



CEF Enhancements

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The purpose of this document is to describe the changes based on the Cisco Express Forwarding infrastructure scalability enhancements that have been implemented to adapt to the evolution of the Internet and to support new platforms and features. The changes are the removal of IP fast switching and the introduction of command line interface (CLI) modifications.

This document lists Cisco Express Forwarding CLI commands that are removed, replaced, changed, and new. To help you transition to the new CLI format, the document illustrates the output for new commands and changed commands.

Enhancements to Cisco Express Forwarding enable it to operate with the Multiprotocol Label Switching (MPLS) Forwarding Infrastructure (MFI) and guarantee consistency across Cisco IOS release trains. Cisco Express Forwarding infrastructure changes were introduced and implemented in the Cisco IOS 12.2(25)S-based releases and were added for T releases in Cisco IOS Release 12.4(20)T.

Cisco Express Forwarding is an advanced Layer 3 IP switching technology. It optimizes network performance and scalability for all kinds of networks: those that carry small amounts of traffic and those that carry large amounts of traffic in complex patterns, such as the Internet, and networks characterized by intensive web-based applications or interactive sessions.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and 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 module.

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.



Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Information About CEF

This document presents the following topics to explain the changes you will find with the implementation of the Cisco Express Forwarding enhancements. This information should be helpful as you transition to Cisco IOS software that includes the Cisco Express Forwarding and MFI enhancements.

The fifth and sixth topics provide information about the CLI changes implemented as part of the Cisco Express Forwarding enhancements. In each section, the commands that are changed are listed, followed by an explanation of how they are changed. Sample command output is included in sections to compare "before" and "after" output information and to provide new output information.

The information about the commands is presented in the following order:

- Removed or existing, but unsupported, commands
- Commands with modified output
- New commands created for output consistency
- Related commands with unchanged output

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Introduction of CEF Enhancements

Cisco Express Forwarding is at the heart of switching in every router. Improvements have been made to the Cisco Express Forwarding infrastructure to enhance and scale switching. Cisco Express Forwarding enhancements were introduced in Cisco IOS Release 12.2(25)S and first adopted by Cisco IOS 12.2(25)S-based releases. In Cisco IOS Release 12.4(20)T, the Cisco Express Forwarding enhancements were added for Cisco IOS 12.4(20)T releases and later T-based releases.

The table below lists the Cisco IOS releases and platforms that support the Cisco Express Forwarding enhancements and the changes described in this document.

Table 1 *Cisco IOS Releases and Platforms That Support Cisco Express Forwarding Enhancements*

Cisco IOS Release	Platforms Supported
12.2(25)SE	Catalyst 2970 series switches Catalyst 3500 series switches Catalyst 3750 series switches
12.2(25)SG	Catalyst 4500 series Switches
12.2(28)SB	Cisco 7200 series routers Cisco 7301 series routers Cisco 7304 series routers Cisco 10000 series routers
12.2(33)SRA	Cisco 7600 series routers

Cisco IOS Release	Platforms Supported
12.2(33)SXH	Catalyst 6500 series switches
12.4(20)T	Cisco 800 series routers Cisco 1700 series routers Cisco 1800 series routers Cisco 2600 series routers Cisco 2800 series routers Cisco 3200 series routers Cisco 3600 series routers Cisco 3700 series routers Cisco 3800 series routers Cisco 7200 series routers Cisco 7400 series routers Cisco 8850 series routers Cisco AS5000 series universal gateways

CEF Enhancements Described

Cisco IOS Release 12.4(20)T incorporates the following Cisco Express Forwarding infrastructure changes:

- Cisco Express Forwarding Scalability and Selective Rewrite (CSSR) for enhanced scalable, distributed Layer 3 switching
- Enhanced Multiprotocol Label Switching (MPLS) Forwarding Infrastructure (MFI)

For information on MFI enhancements, see [MPLS Infrastructure Changes: Introduction of MFI and Removal of MPLS LSC and LC-ATM Features](#).

The Cisco Express Forwarding infrastructure changes provide the following:

- Simplified fast switching path decisions for both IPv4 and IPv6 traffic, which improve performance and provide more CPU cycles for other Cisco IOS services
- Enhanced scalability to support large numbers of the following:
 - IPv4 and IPv6 prefixes and adjacencies
 - Load balancing paths over multiple links based on Layer 3 routing information
 - Virtual Private Network (VPN) routing and forwarding (VRF) instances
- Improved manageability of the following:
 - Cisco Express Forwarding logging for both IPv4 and IPv6
 - Unicast Reverse Path Forwarding (uRPF) strict and loose mode
 - Cisco Express Forwarding MIB (CEF-MIB)
 - uRPF MIB
 - CLI display enhancements for Cisco Express Forwarding

No new features are introduced in Cisco IOS Release 12.4(20)T. However, some features that previously shipped with a Cisco IOS 12.2(25)S-based release are new to the Cisco IOS 12.4T release.



Note

CSSR and MFI enhancements in Cisco IOS Release 12.4(20)T might result in changed performance characteristics in your network. We suggest that you test configurations before upgrading to this software.

Removal of Support for IPv4 Fast Switching

IPv4 fast switching is removed with the implementation of the Cisco Express Forwarding infrastructure enhancements for Cisco IOS 12.2(25)S-based releases and Cisco IOS Release 12.4(20)T. For these and

later Cisco IOS releases, switching path are Cisco Express Forwarding switched or process switched. This makes the switching decision easier for future development of software features.

**Note**

Starting with the implementation of the Cisco Express Forwarding enhancements and the removal of IPv4 fast switching, components that do not support Cisco Express Forwarding will work only in process switched mode.

CEF Command Changes

The following commands are obsolete and have been removed from Cisco IOS software with the present Cisco Express Forwarding enhancements:

- **show ip cef inconsistency records**
- **show ip cef inconsistency now**
- **show ip cef inconsistency now detail**

The table below lists the commands that replace the removed commands.

Table 2 *Removed Cisco Express Forwarding Commands--Cisco Express Forwarding*

Command Before Cisco Express Forwarding Enhancements	Replacement Command After Cisco Express Forwarding Enhancements
ip cef table adjacency-prefix	--
ip cef table resolution-timer	--
show ip cef inconsistency records	test cef table consistency
show ip cef inconsistency now	test cef table consistency
show ip cef inconsistency now detail	test cef table consistency detail

The following commands still exist, but are no longer supported in Cisco IOS software:

- **show cef events**
- **show cef dropped**
- **show cef non-cef-switched**

The table below lists commands that still exist, but are no longer supported, and the commands that replaces the unsupported commands. You should start using the replacement commands.

