

Programmability Command Reference for Cisco 8000 Series Routers

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Preface

This preface contains these sections:

- Changes to This Document, on page v
- Communications, Services, and Additional Information, on page v

Changes to This Document

This table lists the technical changes made to this document since it was first released.

Table 1: Changes to This Document

Date	Summary
May 2024	Initial release of this document.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business results you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco Marketplace.
- To obtain general networking, training, and certification titles, visit Cisco Press.
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Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.



YANG Commands

This module outlines the commands necessary to utilize the YANG server module configuration protocol, which defines network operations using data models.

For detailed information about YANG data model concepts, configuration tasks, and examples, see the *Drive Network Automation Using Programmable YANG Data Modelsin the Cisco 8000 Series Router* module in the *Programmability Configuration Guide for Cisco 8000 Series Routers*.

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- lldp interface-only, on page 3

yang-server module-set

To enable a certain set of YANG models, use the **yang-server module-set** command in the Global Configuration mode.

yang-server module-set

Syntax Description

UM-preferred	Enables Unified Models (UMs) only. Excludes OpenConfig (OC) models.
UM-preferred-plus	Enables UMs and includes all supported OC models.
XR-only	Enables only IOS XR native models, excluding UM and OC models
all	Enables the full range of available models, including IOS XR native, UM, and OC models.

Command Default

None

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 7.0.1	This command was introduced.
Release 25.1.1	The **UM-preferred-plus** and **all** keywords were introduced.

Usage Guidelines

The **yang-server module-set** command is applied to only config models. When this command is configured, all externally defined YANG models, including OpenConfig models, are disabled.

Task ID

Task ID	Operation
config-services	read, write

Example

This command shows how to use the **yang-server module-set** command:

```
Router# config
Router(config)# yang-server module-set XR-only
Router# end
```

lldp interface-only

To configure the LLDP interface-only feature, use the **lldp interface-only** command in the XR Config mode.

lldp interface-only

Syntax Description

interface-only	Specifies the option to modify LLDP global parameters without automatically enabling LLDP on all interfaces.

Command Default

No default action.

Command Modes

XR Config mode

Command History

Release	Modification
Release 25.1.1	This command was introduced.

Usage Guidelines

None

Task ID

Task ID	Operation
config-services	read, write

Example

This example shows how to configure the LLDP interface-only feature for enabling you to modify LLDP global parameters without automatically enabling LLDP on all interfaces:

```
Router(config)# lldp
 Router(config-lldp)# timer 60
 Router(config-lldp)# interface-only
Router(config-lldp)# exit
```



gRPC Commands

This module describes the commands used to use the gRPC Protocol to define network operations with data models.

For detailed information about gRPC concepts, configuration tasks, and examples, see the *Use gRPC Protocol to Define Network Operations with Data Models in the Cisco 8000 Series Router* module in the *Programmability Configuration Guide for Cisco 8000 Series Routers*.

gRPC encodes requests and responses in binary. gRPC is extensible to other content types along with Protobuf. The Protobuf binary data object in gRPC is transported over HTTP/2.

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clear gnsi path authorization counters

To clear the gNSI path authorization counters, use the **clear gnsi path authorization counters** command in Global Configuration mode.

clear gnsi path authorization counters [**path** *XPath* | **server-name** *server-name*]

Syntax Description

XPath	Provide the XPath for which authorization counters can be cleared.
server-name	The server's IP address from where authorization counters can be cleared.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.2.11	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the clearing of gNSI path authorization counters on the router:

```
Router# clear gnsi path authorization counters
Router#
```

grpc

To configure network devices and view operational data, use the **grpc** command in the XR Config mode. To remove the **grpc** protocol, use the **no** form of this command.

grpc { **address-family** | **certificate-authentication** | **dscp** | **local-connection** | **max-concurrent-streams** | **max-request-per-user** | **max-request-total** | **max-streams** | **max-streams-per-user** | **tls-max-version** | **tls-min-version** | **no-tls** | **tlsv1-disable** | **tls-cipher** | **tls-mutual** | **tls-trustpoint** | **server** *server-name* { **address-family** | **apply-group** | **disable** | **dscp** | **exclude-group** | **keepalive** | **listen-addresses** | **local-connection** | **max-concurrent-streams** | **metadata-authentication** | **port** | **remote-connection** | **services** | **ssl-profile-id** | **tls** | **ttl** | **tunnel** | **vrf** } | **service-layer** | **vrf** }

Syntax Description

address-family	Specifies the address family identifier type.
certificate-authentication	It enables certificate-based authentication.
dscp	Specifies QoS marking DSCP on transmitted gRPC.
local-connection	It enables grpc server over unix socket.
max-concurrent-streams	Specifies the limit on the maximum concurrent streams per gRPC connection to be applied on the server.
max-request-per-user	Specifies the maximum concurrent requests per user.
max-request-total	Specifies the maximum concurrent requests in total.
max-streams	Specifies the maximum number of concurrent gRPC requests. The maximum subscription limit is 128 requests. The default is 32 requests.
max-streams-per-user	Specifies the maximum concurrent gRPC requests for each user. The maximum subscription limit is 128 requests. The default is 32 requests.
tls-max-version	Specifies the maximum version that TLS supports. It supports 1.0, 1.1, 1.2, and 1.3
tls-min-version	Specifies the minimum version that TLS supports. It supports 1.0, 1.1, 1.2, and 1.3
no-tls	It disable transport layer security (TLS). The TLS is enabled by default.
tlsv1-disable	It disable TLS version 1.0
tls-cipher	It enable the gRPC TLS cipher suites.
tls-mutual	Specifies the mutual authentication.
tls-trustpoint	It configure trustpoint.
server *server-name*	Specifies the gRPC server configuration and a unique name for the gRPC server.
address-family	Specifies the address family identifier type.

apply-group	Applies the configuration from a group.
disable	Disables gRPC server.
dscp	Specifies the QoS marking DSCP to be set on transmitted gRPC.
exclude-group	Excludes apply-group configuration from a group.
keepalive	Specifies the server keepalive time and timeout.
listen-addresses	Specifies the gRPC server listening addresses.
local-connection	Enables gRPC server over Unix socket.
max-concurrent-streams	Specifies the gRPC server maximum concurrent streams per connection.
metadata-authentication	Enables metadata authentication.
port	Specifies the gRPC server listening port.
remote-connection	Specifies the configuration to toggle TCP support on the gRPC server.
services	Specifies the list of gRPC services to be registered with the server.
ssl-profile-id	Specifies the gRPC server SSL profile ID.
tls	Specifies the TLS configuration options for gRPC server.
ttl	Specifies the gRPC packets TTL value.
tunnel	Specifies the grpc tunnel service of the gRPC server.
vrf	Enables the server vrf.
services	It lists the gRPC services to be registered with the server.
service-layer	It enable the grpc service layer configuration.
vrf	It enable server vrf.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.
Release 25.4.1	The command was modified to include **server** and **services** keywords.
Release 25.4.1	The TLS 1.0 and 1.1 is deprecated.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit OS.

Starting with Cisco IOS XR software release 25.4.1, when configuring a gRPC server using the **grpc server server1**, both TLS and remote-connection are enabled by default. You cannot disable TLS unless you also disable remote-connection. This means that to turn off TLS, remote-connection must first be disabled, restricting the server to Unix Domain Socket (UDS) connections only. Attempting to disable TLS while remote-connection is enabled will result in a configuration error, as will enabling remote-connection while TLS is disabled.

You must only capture safe ciphers. The following is the list of safe ciphers. Other ciphers are not supported.

- ecdhe-rsa-chacha20-poly1305
- ecdhe-ecdsa-chacha20-poly1305
- ecdhe-rsa-aes128-gcm-sha256
- ecdhe-ecdsa-aes128-gcm-sha256
- ecdhe-rsa-aes256-gcm-sha384
- ecdhe-ecdsa-aes256-gcm-sha384
- aes128-gcm-sha256
- aes256-gcm-sha384

Task ID

Task ID	Operations
config-services	read

This example shows how to enable gRPC over an HTTP/2 connection:

```
Router#configure
Router(config)#grpc
Router(config-grpc)#port <port-number>
```

This example shows the newly created server and the gRPC services that have been registered with this server:

```
Router#config
Router(config)#grpc
Router(config-grpc)#server server1
Router(config-grpc-server)#services P4RT
Router(config-grpc-server)#services gNPSI
Router(config-grpc-server)#port 9559
Router(config-grpc-server)#exit
```

gnmi

To create a gRPC listener with the default or IANA ratified gNMI port of 9339, use the **gnmi** command in Global Configuration Mode.

gnmi port *portnum*

Syntax Description

portnum	Specifies the server listening port for the gRPC service. • gNMI service port: default: 9339, range: 57344-57999

Command Default

None

Command Modes

Global Configuration Mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

Unconfiguring gNMI will disable requests on port 9339.

The allowed ports within this range are 9339 (IANA ratified port) and 57344-57999 (Linux application port range)

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure gNMI as a submode under gRPC and committing this configuration would create a gRPC listener with the default or IANA ratified gNMI port of 9339.

```
Router(config-grpc)gnmi
Router(config-grpc-gnmi)commit
```

Verify the submode configuration.

```
Router#show running-config grpc
grpc
  gnmi
!
```

The **port** command under gNMI submode allows the port to be modified in the port range or IANA ratified port.

```
Router(config-grpc)#gnmi
Router(config-grpc-gnmi)#port 9339
Router(config-grpc-gnmi)#commit
```

Verify the port number.

```
Router#show running-config grpc
grpc
```

```
  gnmi
    port 9339
!
```

grpc aaa accounting history-memory

To configure the maximum memory allocated for cached accounting history records, use the **grpc aaa accounting history-memory** command in the XR Config mode.

This command should be used in conjunction with the **queue-size** parameter to effectively limit the EMSD memory used by cached accounting history records. The approximate worst case memory usage would be (N+1)* history-memory, where N is the number of collectors connected.

grpc aaa accounting history-memory *size*

Syntax Description

size	Specifies the maximum memory allocated for cached accounting history records.

Command Default

The default size of the history memory is 40 MB. The size range is 1-400 MB.

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.4.1	The command was introduced.

Usage Guidelines

None

Task ID

Task ID	Operation
config-services	read, write

This example configures the maximum memory allocated for cached accounting history records to the specified size.

```
Router(config)#grpc aaa accounting history-memory 20
```

This example displays the memory configuration specified in the previous example.

```
Router(config)#show
Tue Jul 23 06:12:38.693 UTC
!! Building configuration...
!! IOS XR Configuration 24.4.1.17I
grpc
 aaa accounting history-memory 20
!
end

RP/0/RP0/CPU0:ios(config)#commit
Tue Jul 23 06:12:41.336 UTC
Router(config)#
```

Use the **show gnsi acctz statistics** command to display the maximum queue size configured using the **grpc aaa accounting queue-size** command.

grpc aaa accounting queue-size

To configure the number of accounting records in a queue, use the **grpc aaa accounting queue-size** command in the XR Config mode.

grpc aaa accounting queue-size *size*

Syntax Description

size	Specifies the number of accounting history records in a queue. The default value is 40, and it ranges from 1—512.

Command Default

None

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.3.1	The command was introduced.

Usage Guidelines

None

Task ID

Task ID	Operation
config-services	read, write

This example configures the maximum size for history record processing queues to the specified value.

```
Router# configure
Router(config)# grpc aaa accounting queue-size 30
Router(config)# end
```

Use the **show gnsi acctz statistics** command to display the specified queue size with the maximum history memory configured using the **grpc aaa accounting history-memory** command.

grpc max-concurrent-streams

To specify a limit on the number of concurrent streams per gRPC connection to be applied on the server, use the **grpc max-concurrent-streams** command in the XR Config mode. To restore the default value, use the **no** form of this command.

grpc max-concurrent-streams *limit*

Syntax Description

max-concurrent-streams *limit*	Specifies the limit on the number of concurrent streams per gRPC connection to be applied on the server. The range is from 1 to 128. The command default is 32.

Command Default

By default, the maximum concurrent streams per gRPC connection is 32.

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to set the limit of the number of concurrent streams per gRPC connection to 40:

```
Router#configure
Router(config)#grpc max-concurrent-streams 40
```

grpc certificate common-name

To allow the router (tunnel client) to dial out to a collector (tunnel server), use the **grpc** command in the XR Config mode. To remove the **gRPC** service, use the **no** form of this command.

grpc certificate common-name *WORD*

Syntax Description

WORD	Specifies the common name when certificate is generated, default: **ems.cisco.com**.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to specify a common-name:

```
Router(config)#grpc
Router(config-grpc)#certificate common-name
Router(config-grpc)#commit
```

grpc tls-max-version

To configure the maximum supported TLS version, use the **grpc tls-max-version** command in the XR Config mode.

grpc tls-max-version *limit*

Syntax Description

tls-max-version *version number*	Specifies the maximum supported TLS version per gRPC connection. TLS maximum version can be 1.0, 1.1, 1.2, or 1.3. The default maximum version for TLS is 1.3.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.
Release 25.4.1	The TLS versions 1.0 and 1.1 are deprecated.

Usage Guidelines

You set the **tlsv1-disable** command to disable the TLS version 1.0. You can also achieve this by setting the **tls-min-version** to greater than 1.0.

From Release 24.1.1, the **tlsv1-disable** command is deprecated.

If you use the **tlsv1-disable** command, you can't use the **tls-min-version** and the **tls-max-version** commands.

If you use the **tls-min-version** and the **tls-max-version** commands, you can't use the **tlsv1-disable** command.

