



Junos[®] OS

User Access and Authentication Feature Guide for Routing Devices

Release
16.2



Modified: 2016-12-12

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Junos[®] OS User Access and Authentication Feature Guide for Routing Devices

16.2

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YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

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About the Documentation

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Documentation and Release Notes

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If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

For the features described in this document, the following platforms are supported:

- M Series
- MX Series
- T Series
- PTX Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xml;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

Table 1 on page xix defines notice icons used in this guide.

Table 1: Notice Icons







Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xx defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric metric>;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (string1 string2 string3)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback rating system—On any page of the Juniper Networks TechLibrary site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <http://www.juniper.net/techpubs/feedback/>.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.

CHAPTER 1

User Access and Authentication Overview

- [Junos OS Login Classes Overview on page 23](#)
- [Junos OS User Accounts Overview on page 24](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Junos OS User Authentication Methods on page 30](#)
- [Understanding Remote Authentication Servers on page 31](#)
- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)
- [Junos OS Authentication Methods for Routing Protocols on page 36](#)

Junos OS Login Classes Overview

All users who can log in to the router or switch must be in a login class. With login classes, you define the following:

- Access privileges that users have when they are logged in to the router or switch
- Commands and statements that users can and cannot specify
- How long a login session can be idle before it times out and the user is logged out

You can define any number of login classes and then apply one login class to an individual user account.

The Junos operating system (Junos OS) contains a few predefined login classes, which are listed in [Table 3 on page 23](#). The predefined login classes cannot be modified.

Table 3: Predefined System Login Classes

Login Class	Permission Flag Set
operator	clear, network, reset, trace, and view
read-only	view
superuser or super-user	all
unauthorized	None



NOTE:

- You cannot modify a predefined login class name. If you issue the `set` command on a predefined class name, the Junos OS appends `-local` to the login class name. The following message also appears:

warning: '<class-name>' is a predefined class name; changing to '<class-name>-local'

- You cannot issue the `rename` or `copy` command on a predefined login class. Doing so results in the following error message:

error: target '<class-name>' is a predefined class

Related Documentation

- [Defining Junos OS Login Classes on page 39](#)

Junos OS User Accounts Overview

User accounts provide one way for users to access the router. (Users can access the router without accounts if you configured RADIUS or TACACS+ servers, as described in [“Junos OS User Authentication Methods” on page 30](#).) For each account, you define the login name for the user and, optionally, information that identifies the user. After you have created an account, the software creates a home directory for the user.

For each user account, you can define the following:

- Username—Name that identifies the user. It must be unique within the router. Do not include spaces, colons, or commas in the username. The username can be up to 64 characters long.
- User’s full name—(Optional) If the full name contains spaces, enclose it in quotation marks. Do not include colons or commas.
- User identifier (UID)—(Optional) Numeric identifier that is associated with the user account name. The identifier must be in the range from 100 through 64,000 and must be unique within the router. If you do not assign a UID to a username, the software assigns one when you commit the configuration, preferring the lowest available number.

You must ensure that the UID is unique. However, it is possible to assign the same UID to different users. If you do this, the CLI displays a warning when you commit the configuration and then assigns the duplicate UID.

- User’s access privilege—(Required) One of the login classes you defined in the `class` statement at the `[edit system login]` hierarchy level, or one of the default classes listed in [“Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69](#).
- Authentication method or methods and passwords that the user can use to access the router—(Optional) You can use SSH or a Message Digest 5 (MD5) password, or you can enter a plain-text password that the Junos OS encrypts using MD5-style encryption before entering it in the password database. For each method, you can

specify the user's password. If you configure the **plain-text-password** option, you are prompted to enter and confirm the password:

```
[edit system login user username]
user@host# set authentication plain-text-password
New password: type password here
Retype new password: retype password here
```

The default requirements for plain-text passwords are:

- The password must be between 6 and 128 characters long.
- You can include most character classes in a password (uppercase letters, lowercase letters, numbers, punctuation marks, and other special characters). Control characters are not recommended.
- Valid passwords must contain at least one change of case or character class.

Junos-FIPS and Common Criteria have special password requirements. FIPS and Common Criteria passwords must be between 10 and 20 characters in length. Passwords must use at least three of the five defined character sets (uppercase letters, lowercase letters, digits, punctuation marks, and other special characters). If Junos-FIPS is installed on the router, you cannot configure passwords unless they meet this standard.

For SSH authentication, you can copy the contents of an SSH key file into the configuration or directly configure SSH key information. Use the **load-key-file** *URL filename* command to load an SSH key file that was previously generated, e.g. by using **ssh-keygen**. The *URL filename* is the path to the file's location and name. This command loads RSA (SSH version 1 and SSH version 2) and DSA (SSH version 2) public keys. The contents of the SSH key file are copied into the configuration immediately after you enter the **load-key-file** statement. Optionally, you can use the **ssh-dsa public key** *<from hostname>* and the **ssh-rsa public key** *<from hostname>* statements to directly configure SSH keys.

For each user account and for root logins, you can configure more than one public RSA or DSA key for user authentication. When a user logs in using a user account or as root, the configured public keys are referenced to determine whether the private key matches any of them.

To view the SSH keys entries, use the configuration mode **show** command. For example:

```
[edit system login user boojum]
user@host# set authentication load-key-file my-host:.ssh/id_dsa.pub
.file.19692 | 0 KB | 0.3 kB/s | ETA: 00:00:00 | 100%
[edit system]
user@host# show
root-authentication {
  ssh-rsa "1024 35 9727638204084251055468226757249864241630322
207404962528390382038690141584534964170019610608358722961563
475784918273603361276441874265946893207739108344813125957722
625461667999278316123500438660915866283822489746732605661192
181489539813862940327687806538169602027491641637359132693963
44008443 boojum@juniper.net"; # SECRET-DATA
}
```

An account for the user **root** is always present in the configuration. You configure the password for **root** using the *root-authentication* statement, as described in [“Configuring the Root Password” on page 333](#).

Related Documentation

- [Configuring Junos OS User Accounts by Using a Configuration Group on page 53](#)
- [Junos OS Login Classes Overview on page 23](#)

Understanding Junos OS Access Privilege Levels

Each top-level command-line interface (CLI) command and each configuration statement have an access privilege level associated with them. Users can execute only those commands and configure and view only those statements for which they have access privileges. The access privileges for each login class are defined by one or more *permission flags*.

For each login class, you can explicitly deny or allow the use of operational and configuration mode commands that would otherwise be permitted or not allowed by a privilege level specified in the **permissions** statement.

The following sections provide additional information about permissions:

- [Junos OS Login Class Permission Flags on page 26](#)
- [Allowing or Denying Individual Commands for Junos OS Login Classes on page 29](#)

Junos OS Login Class Permission Flags

The **permissions** statement specifies one or more of the permission flags listed in [Table 4 on page 26](#). Permission flags are not cumulative, so for each class you must list all the permission flags needed, including **view** to display information and **configure** to enter configuration mode. Two forms of permissions control for individual parts of the configuration are:

- “Plain” form—Provides read-only capability for that permission type. An example is **interface**.
- Form that ends in **-control**—Provides read and write capability for that permission type. An example is **interface-control**.

[Table 4 on page 26](#) lists the Junos OS login class permission flags that you can configure by including the **permissions** statement at the **[edit system login class class-name]** hierarchy level.

Table 4: Login Class Permission Flags

Permission Flag	Description
access	Can view the access configuration in configuration mode and with the show configuration operational mode command.
access-control	Can view and configure access information at the [edit access] hierarchy level.

Table 4: Login Class Permission Flags (*continued*)

Permission Flag	Description
admin	Can view user account information in configuration mode and with the show configuration operational mode command.
admin-control	Can view user accounts and configure them at the [edit system login] hierarchy level.
all	Can access all operational mode commands and configuration mode commands. Can modify configuration in all the configuration hierarchy levels.
clear	Can clear (delete) information learned from the network that is stored in various network databases by using the clear commands.
configure	Can enter configuration mode by using the configure command.
control	Can perform all control-level operations—all operations configured with the -control permission flags.
field	Can view field debug commands. Reserved for debugging support.
firewall	Can view the firewall filter configuration in configuration mode.
firewall-control	Can view and configure firewall filter information at the [edit firewall] hierarchy level.
floppy	Can read from and write to the removable media.
flow-tap	Can view the flow-tap configuration in configuration mode.
flow-tap-control	Can view the flow-tap configuration in configuration mode and can configure flow-tap configuration information at the [edit services flow-tap] hierarchy level.
flow-tap-operation	<p>Can make flow-tap requests to the router or switch. For example, a Dynamic Tasking Control Protocol (DTCP) client must have flow-tap-operation permission to authenticate itself to the Junos OS as an administrative user.</p> <p>NOTE: The flow-tap-operation option is not included in the all-control permissions flag.</p>
idp-profiler-operation	Can view profiler data.
interface	Can view the interface configuration in configuration mode and with the show configuration operational mode command.

Table 4: Login Class Permission Flags (*continued*)

Permission Flag	Description
interface-control	Can view chassis, class of service (CoS), groups, forwarding options, and interfaces configuration information. Can edit configuration at the following hierarchy levels: <ul style="list-style-type: none"> • [edit chassis] • [edit class-of-service] • [edit groups] • [edit forwarding-options] • [edit interfaces]
maintenance	Can perform system maintenance, including starting a local shell on the router or switch and becoming the superuser in the shell by using the su root command, and can halt and reboot the router or switch by using the request system commands.
network	Can access the network by using the ping , ssh , telnet , and traceroute commands.
pgcp-session-mirroring	Can view the pgcp session mirroring configuration.
pgcp-session-mirroring-control	Can modify the pgcp session mirroring configuration.
reset	Can restart software processes by using the restart command and can configure whether software processes are enabled or disabled at the [edit system processes] hierarchy level.
rollback	Can use the rollback command to return to a previously committed configuration other than the most recently committed one.
routing	Can view general routing, routing protocol, and routing policy configuration information in configuration and operational modes.
routing-control	Can view general routing, routing protocol, and routing policy configuration information and can configure general routing at the [edit routing-options] hierarchy level, routing protocols at the [edit protocols] hierarchy level, and routing policy at the [edit policy-options] hierarchy level.
secret	Can view passwords and other authentication keys in the configuration.
secret-control	Can view passwords and other authentication keys in the configuration and can modify them in configuration mode.
security	Can view security configuration in configuration mode and with the show configuration operational mode command.

Table 4: Login Class Permission Flags (*continued*)

Permission Flag	Description
security-control	Can view and configure security information at the [edit security] hierarchy level.
shell	Can start a local shell on the router or switch by using the start shell command.
snmp	Can view Simple Network Management Protocol (SNMP) configuration information in configuration and operational modes.
snmp-control	Can view SNMP configuration information and can modify SNMP configuration at the [edit snmp] hierarchy level.
system	Can view system-level information in configuration and operational modes.
system-control	Can view system-level configuration information and configure it at the [edit system] hierarchy level.
trace	Can view trace file settings and configure trace file properties.
trace-control	Can modify trace file settings and configure trace file properties.
view	Can use various commands to display current system-wide, routing table, and protocol-specific values and statistics. Cannot view the secret configuration.
view-configuration	Can view all of the configuration excluding secrets, system scripts, and event options. NOTE: Only users with the maintenance permission can view commit script, op script, or event script configuration.

Allowing or Denying Individual Commands for Junos OS Login Classes

By default, all top-level CLI commands have associated access privilege levels. Users can execute only those commands and view only those statements for which they have access privileges. For each login class, you can explicitly deny or allow the use of operational and configuration mode commands that would otherwise be permitted or not allowed by a privilege level specified in the **permissions** statement.

Permission flags are used to grant a user access to operational mode commands and configuration hierarchy levels and statements. By specifying a specific permission flag on the user's login class at the **[edit system login class]** hierarchy level, you grant the user access to the corresponding commands and configuration hierarchy levels and statements. To grant access to all commands and configuration statements, use the **all** permissions flag. For permission flags that grant access to configuration hierarchy levels and statements, the flags grant read-only privilege to that configuration. For example, the **interface** permissions flag grants read-only access to the **[edit interfaces]** hierarchy

level. The **-control** form of the flag grants read-write access to that configuration. Using the preceding example, **interface-control** grants read-write access to the **[edit interfaces]** hierarchy level.

- The **all** login class permission bits take precedence over extended regular expressions when a user issues **rollback** command with **rollback** permission flag enabled.
- Expressions used to allow and deny commands for users on RADIUS and TACACS+ servers have been simplified. Instead of a single, long expression with multiple commands (**allow-commands=cmd1 cmd2 ... cmdn**), you can specify each command as a separate expression. This new syntax is valid for **allow-configuration**, **deny-configuration**, **allow-commands**, **deny-commands**, and all user permission bits.
- Users cannot issue the **load override** command when specifying an extended regular expression. Users can only issue the **merge**, **replace**, and **patch** configuration commands.
- If you allow and deny the same commands, the **allow-commands** permissions take precedence over the permissions specified by the **deny-commands**. For example, if you include **allow-commands "request system software add"** and **deny-commands "request system software add"**, the login class user is allowed to install software using the **request system software add** command.
- Regular expressions for **allow-commands** and **deny-commands** can also include the **commit**, **load**, **rollback**, **save**, **status**, and **update** commands.
- If you specify a regular expression for **allow-commands** and **deny-commands** with two different variants of a command, the longest match is always executed.

For example, if you specify a regular expression for **allow-commands** with the **commit-synchronize** command and a regular expression for **deny-commands** with the **commit** command, users assigned to such a login class would be able to issue the **commit synchronize** command, but not the **commit** command. This is because **commit-synchronize** is the longest match between **commit** and **commit-synchronize** and it is specified for **allow-commands**.

Likewise, if you specify a regular expression for **allow-commands** with the **commit** command and a regular expression for **deny-commands** with the **commit-synchronize** command, users assigned to such a login class would be able to issue the **commit** command, but not the **commit-synchronize** command. This is because **commit-synchronize** is the longest match between **commit** and **commit-synchronize** and it is specified for **deny-commands**.

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)

Junos OS User Authentication Methods

The Junos OS supports three methods of user authentication: local password authentication, Remote Authentication Dial-In User Service (RADIUS), and Terminal Access Controller Access Control System Plus (TACACS+).

With local password authentication, you configure a password for each user allowed to log in to the router or switch.

RADIUS and TACACS+ are authentication methods for validating users who attempt to access the router or switch using telnet. They are both distributed client-server systems—the RADIUS and TACACS+ clients run on the router or switch, and the server runs on a remote network system.

You can configure the router or switch to be both a RADIUS and TACACS+ client, and you can also configure authentication passwords in the Junos OS configuration file. You can prioritize the methods to configure the order in which the software tries the different authentication methods when verifying user access.

**Related
Documentation**

- [Configuring RADIUS Server Authentication on page 355](#)
- [Configuring TACACS+ Authentication on page 373](#)
- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)

Understanding Remote Authentication Servers

You probably already use a remote authentication server (or servers) in your network. It is a recommended best practice, because the servers allow you to centrally create a consistent set of user accounts for all devices in your network. There are many good reasons for implementing a authentication, authorization, and accountability (AAA) solution in your network, not the least of which is to make the management of user accounts easier.

There are two basic methods of remote authentication in use by most enterprises today—RADIUS and TACACS+. Junos OS supports both types and can be configured to query multiple remote authentication servers of both types. The idea behind a RADIUS or TACACS+ server is simple, a central authentication server that routers, switches, security devices, and even servers can use to authenticate users as they attempt to gain access to these systems. Think of the advantages that a central user directory brings for authentication auditing and access control in a client server model, and you have your justification for RADIUS or TACACS+ for your networks infrastructure.

Using a central server has multiple advantages over the alternative of creating local users on each device, a time-consuming and error-prone task. A central authentication system also simplifies the use of one-time password systems such as SecureID, which offer protection against password sniffing and password replay attacks, in which someone uses a captured password to pose as a system administrator.

- **RADIUS**—You should use RADIUS when your priorities are interoperability and performance.
 - **Interoperability**—RADIUS is more interoperable than TACACS+, primarily because of the proprietary nature of TACACS+. While TACACS+ supports more protocols, RADIUS is universally supported.

- Performance—RADIUS is much lighter on your routers and switches and for this reason, network engineers generally prefer RADIUS over TACACS+.
- TACACS+—You should use TACACS+ when your priorities are security and flexibility.
- Security—TACACS+ is more secure than RADIUS. Not only is the full session encrypted, but authorization and authentication are done separately to prevent someone from trying to force their way into your network.
- Flexibility—TCP is a more flexible transport protocol than UDP. You can do more with it in more advanced networks. In addition, TACACS+ supports more of the enterprise protocols like NetBios or Appletalk.

Related •
Documentation

Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication

Using the **authentication-order** statement, you can prioritize the order in which the Junos OS tries the different authentication methods when verifying user access to a router or switch.

If the **authentication-order** is remote-server then local, Junos OS will retry the local server if the remote-server is unreachable or has timed out. However; if the remote-server rejects the authentication, Junos OS will not retry the authentication.

If none of the configured authentication methods accept the login credentials and if a reject response is received, the login attempt fails. If no response is received from any configured authentication method, the Junos OS consults local password authentication as a last resort.

Using RADIUS or TACACS+ Authentication

You can configure the Junos OS to be both a RADIUS and TACACS+ authentication client.

If an authentication method included in the **[authentication-order]** statement is not available, or if the authentication is available but returns a reject response, the Junos OS tries the next authentication method included in the **authentication-order** statement.

The RADIUS or TACACS+ server authentication might fail because of the following reasons:

- The authentication method is configured, but the corresponding authentication servers are not configured. For instance, the RADIUS and TACACS+ authentication methods are included in the **authentication-order** statement, but the corresponding RADIUS or TACACS+ servers are not configured at the respective **[edit system radius-server]** and **[edit system tacplus-server]** hierarchy levels.
- The RADIUS or TACACS+ server does not respond within the timeout period configured at the **[edit system radius-server]** or **[edit system tacplus-server]** hierarchy levels.
- The RADIUS or TACACS+ server is not reachable because of a network problem.

The RADIUS or TACACS+ server authentication might return a reject response because of the following reasons:

- The user profiles of users accessing a router or switch might not be configured on the RADIUS or TACACS+ server.
- The user enters incorrect logon credentials.

Using Local Password Authentication

You can explicitly configure the password authentication method or use this method as a fallback mechanism when remote authentication servers fail. The password authentication method consults the local user profiles configured at the **[edit system login]** hierarchy level. Users can log in to a router or switch using their local username and password in the following scenarios:

- The password authentication method (password) is explicitly configured as one of the authentication methods in the **[authentication-order authentication-methods]** statement. In this case, the password authentication method is tried if no previous authentication accepts the logon credentials. This is true whether the previous authentication method fails to respond or returns a reject response because of an incorrect username or password.
- The password authentication method is not explicitly configured as one of the authentication methods in the **authentication-order authentication-methods** statement. In this case, the password authentication method is tried only if all configured authentication methods fail to respond. It is not consulted if any configured authentication method returns a reject response because of an incorrect username or password.

Order of Authentication Attempts

[Table 5 on page 33](#) describes how the **authentication-order** statement at the **[edit system]** hierarchy level determines the procedure that the Junos OS uses to authenticate users for access to a router or switch.