Table 3 *Replaced Cisco Express Forwarding Commands--Cisco Express Forwarding Feature*

Command Before Cisco Express Forwarding Enhancements	Replacement Command After Cisco Express Forwarding Enhancements
ip cef event -log	monitor event-log cef event
ip cef interface event-log	monitor event-log cef interface

Command Before Cisco Express Forwarding Enhancements	Replacement Command After Cisco Express Forwarding Enhancements
ip cef table event-log	monitor event-log cef ipv4
ip cef table consistency-check	cef table consistency-check
ip cef loadinfo	cef table output-chain
show cef events	show monitor event-trace cef events all
show cef drop	show {ip ipv6} cef switching statistics[feature]¹
show cef not-cef-switched	show {ip ipv6} cef switching statistics [feature]

CEF show Command Output Changes

This section describes the CLI command output changes introduced with the Cisco Express Forwarding feature. In some commands the output format is changed. In other commands, pieces of information are added or removed from the output. The output of the following commands is changed with this feature:

- show ip cef summary
- show ipv6 cef summary
- show ip cef internal
- show ipv6 cef internal
- show ip cef detail
- show ipv6 cef detail
- show ip cef internal
- show ipv6 cef internal
- show ip cef
- show ip cef exact-route detail
- show ip cef exact-route
- show ip cef adjacency
- show adjacency summary
- show adjacency detail
- show adjacency internal
- show cef state
- show cef timers
- show ip cef epoch
- show ipv6 cef epoch
- show ip cef unresolved detail
- show ipv6 cef unresolved detail
- show ipv6 cef non-recursive

For a full description of these commands, see the Cisco IOS IP Switching Command Reference and the Cisco IOS IPv6 Command Reference.

- [show ip cef summary, page 6](#)

¹ If you enter the optional feature keyword, the output shows per-feature drop and punt counters.

- [show ipv6 cef summary, page 7](#)
- [show ip cef internal, page 8](#)
- [show ipv6 cef internal, page 9](#)
- [show ip cef detail, page 10](#)
- [show ipv6 cef detail, page 11](#)
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- [show ip cef exact-route detail, page 13](#)
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- [show cef state, page 17](#)
- [show cef timers, page 18](#)
- [show ip cef epoch, page 19](#)
- [show ipv6 cef epoch, page 19](#)
- [show ip cef unresolved detail, page 20](#)
- [show ipv6 cef unresolved detail, page 20](#)
- [show ipv6 cef non-recursive, page 21](#)

show ip cef summary

This feature provides the following changes to the output of the **show ip cef summary** command:

- IPv4 and IPv6 are separately addressed.
- Figures related to adjacencies are moved to the **show adjacency summary** command (see the [show adjacency summary, page 15](#)).
- Mtrie data structure descriptions are moved to a new command, the **show ip cef tree** command (see the [New Commands for the CEF Feature, page 21](#)).

The table below compares the **show ip cef summary** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 4 *show ip cef summary Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
Router# show ip cef summary	Router# show ip cef summary
IP CEF with switching (Table Version 32), flags=0x0	IPv4 CEF is enabled and running
26 routes, 0 reresolve, 0 unresolved (0 old, 0 new), peak 2	VRF Default:
26 leaves, 19 nodes, 23400 bytes, 53 inserts, 27 invalidations	22 prefixes (22/0 fwd/non-fwd)
0 load sharing elements, 0 bytes, 0 references	Table id 0
universal per-destination load sharing algorithm, id DF940F94	Database epoch: 0 (22 entries at this epoch)
3(0) CEF resets, 0 revisions of existing leaves	
Resolution Timer: Exponential (currently 1s, peak 1s)	
0 in-place/0 aborted modifications	
refcounts: 1342 leaf, 1321 node	
Table epoch: 0 (26 entries at this epoch)	
Adjacency Table has 4 adjacencies	
2 IPv4 adjacencies	
2 IPv6 adjacencies	

show ipv6 cef summary

This feature provides the following change to the output of the **show ipv6 cef summary** command:

- Output is reformatted (information provided is similar to what was provided before the Cisco Express Forwarding enhancement.)

The table below compares the **show ipv6 cef summary** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 5 *show ipv6 cef summary Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
Router# show ipv6 cef summary	Router# show ipv6 cef summary
IPv6 CEF is enabled and running	IPv6 CEF is enabled and running
Slow processing intvl = 1 seconds backoff level current/max 0/0	VRF Default:
0 unresolved prefixes, 0 requiring adjacency update	20 prefixes (20/0 fwd/non-fwd)
IPv6 CEF default table	Table id 0
19 prefixes	Database epoch: 0 (20 entries at this epoch)

show ip cef internal

This feature provides the following changes to the output of the **show ip cef internal** command:

- IPv4 and IPv6 are separately addressed.
- Mtrie data structure descriptions are moved to a new command, the **show ip cef tree** command (see the [New Commands for the CEF Feature, page 21](#)).
- Troubleshooting is made easier with the addition of references to internal structure pointers.
- The concept of output chain (chain of output features) is introduced.