When you set the **tlsv1-disable** command, the **tls-max-version** command displays:

```
Invalid argument: Cannot set tls-min-version while tlsV1-disable is set.
```

When you configure the **tls-max-version** command, the **tlsv1-disable** command displays:

```
!!% Invalid argument: Cannot set tlsV1-disable while tls-min-version is set.
!!% tlsV1-disable CLI is deprecated.
```

TLS versions 1.0 and 1.1 are no longer supported for the **grpc server server1** command. The default minimum TLS version is 1.2, and the maximum is 1.3. When configuring TLS versions, only 1.2 and 1.3 are valid options for both minimum and maximum settings. This ensures that the server uses secure and modern TLS protocols.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to set the **tls-max-version**.

```
Router# configure
Router(config)# grpc tls-max-version 1.2
Router# end
```

grpc tls-min-version

To configure the minimum supported TLS version, use the **grpc tls-min-version** command in the XR Config mode.

grpc tls-min-version *limit*

Syntax Description

tls-min-version *version number*	Specifies the minimum supported TLS version per gRPC connection. TLS minimum version can be 1.0, 1.1, 1.2, or 1.3. The default minimum version for TLS is 1.0.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.
Release 25.4.1	The TLS versions 1.0 and 1.1 are deprecated.

Usage Guidelines

You set the **tlsv1-disable** command to disable the TLS version 1.0. You can also achieve this by setting the **tls-min-version** to greater than 1.0.

From Release 24.1.1, the **tlsv1-disable** command is deprecated.

If you use the **tlsv1-disable** command, you can't use the **tls-min-version** and the **tls-max-version** commands.

If you use the **tls-min-version** and the **tls-max-version** commands, you can't use the **tlsv1-disable** command.

When you set the **tlsv1-disable** command, the **tls-min-version** command displays:

```
Invalid argument: Cannot set tls-min-version while tlsV1-disable is set.
```

When you configure the **tls-min-version** command, the **tlsv1-disable** command displays:

```
!!% Invalid argument: Cannot set tlsV1-disable while tls-min-version is set.
!!% tlsV1-disable CLI is deprecated.
```

The **tls-min-version** can't be greater than **tls-max-version**.

TLS versions 1.0 and 1.1 are no longer supported for the **grpc server server1** command. The default minimum TLS version is 1.2, and the maximum is 1.3. When configuring TLS versions, only 1.2 and 1.3 are valid options for both minimum and maximum settings. This ensures that the server uses secure and modern TLS protocols.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to set the **tls-min-version**.

```
Router#configure
Router(config)#grpc tls-min-version 1.2
```

grpc tunnel

To allow the router (tunnel client) to dial out to a collector (tunnel server), use the **grpc tunnel** command in the XR Config mode. To remove the **gRPC tunnel** service, use the **no** form of this command.

grpc tunnel { **destination** *IP-address domain name* | **port** *port-ID* | **address-family** *ipv4 ipv6* | **target** *address* | **source** *ipv4 virtual ipv6 virtual* }

Syntax Description

destination*IP-address*or*domain name*	Specifies the gRPC tunnel destination.
port*port-ID*	Specifies the destination port.
address-family*ipv4*or*ipv6*	Specifies the address-family (AF) for the returned addresses from DNS. Only applicable to domain name.
target*address*	Specifies the target name to register the tunnel service.
source*ipv4 virtual*or*ipv6 virtual*	Specifies the virtual IP address family.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.10.1	Keywords **source ipv4 virtual address**, **source ipv6 virtual address**, **address-family ipv4**, and **address-family ipv6** were added to this command.
Release 7.5.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to set up a virtual IPv4 or IPv6 or both as source address:

```
Router(config)#grpc
Router(config-grpc)#tunnel
Router(config-grpc-tunnel)#destination 192.168.0.1 port 59500
Router(config-grpc-tunnel-dest)#target xr
Router(config-grpc-tunnel-dest)#source ipv4 virtual address
Router(config-grpc-tunnel-dest)#source ipv6 virtual address
Router(config-grpc-tunnel-dest)#source-interface MgmtEth 0/RP0/CPU0/0
```

The following example shows how to set up FQDN as gRPC tunnel destination (IPv4):

```
Router#config
Router(config)#grpc
Router(config-grpc)#tunnel
Router(config-grpc-tunnel)#destination test.tunnel.dn port 59500
Router(config-grpc-tunnel-dest)#address-family ipv4
Router(config-grpc-tunnel-dest)#target xr
Router(config-grpc-tunnel-dest)#commit
```

grpc p4rt

To enable programming the data plane elements using Programming Protocol-independent Packet Processors (P4) Runtime API, use the **grpc p4rt** command in the XR Config mode. To remove the P4Runtime API, use the **no** form of this command.

grpc p4rt

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to enable P4Runtime service:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# grpc p4rt
RP/0/RP0/CPU0:router(config-grpc-p4rt)# commit
```

grpc p4rt interface

To assign unique port identifiers to configure P4Runtime programming on the router, use the **grpc p4rt interface** command in the XR Config mode. To remove the P4Runtime port identifier configuration for the interfaces, use the **no** form of this command.

grpc p4rt interface *type location* **port-id** *port-identifier*

Syntax Description

type	Specifies the interface type. For more information, use the question mark (**?**) online help function.
location	Specifies the physical or virtual interface in *rack/slot/instance/port/breakout* or *rack/slot/interface/port* format.
port-id *port-identifier*	Assigns a unique numeric identifier to each physical port on the router. The port ID is a unique 32-bit identifier. The range is 1 to 4294967039.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure the interfaces HundredGigE0/0/0/24, HundredGigE0/0/0/25 and HundredGigE0/0/0/26 with port IDs 3, 6 and 7 respectively for P4Runtime:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# grpc p4rt
RP/0/RP0/CPU0:router(config-grpc-p4rt)# location 0/0/CPU0 npu-id 0 device-id 1000000
RP/0/RP0/CPU0:router(config-grpc-p4rt)#location 0/0/CPU0 npu-id 1 device-id 1000001
RP/0/RP0/CPU0:router(config-grpc-p4rt)#location 0/1/CPU0 npu-id 2 device-id 1000002
RP/0/RP0/CPU0:router(config-grpc-p4rt)#location 0/1/CPU0 npu-id 3 device-id 1000011
```

grpc p4rt location

To assign unique identifiers for each Network Processing Unit (NPU) in the system to configure P4Runtime programming on the router, use the **grpc p4rt location** command in the XR Config mode. To remove the P4Runtime device identifier configuration for the NPUs, use the **no** form of this command.

grpc p4rt location *node-id* **npu-id** *npu-identifier* **device-id** *device-identifier*

Syntax Description

node-id	Specifies the card location on the specified node in *rack/slot/module* notation.
npu-id *npu-identifier*	Specifies the NPU identifier on the card. The `npu-id` is a unique value in the range of 0 to 7.
device-id *device-identifier*	Assigns a unique device identifier to each device in the system. The `device-id` is a unique 64-bit identifier. The range is 1 to 18446744073709551615.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure the NPU ID and device ID for nodes 0/0/CPU0 and 0/1/CPU0:

```
RP/0/RP0/CPU0:router## configure
RP/0/RP0/CPU0:router(config)# grpc p4rt
RP/0/RP0/CPU0:router(config-grpc-p4rt)# location 0/0/CPU0 npu-id 0 device-id 1000000
RP/0/RP0/CPU0:router(config-grpc-p4rt)# location 0/0/CPU0 npu-id 1 device-id 1000001
RP/0/RP0/CPU0:router(config-grpc-p4rt)# location 0/1/CPU0 npu-id 2 device-id 1000002
RP/0/RP0/CPU0:router(config-grpc-p4rt)# location 0/1/CPU0 npu-id 3 device-id 1000011
```

gnsi load service authorization policy

To instruct the router to load the service authorization policy file into its memory and update the policy, use the **gnsi load service authorization policy** command in Global Configuration Mode.

gnsi load service authorization policy *file_path*

Syntax Description

file-path	Specifies the path of the policy file.

Command Default

Enabled, by default

Command Modes

Global Configuration Mode

Command History

Release	Modification
Release 7.11.1	This command was introduced.

Usage Guidelines

A policy file which has no specified or the policy is invalid, the default behavior will transition to the zero-policy behavior. Zero-policy allows all gRPC services to all the users if their profiles are configured.

Task ID

Task ID	Operation
config-services	read, write

This example shows how to activate the authorization policy test.json in the router.

```
Router(config)#gnsi load service authorization policy /disk0:/test.json
Successfully loaded policy
```

grpc gnsi service certz ssl-profile-id

To instruct the router to load the certz.proto, use the **grpc gnsi service certz ssl-profile-id** command in Global Configuration Mode. To disable the SSL profiles configured with certz.proto, use the no form of the command.

grpc gnsi service certz ssl-profile-id *ssl-profile name*

Syntax Description

ssl-profile name	Specifies the SSL-profile name for which certz. proto needs to be activated.

Command Default

None

Command Modes

Global Configuration Mode

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

If Certz. proto is not active, then gNOI cert.proto is taken into consideration. If niether certz.proto nor cert.proto is active, then TLS trustpoint's data is considered.

Task ID

Task ID	Operation
config-services	read, write

This example shows how to activate the certz.proto in the router.

```
Router(config)#grpc gnsi service certz ssl-profile-id gNxI
Router(config)#commit
```

port (gRPC)

To set custom ports for gNMI, gRIBI, and P4RT services within the defined range, including default IANA ports like 9339, 9340, and 9559 (respectively), use the **port** command under the service submode.

port *portnum*

Syntax Description

portnum	Specifies the server listening port for the gRPC service. • gNMI service port: default: 9339, range: 57344-57999 • gRIBI service port: default: 9340, range: 57344-57999 • p4RT service port: default: 9559, range: 57344-57999

Command Default

None

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

Disabling the **port** command will cause the service to use the default or IANA port.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure a port for any available gRPC service (gNMI, P4RT, gRIBI) :

For P4RT service:

```
Router(config-grpc)#p4rt
Router(config-grpc-p4rt)#port 9559
Router(config-grpc-p4rt)#commit
```

Verify the port number.

```
Router#show running-config grpc
grpc
  p4rt
    port 9559
!
```

script exec

To execute a script provided by Cisco, use the **script exec** command in XR EXEC mode.

script exec { **auto-update** *file-name remote-server-path* **condition** [**manual** | **on-run** | **schedule**] | *file-name* }

Syntax Description

auto-update	It enables routers to automatically update the local copy of the scripts with the latest copy of the scripts on the server.
manual	It enables routers to update the scripts at any specific time.
on-run	It enables routers to update the scripts during run time. Only the exec scripts support the on-run option.
schedule	It enables routers to update the scripts at a scheduled time. The schedule option does not support SCP protocol.
file-name	Specifies the file name of the script file. The script file must be in .py format.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.5.1	This command was introduced.

Usage Guidelines

The script EXEC command opens the script utility, which allows you to execute Cisco-supplied scripts. The script utility can read standard terminal input from the user if the script you run requires input from the user.

Note The script utility is designed to run only Cisco-supplied scripts. You cannot execute script files that lack Cisco signatures or that have been corrupted or modified.

When you run the script, the script is downloaded and the checksum is automatically configured on the router.

- If on-run option is configured, running the script run command downloads the script.
- If manual option is configured, then you must run script update Exec command.
- If schedule option is selected, then the script is automatically updated after the specified interval.

Task ID

Task ID	Operations
config-services	read, write

The following example displays sample3.py script is automatically updated from the remote server at http://10.23.255.205:

```
Router# configure
Router(config)# script exec auto-update sample3.py http://10.23.255.205 condition manual
```

show grpc certificate

To display the active gRPC certificate management policies on the router, use the **show grpc certificate** command in EXEC mode.

show grpc certificate

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 24.1.1	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the active gRPC certificate management policies on the router. The below-mentioned command output is truncated version.

```
Router#show grpc certificate
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 32 (0x20)
        Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=localhost,O=OpenConfig,C=US
        Validity
            Not Before: Nov  8 08:49:38 2023 GMT
            Not After : Mar 22 08:49:38 2025 GMT
        Subject: CN=ems,O=OpenConfig,C=US
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                RSA Public-Key: (4096 bit)
                Modulus:
                    00:ea:6a:6c:25:be:9f:15:71:ce:74:89:03:ec:ef:
                    0b:3b:de:58:a8:7e:28:b8:cf:b3:82:91:b4:5c:42:
                    e7:d8:28:98:35:bd:35:60:a7:4e:f8:77:02:46:5f:
                    27:a4:16:cf:3c:e3:24:28:69:9c:22:1e:e3:52:96:
                    71:87:7c:40:0c:1f:dd:30:ea:dc:40:ca:93:00:54:
                    5e:de:20:54:5b:f4:2f:9f:19:6f:71:61:28:69:3d:
                    97:26:ab:e1:5f:53:3c:f1:a2:c3:14:f4:01:90:1a:
                    .
                    .
                    .
```

```
            Exponent: 65537 (0x10001)
        X509v3 extensions:
            X509v3 Key Usage: critical
                Digital Signature
            X509v3 Extended Key Usage:
                TLS Web Client Authentication, TLS Web Server Authentication
            X509v3 Authority Key Identifier:
                keyid:0A:A8:9A:6A:23:34:AE:CA:96:00:2C:F3:04:38:14:E3:D4:8D:77:BD

            X509v3 Subject Alternative Name:
                DNS, IP Address:64.103.223.56
    Signature Algorithm: sha256WithRSAEncryption
         b9:89:ec:60:3d:8d:7d:9c:dc:08:56:89:99:44:92:98:45:b6:
         97:ba:e3:e5:f2:48:b2:44:8d:db:23:bb:a1:c0:62:79:78:18:
         d7:55:f6:4a:67:5b:75:e0:c0:0b:52:51:07:36:d5:6c:c7:67:
         48:86:8d:dd:70:1c:9f:7c:a1:7b:aa:a5:4e:e1:ad:cf:4c:e5:
         81:db:92:cf:88:70:5a:1c:8d:de:0d:e8:b3:05:de:b9:04:4d:
         23:e1:de:66:e5:08:bd:2e:31:0a:07:a6:c0:00:3a:38:2f:00:
         .
         .
         .
```

show grpc services

Use the **show grpc services** command in the XR EXEC mode to display all gNSI and gRPC services with their release numbers on the router.

show grpc services

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 24.3.1	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays all gNSI and gRPC services with their release numbers on the router.

```
Router#show grpc services
Tue Jul 23 00:07:20.406 UTC

Registered gRPC Services: 20
Service:                                                        Version:
grpc                                                            v1.64.0
gnmi                                                            v0.10.0
gnsi                                                            v1.4.5
attestz                                                         v0.2.0
bootz                                                           v0.3.1
gribi                                                           v0.1.1
p4runtime                                                       v1.4.0
gnoi.system                                                     v1.1.0
gnoi.bgp                                                        v0.1.0
gnoi.healthz                                                    v1.3.0
gnoi.factory_reset                                              v0.1.0
gnoi.mpls                                                       v0.1.0
gnoi.layer2                                                     v0.1.0
gnoi.diag                                                       v0.1.0
gnoi.file                                                       v0.1.0
gnoi.cert                                                       v0.2.0
gnoi.packet_link_qualification                                  v1.1.0
gnoi.os                                                         v0.1.4
gnoi.wavelength_router                                          v0.2.0
gnoi.otdr                                                       v0.1.0
```



Note Starting with Cisco IOS XR Release 24.4.1, **AcctzStream**, which is a server-streaming service, replaces the existing bidirectional streaming service, **Acctz**, introduced in Cisco IOS XR Release 24.3.1.

show gnpsi connections

Displays TCP connections between the gRPC agent process on the RP and NetFlow agent on the line cards.

show gnpsi connections

Syntax Description This command has no keywords or arguments.