Table 5: Order of Authentication Attempts

Syntax	Order of Authentication Attempts
authentication-order radius;	<ol style="list-style-type: none"> 1. Try configured RADIUS authentication servers. 2. If RADIUS server is available and authentication is accepted, grant access. 3. If RADIUS server is available but authentication is rejected, deny access. 4. If RADIUS servers are not available, try password authentication. <p>NOTE: If a RADIUS server is available, password authentication is not attempted, because it is not explicitly configured in the authentication order.</p>

Table 5: Order of Authentication Attempts (*continued*)

Syntax	Order of Authentication Attempts
authentication-order [radius password];	<ol style="list-style-type: none"> 1. Try configured RADIUS authentication servers. 2. If RADIUS servers fail to respond or return a reject response, try password authentication, because it is explicitly configured in the authentication order.
authentication-order [radius tacplus];	<ol style="list-style-type: none"> 1. Try configured RADIUS authentication servers. 2. If RADIUS server is available and authentication is accepted, grant access. 3. If RADIUS servers fail to respond or return a reject response, try configured TACACS+ servers. 4. If TACACS+ server is available and authentication is accepted, grant access. 5. If TACACS+ server is available but authentication is rejected, deny access. 6. If both RADIUS and TACACS+ servers are not available, try password authentication. <p>NOTE: If either RADIUS or TACACS+ servers are available, password authentication is not attempted, because it is not explicitly configured in the authentication order.</p>
authentication-order [radius tacplus password];	<ol style="list-style-type: none"> 1. Try configured RADIUS authentication servers. 2. If RADIUS server is available and authentication is accepted, grant access. 3. If RADIUS servers fail to respond or return a reject response, try configured TACACS+ servers. 4. If TACACS+ server is available and authentication is accepted, grant access. 5. If TACACS+ servers fail to respond or return a reject response, try password authentication, because it is explicitly configured in the authentication order.
authentication-order tacplus;	<ol style="list-style-type: none"> 1. Try configured TACACS+ authentication servers. 2. If TACACS+ server is available and authentication is accepted, grant access. 3. If TACACS+ server is available but authentication is rejected, deny access. 4. If TACACS+ servers are not available, try password authentication. <p>NOTE: If a TACACS+ server is available, password authentication is not attempted, because it is not explicitly configured in the authentication order.</p>

Table 5: Order of Authentication Attempts (*continued*)

Syntax	Order of Authentication Attempts
authentication-order [tacplus password];	<ol style="list-style-type: none"> 1. Try configured TACACS+ authentication servers. 2. If TACACS+ servers fail to respond or return a reject response, try password authentication, because it is explicitly configured in the authentication order.
authentication-order [tacplus radius];	<ol style="list-style-type: none"> 1. Try configured TACACS+ authentication servers. 2. If TACACS+ server is available and authentication is accepted, grant access. 3. If TACACS+ servers fail to respond or return a reject response, try configured RADIUS servers. 4. If RADIUS server is available and authentication is accepted, grant access. 5. If RADIUS server is available but authentication is rejected, deny access. 6. If both TACACS+ and RADIUS servers are not available, try password authentication. <p>NOTE: If either TACACS+ or RADIUS servers are available, password authentication is not attempted, because it is not explicitly configured in the authentication order.</p>
authentication-order [tacplus radius password];	<ol style="list-style-type: none"> 1. Try configured TACACS+ authentication servers. 2. If TACACS+ server is available and authentication is accepted, grant access. 3. If TACACS+ servers fail to respond or return a reject response, try configured RADIUS servers. 4. If RADIUS server is available and authentication is accepted, grant access. 5. If RADIUS servers fail to respond or return a reject response try password authentication, because it is explicitly configured in the authentication order.
authentication-order password;	<ol style="list-style-type: none"> 1. Try to authenticate the user, using the password configured at the [edit system login] hierarchy level. 2. If the authentication is accepted, grant access. 3. If the authentication is rejected, deny access.



NOTE: If SSH public keys are configured, SSH user authentication first tries to perform public key authentication before using the authentication methods configured in the authentication-order statement. If you want SSH logins to use the authentication methods configured in the authentication-order statement without first trying to perform public key authentication, do not configure SSH public keys.

In a routing matrix based on a TX Matrix router, the authentication order must be configured only at the configuration groups `re0` and `re1`. The authentication order must not be configured at the `[edit system]` hierarchy. This is because the authentication order for the routing matrix is controlled on the switch-card chassis (or TX Matrix router) or switch-fabric chassis (for TX Matrix Plus router) only.

In Junos OS Release 10.0 and later, the superuser (belonging to the super-user login class) is also authenticated based on the authentication order that is configured for TACACS+, RADIUS, or password authentication using the authentication-order statement. For example, if the only configured authentication order is TACACS+, the superuser can only be authenticated by the TACACS+ server and password authentication cannot be used as an alternative. However, in Junos OS Release 9.6 and earlier, the superuser can use password authentication to login, even if password authentication is not configured explicitly using the authentication-order statement.

Related Documentation

- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 368](#)
- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 351](#)
- [Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 352](#)

Junos OS Authentication Methods for Routing Protocols

Some interior gateway protocols (IGPs)—Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), and Routing Information Protocol (RIP)—and Resource Reservation Protocol (RSVP) allow you to configure an authentication method and password. Neighboring routers use the password to verify the authenticity of packets sent by the protocol from the router or from a router interface. The following authentication methods are supported:

- Simple authentication (IS-IS, OSPF, and RIP)—Uses a simple text password. The receiving router uses an authentication key (password) to verify the packet. Because the password is included in the transmitted packet, this method of authentication is relatively insecure. We recommend that you not use this authentication method.

- MD5 and HMAC-MD5 (IS-IS, OSPF, RIP, and RSVP)—Message Digest 5 (MD5) creates an encoded checksum that is included in the transmitted packet. HMAC-MD5, which combines HMAC authentication with MD5, adds the use of an iterated cryptographic hash function. With both types of authentication, the receiving router uses an authentication key (password) to verify the packet. HMAC-MD5 authentication is defined in RFC 2104, *HMAC: Keyed-Hashing for Message Authentication*.

In general, authentication passwords are text strings consisting of a maximum of 16 or 255 letters and digits. Characters can include any ASCII strings. If you include spaces in a password, enclose all characters in quotation marks (" ").

Junos-FIPS has special password requirements. FIPS passwords must be between 10 and 20 characters in length. Passwords must use at least three of the five defined character sets (uppercase letters, lowercase letters, digits, punctuation marks, and other special characters). If Junos-FIPS is installed on the router, you cannot configure passwords unless they meet this standard.

**Related
Documentation**

- [Example: Configuring the BGP and IS-IS Routing Protocols on page 437](#)
- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)

CHAPTER 2

Configuring Junos OS Login Classes

- [Defining Junos OS Login Classes on page 39](#)
- [Example: Creating Login Classes with Specific Privileges on page 40](#)
- [Configuring the Timeout Value for Idle Login Sessions on page 41](#)
- [Using Junos OS to Configure Logical System Administrators on page 41](#)
- [Configuring the Junos OS to Display a System Login Message on page 42](#)
- [Configuring the Junos OS to Display a System Login Announcement on page 44](#)
- [Examples: Configuring Time-Based User Access on page 45](#)
- [Configuring System Alarms to Appear Automatically Upon Login on page 46](#)

Defining Junos OS Login Classes

Login classes allow you to define the following:

- Access privileges that users have when they are logged in to the router or switch
- Commands and statements that users can and cannot specify
- How long a login session can be idle before it times out and the user is logged out

All users who can log in to the router or switch must be in a login class. Therefore, you must define a Junos OS login class for each user or class of users. You can define any number of login classes depending on the types of permissions the users need.

To define a login class and its access privileges, include the **class** statement at the **[edit system login]** hierarchy level:

```
[edit system login]
class class-name {
  access-end;
  access-start;
  allow-commands "regular-expression";
  ( allow-configuration | allow-configuration-regexps ) "regular expression 1" "regular
  expression 2";
  allowed-days;
  configuration-breadcrumbs;
  deny-commands "regular-expression";
  ( deny-configuration | deny-configuration-regexps ) "regular expression 1" "regular
  expression 2";
```

```
idle-timeout minutes;  
login-script filename;  
login-tip;  
permissions [ permissions ];  
}
```

**Related
Documentation**

- [Junos OS User Accounts Overview on page 24](#)
- [Example: Creating Login Classes with Specific Privileges on page 40](#)
- [Using Junos OS to Configure Logical System Administrators on page 41](#)

Example: Creating Login Classes with Specific Privileges

Login classes are used to assign certain permissions or restrictions to groups of users, ensuring that sensitive commands are only accessible to the appropriate users. By default, Juniper Networks devices have four types of login classes with preset permissions: operator, read-only, superuser or super-user, and unauthorized.

You can create new custom login classes to make different combinations of permissions that are not found in the default login classes. The following example shows how to create three custom login classes, each with specific privileges and timers to disconnect the class members after a period of inactivity. Inactivity timers help protect network security by disconnecting a user from the network if the user is away from his computer for too long, preventing potential security risks created by leaving an unattended account logged in to a switch or router. The permissions and inactivity timers shown here are only examples and should be customized to your organization.

The first class of users is called **observation** and they can only view statistics and configuration. They are not allowed to modify any configuration. The second class of users is called **operation** and they can view and modify the configuration. The third class of users is called **engineering** and they have unlimited access and control. All three login classes use the same inactivity timer of 5 minutes.

```
[edit]  
system {  
  login {  
    class observation {  
      idle-timeout 5;  
      permissions [ view ];  
    }  
    class operation {  
      idle-timeout 5;  
      permissions [ admin clear configure interface interface-control network  
reset routing routing-control snmp snmp-control trace-control  
firewall-control rollback ];  
    }  
    class engineering {  
      idle-timeout 5;  
      permissions all;  
    }  
  }  
}
```

- Related Documentation**
- [Junos OS Login Classes Overview on page 23](#)
 - [Defining Junos OS Login Classes on page 39](#)
 - [Configuring a Local Administrator Account on page 52](#)

Configuring the Timeout Value for Idle Login Sessions

An idle login session is one in which the CLI operational mode prompt is displayed but there is no input from the keyboard. By default, a login session remains established until a user logs out of the router or switch, even if that session is idle. To close idle sessions automatically, you must configure a time limit for each login class. If a session established by a user in that class remains idle for the configured time limit, the session automatically closes.

To define the timeout value for idle login sessions, include the **idle-timeout** statement at the **[edit system login class *class-name*]** hierarchy level:

```
[edit system login class class-name]  
idle-timeout minutes;
```

Specify the number of minutes that a session can be idle before it is automatically closed.

If you have configured a timeout value, the CLI displays messages similar to the following when timing out an idle user. It starts displaying these messages 5 minutes before timing out the user.

```
user@host# Session will be closed in 5 minutes if there is no activity.  
Warning: session will be closed in 1 minute if there is no activity  
Warning: session will be closed in 10 seconds if there is no activity  
Idle timeout exceeded: closing session
```

If you configure a timeout value, the session closes after the specified time has elapsed, unless the user is running telnet or monitoring interfaces using the **monitor interface** or **monitor traffic** command.

- Related Documentation**
- [Defining Junos OS Login Classes on page 39](#)
 - [idle-timeout \(System-Login\) on page 497](#)

Using Junos OS to Configure Logical System Administrators

Using Junos OS, you can partition a single router or switch into multiple logical devices that perform independent routing or switching tasks. When creating logical systems, you must configure logical system administrators and interfaces, assign logical interfaces to logical systems, and configure various other logical system statements.

The master administrator can assign one or more logical system administrators to each logical system. Once assigned to a logical system, administrators are restricted to viewing only configurations of the logical system to which they are assigned and accessing only the operational commands that apply to that particular logical system. This restriction means that these administrators cannot access global configuration statements, and

all command output is restricted to the logical system to which the administrators are assigned.

To configure logical system administrators, include the **logical-system *logical-system-name*** statement at the **[edit system login class *class-name*]** hierarchy level and apply the class to the user. For example:

```
[edit]
system {
  login {
    class admin1 {
      permissions all;
      logical-system logical-system-LS1;
    }
    class admin2 {
      permissions view; # Gives users assigned to class admin2 the ability to view
                        # but not to change the configuration.
      logical-system logical-system-LS2;
    }
    user user1 {
      class admin1;
    }
    user user2 {
      class admin2;
    }
  }
}
```

Fully implementing logical systems requires that you also configure any protocols, routing statements, switching statements, and policy statements for the logical system.

- Related Documentation**
- [Defining Junos OS Login Classes on page 39](#)
 - [Defining Junos OS Login Classes](#)

Configuring the Junos OS to Display a System Login Message

You can create login banners for those who post messages and announcements to those who access the device. You might want to configure an initial login message now, before you create any user accounts.

A login message displays a banner to users when they access the device, before they log in. To display a message only after the user logs in, use a system login announcement instead of a system login message.

You can format the login message using the following special characters:

- \n—New line
- \t—Horizontal tab
- \'—Single quotation mark

- \"—Double quotation mark
- \\—Backslash

If the message text contains any spaces, enclose it in quotation marks.

To configure a login banner:

1. Include the **message** statement in the **[edit system login]** configuration.

```
[edit system login]
message text;
```

For example:

```
system {
  login {
    message "\n\n\n\tUNAUTHORIZED USE OF THIS SYSTEM\n
\tIS STRICTLY PROHIBITED!\n\n\tPlease contact
\t'company-noc@company.com\t' to gain\tauthorization
\tto this equipment if you need access.\n\n\n";
  }
}
```

2. Commit the configuration.

```
[edit system login]
user@host# commit
```

3. Connect to the device in a new session to verify the presence of the new banner.

The preceding login message configuration example produces a login message similar to the following:

```
server% telnet router1
Trying 1.1.1.1...
Connected to router1.
Escape character is '^['.
```

```
UNAUTHORIZED USE OF THIS SYSTEM
IS STRICTLY PROHIBITED!
```

```
Please contact 'company-noc@company.com' to gain
authorization to this equipment if you need access.
```

```
router1 (ttyp0)
```

```
login:
```



NOTE: On some platforms, when you log in from the console, the login banner message is not seen unless you press Ctrl-D at the login prompt.

Related Documentation

- [Configuring the Junos OS to Display a System Login Announcement on page 44](#)
- [Defining Junos OS Login Classes on page 39](#)
- [Configuring the Junos OS to Display a System Login Announcement on page 44](#)

Configuring the Junos OS to Display a System Login Announcement

Sometimes you want to make announcements only to authorized users after they have logged in. For example, you might want to announce an upcoming maintenance event.

You can format the announcement using the following special characters:

- `\n`—New line
- `\t`—Horizontal tab
- `\'`—Single quotation mark
- `\"`—Double quotation mark
- `\\`—Backslash

If the message text contains any spaces, enclose it in quotation marks.

By default, no login announcement is displayed.

To configure an announcement that can be seen only by authorized users:

1. Include the **announcement** statement in the **[edit system login]** configuration.

```
[edit system login]
user@host# set announcement text
```

For example:

```
system {
  login {
    announcement "\tJuly 27th 1:00 AM to 8:00\n\nPlanned Network
    Maintenance\n\nAFFECTED LOCATIONS: Sunnyvale\n\nPLANNED ACTIVITY:
    Upgrade all 6200 switch firmware to the Enterprise TAC recommended firmware
    version\n\nPURPOSE: This activity will help to minimize the impact of unplanned
    power outages as well as address known issues within our currently installed
    firmware version(s)\n\nWHAT TO EXPECT: During the maintenance window for
    your site, the office network will not be available.\n\n";
    message "\n\n\tTPO - M7i - iX Router Lab\n\n\tUNAUTHORIZED USE OF THIS
    ROUTER\n\tIS STRICTLY PROHIBITED!\n\n\tPlease contact
    \'astatti@juniper.net\' to gain\n\taccess to this equipment if you need
    authorization.\n\n\n"
  }
}
```

2. Commit the configuration.

```
[edit system login]
user@host# commit
```

3. Connect to the device in a new session to verify the presence of the new banner.

The preceding login message configuration example produces a login message similar to the following:

```
server% telnet host
Trying 203.0.113.0
Connected to host.example.net
Escape character is '^['.
```

TP0 - M7i - iX Router Lab

UNAUTHORIZED USE OF THIS ROUTER
IS STRICTLY PROHIBITED!

Please contact 'astatti@juniper.net' to gain
access to this equipment if you need authorization

login: user
Password:

July 27th 1:00 AM to 8:00

Planned Network Maintenance

AFFECTED LOCATIONS: Sunnyvale

PLANNED ACTIVITY: Upgrade all 6200 switch firmware to the Enterprise TAC
recommended firmware version

PURPOSE: This activity will help to minimize the impact of unplanned power
outages as well as address known issues within our currently installed firmware
version(s)

WHAT TO EXPECT: During the maintenance window for your site, the office network
will not be available.

Related Documentation • [Configuring the Junos OS to Display a System Login Message on page 42](#)

Examples: Configuring Time-Based User Access

The following example shows how to configure user access for the **operator-round-the-clock-access** login class from Monday through Friday without any restriction on access time or duration of login:

```
[edit system]
login {
  class operator-round-the-clock-access {
    allowed-days [ monday tuesday wednesday thursday friday ];
  }
}
```

The following example shows how to configure user access for the **operator-day-shift** login class on Monday, Wednesday, and Friday from 8:30 AM to 4:30 PM:

```
[edit system]
```

```
login {  
  class operator-day-shift {  
    allowed-days [ monday wednesday friday ];  
    access-start 0830;  
    access-end 1630;  
  }  
}
```

Alternatively, you can also specify the login start time and end time for the **operator-day-shift** login class to be from 8:30 AM to 4:30 PM in the following format:

```
[edit system]  
login {  
  class operator-day-shift {  
    allowed-days [ monday wednesday friday ];  
    access-start 08:30am;  
    access-end 04:30pm;  
  }  
}
```

The following example shows how to configure user access for the **operator-day-shift-all-days-of-the-week** login class to be on all days of the week from 8:30 AM to 4:30 PM:

```
[edit system]  
login {  
  class operator-day-shift-all-days-of-the-week {  
    access-start 0830;  
    access-end 1630;  
  }  
}
```

Related Documentation • [Configuring Time-Based User Access on page 48](#)

Configuring System Alarms to Appear Automatically Upon Login

You can configure Juniper Networks routers and switches to run the **show system alarms** command whenever a user with the login class **admin** logs in to the router or switch. To do so, include the **login-alarms** statement at the **[edit system login class admin]** hierarchy level.

```
[edit system login class admin]  
login-alarms;
```

For more information on the **show system alarms** command, see the [CLI Explorer](#).

Related Documentation • [show system alarms](#)

CHAPTER 3

Configuring Junos OS User Accounts

- [Junos-FIPS Crypto Officer and User Accounts Overview on page 47](#)
- [Configuring Time-Based User Access on page 48](#)
- [Examples: Configuring Time-Based User Access on page 49](#)
- [Configuring Local User Template Accounts for User Authentication on page 50](#)
- [Configuring Remote Template Accounts for User Authentication on page 52](#)
- [Configuring a Local Administrator Account on page 52](#)
- [Configuring Junos OS User Accounts by Using a Configuration Group on page 53](#)
- [Example: Configuring User Accounts on page 56](#)
- [Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57](#)
- [Example: Limiting the Number of Login Attempts for SSH and Telnet Sessions to Prevent Unauthorized Access on page 58](#)
- [Configuring Login Tips on page 58](#)
- [Handling Authorization Failure on page 59](#)
- [Example: Configuring System Retry Options on page 60](#)

Junos-FIPS Crypto Officer and User Accounts Overview

Junos-FIPS defines a restricted set of user roles. Unlike the Junos OS, which enables a wide range of capabilities to users, FIPS 140-2 defines specific types of users (Crypto Officer, User, and Maintenance). Crypto Officers and FIPS Users perform all FIPS-related configuration tasks and issue all FIPS-related commands. Crypto Officer and FIPS User configurations must follow FIPS 140-2 guidelines. Typically, no user besides a Crypto Officer can perform FIPS-related tasks.

Crypto Officer User Configuration

Junos-FIPS offers finer control of user permissions than those mandated by FIPS 140-2. For FIPS 140-2 conformance, any Junos-FIPS user with the **secret**, **security**, and **maintenance** permission bits set is a Crypto Officer. In most cases, the **super-user** class should be reserved for a Crypto Officer. A FIPS User can be defined as any Junos-FIPS user that does not have the **secret**, **security**, and **maintenance** bits set.

FIPS User Configuration

A Crypto Officer sets up FIPS Users. FIPS Users can be granted permissions normally reserved for a Crypto Officer; for example, permission to zeroize the system and individual AS-II FIPS PICs.

Related Documentation • [Junos OS User Accounts Overview on page 24](#)

Configuring Time-Based User Access

The Junos OS enables you to configure time-based restrictions for user access to log in to a device. This is useful for restricting the time and duration of user logins for all users belonging to a login class. You can specify the days of the week when users can log in, the access start time, and the access end time.

- To configure user access on specific days of the week, without any restrictions on the duration of login, include the **allowed-days** statement only.

```
[edit system]
login {
  class class-name {
    allowed-days [ days-of-the-week ];
  }
}
```

- To configure user access on all the days of the week for a specific duration, include the **access-start** and **access-end** statements only.

```
[edit system]
login {
  class class-name {
    access-start HH:MM;
    access-end HH:MM;
  }
}
```

- To configure user access on specific days of the week for a specified duration, include the **allowed-days**, **access-start**, and **access-end** statements.

```
[edit system]
login {
  class class-name {
    allowed-days [ days-of-the-week ];
    access-start HH:MM;
    access-end HH:MM;
  }
}
```

Specify the start time and end time in **HH:MM** (24-hour) format, where **HH** represents the hours and **MM** represents the minutes.