The table below compares the **show ip cef internal** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 6 *show ip cef internal Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef internal IP CEF with switching (Table Version 32), flags=0x0 26 routes, 0 reresolve, 0 unresolved (0 old, 0 new), peak 2 26 leaves, 19 nodes, 23400 bytes, 53 inserts, 27 invalidations 0 load sharing elements, 0 bytes, 0 references universal per-destination load sharing algorithm, id DF940F94 3(0) CEF resets, 0 revisions of existing leaves Resolution Timer: Exponential (currently 1s, peak 1s) 0 in-place/0 aborted modifications refcounts: 1342 leaf, 1321 node Table epoch: 0 (26 entries at this epoch) Adjacency Table has 3 adjacencies 1 IPv4 adjacency 2 IPv6 adjacencies 0.0.0.0/32, version 0, epoch 0, receive 10.10.1.1/32, version 22, epoch 0, cached adjacency 172.17.24.1 (0x629E1B60) 0 packets, 0 bytes via 172.17.24.1, FastEthernet0/1, 0 dependencies next hop 172.17.24.1, FastEthernet0/1 valid cached adjacency (0x629E1B60)</pre>	<pre>Router# show ip cef internal IPv4 CEF is enabled and running VRF Default: 22 prefixes (22/0 fwd/non-fwd) Table id 0 Database epoch: 0 (22 entries at this epoch) 0.0.0.0/32, epoch 0, flags receive, refcount 4 sources: Spc feature space: MFI: path extension list empty subblocks: Special source: receive ifnums: (none) path 633AA3DC, path list 633A79D0, share 1, type receive path_list contains no resolved destination(s). HW IPv4 notified. receive output chain: receive (11) 10.10.1.1/32, epoch 0, RIB, refcount 4 sources: RIB feature space: MFI: path extension list empty IPRM: 0x00038000 IP adj out of POS1/0 635BB2A0 ifnums: (none) path 633A9504, path list 633A6FB8, share 1, type attached nexthop path_list contains at least one resolved destination(s). HW IPv4 notified. nexthop 172.17.13.1 POS1/0, adjacency IP adj out of POS1/0 635BB2A0 output chain: IP adj out of POS1/0 635BB2A0</pre>

show ipv6 cef internal

This feature provides the following changes to the output of the **show ipv6 cef internal** command:

- More references to pointers are added.
- The concept of output chain (chain of output features) is introduced.

The previous version of the command output is very similar to the output of the command after the Cisco Express Forwarding enhancements.

The table below compares the **show ipv6 cef internal** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 7 *show ipv6 cef internal Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ipv6 cef internal IPv6 CEF is enabled and running Slow processing intvl = 1 seconds backoff level current/max 0/0 0 unresolved prefixes, 0 requiring adjacency update IPv6 CEF default table 19 prefixes tableid 0 table version 37 root 63038970 2001:1:12::/64 RIBfib Using cached adjacency 0x629E1CE0 path list pointer 62A2C310 1 path - Nexthop path_pointer 62A297B0 traffic share 1 path_list pointer 62A2C310 nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 next_hop_len 0 adjacency pointer 629E1CE0 refcount 10 no loadinfo</pre>	<pre>Router# show ipv6 cef internal IPv6 CEF is enabled and running VRF Default: 20 prefixes (20/0 fwd/non-fwd) Table id 0 Database epoch: 0 (20 entries at this epoch) 2001:1:12::/64, epoch 0, RIB, refcount 3 sources: RIB feature space: MFI: path extension list empty IPRM: 0x00038000 IPV6 adj out of POS1/0 635BAFE0 ifnums: (none) path 633A9A18, path list 633A732C, share 1, type attached nexthop path_list contains at least one resolved destination(s). HW IPv6 notified. nexthop FE80::205:DCFF:FE26:4800 POS1/0, adjacency IPV6 adj out of POS1/0 635BAFE0 output chain: IPV6 adj out of POS1/0 635BAFE0</pre>

show ip cef detail

This feature provides the following changes to the output of the **show ip cef detail** command:

- IPv4 and IPv6 are now separately addressed.
- Mtrie data structure descriptions are moved to a new command, the **show ip cef tree** command (see the [New Commands for the CEF Feature, page 21](#)).
- The per-prefix output is reformatted (however, the information provided is the same).
- The table below compares the **show ip cef detail** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 8 *show ip cef detail Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef detail IP CEF with switching (Table Version 32), flags=0x0 26 routes, 0 reresolve, 0 unresolved (0 old, 0 new), peak 2 26 leaves, 19 nodes, 23400 bytes, 53 inserts, 27 invalidations 0 load sharing elements, 0 bytes, 0 references universal per-destination load sharing algorithm, id DF940F94 3(0) CEF resets, 0 revisions of existing leaves Resolution Timer: Exponential (currently 1s, peak 1s) 0 in-place/0 aborted modifications refcounts: 1342 leaf, 1321 node Table epoch: 0 (26 entries at this epoch) Adjacency Table has 3 adjacencies 1 IPv4 adjacency 2 IPv6 adjacencies 0.0.0.0/32, version 0, epoch 0, receive 10.10.1.1/32, version 22, epoch 0, cached adjacency 172.17.24.1 0 packets, 0 bytes via 172.17.24.1, FastEthernet0/1, 0 dependencies next hop 172.17.24.1, FastEthernet0/1 valid cached adjacency</pre>	<pre>Router# show ip cef detail IPv4 CEF is enabled and running VRF Default: 22 prefixes (22/0 fwd/non-fwd) Table id 0 Database epoch: 0 (22 entries at this epoch) 0.0.0.0/32, epoch 0, flags receive Special source: receive receive 10.10.1.1/32, epoch 0 nexthop 172.17.13.1 POS1/0 10.10.1.2/32, epoch 0 nexthop 172.17.13.1 POS1/0 10.20.12.0/24, epoch 0 nexthop 172.17.13.1 POS1/0 10.60.17.0/24, epoch 0, flags attached, connected attached to FastEthernet0/0 10.60.17.0/32, epoch 0, flags receive receive 10.60.17.251/32, epoch 0, flags receive receive</pre>

show ipv6 cef detail

This feature provides the following change to the output of the **show ipv6 cef detail** command:

- Output is reformatted (the information provided is the same as before the Cisco Express Forwarding enhancements).

The table below compares the **show ipv6 cef detail** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 9 *show ipv6 cef detail Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ipv6 cef detail IPv6 CEF is enabled and running Slow processing intvl = 1 seconds backoff level current/max 0/0 0 unresolved prefixes, 0 requiring adjacency update IPv6 CEF default table 19 prefixes 2001:1:12::/64 RIBfib nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 2001:2:13::/64 RIBfib nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 2001:2:22::/64 RIBfib nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 2001:2:24::2/128 Receive, RIBfib Receive 2001:2:24::/64 Attached, Connected, RIBfib attached to FastEthernet0/1</pre>	<pre>Router# show ipv6 cef detail IPv6 CEF is enabled and running VRF Default: 20 prefixes (20/0 fwd/non-fwd) Table id 0 Database epoch: 0 (20 entries at this epoch) 2001:1:12::/64, epoch 0 nexthop FE80::205:DCFF:FE26:4800 POS1/0 2001:2:13::/64, epoch 0, flags attached, connected attached to POS1/0 2001:2:13::2/128, epoch 0, flags receive</pre>

show ip cef internal

This feature provides the following changes to the output of the **show ip cef prefix internal** command:

- Troubleshooting is made easier with the addition of references to internal structure pointers.
- The concept of output chain (chain of output features) is introduced.