Command Default None

Command Modes XR EXEC mode

Command History

Release	Modification
Release 25.4.1	The command was introduced.

Usage Guidelines

- Use this command to check the connections between the gRPC agent process on the RP and NetFlow or sFlow agent process on the line cards.

Note A gRPC agent process is referred to as EMSd, while the NetFlow agent is known as NFSVR.

- Use this command during troubleshooting to identify connection errors, state transitions, and sample reception rates.

Task ID

Task ID	Operation
config-services	read

Command output fields

Table 2:

Field	Description
Connection Id	Unique identifier of the connection.
IP Address	Remote endpoint’s IP and port.
Node id	Local node handling the connection.
State	Internal state of the connection.
Hello Timestamp	Time the last valid hello message was received.
Parsed TLVs or Bytes	Number of TLVs processed since connection start.

Field	Description
Parsed Samples or Bytes	Metrics for received sample data.
Rater Stats	Tick-based measurement and activity counters.
Queue Drops or Errors	Queue-level reliability indicators.
Connection Publish Errors	Number of send-side failures.

This example displays all active gNPSI connections:

```
ROUTER#show gnpsi connections

------------------------gNPSI Connections---------------------

Connections:

Connection Id                 : 4
IP Address                   : 192.168.30.66:57836
Node id                      : 0/RP0/CPU0 (0x2000)
State                        : 2
Last Error                   :
Hello Timestamp              : Fri, 05 Dec 2025 05:49:13 +0000
Parsed TLVs                  : 2
Parsed TLVs Bytes            : 176
Received Hello TLVs          : 1
Received Sample TLVs         : 1
Parsed Samples (with buffers): 1
Parsed Samples Bytes         : 144
Rater Stats:
Tick(ms)                    : 1000
Origin Tick                 : 497
Last Tick                   : 514
Reset Count                 : 1
The following display counters 'at' Tick
Last 10 Ticks               :
0  Parsed Samples           : 1
Bytes                       : 144
1  Parsed Samples           : 1
Bytes                       : 144
2  Parsed Samples           : 1
Bytes                       : 144
3  Parsed Samples           : 1
Bytes                       : 144
4  Parsed Samples           : 1
Bytes                       : 144
5  Parsed Samples           : 1
Bytes                       : 144
6  Parsed Samples           : 1
Bytes                       : 144
7  Parsed Samples           : 1
Bytes                       : 144
8  Parsed Samples           : 1
Bytes                       : 144
9  Parsed Samples           : 1
Bytes                       : 144
Last 1 multiple of 10 Ticks :
0  Parsed Samples           : 1
Bytes                       : 144
Sent Samples (count per stream) : 1
Sent GPB Samples Bytes      : 161
```

```
Read Errors                 : 0
Packet Pool Errors          : 0
Sample Read Errors          : 0
Sample Metadata Errors      : 0
No Subscribers Packets Drops: 0
Queue Drops                 : 0
Queue Drops Bytes           : 0
Queue Errors                : 0
Queue Errors Bytes          : 0
Connection Publish Errors   : 0

Total 1 items found
```

show gnpsi sessions

Displays gNPSI (gRPC Network Packet Sampling Interface) streaming sessions established with subscribers. A session corresponds to a subscriber stream that is receiving samples generated by the device.

This command shows the sessions between the gRPC agent on the Route Processor (RP) and Netflow agent on the line cards.

show gnpsi sessions

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 25.4.1	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Command output fields

Field	Description
Session Id	Numeric identifier of the session.
IP Address	Subscriber address.
Source Port	Local port used for sending data.
Sent Samples (count per stream)	Number of samples transmitted.
Rater Stats	Tick-based counters tracking sending activity.
Queue Drops or Errors	Dropped or errored entries within the streaming queue.
Stream	Send or receive channel status indicators.
Queue	Soft or hard queue metrics and retry counters.

This example displays all active gNPSI sessions:

```
ROUTER#show gnpsi sessions

------------------------gNPSI Sessions---------------------
```

```
Sessions:

Session Id                      : 2
IP Address                     : 192.168.1.21
Source Port                    : 40716
Sent Samples (count per stream): 1
Sent GPB Samples Bytes         : 161
Sent raw Samples Bytes         : 144
Rater Stats:
Tick(ms)                      : 1000
Origin Tick                   : 0
Last Tick                     : 535
Reset Count                   : 0
The following display counters 'at' Tick
Last 10 Ticks                 :
0         Samples             : 1
GPB Bytes                     : 161
1         Samples             : 1
GPB Bytes                     : 161
2         Samples             : 1
GPB Bytes                     : 161
3         Samples             : 1
GPB Bytes                     : 161
4         Samples             : 1
GPB Bytes                     : 161
5         Samples             : 1
GPB Bytes                     : 161
6         Samples             : 1
GPB Bytes                     : 161
7         Samples             : 1
GPB Bytes                     : 161
8         Samples             : 1
GPB Bytes                     : 161
9         Samples             : 1
GPB Bytes                     : 161
Last  6 multiple of 10 Ticks  :
0         Samples             : 1
GPB Bytes                     : 161
1         Samples             : 1
GPB Bytes                     : 161
2         Samples             : 1
GPB Bytes                     : 161
3         Samples             : 1
GPB Bytes                     : 161
4         Samples             : 0
GPB Bytes                     : 0
5         Samples             : 0
GPB Bytes                     : 0
Last  8 multiple of 60 Ticks  :
0         Samples             : 0
GPB Bytes                     : 0
1         Samples             : 0
GPB Bytes                     : 0
2         Samples             : 0
GPB Bytes                     : 0
3         Samples             : 0
GPB Bytes                     : 0
4         Samples             : 0
GPB Bytes                     : 0
5         Samples             : 0
GPB Bytes                     : 0
6         Samples             : 0
GPB Bytes                     : 0
```

```
7         Samples             : 0
GPB Bytes                    : 0
Queue Drops                   : 0
Queue Drops Bytes             : 0
Queue Errors                  : 0
Queue Errors Bytes            : 0
Stream:
Status                       : 2
Send Status                  : 1
Send Err Chan Len            : 0
Send Enqueue Count           : 1
Send Close                   : 0
Send Count                   : 1
Send Errors                  : 0
Queue:
Recv Count                   : 8000
Chan Len                     : 0
Size                         : 0
Soft Limit                   : 4000
Low WaterMark                : 0
WaterMark                    : no
Chan Closed                  : no
Status                       : 2
Enqueue Count                : 1
Dequeue Count                : 1
Retries                      : 0
Retry Full Count             : 0

Total 1 items found
```

show gnpsi stats

Displays global statistics for both gRPC agent process on the Route Processor (RP) and NetFlow agent on the line cards. Information includes packet-pool utilization, subscriber counts, listener details, parsed TLV statistics, sample processing, and publish results.

show gnpsi stats

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 25.4.1	The command was introduced.

Usage Guidelines

This command displays internal and external statistical information for gNPSI. Use this command to help troubleshoot issues with the active gNPSI working session.

Task ID

Task ID	Operation
config-services	read

Command output fields

Field	Description
Packet Pool	Size categories, allocation levels, and pool-error counters.
Subscribers	External gRPC controllers.
Server	Queue limits and send-success metrics.
Listener	Internal line card connections and its corresponding stats.

This example displays the truncated version of the global statistics for the gNPSI subsystem.

```
ROUTER#show gnpsi stats

-------------------------gNPSI stats--------------------------
Packet Pool:
Total Number of Pools             : 36
Pool Bad Size Errors              : 0
Size:
In-Use |               Max-Limit |                Overflow
Total Alloc |              Total Free |              Pool Alloc
512:
```

```
0 |                   32000 |                       0
8225 |                    8225 |                    2666
768:
0 |                   32000 |                       0
0 |                       0 |                       0
.
.
.
.
.
.
<truncated output>

Subscribers:
Total Connections               : 1

Server:
Max Queue Size                  : 8000
Soft Max Queue Size             : 4000
Last Subscriber ID              : 2
Packets Sent Success            : 8225
Packets Sent Fail               : 0

Listener:
Listener State                  : 2
Number of Connections           : 1
Accept Connections              : yes
Publish Enable                  : yes
Address                         : 192.0.2.1:6343
Parsed TLVs                     : 8229
Parsed TLVs Bytes               : 1121872
Received Hello TLVs             : 4
Received Sample TLVs            : 8225
Parsed Samples (with buffers)   : 8225
Parsed Samples Bytes            : 990208
New Connections                 : 4
Reset Connections               : 0
Sent Samples (count per stream) : 8225
Sent GPB Samples Bytes          : 1127883
Read Errors                     : 3
Packet Pool Errors              : 0
Sample Read Errors              : 0
Sample Metadata Errors          : 0
No Subscribers Packets Drops    : 0
Queue Drops                     : 0
Queue Drops Bytes               : 0
Queue Errors                    : 0
Queue Errors Bytes              : 0
Connection Publish Errors       : 0
```

show gnsi acctz statistics

To display the detailed statistics for GNSI Acctz accounting, use the **show gnsi acctz statistics** command in the XR EXEC mode.

This command provides these information:

- per service counter
- drop counter
- rate of accounting events
- history
- connected collectors
- collector per service record counters

show gnsi acctz statistics

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 24.3.1	The command was introduced.
Release 24.4.1	The command was modified to include counters and processing required at various stages.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read, write

