Interface and Hardware Component Features Roadmap

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This feature roadmap lists the Cisco IOS features documented in the *Cisco IOS Interface and Hardware Component Configuration Guide* and maps them to the documents in which they appear. The roadmap is organized so that you can select your release train and see the features in that release. Find the feature name you are searching for and click on the URL in the "Where Documented" column to access the document containing that feature.

Feature and Release Support

Table 1 lists interface and hardware component feature support for the following Cisco IOS software release trains:

- Cisco IOS Release 12.0S
- Cisco IOS Release 12.2SB
- Cisco IOS Release 12.2SR
- Cisco IOS Release 12.2SX
- Cisco IOS Releases 12.2T, 12.3, 12.3T, 12.4 and 12.4T

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 lists the most recent release of each software train first and the features in alphabetical order within the release.

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Table 1 Supported Interface and Hardware Components Features

Release	Feature Name	Feature Description	Where Documented
Cisco IOS Release 12.0S			
12.0(23)S	GRE Tunnel IP Source and Destination VRF Membership	This feature allows you to configure the source and destination of a tunnel to belong to any Virtual Private Network (VPN) routing/forwarding (VRF) tables. A VRF table stores routing data for each VPN. The VRF table defines the VPN membership of a customer site attached to the network access server (NAS). Each VRF table comprises an IP routing table, a derived Cisco Express Forwarding (CEF) table, and guidelines and routing protocol parameters that control the information that is included in the routing table.	"GRE Tunnel IP Source and Destination VRF Membership" in Implementing Tunnels
	GRE Tunnel Keepalive	The GRE Tunnel Keepalive feature provides the capability of configuring keepalive packets to be sent over IP-encapsulated generic routing encapsulation (GRE) tunnels. You can specify the rate at which keepalives will be sent and the number of times that a device will continue to send keepalive packets without a response before the interface becomes inactive. GRE keepalive packets may be sent from both sides of a tunnel or from just one side.	"GRE Tunnel Keepalive" in Implementing Tunnels
12.0(21)S	Generic Routing Encapsulation	Encapsulation takes packets or frames from one network system and places them inside frames from another network system. This method is sometimes called tunneling. Tunneling provides a means for encapsulating packets inside a routable protocol via virtual interfaces. Cisco's Generic Routing Encapsulation (GRE) supports: Encapsulates - Novell Internetwork Packet Exchange (IPX), Internet Protocol (IP), Connectionless Network Protocol (CLNP), AppleTalk, DECnet Phase IV, Xerox Network Systems (XNS), Banyan Virtual Network System (VINES), and Apollo packets for transport over IP	"Generic Routing Encapsulation" in Implementing Tunnels
12.0(17)S	Tunnel Type of Service (ToS)	The Tunnel ToS feature allows you to configure the ToS and Time-to-Live (TTL) byte values in the encapsulating IP header of tunnel packets for an IP tunnel interface on a router. The Tunnel ToS feature is supported on Cisco Express Forwarding (CEF), fast switching, and process switching forwarding modes.	"Tunnel ToS" in Implementing Tunnels