The table below compares the **show ip cef prefix internal** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 10 *show ip cef prefix internal* Command Output Before and After Cisco Express Forwarding Enhancements

Old	New
<pre>Router# show ip cef 10.20.12.0/24 internal 10.20.12.0/24, version 17, epoch 0, cached adjacency 172.17.24.1 (0x629E1B60) 0 packets, 0 bytes via 172.17.24.1, FastEthernet0/1, 0 dependencies next hop 172.17.24.1, FastEthernet0/1 valid cached adjacency (0x629E1B60)</pre>	<pre>Router# show ip cef 172.16.1.0/24 internal 172.16.1.0/24, epoch 0, RIB, refcount 5 sources: RIB feature space: MFI: path extension list empty IPRM: 0x00038000 IP adj out of POS1/0 635BB2A0 path 633A9504, path list 633A6FB8, share 1, type attached nexthop, for IPv4 ifnums: (none) path_list contains at least one resolved destination(s). HW IPv4 notified. nexthop 172.17.13.1 POS1/0, adjacency IP adj out of POS1/0 635BB2A0 output chain: IP adj out of POS1/0 635BB2A0</pre>

show ipv6 cef internal

This feature provides the following changes to the output of the **show ipv6 cef prefix internal** command:

- More references to structure pointers are added.
- The concept of output chain (chain of output features) is introduced.

The previous version of the command output is very similar to the output in the command after the Cisco Express Forwarding enhancements.

The table below compares the **show ipv6 cef prefix internal** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 11 *show ipv6 cef prefix internal Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ipv6 cef 2001:2:25::/64 internal 2001:2:25::/64 RIBfib Using cached adjacency 0x629E1CE0 path list pointer 62A2C310 1 path - Nexthop path_pointer 62A297B0 traffic share 1 path_list pointer 62A2C310 nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 next_hop_len 0 adjacency pointer 629E1CE0 refcount 10 no loadinfo</pre>	<pre>Router# show ipv6 cef 2001:2:25::/64 internal 2001:2:25::/64, epoch 0, RIB, refcount 4 sources: RIB feature space: MFI: path extension list empty IPRM: 0x00038000 IPV6 adj out of POS1/0 635BAFE0 path 633A9568, path list 633A6FFC, share 1, type attached nexthop, for IPV6 ifnums: (none) path_list contains at least one resolved destination(s). HW IPV6 notified. nexthop FE80::205:DCFF:FE26:4800 POS1/0, adjacency IPV6 adj out of POS1/0 635BAFE0</pre>

show ip cef

This feature provides the following changes to the output of the **show ip cef prefix** command:

- Output is reformatted; the key information provided is similar to the command output provided before the Cisco Express Forwarding enhancements.
- Adjacency information is moved to the **show adjacency prefix detail** command (see the [New Commands for the CEF Feature, page 21](#)).

The table below compares the **show ip cef prefix** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 12 *show ip cef prefix Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef 10.20.12.0/24 10.20.12.0/24, version 17, epoch 0, cached adjacency 172.17.24.1 0 packets, 0 bytes via 172.17.24.1, FastEthernet0/1, 0 dependencies next hop 172.17.24.1, FastEthernet0/1 valid cached adjacency</pre>	<pre>Router# show ip cef 172.16.1.0/24 172.16.1.0/24 nexthop 172.17.13.1 POS1/0</pre>



Note

The command output of the **show ipv6 prefix** command is the same after the Cisco Express Forwarding enhancement changes as it was before the changes.

show ip cef exact-route detail

This feature provides the following change to the output of the **show ip cef exact-route source destination detail** command:

- Output is reformatted (the information provided is the same as the information provided before the Cisco Express Forwarding enhancements).

The table below compares the command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 13 *show ip cef exact-route source destination detail Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef exact-route 172.16.1.1 172.16.1.5 detail 172.16.1.1 -> 172.16.1.5 : FastEthernet0/1 (next hop 172.17.24.1)</pre>	<pre>Router# show ip cef exact-route 172.16.1.3 172.16.1.2 detail 172.16.1.3 -> 172.16.1.2 => IP adj out of FastEthernet0/1, addr 172.17.25.1</pre>

show ip cef exact-route

This feature provides the following change to the output of the **show ip cef exact-route source destination** command:

- Output is reformatted (the information provided is the same as the information provided before the Cisco Express Forwarding enhancements).

The table below compares the **show ip cef exact-route source destination** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 14 *show ip cef exact-route source destination Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef exact-route 172.16.1.1 172.16.1.5 172.16.1.1 -> 172.16.1.5 : FastEthernet0/1 (next hop 172.17.24.1)</pre>	<pre>Router# show ip cef exact-route 172.16.1.3 172.16.1.2 172.16.1.3 -> 172.16.1.2 => IP adj out of FastEthernet0/1, addr 172.17.25.1</pre>

show ip cef adjacency

This feature provides the following change to the output of the **show ip cef adjacency interface next-hop** command:

- Output is reformatted (the information provided is the same as the information provided before the Cisco Express Forwarding enhancements).

The table below compares the **show ip cef adjacency interface next-hop** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 15 *show ip cef adjacency interface next-hop Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef adjacency FastEthernet0/1 172.17.24.1 Prefix Next Hop Interface 10.10.1.1/32 172.17.24.1 FastEthernet0/1 10.10.1.2/32 172.17.24.1 FastEthernet0/1 10.20.12.0/24 172.17.24.1 FastEthernet0/1</pre>	<pre>Router# show ip cef adjacency FastEthernet0/1 172.17.22.1 10.10.1.2/32 nexthop 172.17.22.1 FastEthernet0/1 10.20.12.0/24 nexthop 172.17.22.1 FastEthernet0/1</pre>

show adjacency summary

This feature provides the following change to the output of the **show adjacency summary** command:

- The new output provides a detailed description of the database, high availability information, and epoch concept information.
- The per-protocol and interface summary table is moved to the **show adjacency link** command (see the [New Commands for the CEF Feature, page 21](#)).