This example displays detailed statistics for GNSI Acctz accounting with the maximum history memory size specified in the **grpc aaa accounting history-memory** command and the maximum queue size specified in the **grpc aaa accounting queue-size** command configuration examples respectively.

```
Router#show gnsi acctz statistics
Tue Jul 23 05:59:28.755 UTC
Acctz History Buffer:
  Total Records                  : 80029
  Total History Truncation       : 0
```

```
    Grpc Service Records:
      GNMI                          : 80002
      GNOI                          : 0
      GNSI                          : 4
      GRIBI                         : 0
      P4RT                          : 0
      Unspecified                   : 0
    Cmd Service Records:
      Shell                         : 0
      Cli                           : 23
      Netconf                       : 0
      Unspecified                   : 0
  History snapshot:
    Max Memory Size                 : 20 MB
    Memory Used                     : 0 MB
    Max Number Of Records           : 30
    Records Used                    : 30
gRPC Accounting Queue:
  Grpc services:
    GNMI                            : 80002 sent, 0 dropped, 0 truncated
    GNOI                            : 0 sent, 0 dropped, 0 truncated
    GNSI                            : 4 sent, 0 dropped, 4 truncated
    GRIBI                           : 0 sent, 0 dropped, 0 truncated
    P4RT                            : 0 sent, 0 dropped, 0 truncated
    Unspecified                     : 0 sent, 0 dropped, 0 truncated
  Queue Rate:
    Input                           : 80000
    Output                          : 80000
    Drop                            : 0
  Stats:
    Queue Buffer Used               : 0 MB
    Queue Enqueue                   : 80006
    Queue Dequeue                   : 80006
    Queue Drops                     : 0
    Queue Max Time                  : 14311 usec
    Queue Min Time                  : 1 usec
    Queue Avg Time                  : 504 usec
  Channel Stats:
    Queue Channel Size              : 512
    Queue Channel Length            : 0
    Queue Inuse Size                : 0
    Queue Size                      : 30
    Queue Low Water Mark            : 1
    Queue Water Mark                : false
    Queue Channel Closed            : false
    Queue Status                    : 2
    Queue Enqueue Count             : 80006
    Queue Decrement Count           : 80006
    Queue Retry Count               : 0
    Queue Retry Full Count          : 0
  Errors:
    Queue Init Failure              : 0
    Queue Update Failure            : 0
    Queue Dequeue Failure           : 0
    Queue Invalid Parameters        : 0
SendtoAAA Accounting Queue:
  Grpc services:
    GNMI                            : 80002 sent, 0 dropped, 0 truncated
    GNOI                            : 0 sent, 0 dropped, 0 truncated
    GNSI                            : 4 sent, 0 dropped, 0 truncated
    GRIBI                           : 0 sent, 0 dropped, 0 truncated
    P4RT                            : 0 sent, 0 dropped, 0 truncated
    Unspecified                     : 0 sent, 0 dropped, 0 truncated
  Queue Rate:
```

```
    Input                          : 80000
    Output                         : 80000
    Drop                           : 0
  Stats:
    Queue Buffer Used              : 0 MB
    Queue Enqueue                  : 80006
    Queue Dequeue                  : 80006
    Queue Drops                    : 0
    Queue Max Time                 : 66549 usec
    Queue Min Time                 : 1 usec
    Queue Avg Time                 : 2544 usec
  Channel Stats:
    Queue Channel Size             : 512
    Queue Channel Length           : 0
    Queue Inuse Size               : 0
    Queue Size                     : 40
    Queue Low Water Mark           : 1
    Queue Water Mark               : false
    Queue Channel Closed           : false
    Queue Status                   : 2
    Queue Enqueue Count            : 80006
    Queue Decrement Count          : 80006
    Queue Retry Count              : 0
    Queue Retry Full Count         : 0
  Errors:
    Queue Init Failure             : 0
    Queue Update Failure           : 0
    Queue Dequeue Failure          : 0
    Queue Invalid Parameters       : 0
Cmd Accounting Queue:
  Cmd services:
    Shell                          : 0 sent, 0 dropped, 0 truncated
    Cli                            : 23 sent, 0 dropped, 0 truncated
    Netconf                        : 0 sent, 0 dropped, 0 truncated
    Unspecified                    : 0 sent, 0 dropped, 0 truncated
  Queue Rate:
    Input                          : 2
    Output                         : 2
    Drop                           : 0
  Stats:
    Queue Buffer Used              : 0 MB
    Queue Enqueue                  : 23
    Queue Dequeue                  : 23
    Queue Drops                    : 0
    Queue Max Time                 : 248 usec
    Queue Min Time                 : 26 usec
    Queue Avg Time                 : 94 usec
  Channel Stats:
    Queue Channel Size             : 512
    Queue Channel Length           : 0
    Queue Inuse Size               : 0
    Queue Size                     : 40
    Queue Low Water Mark           : 1
    Queue Water Mark               : false
    Queue Channel Closed           : false
    Queue Status                   : 2
    Queue Enqueue Count            : 23
    Queue Decrement Count          : 23
    Queue Retry Count              : 0
    Queue Retry Full Count         : 0
  Errors:
    Queue Init Failure             : 0
    Queue Update Failure           : 0
    Queue Dequeue Failure          : 0
```

```
    Queue Invalid Parameters       : 0
Client Stats:
  Number Of Clients                : 2
  History Truncation Events        : 0
  Client Idle Timeouts             : 0
  Record Requests                  : 4
  Record Responses                 : 80029
Collectors:
  Collector Statistics:
    IP                             : 192.168.122.1
    Port                           : 25906
    Total                          : Records: 80029, Drops: 0
    Total History Truncation       : 0
    Grpc Service Records:
      gNMI                         : Records: 80002, Drops: 0
      gNOI                         : Records: 0, Drops: 0
      gNSI                         : Records: 4, Drops: 0
      gRIBI                        : Records: 0, Drops: 0
      P4RT                         : Records: 0, Drops: 0
      Unspecified                  : Records: 0, Drops: 0
    Cmd Service Records:
      Shell                        : Records: 0, Drops: 0
      CLI                          : Records: 23, Drops: 0
      Netconf                      : Records: 0, Drops: 0
      Unspecified                  : Records: 0, Drops: 0
   gRPC Stream Stats:
    gRPC Stream Status             : 2
    gRPC Send Status               : 1
    gRPC Send Error Channel Length : 0
    gRPC Send Errors               : 0
    gRPC Send Enqueue Count        : 80029
    gRPC Send Close Count          : 0
    gRPC Stream Send Count         : 80029
    gRPC Stream Send Error Count   : 0
  Send Channel Stats:
    Queue Channel Size             : 512
    Queue Channel Length           : 0
    Queue Inuse Size               : 0
    Queue Size                     : 40
    Queue Low Water Mark           : 0
    Queue Water Mark               : false
    Queue Channel Closed           : false
    Queue Status                   : 2
    Queue Enqueue Count            : 80029
    Queue Decrement Count          : 80029
    Queue Retry Count              : 0
    Queue Retry Full Count         : 0
  Collector Statistics:
    IP                             : 192.168.122.1
    Port                           : 25912
    Total                          : Records: 80029, Drops: 0
    Total History Truncation       : 0
    Grpc Service Records:
      gNMI                         : Records: 80002, Drops: 0
      gNOI                         : Records: 0, Drops: 0
      gNSI                         : Records: 4, Drops: 0
      gRIBI                        : Records: 0, Drops: 0
      P4RT                         : Records: 0, Drops: 0
      Unspecified                  : Records: 0, Drops: 0
    Cmd Service Records:
      Shell                        : Records: 0, Drops: 0
      CLI                          : Records: 23, Drops: 0
      Netconf                      : Records: 0, Drops: 0
      Unspecified                  : Records: 0, Drops: 0
```

```
   gRPC Stream Stats:
    gRPC Stream Status             : 2
    gRPC Send Status               : 1
    gRPC Send Error Channel Length : 0
    gRPC Send Errors               : 0
    gRPC Send Enqueue Count        : 80029
    gRPC Send Close Count          : 0
    gRPC Stream Send Count         : 80029
    gRPC Stream Send Error Count   : 0
  Send Channel Stats:
    Queue Channel Size             : 512
    Queue Channel Length           : 0
    Queue Inuse Size               : 0
    Queue Size                     : 40
    Queue Low Water Mark           : 0
    Queue Water Mark               : false
    Queue Channel Closed           : false
    Queue Status                   : 2
    Queue Enqueue Count            : 80029
    Queue Decrement Count          : 80029
    Queue Retry Count              : 0
    Queue Retry Full Count         : 0
Accounting Stats:
  Grpc Accounting                  : 80006
  Cmd Accounting                   : 23
Error Stats:
  AAA Dequeue Failed               : 0
  AAA Payload Failed               : 0
  Send To AAA Failed               : 0
  gRPC Dequeue Failed              : 0
  Cmd Dequeue Failed               : 0
  Accounting Payload Failed        : 0
  Record Create Failed             : 0
  Get RPC Failed                   : 0
  Get Method Failed                : 0
  Serialize Payload Failed         : 0
  Record Response Payload Failed   : 0
  Get Local Info Failed            : 0
  Get Remote Info Failed           : 0
  Get Username Failed              : 0
  Locald Invalid Service Type      : 0
```

show gnsi service authorization policy

To display the active gRPC service authorization policies on the router, use the **show gnsi service authorization policy** command in Global Configuration mode.

show gnsi service authorization policy

Syntax Description

This command has no keywords or arguments.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 7.11.1	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the policy which is active on the router:

```
Router#show gnsi service authorization policy
Wed Jul 19 10:56:14.509 UTC{
    "version": "1.0",
    "created_on": 1700816204,
    "policy": {
        "name": "authz",
        "allow_rules": [
            {
                "name": "allow all gNMI for all users",
                "request": {
                    "paths": [
                        "*"
                    ]
                },
                "source": {
                    "principals": [
                        "*"
                    ]
                }
            }
        ],
        "deny_rules": [
            {
                "name": "deny gNMI set for oper users",
                "request": {
                    "paths": [
                        "/gnmi.gNMI/*"
```

```
                        ]
                    },
                    "source": {
                        "principals": [
                            "User1"
                        ]
                    }
                }
            ]
        }
    }
```

show gnsi path authorization counters

To view the gNSI path authorization counters such as number of accepted, rejected authorizations, use the **show gnsi path authorization counters** command in Global Configuration mode.

show gnsi path authorization counters [**path** *XPath* | **server-name** *server-name*]

Syntax Description

XPath	Provide the XPath for which authorization counters can be retrieved.
server-name	The server's IP address from where authorization counters can be retrieved.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.2.11	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the policy which is active on the router:

```
Router# show gnsi path authorization counters
Mon Apr  1 08:05:46.297 UTC
----------------Pathz Counters Info--------------

/system/config/hostname:
                                        Read                                Write
Rejects :                                  0                                    0
   Last :                                N/A                                  N/A
Accepts :                                  0                                    3
   Last :                                N/A    Mon, 01 Apr 2024 08:05:25 +0000
Total path records received 1

Router# show gnsi path authorization counters server-name 64.103.223.33
Mon Apr  1 08:33:25.194 UTC
----------------Pathz Counters Info--------------

/:
                                        Read                                Write
Rejects :                                  0                                    2
   Last :                                N/A    Mon, 01 Apr 2024 08:32:37 +0000
Accepts :                                  0                                    0
   Last :                                N/A                                  N/A

/system/config/hostname:
```

```
                                        Read                                Write
Rejects :                                  0                                    6
   Last :                                N/A    Mon, 01 Apr 2024 08:32:36 +0000
Accepts :                                  0                                    0
   Last :                                N/A                                  N/A
Total path records received 2
Router#
```

```
Router# show gnsi path authorization counters path /system/config/hostname
Mon Apr  1 08:32:46.468 UTC
----------------Pathz Counters Info--------------

/system/config/hostname:
                                        Read                                Write
Rejects :                                  0                                    6
   Last :                                N/A    Mon, 01 Apr 2024 08:32:36 +0000
Accepts :                                  0                                    0
   Last :                                N/A                                  N/A
Total path records received 1
Router#
```

show gnsi path authorization policy

To view the running gNSI path authorization policy on the router, use the **show gnsi path authorization policy** command in Global Configuration mode.

show gnsi path authorization policy

Syntax Description

This command has no keywords or arguments.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.2.11	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the gnsi path authorization policy which is active on the router:

```
Router# show gnsi path authorization policy
Mon Apr  1 04:29:37.905 UTC
version:"1" created_on:1711946719670313 policy:{rules:{user:"cafyauto"
path:{origin:"openconfig" elem:{name:"system"} elem:{name:"config"} elem:{name:"hostname"}}
 action:ACTION_PERMIT mode:MODE_WRITE}}
Router#
```

show gnsi path authorization statistics

To view the gNSI path authorization statistics on the router, use the **show gnsi path authorization statistics** command in Global Configuration mode.

show gnsi path authorization statistics

Syntax Description

This command has no keywords or arguments.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.2.11	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the gNSI path authorization statistics on the router:

```
Router# show gnsi path authorization statistics
Mon Apr  1 04:29:23.259 UTC
----------------Pathz Info--------------
Engine:

  State:
    Active Policy:
      Version                 : 1
      Created On (UTC)        : Wed, 09 Dec 54251401 07:58:33 +0000
    Sandbox Policy:
      Version                 : N/A
      Created On (UTC)        : N/A
    Policy Rotation in Progress: False

  Stats:
    Rotations in Progress Count: 0
    Policy Rotations          : 0
    Policy Rotation Errors    : 0
    Policy Upload Requests    : 0
    Policy Upload Errors      : 0
    Policy Finalize           : 0
    Policy Finalize Errors    : 0
    Probe Requests            : 0
    Probe Errors              : 0
    Get Requests              : 0
    Get Errors                : 0
    Policy Unmarshall Errors  : 0
```

```
  Sandbox Policy Errors      : 0

Counters:
  No Policy Auth Requests    : 0
  gNMI Path Leaves           : 0
  gNMI Authorizations        : 0
  gNMI Set Path Permit       : 0
  gNMI Set Path Deny         : 0
  gNMI Get Path Permit       : 0
  gNMI Get Path Deny         : 0

Errors:
  Path To String             : 0
  Origin Type                : 0
  Bad Mode                   : 0
  Bad Action                 : 0
  JSON Flatten               : 0
  String To Path             : 0
  Join Paths                 : 0
  Nil Path                   : 0
  Nil SetRequest             : 0
  Empty User                 : 0
  Probe Internal             : 0
  Path Counters:
    Increment                : 0
    Find                     : 0
    Clear                    : 0
    Walk                     : 0
```

show p4rt devices

To view the status of P4Runtime devices, use the **show p4rt devices** command in EXEC mode.

show p4rt devices *device-id* **location** *npu-location* **npu-id** *npu-id*

Syntax Description

device-id	Specifies the 64-bit device identifier as a decimal value in the range of 1 to 18446744073709551615.
location *npu-location*	Specifies the location of the Network Processing Unit (NPU) device.
npu-id *npu-id*	Specifies the unique NPU identifier in the range of 0 to 7.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read

This example shows how to view the status of devices configured for P4Runtime:

```
RP/0/RP0/CPU0:router# show p4rt devices
Wed May 17 17:11:43.670 UTC
----------------P4RT Devices--------------
Device Id                                : 1000000
    Node Id                              : 0/0/CPU0 (0x0)
    NPU Id                               : 0x0
    Internal Tx State                    : 1
    Max Election Id                      : 0,0
    Shutdown Requested                   : no
    Sessions count                       : 0
    P4Info Hash Value                    : 0x0
    P4Info Ref Count                     : 0
    Protocol Stats:
        New Primary Count                : 0
        Last Session Id                  : 0
        Successfull FwdConfig            : 0
        Unsuccessfull FwdConfig          : 0
        Not Primary FwdConfig            : 0
    Write Stats:
        Successfull Write                : 0
        Unsuccessfull Write              : 0
        Not Primary Write                : 0
        Failed Precondition Write        : 0
```

```
        Successfull Write Entries         : 0
        Unsuccessfull Write Entries       : 0
    Read Stats:
        Successfull Read                  : 0
        Unsuccessfull Read                : 0
        Failed Precondition Read          : 0
        Successfull Read Entries          : 0
    Inject Stats:
        Primary Packets                   : 0
        Primary Drops                     : 0
        Failed Precondition               : 0
        Non Primary Drops                 : 0
        Bad Packet Length                 : 0
        Bad Packet Metadata               : 0
    Punt Queue Stats:
        Size                              : 0
        Inserted                          : 0
        Removed                           : 0
        Full Drops                        : 0
        Drained Drops                     : 0
    Punt Stats:
        Total Primary Packets             : 0
        Primary Packet Errors             : 0

  Table Entries                           : 0

  Sessions:
      None found


Device Id                                 : 1000001
    Node Id                               : 0/1/CPU0 (0x100)
    NPU Id                                : 0x3
    Internal Tx State                     : 1
    Max Election Id                       : 0,0
    Shutdown Requested                    : no
------------------ Truncated for brevity --------------------
```

show p4rt interfaces

To view the status of P4Runtime interfaces, use the **show p4rt interfaces** command in XR EXEC mode.