NOTE: Access start time and end time that spans across 12:00 AM on a specified day results in the user having access until the next day, even if the access day is not explicitly configured. For instance, the following configuration results in the user having access until 6:00 AM on Tuesday and Thursday, although the `allowed-days` statement specifies access only on Monday and Wednesday:

```
[edit system]
login {
  class operator-night-shift {
    allowed-days [ monday wednesday ];
    access-start 2000;
    access-end 0600;
  }
}
```

Related Documentation

- [Examples: Configuring Time-Based User Access on page 45](#)
- [Defining Junos OS Login Classes on page 39](#)
- [access-end on page 453](#)
- [access-start on page 453](#)
- [allowed-days on page 458](#)
- [access-end](#)

Examples: Configuring Time-Based User Access

The following example shows how to configure user access for the **operator-round-the-clock-access** login class from Monday through Friday without any restriction on access time or duration of login:

```
[edit system]
login {
  class operator-round-the-clock-access {
    allowed-days [ monday tuesday wednesday thursday friday ];
  }
}
```

The following example shows how to configure user access for the **operator-day-shift** login class on Monday, Wednesday, and Friday from 8:30 AM to 4:30 PM:

```
[edit system]
login {
  class operator-day-shift {
    allowed-days [ monday wednesday friday ];
    access-start 0830;
    access-end 1630;
  }
}
```

Alternatively, you can also specify the login start time and end time for the **operator-day-shift** login class to be from 8:30 AM to 4:30 PM in the following format:

```
[edit system]
login {
  class operator-day-shift {
    allowed-days [ monday wednesday friday ];
    access-start 08:30am;
    access-end 04:30pm;
  }
}
```

The following example shows how to configure user access for the **operator-day-shift-all-days-of-the-week** login class to be on all days of the week from 8:30 AM to 4:30 PM:

```
[edit system]
login {
  class operator-day-shift-all-days-of-the-week {
    access-start 0830;
    access-end 1630;
  }
}
```

Related Documentation

- [Configuring Time-Based User Access on page 48](#)

Configuring Local User Template Accounts for User Authentication

You use local user template accounts when you need different types of templates for authentication. Each template can define a different set of permissions appropriate for the group of users who use that template. These templates are defined locally on the router or switch and referenced by the TACACS+ and RADIUS authentication servers.

When you configure local user templates and a user logs in, Junos OS issues a request to the authentication server to authenticate the user's login name. If a user is authenticated, the server returns the local username to Junos OS, which then determines whether a local username is specified for that login name (**local-username** for TACACS+, **Juniper-Local-User** for RADIUS). If so, Junos OS selects the appropriate local user template locally configured on the router or switch. If a local user template does not exist for the authenticated user, the router or switch defaults to the **remote** template.

To configure different access privileges for users who share the local user template account, include the **allow-commands** and **deny-commands** commands in the authentication server configuration file.

To configure a local user template, include the **user local-username** statement at the **[edit system login]** hierarchy level and specify the privileges you want to grant to the local users to whom the template applies:

```
[edit system login]
user local-username {
  full-name "Local user account";
  uid uid-value;
```

```

    class class-name;
}

```

This example configures the **sales** and **engineering** local user templates:

```

[edit]
system {
  login {
    user sales {
      uid uid-value;
      class class-name;
    }
    user engineering {
      uid uid-value;
      class class-name;
    }
  }
}

user = simon {
  ...
  service = junos-exec {
    local-user-name = sales
    allow-commands = "configure"
    deny-commands = "shutdown"
  }
}

user = rob {
  ...
  service = junos-exec {
    local-user-name = sales
    allow-commands = "(request system) | (show rip neighbor)"
    deny-commands = "clear"
  }
}

user = harold {
  ...
  service = junos-exec {
    local-user-name = engineering
    allow-commands = "monitor | help | show | ping | traceroute"
    deny-commands = "configure"
  }
}

user = jim {
  ...
  service = junos-exec {
    local-user-name = engineering
    allow-commands = "show bgp neighbor"
    deny-commands = "telnet | ssh"
  }
}

```

When the login users Simon and Rob are authenticated, the router or switch applies the sales local user template. When login users Harold and Jim are authenticated, the router or switch applies the engineering local user template.

- Related Documentation**
- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 368](#)
 - [user \(Access\) on page 577](#)

Configuring Remote Template Accounts for User Authentication

By default, the Junos OS uses remote template accounts for user authentication when:

- The authenticated user does not exist locally on the router or switch.
- The authenticated user's record in the authentication server specifies local user, or the specified local user does not exist locally on the router or switch.

To configure the remote template account, include the **user remote** statement at the **[edit system login]** hierarchy level and specify the privileges you want to grant to remote users:

```
[edit system login]
user remote {
  full-name "All remote users";
  uid uid-value;
  class class-name;
}
```

To configure different access privileges for users who share the remote template account, include the **allow-commands** and **deny-commands** statements in the authentication server configuration file.

- Related Documentation**
- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 368](#)
 - [user \(Access\) on page 577](#)

Configuring a Local Administrator Account

The following example shows how to configure a password-protected local administration account called **admin** with superuser privileges. Superuser privileges give a user permission to use any command on the router and are generally reserved for a select few users such as system administrators. It is important to protect the local administrator account with a password to prevent unauthorized users from gaining access to superuser commands that can be used to alter the system configuration. Even users with RADIUS authentication should configure a local password. If RADIUS fails or becomes unreachable, the login process will revert to password authentication on the local administrator account.

```
[edit]
system {
  login {
    user admin {
      uid 1000;
      class superuser;
      authentication {
        encrypted-password "<PASSWORD>"; # SECRET-DATA
      }
    }
  }
}
```

```

    }
  }
}

```

- Related Documentation**
- [Junos OS Login Classes Overview on page 23](#)
 - [Configuring Junos OS User Accounts by Using a Configuration Group on page 53](#)

Configuring Junos OS User Accounts by Using a Configuration Group

User accounts provide a way for users to access a router or switch. Junos OS requires that all users have a predefined user account before they can log in to the device. For each user account, you define the login name for the user and, optionally, information that identifies the user. After you have created an account, the software creates a home directory for the user.

It is a common practice to use remote authentication servers to centrally store information about users. Even so, it is also a good practice to configure at least one nonroot user directly on each device, in case access to the remote authentication server is disrupted. This one nonroot user commonly has a generic name, such as **admin**.

Because user accounts are configured on multiple devices, they are commonly configured inside of a configuration group. As such, the examples shown here are in a configuration group called **global**. Using a configuration group for your user accounts is optional.

To create a user account:

1. Add a new user, using the user's assigned account login name.

```

[edit groups global]
user@host# edit system login user user username

```

2. (Optional) Configure a full descriptive name for the account.

If the full name includes spaces, enclose the entire name in quotation marks.

```

[edit groups global system login user user-name]
user@host# set full-name complete-name

```

For example:

```

user@host# show groups
global {
  system {
    login {
      user admin {
        full-name "general administrator";
      }
    }
  }
}

```

3. (Optional) Set the user identifier (UID) for the account.

As with UNIX systems, the UID enforces user permissions and file access. If you do not set the UID, Junos OS assigns one for you. The format of the UID is a number in the range of 100 to 64000.

```
[edit groups global system login user user-name]  
user@host# set uid uid-value
```

For example:

```
user@host# show groups  
global {  
  system {  
    login {  
      user admin {  
        uid 9999;  
      }  
    }  
  }  
}
```

4. Assign the user to a login class.

You can define your own login classes or assign one of the predefined Junos OS login classes.

The predefined login classes are as follows:

- super-user—all permissions
- operator—clear, network, reset, trace, and view permissions
- read-only— view permissions
- unauthorized—no permissions

```
[edit groups global system login user user-name]  
user@host# set class class-name
```

For example:

```
user@host# show groups  
global {  
  system {  
    login {  
      user admin {  
        class super-user;  
      }  
    }  
  }  
}
```

5. Use one of the following methods to configure the user password.

- To enter a clear-text password that the system encrypts for you, use the following command to set the user password:

```
[edit groups global system login user user-name]  
user@host# set authentication plain-text-password password  
New Password: type password here
```

Retype new password: *retype password here*

As you enter the password in plain text, Junos OS encrypts it immediately. You do not have to configure Junos OS to encrypt the password as in some other systems. Plain-text passwords are therefore hidden and marked as ## SECRET-DATA in the configuration.

- To enter a password that is already encrypted, use the following command to set the user password:



CAUTION: Do not use the `encrypted-password` option unless the password is *already* encrypted, and you are entering the encrypted version of the password.

If you accidentally configure the `encrypted-password` option with a plain-text password or with blank quotation marks (" "), you will not be able to log in to the device as this user.

```
[edit groups global system login user user-name]
user@host# set authentication encrypted-password "password"
New Password: type password here
Retype new password: retype password here
```

- To load previously generated public keys from a named file at a specified URL location, use the following command to set the user password:

```
[edit groups global system login user user-name]
user@host# set authentication load-key-file URL filename
```

- To enter an ssh public string, use the following command to set the user password:

```
[edit groups global system login user user-name]
user@host# set authentication (ssh-dsa | ssh-ecdsa | ssh-rsa) authorized-key
```

6. At the top level of the configuration, apply the configuration group.

If you use a configuration group, you must apply it for it to take effect.

```
[edit]
user@host# set apply-groups global
```

7. Commit the configuration.

```
user@host# commit
```

8. To verify the configuration, log out and log back in as the new user.

Related Documentation

- [Defining Junos OS Login Classes on page 39](#)
- [Example: Creating Login Classes with Specific Privileges on page 40](#)
- [Junos OS User Accounts Overview on page 24](#)
- [Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57](#)
- [User Access and Authentication Feature Guide for Routing Devices](#)

Example: Configuring User Accounts

The following example shows how to create accounts for four router or switch users, and create an account for the template user **remote**. All users use one of the default system login classes. User **alexander** also has two digital signal algorithm (DSA) public keys configured for SSH authentication.

```
[edit]
system {
  login {
    user philip {
      full-name "Philip of Macedonia";
      uid 1001;
      class super-user;
      authentication {
        encrypted-password "$ABC123";
      }
    }
    user alexander {
      full-name "Alexander the Great";
      uid 1002;
      class view;
      authentication {
        encrypted-password "$ABC123";
        ssh-dsa "8924 37 5678 5678@gaugamela.per";
        ssh-dsa "6273 94 9283@boojum.per";
      }
    }
    user darius {
      full-name "Darius King of Persia";
      uid 1003;
      class operator;
      authentication {
        ssh-rsa "1024 37 12341234@ecbatana.per";
      }
    }
    user anonymous {
      class unauthorized;
    }
    user remote {
      full-name "All remote users";
      uid 9999;
      class read-only;
    }
  }
}
```

Related Documentation

- [Junos OS User Accounts Overview on page 24](#)
- [Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57](#)

Limiting the Number of User Login Attempts for SSH and Telnet Sessions

You can limit the number of times a user can attempt to enter a password while logging in through SSH or Telnet. The connection is terminated if a user fails to log in after the number of attempts specified. You can also specify a delay, in seconds, before a user can try to enter a password after a failed attempt. In addition, you can specify the threshold for the number of failed attempts before the user experiences a delay in being able to enter a password again.

To specify the number of times a user can attempt to enter a password while logging in, include the **retry-options** statement at the **[edit system login]** hierarchy level:

```
[edit system login]
retry-options {
  tries-before-disconnect number;
  backoff-threshold number;
  backoff-factor seconds;
  maximum-time seconds
  minimum-time seconds;
}
```

You can configure the following options:

- **tries-before-disconnect**—Number of times a user can attempt to enter a password when logging in. The connection closes if a user fails to log in after the number specified. The range is from 1 through 10, and the default is 10.
- **backoff-threshold**—Threshold for the number of failed login attempts before the user experiences a delay in being able to enter a password again. Use the **backoff-factor** option to specify the length of the delay in seconds. The range is from 1 through 3, and the default is 2.
- **backoff-factor**—Length of time, in seconds, before a user can attempt to log in after a failed attempt. The delay increases by the value specified for each subsequent attempt after the threshold. The range is from 5 through 10, and the default is 5 seconds.
- **maximum-time *seconds***—Maximum length of time, in seconds, that the connection remains open for the user to enter a username and password to log in. If the user remains idle and does not enter a username and password within the configured **maximum-time**, the connection is closed. The range is from 20 through 300 seconds, and the default is 120 seconds.
- **minimum-time**—Minimum length of time, in seconds, that a connection remains open while a user is attempting to enter a correct password. The range is from 20 through 60, and the default is 40.

Related Documentation

- [Example: Limiting the Number of Login Attempts for SSH and Telnet Sessions to Prevent Unauthorized Access on page 58](#)
- [Configuring Junos OS User Accounts by Using a Configuration Group on page 53](#)

Example: Limiting the Number of Login Attempts for SSH and Telnet Sessions to Prevent Unauthorized Access

Limiting the number of SSH and Telnet login attempts per user is one of the most effective methods of stopping brute force attacks from compromising your network security. Brute force attackers execute a large number of login attempts in a short period of time to illegitimately gain access to a private network. By configuring the **retry-options** command, you can create an increasing delay after each failed login attempt, eventually disconnecting any user who passes your set threshold of login attempts.

The following example shows how to limit the user to four attempts when the user enters a password while logging in through SSH or Telnet. Set the **backoff-threshold** to 2, the **back-off-factor** to 5 seconds, and the **minimum-time** to 40 seconds. The user experiences a delay of 5 seconds after the second attempt to enter a correct password fails. After each subsequent failed attempt, the delay increases by 5 seconds. After the fourth and final failed attempt to enter a correct password, the user experiences an additional 10-second delay, and the connection closes after a total of 40 seconds.

The additional variables **maximum-time** and **lockout-period** are not set in this example.

```
[edit]
system {
  login {
    retry-options {
      backoff-threshold 2;
      backoff-factor 5;
      minimum-time 40;
      tries-before-disconnect 4;
    }
    password {
    }
  }
}
```



NOTE: This sample only shows the portion of the [edit system login] hierarchy level being modified.

Related Documentation

- [Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57](#)
- [login on page 506](#)

Configuring Login Tips

The Junos OS CLI provides the option of configuring login tips for the user. By default, the **tip** command is not enabled when a user logs in.

- To enable tips, include the **login-tip** statement at the **[edit system login class *class-name*]** hierarchy level:

```
[edit system login class class-name]  
login-tip;
```

Adding this statement enables the **tip** command for the class specified, provided the user logs in using the CLI.

**Related
Documentation**

- [Defining Junos OS Login Classes on page 39](#)

Handling Authorization Failure

The security administrator can configure the number of times a user can try to log in to the device with invalid login credentials. The device can be locked after the specified number of unsuccessful authentication attempts. This helps to protect the device from malicious users attempting to access the system by guessing an account's password. The security administrator can unlock the user account or define a time period for the user account to remain locked.

The system **lockout-period** defines the amount of time the device can be locked for a user account after a specified number of unsuccessful login attempts.

The security administrator can configure a period of time after which an inactive session will be locked and require re-authentication to be unlocked. This helps to protect the device from being idle for a long period before the session times out.

The system **idle-timeout** defines length of time the CLI operational mode prompt remains active before the session times out.

The security administrator can configure a banner with an advisory notice to be displayed before the identification and authentication screen.

The system **message** defines the system login message. This message appears before a user logs in.

The number of reattempts the device allows is defined by the **tries-before-disconnect** option. The device allows 3 unsuccessful attempts by default or as configured by the administrator. The device prevents the locked users to perform activities that require authentication, until a security administrator manually clears the lock or the defined time period for the device to remain locked has elapsed. However, the existing locks are ignored when the user attempts to log in from the local console.



NOTE: To clear the console during an administrator-initiated logout, the administrator must configure the set system login message “message string” such that, the message-string contains newline (\n) characters and a login banner message at the end of the \n characters.

To ensure that configuration information is cleared completely, the administrator can enter 50 or more \n characters in the *message-string* of the command set system login message “message string”.

For example, set system login message

"~~~~~
Welcome to Junos!!!"

Related Documentation

- Example: Configuring System Retry Options on page 60

Example: Configuring System Retry Options

This example shows how to configure system retry options to protect the device from malicious users.

- Requirements on page 60
- Overview on page 60
- Configuration on page 62
- Verification on page 63

Requirements

Before you begin, you should understand “[Handling Authorization Failure](#)” on page 59.

No special configuration beyond device initialization is required before configuring this feature.

Overview

Malicious users sometimes try to log in to a secure device by guessing an authorized user account's password. Locking out a user account after a number of failed authentication attempts helps protect the device from malicious users.

Device lockout allows you to configure the number of failed attempts before the user account is locked out of the device and configure the amount of time before the user can attempt to log in to the device again. You can configure the amount of time in-between failed login attempts of a user account and can manually lock and unlock user accounts.

**NOTE:**

This example includes the following settings:

- **backoff-factor** — Sets the length of delay in seconds after each failed login attempt. When a user incorrectly logs in to the device, the user must wait the configured amount of time before attempting to log in to the device again. The length of delay increases by this value for each subsequent login attempt after the value specified in the **backoff-threshold** statement. The default value for this statement is five seconds, with a range of five to ten seconds.
- **backoff-threshold** — Sets the threshold for the number of failed login attempts on the device before the user experiences a delay when attempting to reenter a password. When a user incorrectly logs in to the device and hits the threshold of failed login attempts, the user experiences a delay that is set in the **backoff-factor** statement before attempting to log in to the device again. The default value for this statement is two, with a range of one through three.
- **lockout-period** — Sets the amount of time in minutes before the user can attempt to log in to the device after being locked out due to the number of failed login attempts specified in the **tries-before-disconnect** statement. When a user fails to correctly login after the number of allowed attempts specified by the **tries-before-disconnect** statement, the user must wait the configured amount of minutes before attempting to log in to the device again. The lockout-period must be greater than zero. The range at which you can configure the lockout-period is one through 43,200 minutes.
- **tries-before-disconnect** — Sets the maximum number of times the user is allowed to enter a password to attempt to log in to the device through SSH or Telnet. When the user reaches the maximum number of failed login attempts, the user is locked out of the device. The user must wait the configured amount of minutes in the **lockout-period** statement before attempting to log back in to the device. The **tries-before-disconnect** statement must be set when the **lockout-period** statement is set; otherwise, the **lockout-period** statement is meaningless. The default number of attempts is ten, with a range of one through ten attempts.

Once a user is locked out of the device, if you are the security administrator, you can manually remove the user from this state using the `clear system login lockout <username>` command. You can also use the `show system login lockout` command to view which users are currently locked out, when the lockout period began for each user, and when the lockout period ends for each user.

If the security administrator is locked out of the device, he can log in to the device from the console port, which ignores any user locks. This provides a way for the administrator to remove the user lock on their own user account.

In this example the user waits for the **backoff-threshold** multiplied by the **backoff-factor** interval, in seconds, to get the login prompt. In this example, the user must wait 5 seconds after the first failed login attempt and 10 seconds after the second failed login attempt to get the login prompt. The user gets disconnected after 15 seconds after the third failed attempt because the **tries-before-disconnect** option is configured as 3.

The user cannot attempt another login until 120 minutes has elapsed, unless a security administrator manually clears the lock sooner.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set system login retry-options backoff-factor 5
set system login retry-options backoff-threshold 1
set system login retry-options lockout-period 120
set system login retry-options tries-before-disconnect 3
```

Step-by-Step Procedure To configure system retry-options:

1. Configure the backoff factor.

```
[edit]
user@host# set system login retry-options backoff-factor 5
```
2. Configure the backoff threshold.

```
[edit]
user@host# set system login retry-options backoff-threshold 1
```
3. Configure the amount of time the device gets locked after failed attempts.

```
[edit]
user@host# set system login retry-options lockout-period 5
```
4. Configure the number of unsuccessful attempts during which, the device can remain unlocked.

```
[edit]
user@host# set system login retry-options tries-before-disconnect 3
```

Results From configuration mode, confirm your configuration by entering the **show system login retry-options** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show system login retry-options
backoff-factor 5;
backoff-threshold 1;
lockout-period 5;
tries-before-disconnect 3;
```

Confirm that the configuration is working properly.

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Displaying the Locked User Logins

Purpose Verify that the login lockout configuration is enabled.

Action Attempt three unsuccessful logins for a particular username. The device will be locked for that username; then log in to the device with a different username. From operational mode, enter the **show system login lockout** command.

Meaning When you perform three unsuccessful login attempts with a particular username, the device is locked for that user for five minutes, as configured in the example. You can verify that the device is locked for that user by logging in to the device with a different username and entering the **show system login lockout** command.

Related Documentation

- [Handling Authorization Failure on page 59](#)

CHAPTER 4

Configuring User Access Privileges

- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies on page 99](#)

Example: Configuring User Permissions with Access Privilege Levels

This example shows how to view permissions for a user account and configure the user permissions with access privileges for a login class. This enables users to execute only those commands and configure and view only those statements for which they have access privileges. This prevents unauthorized users from executing or configuring sensitive commands and statements that could potentially cause damage to the network.

- [Requirements on page 65](#)
- [Overview on page 66](#)
- [Configuration on page 67](#)
- [Verification on page 68](#)

Requirements

This example uses the following hardware and software components:

- One Juniper Networks device
- One TACACS+ (or RADIUS) server
- Junos OS build running on the Juniper Networks device

Before you begin:

- Establish connection between the device and the TACACS+ server.

For information on configuring a TACACS+ server, see [“Configuring TACACS+ Authentication” on page 373](#).

- Configure at least one user assigned to a login class on the Juniper Networks device. There can be more than one login class, each with varying permission configurations, and more than one user on the device.

Overview

Each top-level command-line interface (CLI) command and each configuration statement in Junos OS has an access privilege level associated with it. For each login class, you can explicitly deny or allow the use of operational and configuration mode commands that would otherwise be permitted or not allowed by a privilege level. Users can execute only those commands and configure and view only those statements for which they have access privileges. To configure access privilege levels, include the **permissions** statement at the **[edit system login class *class-name*]** hierarchy level.