The table below compares the **show adjacency summary** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 16 *show adjacency summary Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show adjacency summary Adjacency Table has 6 adjacencies 4 IPv4 adjacencies 2 IPv6 adjacencies Table epoch: 0 (6 entries at this epoch) Interface IPv4 Adjacencies IPv6 Adjacencies FastEthernet0/1 1 1 FastEthernet0/0 2 0 FastEthernet1/1 1 1</pre>	<pre>Router# show adjacency summary Adjacency table has 9 adjacencies: each adjacency consumes 348 bytes (0 bytes platform extension) 7 complete adjacencies 2 incomplete adjacencies 4 adjacencies of linktype IP 4 complete adjacencies of linktype IP 0 incomplete adjacencies of linktype IP 0 adjacencies with fixups of linktype IP 4 adjacencies with IP redirect of linktype IP 4 adjacencies of linktype IPV6 2 complete adjacencies of linktype IPV6 2 incomplete adjacencies of linktype IPV6 1 adjacency of linktype TAG 1 complete adjacency of linktype TAG 0 incomplete adjacencies of linktype TAG Adjacency database high availability: Database epoch: 0 (9 entries at this epoch) Adjacency manager summary event processing: Summary events epoch is 3 Summary events queue contains 0 events (high water mark 7 events)</pre>

show adjacency detail

This feature provides the following change to the output of the **show adjacency detail** command:

- Output is reformatted (the information provided is the same as the information provided before the Cisco Express Forwarding enhancements).

The table below compares the **show adjacency detail** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 17 *show adjacency detail Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show adjacency detail Protocol Interface Address IP FastEthernet1/1 20.0.0.2(5) 4 packets, 456 bytes 003085641F11 00055F26F81D0800 ARP 01:47:23 Epoch: 0 IPV6 FastEthernet1/1 2011:41::2(5) 0 packets, 0 bytes 003085641F11 00055F26F81D86DD IPv6 ND never Epoch: 0</pre>	<pre>Router# show adjacency detail Protocol Interface Address IP FastEthernet0/1 172.17.22.1(16) 0 packets, 0 bytes epoch 0 sourced in sev-epoch 3 Encap length 14 00D001E4680000055FAF2C060800 IPV6 FastEthernet0/1 2001:2:22::1(6) 0 packets, 0 bytes epoch 0 sourced in sev-epoch 3 Encap length 14 00D001E4680000055FAF2C0686DD IPV6 ND</pre>

show adjacency internal

This feature provides the following changes to the output of the **show adjacency internal** command:

- Output is reformatted.
- An output chain of features was added. Otherwise, the information provided is the same as the information provided before the Cisco Express Forwarding enhancements.

The table below compares the **show adjacency internal** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 18 *show adjacency internal Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show adjacency internal Protocol Interface Address IP FastEthernet1/1 20.0.0.2(5) 4 packets, 456 bytes 003085641F11 00055F26F81D0800 ARP 01:32:30 Epoch: 0 Fast adjacency enabled IP redirect enabled IP mtu 1500 (0x0) Fixup disabled Adjacency pointer 0x629E16E0, refCount 5 Adjacency flags 0x000000 Connection Id 0x000000 Bucket 22 IPV6 FastEthernet0/1 FE80::2D0:1FF:FEE4:6800(13) 0 packets, 0 bytes 00D001E46800 00055F26F80686DD IPv6 ND never Epoch: 0 Fast adjacency enabled IPv6 redirect enabled IPv6 mtu 1500 (0x0) Fixup disabled Adjacency pointer 0x629E1CE0, refCount 13 Bucket 32</pre>	<pre>Router# show adjacency internal Protocol Interface Address IP FastEthernet0/0 10.60.17.2(6) 0 packets, 0 bytes epoch 0 sourced in sev-epoch 3 Encap length 14 00000C386D8800055FAF2C080800 ARP Fast adjacency enabled [OK] L3 mtu 1500 Flags (0x100E) Fixup disabled HWIDB/IDB pointers 0x63148358/0x63148FD8 IP redirect enabled Switching vector: IPv4 Adjacency pointer 0x636F31A0 Next-hop 172.17.13.1 ... 2001:2:22::1(6) 0 packets, 0 bytes epoch 0 sourced in sev-epoch 3 Encap length 14 IPV6 FastEthernet0/1 00D001E4680000055FAF2C0686DD IPv6 ND Fast adjacency enabled [OK] L3 mtu 1500 Flags (0x100E) Fixup disabled HWIDB/IDB pointers 0x6313AD40/0x6313B9C0 IP redirect enabled Switching vector: IPv6 Adjacency pointer 0x531C738 Next-hop FE80::A8BB:FE00:6500 ...</pre>

show cef state

This feature provides the following changes to the output of the **show cef state** command:

- New output is more concise.
- Load sharing anti-polarization ID is added to the command output.
- The **show cef state** command adds a new **capabilities** keyword. Capability details now display with the new keyword.

The table below compares the **show cef state** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 19 *show cef state Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show cef state CEF Status [RP] CEF enabled/running dCEF disabled/not running CEF switching enabled/running CEF default capabilities: Always CEF switching: no Always dCEF switching: no Default CEF switching: yes Default dCEF switching: no Drop multicast packets: no OK to punt packets: yes NVGEN CEF state: no fastsend() used: yes CEF NSF capable: no RPR+/SSO standby capable: no IPC delayed func on SSO: no FIB auto repair supported: yes LCs not running at init time: no Hardware forwarding supported: no Hardware forwarding in use: no Load-sharing pr. packet supported: yes</pre>	<pre>Router# show cef state CEF Status: RP instance common CEF enabled IPv4 CEF Status: CEF enabled/running dCEF disabled/not running CEF switching enabled/running universal per-destination load sharing algorithm, id A189DD49 IPv6 CEF Status: CEF enabled/running dCEF disabled/not running original per-destination load sharing algorithm, id A189DD49 Router# show cef state capabilities CEF Capabilities: Supported address families: IPv4 IPv6 Active address families: IPv4 IPv6 Distributed Platform: no Warm or Hot Standby supported: no CEF NSF capable: no IPC delayed func on SSO: no Hardware forwarding: no Checker auto-repair supported: yes Crashdump on memory failure: no Support load-sharing alg config: yes Blocking STANDBY_HOT until synced: no IPv4 CEF Capabilities: Default CEF switching: yes Always FIB switching: no Default dCEF switching: no Always dCEF switching: no Drop multicast packets: no OK to punt packets: yes NVGEN CEF state: yes fastsend() used: yes Support per packet load sharing: yes Support L4 ports in load sharing: yes Multicast (*,G) groups in CEF: no Install local entries from RIB: no IPv6 CEF Capabilities:² Default CEF switching: yes Always FIB switching: no Default dCEF switching: no Always dFIB switching: no Drop multicast packets: no OK to punt packets: yes NVGEN CEF state: yes fastsend() used: yes L4 ports in load balancing support: yes</pre>

show cef timers

This feature provides the following change to the output of the **show cef timers** command:

- The command output has been updated to reflect the new timers.