show p4rt interfaces *type location*

Syntax Description

type	Specifies the interface type. For more information, use the question mark (**?**) online help function.
location	Specifies the physical or virtual interface in *rack/slot/instance/port/breakout* or *rack/slot/interface/port* format.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read

This example shows how to view the status of interfaces configured for P4Runtime:

```
RP/0/RP0/CPU0:router# show p4rt interfaces
Wed May 17 16:53:01.459 UTC
----------------P4RT Interface-------------
Interface Name     : HundredGigE0/0/0/24
    Handle         : 0x250
    P4RT Port-id   : 3
    Node-id        : 0/0/CPU0 (0x0)
    NPU-id         : 0x0
    FSM State      : SPIO_ATTACHED
    RefCnt         : 3
    Flags          : 0xd

Interface Name     : HundredGigE0/0/0/25
    Handle         : 0x258
    P4RT Port-id   : 6
    Node-id        : 0/0/CPU0 (0x0)
    NPU-id         : 0x1
    FSM State      : SPIO_ATTACHED
    RefCnt         : 3
    Flags          : 0xd

Interface Name     : HundredGigE0/0/0/26
    Handle         : 0x260
    P4RT Port-id   : 7
    Node-id        : 0/0/CPU0 (0x0)
    NPU-id         : 0x1
```

```
FSM State       : SPIO_ATTACHED
RefCnt          : 3
Flags           : 0xd
```

show p4rt state

To view the global state of P4Runtime gRPC service configured on the router, use the **show p4rt state** command in XR EXEC mode.

show p4rt state

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read

This example shows how to view the global state of P4Runtime service configured on the router:

```
RP/0/RP0/CPU0:router# show p4rt state
Wed May 17 17:24:56.802 UTC
----------------P4RT state--------------
Global:
    Thread cerrno              : Success
    State                      : CONFIGURED
    Configured                 : Yes

Interface Manager:
    Connected                  : Yes

SPIO:
    Initialized                : Yes
    Thread cerrno              : Success
    Thread running             : Yes
    Thread asked to stop       : No
    Resync in Progress         : No

NETIO:
    Connected                  : Yes

LPTS:
    Client cerrno              : Success
```

show p4rt stats

To view the P4Runtime statistics, use the **show p4rt stats** command in XR EXEC mode.

show p4rt stats

Syntax Description This command has no keywords or arguments.

Command Default None

Command Modes XR EXEC mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read

This example shows how to view the global state of P4Runtime services configured on the router:

```
RP/0/RP0/CPU0:router# show p4rt stats
Wed May 17 17:34:14.611 UTC
----------------P4RT stats--------------
Global:
    Ifname Objects              : 3
    ID Objects                  : 3
    IfHandle Objects            : 3
    Stale Interface Objects     : 0
  Inject Stats:
    Added to Internal Queue     : 0
    Internal Queue Full Drops   : 0

SPIO:
    Interface Attach OK         : 3
    Interface Attach Error      : 0
    Interface Resync OK         : 0
    Interface Resync Error      : 0
  Punt Stats:
    Packets                     : 0
    Added to Device Queue       : 0
    Ifhandle Errors             : 0
    Egress Ifhandle Lookup Errors: 0
    Egress Ifhandle Errors      : 0
    Packet Len Errors           : 0
    Bad Punt Reason Errors      : 0
    Packet Buf Errors           : 0
    Bad Device Errors           : 0
    Device Queue Full Drops     : 0
  Inject Stats:
    SPIO Errors                 : 0
```

```
    SPIO Delivered               : 0

NETIO:
  Inject Stats:
    Bad Packet Len Errors        : 0
    Packet Buffer Memory Error   : 0
    Bad IP Packet Error          : 0
    Pak API Error                : 0
    Netio Send Error             : 0
    Netio Down Error             : 0
    Netio Delivered              : 0

LPTS:
  Write:
    Attempts                     : 0
    Errors                       : 0
    Entries:
        Attempts                 : 0
        Errors                   : 0
        Skipped (gRPC Parse)     : 0
        Opcode Errors            : 0
        Punt type Errors         : 0
        Not Suppported Punt type : 0
        LPTS Client Errors       : 0
        LPTS Client Success      : 0
  Read:
    Attempts                     : 0
    Errors                       : 0
    Entries:
        Destination Errors       : 0
        Node_id Errors           : 0
        Npu_id Errors            : 0
        Attribute Errors         : 0
        Read                     : 0
```

show p4rt trace

To view the trace information of P4Runtime configuration, use the **show p4rt trace** command in XR EXEC mode.

show p4rt trace { **all** | **lib** }

Syntax Description

all	Displays trace data for all P4Runtime library.
lib	Displays trace data for general P4Runtime library.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read

This example shows how to view the trace information for P4Runtime configuration:

```
RP/0/RP0/CPU0:router# show p4rt trace all
Wed May 17 17:40:28.774 UTC
111 wrapping entries (6528 possible, 896 allocated, 0 filtered, 111 total)
May 17 15:08:47.499 p4rt/lib_slow 0/RP0/CPU0 t18073 Code(224) Thread Init: 'Slow Trace
Started'
May 17 15:08:47.499 p4rt/lib_slow 0/RP0/CPU0 t18073 Code(249) Thread Init: Parent 'thread
Barrier WAITING'
May 17 15:08:47.502 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(218) Thread Init: 'p4rt thread
EVMGR ok'
May 17 15:08:47.502 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(219) Thread Init: 'Role pulse
handler attached'
May 17 15:08:47.502 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(256) Role changed to: 'ACTIVE'
May 17 15:08:47.502 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(226) Thread Init: 'p4rt thread
debug ok'
May 17 15:08:47.502 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(240) DB: 'DB Initialized ok'
May 17 15:08:47.512 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(232) EDM Init: 'EDM sysdb reg ok'
May 17 15:08:47.512 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(233) EDM Init: 'EDM conn id ok'
May 17 15:08:47.512 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(356) OC EDM: OC EDM connect
May 17 15:08:47.522 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(359) OC EDM: Interface EDM
registration successful
May 17 15:08:47.522 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(360) OC EDM: Platform EDM register
May 17 15:08:47.529 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(361) OC EDM: Platform EDM
registration successful
May 17 15:08:47.529 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(238) OC EDM: Conn Success
May 17 15:08:47.532 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(269) LPTS: 'LPTS client init OK'
May 17 15:08:47.532 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(257) Event: 'Client Connections
```

```
Init'
May 17 15:08:47.535 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(236) IfMgr: 'IM callback registered'
May 17 15:08:47.535 p4rt/lib_event 0/RP0/CPU0 t18092 IfMgr: Code(4) - 'Connection UP'
May 17 15:08:47.535 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(238) IfMgr: 'Conn Success'
May 17 15:08:47.535 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(243) SPIO: 'spio Mutex ok'
May 17 15:08:47.535 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(244) SPIO: 'spio thread EVMGR ok'
May 17 15:08:47.535 p4rt/lib_slow 0/RP0/CPU0 t18092 Code(227) Thread Init: 'Stop pulse
handler attached'
---------------------- Truncated for brevity -----------------------
```

show ssh server

To view the SSH server configuration and the host-certs, use the **show ssh server** command in the EXEC mode.

show ssh server { **vrf** *vrf-name* | **configuration** | | **gnsi configuration** | | **authorized_keys user** *user-name* | **authorized_principals user** *user-name* | **ca_keys** | **host_keys** | **host-certs** }

Syntax Description

vrf *vrf-name*	Displays all the active configurations on the router for a given VRF
gnsi	Displays all the finalized configurations on the router for a given VRF.
authorized_keys user *user-name*	Displays a user's public keys for authentication.
authorized_principals user *user-namename*	Displays the list of accepted principal names for a user's certificate authentication.
ca_keys *user-name*	Displays the trusted certificate authorities' public keys for user authentication.
host_keys	Displays various SSH private host keys (rsa, ecda, dsa, ed25519) if set up.
host-certs	Displays different public host certificates that match with the private host keys shown in **host_keys**.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows the gNSI configurations on the router:

```
Router# config
Router(config)# grpc port 57888
Router(config)# grpc no-tls
Router(config)# commit
Router(config)# end
```

To view the gNSI configuration on the router, use the **show ssh server gnsi configuration** command.

```
Router# show ssh server gnsi configuration
Wed May  1 14:45:29.008 UTC
----------------------------------------
AuthorizedKeysFile /etc/ciscossh/authorized_list/%u/authorized_keys
AuthorizedPrincipalsFile /etc/ciscossh/authorized_list/%u/authorized_principals
HostCertificate /etc/ciscossh/host_certs/ecdsa-sha2-nistp256-cert.pub
HostCertificate /etc/ciscossh/host_certs/ecdsa-sha2-nistp521-cert.pub
HostCertificate /etc/ciscossh/host_certs/ed25519-cert.pub
----------------------------------------
```

The following example shows the VRF configurations on the router:

```
Router# config
Router(config)# ssh server vrf default
Router(config)# commit
Router(config)# end
```

To view the server VRF configuration on the router, use the **show ssh server vrf** command.

```
Router# show ssh server vrf default configuration
----------------------------------------
UsePAM yes
HostKeyAlgorithms
x509v3-ssh-rsa,ssh-rsa-cert-v01@openssh.com,ssh-ed25519-cert-v01@openssh.com,
ecdsa-sha2-nistp521-cert-v01@openssh.com,ecdsa-sha2-nistp256-cert-v01@openssh.com,
ecdsa-sha2-nistp256,ecdsa-sha2-nistp384,ecdsa-sha2-nistp521,ssh-ed25519,rsa-sha2-512,
rsa-sha2-256,ssh-rsa,ssh-dss
PermitRootLogin yes
MaxAuthTries 20
MaxSessions 16
RekeyLimit 1024M 60m
Subsystem sftp /pkg/bin/sftp-server
MACs hmac-sha2-512,hmac-sha2-256,hmac-sha1
LoginGraceTime 30
ClientAliveInterval 60
AllowTcpForwarding no
MaxStartups 150
LogLevel DEBUG
IPQoS 0x40
HostKey   /pkg/ecdsa-sha2-nistp256
HostKey  /pkg/ecdsa-sha2-nistp384
HostKey  /pkg/ecdsa-sha2-nistp521
HostKey  /pkg/ed25519
HostKey  /pkg/rsa
HostKey  /pkg/dsa
HostKey  /pkg/x509v3-ssh-rsa
HostKey  /pkg/ssh-rsa-cert-v01
AcceptedAlgorithms x509v3-ssh-rsa,x509v3-ecdsa-sha2-nistp256,x509v3-ecdsa-sha2-nistp384,
x509v3-ecdsa-sha2-nistp521,x509v3-ssh-dss,ssh-rsa,ssh-rsa-cert-v01@openssh.com,
rsa-sha2-256-cert-v01@openssh.com,rsa-sha2-512-cert-v01@openssh.com,
ecdsa-sha2-nistp256-cert-v01@openssh.com,ecdsa-sha2-nistp384-cert-v01@openssh.com,
ecdsa-sha2-nistp521-cert-v01@openssh.com,ssh-dss-cert-v01@openssh.com,ssh-ed25519-cert-v01@openssh.com,
ecdsa-sha2-nistp256,ecdsa-sha2-nistp384,ecdsa-sha2-nistp521,ssh-ed25519,rsa-sha2-256,rsa-sha2-512,ssh-rsa
Port 22
PidFile /var/run/sshd_default.pid
```

To view the server host-keys on the router, use the **show ssh server host-keys** command.

```
Router# show ssh server host-keys
Wed May  1 14:39:36.746 UTC
----------------------------------------
Key label: the_default
Type     : ED25519
Data     : ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAILMXlhKk4HixCE/HGwKGkbGwgLAT7ecm0fze7ZsQQIJw
```

```
xxxx@vxr-slurm-146.xxxx.com

Key label: the_default
Type     : ECDSA General Curve Nistp256
Degree   : 256
Data     : ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBA9mwnz5O1+
oV5m6Zdo3Mqmc6IjkxrCbt+E/vhK67/B8mEaGEO5JfFcJ7zHp905HsiLm0mYijS4zQCZNYRMcvNk=
xxxx@vxr-slurm-146.xxxx.com

Key label: the_default
Type     : ECDSA General Curve Nistp521
Degree   : 521
Data     : ecdsa-sha2-nistp521
AAAAE2VjZHNhLXNoYTItbmlzdHA1MjEAAAAIbmlzdHA1MjEAAACFBABjiqUtIXeBAfO
sur6xhCaX0865nf6Gp0gIQC/DzBNC1AJTtqZfQl4FMHPTkixAsHZ/7OVSh70tMgk4VzCHH+EmpAB5zIrz7fSzJFXSs9DJqw
75DxtOsjb/mcovLnHU2wfSiDD7qOjhyznL/VlAkKRq60aFK9w4r0qWW5L/infNDoDfvg==
xxxx@vxr-slurm-146.xxxx.com

----------------------------------------
Router#
```

