

IP Tunnel - GRE Key Entropy Support

The IP Tunnel - GRE Key Entropy Support feature enables load balancing of tunnel packets in the Generic Routing Encapsulation (GRE) mode of a core network.

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Prerequisites for IP Tunnel - GRE Key Entropy Support

- You can enable tunnel entropy calculation only on Generic Routing Encapsulation (GRE) mode of the tunnel interface.
- You must configure the tunnel key value before you enable tunnel entropy calculation.

Restrictions for IP Tunnel - GRE Key Entropy Support

- You must not configure a tunnel key with a value that is more than 24 bits. The configuration of tunnel entropy calculation fails if the tunnel key value is more than 24 bits.
- You cannot disable tunnel entropy calculation unless you remove the configured tunnel key.

Information About IP Tunnel - GRE Key Entropy Support

IP Tunnel - GRE Key Entropy Support Overview

The IP Tunnel - GRE Key Entropy Support feature enables load balancing of tunnel packets in the Generic Routing Encapsulation (GRE) mode of a core network. You can configure the tunnel entropy calculation feature only on the GRE mode of the tunnel interface.

The characteristics of a tunnel entropy label are:

- You cannot use entropy labels for packet forwarding.
- You cannot use entropy labels for signaling.
- You can only use the entropy label to improve load balancing on a network.

In order to configure tunnel entropy calculation using the **tunnel entropy** command, you must first configure a tunnel key using the **tunnel key** command in interface configuration mode. The tunnel key has a maximum size of 32 bits. If you configure tunnel entropy calculation, 24 bits are reserved for the GRE key and 8 bits for entropy.



Note If you configure a GRE tunnel key of 32 bits, you cannot configure tunnel entropy calculation. You must remove the tunnel key and then configure a key of the size of 24 bits or less. To disable an already configured GRE tunnel entropy, remove the GRE tunnel key value first.

Entropy bits are calculated by 6 tuples, which are virtual routing and forwarding (VRF) ID, source IP address, destination IP address, source port, destination port, and protocols of the private IPv4/IPv6 packets in a network.

How To Configure IP Tunnel - GRE Key Entropy Support

Configuring IP Tunnel - GRE Key Entropy Support

Perform this task to configure GRE tunnel entropy calculation:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface tunnel** *tunnel-number*
4. **tunnel source** {*ipv4-addr* | *ipv6-addr* | *interface-type interface-number* | **dynamic**}
5. **tunnel destination** {*ipv4-addr* | *ipv6-addr* | *hostname* | **dynamic**}
6. **tunnel mode gre ip**
7. **tunnel key** *key-number*
8. **tunnel entropy**
9. **end**
10. **show interfaces** *interface-type interface-number*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:**	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
	`Device> enable`	
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *tunnel-number* **Example:** `Device(config)# interface tunnel 21`	Specifies a tunnel interface and number, and enters interface configuration mode.
Step 4	**tunnel source** {*ipv4-addr* | *ipv6-addr* | *interface-type interface-number* | **dynamic**} **Example:** `Device(config-if)# tunnel source 10.1.1.1`	Specifies the source IP address for a tunnel interface.
Step 5	**tunnel destination** {*ipv4-addr* | *ipv6-addr* | *hostname* | **dynamic**} **Example:** `Device(config-if)# tunnel destination 172.168.2.1`	Specifies the destination IP address for a tunnel interface.
Step 6	**tunnel mode gre ip** **Example:** `Device(config-if)# tunnel mode gre ip`	Configures the encapsulation mode for a tunnel interface.
Step 7	**tunnel key** *key-number* **Example:** `Device(config-if)# tunnel key 4683`	Enables an ID key for a tunnel interface.
Step 8	**tunnel entropy** **Example:** `Device(config-if)# tunnel entropy`	Achieves load balancing of tunnel packets in a network.
Step 9	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.
Step 10	**show interfaces** *interface-type interface-number* **Example:**	Displays statistics for all interfaces configured on a device or access server.

	Command or Action	Purpose
	`Device# show interfaces tunnel 21`	

Configuration Examples for IP Tunnel - GRE Key Entropy Support

Examples: Configuring IP Tunnel - GRE Key Entropy Support

The following example shows how to configure tunnel entropy calculation for GRE mode of the tunnel interface:

```
Device> enable
Device# configure terminal
Device(config)# interface tunnel 21
Device(config-if)# tunnel source 10.1.1.1
Device(config-if)# tunnel destination 172.168.2.1
Device(config-if)# tunnel mode gre ip
Device(config-if)# tunnel key 4683
Device(config-if)# tunnel entropy
Device(config-if)# end
```

The following is sample output from the **show interfaces tunnel** command, which displays that tunnel entropy calculation is enabled with a 24-bit key:

```
Device# show interfaces tunnel 21

Tunnel21 is up, line protocol is up
Hardware is Tunnel
MTU 17864 bytes, BW 100 Kbit/sec, DLY 50000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation TUNNEL, loopback not set
Keepalive not set
Tunnel source 10.1.1.1, destination 172.168.2.1
Tunnel protocol/transport GRE/IP
Key 0x124B, sequencing disabled
Checksumming of packets disabled
Tunnel Entropy Calculation Enabled (24-bit Key)
Tunnel TTL 255, Fast tunneling enabled
Tunnel transport MTU 1472 bytes
Tunnel transmit bandwidth 8000 (kbps)
Tunnel receive bandwidth 8000 (kbps)
Last input never, output never, output hang never
Last clearing of "show interface" counters 00:03:07
Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/0 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts (0 IP multicasts)
0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
```

```
0 unknown protocol drops
0 output buffer failures, 0 output buffers swapped out
```

Additional References for IP Tunnel - GRE Key Entropy Support

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Command List, All Releases*
Tunnel commands: complete command syntax, command mode, defaults, command history, usage guidelines, and examples	*Cisco IOS Interface and Hardware Component Command Reference*
Cisco IOS XE Interface and Hardware Component configuration modules	*Cisco IOS XE Interface and Hardware Component Configuration Guide*

Standards and RFCs

RFC	Title
RFC6790	The Use of Entropy Labels in MPLS Forwarding

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	*http://www.cisco.com/support*

Feature Information for IP Tunnel - GRE Key Entropy Support

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 https://cfnng.cisco.com/. An account on Cisco.com is not required.

Table 1: Feature Information for IP Tunnel - GRE Key Entropy Support

Feature Name	Releases	Feature Information
IP Tunnel - GRE Key Entropy Support	Cisco IOS XE Release 3.11S	The IP Tunnel - GRE Key Entropy Support feature enables load balancing of tunnel packets in the Generic Routing Encapsulation (GRE) mode of a core network. The following commands were introduced or modified: **tunnel entropy** **tunnel key** **show interfaces**