² This is the continuation of the output of the **show cef state capabilities** command.

The table below compares the **show cef timers** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 20 *show cef timers Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show cef timers CEF background process Expiration Type 0.740 (parent) 0.740 ARP throttle 0.908 adjacency update hwidb 0.908 slow resolution 8.572 <unknown:6240E510/0> CEF FIB scanner process Expiration Type 5.764 (parent) 5.764 checker scan-rib 6.340 checker scan-sw-hw 49.588 checker scan-hw-sw</pre>	<pre>Router# show cef timers CEF background process Expiration Type 13.248 (parent) 13.248 FIB checkers: IPv4 scan-rib-ios scanner 13.248 FIB checkers: IPv4 scan-ios-rib scanner 13.248 FIB checkers: IPv6 scan-ios-rib scanner Platform counter polling is not enabled IPv4 CEF background process Expiration Type 0.600 (parent) 0.600 ARP throttle 0.600 adjacency update hwidb</pre>

show ip cef epoch

This feature provides the following change to the output of the **show ip cef epoch** command:

The table below compares the **show ip cef epoch** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 21 *show ip cef epoch Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef epoch CEF epoch information: Table: Default Table epoch: 0 (33 entries at this epoch) Adjacency table Table epoch: 0 (7 entries at this epoch)</pre>	<pre>Router# show ip cef epoch Table: Default Database epoch: 0 (24 entries at this epoch)</pre>

show ipv6 cef epoch

This feature provides the following change to the output of the **show ipv6 cef epoch** command:

The table below compares the **show ipv6 cef epoch** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 22 *show ipv6 cef epoch Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ipv6 cef epoch CEF epoch information: Table: Default Table epoch: 1 (2 entries at this epoch) Adjacency table Table epoch: 0 (1 entries at this epoch)</pre>	<pre>Router# show ipv6 cef epoch Table: Default Database epoch: 1 (2 entries at this epoch)</pre>

show ip cef unresolved detail

This feature provides the following changes to the output of the **show ip cef unresolved detail** command:

- The new command output lists only unresolved prefixes.
- IPv4 and IPv6 are now separately addressed.
- Figures related to adjacencies are moved to the **show adjacency summary** command (see the [show adjacency summary, page 15](#)).
- Mtrie data structure descriptions are moved to a new command, the **show ip cef tree** command (see the [New Commands for the CEF Feature, page 21](#)).
- Nothing is displayed if no unresolved adjacencies exist.

The table below compares the **show ip cef unresolved detail** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 23 *show ip cef unresolved detail Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ip cef unresolved detail IP CEF with switching (Table Version 59), flags=0x0 34 routes, 0 reresolve, 0 unresolved (0 old, 0 new), peak 2 34 leaves, 22 nodes, 27640 bytes, 80 inserts, 46 invalidations 0 load sharing elements, 0 bytes, 0 references universal per-destination load sharing algorithm, id DF940F94 3(0) CEF resets, 0 revisions of existing leaves Resolution Timer: Exponential (currently 1s, peak 1s) 0 in-place/0 aborted modifications refcounts: 5933 leaf, 5888 node Table epoch: 0 (34 entries at this epoch) Adjacency Table has 7 adjacencies 4 IPv4 adjacencies 3 IPv6 adjacencies</pre>	<pre>Router# show ip cef unresolved detail IPv4 CEF is enabled and running VRF Default 25 prefixes (25/0 fwd/non-fwd) Table id 0x0 Database epoch: 0 (25 entries at this epoch) 101.1.1.1/32, epoch 0, flags rib only nolabel, rib defined all labels recursive via 102.2.2.2, unresolved</pre>

show ipv6 cef unresolved detail

This feature provides the following changes to the output of the **show ipv6 cef unresolved detail** command:

- Figures related to adjacencies are moved to the **show adjacency summary** command (see the [show adjacency summary, page 15](#)).
- Nothing is displayed in the output if there are no unresolved adjacencies.

The table below compares the **show ipv6 cef unresolved detail** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 24 *show ipv6 cef unresolved detail Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ipv6 cef unresolved detail IPv6 CEF is enabled and running Slow processing intvl = 1 seconds backoff level current/max 0/0 0 unresolved prefixes, 0 requiring adjacency update IPv6 CEF default table 20 prefixes</pre>	<pre>Router# show ipv6 cef unresolved detail IPv6 CEF is enabled and running centrally. VRF Default 6 prefixes (6/0 fwd/non-fwd) Table id 0x1E000000 Database epoch: 0 (6 entries at this epoch) 2002::/128, epoch 0, flags rib only nolabel, rib defined all labels recursive via 2003::BEEF, unresolved</pre>

show ipv6 cef non-recursive

This feature provides the following change to the output of the **show ipv6 cef non-recursive** command:

- The path information is changed to be more consistent with IPv4 path information.

The table below compares the **show ipv6 cef non-recursive** command output before ("Old" heading) and after ("New" heading) the Cisco Express Forwarding enhancements.