To view the host certificates on the router, use the **show ssh server host-certs** command.

```
Router# show ssh server host-certs
Wed May  1 13:56:21.596 UTC
----------------------------------------
Type : ecdsa-sha2-nistp521-cert
Data : ecdsa-sha2-nistp521-cert-v01@openssh.com AAAAKGVjZHNhLXNoYTItbmlzdHA1MjEt
Y2VydC12MDFAb3BlbnNzaC5jb20AAAAgKjWh4uPFNKIr4uZV5maPUoOfyys/ncTyMpBbQZX+7KMAAAAI
bmlzdHA1MjEAAACFBABjiqUtIXeBAfOsur6xhCaX0865nf6Gp0gIQC/DzBNC1AJTtqZfQl4FMHPTk
ixAsHZ/7OVSh70tMgk4VzCHH+EmpAB5zIrz7fSzJFXSs9DJqw75DxtOsjb/mcovLnHU2wfSiDD7qOjhyznL/
VlAkKRq60aFK9w4r0qWW5L/infNDoDfvgAAAAAAAAAAAAAAAgAAAAVjaXNjbwAAAAAAAAAAZdQxHgAAAAB
n1loeAAAAAAAAAAAAAAAAAAAABFwAAAAdzc2gtcnNhAAAAAwEAAQAAAQEA26xFTM/0hzlcDKmg6q17s8lk+
UqOqEm6FUytpKw/aPd4cBFNxGWO5BaiTQjTWSDLik9+rxmBF+vpBh4fScT64WDFHUx0OX9URaDl4cyK21
z1KUP7L607ypurZDqmsLuNHYH+nQgwCBJKQzd6/Ph2iuYxY5xhDCG8FzSrxyoMltHrL7gCey9fdO8+Jl
dTMADqp8SCvJjJcKuj0GJ68ut3pII4j0xZCTIMvQQ6ZmWSJgemN7xJLMUN4ZzJjGT1olDkq5kMEVP8pOk8
ylIQkOyRcmuNlBW126D/W58dYXdY5z/OcYWZTBQ1SSIE+Lwbt0RktJfVqrYn1aNq/f38KDyYVQAAARQAAAAM
cnNhLXNoYTItNTEyAAABAIc35ctjmPfOb3RRc3bD9gvHRzKzIO5mGbHxeH06qrNFyDxjPx/A02QydllRU1qjeH/
REAi38/RhUInEj75Iwi+f349xZx0bGacULZHMJWPYy2cGgx3e4WLF43Z3Zu09xSNzVCcUea71d21JhJGUAMWGl
ak86RLbOBvAESyYCCUG+jdNDBq7dfiaeJ05DvY33RRszfEf/4Cy6X8GYzyB/V0bmjrCllUkb56JNscNYweWCB
je2da5BwqxSbQUaLkD97Lad1Jjjeo8A/qrXMWVm71e9AAm1htKtlUusqEAwW1KmeZ4rbUkyTOJ3NaxdW/gEs4
uuAh58oweCaZyasv3ay0= lavms@vxr-slurm-146.cisco.com

Type : ecdsa-sha2-nistp256-cert
Data : ecdsa-sha2-nistp256-cert-v01@openssh.com AAAAKGVjZHNhLXNoYTItbmlzdHAyNTYtY2Vyd
C12MDFAb3BlbnNzaC5jb20AAAAgQDMsG2AcMkoXfaK9SGTtyuJ65sd0GuR7037ikt6Yo9IAAAAIbmlzdHAyNTYAAABBBA9
mwnz5O1+oV5m6Zdo3Mqmc6IjkxrCbt+E/vhK67/B8mEaGEO5JfFcJ7zHp905HsiLm0mYijS4zQCZNYRMcvNk
AAAAAAAAAAAAAAAAIAAAAFY2lzY28AAAAJAAAABWNpc2NvAAAAAAAAAAD//////////wAAAAAAAAAAAAAAAAAAAAAZ
cAAAAHc3NoLXJzYQAAAAMBAAEAAAGBAOiOhEHzx1mQXR84w/IoKLOSfq/XI0aFqHdQ4ysQu3nTxiQeqRJtdVSslQM2OZF+
iExpMl4ElZ9Y1pO1BbrMynRhSywx+vtfypBIONfqI/z+jj3uea9i8tf7XF43llt1zE/SuwG9koUb+UI/MhSjL4AUefc9
u4qqY1+OVjKvZe4OfSzQglbNAQWHzhngs1pTjEeYAM5w3zvlDN4SJkPaA41/cRYLj29LJOMhD8NuATfpKxjU55Ja/
cISsfQdQrsTXl+2cFl3vnVYL6JIqjBR9vX36fuKurlZLFx95y7D7lRAb0Nh8D1kbqM8H94LLOd850XfDC/ygOjthkh
MrKipBwX9NnHOE3pwXR7RLaVXNqso04rQCJJmltiQ6ujTfGbtBhvxh+v+uTGhIIcsnJ3ZPIjrsI4KoqaIWPsOkhHbzq
JGcMlJcs6DqfkTl6P/AUOCgo2ssUwaXIrG6sn9plipd27Pq0JvTrIcPdNce0hpr9jAWNpx9UGHeGGFXdXKWqSQh
wAAAZQAAAAMcnNhLXNoYTItNTEyAAABgLXLFmLOFZUUO1hb/c10F8NEe95I865wZ1GKPgF08so5B0yeufjcHuAGkVCC
aO6IYW6jmnfROF48kgmZO3Ri83fIs0McNk9Q0/zb6t2AcWGI/cZtzM2WxQJ0C9SZsIXMGvAK+JnG2CG8Ca7Pa25hCLyhm
Rt22ysGKyCAws1buFI+1AAhnIgoUkBpUiA9kwIBtZPT9dn5vezcmYfJfTgsa/X7mnSm6sfvrFprz6R4Zv6AtRqi6GkWA
g47UXPmo7lAjsIBgzryN1VpHm0uveWAIZu6zOLCCTiKTfqcitaIEbV0aZ5e0g72uB7T6RLhvyhwWaiZ3hqfgAiFqiTzO
omScKzM5+XTOwgW4stT5n8PqTxYXH3okHAlNH29ne8JcnFm9hxWgK8Ru9YxfTRqDO9sb2Z5XtSZEuBr9bUCLfmez4ZeY
ptRxm5tXYMhAevqrRovtMcRMyOsZCLqYANwEh+6n0J/xgkoHFEFY2G0W0gc+a9/Ag1QoQvqyDocYa42N9NLEg==
 xxxxx@vxr-slurm-146.cisco.com

Type : ed25519-cert
Data : ssh-ed25519-cert-v01@openssh.com AAAAIHNzaC1lZDI1NTE5LWNlcnQtdjAxQG9wZW5zc2guY29t
AAAAIAHRCCkOCw1xUoTS9LsmH05SeyxMo1xYumXSaHygo9fFAAAAILMXlhKk4HixCE/HGwKGkbGwgLAT7ecm0fze7ZsQQIJ
```

```
wAAAAAAAAAAAAAAACAAAABWNpc2NvAAAAAAAAAAAB11DE2AAAAAGfWWjYAAAAAAAAAAAAAAAAAAAAAEXAAAAB3NzaC1yc2
EAAAADAQABAAABAQDbrEVMz/SHOVwMqaDqrXuzyWT5So6oSboVTK2krD9o93hwEU3EZY7kFqJNCNNZIMuKT36vGYEX6+
kGHh9JxPrhYMUdTHQ5f1RFoOXhzIrbXPUpQ/svrTvKm6tkOqawu40dgf6dCDAIEkpDN3r8+HaK5jFjnGEMIbwXNKvHKgyW0
esvuAJ7L1907z4mV1MwAOqnxIK8mMlwq6PQYnry63ekgjiPTFkJMgy9BDpmZZImB6Y3vEksxQ3hnMmMZPWiUOSrmQwRU/
yk6TzKUhCQ7JFya42UFbXboP9bnx1hd1jnP85xhZlMFDVJIgT4vBu3RGS0l9WqtifVo2r9/fwoPJhVAAABFAAAAAxyc
2Etc2hhMi01MTIAAAEAFZeqNRf3YT9K+/Zqkh17fnh+TIT2GYPktlVmyZ364EQ9igkKeOTuvqg/TNCt3BBsdRMAPShxOWr+
qcvkU+Amk3u5oP3TbWKvqMA91T3t/ZP3Mo+C+7ONe2zcvC9Rj2JgMn0tcVFI464vNEnyqUcs2AAs/hppiCwdyXbm4kQKxkax
IukonW7E9PuBkV939L4K1VTvEn4S0nTRVPX0tFXO73dIW+BhjDec9NSE/+tJY0SsuvqlL80QV73K/gHv6cJ2QaNinMSBg84Eu/
SghQJO+092ocZSWQe4MiEg4Cgz/KjJhg4I4yyLbBNaL76aAt7k4VThl83QZFLDMU1a4UuT5g==xxxxx@vxr-slurm-146.cisco.com
```

To view the certificate authority keys on the router, use the **show ssh server ca-keys** command.

```
Router# show ssh server ca-keys
Wed May  1 15:06:21.094 UTC
----------------------------------------
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC83fcxKGF2i5umMS5Xc74mUxfRIMJLkawJk/BzRc1t+
/lEbD8G+eIMrwRTZ5c60mI/B0Cy1hzgAKKW5KXouBPDEVyIn3BBmYlqzHzenj1RXZYmUlS0lqcB2K2jFL7qzS9+Q+vv3l
+fHvDRMWW5sJnsdPatdY8X1ZOdNlUqwa6C/WcQ4b2FkEp4FctmrJfXv8lMbe+KqiPA1+fjXWH7douS7FDUj2bNEt
f35gcxcDptbLS8oCGvJ4fQCB9kkGpKBe20a+WUkwsoRhDz5Y2e4PUfWFV5AsgbegZmnPrXkqGb7KMf2L1uJgcyxZT+
HZilvSY5gP7FawbkEYTOmgWJEv3f sabgupta@bgl-ads-4100
----------------------------------------
Router#
```

To view the authorized keys for a user on the router, use the **server authorized-keys user** command.

```
Router# show ssh server authorized-keys user user1
Wed May  1 14:29:48.644 UTC
----------------------------------------
pty ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQC83fcxKGF2i5umMS5Xc74mUxfRIMJLkawJk/BzRc1t+/lEbD8G+eIMrwRTZ5c60mI/
B0Cy1hzgAKKW5KXouBPDEVyIn3BBmYlqzHzenj1RXZYmUlS0lqcB2K2jFL7qzS9+Q+vv3l+fHvDRMWW5sJnsdPatdY8X1ZOdNlUqwa6C/
WcQ4b2FkEp4FctmrJfXv8lMbe+KqiPA1+fjXWH7douS7FDUj2bNEtf35gcxcDptbLS8oCGvJ4fQCB9kkGpKBe20a+WUkwsoRhDz5Y2e4P
UfWFV5AsgbegZmnPrXkqGb7KMf2L1uJgcyxZT+HZilvSY5gP7FawbkEYTOmgWJEv3f rsavalue
from="192.0.2.1,192.0.2.22,192.0.2.33" ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC83fcxKGF2i5um
MS5Xc74mUxfRIMJLkawJk/BzRc1t+/lEbD8G+eIMrwRTZ5c60mI/B0Cy1hzgAKKW5KXouBPDEVyIn3BBmYlqzHzenj1RXZYmUlS0lqcB2
K2jFL7qzS9+Q+vv3l+fHvDRMWW5sJnsdPatdY8X1ZOdNlUqwa6C/WcQ4b2FkEp4FctmrJfXv8lMbe+KqiPA1+fjXWH7douS7FDUj2bNEtf
35gcxcDptbLS8oCGvJ4fQCB9kkGpKBe20a+WUkwsoRhDz5Y2e4PUfWFV5AsgbegZmnPrXkqGb7KMf2L1uJgcyxZT+HZilvSY5gP7FawbkEYTOmgWJEv3f
 rsavalue
expiry-time="20241001" ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQC83fcxKGF2i5umMS5Xc74mUxfRIMJLkawJk/BzRc1t+/
lEbD8G+eIMrwRTZ5c60mI/B0Cy1hzgAKKW5KXouBPDEVyIn3BBmYlqzHzenj1RXZYmUlS0lqcB2K2jFL7qzS9+Q+vv3l+fHvDRMWW5sJnsdPatdY8X1ZOdNlUqwa6C/
WcQ4b2FkEp4FctmrJfXv8lMbe+KqiPA1+fjXWH7douS7FDUj2bNEtf35gcxcDptbLS8oCGvJ4fQCB9kkGpKBe20a+WUkwsoRhDz5Y2e4PUfWFV5AsgbeG
ZmnPrXkqGb7KMf2L1uJgcyxZT+HZilvSY5gP7FawbkEYTOmgWJEv3f rsavalue
expiry-time="20241001" ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQC83fcxKGF2i5umMS5Xc74mUxfRIMJLkawJk/BzRc1t+/lEbD8G+eIMrwRTZ5c60mI/B0Cy1hzgAKKW5KXouBPDEVyIn3BBmYlqzHzenj1RXZYmUlS0lqcB2K2jFL7qzS9+Q+vv3l+f
HvDRMWW5sJnsdPatdY8X1ZOdNlUqwa6C/WcQ4b2FkEp4FctmrJfXv8lMbe+KqiPA1+fjXWH7douS7FDUj2bNEtf35gcxcDptbLS8oCGvJ4fQCB9kkGpKBe20a+
WUkwsoRhDz5Y2e4PUfWFV5AsgbegZmnPrXkqGb7KMf2L1uJgcyxZT+HZilvSY5gP7FawbkEYTOmgWJEv3f rsavalue
from="abcd" ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQC83fcxKGF2i5umMS5Xc74mUxfRIMJLkawJk/BzRc1t+/lEbD8G+eIMrwRTZ5c60mI/
B0Cy1hzgAKKW5KXouBPDEVyIn3BBmYlqzHzenj1RXZYmUlS0lqcB2K2jFL7qzS9+Q+vv3l+fHvDRMWW5sJnsdPatdY8X1ZOdNlUqwa6C/
WcQ4b2FkEp4FctmrJfXv8lMbe+KqiPA1+fjXWH7douS7FDUj2bNEtf35gcxcDptbLS8oCGvJ4fQCB9kkGpKBe20a+WUkwsoRhDz5Y2e4PUfWFV5AsgbegZmn
PrXkqGb7KMf2L1uJgcyxZT+HZilvSY5gP7FawbkEYTOmgWJEv3f rsavalue
----------------------------------------
```

To view the list of principals (identities) that are authorized for SSH access, use the **show ssh server authorized-principals user** command.

```
Router# show ssh server authorized-principals user user1
Wed May  1 14:37:37.933 UTC
----------------------------------------
pty cisco
from="192.0.2.1,192.0.2.22,192.0.2.32" lab
expiry-time="20241001" one
```

```
---------------------------------------
```

show emsd server all detail

To display the detailed configuration, security settings, and operational status for all gRPC server instances on the router, use the **show emsd server all detail** command in EXEC mode.