The access privileges for each login class are defined by one or more permission flags specified in the **permissions** statement. Permission flags are used to grant a user access to operational mode commands, statements, and configuration hierarchies. Permission flags are not cumulative, so for each login class you must list all the permission flags needed, including **view** to display information and **configure** to enter configuration mode. By specifying a specific permission flag on the user's login class, you grant the user access to the corresponding commands, statements, and configuration hierarchies. To grant access to all commands and configuration statements, use the **all** permissions flag. The permission flags provide read-only (“plain” form) and read and write (form that ends in -control) capability for a permission type.



NOTE: The all login class permission bits take precedence over extended regular expressions when a user issues a rollback command with the rollback permission flag enabled.

To configure user access privilege levels:

1. View permissions for a user account.

You can view the permissions for a user account before configuring the access privileges for those permissions.

To view the user permissions, enter **?** at the **[edit]** hierarchy level:

```
[edit]
?
```

2. Configure user permissions with access privileges.

All users who can log in to a device must be in a login class. For each login class, you can configure the access privileges that the associated users can have when they are logged in to the device.

To configure access privilege levels for user permissions, include the **permissions** statement at the **[edit system login class *class-name*]** hierarchy level, followed by the user permission, the **permissions** option, and the required permission flags.

```
[edit system login]
user@host# set class class-name permissions user-permission permissions [permission flags];
```

Configuration

Configuring User Permissions with Access Privilege Levels

Step-by-Step Procedure

To configure access privileges:

1. From the device, view the list of permissions available for the user account. In this example, the username of the user account is host.

```
[edit]
user@host> ?
Possible completions:
  clear          Clear information in the system
  configure      Manipulate software configuration information
  file           Perform file operations
  help           Provide help information
  load           Load information from file
  monitor        Show real-time debugging information
  mtrace         Trace multicast path from source to receiver
  op             Invoke an operation script
  ping           Ping remote target
  quit           Exit the management session
  request        Make system-level requests
  restart        Restart software process
  save           Save information to file
  set            Set CLI properties, date/time, craft interface
message
  show           Show system information
  ssh            Start secure shell on another host
  start          Start shell
  telnet         Telnet to another host
  test           Perform diagnostic debugging
  traceroute     Trace route to remote host
```

The output lists the permissions for the user host. Customized login classes can be created by configuring different access privileges on these user permissions.

2. Configure an access privilege class to enable user host to configure and view SNMP parameters only. In this example, this login class is called network-management. To customize the network-management login class, include the SNMP permission flags to the **configure** user permission.

```
[edit system login class network-management]
user@host# set permissions configure permissions snmp
user@host# set permissions configure permissions snmp-control
```

Here, the configured permission flags provide both read (snmp) and read-and-write (snmp-control) capability for SNMP, and this is the only allowed access privilege for the network-management login class. In other words, all other access privileges other than configuring and viewing SNMP parameters are denied.

Results

From configuration mode, confirm your configuration by entering the **show system login** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show system login
class network-management {
  permissions [ configure snmp snmp-control ];
}
```

Verification

Log in as the username assigned with the new login class, and confirm that the configuration is working properly.

- [Verifying SNMP Configuration on page 68](#)
- [Verifying non-SNMP Configuration on page 68](#)

Verifying SNMP Configuration

Purpose	Verify that SNMP configuration can be executed.
Action	<p>From configuration mode, execute basic SNMP commands at the [edit snmp] hierarchy level.</p> <pre>[edit snmp] user@host# set name <i>device1</i> user@host# set description <i>switch1</i> user@host# set location <i>Lab1</i> user@host# set contact <i>example.com</i> user@host# commit</pre>
Meaning	The user host assigned to the network-management login class is able to configure SNMP parameters, as the permission flags specified for this class include both snmp (read capabilities) and snmp-control (read and write capabilities) permission bits.

Verifying non-SNMP Configuration

Purpose	Verify that non-SNMP configuration is denied for the network-management login class.
Action	<p>From the configuration mode, execute any non-SNMP configuration, for example, interfaces configuration.</p> <pre>[edit] user@host# edit interfaces Syntax error, expecting <statement> or <identifier>.</pre>
Related Documentation	<ul style="list-style-type: none">• Understanding Junos OS Access Privilege Levels on page 26• Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69

Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies

This topic contains the following sections:

- [Understanding Regular Expressions on page 69](#)
- [Specifying Regular Expressions on page 70](#)
- [Regular Expressions Operators on page 72](#)
- [Regular Expression Examples on page 75](#)

Understanding Regular Expressions

You can use extended regular expressions to specify which operational mode commands, configuration statements, and hierarchies are denied or allowed. You specify these regular expressions locally in the **allow/deny-commands**, **allow/deny-configuration-regexps**, and **allow/deny-configuration** statements at the **[edit system login class *class-name*]** hierarchy level, or remotely by specifying Juniper Networks vendor-specific TACACS+ or RADIUS attributes in your authentication server's configuration.

The difference between a local and remote authentication configuration is the pattern in which the regular expressions statements are executed. While it is possible to specify multiple regular expressions using strings in the local authentication configuration, in a remote configuration, the regular expressions statements need to be split and specified in individual strings. When the authentication parameters are configured both remotely and locally, the regular expressions received during TACACS+ or RADIUS authentication get merged with any regular expressions available on the local device.

[Table 6 on page 70](#) differentiates the local and remote authentication configuration using regular expressions.

Table 6: Sample Local and Remote Authentication Configuration Using Regular Expressions

Local Configuration	Remote Configuration
<pre>login { class local { permissions configure; allow-commands "(ping.*)(traceroute .*)(show.*)(configure .*)(edit)(exit)(commit)(rollback.*)"; deny-commands .*; allow-configuration "(interfaces.* unit 0 family ethernet-switching vlan mem.* .*)(interfaces.* native.*.*)(interfaces .* unit 0 family ethernet-switching interface-mo.*.*)(interfaces.* unit .*)(interfaces.* disable)(interfaces.* description.)(vlangs.* vlan-.*.*)" deny-configuration .*; } }</pre>	<pre>user = remote { login = username service = junos-exec { allow-commands1 = "ping ." allow-commands2 = "traceroute ." allow-commands3 = "show ." allow-commands4 = "configure" allow-commands5 = "edit" allow-commands6 = "exit" allow-commands7 = "commit" allow-commands8 = ".*xml-mode" <<<<< allow-commands9 = ".*netconf" <<<<< allow-commands10 = ".*need-trailer" <<<<< allow-commands11 = "rollback.%" deny-commands1 = ".*" allow-configuration1 = "interfaces.* unit 0 family ethernet-switching vlan mem.*.%" allow-configuration2 = "interfaces.* native.*.%" allow-configuration3 = "interfaces.* unit 0 family ethernet-switching interface-mo.*.%" allow-configuration4 = "interfaces.* unit.%" allow-configuration5 = "interfaces.* disable" allow-configuration6 = "interfaces.* description.%" allow-configuration7 = "interfaces.%" allow-configuration8 = "vlangs.* vlan-.*.%" deny-configuration1 = ".*" local-user-name = local-username user-permissions = "configure" } }</pre>

**NOTE:**

- You need to explicitly allow access to the NETCONF mode, either locally or remotely, by issuing the following three commands: `xml-mode`, `netconf`, and `need-trailer`.
- When the `deny-configuration = ".*"` statement is used, all the other desired configurations should be allowed using the `allow-configuration` statement. This can affect the allowed regular expressions buffer limit for the `allow-configuration` statement. When this limit exceeds, the allowed configuration might not work. This regular expression buffer size limit has been increased in Junos OS Release 14.1x53-D40, 15.1, and 16.1.

Specifying Regular Expressions



WARNING: When you specify regular expression for commands and configuration statements, pay close attention to the following examples, as

regular expression with invalid syntax might not produce the desired results, even if the configuration is committed without any error.

Regular expressions for commands and configuration statements should be specified in the same manner as executing the complete command or statement.

Table 7 on page 71 lists the regular expressions for configuring access privileges for the **[edit interfaces]** and **[edit vlans]** statement hierarchies, and for the **delete interfaces** command.

Table 7: Specifying Regular Expressions

Statement	Regular Expression	Configuration Notes
<p>[edit interfaces]</p> <p>The set command for interfaces is executed as follows:</p> <pre>[edit] user@host# set interfaces interface-name unit interface-unit-number</pre>	<p>The set interfaces statement is incomplete by itself, and requires the unit option to execute the statement.</p> <p>As a result, the regular expression required for denying the set interfaces configuration must specify the entire executable string with the .* operator in place of statement variables:</p> <pre>[edit system login class class-name] user@host# set permissions configure user@host# set deny-configuration "interfaces.* unit.*"</pre>	<ul style="list-style-type: none"> The .* operator denotes everything from the specified point onward for that particular command or statement. In this example, it denotes any interface name with any unit value. Specifying only the deny-configuration "interfaces.*" statement is incorrect and does not deny access to the interfaces configuration for the specified login class. Other valid options can be included in the regular expression, for example: <pre>[edit system login class class-name] user@host# set permissions configure user@host# set deny-configuration "interfaces.* description.*" [edit system login class class-name] user@host# set permissions configure user@host# set allow-configuration-regexps ["interfaces.* description.*" "interfaces .* unit.* description.*" "interfaces.* unit.* family inet address.*" "interfaces.* disable"] [edit system login class class-name] user@host# set permissions configure user@host# set allow-configuration "interfaces.* unit 0 family ethernet-switching vlan mem.*.*"</pre> <p>Note: The mem.* regular expression in this example is used when multiple strings starting with the mem keyword are expected to be included in the specified regular expression. When only one member string is expected to be included, the member.* regular expression is used.</p>

Table 7: Specifying Regular Expressions (*continued*)

Statement	Regular Expression	Configuration Notes
delete interfaces The delete command for interfaces is executed as follows: <pre>[edit] user@host# delete interfaces interface-name</pre>	<p>The delete interfaces statement can be executed by itself and does not require additional statements to be complete.</p> <p>As a result, the regular expression required for denying the delete interfaces statement should specify the following:</p> <pre>[edit system login class class-name] user@host# set permissions configure user@host# set allow-configuration "interfaces.*" user@host# set deny-configuration "interfaces.*"</pre>	<ul style="list-style-type: none"> The .* operator denotes everything from the specified point onward for that particular command or statement. In this example, it denotes any interface name. For the deny-configuration "interfaces.*" regular expression to take effect, the specified login class should allow configuration permissions for the interfaces hierarchy using the allow-configuration "interfaces.*" regular expression.
[edit vlans] The set command for VLANs is executed as follows: <pre>[edit] user@host# set vlans vlan-name vlan-id vlan-id</pre>	<p>Here, the set vlans statement is incomplete by itself, and requires the vlan-id option to execute the statement.</p> <p>As a result, the regular expression required for allowing the set vlans configuration must specify the entire executable string with the .* operator in place of statement variables:</p> <pre>[edit system login class class-name] user@host# set permissions configure user@host# set allow-configuration "vlans.* vlan-id.*"</pre>	<ul style="list-style-type: none"> The .* operator denotes everything from the specified point onward for that particular command or statement. In this example, it denotes any VLAN name with any VLAN ID. Other valid options under the [edit vlans] statement hierarchy can be included in the regular expression, for example: <pre>[edit system login class class-name] user@host# set permissions configure user@host# set allow-configuration-regexps ["vlans .* vlan-id.*" "vlans.* vlan-id.* description.*" "vlans.* vlan-id.* filter .*"]</pre>

Regular Expressions Operators

Table 8 on page 73 lists common regular expression operators that you can use for allowing or denying operational and configuration modes.

Command regular expressions implement the extended (modern) regular expressions, as defined in POSIX 1003.2.

Table 8: Common Regular Expression Operators

Operator	Match	Example
	One of two or more terms separated by the pipe. Each term must be a complete standalone expression enclosed in parentheses (), with no spaces between the pipe and the adjacent parentheses.	<pre>[edit system login class test] user@host# set permissions configure user@host# set allow-commands "(ping) (traceroute) (show system alarms) (show system software)" user@host# set deny-configuration "(access) (access-profile) (accounting-options) (applications) (apply-groups) (bridge-domains) (chassis) (class-of-service)"</pre> <p>With the above configuration, the users assigned to the test login class have operational mode access restricted to only the commands specified in the allow-commands statement, and access to the configuration mode, excluding the hierarchy levels specified in the deny-configuration statement.</p>
^	At the beginning of an expression, used to denote where the command begins, where there might be some ambiguity.	<pre>[edit system login class test] user@host# set permissions interface user@host# set permissions interface-control user@host# set allow-commands "(^show) (log interfaces policer)))(^monitor)"</pre> <p>With the above configuration, the users assigned to the test login class have access to configuring and viewing interface configuration from the operational and configuration mode. The allow-commands statement specifies access to commands that begin with show and monitor keywords.</p> <p>For the first filter, the commands specified include the show log, show interfaces, and show policer commands. The second filter specifies all commands starting with the monitor keyword, such as monitor interfaces or monitor traffic commands.</p>
\$	Character at the end of a command. Used to denote a command that must be matched exactly up to that point.	<pre>[edit system login class test] user@host# set permissions interface user@host# set allow-commands "(show interfaces\$)"</pre> <p>With the above configuration, the users assigned to the test login class can view the interface configuration in the configuration mode and with the show configuration operational mode command with the interface user permission. However, the regular expression specified in the allow-commands statement restricts the users to execute only the show interfaces command and denies access to the command extensions, such as show interfaces detail or show interfaces extensive.</p>
[]	Range of letters or digits. To separate the start and end of a range, use a hyphen (-).	<pre>[edit system login class test] user@host# set permissions clear user@host# set permissions configure user@host# set permissions network user@host# set permissions trace user@host# set permissions view user@host# set allow-configuration-regexps ["interfaces [gx]e-.* unit [0-9]* description .*"]</pre> <p>With the above configuration, the users assigned to the test login class have operator-level user permissions, and have access to configure interfaces within the specified range of interface name and unit number (0 through 9).</p>

Table 8: Common Regular Expression Operators (*continued*)

Operator	Match	Example
()	A group of commands, indicating a complete, standalone expression to be evaluated. The result is then evaluated as part of the overall expression. Parentheses must be used in conjunction with pipe operators, as explained.	<pre>[edit system login class test] user@host# set permissions all user@host# set allow-commands "(clear) (configure)" user@host# deny-commands "(mtrace) (start) (delete)"</pre> <p>With the above configuration, users assigned to the test login class have superuser-level permissions, and have access to the commands specified in the allow-commands statement.</p>
*	Zero or more terms.	<pre>[edit system login class test] user@host# set permissions configure user@host# set deny-configuration "(system login class m*)"</pre> <p>With the above configuration, users assigned to the test login class whose login username begins with m are denied configuration access.</p>
+	One or more terms.	<pre>[edit system login class test] user@host# set permissions configure user@host# set deny-configuration "(system login class m+)"</pre> <p>With the above configuration, users assigned to the test login class whose login username begins with m are denied configuration access.</p>
.	Any character except for a space " ".	<pre>[edit system login class test] user@host# set permissions configure user@host# set deny-configuration "(system login class m.)"</pre> <p>With the above configuration, users assigned to the test login class whose login username begins with m are denied configuration access.</p>
.*	Everything from the specified point onward.	<pre>[edit system login class test] user@host# set permissions configure user@host# set deny-configuration "(system login class m.*)"</pre> <p>With the above configuration, users assigned to the test login class whose login username begins with m are denied configuration access.</p> <p>Similarly, the deny-configuration "protocols.*" statement denies all configuration access under the [edit protocols] hierarchy level.</p> <p>NOTE:</p> <ul style="list-style-type: none"> The *, +, and . operations can be achieved by using .*. The deny-commands.* and deny-configuration.* statements deny access to all operational mode commands and configuration hierarchies, respectively.



NOTE: Junos OS does not support the ! regular expression operator.

Regular Expression Examples

Table 9 on page 75 lists the regular expressions used to allow configuration options under two configuration hierarchies—[edit system ntp server] and [edit protocols rip]—as an example for specifying regular expressions.



NOTE: Table 9 on page 75 does not provide a comprehensive list of all regular expressions and keywords for all configuration statements and hierarchies. The regular expressions listed in the table are supported in Junos OS Release 16.1, and are validated only for the [edit system ntp server] and [edit protocols rip] statement hierarchies.

Table 9: Regular Expressions Examples

Statement Hierarchy	Regular Expressions	Allowed Configuration	Denied Configuration
[edit system ntp server]			
key <i>key-number</i>	[edit system login class test] set permissions configure set allow-configuration-regexps ["system ntp server .*" "system ntp server .* key .*"] set deny-configuration-regexps ["system ntp server .* version .*" "system ntp server .* prefer"]	<ul style="list-style-type: none"> server IP server IP and key 	<ul style="list-style-type: none"> version prefer
version <i>version-number</i>	[edit system login class test] set permissions configure set allow-configuration-regexps ["system ntp server .*" "system ntp server .* version .*"] set deny-configuration-regexps ["system ntp server .* key .*" "system ntp server .* prefer"]	<ul style="list-style-type: none"> server IP server IP and version 	<ul style="list-style-type: none"> key prefer
prefer	[edit system login class test] set permissions configure set allow-configuration-regexps ["system ntp server .*" "system ntp server .* prefer"]; set deny-configuration-regexps ["system ntp server .* key .*" "system ntp server .* version .*"]	<ul style="list-style-type: none"> server IP server IP and prefer 	<ul style="list-style-type: none"> key version
[edit protocols rip]			

Table 9: Regular Expressions Examples (*continued*)

Statement Hierarchy	Regular Expressions	Allowed Configuration	Denied Configuration
message-size <i>message-size</i>	[edit system login class test] set permissions configure set allow-configuration-regexps "protocols rip message-size .*" set deny-configuration-regexps ["protocols rip metric-in .*" "protocols rip route-timeout .*" "protocols rip update-interval .*"]	<ul style="list-style-type: none"> message-size 	<ul style="list-style-type: none"> metric-in route-timeout update-interval
metric-in <i>metric-in</i>	[edit system login class test] set permissions configure set allow-configuration-regexps "protocols rip metric-in .*" set deny-configuration-regexps ["protocols rip message-size .*" "protocols rip route-timeout .*" "protocols rip update-interval .*"]	<ul style="list-style-type: none"> metric-in 	<ul style="list-style-type: none"> message-size route-timeout update-interval
route-timeout <i>route-timeout</i>	[edit system login class test] set permissions configure set allow-configuration-regexps "protocols rip route-timeout .*" set deny-configuration-regexps ["protocols rip metric-in .*" "protocols rip message-size .*" "protocols rip update-interval .*"]	<ul style="list-style-type: none"> route-timeout 	<ul style="list-style-type: none"> message-size metric-in update-interval
update-interval <i>update-interval</i>	[edit system login class test] set permissions configure set allow-configuration-regexps "protocols rip update-interval .*" set deny-configuration-regexps ["protocols rip metric-in .*" "protocols rip route-timeout .*" "protocols rip message-size .*"]	<ul style="list-style-type: none"> update-interval 	<ul style="list-style-type: none"> message-size metric-in route-timeout

Related Documentation

- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies on page 99](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69](#)

Example: Configuring User Permissions with Access Privileges for Operational Mode Commands

This example shows how to configure custom login classes and assign access privileges for operational mode commands. This enables users of the customized login class to execute only those operational commands for which access privileges have been specified.

This prevents unauthorized users from executing sensitive commands that could potentially cause damage to the network.

- [Requirements on page 77](#)
- [Overview and Topology on page 77](#)
- [Configuration on page 79](#)
- [Verification on page 84](#)

Requirements

This example uses the following hardware and software components:

- One Juniper Networks device
- One TACACS+ (or RADIUS) server
- Junos OS build running on the Juniper Networks device

Before you begin:

- Establish a TCP connection between the device and the TACACS+ server. In the case of the RADIUS server, establish a UDP connection between the device and the RADIUS server.

For information on configuring a TACACS+ server, see [“Configuring TACACS+ Authentication” on page 373](#).

- Configure at least one user assigned to a login class on the Juniper Networks device. There can be more than one login class, each with varying permission configurations, and more than one user on the device.

Overview and Topology

Each top-level command-line interface (CLI) command and each configuration statement in Junos OS has an access privilege level associated with it. For each login class, you can explicitly deny or allow the use of operational and configuration mode commands that would otherwise be permitted or not allowed by a privilege level. Users can execute only those commands and configure and view only those statements for which they have access privileges. To configure access privilege levels, include the **permissions** statement at the **[edit system login class class-name]** hierarchy level.

The access privileges for each login class are defined by one or more permission flags specified in the **permissions** statement. In addition to this, you can specify extended regular expressions with the following statements:

- **allow-commands** and **deny-commands**—Allow or deny access to operational mode commands only.
- **allow-configuration** and **deny-configuration**—Allow or deny access to a particular configuration hierarchy only.
- **allow-configuration-regexps** and **deny-configuration-regexps**—Allow or deny access to a particular configuration hierarchy only using strings of regular expressions.

The above statements define a user's access privileges to individual operational mode commands, configuration statements, and hierarchies. These statements take precedence over a login class permissions bit set for a user.

Configuration Notes

When configuring the **allow-commands** and **deny-commands** statements with access privileges, take the following into consideration:

- You can include one **deny-commands** and one **allow-commands** statement in each login class.
- If the exact same command is configured under both **allow-commands** and **deny-commands** statements, then the allow operation takes precedence over the deny command.

For instance, with the following configuration, a user assigned to login class test is allowed to install software using the **request system software add** command, although the **deny-commands** statement also includes it:

```
[edit system login]
user@host# set class test permissions allow-commands "request system software
add"
user@host# set class test permissions deny-commands "request system software add"
```

- If you specify a regular expression for **allow-commands** and **deny-commands** statements with two different variants of a command, the longest match is always executed.

For instance, for the following configuration, a user assigned to test login class is allowed to execute the **commit synchronize** command and not the **commit** command. This is because **commit-synchronize** is the longest match between **commit** and **commit-synchronize** and it is specified for **allow-commands**.

