



Segment Routing Command Reference for Cisco NCS 5000 Series Routers

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Preface

The preface contains these sections:

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- [Communications, Services, and Additional Information](#), on page v

Changes to This Document

The following table lists the technical changes made to this document since it was first published.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at [Cisco Profile Manager](#).
- To get the business impact you're looking for with the technologies that matter, visit [Cisco Services](#).
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Segment Routing Commands

This chapter describes the commands used to configure and use Segment Routing.

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egress-engineering

To configure segment routing egress peer engineering (EPE) on the egress node, use the **egress-engineering** command.

egress-engineering

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Neighbor configuration

Command History	Release	Modification
	Release 6.1.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	mpls-te	read, write

Examples This example shows how to configure segment routing EPE on the egress node:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router (config) # router bgp 1
RP/0/RSP0/CPU0:router (config-bgp) # neighbor 192.168.1.3
RP/0/RSP0/CPU0:router (config-bgp-nbr) # remote-as 3
RP/0/RSP0/CPU0:router (config-bgp-nbr) # egress-engineering
```


ping mpls nil-fec labels

To check network connectivity and identify LSP breakages, use the **ping mpls nil-fec labels** command.

```
ping mpls nil-fec labels {label[,label...]} [output {interface tx-interface} [nexthop
next-hop-ip-address]]
```

Syntax Description	Labels	Description
	labels <i>label,label...</i>	Specifies the label stack. Use commas to separate the each <i>label</i> .
	output interface <i>tx-interface</i>	Specifies the output interface.
	nexthop <i>next-hop-ip-address</i>	(Optional) Causes packets to go through the specified next-hop address.

Command Default None

Command Modes EXEC

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
	mpls-te	read, write

Example

This example shows how to check connectivity for a known label stack using a specific output interface and next-hop address:

```
RP/0/RSP0/CPU0:router# ping mpls nil-fec labels 16005,16007 output interface GigabitEthernet
0/2/0/1 nexthop 10.1.1.4 repeat 1
Sending 1, 72-byte MPLS Echos with Nil FEC labels 16005,16007,
  timeout is 2 seconds, send interval is 0 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
       'L' - labeled output interface, 'B' - unlabeled output interface,
       'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
       'M' - malformed request, 'm' - unsupported tlvs, 'N' - no label entry,
       'P' - no rx intf label prot, 'p' - premature termination of LSP,
       'R' - transit router, 'I' - unknown upstream index,
       'd' - see DDMAP for return code,
       'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.
!
Success rate is 100 percent (1/1), round-trip min/avg/max = 1/1/1 ms
Total Time Elapsed 0 ms
```

Related Commands

Command	Description
traceroute mpls nil-fec labels	Checks network connectivity and identifying LSP breakages.

prefix-sid

To specify or advertise prefix (node) segment ID (SID) on all routers, use the **prefix-sid** command in IS-IS interface address family or OSPF interface configuration mode. To stop advertising prefix SID, use the **no** form of this command.

```
prefix-sid [ strict-spf ] { index sid-index | absolute sid-value } [ n-flag-clear ] [ explicit-null ]
```