Table 25 *show ipv6 cef non-recursive Command Output Before and After Cisco Express Forwarding Enhancements*

Old	New
<pre>Router# show ipv6 cef non-recursive 2001:1:12::/64 nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 2001:2:13::/64 nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1 2001:2:22::/64 nexthop FE80::2D0:1FF:FEE4:6800 FastEthernet0/1</pre>	<pre>Router# show ipv6 cef non-recursive ::/0 no route ::/127 discard 2003::/128 nexthop 3003::DEAD Ethernet2/0 FE80::/10 receive for Null0 FF00::/8 multicast</pre>

New Commands for the CEF Feature

This section does not contain all new Cisco Express Forwarding commands. It contains only new commands introduced with the Cisco Express Forwarding enhancements to provide the same level of information that was available with the use of other commands before the Cisco Express Forwarding enhancements were implemented. Sample output is provided for the following new commands:

- show adjacency link
- show adjacency
- show adjacency detail
- show cef tree
- test cef table consistency detail
- [show adjacency link, page 22](#)

- [show adjacency](#), page 22
- [show adjacency detail](#), page 22
- [show cef tree](#), page 23
- [test cef table consistency detail](#), page 23

show adjacency link

The **show adjacency link ipv4** command and the **show adjacency link ipv6** command display information about IPv4 and IPv6 traffic, respectively, in the Cisco Express Forwarding adjacency table or the hardware Layer 3-switching adjacency table.

Per-protocol and interface summary adjacency information was moved from the **show adjacency summary** command to the **show adjacency link** command.

Following is sample output of the **show adjacency link ipv4** command.

```
Router# show adjacency link ipv4
Protocol Interface      Address
IP        FastEthernet0/0      10.60.17.2(6)
IP        FastEthernet0/0      10.60.17.20(6)
IP        FastEthernet0/0      10.60.17.254(7)
IP        FastEthernet0/1      172.17.22.1(16)
```

Following is sample output of the **show adjacency link ipv6** command.

```
Router# show adjacency link ipv6
Protocol Interface      Address
IPV6     FastEthernet0/1      2001:2:22::1(6)
IPV6     FastEthernet0/1      2001:2:22::2(3) (incomplete)
IPV6     FastEthernet0/1      FE80::2D0:1FF:FEE4:6800(14)
IPV6     Serial3/0             point2point(7)
IPV6     Serial3/1             point2point(10)
```

show adjacency

The **show adjacency prefix** command shows adjacency information for the specified prefix.

Following are sample outputs from the **show adjacency prefix** command for an IPv4 prefix and an IPv6 prefix:

```
Router# show adjacency 172.17.22.1/24
Protocol Interface      Address
IP        FastEthernet0/1      172.17.22.1(16)
Router# show adjacency 2001:2:22::1/64
Protocol Interface      Address
IPV6     FastEthernet0/1      2001:2:22::1(6)
```

show adjacency detail

The **show adjacency prefix detail** command provides additional adjacency information for a specified prefix.

Information about the adjacency epoch was removed from the **show ip cef epoch** and **show ipv6 cef epoch** commands and is available from the **show adjacency prefix detail** command.

Following are sample outputs from the **show adjacency prefix detail** command for an IPv4 prefix and an IPv6 prefix:

```
Router# show adjacency 172.17.22.1/24 detail
```

```

Protocol Interface      Address
IP           FastEthernet0/1  172.17.22.1(16)
              0 packets, 0 bytes
              epoch 0
              sourced in sev-epoch 3
              Encap length 14
              00D001E4680000055FAF2C060800
              ARP
Router# show adjacency 2001:2:22::1/64 detail

Protocol Interface      Address
IPv6          FastEthernet0/1  2001:2:22::1(6)
              0 packets, 0 bytes
              epoch 0
              sourced in sev-epoch 3
              Encap length 14
              00D001E4680000055FAF2C0686DD
              IPv6 ND

```

show cef tree

The **show{ip|ipv6} cef tree** command displays summary information about the underlying data structures representing the specified FIB tree.

Mtrie data structure information was removed from several commands for the implementation of the Cisco Express Forwarding enhancements. This command provides the Mtrie information removed from the **show ip cef summary**, **show ip cef internal**, and **show ip cef detail** commands.

Following is sample output for the **show ip cef tree** command:

```

Router# show ip cef tree
VRF Default tree information:
MTRIE/RTREE storing IPv4 addresses
24 entries (24/0 fwd/non-fwd)
Forwarding tree:
  Forwarding lookup routine: IPv4 mtrie 8-8-8-8 optimized
  33 inserts, 9 deletes
  8-8-8-8 stride pattern
  short mask protection enabled for <= 4 bits without process suspension
  24 leaves (672 bytes), 22 nodes (22880 bytes)
  25208 total bytes
  leaf ops: 33 inserts, 9 deletes
  leaf ops with short mask protection: 2 inserts, 1 delete
  per-prefix length stats: lookup off, insert off, delete off
  refcounts: 1356 leaf, 1324 node
  node pools:
    pool[C/8 bits]: 22 allocated (0 failed), 22880 bytes
Non-Forwarding tree:
  38 inserts, 38 deletes
  0 leaves (0 bytes), 0 nodes (0 bytes)
  0 total bytes

```

test cef table consistency detail

The **test cef table consistency detail** command displays recorded Cisco Express Forwarding consistency records found by the following detection mechanisms: **lc-detect**, **scan-rib-ios**, **scan-ios-rib**, **scan-lc-rp**, and **scan-rp-lc**. The **scan-lc-rp** and **scan-rp-lc** detection mechanisms are available only on routers with line cards. You can configure the Cisco Express Forwarding prefix consistency-detection mechanisms using the **cef table consistency-check** command.

This command provides output that replaces the output provided by the removed and obsolete **show ip cef inconsistency records**, **show ip cef inconsistency now**, and **show ip cef inconsistency now detail** commands.