```
[edit system login class]
user@host# set class test permissions allow-commands "commit-synchronize"
user@host# set class test permissions deny-commands commit
```

- Regular expressions for **allow-commands** and **deny-commands** statements can also include the **commit**, **load**, **rollback**, **save**, **status**, and **update** commands.
- If the regular expression contains any spaces, operators, or wildcard characters, enclose the expression in quotation marks. Regular expressions are not case-sensitive, for example, **allow-commands "show interfaces"**;
- Modifiers, such as *set*, *log*, and *count*, are not supported within the regular expression string to be matched. If a modifier is used, then nothing is matched.

Incorrect configuration:

```
[edit system login]
user@host# set class test permission deny-commands "set protocols"
```

Correct configuration:

```
[edit system login]
user@host# set class test permission deny-commands protocols
```

- Anchors are required when specifying complex regular expressions with the **allow-commands** statement.

For example:

```
[edit system login]
user@host# set class test permissions allow-commands "( ^monitor) | ( ^ping) | ( ^show)
| ( ^exit)"
```

OR

```
set class test permissions allow-commands "allow-commands = "(monitor | ping |
show | exit)"
```

Topology

Figure 1: Configuring TACACS+ Server Authentication



Figure 1 on page 79 illustrates a simple topology, where Router R1 is a Juniper Networks device and has a TCP connection established with a TACACS+ server.

In this example, R1 is configured with three customized login classes—Class1, Class2, and Class3—for specifying access privileges with extended regular expressions using the **allow-commands** and **deny-commands** statements differently.

The purpose of each login class is as follows:

- **Class1**—Defines access privileges for the user with the **allow-commands** statement only. This login class provides operator-level user permissions, and should provide authorization for only rebooting the device.
- **Class2**—Defines access privileges for the user with the **deny-commands** statement only. This login class provides operator-level user permissions, and should deny access to **set** commands.
- **Class3**—Defines access privileges for the user with both the **allow-commands** and **deny-commands** statements. This login class provides superuser-level user permissions, and should provide authorization for accessing interfaces and viewing device information. It should also deny access to **edit** and **configure** commands.

Router R1 has three different users, User1, User2, and User3, assigned to Class1, Class2, and Class3 login classes, respectively.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
R1  set system authentication-order tacplus
    set system authentication-order radius
    set system authentication-order password
    set system radius-server 10.209.1.66 secret "$ABC123"
    set system tacplus-server 10.209.1.66
    set system radius-options enhanced-accounting
    set system tacplus-options enhanced-accounting
    set system accounting events login
    set system accounting events change-log
    set system accounting events interactive-commands
    set system accounting traceoptions file auditlog
    set system accounting traceoptions flag all
    set system accounting destination tacplus server 10.209.1.66
    set system login class Class1 permissions clear
    set system login class Class1 permissions network
    set system login class Class1 permissions reset
    set system login class Class1 permissions trace
    set system login class Class1 permissions view
    set system login class Class1 allow-commands "request system reboot"
    set system login class Class2 permissions clear
    set system login class Class2 permissions network
    set system login class Class2 permissions reset
    set system login class Class2 permissions trace
    set system login class Class2 permissions view
    set system login class Class2 deny-commands set
    set system login class Class3 permissions all
    set system login class Class3 allow-commands configure
    set system login class Class3 deny-commands .*
    set system login user User1 uid 2001
    set system login user User1 class Class1
    set system login user User1 authentication encrypted-password "$ABC123"
    set system login user User2 uid 2002
    set system login user User2 class Class2
    set system login user User2 authentication encrypted-password "$ABC123"
    set system login user User3 uid 2003
    set system login user User3 class Class3
    set system login user User3 authentication encrypted-password "$ABC123"
    set system syslog file messages any any
```

Configuring Authentication Parameters for Router R1

Step-by-Step Procedure The following example requires that you navigate various levels in the configuration hierarchy. For information about navigating the CLI, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure Router R1 authentication:

1. Configure the order in which authentication should take place for R1. In this example, TACACS+ server authentication is first, followed by RADIUS server authentication, and then the local password.

```
[edit system]
user@R1# set authentication-order tacplus
user@R1# set authentication-order radius
user@R1# set authentication-order password
```

2. Establish R1 connection with the TACACS+ server.


```
[edit system]
user@R1# set tacplus-server 10.209.1.66
user@R1# set tacplus-options enhanced-accounting
user@R1# set accounting destination tacplus server 10.209.1.66
```
3. Configure RADIUS server authentication parameters.


```
[edit system]
user@R1# set radius-server 10.209.1.66 secret "$ABC123"
user@R1# set radius-options enhanced-accounting
```
4. Configure R1 accounting configuration parameters.


```
[edit system]
user@R1# set accounting events login
user@R1# set accounting events change-log
user@R1# set accounting events interactive-commands
user@R1# set accounting traceoptions file auditlog
user@R1# set accounting traceoptions flag all
```

Configuring Access Privileges with `allow-commands` Statement Only (Class1)

Step-by-Step Procedure

To specify regular expressions using the `allow-commands` statement only:

1. Configure Class1 custom login class and assign operator-level user permissions. For information on the predefined system login classes, see the [“Junos OS Login Classes Overview” on page 23](#).


```
[edit system login]
user@R1# set class Class1 permissions clear
user@R1# set class Class1 permissions network
user@R1# set class Class1 permissions reset
user@R1# set class Class1 permissions trace
user@R1# set class Class1 permissions view
```
2. Specify the command to enable rebooting of R1 in the `allow-commands` statement.


```
[edit system login]
user@R1# set class Class1 allow-commands "request system reboot"
```
3. Configure the user account for the Class1 login class.


```
[edit system login]
user@R1# set user User1 uid 2001
user@R1# set user User1 class Class1
user@R1# set user User1 authentication encrypted-password "$ABC123"
```

Configuring Access Privileges with `deny-commands` Statement Only (Class2)

Step-by-Step Procedure

To specify regular expressions using the `deny-commands` statement only:

1. Configure the Class2 custom login class and assign operator-level user permissions. For information on the predefined system login classes, see the [“Junos OS Login Classes Overview” on page 23](#).


```
[edit system login]
```

```
user@R1# set class Class1 permissions clear
user@R1# set class Class1 permissions network
user@R1# set class Class1 permissions reset
user@R1# set class Class1 permissions trace
user@R1# set class Class1 permissions view
```

2. Disable execution of any set commands in the **deny-commands** statement.

```
[edit system login]
user@R1# set class Class1 deny-commands "set"
```

3. Configure the user account for the Class2 login class.

```
user@R1# set login user User2 uid 2002
user@R1# set login user User2 class Class2
user@R1# set login user User2 authentication encrypted-password "$ABC123"
```

Configuring Access Privileges with Both **allow-commands** and **deny-commands** Statements (Class3)

Step-by-Step Procedure

To specify regular expressions using both the **allow-commands** and **deny-commands** statements:

1. Configure the Class3 custom login class and assign superuser-level user permissions. For information on the predefined system login classes, see the ["Junos OS Login Classes Overview" on page 23](#).

```
[edit system login]
user@R1# set class Class3 permissions all
```

2. Specify the commands to enable only configure commands in the **allow-commands** statement.

```
[edit system login]
user@R1# set class Class3 allow-commands configure
```

3. Disable execution of all commands in the **deny-commands** statement.

```
[edit system login]
user@R1# set class Class3 deny-commands .*
```

4. Configure the user account for the Class1 login class.

```
[edit system login]
user@R1# set login user User3 uid 2003
user@R1# set login user User3 class Class3
user@R1# set login user User3 authentication encrypted-password "$ABC123"
```

Results

From configuration mode, confirm your configuration by entering the **show system** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@R1# show system
authentication-order [ tacplus radius password ];
radius-server {
    10.209.1.66 secret "$ABC123";
```

```
}
tacplus-server {
  10.209.1.66;
}
radius-options {
  enhanced-accounting;
}
tacplus-options {
  enhanced-accounting;
}
accounting {
  events [ login change-log interactive-commands ];
  traceoptions {
    file auditlog;
    flag all;
  }
  destination {
    tacplus {
      server {
        10.209.1.66;
      }
    }
  }
}
login {
  class Class1 {
    permissions [ clear network reset trace view ];
    allow-commands "request system reboot";
  }
  class Class2 {
    permissions [ clear network reset trace view ];
    deny-commands set;
  }
  class Class3 {
    permissions all;
    allow-commands configure;
    deny-commands .*;
  }
  user User1 {
    uid 2001;
    class Class1;
    authentication {
      encrypted-password "$ABC123";
    }
  }
  user User2 {
    uid 2002;
    class Class2;
    authentication {
      encrypted-password "$ABC123";
    }
  }
  user User3 {
    uid 2003;
    class Class3;
    authentication {
```

```
        encrypted-password "$ABC123";
    }
}
syslog {
    file messages {
        any any;
    }
}
```

Verification

Log in as the username assigned with the new login class, and confirm that the configuration is working properly.

- [Verifying Class1 Configuration on page 84](#)
- [Verifying Class2 Configuration on page 85](#)
- [Verifying Class3 Configuration on page 86](#)

Verifying Class1 Configuration

Purpose Verify that the permissions and commands allowed in the Class1 login class are working.

Action From operational mode, run the **show system users** command.

```
User1@R1> show system users
12:39PM up 6 days, 23 mins, 6 users, load averages: 0.00, 0.01, 0.00
USER   TTY   FROM                               LOGIN@  IDLE WHAT
User1  p0    abc.example.net 12:34AM 12:04 cli
User2  p1    abc.example.net 12:36AM 12:02 -cli (cli)
User3  p2    abc.example.net 10:41AM 11 -cli (cli)
```

From operational mode, run the **request system reboot** command.

```
User1@R1> request system ?
Possible completions:
  reboot                Reboot the system
```

Meaning The Class1 login class to which User1 is assigned has the operator-level user permissions, and is allowed to execute the **request system reboot** command.

The predefined operator login class has the following permission flags specified:

- **clear**—Can clear (delete) information learned from the network that is stored in various network databases by using the **clear** commands.
- **network**—Can access the network by using the **ping**, **ssh**, **telnet**, and **traceroute** commands.
- **reset**—Can restart software processes by using the **restart** command and can configure whether software processes are enabled or disabled at the **[edit system processes]** hierarchy level.

- **trace**—Can view trace file settings and configure trace file properties.
- **view**—Can use various commands to display current system-wide, routing table, and protocol-specific values and statistics. Cannot view the secret configuration.

For the Class1 login class, in addition to the above-mentioned user permissions, User1 can execute the **request system reboot** command. The first output displays the view permissions as an operator, and the second output shows that the only **request** command that User1 can execute as an operator is the **request system reboot** command.

Verifying Class2 Configuration

Purpose Verify that the permissions and commands allowed for the Class2 login class are working.

Action From the operational mode, run the **ping** command.

```
User2@R1> ping 10.209.1.66
ping 10.209.1.66
PING 10.209.1.66 (10.209.1.66): 56 data bytes
64 bytes from 10.209.1.66: icmp_seq=0 ttl=52 time=212.521 ms
64 bytes from 10.209.1.66: icmp_seq=1 ttl=52 time=212.844 ms
64 bytes from 10.209.1.66: icmp_seq=2 ttl=52 time=211.304 ms
64 bytes from 10.209.1.66: icmp_seq=3 ttl=52 time=210.963 ms
^C
--- 10.209.1.66 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max/stddev = 210.963/211.908/212.844/0.792 ms
```

From the CLI prompt, check the available permissions.

```
User2@R1> ?
Possible completions:
clear          Clear information in the system
file           Perform file operations
help           Provide help information
load           Load information from file
monitor        Show real-time debugging information
mtrace         Trace multicast path from source to receiver
op             Invoke an operation script
ping           Ping remote target
quit           Exit the management session
request        Make system-level requests
restart        Restart software process
save           Save information to file
show           Show system information
ssh            Start secure shell on another host
start          Start shell
telnet         Telnet to another host
test           Perform diagnostic debugging
traceroute     Trace route to remote host
```

From the CLI prompt, execute any set command.

```
User2@R1> set
      ^
unknown command.
```

Meaning The Class2 login class to which User2 is assigned has the operator-level user permissions, and is denied access to all **set** commands. This is displayed in the command outputs.

The permission flags specified for the predefined operator login class are the same as that of Class1.

Verifying Class3 Configuration

Purpose Verify that the permissions and commands allowed for the Class3 login class are working.

Action From the CLI prompt, check the available permissions.

```
User3@R1> ?
Possible completions:
  configure          Manipulate software configuration information
```

From the operational mode, enter configuration mode.

```
User3@R1> configure
Entering configuration mode
```

```
[edit]
User3@R1#
```

Meaning The Class3 login class to which User3 is assigned has the superuser (all) user permissions, but is allowed to execute the **configure** command only, and is denied access to all other operational mode commands. Because the regular expressions specified in the **allow/deny-commands** statements take precedence over the user permissions, User3 on R1 has access only to configuration mode, and is denied access to all other operational mode commands.

Related Documentation

- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies on page 99](#)

Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies

This example shows how to configure custom login classes and assign access privileges to portions of the configuration hierarchy. This enables users of the customized login class to execute only those configuration statements and hierarchies for which access privileges have been specified. This prevents unauthorized users from accessing device configurations that could potentially cause damage to the network.

- [Requirements on page 87](#)
- [Overview and Topology on page 88](#)
- [Configuration on page 94](#)
- [Verification on page 97](#)

Requirements

This example uses the following hardware and software components:

- One Juniper Networks device

- One TACACS+ (or RADIUS) server
- Junos OS build running on the Juniper Networks device

Before you begin:

- Establish a TCP connection between the device and the TACACS+ server. In the case of the RADIUS server, establish a UDP connection between the device and the RADIUS server.

For information on configuring a TACACS+ server, see [“Configuring TACACS+ Authentication” on page 373](#).

- Configure at least one user assigned to a login class on the Juniper Networks device. There can be more than one login class, each with varying permission configurations, and more than one user on the device.

Overview and Topology

Each top-level command-line interface (CLI) command and each configuration statement in Junos OS has an access privilege level associated with it. For each login class, you can explicitly deny or allow the use of operational and configuration mode commands that would otherwise be permitted or not allowed by a privilege level. Users can execute only those commands and configure and view only those statements for which they have access privileges. To configure access privilege levels, include the **permissions** statement at the **[edit system login class *class-name*]** hierarchy level.

The access privileges for each login class are defined by one or more permission flags specified in the **permissions** statement. In addition to this, you can specify extended regular expressions with the following statements:

- **allow-commands** and **deny-commands**—Allow or deny access to operational mode commands.
- **allow-configuration** and **deny-configuration**—Allow or deny access to parts of the configuration hierarchy.

These statements perform slower matching, with more flexibility, especially in wildcard matching. However, it can take a very long time to evaluate all of the possible statements if a great number of full-path regular expressions or wildcard expressions are configured, possibly impacting performance.

- **allow-configuration-regexps** and **deny-configuration-regexps**—Allow or deny access to a particular configuration hierarchy using strings of regular expressions. These statements are similar to **allow-configuration** and **deny-configuration** statements, except that in the **allow/deny-configuration-regexps** statements you can configure sets of strings in which the strings include spaces when using the first set of statements.

The above statements define a user’s access privileges to individual operational mode commands, configuration statements, and hierarchies. These statements take precedence over a login class permissions bit set for a user.

Difference between allow/deny-configuration and allow/deny-configuration-regexps statements

The **allow-configuration** and **deny-configuration** statements were introduced before Junos OS Release 7.4. The **allow-configuration-regexps** and **deny-configuration-regexps** statements were introduced in Junos OS Release 11.2. In Junos OS Release 11.4, the **allow-configuration** and **deny-configuration** statements were deprecated, but because these statements were useful in executing simple configurations, these statements were undeprecated in Junos OS Release 11.4R6, and starting with the 11.4R6 release, both the **allow/deny-configuration** and the **allow/deny-configuration-regexps** statements are supported.

The **allow/deny-configuration-regexps** statements split up the regular expression into tokens and match each piece against each part of the specified configuration's full path, whereas the **allow/deny-configuration** statements match against the full string. For **allow/deny-configuration-regexps** statements, you configure a set of strings in which each string is a regular expression, with spaces between the terms of the string. This provides very fast matching, but with less flexibility. For specifying wildcard expressions you must set up wildcards for each token of the space-delimited string you want to match, and this makes it more tedious to use wildcard expressions for these statements.

For example:

- **Regular expression matching one token using allow-configuration-regexps**

This example shows that **options** is the only matched expression against the first token of the statement.

```
[edit system]
login {
  class test {
    permissions configure;
    allow-configuration-regexps .*options;
  }
}
```

The above configuration matches the following statements:

- set policy-**options** condition *condition* dynamic-db
- set routing-**options** static route *static-route* next-hop *next-hop*
- set event-**options** generate-event *event* time-interval *seconds*

The above configuration does not match the following statements:

- system host-name host-**options**
- interfaces *interface-name* description **options**

- **Regular expression matching three tokens using allow-configuration-regexps**

This example shows that **ssh** is the only matched expression against the third token of the statement.

```
[edit system]
login {
  class test {
    permissions configure;
    allow-configuration-regexps ".*.*ssh";
```

```

    }
}

```

In the above example, the three tokens include `.*`, `.*`, and `.*ssh`, respectively.

The above configuration matches the following statements:

- system host-name hostname-**ssh**
- system services **ssh**
- system services outbound-**ssh**

The above configuration does not match the following statement:

- interfaces *interface-name* description **ssh**

You can restrict configuration access easily using the **deny-configuration** statement as compared to using the **deny-configuration-regexps** statement. [Table 10 on page 90](#) illustrates the use of both the **deny-configuration** and **deny-configuration-regexps** statements in different configurations to achieve the same result of restricting access to a particular configuration.

Table 10: Restricting Configuration Access Using deny-configuration and deny-configuration-regexps Statements

Configuration Denied	Using: deny-configuration	Using: deny-configuration-regexps	Result
xnm-ssl	<pre> [edit system] login { class test { permissions configure; allow-configuration .*; deny-configuration .*xnm-ssl; } } </pre>	<pre> [edit system] login { class test { permissions configure; allow-configuration .*; deny-configuration-regexps ".*.* .*-ssl""; } } </pre>	<p>The following configuration statement is denied:</p> <ul style="list-style-type: none"> • system services xnm-ssl
ssh	<pre> [edit system] login { class test { permissions configure; allow-configuration .*; deny-configuration ".*ssh"; } } </pre>	<pre> [edit system] login { class test { permissions configure; allow-configuration .*; deny-configuration-regexps ".*ssh"; deny-configuration-regexps ".* .*ssh"; deny-configuration-regexps ".*.* .*ssh"; } } </pre>	<p>The following configuration statements are denied:</p> <ul style="list-style-type: none"> • system host-name hostname-ssh • system services ssh • system services outbound-ssh • security ssh-known-host

Although the **allow/deny-configuration** statements are also useful when simple configuration is desired, the **allow/deny-configuration-regexps** statements provide better

performance and overcome the ambiguity that existed when combining expressions set in the **allow/deny-configuration** statements.



NOTE: The **allow/deny-configuration** and **allow/deny-configuration-regexps** statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the **allow/deny-configuration** statement, or the **allow/deny-configuration-regexps** statement. If you have existing configurations using the **allow/deny-configuration** statements, using the same configuration options with the **allow/deny-configuration-regexps** statements might not produce the same results, as the search and match methods differ in the two forms of these statements.

Configuration Notes

When configuring the **allow-configuration**, **deny-configuration**, **allow-configuration-regexps**, and **deny-configuration-regexps** statements with access privileges, take the following into consideration:

- You can include one **deny-configuration** and one **allow-configuration** statement in each login class.
- The **allow/deny-configuration** and **allow/deny-configuration-regexps** statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the **allow/deny-configuration** statement, or the **allow/deny-configuration-regexps** statement. If you have existing configurations using the **allow/deny-configuration** statements, using the same configuration options with the **allow/deny-configuration-regexps** statements might not produce the same results, as the search and match methods differ in the two forms of these statements.
- Explicitly allowing configuration mode hierarchies or regular expressions using the **allow-configuration** statement adds to the regular permissions set using the **permissions** statement. Likewise, explicitly denying configuration mode hierarchies or regular expressions using the **deny-configuration** statement removes permissions for the specified configuration mode hierarchy, from the default permissions provided by the **permissions** statement.

For example, for the following configuration, the login class user can edit the configuration at the **[edit system services]** hierarchy level and issue configuration mode commands (such as **commit**), in addition to just entering the configuration mode using the **configure** command, which is the permission specified by the **configure** permission flag:

```
[edit system login]
user@host# set class test permissions configure allow-configuration "system services"
```

Likewise, for the following configuration, the login class user can perform all operations allowed by the **all** permissions flag, except issuing configuration mode commands (such as **commit**) or modifying the configuration at the **[edit system services]** hierarchy level:

```
[edit system login]
user@host# set class test permissions all deny-configuration "system services"
```

- To define access privileges to parts of the configuration hierarchy, specify the full paths in the extended regular expressions with the **allow-configuration** and **deny-configuration** statements. Use parentheses around an extended regular expression that connects two or more expressions with the pipe (|) symbol.

For example:

```
[edit system login]
user@host# set class test deny-configuration "(system login class)|(system services)"
```

- When specifying extended regular expressions using the **allow/deny-commands** and **allow/deny-configuration** statements, each expression separated by a pipe (|) symbol must be a complete standalone expression, and must be enclosed in parentheses (). Do not use spaces between regular expressions separated with parentheses and connected with the pipe (|) symbol.

For example:

```
[edit system login]
user@host# set class test allow-commands "(ping .*)|(traceroute .*)|(show
.*)|(configure .*)|(edit)|(exit)|(commit)|(rollback .*)"
user@host# set class test deny-configuration "(system login class)|(system services)"
```

- When specifying extended regular expressions using the **allow-deny-configuration-regexps** statement, each expression enclosed within quotes (") and separated by a space must be enclosed in angular brackets [].

For example:

```
[edit system login]
user@host# set class test allow-configuration-regexps [ "interfaces.*description.*"
"interfaces.*unit.*description.*" "interfaces.*unit.*family inet address.*"
"interfaces.*disable" ]
```

- If the exact same command is configured under both **allow-configuration** and **deny-configuration** statements, then the allow operation takes precedence over the deny statement.

For instance, with the following configuration, a user assigned to login class test is allowed to access the **[edit system services]** configuration hierarchy, although the **deny-configuration** statement also includes it:

```
[edit system login]
user@host# set class test permissions allow-configuration "system services"
user@host# set class test permissions deny-configuration "system services"
```

For instance, if a certain command or configuration is allowed, for example, using permission *all*, then we can use the **deny-configuration** command to deny access to a particular hierarchy.

- Modifiers such as *set*, *log*, and *count* are not supported within the regular expression string to be matched. If a modifier is used, then nothing is matched.

Incorrect configuration:

```
[edit system login]
```

```
user@host# set class test permission deny-configuration "set protocols"
```

Correct configuration:

```
[edit system login]
user@host# set class test permission deny-configuration protocols
```

- You can use the * wildcard character when denoting regular expressions. However, it must be used as a portion of a regular expression. You cannot use [*] or [.*] alone.
- You cannot configure the **allow-configuration** statement with the *(interfaces (description (.*)*) regular expression, as this evaluates to **allow-configuration = .*** regular expression.
- You can configure as many regular expressions as needed to be allowed or denied. Regular expressions to be denied take precedence over configurations to be allowed.

Topology

Figure 2: Configuring TACACS+ Server Authentication



Figure 2 on page 93 illustrates a simple topology, where Router R1 is a Juniper Networks device and has a TCP connection established with a TACACS+ server.

In this example, R1 is configured with two customized login classes—Class1 and Class2—for specifying access privileges with extended regular expressions using the **allow-configuration**, **deny-configuration**, **allow-configuration-regexps**, and **deny-configuration-regexps** statements differently.

The purpose of the login classes is as follows:

- **Class1**—Define access privileges for the user with the **allow-configuration** and **deny-configuration** statements. This login class should provide access to configure interfaces hierarchy only, and deny all other access on the device. To do this, the user permissions should include *configure* to provide configuration access. In addition to this, the **allow-configuration** statement should allow interfaces configuration, and the **deny-configuration** statement should deny access to all other configurations. Because the allow statement takes precedence over the deny statement, the users assigned to the Class1 login class can access only the **[edit interfaces]** hierarchy level.
- **Class2**—Define access privileges for the user with the **allow-configuration-regexps** and **deny-configuration-regexps** statements. This login class provides superuser-level user permissions, and in addition, explicitly allows configuration under multiple hierarchy levels for interfaces. It also denies configuration access to the **[edit system]** and **[edit protocols]** hierarchy levels.

Router R1 has two users, User1 and User2, assigned to the Class1 and Class2 login classes, respectively.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
R1  set system authentication-order tacplus
    set system authentication-order radius
    set system authentication-order password
    set system radius-server 10.209.1.66 secret "$ABC123"
    set system tacplus-server 10.209.1.66
    set system radius-options enhanced-accounting
    set system tacplus-options enhanced-accounting
    set system accounting events login
    set system accounting events change-log
    set system accounting events interactive-commands
    set system accounting traceoptions file auditlog
    set system accounting traceoptions flag all
    set system accounting destination tacplus server 10.209.1.66
    set system login class Class1 permissions configure
    set system login class Class1 allow-configuration "interfaces .* unit .*"
    set system login class Class1 deny-configuration .*
    set system login class Class2 permissions all
    set system login class Class2 allow-configuration-regexps [ "interfaces .* description .*"
        "interfaces .* unit .* description .*" "interfaces .* unit .* family inet address .*"
        "interfaces.* disable" ]
    set system login class Class2 deny-configuration-regexps [ "system" "protocols" ]
    set system login user User1 uid 2004
    set system login user User1 class Class1
    set system login user User1 authentication encrypted-password "$ABC123"
    set system login user User2 uid 2006
    set system login user User2 class Class2
    set system login user User2 authentication encrypted-password "$ABC123"
    set system syslog file messages any any
```

Configuring Authentication Parameters for Router R1

Step-by-Step Procedure The following example requires that you navigate various levels in the configuration hierarchy. For information about navigating the CLI, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure Router R1 authentication:

1. Configure the order in which authentication should take place for R1. In this example, TACACS+ server authentication is first, followed by RADIUS server authentication, then the local password.

```
[edit system]
user@R1# set authentication-order tacplus
user@R1# set authentication-order radius
user@R1# set authentication-order password
```
2. Establish R1 connection with the TACACS+ server.

```
[edit system]
user@R1# set tacplus-server 10.209.1.66
user@R1# set tacplus-options enhanced-accounting
user@R1# set accounting destination tacplus server 10.209.1.66
```

3. Configure RADIUS server authentication parameters.

```
[edit system]
user@R1# set radius-server 10.209.1.66 secret "$ABC123"
user@R1# set radius-options enhanced-accounting
```

4. Configure the R1 accounting configuration parameters.

```
[edit system]
user@R1# set accounting events login
user@R1# set accounting events change-log
user@R1# set accounting events interactive-commands
user@R1# set accounting traceoptions file auditlog
user@R1# set accounting traceoptions flag all
```

Configuring Access Privileges with `allow-configuration` and `deny-configuration` Statements (Class1)

Step-by-Step Procedure

To specify regular expressions using the `allow-configuration` and `deny-configuration` statements:

1. Configure the Class1 custom login class and assign configuration user permissions.

```
[edit system login]
user@R1# set class Class1 permissions configure
```

2. Specify the regular expression in the `allow-configuration` statement to allow configuration at the `[edit interfaces]` hierarchy level. To allow `set` commands at the `[edit interfaces]` hierarchy level, the regular expression used is `interfaces.*unit.*`.

```
[edit system login]
user@R1# set class Class1 allow-configuration "interfaces.*unit.*"
```

3. Specify the regular expression in the `deny-configuration` statement to disable all configuration access. The regular expression used to deny all configuration access is `.*`.

```
[edit system login]
user@R1# set class Class1 deny-configuration .*
```

4. Configure the user account for the Class1 login class.

```
[edit system login]
user@R1# set system login user User1 uid 2004
user@R1# set system login user User1 class Class1
user@R1# set system login user User1 authentication encrypted-password "$ABC123"
```

Configuring Access Privileges with `allow-configuration-regexps` and `deny-configuration-regexps` Statements (Class2)

Step-by-Step Procedure

To specify regular expressions using the `allow-configuration-regexps` and `deny-configuration-regexps` statements:

1. Configure the Class2 custom login class and assign superuser (all) user permissions. For information on the predefined system login classes, see [“Junos OS Login Classes Overview” on page 23](#).

```
[edit system login]
user@R1# set class Class2 permissions all
```

2. Specify the regular expression to allow access to multiple hierarchies under the `[edit interfaces]` hierarchy level.

```
[edit system login]
user@R1# set class Class2 allow-configuration-regexps [ "interfaces.*description
.*" "interfaces.*unit.*description.*" "interfaces.*unit.*family inet address.*"
"interfaces.*disable" ]
```

3. Specify the regular expression to deny configuration at the `[edit system]` and `[edit protocols]` hierarchy levels.

```
[edit system login]
user@R1# set class Class2 deny-configuration-regexps [ "system" "protocols" ]
```

4. Configure the user account for the Class2 login class.

```
[edit system login]
user@R1# set system login user User2 uid 2006
user@R1# set system login user User2 class Class2
user@R1# set system login user User2 authentication encrypted-password "$ABC123"
```

Results

From configuration mode, confirm your configuration by entering the `show system` command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@R1# show system
authentication-order [ tacplus radius password ];
radius-server {
    10.209.1.66 secret "$ABC123";
}
tacplus-server {
    10.209.1.66;
}
radius-options {
    enhanced-accounting;
}
tacplus-options {
    enhanced-accounting;
}
accounting {
    events [ login change-log interactive-commands ];
```

```

traceoptions {
  file auditlog;
  flag all;
}
destination {
  tacplus {
    server {
      10.209.1.66;
    }
  }
}
login {
  class Class1 {
    permissions configure;
    allow-configuration "interfaces.* unit.*";
    deny-configuration.*;
  }
  class Class2 {
    permissions all;
    allow-configuration-regexps [ "interfaces.* description.*" "interfaces.* unit.*
    description.*" "interfaces.* unit.* family inet address.*" "interfaces.* disable" ];
    deny-configuration-regexps [ "system" "protocols" ];
  }
  user User1 {
    uid 2001;
    class Class1;
    authentication {
      encrypted-password "$ABC123";
    }
  }
  user User2 {
    uid 2002;
    class Class2;
    authentication {
      encrypted-password "$ABC123";
    }
  }
}
syslog {
  file messages {
    any any;
  }
}

```

Verification

Log in as the username assigned with the new login class, and confirm that the configuration is working properly.

- [Verifying Class1 Configuration on page 98](#)
- [Verifying Class2 Configuration on page 98](#)

Verifying Class1 Configuration

Purpose Verify that the permissions allowed in the Class1 login class are working.

Action From the CLI prompt, check the available permissions.

```
User1@R1> ?
Possible completions:
  clear          Clear information in the system
  configure      Manipulate software configuration information
  file           Perform file operations
  help          Provide help information
  load          Load information from file
  op            Invoke an operation script
  quit          Exit the management session
  request       Make system-level requests
  save          Save information to file
  set           Set CLI properties, date/time, craft interface message
  start         Start shell
  test          Perform diagnostic debugging
```

From the configuration mode, check the available configuration permissions.

```
User1@R1# edit ?
Possible completions:
> interfaces      Interface configuration
```

Meaning User1 has *configure* user permissions seen in the first output, and the only configuration access allowed for User1 is at the interfaces hierarchy level. All other configuration is denied, as seen in the second output.

Verifying Class2 Configuration

Purpose Verify that the Class2 configuration is working.

Action From the configuration mode, access the interfaces configuration.

```
[edit interfaces]
User2@R1# set ?
Possible completions:
  <interface-name> Interface name
+ apply-groups      Groups from which to inherit configuration data
+ apply-groups-except Don't inherit configuration data from these groups
  ge-0/0/3          Interface name
> interface-range   Interface ranges configuration
> interface-set      Logical interface set configuration
> traceoptions       Interface trace options
```

From the configuration mode, access the system and protocols configuration hierarchies.

```
User2@R1# edit system
          ^
Syntax error, expecting <statement> or <identifier>.

User2@R1# edit protocols
```

^
Syntax error, expecting <statement> or <identifier>.

Meaning User2 has permissions to configure interfaces of R1, but the **[edit system]** and **[edit protocols]** hierarchy levels are denied access, as seen in the output.

- Related Documentation**
- [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies on page 99](#)

Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies

This example shows how to configure custom login classes and assign access privileges for operational mode commands and to portions of the configuration hierarchy. This enables users of the customized login class to execute only those commands and access only those configuration statements and hierarchies for which access privileges have been specified. This prevents unauthorized users from executing sensitive commands or accessing device configurations that could potentially cause damage to the network.

- [Requirements on page 99](#)
- [Overview and Topology on page 100](#)
- [Configuration on page 103](#)
- [Verification on page 106](#)

Requirements

This example uses the following hardware and software components:

- One Juniper Networks device
- One TACACS+ (or RADIUS) server
- Junos OS build running on the Juniper Networks device

Before you begin:

- Establish a TCP connection between the device and the TACACS+ server. In the case of the RADIUS server, establish a UDP connection between the device and the RADIUS server.

For information on configuring a TACACS+ server, see [“Configuring TACACS+ Authentication” on page 373](#).

- Configure at least one user assigned to a login class on the Juniper Networks device. There can be more than one login class, each with varying permission configurations, and more than one user on the device.

Overview and Topology

Each top-level command-line interface (CLI) command and each configuration statement in Junos OS has an access privilege level associated with it. For each login class, you can explicitly deny or allow the use of operational and configuration mode commands that would otherwise be permitted or not allowed by a privilege level. Users can execute only those commands and configure and view only those statements for which they have access privileges. To configure access privilege levels, include the **permissions** statement at the **[edit system login class *class-name*]** hierarchy level.

The access privileges for each login class are defined by one or more permission flags specified in the **permissions** statement. In addition to this, you can specify extended regular expressions with the following statements:

- **allow-commands** and **deny-commands**—Allow or deny access to operational mode commands only.
- **allow-configuration** and **deny-configuration**—Allow or deny access to a particular configuration hierarchy only.
- **allow-configuration-regexps** and **deny-configuration-regexps**—Allow or deny access to a particular configuration hierarchy only using strings of regular expressions.

The above statements define a user's access privileges to individual operational mode commands, configuration statements, and hierarchies. These statements take precedence over a login class permissions bit set for a user.

Configuration Notes

When configuring the **allow-commands**, **deny-commands**, **allow-configuration**, and **deny-configuration** statements with access privileges, take the following into consideration:

- You can include the allow/deny statement only once in each login class.
- If the exact same command is configured under both **allow-commands** and **deny-commands** statements, or both **allow-configuration** and **deny-configuration** statements, then the allow operation takes precedence over the deny statement.

For instance, with the following configuration, a user assigned to login class test is allowed to install software using the **request system software add** command, although the **deny-commands** statement also includes it:

```
[edit system login]
user@host# set class test permissions allow-commands "request system software
add"
user@host# set class test permissions deny-commands "request system software add"
```

For instance, with the following configuration, a user assigned to login class test is allowed to access the **[edit system services]** configuration hierarchy, although the **deny-configuration** statement also includes it:

```
[edit system login]
user@host# set class test permissions allow-configuration "system services"
user@host# set class test permissions deny-configuration "system services"
```

- If you specify a regular expression for **allow-commands** and **deny-commands** statements with two different variants of a command, the longest match is always executed.

For instance, for the following configuration, a user assigned to test login class is allowed to execute the **commit synchronize** command and not the **commit** command. This is because **commit-synchronize** is the longest match between **commit** and **commit-synchronize**, and it is specified for **allow-commands**.

```
[edit system login class]
user@host# set class test permissions allow-commands "commit-synchronize"
user@host# set class test permissions deny-commands commit
```

- Regular expressions for **allow-commands** and **deny-commands** statements can also include the **commit**, **load**, **rollback**, **save**, **status**, and **update** commands.
- Explicitly allowing configuration mode hierarchies or regular expressions using the **allow-configuration** statement adds to the regular permissions set using the **permissions** statement. Likewise, explicitly denying configuration mode hierarchies or regular expressions using the **deny-configuration** statement removes permissions for the specified configuration mode hierarchy, from the default permissions provided by the **permissions** statement.

For example, for the following configuration, the login class user can edit the configuration at the **[edit system services]** hierarchy level and issue configuration mode commands (such as **commit**), in addition to just entering the configuration mode using the **configure** command, which is the permission specified by the **configure** permission flag:

```
[edit system login]
user@host# set class test permissions configure allow-configuration "system services"
```

Likewise, for the following configuration, the login class user can perform all operations allowed by the **all** permissions flag, except issuing configuration mode commands (such as **commit**) or modifying the configuration at the **[edit system services]** hierarchy level:

```
[edit system login]
user@host# set class test permissions all deny-configuration "system services"
```

- The **allow/deny-configuration** and **allow/deny-configuration-regexps** statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the **allow/deny-configuration** statement, or the **allow/deny-configuration-regexps** statement. If you have existing configurations using the **allow/deny-configuration** statements, using the same configuration options with the **allow/deny-configuration-regexps** statements might not produce the same results, as the search and match methods differ in the two forms of these statements.

- To define access privileges to parts of the configuration hierarchy, specify the full paths in the extended regular expressions with the **allow-configuration** and **deny-configuration** statements. Use parentheses around an extended regular expression that connects two or more expressions with the pipe (|) symbol.

For example:

```
[edit system login]
user@host# set class test deny-configuration "(system login class) | (system services)"
```

- If the regular expression contains any spaces, operators, or wildcard characters, enclose the expression in quotation marks. Regular expressions are not case-sensitive; for example, **allow-commands "show interfaces"**.
- Modifiers such as *set*, *log*, and *count* are not supported within the regular expression string to be matched. If a modifier is used, then nothing is matched.

Incorrect configuration:

```
[edit system login]
user@host# set class test permission deny-commands "set protocols"
```

Correct configuration:

```
[edit system login]
user@host# set class test permission deny-commands protocols
```

- Anchors are required when specifying complex regular expressions with the **allow-commands** statement.

For example:

```
[edit system login]
user@host# set class test permissions allow-commands "(^monitor) | (^ping) | (^show) | (^exit)"
```

OR

```
set class test permissions allow-commands "allow-commands = "^(monitor | ping | show | exit)"
```

- When specifying extended regular expressions using the **allow/deny-commands** and **allow/deny-configuration** statements, each expression separated by a pipe (|) symbol must be a complete standalone expression, and must be enclosed in parentheses (). Do not use spaces between regular expressions separated with parentheses and connected with the pipe (|) symbol.

For example:

```
[edit system login]
user@host# set class test allow-commands "(ping.*)|(traceroute.*)|(show .*)|(configure.*)|(edit)|(exit)|(commit)|(rollback.*)"
user@host# set class test deny-configuration "(system login class)|(system services)"
```

- When specifying extended regular expressions using the **allow-deny-configuration-regexps** statement, each expression enclosed within quotes (") and separated by a space must be enclosed in angular brackets [].

For example:

```
[edit system login]
user@host# set class test allow-configuration-regexps [ "interfaces.* description.*"
"interfaces.* unit.* description.*" "interfaces.* unit.* family inet address.*"
"interfaces.* disable" ]
```

- You can use the * wildcard character when denoting regular expressions. However, it must be used as a portion of a regular expression. You cannot use [*] or [.*] alone.
- You cannot configure the **allow-configuration** statement with the (interfaces (description (.*)) regular expression, as this evaluates to **allow-configuration = .*** regular expression.
- You can configure as many regular expressions as needed to be allowed or denied. Regular expressions to be denied take precedence over configurations to be allowed.

Topology

Figure 3: Configuring TACACS+ Server Authentication



Figure 3 on page 103 illustrates a simple topology, where Router R1 is a Juniper Networks device and has a TCP connection established with a TACACS+ server. In this example, R1 has a customized login class, Class1, with an associated login user, User1.

The purpose of the Class1 login class is to provide security user permission with access to only the **configure** command, and deny access to all other operational mode commands. The login class again filters the configuration access to only group VPN configuration under the **[edit security]** hierarchy, and denies access to the **multi-chassis** configuration statement, which is allowed with the security user permissions.

User1 is the login user assigned to the Class1 login class.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
R1 set system authentication-order tacplus
R1 set system authentication-order radius
R1 set system authentication-order password
R1 set system ports console log-out-on-disconnect
R1 set system radius-server 10.209.1.66 secret "$ABC123"
R1 set system tacplus-server 10.209.1.66
R1 set system radius-options enhanced-accounting
R1 set system tacplus-options enhanced-accounting
R1 set system accounting events login
R1 set system accounting events change-log
R1 set system accounting events interactive-commands
R1 set system accounting traceoptions file auditlog
R1 set system accounting traceoptions flag all
```

```
set system accounting destination tacplus server 10.209.1.66
set system login class Class1 permissions security
set system login class Class1 allow-commands configure
set system login class Class1 deny-commands .*
set system login class Class1 allow-configuration "security group-vpn"
set system login class Class1 deny-configuration multi-chassis
set system login user User1 uid 2005
set system login user User1 class Class1
set system login user User1 authentication encrypted-password "$ABC123"
```