```
no prefix-sid [ strict-spf ] { index sid-index | absolute sid-value } [ n-flag-clear ] [ explicit-null ]
```

Syntax Description

strict-spf	Specifies that the prefix-SID should use the SPF path instead of the SR-TE policy.
index <i>sid-index</i>	Specifies the prefix SID based on the lower boundary of the SRGB + the index.
absolute <i>sid-value</i>	Specifies the specific prefix SID value within the SRGB.
n-flag-clear	Specifies that the prefix-SID is not a node-SID by setting the N flag in the prefix-SID sub Type Length Value (TLV) to 0.
explicit-null	Adds an explicit-Null label by setting the E flag in the prefix-SID sub TLV to 1. Automatically disables penultimate-hop-popping (PHP) by setting the P flag (IS-IS) or NP flag (OSPF) to 1.

Command Default

Prefix SID is a node SID (N-flag is set to 1).
Explicit-Null label is not set (E-flag is set to 0).

Command Modes

IS-IS interface address-family configuration
OSPF interface configuration

Usage Guidelines

Segment routing must be configured on the ISIS instance or on the OSPF process, area, or interface before configuring prefix SID value.

Strict-SPF SIDs are used to forward traffic strictly along the SPF path. Strict-SPF SIDs are not forwarded to SR-TE policies. IS-IS advertises the SR Algorithm sub Type Length Value (TLV) (in the SR Router Capability SubTLV) to include both algorithm 0 (SPF) and algorithm 1 (Strict-SPF). When the IS-IS area or level is Strict-SPF TE-capable, Strict-SPF SIDs are used to build the SR-TE Strict-SPF policies. Strict-SPF SIDs are also used to program the backup paths for prefixes, node SIDs, and adjacency SIDs.



Note The same SRGB is used for both regular SIDs and strict-SPF SIDs.

Task ID	Task ID	Operations
	isis	read, write
	ospf	

Examples

This example shows how to configure a prefix SID.

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router (config)# router isis 100
RP/0/RSP0/CPU0:router (config-isis)# interface loopback0
RP/0/RSP0/CPU0:router (config-isis-if)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router (config-isis-if-af)# prefix-sid index 1001
```

This example shows how to configure an absolute prefix SID on an OSPF interface.

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router (config)# router ospf 1
RP/0/RSP0/CPU0:router (config-ospf)# router area 0
RP/0/RSP0/CPU0:router (config-ospf-ar)# interface loopback0
RP/0/RSP0/CPU0:router (config-ospf-ar-if)# prefix-sid absolute 16041
```

Related Commands

Command	Description
segment-routing global-block	Configures the segment routing global block (SRGB).

segment-routing global-block

To configure the segment routing global block (SRGB), use the **segment-routing global-block** command.

segment-routing global-block *starting_value ending_value*

Syntax Description

starting_value ending_value Specifies the block of segment routing IDs that are allocated for the routers in the network. Ranges from 16000 to 1048574.

Command Default

Default SRGB range is 16000 to 23999.

Command Modes

Global Configuration mode

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To keep the segment routing configuration simple and to make it easier to troubleshoot segment routing issues, we recommend that you use the default SRGB range on each node in the domain. However, there are instances when you might need to define a different range:

- The nodes of another vendor support a label range that is different from the default SRGB, and you want to use the same SRGB on all nodes.
- The default range is too small.
- To specify separate SRGBs for IS-IS and OSPF protocols, as long as the ranges do not overlap.

Because the values assigned from the range have domain-wide significance, we recommend that all routers within the domain be configured with the same range of values.

Task ID

Task ID	Operation
mpls-te	read, write

Example

This example shows how to configure the SRGB range:

```
RP/0/RSP0/CPU0:router(config)# segment-routing global-block 17000 20000
```

Related Commands

Command	Description
prefix-sid	Configures the segment ID (SID).

segment-routing mapping-server

To configure the segment routing mapping server (SRMS), use the **segment-routing mapping-server** command.

```
segment-routing mapping-server prefix-sid-map address-family { ipv4 | ipv6 } ip_address/subnet_mask
SID_start_value range range
```

Syntax Description

address-family { **ipv4** | **ipv6** } Configures the address family for IS-IS.

ip_address/subnet_mask Specifies the prefix and mask.

SID_start_value Specifies the first prefix SID in the range.

range *range* Specifies the size of the range.

Command Default

None

Command Modes

Global Configuration mode

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The position of the mapping server in the network is not important. However, since the mapping advertisements are distributed in IGP using the regular IGP advertisement mechanism, the mapping server needs an IGP adjacency to the network.

The role of the mapping server is crucial. For redundancy purposes, you should configure multiple mapping servers in the networks.

Task ID

Task ID	Operation
mpls-te	read, write

Example

This example shows how to configure the mapping server and add prefix-SID mapping entries in the active local mapping policy:

```
RP/0/RSP0/CPU0:router(config)# segment-routing mapping-server prefix-sid-map address-family
ipv4 10.1.1.1/32 17000 range 100
```

Related Commands

Command	Description
segment-routing prefix-sid-map advertise-local	Enables the router to advertise the SRMS entries that are locally configured.
segment-routing prefix-sid-map receive disable	Disables mapping client functionality.
show isis segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for IS-IS.
show ospf segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for OSPF.
show segment-routing mapping-server prefix-sid-map	Displays the locally configured prefix-to-SID mappings.

segment-routing mpls

To enable segment routing for IPv4 addresses with MPLS data plane, use the **segment-routing mpls** command in IPv4 address family configuration mode. To disable segment routing, use the **no** form of this command.

segment-routing mpls

Syntax Description	mpls Enables segment routing for IPv4 addresses with MPLS data plane.				
Command Default	No default behavior or values.				
Command Modes	IPv4 address family configuration Router configuration Area configuration				
Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.				
Task ID	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read, write</td> </tr> </tbody> </table>	Task ID	Operation	mpls-te	read, write
Task ID	Operation				
mpls-te	read, write				

Example

This example shows how to enable segment routing with MPLS data plane.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# router isis 100
RP/0/RSP0/CPU0:router(config-isis)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-isis-af)# segment-routing mpls
```


segment-routing prefix-sid-map advertise-local

To enable the router to advertise the segment routing mapping server (SRMS) entries that are locally configured, use the **segment-routing prefix-sid-map advertise-local** command. In addition to advertising these local SRMS entries, these mapping entries are also used to calculate segment ID (SID).

segment-routing prefix-sid-map advertise-local

Syntax Description	advertise-local Advertises the SRMS mapping entries that are locally configured.						
Command Default	Disabled.						
Command Modes	IPv4 address family configuration Router configuration						
Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.						
Task ID	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>ospf</td> <td>read,</td> </tr> <tr> <td>isis</td> <td>write</td> </tr> </tbody> </table>	Task ID	Operation	ospf	read,	isis	write
Task ID	Operation						
ospf	read,						
isis	write						

Example

This example shows how to enable the router to advertise the locally configured SRMS entries:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# router ospf 1
RP/0/RSP0/CPU0:router(config-ospf)# segment-routing prefix-sid-map advertise-local
```

Related Commands	Command	Description
	segment-routing mapping-server, on page 8	Configures the segment routing mapping server (SRMS).
	segment-routing prefix-sid-map receive disable	Disables mapping client functionality.
	show isis segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for IS-IS.
	show ospf segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for OSPF.

Command	Description
show segment-routing mapping-server prefix-sid-map	Displays the locally configured prefix-to-SID mappings.

segment-routing prefix-sid-map receive disable

To disable mapping client functionality, use the **segment-routing prefix-sid-map receive disable** command. To reenable client functionality, use the **segment-routing prefix-sid-map receive** command.

segment-routing prefix-sid-map receive [**disable**]

Syntax Description	<p>receive Only remote SRMS mapping entries are used for SID calculation.</p> <p>disable Disable remote SRMS mapping entries received by flooding.</p>
Command Default	Enabled.
Command Modes	IPv4 address family configuration Router configuration
Usage Guidelines	<p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>The mapping client functionality is enabled by default. When you disable client functionality, the SRMS active policy is calculated without remote SRMS entries.</p> <p>You can use this command with the segment-routing prefix-sid-map advertise-local command simultaneously.</p>

Task ID	Task ID	Operation
	ospf	read,
	isis	write

Example

This example shows how to disable the mapping server client functionality:

```
RP/0/RSP0/CPU0:router(config)# router isis 1
RP/0/RSP0/CPU0:router(config-isis)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-isis-af)# segment-routing prefix-sid-map receive disable
```

Related Commands	Command	Description
	segment-routing mapping-server , on page 8	Configures the segment routing mapping server (SRMS).
	segment-routing prefix-sid-map advertise-local	Enables the router to advertise the SRMS entries that are locally configured.

Command	Description
show isis segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for IS-IS.
show ospf segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for OSPF.
show segment-routing mapping-server prefix-sid-map	Displays the locally configured prefix-to-SID mappings.

show bgp egress-engineering

To display BGP egress peer engineering (EPE) information, use the **show bgp egress-engineering** command.

show bgp egress-engineering

Syntax Description	This command has no keywords or arguments.
---------------------------	--

Command Default	None
------------------------	------

Command Modes	EXEC
----------------------	------

Command History	Release	Modification
	Release 6.1.2	This command was introduced.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.
-------------------------	---

Task ID	Task	Operation
		bgp

Example

This example shows how to display BGP egress peer engineering (EPE) information:

```
RP/0/RSP0/CPU0:router2# show bgp egress-engineering
```

```
Egress Engineering Peer Set: 1.1.1.5/32 (10b48fec)
  Nexthop: 1.1.1.5
  Version: 2, rn_version: 2
  Flags: 0x00000006
  Local ASN: 1
  Remote ASN: 5
  Local RID: 1.1.1.2
  Remote RID: 1.1.1.5
  First Hop: 10.1.1.9
  NHID: 0, 0
  Label: 30025, Refcount: 3
  rpc_set: 10c34c24
. . .
```

show isis segment-routing prefix-sid-map

To verify the active and backup prefix-to-SID mappings for IS-IS, use the **show isis segment-routing prefix-sid-map** command.

show isis segment-routing prefix-sid-map [**active-policy** | **backup-policy**]

Syntax Description

active-policy (Optional) Specifies the active mapping policy.

backup-policy (Optional) Specifies the backup mapping policy.

Command Default

None

Command Modes

EXEC

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Task	Operation
	isis	read

Example

The example shows how to verify the active mapping policy on IS-IS:

```
RP/0/0/CPU0:router# show isis segment-routing prefix-sid-map active-policy
```

IS-IS 1 active policy

Prefix	SID Index	Range	Flags
1.1.1.100/32	100	20	
1.1.1.150/32	150	10	

Number of mapping entries: 2

The example shows how to verify the backup mapping policy on IS-IS:

```
RP/0/0/CPU0:router# show isis segment-routing prefix-sid-map backup-policy
```

IS-IS 1 backup policy

Prefix	SID Index	Range	Flags
1.1.1.100/32	100	20	
1.1.1.150/32	150	10	

Number of mapping entries: 2

Related Commands

Command	Description
segment-routing mapping-server, on page 8	Configures the segment routing mapping server (SRMS).
segment-routing prefix-sid-map advertise-local	Enables the router to advertise the SRMS entries that are locally configured.
segment-routing prefix-sid-map receive disable	Disables mapping client functionality.
show ospf segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for OSPF.
show segment-routing mapping-server prefix-sid-map	Displays the locally configured prefix-to-SID mappings.

show ospf segment-routing prefix-sid-map

To verify the active and backup prefix-to-SID mappings for OSPF, use the **show ospf segment-routing prefix-sid-map** command.

show ospf segment-routing prefix-sid-map [**active-policy** | **backup-policy**]

Syntax Description	active-policy (Optional) Specifies the active mapping policy.				
	backup-policy (Optional) Specifies the backup mapping policy.				
Command Default	None				
Command Modes	EXEC				
Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.				
Task ID	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>ospf</td> <td>read</td> </tr> </tbody> </table>	Task ID	Operation	ospf	read
Task ID	Operation				
ospf	read				

Example

The example shows how to verify the active mapping policy on OSPF:

```
RP/0/0/CPU0:router# show ospf segment-routing prefix-sid-map active-policy
      SRMS active policy for Process ID 1

Prefix          SID Index   Range      Flags
1.1.1.100/32    100         20
1.1.1.150/32    150         10

Number of mapping entries: 2
```

The example shows how to verify the backup mapping policy on OSPF:

```
RP/0/0/CPU0:router# show ospf segment-routing prefix-sid-map backup-policy
      SRMS backup policy for Process ID 1

Prefix          SID Index   Range      Flags
1.1.1.100/32    100         20
1.1.1.150/32    150         10