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.0(16)S	Route Processor Redundancy Plus (RPR+)	Route Processor Redundancy Plus (RPR+), the standby RP is fully initialized and configured. This feature allows RPR+ to dramatically shorten the switchover time if the active RP fails, or if a manual switchover is performed. Because both the startup config and running config are continually synced from the active to the standby RP, line cards are not reset during a switchover. The interfaces remain up during this transfer, so neighboring routers do not detect a link flap (i.e. link does not go down and back up).	Route Processor Redundancy Plus (RPR+)
12.0(11)S	Distributed GRE (dGRE)	The GRE tunneling allows service providers to support a large number of tunnels by forwarding distributed tunneled packets. This feature is an extension of the nondistributed forwarding information base (FIB) forwarding paths.	"Generic Routing Encapsulation" in Implementing Tunnels
12.0(5)S	Automatic Protection Switching (APS)	This feature allows switch over of packet-over-SONET (POS) circuits and is often required when connecting SONET equipment to telco equipment. APS refers to the mechanism of bringing a "protect" POS interface into the SONET network as the "working" POS interface on a circuit from the intervening SONET equipment.	"Configuring Automatic Protection Switching of Packet-over-SONET Circuits" in Configuring Serial Interfaces
Cisco IOS Release 12.2SB			
12.2(31)SB5	GRE Tunnel IP Source and Destination VRF Membership	This feature allows you to configure the source and destination of a tunnel to belong to any Virtual Private Network (VPN) routing/forwarding (VRF) tables. A VRF table stores routing data for each VPN. The VRF table defines the VPN membership of a customer site attached to the network access server (NAS). Each VRF table comprises an IP routing table, a derived Cisco Express Forwarding (CEF) table, and guidelines and routing protocol parameters that control the information that is included in the routing table.	"Generic Routing Encapsulation Tunnel IP Source and Destination VRF Membership" in Implementing Tunnels
12.2(31)SB2	RBSCP (Rate Based Satellite Control Protocol)	Rate Based Satellite Control Protocol (RBSCP) enables Cisco IOS to optimize link utilization and throughput for IP protocols traversing a link with high error rate (high packet loss rate) and a high delay-bandwidth product, as typically found for satellite links.	Rate Based Satellite Control Protocol

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(28)SB	GRE Tunnel Keepalive	The GRE Tunnel Keepalive feature provides the capability of configuring keepalive packets to be sent over IP-encapsulated generic routing encapsulation (GRE) tunnels. You can specify the rate at which keepalives will be sent and the number of times that a device will continue to send keepalive packets without a response before the interface becomes inactive. GRE keepalive packets may be sent from both sides of a tunnel or from just one side.	"GRE Tunnel Keepalive" in Implementing Tunnels
	IP Precedence for GRE Tunnels	This feature works to provide the following benefits: • Routers between GRE tunnel endpoints will adhere to precedence bits and other TOS bits, thereby possibly improving the routing of important packets. Cisco IOS Quality-of-Service technology, such as policy routing, Committed Access Rate, WFQ, and WRED can operate on intermediate routers between GRE tunnel endpoints. • Additional security is possible when Cisco IOS network layer encryption is used with precedence for GRE tunnels to provide data confidentiality between VPN tunnel endpoints. • QoS policy granularity is available per network, per user, and per application. • The deployment of a GRE tunnel is flexible; it can be applied at the Enterprise CPE or at the Service Provider ingress point.	Implementing Tunnels
	Route Processor Redundancy Plus (RPR+)	Route Processor Redundancy Plus (RPR+), the standby RP is fully initialized and configured. This feature allows RPR+ to dramatically shorten the switchover time if the active RP fails, or if a manual switchover is performed. Because both the startup config and running config are continually synced from the active to the standby RP, line cards are not reset during a switchover. The interfaces remain up during this transfer, so neighboring routers do not detect a link flap (i.e. link does not go down and back up).	Route Processor Redundancy Plus (RPR+)