Configuring Authentication Parameters for Router R1

Step-by-Step Procedure The following example requires that you navigate various levels in the configuration hierarchy. For information about navigating the CLI, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure Router R1 authentication:

1. Configure the order in which authentication should take place for R1. In this example, TACACS+ server authentication is first, followed by RADIUS server authentication, then the local password.

```
[edit system]
user@R1# set authentication-order tacplus
user@R1# set authentication-order radius
user@R1# set authentication-order password
```

2. Establish R1 connection with the TACACS+ server.

```
[edit system]
user@R1# set tacplus-server 10.209.1.66
user@R1# set tacplus-options enhanced-accounting
user@R1# set accounting destination tacplus server 10.209.1.66
```

3. Configure RADIUS server authentication parameters.

```
[edit system]
user@R1# set radius-server 10.209.1.66 secret "$ABC123"
user@R1# set radius-options enhanced-accounting
```

4. Configure the R1 accounting configuration parameters.

```
[edit system]
user@R1# set accounting events login
user@R1# set accounting events change-log
user@R1# set accounting events interactive-commands
user@R1# set accounting traceoptions file auditlog
user@R1# set accounting traceoptions flag all
```

Configuring Access Privileges with Regular Expressions

Step-by-Step Procedure To specify regular expressions for user permissions with access privileges:

1. Configure the Class1 custom login class and assign security user permissions.

```
[edit system login]
user@R1# set class Class1 permissions security
```

2. Specify the regular expression in the **allow-commands** statement to enter the configuration mode.

```
[edit system login]
user@R1# set class Class1 allow-commands configure
```
3. Specify the regular expression in the **deny-commands** statement to disable access to all other operational mode commands. The regular expression used to deny all access is **deny-commands.***.

```
[edit system login]
user@R1# set class Class1 deny-commands .*
```
4. Specify the regular expression in the **allow-configuration** statement to allow access to the group VPN configuration at the **[edit security]** hierarchy level.

```
[edit system login]
user@R1# set class Class1 allow-configuration "security group-vpn"
```
5. Specify the regular expression in the **deny-configuration** statement to disable access to the **multi-chassis** configuration statement.

```
[edit system login]
user@R1# set class Class1 deny-configuration multi-chassis
```
6. Configure the user account for the Class1 login class.

```
[edit system login]
user@R1# set user User1 uid 2005
user@R1# set user User1 class Class1
user@R1# set user User1 authentication encrypted-password "$ABC123"
```

Results

From configuration mode, confirm your configuration by entering the **show system** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@R1# show system
authentication-order [ tacplus radius password ];
ports {
  console log-out-on-disconnect;
}
radius-server {
  10.209.1.66 secret "$ABC123";
}
tacplus-server {
  10.209.1.66;
}
radius-options {
  enhanced-accounting;
}
tacplus-options {
  enhanced-accounting;
}
accounting {
  events [ login change-log interactive-commands ];
```

```
traceoptions {
  file auditlog;
  flag all;
}
destination {
  tacplus {
    server {
      10.209.1.66;
    }
  }
}
login {
  class Class1 {
    permissions security;
    allow-commands configure;
    deny-commands .*;
    allow-configuration "security group-vpn";
    deny-configuration multi-chassis;
  }
  user User1 {
    uid 2005;
    class Class1;
    authentication {
      encrypted-password "$ABC123";
    }
  }
}
```

Verification

Log in as the username assigned with the new login class, and confirm that the configuration is working properly.

- [Verifying Class1 Configuration on page 106](#)

Verifying Class1 Configuration

Purpose Verify that the permissions and regular expressions allowed in Class1 login class are working.

Action From the CLI prompt, view the allowed user permissions.

```
User1@R1> ?
Possible completions:
  configure          Manipulate software configuration information
```

From the configuration mode, enter the **[edit security]** hierarchy and view the allowed configuration statements.

```
User1@R1> edit ?
Possible completions:
> group-vpn         Group VPN configuration
```

From the configuration mode, enter the **multi-chassis** configuration statement.

```
User1@R1# edit multi-chassis
                ^
Syntax error, expecting <statement> or <identifier>.
```

Meaning User 1 has security user permissions, which allows the user to view the security configuration in configuration mode and with the **show configuration** operational mode command. However, this has been altered with the **allow-commands** and **deny-commands** statements, where User1 is able to enter configuration mode with the **configure** command in the **allow-commands** statement, and is denied access to all other operational mode commands with the use of the **deny-commands.*** statement. As a result, even the **show configuration** command, which was allowed with the security user permissions, is now denied. This is displayed in the first output.

In the second output, the **allow-configuration** statement takes effect, and the only allowed configuration under the **[edit security]** hierarchy level is for group VPN.

In the last output, the **deny-configuration** statement takes effect, and the **multi-chassis** configuration statement that is allowed with the security user permissions is denied for User1.

- Related Documentation**
- [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

CHAPTER 5

Permission Flags for User Access Privileges

- [Access Privilege User Permission Flags Overview on page 110](#)
- [access on page 112](#)
- [access-control on page 113](#)
- [admin on page 113](#)
- [admin-control on page 114](#)
- [all-control on page 115](#)
- [clear on page 115](#)
- [configure on page 182](#)
- [control on page 183](#)
- [field on page 183](#)
- [firewall on page 184](#)
- [firewall-control on page 184](#)
- [floppy on page 185](#)
- [flow-tap on page 186](#)
- [flow-tap-control on page 186](#)
- [flow-tap-operation on page 187](#)
- [idp-profiler-operation on page 187](#)
- [interface on page 187](#)
- [interface-control on page 188](#)
- [maintenance on page 189](#)
- [network on page 197](#)
- [pgcp-session-mirroring on page 199](#)
- [pgcp-session-mirroring-control on page 200](#)
- [reset on page 200](#)
- [rollback on page 201](#)
- [routing on page 201](#)

- [routing-control](#) on page 206
- [secret](#) on page 210
- [secret-control](#) on page 211
- [security](#) on page 212
- [security-control](#) on page 216
- [shell](#) on page 219
- [snmp](#) on page 220
- [snmp-control](#) on page 220
- [system](#) on page 221
- [system-control](#) on page 223
- [trace](#) on page 225
- [trace-control](#) on page 230
- [view](#) on page 235
- [view-configuration](#) on page 331

Access Privilege User Permission Flags Overview

Permission flags are used to grant a user access to operational mode commands and configuration hierarchy levels and statements. By specifying a specific permission flag on the user's login class at the **[edit system login class]** hierarchy level, you grant the user access to the corresponding commands and configuration hierarchy levels and statements. To grant access to all commands and configuration statements, use the **all** permissions flag.

For permission flags that grant access to configuration hierarchy levels and statements, the flags grant read-only privilege to that configuration. For example, the **interface** permissions flag grants read-only access to the **[edit interfaces]** hierarchy level. The **-control** form of the flag grants read-write access to that configuration. Using the preceding example, **interface-control** grants read-write access to the **[edit interfaces]** hierarchy level.

The permission flags listed in "Related Documentation" grant a specific set of access privileges. Each permission flag is listed with the operational mode commands and configuration hierarchy levels and statements for which that flag grants access.



NOTE: Each command listed represents that command and all subcommands with that command as a prefix. Each configuration statement listed represents the top of the configuration hierarchy to which that flag grants access.

Related Documentation

- [Understanding Junos OS Access Privilege Levels](#) on page 26
- [access](#) on page 112
- [access-control](#) on page 113

- [admin](#) on page 113
- [admin-control](#) on page 114
- [all-control](#) on page 115
- [clear](#) on page 115
- [configure](#) on page 182
- [control](#) on page 183
- [field](#) on page 183
- [firewall](#) on page 184
- [firewall-control](#) on page 184
- [floppy](#) on page 185
- [flow-tap](#) on page 186
- [flow-tap-operation](#) on page 187
- [idp-profiler-operation](#) on page 187
- [interface](#) on page 187
- [interface-control](#) on page 188
- [maintenance](#) on page 189
- [network](#) on page 197
- [pgcp-session-mirroring](#) on page 199
- [pgcp-session-mirroring-control](#) on page 200
- [reset](#) on page 200
- [rollback](#) on page 201
- [secret](#) on page 210
- [secret-control](#) on page 211
- [security](#) on page 212
- [security-control](#) on page 216
- [shell](#) on page 219
- [snmp](#) on page 220
- [system](#) on page 221
- [system-control](#) on page 223
- [trace](#) on page 225
- [trace-control](#) on page 230
- [view](#) on page 235
- [view-configuration](#) on page 331

access

Can view the access configuration in configuration mode.

Commands No associated CLI commands.

**Configuration
Hierarchy Levels**

```
[edit access]
[edit access diameter]
[edit access ppp-options]
[edit access radius]
[edit dynamic-profile]
[edit logical-systems access]
[edit logical-systems routing-instances instance system services
static-subscribers access-profile]
[edit logical-systems routing-instances instance system services
static-subscribers dynamic-profile]
[edit logical-systems routing-instances instance system services
static-subscribers group access-profile]
[edit logical-systems routing-instances instance system services
static-subscribers group dynamic-profile]
[edit logical-systems system services static-subscribers access-profile]
[edit logical-systems system services static-subscribers dynamic-profile]
[edit logical-systems system services static-subscribers group access-profile]
[edit logical-systems system services static-subscribers group dynamic-profile]
[edit routing-instances instance system services static-subscribers
access-profile]
[edit routing-instances instance system services static-subscribers
dynamic-profile]
[edit routing-instances instance system services static-subscribers group
access-profile]
[edit routing-instances instance system services static-subscribers group
dynamic-profile]
[edit system services extensible-subscriber-services access-profile]
[edit system services static-subscribers access-profile]
[edit system services static-subscribers dynamic-profile]
[edit system services static-subscribers group access-profile]
[edit system services static-subscribers group dynamic-profile]
```

**Related
Documentation**

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [access-control on page 113](#)

access-control

Can view access configuration information. Can edit access configuration at the **[edit access]**, **[edit logical-systems]**, **[edit routing-instances]**, and **[edit system services]** hierarchy levels.

Configuration Hierarchy Levels

```
[edit access]
[edit access ppp-options]
[edit dynamic-profile]
[edit logical-systems access]
[edit logical-systems routing-instances instance system services
static-subscribers access-profile]
[edit logical-systems routing-instances instance system services
static-subscribers dynamic-profile]
[edit logical-systems routing-instances instance system services
static-subscribers group access-profile]
[edit logical-systems routing-instances instance system services
static-subscribers group dynamic-profile]
[edit logical-systems system services static-subscribers access-profile]
[edit logical-systems system services static-subscribers dynamic-profile]
[edit logical-systems system services static-subscribers group access-profile]
[edit logical-systems system services static-subscribers group dynamic-profile]
[edit routing-instances instance system services static-subscribers
access-profile]
[edit routing-instances instance system services static-subscribers
dynamic-profile]
[edit routing-instances instance system services static-subscribers group
access-profile]
[edit routing-instances instance system services static-subscribers group
dynamic-profile]
[edit system services static-subscribers access-profile]
[edit system services static-subscribers dynamic-profile]
[edit system services static-subscribers group access-profile]
[edit system services static-subscribers group dynamic-profile]
```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [access on page 112](#)

admin

Can view user account information in configuration mode.

Commands

```
show system audit
```

**Configuration
Hierarchy Levels**

```
[edit protocols uplink-failure-detection]
[edit system]
[edit system accounting]
[edit system diag-port-authentication]
[edit system extensions]
[edit system login]
[edit system pic-console-authentication]
[edit system root-authentication]
[edit system services ssh authorized-keys-command]
[edit system services ssh authorized-keys-command-user]
[edit system services ssh ciphers]
[edit system services ssh client-alive-count-max]
[edit system services ssh client-alive-interval]]
[edit system services ssh fingerprint-hash]
[edit system services ssh hostkey-algorithm]
[edit system services ssh key-exchange]
[edit system services ssh macs]
[edit system services ssh max-sessions-per-connection]
[edit system services ssh no-tcp-fowarding]
[edit system services ssh protocol-version]
[edit system services ssh root-login]
[edit system services ssh tcp-fowarding]
```

**Related
Documentation**

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [admin-control on page 114](#)

admin-control

Can view user account information and configure it at the **[edit system]** hierarchy level.

Commands

```
show system audit
```

**Configuration
Hierarchy Levels**

```
[edit protocols uplink-failure-detection]
[edit system]
[edit system accounting]
[edit system diag-port-authentication]
[edit system extensions]
[edit system login]
[edit system pic-console-authentication]
[edit system root-authentication]
[edit system services ssh ciphers]
[edit system services ssh hostkey-algorithm]
[edit system services ssh key-exchange]
[edit system services ssh macs]
[edit system services ssh protocol-version]
[edit system services ssh root-login]
```

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
 - [admin on page 113](#)

all-control

Can access all operational mode commands and configuration mode commands. Can modify configuration in all the configuration hierarchy levels.

Commands All CLI commands.

Configuration Hierarchy Levels All CLI configuration hierarchy levels and statements.

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

clear

Can clear (delete) information learned from the network that is stored in various network databases.

Commands

```
clear
clear access-security
clear access-security router-advertisement-entries
<clear-as-router-advertisement-entry>
clear amt
clear amt statistics
<clear-amt-statistics>
clear amt tunnel
clear-amt-tunnel
clear amt tunnel gateway-address
<clear amt tunnel gateway-address>
clear amt tunnel statistics
<clear-amt-tunnel-statistics>
clear amt tunnel statistics gateway-address
<clear-amt-tunnel-gateway-address-statistics>
```

```
clear amt tunnel statistics tunnel-interface
<clear-amt-tunnel-interface-statistics>
clear amt tunnel tunnel-interface
<clear-amt-tunnel-interface>
clear ancp
clear ancp neighbor
  <clear-ancp-neighbor-connection>
clear ancp statistics
<clear-ancp-statistics>
clear ancp subscriber
<clear-ancp-subscriber-connection>
clear appqos-counter
<clear-appqos-rate-limiters-statistics>
clear appqos-rate-limiter-statistics
clear appqos-rule-statistics
clear arp
  <clear-arp-table>
clear auto-configuration
clear auto-configuration interfaces
<clear-auto-configuration-interfaces>
clear bfd
clear bfd adaptation
<clear-bfd-adaptation-information>
clear bfd adaptation address
<clear-bfd-adaptation-address>
clear bfd adaptation discriminator
<clear-bfd-adaptation-discriminator>
clear bfd session
<clear-bfd-session-information>
clear bfd session address
<clear-bfd-session-address>
clear bfd session discriminator
<clear-bfd-session-discriminator>
clear bgp
clear bgp damping
  <clear-bgp-damping>
clear bgp neighbor
  <clear-bgp-neighbor>
clear bgp table
  <clear-bgp-table>
clear bridge
clear bridge evpn
clear bridge evpn arp-table
<clear-bridge-evpn-arp-table>
clear bridge mac-table
  <clear-bridge-mac-table>
clear bridge mac-table interface
  <clear-bridge-interface-mac-table>
clear bridge recovery-timeout
<clear-bridge-recovery>
clear bridge recovery-timeout interface
<clear-bridge-recovery-interface>
clear bridge satellite
clear bridge satellite logging
<clear-satellite-control-logging>
clear bridge satellite vlan-auto-sense
<clear-satellite-control-plane-vlan-auto-sense>
clear captive-portal
clear captive-portal firewall
<clear-captive-portal-firewall>
clear captive-portal firewall interface
```

```

<clear-captive-portal-firewall-interface>
clear captive-portal interface
<clear-captive-portal-interface-session>
clear captive-portal mac-address
<clear-captive-portal-mac-session>
clear cli
clear cli logical-system
<clear-cli-logical-system>
clear database-replication
clear database-replication statistics
  <clear-database-replication-statistics-information>
clear ddos-protection
clear ddos-protection protocols
clear ddos-protection protocols all-fiber-channel-enode
clear ddos-protection protocols all-fiber-channel-enode aggregate
clear ddos-protection protocols all-fiber-channel-enode aggregate culprit-flows
<clear-ddos-all-fc-enode-aggregate-flows>
clear ddos-protection protocols all-fiber-channel-enode aggregate states
<clear-ddos-all-fc-enode-aggregate-states>
clear ddos-protection protocols all-fiber-channel-enode aggregate statistics
<clear-ddos-all-fc-enode-aggregate-statistics>
clear ddos-protection protocols all-fiber-channel-enode culprit-flows
<clear-ddos-all-fc-enode-flows>
clear ddos-protection protocols all-fiber-channel-enode states
<clear-ddos-all-fc-enode-states>
clear ddos-protection protocols all-fiber-channel-enode statistics
<clear-ddos-all-fc-enode-statistics>
clear ddos-protection protocols amtv4
clear ddos-protection protocols amtv4 aggregate
clear ddos-protection protocols amtv4 aggregate culprit-flows
clear ddos-protection protocols amtv4 aggregate states
clear ddos-protection protocols amtv4 aggregate statistics
clear ddos-protection protocols amtv4 culprit-flows
clear ddos-protection protocols amtv4 states
clear ddos-protection protocols amtv4 statistics
clear ddos-protection protocols amtv6
clear ddos-protection protocols amtv6 aggregate
clear ddos-protection protocols amtv6 aggregate culprit-flows
<clear-ddos-amtv6-aggregate-flows>
clear ddos-protection protocols amtv6 aggregate states
<clear-ddos-amtv6-aggregate-states>
clear ddos-protection protocols amtv6 aggregate statistics
<clear-ddos-amtv6-aggregate-statistics>
clear ddos-protection protocols amtv6 culprit-flows
<clear-ddos-amtv6-flows>
clear ddos-protection protocols amtv6 states
<clear-ddos-amtv6-states>
clear ddos-protection protocols amtv6 statistics
<clear-ddos-amtv6-statistics>
clear ddos-protection protocols ancp aggregate culprit-flows
<clear-ddos-ancp-aggregate-flows>
clear ddos-protection protocols ancp culprit-flows
clear ddos-protection protocols ancp
clear ddos-protection protocols ancp aggregate
clear ddos-protection protocols ancp aggregate states
clear ddos-protection protocols ancp aggregate statistics
<clear-ddos-ancp-aggregate-statistics>
clear ddos-protection protocols ancp states
<clear-ddos-ancp-states>
clear ddos-protection protocols ancp statistics
<clear-ddos-ancp-statistics>

```

```
clear ddos-protection protocols ancpv6
clear ddos-protection protocols ancpv6 aggregate
clear ddos-protection protocols ancpv6 aggregate states

clear ddos-protection protocols ancpv6 aggregate culprit-flows
clear ddos-protection protocols arp aggregate statistics
clear-ddos-arp-aggregate-statistics
clear ddos-protection protocols arp aggregate culprit-flows
clear ddos-protection protocols arp states
clear-ddos-arp-states
clear ddos-protection protocols arp statistics
<clear-ddos-arp-statistics>
clear ddos-protection protocols arp-snoop
clear ddos-protection protocols arp-snoop aggregate
clear ddos-protection protocols arp-snoop aggregate culprit-flows
<clear-ddos-arp-snoop-aggregate-flows>
clear ddos-protection protocols arp-snoop aggregate states
<clear-ddos-arp-snoop-aggregate-states>
clear ddos-protection protocols arp-snoop aggregate statistics
<clear-ddos-arp-snoop-aggregate-statistics>
clear ddos-protection protocols arp-snoop culprit-flows
<clear-ddos-arp-snoop-flows>
clear ddos-protection protocols arp-snoop states
<clear-ddos-arp-snoop-states>
clear ddos-protection protocols arp-snoop statistics
<clear-ddos-arp-snoop-statistics>
clear ddos-protection protocols arp culprit-flows
clear ddos-protection protocols atm
clear ddos-protection protocols atm aggregate
clear ddos-protection protocols atm aggregate culprit-flows
clear ddos-protection protocols atm aggregate states
<clear-ddos-atm-aggregate-states>
clear ddos-protection protocols atm aggregate statistics
<clear-ddos-atm-aggregate-statistics>
clear ddos-protection protocols atm culprit-flows
clear ddos-protection protocols bfd aggregate culprit-flows
clear ddos-protection protocols atm states
clear-ddos-atm-states
clear ddos-protection protocols atm statistics
clear-ddos-atm-statistics
clear ddos-protection protocols bfd
clear ddos-protection protocols bfd aggregate
clear ddos-protection protocols bfd culprit-flows
clear ddos-protection protocols bfd aggregate states
clear-ddos-bfd-aggregate-states
  clear ddos-protection protocols bfd aggregate statistics
clear-ddos-bfd-aggregate-statistics
  clear ddos-protection protocols bfd states
clear-ddos-bfd-states
clear ddos-protection protocols bfd statistics
clear-ddos-bfd-statistics
clear ddos-protection protocols bfdv6
clear ddos-protection protocols bfdv6 aggregate
clear ddos-protection protocols bfdv6 culprit-flows
clear ddos-protection protocols bfdv6 aggregate states
clear-ddos-bfdv6-aggregate-states
clear ddos-protection protocols bfdv6 aggregate statistics
clear-ddos-bfdv6-aggregate-statistics
clear ddos-protection protocols bfdv6 states
clear-ddos-bfdv6-states
clear ddos-protection protocols bfdv6 statistics
```

