command Reference*
Information on how to configure SMDS packet-switched software	"Configuring SDMS " chapter in the *Access and Communication Servers Configuration Guide*
Description of SMDS commands	"SMDS Commands " chapter in the *Access and Communication Servers Command Reference*
Information on how to configure DECnet	*Cisco IOS DECnet Configuration Guide*
Description of DECnet command	*Cisco IOS DECnet Command Reference*
Information on how to configure ISO CLNS	*Cisco IOS ISO CLNS Configuration Guide*
Description of ISO CLNS commands	*Cisco IOS ISO CLNS Command Reference*

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Configuring Fast Switching

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1 Feature Information for Configuring Fast Switching

Feature Name	Releases	Feature Information
This table is intentionally left blank because no features were introduced or modified in Cisco IOS Release 12.2(1) or later. This table will be updated when feature information is added to this module.	--	--

Glossary

AppleTalk --A multilayered protocol providing internetwork routing, transaction and data stream service, naming service, and comprehensive file and print sharing.

IPX --Internetwork Packet Exchange. A NetWare protocol that routes outgoing data packets across a network. Every NetWare network has a unique address assigned when its servers are configured. IPX routers use this address to route packets through an internetwork.

ISO CLNS --International Organization for Standardization (ISO) Connectionless Network Service (CLNS). A standard for the network layer of the Open System Interconnection (OSI) model. CLNS is the OSI network layer service that does not require a circuit to be established before data is transmitted. CLNS routes messages to their destination independently of any other message.

NetWare --Popular distributed network operating system developed by Novell.

SMDS --Switched Multimegabit Data Service. A wide-area networking service offered by some Regional Bell Operating Companies (RBOCs).

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