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
Cisco IOS Release 12.2SR			
12.2(33)SRA	GRE Tunnel IP Source and Destination VRF Membership	This feature allows you to configure the source and destination of a tunnel to belong to any Virtual Private Network (VPN) routing/forwarding (VRF) tables. A VRF table stores routing data for each VPN. The VRF table defines the VPN membership of a customer site attached to the network access server (NAS). Each VRF table comprises an IP routing table, a derived Cisco Express Forwarding (CEF) table, and guidelines and routing protocol parameters that control the information that is included in the routing table.	"Generic Routing Encapsulation Tunnel IP Source and Destination VRF Membership" in Implementing Tunnels
Cisco IOS Release 12.2SX			
12.2(33)SXI1	CISCO-IP-IF-MIB Support for IP Helper Addresses	This feature enables all IP helper addresses configured on each interface to be stored (and retrieved through SNMP) in the MIB.	CISCO-IP-IF-MIB Support for IP Helper Addresses
12.2(33)SXH	GRE Tunnel IP Source and Destination VRF Membership	This feature allows you to configure the source and destination of a tunnel to belong to any Virtual Private Network (VPN) routing/forwarding (VRF) tables. A VRF table stores routing data for each VPN. The VRF table defines the VPN membership of a customer site attached to the network access server (NAS). Each VRF table comprises an IP routing table, a derived Cisco Express Forwarding (CEF) table, and guidelines and routing protocol parameters that control the information that is included in the routing table.	"Generic Routing Encapsulation Tunnel IP Source and Destination VRF Membership" in Implementing Tunnels
12.2(14)SX	Route Processor Redundancy Plus (RPR+)	Route Processor Redundancy Plus (RPR+), the standby RP is fully initialized and configured. This feature allows RPR+ to dramatically shorten the switchover time if the active RP fails, or if a manual switchover is performed. Because both the startup config and running config are continually synced from the active to the standby RP, line cards are not reset during a switchover. The interfaces remain up during this transfer, so neighboring routers do not detect a link flap (i.e. link does not go down and back up).	Route Processor Redundancy Plus (RPR+)
Cisco IOS Releases 12.2T, 12.3, 12.3T, 12.4 and 12.4T			
12.4(22)T	Input clock switch-over on serial CEM NM	This feature provides continuity of the CEM channel during disruption of the RxC from the CPE.	Circuit Emulation over IP

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
	Configure CEM channel as unidirectional	Users can configure CEM channel as unidirectional only. When one direction of CEM traffic is detected on that channel, the CEM channel is considered to be active and a new status of the CEM channel is created to reflect the uni-directional channel.	Circuit Emulation over IP
12.4(20)T	Support for IP-Tunnel-MIB as per RFC4087	Tunneling provides a way to encapsulate arbitrary packets inside a transport protocol. Tunnels are implemented as a virtual interface to provide a simple interface for configuration. This feature supports IP-Tunnel-MIB as per RFC4087 standard.	Implementing Tunnels
12.4(15)T	MiniTunnel-MIB	There are a number of tunneling mechanisms specified by IETF and implemented on Cisco IOS. There are different MIB's available for different tunneling mechanisms. Tunnel-MIB (RFC 4087) is a more generic MIB for managing all IPv4, IPv6 related tunnels and L2TP-MIB (RFC 3371) is a more specific MIB for managing L2TP Tunnels. This feature provides minimal implementation support for Tunnel-MIB implementation. This feature also provides read-only support for the tunnelIfEntryTable defined in Tunnel-MIB .	Implementing Tunnels
12.4(11)T	Tunnel Route Selection	The Tunnel Route Selection feature provides the ability to select the source address of a tunnel based on the physical output interface.	Tunnel Route Selection
12.4(2)T	Enhanced Adaptive Clocking on Circuit Emulation over IP Network Module	The adaptive clocking option of CEoIP allows the egress clock to vary by expanding or contracting the clock period from the nominal clock. After you have implemented the clocking feature, the adaptive clocking circuits continuously adjust the selected clock based on the data buffer level. You can implement adaptive clocking on each port independently.	Circuit Emulation over IP