Number of mapping entries: 2
```


Related Commands

Command	Description
segment-routing mapping-server, on page 8	Configures the segment routing mapping server (SRMS).
segment-routing prefix-sid-map advertise-local	Enables the router to advertise the SRMS entries that are locally configured.
segment-routing prefix-sid-map receive disable	Disables mapping client functionality.
show isis segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for IS-IS.
show segment-routing mapping-server prefix-sid-map	Displays the locally configured prefix-to-SID mappings.

show segment-routing mapping-server prefix-sid-map

To verify the locally configured prefix-to-SID mappings, use the **show segment-routing mapping-server prefix-sid-map** command.

show segment-routing mapping-server prefix-sid-map [**ipv4** | **ipv6**] [*prefix*] [**detail**]

Syntax Description	
	ipv4 (Optional) Specifies an IPv4 address family.
	ipv6 (Optional) Specifies an IPv6 address family.
	<i>prefix</i> (Optional) Specifies a prefix.
	detail (Optional) Displays detailed information on the prefix-to-SID mappings.

Command Default None

Command Modes EXEC

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
		read

Example

The example shows how to verify the IPv4 prefix-to-SID mappings:

```
RP/0/0/CPU0:router# show segment-routing mapping-server prefix-sid-map ipv4
Prefix          SID Index  Range      Flags
20.1.1.0/24     400        300
10.1.1.1/32     10         200
Number of mapping entries: 2
```

The example shows how to display detailed information on the IPv4 prefix-to-SID mappings:

```
RP/0/0/CPU0:router# show segment-routing mapping-server prefix-sid-map ipv4 detail
Prefix
20.1.1.0/24
  SID Index:      400
  Range:          300
  Last Prefix:    20.2.44.0/24
  Last SID Index: 699
  Flags:
10.1.1.1/32
  SID Index:      10
  Range:          200
```

```

Last Prefix:    10.1.1.200/32
Last SID Index: 209
Flags:
Number of mapping entries: 2

```

Related Commands

Command	Description
segment-routing mapping-server, on page 8	Configures the segment routing mapping server (SRMS).
segment-routing prefix-sid-map advertise-local	Enables the router to advertise the SRMS entries that are locally configured.
segment-routing prefix-sid-map receive disable	Disables mapping client functionality.
show isis segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for IS-IS.
show ospf segment-routing prefix-sid-map	Displays the active and backup prefix-to-SID mappings for OSPF.

traceroute mpls nil-fec labels

To check network connectivity and identify LSP breakages, use the **traceroute mpls nil-fec labels** command.

```
traceroute mpls nil-fec labels {label [,label...]} [output {interface tx-interface} [nexthop
next-hop-ip-address]]
```

Syntax Description	Labels	Description
	labels <i>label, label...</i>	Specifies the label stack. Use commas to separate the each <i>label</i> .
	output interface <i>tx-interface</i>	Specifies the output interface.
	nexthop <i>next-hop-ip-address</i>	(Optional) Causes packets to go through the specified next-hop address.

Command Default None

Command Modes EXEC

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
	mpls-te	read, write

Example

This example shows how to check connectivity for a known label stack using a specific output interface and next-hop address:

```
RP/0/RSP0/CPU0:router# traceroute mpls nil-fec labels 16005,16007 output interface
GigabitEthernet 0/2/0/1 nexthop 10.1.1.4
Tracing MPLS Label Switched Path with Nil FEC labels 16005,16007, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
       'L' - labeled output interface, 'B' - unlabeled output interface,
       'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
       'M' - malformed request, 'm' - unsupported tlvs, 'N' - no label entry,
       'P' - no rx intf label prot, 'p' - premature termination of LSP,
       'R' - transit router, 'I' - unknown upstream index,
       'd' - see DDMAP for return code,
       'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.
 0 10.1.1.3 MRU 1500 [Labels: 16005/16007/explicit-null Exp: 0/0/0]
L 1 10.1.1.4 MRU 1500 [Labels: implicit-null/16007/explicit-null Exp: 0/0/0] 1 ms
L 2 10.1.1.5 MRU 1500 [Labels: implicit-null/explicit-null Exp: 0/0] 1 ms
! 3 10.1.1.7 1 ms
```

Related Commands

Command	Description
ping mpls nil-fec labels	Checks network connectivity and identifying LSP breakages.