The External Management Service Daemon (EMSD) is the specific process for gRPC services. It manages the server that allows external software to talk to the router. It listens for connection requests on specific network ports. The EMSD ensures that the gRPC server only starts after the router finishes its startup configuration. The output displays active ports, VRF (Virtual Routing and Forwarding) assignments, and security profiles. This information helps administrators troubleshoot connectivity issues between automation clients and the gRPC server.

show emsd server [{ *server-name* | **all** }] [**detail**]

Syntax Description

emsd	Specifies the External Management Service Daemon (EMSD). This process manages gRPC (Remote Procedure Call) services.
server	Targets the gRPC server configuration and operational status.
server-name	Instructs the router to display information for the specified gRPC server name.
all	Instructs the router to display information for every configured gRPC server instance or name.
detail	Provides comprehensive information. It includes security settings, cipher suites, and connection timers.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 25.4.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
system	read

This example displays the detailed configuration, security settings, and operational status for all gRPC server instances on the router.

```
Router#show emsd server all detail
Fri Jan  9 21:50:54.403 UTC
Server name                              : DEFAULT
Server ID                                : 1
Port                                     : 57400
VRF                                      : global-vrf
```

```
Local connection                        : No
Enabled                                 : Yes
Services                                : ENROLLZ
                                        : ATTESTZ
                                        : GNPSI
                                        : P4RT
                                        : GNSI
                                        : GRIBI
                                        : SRTE
                                        : GNMI
                                        : CNMI
                                        : GNOI
                                        : SLAPI
Listen addresses                        : ANY
Address family                          : dual
TLS                                     : disabled
TLS Minimum Version                     : TLS 1.0
TLS Maximum Version                     : TLS 1.3
Trustpoint                              :
SSL Profile ID                          : system_default_profile
Metadata Authentication                 : enabled
Certificate common name                 : ems.cisco.com

TLS cipher suites
  Default                               : none
  Default TLS1.3                        : aes_128_gcm_sha256
                                        : aes_256_gcm_sha384
                                        : chacha20_poly1305_sha256

  Enable                                :
  Disable                               :

  Operational enable                    :
  Operational disable                   :

DSCP                                    : 0
TTL                                     : 64
Keepalive time                          : 30
Keepalive timeout                       : 20
Keepalive enforcement minimum time      : 300
Maximum concurrent streams              : 32
Latest Connection Id                    : 2

-------------------------------------------------------------------------------

Server name                             : test1
Server ID                               : 3
Port                                    : 0
VRF                                     : global-vrf
Local connection                        : No
Enabled                                 : No (Port not configured)
Services                                : none
Listen addresses                        : ANY
Address family                          : dual
TLS                                     : enabled
TLS Minimum Version                     : TLS 1.2
TLS Maximum Version                     : TLS 1.3
Trustpoint                              :
SSL Profile ID                          :
Metadata Authentication                 : enabled
Certificate common name                 : ems.cisco.com

TLS cipher suites
  Default                               : none
```

```
  Default TLS1.3                        : aes_128_gcm_sha256
                                        : aes_256_gcm_sha384
                                        : chacha20_poly1305_sha256

  Enable                                :
  Disable                               :

  Operational enable                    : ecdhe-rsa-chacha20-poly1305
                                        : ecdhe-ecdsa-chacha20-poly1305
                                        : ecdhe-rsa-aes128-gcm-sha256
                                        : ecdhe-ecdsa-aes128-gcm-sha256
                                        : ecdhe-rsa-aes256-gcm-sha384
                                        : ecdhe-ecdsa-aes256-gcm-sha384
                                        : aes128-gcm-sha256
                                        : aes256-gcm-sha384
  Operational disable                   : ecdhe-rsa-aes128-sha
                                        : ecdhe-ecdsa-aes128-sha
                                        : ecdhe-rsa-aes256-sha
                                        : ecdhe-ecdsa-aes256-sha
                                        : aes128-sha
                                        : aes256-sha

DSCP                                    : 0
TTL                                     : 64
Keepalive time                          : 30
Keepalive timeout                       : 20
Keepalive enforcement minimum time      : 300
Maximum concurrent streams              : 32
Latest Connection Id                    : 0
```

show tech-support gnsi

To collect diagnostic information of gNSI on the router, use the **show tech-support gnsi** command in Global Configuration mode.

show tech-support gnsi

Syntax Description

This command has no keywords or arguments.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.2.11	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the gNSI tech-support:

```
Router# show tech-support gnsi
Mon Apr  1 06:55:51.482 UTC
++ Show tech start time: 2024-Apr-01.065551.UTC ++
Mon Apr  1 06:55:52 UTC 2024 Waiting for gathering to complete
...
Mon Apr  1 06:56:01 UTC 2024 Compressing show tech output
Show tech output available at Router#:
/harddisk:/showtech/showtech-mtb_sf2-gnsi-2024-Apr-01.065551.UTC.tgz
++ Show tech end time: 2024-Apr-01.065601.UTC ++
```

show tech-support gnsi command places the collected diagnostic information in a file, example **Router#: /harddisk: /showtech/showtech-mtb_sf2-gnsi-2024-Apr-01.065551**.

show tech-support script

To collect logs that contain debug information for logical traces and tech-support data, use the **show tech-support script** command in XR EXEC mode.

script tech-support script { **file** *filepath_filename* | **list-CLIs** | **time-out** }

Syntax Description

file *filepath_filename*	Specifies the complete path to a file, including the filename to save the log.
list-CLIs	Creates a log zip file containing a list of all CLI commands executed as part of the tech-support script. The CLI commands are only listed, not executed.
time-out	Specifies the timeout value for each command in seconds ranging from 120-3600 seconds. By default, the timeout is 900 seconds.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.5.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

This example displays how to save the logical traces and tech-support data in the test file in the disk0 path:

```
Router# show tech-support script file disk0:/test.log
Wed Sep 25 07:11:39.915 PDT
++ Show tech start time: 2024-Sep-25.071140.PDT ++
Wed Sep 25 07:11:40 PDT 2024 Waiting for gathering to complete
.....................
Wed Sep 25 07:12:49 PDT 2024 Compressing show tech output
Show tech output available at 0/RP0/CPU0 : /disk0:/test.log.tgz
++ Show tech end time: 2024-Sep-25.071250.PDT ++
```

show gnsi trace pathz

To trace the configured gNSI policy on the router, use the **show gnsi trace pathz** command in Global Configuration mode.

show gnsi trace pathz

Syntax Description

This command has no keywords or arguments.

Command Default

Enabled, by default

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 24.2.11	The command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example displays the gNSI trace data on the router:

```
Router# show gnsi trace pathz all
Mon Apr  1 04:31:26.689 UTC
61 wrapping entries (21760 possible, 512 allocated, 0 filtered, 61 total)
Apr  1 04:07:09.681 gnsi/pathz 0/RP0/CPU0 t11383 Pathz: Code(178) 'Trying to load policy'
'/mnt/rdsfs/ems/gnsi/pathz_policy.txt'
Apr  1 04:07:09.685 gnsi/pathz 0/RP0/CPU0 t11383 Pathz: Code(173) 'Set Sandbox policy'
'1(54251382-02-18 11:34:58 +0000 UTC)'
Apr  1 04:07:09.685 gnsi/pathz 0/RP0/CPU0 t11383 Pathz: Code(179) 'Set Policy from'
'/mnt/rdsfs/ems/gnsi/pathz_policy.txt'
Apr  1 04:07:09.685 gnsi/pathz 0/RP0/CPU0 t11383 Pathz: Code(249) 'Pathz Policy Clearing
Counters' ' '
Apr  1 04:07:09.685 gnsi/pathz 0/RP0/CPU0 t11383 Pathz: Code (79): 'Engine Initialized'
Apr  1 04:08:05.761 gnsi/pathz 0/RP0/CPU0 t11794 Pathz: Code(63) 'Pathz.Get()'
'5.38.4.111:52126'
Apr  1 04:08:05.761 gnsi/pathz_err 0/RP0/CPU0 t11794 Pathz ERROR: Code (65): 'Nil Policy'
Apr  1 04:08:05.788 gnsi/pathz 0/RP0/CPU0 t11480 Pathz: Code(63) 'Pathz.Get()'
'5.38.4.111:52126'
Apr  1 04:08:05.788 gnsi/pathz 0/RP0/CPU0 t11480 Pathz: Code(176) 'Get'
'POLICY_INSTANCE_ACTIVE 1(1711946094752098)'
Apr  1 04:08:05.791 gnsi/pathz_deny 0/RP0/CPU0 t11481 Pathz DENY: Code(235) 'Upd/Rep Denied
 path' 'cafyauto@/system/config/hostname,|1,1711946094752098'
Apr  1 04:08:05.808 gnsi/pathz_deny 0/RP0/CPU0 t11383 Pathz DENY: Code(234) 'Del Denied
path' 'cafyauto@/system/config/hostname,|1,1711946094752098'
Apr  1 04:08:05.821 gnsi/pathz_deny 0/RP0/CPU0 t11480 Pathz DENY: Code(235) 'Upd/Rep Denied
 path' 'cafyauto@/system/config/hostname,|1,1711946094752098'
Apr  1 04:08:07.348 gnsi/pathz_deny 0/RP0/CPU0 t11383 Pathz DENY: Code(235) 'Upd/Rep Denied
 path' 'cafyauto@/lldp/config/enabled,|1,1711946094752098'
```

```
Apr  1 04:08:08.205 gnsi/pathz 0/RP0/CPU0 t11383 Pathz: Code(63) 'Pathz.Get()'
'5.38.4.111:52126'
Apr  1 04:08:08.205 gnsi/pathz_err 0/RP0/CPU0 t11383 Pathz ERROR: Code (65): 'Nil Policy'
Apr  1 04:08:08.221 gnsi/pathz 0/RP0/CPU0 t11480 Pathz: Code(63) 'Pathz.Get()'
'5.38.4.111:52126'
Apr  1 04:08:08.221 gnsi/pathz 0/RP0/CPU0 t11480 Pathz: Code(176) 'Get'
'POLICY_INSTANCE_ACTIVE 1(1711946094752098)'
Apr  1 04:08:08.238 gnsi/pathz_deny 0/RP0/CPU0 t11481 Pathz DENY: Code(235) 'Upd/Rep Denied
 path' 'cafyauto@/system/config/hostname,|1,1711946094752098'
Apr  1 04:08:08.281 gnsi/pathz_deny 0/RP0/CPU0 t11480 Pathz DENY: Code(234) 'Del Denied
path' 'cafyauto@/system/config/hostname,|1,1711946094752098'
Router#
```



NETCONF Commands

This module describes the commands used to use the NETCONF configuration protocol to define network operations with data models.

For detailed information about gRPC concepts, configuration tasks, and examples, see the *Use NETCONF Protocol to Define Network Operations with Data Modelsin the Cisco 8000 Series Router* module in the *Programmability Configuration Guide for Cisco 8000 Series Routers*.

NETCONF uses an Extensible Markup Language (XML)-based data encoding for the configuration data, as well as protocol messages.

- netconf-yang agent, on page 78

netconf-yang agent

To set the netconf-yang agent details such as netconf-yang version and netconf-yang session limits, use the **netconf-yang agent** command in the Global Configuration mode.

To remove the configured session version and limits, use the **no** form of the command.

netconf-yang agent { **netconf1.0** | **session** { **limit** *value* } }

Syntax Description

limit *value*	Sets the maximum count for concurrent netconf-yang sessions. The range is 1–1024.
session	Netconf -yang-agent session. You can provide the session settings, such as absolute, idle session time, number of sessions using this command.
netconf1.0	Provides NETCONF version 1.0 support as per the RFC-4741 and RFC-4742.

Command Default

By default, no limits are set

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 5.3.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read, write

Example

This command shows how to use the **netconf-yang agent** command:

```
Router# config
Router(config)# netconf-yang agent netconf1.0
Router(config)# netconf-yang agent session limit 10

/*limit value sets the maximum count for concurrent netconf-yang sessions. The range is
from 1 to 128.*/
Router# end
```



Service-Layer Commands

This module outlines the commands necessary to utilize the service layer.