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.3(7)T	Circuit Emulation over IP (CEoIP)	Circuit Emulation over IP (CEoIP) provides a virtual circuit through an IP network, similar to a leased line, to integrate solutions that require a time-sensitive, bit-transparent transport into IP networks. Data, with proprietary framing or without, arrives at its destination unchanged; the transport is transparent to the destination. CEoIP provides a simple migration path to IP-only networks.	Circuit Emulation over IP
	RBSCP (Rate Based Satellite Control Protocol)	Rate Based Satellite Control Protocol (RBSCP) enables Cisco IOS to optimize link utilization and throughput for IP protocols traversing a link with high error rate (high packet loss rate) and a high delay-bandwidth product, as typically found for satellite links.	Rate Based Satellite Control Protocol
	Route Processor Redundancy Plus (RPR+)	Route Processor Redundancy Plus (RPR+), the standby RP is fully initialized and configured. This feature allows RPR+ to dramatically shorten the switchover time if the active RP fails, or if a manual switchover is performed. Because both the startup config and running config are continually synced from the active to the standby RP, line cards are not reset during a switchover. The interfaces remain up during this transfer, so neighboring routers do not detect a link flap (i.e. link does not go down and back up).	Route Processor Redundancy Plus (RPR+)
12.3(2)T	GRE Tunnel IP Source and Destination VRF Membership	This feature allows you to configure the source and destination of a tunnel to belong to any Virtual Private Network (VPN) routing/forwarding (VRF) tables. A VRF table stores routing data for each VPN. The VRF table defines the VPN membership of a customer site attached to the network access server (NAS). Each VRF table comprises an IP routing table, a derived Cisco Express Forwarding (CEF) table, and guidelines and routing protocol parameters that control the information that is included in the routing table.	"Generic Routing Encapsulation Tunnel IP Source and Destination VRF Membership" in Implementing Tunnels

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(15)T	IP Precedence for GRE Tunnels	This feature works to provide the following benefits: • Routers between GRE tunnel endpoints will adhere to precedence bits and other TOS bits, thereby possibly improving the routing of important packets. Cisco IOS Quality-of-Service technology, such as policy routing, Committed Access Rate, WFQ, and WRED can operate on intermediate routers between GRE tunnel endpoints. • Additional security is possible when Cisco IOS network layer encryption is used with precedence for GRE tunnels to provide data confidentiality between VPN tunnel endpoints. • QoS policy granularity is available per network, per user, and per application. • The deployment of a GRE tunnel is flexible; it can be applied at the Enterprise CPE or at the Service Provider ingress point.	Qos Options for Tunnels in Implementing Tunnels
12.2(13)T	Automatic Protection Switching (APS)	This feature allows switch over of packet-over-SONET (POS) circuits and is often required when connecting SONET equipment to telco equipment. APS refers to the mechanism of bringing a "protect" POS interface into the SONET network as the "working" POS interface on a circuit from the intervening SONET equipment.	"Configuring Automatic Protection Switching of Packet-over-SONET Circuits" in Configuring Serial Interfaces
12.2(8)T	CEF-Switched Multipoint GRE Tunnels	The CEF-Switched Multipoint GRE Tunnels feature enables CEF switching of IP traffic to and from multipoint GRE tunnels. Tunnel traffic can be forwarded to a prefix through a tunnel destination when both the prefix and the tunnel destination are specified by the application.	Implementing Tunnels
	Distributed GRE (dGRE)	The GRE tunneling allows service providers to support a large number of tunnels by forwarding distributed tunneled packets. This feature is an extension of the nondistributed forwarding information base (FIB) forwarding paths.	"Generic Routing Encapsulation" in Implementing Tunnels

Table 1 Supported Interface and Hardware Components Features (continued)

Release	Feature Name	Feature Description	Where Documented
	GRE Tunnel Keepalive	The GRE Tunnel Keepalive feature provides the capability of configuring keepalive packets to be sent over IP-encapsulated generic routing encapsulation (GRE) tunnels. You can specify the rate at which keepalives will be sent and the number of times that a device will continue to send keepalive packets without a response before the interface becomes inactive. GRE keepalive packets may be sent from both sides of a tunnel or from just one side.	"GRE Tunnel Keepalive" in Implementing Tunnels
	Tunnel Type of Service (ToS)	The Tunnel ToS feature allows you to configure the ToS and Time-to-Live (TTL) byte values in the encapsulating IP header of tunnel packets for an IP tunnel interface on a router. The Tunnel ToS feature is supported on Cisco Express Forwarding (CEF), fast switching, and process switching forwarding modes.	"Tunnel ToS" in in Implementing Tunnels

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.