Following is sample output for the **test cef table consistency detail** command:

```
Router# test cef table consistency detail

full-scan-rib-ios: Checking IPv4 RIB to FIB consistency
full-scan-rib-ios: FIB checked 12 prefixes, and found 0 missing.
full-scan-ios-rib: Checking IPv4 FIB to RIB consistency
full-scan-ios-rib: Checked 12 FIB prefixes in 1 pass, and found 0 extra.
full-scan-rp-lc: Sent 26 IPv4 prefixes to linecards in 1 pass
full-scan-rp-lc: Initiated IPv4 FIB check on linecards..4..1..0..
full-scan-rp-lc: FIB IPv4 check completed on linecards..1..0..4..
full-scan-rp-lc: Linecard 4 checked 26 IPv4 prefixes (ignored 0). 0 inconsistent.
full-scan-rp-lc: Linecard 1 checked 26 IPv4 prefixes (ignored 0). 0 inconsistent.
full-scan-rp-lc: Linecard 0 checked 26 IPv4 prefixes (ignored 0). 0 inconsistent.
full-scan-rib-ios: Checking IPv6 RIB to FIB consistency
full-scan-rib-ios: FIB checked 16 prefixes, and found 5 missing.
full-scan-ios-rib: Checking IPv6 FIB to RIB consistency
full-scan-ios-rib: Checked 11 FIB prefixes in 1 pass, and found 0 extra.
full-scan-rp-lc: Sent 11 IPv6 prefixes to linecards in 1 pass
full-scan-rp-lc: Initiated IPv6 FIB check on linecards..4..1..0..
full-scan-rp-lc: FIB IPv6 check completed on linecards..1..4..0..
full-scan-rp-lc: Linecard 4 checked 11 IPv6 prefixes (ignored 0). 0 inconsistent.
full-scan-rp-lc: Linecard 1 checked 11 IPv6 prefixes (ignored 0). 0 inconsistent.
full-scan-rp-lc: Linecard 0 checked 11 IPv6 prefixes (ignored 0). 0 inconsistent.
No IPv4 inconsistencies found, check took 00:00:01.444
Warning: 5 IPv6 inconsistencies found, check took 00:00:01.240
```

Unchanged CEF show Commands

Some Cisco Express Forwarding **show** commands related to the Cisco Express Forwarding enhancements were not changed with the introduction of the enhancements. The output of the following commands was not changed:

- **show cef idb**
- **show cef interface**
- **show ip cef**
- **show ip cef non-recursive**
- **show ipv6 cef**
- **show ipv6 cef adjacency**

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Description of Cisco Express Forwarding commands	<i>Cisco IOS IP Switching Command Reference</i>
Description of Cisco Express Forwarding IPv6 commands	<i>Cisco IOS IPv6 Command Reference</i>
Information on MFI enhancements	MPLS Infrastructure Changes: Introduction of MFI and Removal of MPLS LSC and LC-ATM Features

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 CEF Enhancements

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 26 **Feature Information for Cisco Express Forwarding**

Feature Name	Releases	Feature Information
Cisco Express Forwarding Enhancements: Introduction of CLI Changes and Removal of IPv4 Fast Switching	12.4(20)T	<p>The purpose of this document is to describe the changes based on the Cisco Express Forwarding infrastructure scalability enhancements that have been implemented to adapt to the evolution of the Internet and to support new platforms and features. The changes are the removal of IP fast switching and the introduction of command line interface (CLI) modifications.</p> <p>This document lists Cisco Express Forwarding CLI commands that are removed, replaced, changed, and new. To help you transition to the new CLI format, the document illustrates the output for new commands and changed commands.</p> <p>Enhancements to Cisco Express Forwarding enable it to operate with the Multiprotocol Label Switching (MPLS) Forwarding Infrastructure (MFI) and guarantee consistency across Cisco IOS release trains. Cisco Express Forwarding infrastructure changes were introduced and implemented in the Cisco IOS 12.2(25)S-based releases and were added for T releases in Cisco IOS Release 12.4(20)T.</p> <p>Cisco Express Forwarding is an advanced Layer 3 IP switching technology. It optimizes network performance and scalability for all kinds of networks: those that carry small amounts of traffic and those that carry large amounts of traffic in complex patterns, such as the Internet, and networks characterized by intensive web-</p>

Feature Name	Releases	Feature Information
		based applications or interactive sessions. In Cisco IOS Release 12.4(20)T, this feature was introduced.

Glossary

adjacency --A relationship formed between selected neighboring routers and end nodes for the purpose of exchanging routing information. Adjacency is based upon the use of a common media segment by the routers and nodes involved.

Cisco Express Forwarding --A Layer 3 switching technology. Cisco Express Forwarding can also refer to central Cisco Express Forwarding mode, one of two modes of Cisco Express Forwarding operation. Cisco Express Forwarding enables a Route Processor (RP) to perform express forwarding. Distributed Cisco Express Forwarding is the other mode of Cisco Express Forwarding operation.

distributed Cisco Express Forwarding --A type of Cisco Express Forwarding switching in which line cards (such as Versatile Interface Processor (VIP) line cards) maintain identical copies of the forwarding information base (FIB) and adjacency tables. The line cards perform the express forwarding between port adapters; this relieves the Route Switch Processor of involvement in the switching operation.

FIB --forwarding information base. A component of Cisco Express Forwarding. The router uses the FIB lookup table to make destination-based switching decisions during Cisco Express Forwarding operation. The router maintains a mirror image of the forwarding information in an IP routing table.

IDB --Interface Descriptor Block. An IDB is a special control structure internal to the Cisco IOS software that contains information such as the IP address, interface state, and packet statistics. Cisco IOS software maintains one IDB for each interface present on a platform and one IDB for each subinterface.

IPRM --IP Rewrite Manager. The IPRM is a module that manages the interaction between Cisco Express Forwarding, the IP Label Distributions Modules (LDM), and the Multiprotocol Label Switching (MPLS) Forwarding Infrastructure (MFI).

Mtrie --multiway tree. The Mtrie is a data structure in which routes are stored. The Mtrie is part of the IP lookup algorithm used in Cisco Express Forwarding.

prefix --The network address portion of an IP address. A prefix is specified by a network and mask and is generally represented in the format network/mask. The mask indicates which bits are the network bits. For example, 10.0.0.0/16 means that the first 16 bits of the IP address are masked, making them the network bits. The remaining bits are the host bits. In this example, the network number is 10.0.

RIB --Routing Information Base. A central repository of routes that contains Layer 3 reachability information and destination IP addresses or prefixes. The RIB is also known as the routing table.

RP --Route Processor. The processor module in the Cisco 7000 series routers that contains the CPU, system software, and most of the memory components that are used in the router. It is sometimes called a supervisory processor.

VRF --A Virtual Private Network (VPN) routing/forwarding instance. A VRF consists of an IP routing table, a derived forwarding table, a set of interfaces that use the forwarding table, and a set of rules and routing protocols that determine what goes into the forwarding table. In general, a VRF includes the routing information that defines a customer VPN site that is attached to a provider edge (PE) router.

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