For detailed information about Service Layer concepts, configuration tasks, and examples, see the *Use Service Layer API to Bring your Controller on Cisco IOS XR Routerin the Cisco 8000 Series Router* module in the *Programmability Configuration Guide for Cisco 8000 Series Routers*.

- show service-layer mpls label, on page 80
- show service-layer path-groups, on page 81
- show service-layer policy, on page 83
- show service-layer policy internal database path-groups, on page 85
- show service-layer rib notifications registrations, on page 88
- show service-layer route, on page 90

show service-layer mpls label

To display MPLS label information service-layer, use the **show service-layer mpls-label** command in EXEC mode.

show service-layer mpls label { *label-number* | brief | client { *client-id* | all | detail } }

Syntax Description

label-number	Specifies a particular label by its number in the range of 16 to 1048575.
brief	Shows brief information about MPLS labels.
client *client-id*	Displays information about a particular client in the range of 0 to 65535.
client all	Displays information about all clients.
detail	Shows more detailed information about MPLS labels.

Command Default

No specific guidelines impact the use of this command.

Command Modes

EXEC

Command History

Release	Modification
Release 24.4.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Example

This example shows output of **show service-layer mpls-label trace lib all** command.

```
Router#show service-layer mpls-label trace lib all

22 unique entries (512 possible, 0 filtered)
Oct 16 23:06:27.527 sl/mpls-label_debug 0/RP0/CPU0 1# t12931 ltrace init ok
Oct 16 23:06:27.537 sl/mpls-label_debug 0/RP0/CPU0 1# t12931 edm init ok
Oct 16 23:06:27.537 sl/mpls-label_debug 0/RP0/CPU0 1# t12931 request init ok
```

show service-layer path-groups

To display path group information in the service-layer, use the **show service-layer path-groups** command in EXEC mode.

show service-layer path-groups { brief | client { *client-id* **| all } | detail | name | vrf {** *vrf-name* **| all } }**

Syntax Description

brief	Shows brief information about path-groups.
client *client-id*	Shows information about a particular client ID in the range of 0 to 65535.
client all	Shows information about all clients.
detail	Shows more detailed information about the path groups.
name	Displays information about path-group name.
vrf *vrf-name*	Displays vrf table information for a specific vrf-name.
vrf all	Displays all the information for all vrfs.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 24.4.1	This command was introduced.
Release 26.1.1	The command output was modified to display the per-path load metric without the route-level metric.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Example

This example shows output of **show service-layer path-groups client all detail** command.

```
Router#show service-layer path groups client all detail


bsid_lspgrp2_eb1_eb2_gold_class-ipv6--1, tag: 0, distance: 30, Route flags(0xc): [viable
paths only, active on viable path]
    path: 1, fe80::ebb:bb03 (nexthop in vrf default) via Bundle-Ether1303
```

```
        remote labels: 62303,
        load metric: 0, path flags: 0
        id: 0, protected bitmap: 0x0
        ref count: 401
  Client:50, Session:0, Operation ID:700000000001
  RIB:Programmed, FIB:Programmed, Ack Type:RIB
  Object Version:2
bsid_lspgrp2_eb1_eb2_gold_class-ipv6--10, tag: 0, distance: 30, Route flags(0xc): [viable
paths only, active on viable path]
    path: 1, fe80::ebb:bb03 (nexthop in vrf default) via Bundle-Ether1303
        remote labels: 62303,
        load metric: 0, path flags: 0
        id: 0, protected bitmap: 0x0
        ref count: 401
  Client:50, Session:0, Operation ID:700000000021
  RIB:Programmed, FIB:Programmed, Ack Type:RIB
  Object Version:2
```

show service-layer policy

To display policy based routing information in the service-layer, use the **show service-layer policy** command in EXEC mode.

show service-layer policy { internal database path-groups | **rule-stats mappings { all** | **policy-name** *name-of-the-policy* **}** | **trace { lib { all** | **debug** | **error } }**

Syntax Description

internal	Displays internal policy-based routing information.
database	Displays policy-based routing database information.
path-groups	Displays path group information in the policy-based routing database.
rule-stats	Displays rule-stats mapping data.
mappings all	Retrieves global-key to local-key mappings.
mappings policy-name *name-of-the-policy*	Gets data for a specific policy name.
trace	Shows policy-based routing trace info.
lib	Shows service-layer policy library general traces.
all	Shows all general traces.
debug	Shows general debug traces.
error	Shows general error traces.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 24.4.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Example

This example shows output of **show service-layer policy trace lib all** command.

```
Router#show service-layer policy trace lib all

22 unique entries (512 possible, 0 filtered)
Oct 16 23:06:27.527 sl/policy_debug 0/RP0/CPU0 1# t12931 ltrace init ok
Oct 16 23:06:27.537 sl/policy_debug 0/RP0/CPU0 1# t12931 edm init ok
Oct 16 23:06:27.537 sl/policy_debug 0/RP0/CPU0 1# t12931 request init ok
```

show service-layer policy internal database path-groups

To display detailed information about path-groups in the service-layer policy database, use the **show service-layer policy internal database path-groups** command in EXEC mode.

show service-layer policy internal database path-groups

Syntax Description

internal	Displays internal policy-based routing information.
database	Displays policy-based routing database information.
path-groups	Displays path group information in the policy-based routing database.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 26.2.1	Introduced Path-Group Type column in the output.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Output syntax description

Syntax Description

Path-Group Str	Displays the name of the path-group.
PGRP ID	Displays the unique identifier assigned to the path-group.
Policy Name	Displays the name of the policy associated with the path-group.
Rule Name	Displays the rules within the policy that reference the path-group.
Path-Group Type	Indicates how the path-group is used in the rule within the policy: • Match: Used for matching traffic conditions • Action: Used for forwarding or policy actions • Match, Action: Used for both matching and action

INUSE State	Indicates whether the path-group usage state has been notified to RIB based on PBR programming in hardware. Possible values: • NONE: Policy not applied or not tracked • TRACKING: Awaiting hardware acknowledgment • INUSE-ACK: Successfully programmed in hardware • INUSE-NACK: Failed programming in hardware
INUSE State Timestamp	Timestamp of the most recent state update.

Example

This example shows output of **show service-layer policy trace lib all** command.

```
Router# show service-layer policy internal database path-groups
The output for INUSE columns should be interpreted as:

# INUSE State - Indicates whether the Path-Group INUSE state has been notified to RIB based
 on PBR programming in hardware.
  Possible values:
   NONE       - Either the Policy containing this Path-Group is not applied to an Interface
 (or any of its members), OR, this is a match Path-Group which is not tracked by HW-ACK
library.
   TRACKING   - This Path-Group is currently being tracked via the HW-ACK library, and is
pending responses from producers.
   INUSE-ACK  - This Path-Group was successfully programmed in PBR, and an ACK has been
notified to RIB.
   INUSE-NACK - This Path-Group failed PBR programming in hardware, and a NACK has been
notified to RIB.

# INUSE State Timestamp - Records the timestamp whenever the latest state of a Path-Group
is updated.

-------------------------------------------------------------------------------------------------
Path-Group Str   | PGRP ID    | Policy Name | Rule Name | Path-Group Type | INUSE State |
INUSE State Timestamp
-------------------------------------------------------------------------------------------------
path-group-4     | 0xa000004  | p1          | r1_p1     | Match           | NONE        |
Mar 17 2026 11:49:51.643
-------------------------------------------------------------------------------------------------
path-group-1     | 0xa000001  | p1          | r1_p1     | Action          | INUSE-ACK   |
Mar 17 2026 11:52:05.140
-------------------------------------------------------------------------------------------------
path-group-2     | 0xa000002  | p1          | r4_p1     | Match, Action   | INUSE-ACK   |
Mar 17 2026 11:52:05.137
                 |            |             | r2_p1     | Action          |             |
-------------------------------------------------------------------------------------------------
path-group-3     | 0xa000003  | p1          | r4_p1     | Match           | INUSE-ACK   |
Mar 17 2026 11:52:05.144
                 |            |             | r3_p1     | Action          |             |
-------------------------------------------------------------------------------------------------
path-group-6     | 0xa000006  | p1          | r3_p1     | Match           | NONE        |
Mar 17 2026 11:49:51.645
-------------------------------------------------------------------------------------------------
path-group-5     | 0xa000005  | p1          | r2_p1     | Match           | NONE        |
Mar 17 2026 11:49:51.644
```

```
--------------------------------------------------------------------------------------------------------------
Router#
```

show service-layer rib notifications registrations

To display all incoming registration requests of route redistribution and nexthop tracking, use the **show service-layer rib notifications registrations** command in EXEC mode.

show service-layer route session *session-id*

Syntax Description

session	Specify the route redistribution and next hop tracking session.
session-id	Specifies the session ID.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 24.4.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

This example shows output of **show service-layer rib notifications registrations** command filtered by session ID.

```
Router#show service-layer rib notifications registrations session 1

IPv4 registrations:
  Session: 1, Client-id: 1, VRF: default
      Route Redistribution registrations:
          proto: local
      NextHop Tracking registrations:
          192.0.2.0/32
IPv6 registrations:
  Session: 1, Client-id: 1, VRF: default
      Route Redistribution registrations:
          proto: connected
      NextHop Tracking registrations:
          2001:0DB8:1:10B::/120, Allow-Default
```

This example shows output of **show service-layer rib notifications registrations** command filtered by session ID for Route redistribution registrations.

```
Router#show service-layer rib notifications registrations session 1 redistribution

IPv4 registrations:
  Session: 1, Client-id: 1, VRF: default
```

```
      Route Redistribution registrations:
          proto: local
IPv6 registrations:
  Session: 1, Client-id: 1, VRF: default
      Route Redistribution registrations:
          proto: connected
```

This example shows output of **show service-layer rib notifications registrations** command filtered by session ID for nexthop only registrations.

```
Router#show service-layer rib notifications registrations session 1 next-hops

IPv4 registrations:
  Session: 1, Client-id: 1, VRF: default
      NextHop Tracking registrations:
          192.0.2.0/32
IPv6 registrations:
  Session: 1, Client-id: 1, VRF: default
      NextHop Tracking registrations:
          2001:0DB8:1:10B::/120, Allow-Default
```

show service-layer route

To display service-layer routing information, use the **show service-layer route** command in EXEC mode.

show service-layer route { *ip-address* | *ip-address/mask* | **brief** | **client {** *client-id* | **all }** | **detail** | **ipv4** | **ipv6** { **ip-address** | **ip-address/length** | **client {** *client-id* | **all }** | **detail** } | **vrf {** *vrf-name* | **all } }**

Syntax Description

ip-address	Specify the IP address of a network to display information about.
ip-address/mask	Specifies a network with a specific prefix length.
afi-all	Displays information for both IPv4 and IPv6 addresses.
multicast	Displays multicast routes.
safi-all	Displays both unicast and multicast routes
brief	Displays the brief information about service-layer routes.
ipv4	Displays route information for IPv4 addresses.
ipv6	Displays route information for IPv6 addresses.
standby	Displays standby route information.
summary	Displays a summary of all routes.
vrf *vrf-name*	Displays vrf table information for a specific vrf-name.
vrf all	Displays all the information for all vrfs.
client *client-id*	Displays service-layer client information for a specific client ID. Client ID can be in the range of 0 to 65535.
client all	Displays service-layer client information for all clients.
detail	Displays more detailed information.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 7.3.1	This command was introduced.
Release 24.4.1	The command was modified to include **client** and **brief** keywords. Also, **afi-all, standby** and **summary** keywords were removed.
Release 26.1.1	The command output was modified to display the route-level metric and per-path load metric.

Usage Guidelines

The Command Syntax prior to Cisco IOS XR Software Release 24.4.1 was as follows:

show service-layer route { *ip-address* | *ip-address/mask* | **afi-all { multicast** | **safi-all** | **standby** | **summary** | **unicast }** | **ipv4** | **ipv6** { **ip-address** | **ip-address/length** | **client {***client-id* | **all }** | **detail** } | **detail** | **vrf {** *vrf-name* | **all } }**

Task ID

Task ID	Operation
config-services	read

Example

This example shows output of **show service-layer route ipv4 client all detail** command.

```
Router#show service-layer route ipv4 client all detail


VRF: default, Client 20


100.2.1.1/32, tag: 0, distance: 0, metric: 1
    path: 1, 102.12.1.2 (nexthop in vrf default) via Bundle-Ether1201
        load metric: 1, path flags: 0
        id: 0, protected bitmap: 0x0
        ref count: 52
    path: 2, 102.12.2.2 (nexthop in vrf default) via Bundle-Ether1202
        load metric: 1, path flags: 0
        id: 0, protected bitmap: 0x0
        ref count: 52
    path: 3, 102.12.3.2 (nexthop in vrf default) via Bundle-Ether1203
        load metric: 2, path flags: 0
        id: 0, protected bitmap: 0x0
        ref count: 52
    path: 4, 102.12.4.2 (nexthop in vrf default) via Bundle-Ether1204
        load metric: 3, path flags: 0
        id: 0, protected bitmap: 0x0
        ref count: 52
  Client:20, Session:0, Operation ID:8985821339679570675
  RIB:Programmed, FIB:Unavailable, Ack Type:RIB
  Object Version:4

M=Multicast,Q=Qualified,GM=Grandmaster

Interface         Transport Address                   Priority1 State
Gi0/2/0/0         IPv4      192.168.172.122           13        M,Q
                  IPv4      192.168.172.123           17        M
Gi0/2/0/1         IPv6      fe80::2b0:4aff:fe6b:f4fc  1         Q,GM
                  IPv6      fe80::2b0:4aff:fe6b:1234  18        Q
Gi0/3/0/0         Ethernet  00b0.4a6b.f4fc
```