```

clear-ddos-bfdv6-statistics
clear ddos-protection protocols bgp
clear ddos-protection protocols bgp aggregate
clear ddos-protection protocols bgp aggregate culprit-flows
clear ddos-protection protocols bgp aggregate states
clear-ddos-bgp-aggregate-states
clear ddos-protection protocols bgp aggregate statistics
clear ddos-protection protocols bgp culprit-flows
clear ddos-protection protocols bgp states
clear-ddos-bgp-states
clear ddos-protection protocols bgp statistics
clear-ddos-bgp-statistics
clear ddos-protection protocols bgpv6
clear ddos-protection protocols bgpv6 aggregate
clear ddos-protection protocols bgpv6 aggregate culprit-flows
clear ddos-protection protocols bgpv6 aggregate states
clear-ddos-bgpv6-aggregate-states
clear ddos-protection protocols bgpv6 aggregate statistics
clear-ddos-bgpv6-aggregate-statistics
clear ddos-protection protocols bgpv6 states
clear-ddos-bgp-aggregate-states
clear-ddos-bgp-aggregate-statistics
clear-ddos-bgp-states
clear-ddos-bgp-statistics
clear-ddos-bgpv6-aggregate-states
clear-ddos-bgpv6-aggregate-statistics
clear-ddos-bgpv6-states
clear ddos-protection protocols bgpv6 statistics
<clear-ddos-bgpv6-statistics>
clear ddos-protection protocols bridge-control
clear ddos-protection protocols bridge-control aggregate
clear ddos-protection protocols bridge-control aggregate culprit-flows
<clear-ddos-brg-ctrl-aggregate-flows>
clear ddos-protection protocols bridge-control aggregate states
<clear-ddos-brg-ctrl-aggregate-states>
clear ddos-protection protocols bridge-control aggregate statistics
<clear-ddos-brg-ctrl-aggregate-statistics>
clear ddos-protection protocols bridge-control culprit-flows
<clear-ddos-brg-ctrl-flows>
clear ddos-protection protocols bridge-control states
<clear-ddos-brg-ctrl-states>
clear ddos-protection protocols bridge-control statistics
<clear-ddos-brg-ctrl-statistics>
clear ddos-protection protocols culprit-flows
clear ddos-protection protocols demux-autosense
clear ddos-protection protocols demux-autosense aggregate
clear ddos-protection protocols demux-autosense aggregate culprit-flows
clear ddos-protection protocols demux-autosense aggregate states
clear-ddos-demuxauto-aggregate-states
clear ddos-protection protocols demux-autosense aggregate statistics
clear ddos-protection protocols demux-autosense culprit-flows
clear ddos-protection protocols demux-autosense states
clear-ddos-demuxauto-states
clear ddos-protection protocols demux-autosense statistics
clear-ddos-demuxauto-statistics
clear ddos-protection protocols dhcpv4
clear ddos-protection protocols dhcpv4 ack
clear ddos-protection protocols dhcpv4 ack culprit-flows
clear ddos-protection protocols dhcpv4 ack states
clear ddos-protection protocols dhcpv4 ack statistics
clear ddos-protection protocols dhcpv4 aggregate

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clear ddos-protection protocols dhcpv4 decline statistics
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clear-ddos-dhcpv4-forcerenew-states
clear ddos-protection protocols dhcpv4 force-renew statistics
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clear-ddos-dhcpv6-confirm-states
clear-ddos-dhcpv6-confirm-statistics
clear-ddos-dhcpv6-decline-states
clear-ddos-dhcpv6-decline-statistics
clear-ddos-dhcpv6-info-req-states
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clear-ddos-dhcpv6-leasequery-states
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clear ddos-protection protocols dhcpv6 reconfigure statistics
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clear-ddos-dhcpv6-release-states
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clear ddos-protection protocols frame-relay aggregate statistics
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clear ddos-protection protocols frame-relay frf16 statistics
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clear ddos-protection protocols ftp aggregate states
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clear ddos-protection protocols ftp aggregate statistics
clear-ddos-ftp-aggregate-statistics
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clear-ddos-igmp-aggregate-statistics

```

```
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clear ddos-protection protocols ip-fragments aggregate
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clear-ddos-ipv4-uncls-aggregate-statistics

```

```
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clear ddos-protection protocols services packet states
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clear ddos-protection protocols services packet statistics
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clear ddos-protection protocols services states
clear-ddos-services-states
clear ddos-protection protocols services statistics
clear-ddos-services-statistics
clear ddos-protection protocols snmp
clear ddos-protection protocols snmp aggregate
clear ddos-protection protocols snmp aggregate states
clear-ddos-snmp-aggregate-states
```

```
clear ddos-protection protocols snmp aggregate statistics
clear ddos-protection protocols snmp culprit-flows
clear ddos-protection protocols snmp states
clear-ddos-snmp-states
clear ddos-protection protocols snmp statistics
clear-ddos-snmp-statistics
clear ddos-protection protocols snmpv6
clear ddos-protection protocols snmpv6 aggregate
clear ddos-protection protocols snmpv6 aggregate states
clear-ddos-snmpv6-aggregate-states
clear ddos-protection protocols snmpv6 aggregate statistics
clear-ddos-snmpv6-aggregate-statistics
clear ddos-protection protocols snmpv6 states
clear-ddos-snmpv6-states
clear ddos-protection protocols snmpv6 statistics
clear-ddos-snmpv6-statistics
clear ddos-protection protocols ssh
clear ddos-protection protocols ssh aggregate
clear ddos-protection protocols ssh aggregate states
clear-ddos-ssh-aggregate-states
clear ddos-protection protocols ssh aggregate statistics
clear-ddos-ssh-aggregate-statistics
clear ddos-protection protocols ssh states
clear-ddos-ssh-states
clear ddos-protection protocols ssh statistics
clear-ddos-ssh-statistics
clear ddos-protection protocols sshv6
clear ddos-protection protocols sshv6 aggregate
clear ddos-protection protocols sshv6 aggregate states
clear-ddos-sshv6-aggregate-states
clear ddos-protection protocols sshv6 aggregate statistics
clear ddos-protection protocols sshv6 culprit-flows
clear ddos-protection protocols sshv6 states
clear-ddos-sshv6-states
clear ddos-protection protocols sshv6 statistics
clear-ddos-sshv6-statistics
clear ddos-protection protocols states
clear-ddos-protocols-states
clear ddos-protection protocols statistics
clear-ddos-protocols-statistics
clear ddos-protection protocols stp
clear ddos-protection protocols stp aggregate
clear ddos-protection protocols stp aggregate states
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clear ddos-protection protocols stp aggregate statistics
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clear ddos-protection protocols stp states
clear-ddos-stp-states
clear ddos-protection protocols stp statistics
clear-ddos-stp-statistics
clear ddos-protection protocols tacacs
clear ddos-protection protocols tacacs aggregate
clear ddos-protection protocols tacacs aggregate states
clear-ddos-tacacs-aggregate-states
clear ddos-protection protocols tacacs aggregate statistics
clear-ddos-tacacs-aggregate-statistics
clear ddos-protection protocols tacacs states
clear-ddos-tacacs-states
clear ddos-protection protocols tacacs statistics
clear-ddos-tacacs-statistics
clear ddos-protection protocols tcp-flags
```

```
clear ddos-protection protocols tcp-flags aggregate
clear ddos-protection protocols tcp-flags aggregate states
clear-ddos-tcp-flags-aggregate-states
clear ddos-protection protocols tcp-flags aggregate statistics
clear-ddos-tcp-flags-aggregate-statistics
clear ddos-protection protocols tcp-flags established
clear ddos-protection protocols tcp-flags established states
clear-ddos-tcp-flags-establish-states
clear ddos-protection protocols tcp-flags established statistics
clear-ddos-tcp-flags-establish-statistics
clear ddos-protection protocols tcp-flags initial
clear ddos-protection protocols tcp-flags initial culprit-flows
clear ddos-protection protocols tcp-flags initial states
clear-ddos-tcp-flags-initial-states
clear ddos-protection protocols tcp-flags initial statistics
clear-ddos-tcp-flags-initial-statistics
clear ddos-protection protocols tcp-flags states
clear-ddos-tcp-flags-states
clear ddos-protection protocols tcp-flags statistics
clear-ddos-tcp-flags-statistics
clear ddos-protection protocols tcp-flags unclassified
clear ddos-protection protocols tcp-flags unclassified states
clear-ddos-tcp-flags-unclass-states
clear ddos-protection protocols tcp-flags unclassified statistics
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clear ddos-protection protocols telnet aggregate statistics
clear-ddos-telnet-aggregate-statistics
clear ddos-protection protocols telnet states
clear-ddos-telnet-states
clear ddos-protection protocols telnet statistics
clear-ddos-telnet-statistics
clear ddos-protection protocols telnetv6
clear ddos-protection protocols telnetv6 aggregate
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clear-ddos-telnetv6-aggregate-states
clear ddos-protection protocols telnetv6 aggregate statistics
clear-ddos-telnetv6-aggregate-statistics
clear ddos-protection protocols telnetv6 states
clear-ddos-telnetv6-states
clear ddos-protection protocols telnetv6 statistics
clear-ddos-telnetv6-statistics
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clear ddos-protection protocols ttl aggregate
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clear ddos-protection protocols ttl aggregate states
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clear ddos-protection protocols ttl aggregate statistics
clear-ddos-ttl-aggregate-statistics
clear ddos-protection protocols ttl states
clear-ddos-ttl-states
clear ddos-protection protocols ttl statistics
clear-ddos-ttl-statistics
clear ddos-protection protocols tunnel-fragment
clear ddos-protection protocols tunnel-fragment aggregate
clear ddos-protection protocols tunnel-fragment aggregate states
clear-ddos-tun-frag-aggregate-states
```

```
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clear-ddos-tun-frag-aggregate-statistics
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clear-ddos-tun-frag-states
clear ddos-protection protocols tunnel-fragment statistics
clear-ddos-tun-frag-statistics
clear ddos-protection protocols unclassified
clear ddos-protection protocols unclassified aggregate
clear ddos-protection protocols unclassified aggregate states
clear ddos-protection protocols unclassified aggregate statistics
clear ddos-protection protocols unclassified control-layer2
clear ddos-protection protocols unclassified control-layer2 culprit-flows
clear ddos-protection protocols unclassified control-layer2 states
clear ddos-protection protocols unclassified control-layer2 statistics
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clear ddos-protection protocols unclassified control-v4 states
clear ddos-protection protocols unclassified control-v4 statistics
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clear ddos-protection protocols unclassified control-v6 culprit-flows
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clear ddos-protection protocols unclassified control-v6 statistics
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clear ddos-protection protocols unclassified filter-v4 statistics
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clear ddos-protection protocols unclassified host-route-v4 statistics
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clear ddos-protection protocols unclassified host-route-v6 states
clear ddos-protection protocols unclassified host-route-v6 statistics
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clear ddos-protection protocols unknown-l2mc aggregate statistics
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clear ddos-protection protocols unknown-l2mc culprit-flows
```

```

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clear ddos-protection protocols unclassified resolve-v4 culprit-flows
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clear ddos-protection protocols unclassified resolve-v4 statistics
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clear ddos-protection protocols unclassified resolve-v6 states
clear ddos-protection protocols unclassified resolve-v6 statistics
clear ddos-protection protocols unclassified states
clear ddos-protection protocols unclassified statistics
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clear ddos-protection protocols virtual-chassis aggregate
clear ddos-protection protocols virtual-chassis aggregate culprit-flows
clear ddos-protection protocols virtual-chassis aggregate states
clear-ddos-protocols-states
clear-ddos-protocols-statistics
clear-ddos-radius-server-states
clear-ddos-radius-server-statistics
clear-ddos-radius-states
clear-ddos-radius-statistics
clear ddos-protection protocols re-services
clear ddos-protection protocols re-services aggregate
clear ddos-protection protocols re-services aggregate culprit-flows
<clear-ddos-re-services-aggregate-flows>

```

```
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clear-ddos-rip-statistics
clear-ddos-ripv6-aggregate-states
clear-ddos-ripv6-aggregate-statistics
clear-ddos-ripv6-states
clear-ddos-ripv6-statistics
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clear-ddos-rsvpv6-states
clear-ddos-rsvpv6-statistics
clear-ddos-services-aggregate-states
clear-ddos-services-aggregate-statistics
clear-ddos-services-states
clear-ddos-services-statistics
```

```
clear-ddos-snmp-aggregate-states
clear-ddos-snmp-aggregate-statistics
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clear-ddos-snmp-statistics
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clear-ddos-snmpv6-statistics
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clear-ddos-ssh-statistics
clear-ddos-sshv6-aggregate-states
clear-ddos-sshv6-aggregate-statistics
clear-ddos-sshv6-states
clear-ddos-sshv6-statistics
clear-ddos-stp-aggregate-states
clear-ddos-stp-aggregate-statistics
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clear-ddos-tcp-flags-establish-statistics
clear-ddos-tcp-flags-initial-states
clear-ddos-tcp-flags-initial-statistics
clear-ddos-tcp-flags-states
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clear-ddos-tcp-flags-unclass-statistics
clear-ddos-telnet-aggregate-states
clear-ddos-telnet-aggregate-statistics
clear-ddos-telnet-states
clear-ddos-telnet-statistics
clear-ddos-telnetv6-aggregate-states
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clear-ddos-telnetv6-statistics
clear-ddos-ttl-aggregate-states
clear-ddos-ttl-aggregate-statistics
clear-ddos-ttl-states
clear-ddos-ttl-statistics
clear-ddos-tun-frag-aggregate-states
```

```
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clear-ddos-tun-frag-states
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clear-ddos-vchassis-control-lo-statistics
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clear-ddos-vchassis-states
clear ddos-protection protocols virtual-chassis statistics
clear-ddos-vchassis-statistics
clear ddos-protection protocols virtual-chassis unclassified
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clear-ddos-vchassis-vc-ttl-err-statistics
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clear-ddos-vrrp-statistics
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clear ddos-protection protocols vrrpv6 aggregate
clear ddos-protection protocols vrrpv6 aggregate states
```

```
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clear ddos-protection protocols vrrpv6 statistics
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clear dhcp proxy-client statistics
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clear dot1x firewall interface
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clear virtual-chassis heartbeat
<clear-virtual-chassis-heartbeat-statistics>
<clear virtual-chassis protocol>
clear virtual-chassis protocol statistics
<clear-virtual-chassis-statistics>
<clear-virtual-chassis-port-statistics>
clear vpls
clear vpls mac-address
<clear-vpls-mac-address>
clear vpls mac-table
<clear-vpls-mac-table>
clear vpls mac-table interface
<clear-vpls-interface-mac-table>
request interface rebalance
request pppoe
request pppoe connect
request pppoe disconnect
request security ike debug-disable
<get-disable-ike-debug>
request security ike debug-enable
<get-enable-ike-debug>
request services rpm twamp start
request services rpm twamp start client
<twamp-test-start>
request services rpm twamp stop
request services rpm twamp stop client
<twamp-test-stop>
request snmp
<request-snmp-utility-mib-clear>
<request-snmp-utility-mib-set>
clear vpls statistics
<clear-vpls-statistics>
clear vrrp
<clear-vrrp-information>
clear vrrp interface
<clear-vrrp-interface-statistics>
request mpls
request mpls lsp
request mpls lsp adjust-autobandwidth
<request-mpls-lsp-autobandwidth-adjust>
clear services inline stateful-firewall
clear services inline stateful-firewall flows
```

```
<clear-service-inline-sfw-flow-table-information>
clear services inline stateful-firewall statistics
<clear-inline-stateful-firewall-statistics>
clear services service-sets statistics drop-flow-limit>
<clear-service-set-drop-flow-statistics>
clear services service-sets statistics jflow-log
<clear-service-set-jflow-log-statistics>
request services ipsec-vpn ipsec
request services ipsec-vpn ipsec switch
request services ipsec-vpn ipsec switch tunnel
request unified-edge
request unified-edge ggsn-pgw
request unified-edge ggsn-pgw call-trace
<monitor-mobile-gateways-call-trace-start>
request unified-edge ggsn-pgw call-trace clear
<get-mobile-gateways-call-trace-clear>
request unified-edge ggsn-pgw call-trace show
<get-mobile-gateways-call-trace-information>
request unified-edge ggsn-pgw call-trace start
<get-mobile-gateways-call-trace-start-information>
request unified-edge ggsn-pgw call-trace stop
<get-mobile-gateways-call-trace-stop-information>
request unified-edge sgw
request unified-edge sgw call-trace
request unified-edge sgw call-trace clear
<get-mobile-gateways-sgw-call-trace-clear>
request unified-edge sgw call-trace show
<get-mobile-gateways-sgw-call-trace-information>
request unified-edge sgw call-trace start
<get-mobile-gateways-sgw-call-trace-start-information>
request unified-edge sgw call-trace stop
<get-mobile-gateways-sgw-call-trace-stop-information>
```

Configuration Hierarchy Levels No associated CLI configuration hierarchy levels and statements.

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

configure

Can enter configuration mode.

Commands

```
configure
request snmp
request-snmp-utility-mib-clear
request-snmp-utility-mib-set
```

Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.
Related Documentation	<ul style="list-style-type: none"> • Access Privilege User Permission Flags Overview on page 110 • Understanding Junos OS Access Privilege Levels on page 26 • Example: Configuring User Permissions with Access Privilege Levels on page 65 • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76 • Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87

control

	Can perform all control-level operations; can modify any configuration.
Commands	<pre>request jnu request jnu role request jnu schema request jnu schema add request jnu schema delete</pre>
Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.
Related Documentation	<ul style="list-style-type: none"> • Access Privilege User Permission Flags Overview on page 110 • Understanding Junos OS Access Privilege Levels on page 26 • Example: Configuring User Permissions with Access Privilege Levels on page 65 • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76 • Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87

field

	Can view field debug commands.
Commands	No associated CLI commands.
Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.
Related Documentation	<ul style="list-style-type: none"> • Access Privilege User Permission Flags Overview on page 110 • Understanding Junos OS Access Privilege Levels on page 26 • Example: Configuring User Permissions with Access Privilege Levels on page 65

- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

firewall

Can view the firewall filter configuration in configuration mode.

Commands	<code>show firewall</code> <code><get-firewall-information></code>
	<code>show firewall counter</code> <code><get-firewall-counter-information></code>
	<code>show firewall filter</code> <code><get-firewall-filter-information></code>
	<code>show firewall filter version</code> <code><get-filter-version></code>
	<code>show firewall log</code> <code><get-firewall-log-information></code>
	<code>show firewall prefix-action-stats</code> <code><get-firewall-prefix-action-information></code>
	<code>show policer</code> <code><get-policer-information></code>
Configuration Hierarchy Levels	<code>[edit chassis satellite-management]</code> <code>[edit firewall]</code> <code>[edit dynamic-profiles firewall]</code> <code>[edit firewall]</code> <code>[edit logical-systems firewall]</code>
Related Documentation	<ul style="list-style-type: none">• Access Privilege User Permission Flags Overview on page 110• Understanding Junos OS Access Privilege Levels on page 26• Example: Configuring User Permissions with Access Privilege Levels on page 65• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76• Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87• firewall-control on page 184

firewall-control

Can view and configure firewall filter information at the `[edit dynamic-profiles firewall]`, `[edit firewall]`, and `[edit logical-systems firewall]` hierarchy levels.

Commands	<pre>show firewall <get-firewall-information> show firewall counter <get-firewall-counter-information> show firewall filter <get-firewall-filter-information> show firewall filter version <get-filter-version> show firewall log <get-firewall-log-information> show firewall prefix-action-stats <get-firewall-prefix-action-information> show policer</pre>
Configuration Hierarchy Levels	<pre>[edit dynamic-profiles firewall] [edit firewall] [edit logical-systems firewall]</pre>
Related Documentation	<ul style="list-style-type: none"> • Access Privilege User Permission Flags Overview on page 110 • Understanding Junos OS Access Privilege Levels on page 26 • Example: Configuring User Permissions with Access Privilege Levels on page 65 • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76 • Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87 • firewall on page 184

floppy

Can read from and write to the removable media.

Commands	No associated CLI commands.
Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.
Related Documentation	<ul style="list-style-type: none"> • Access Privilege User Permission Flags Overview on page 110 • Understanding Junos OS Access Privilege Levels on page 26 • Example: Configuring User Permissions with Access Privilege Levels on page 65 • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76

- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

flow-tap

Can view the flow-tap configuration in configuration mode.

Commands No associated CLI commands.

Configuration Hierarchy Levels `[edit services flow-tap]`
`[edit services radius-flow-tap]`
`[edit system services flow-tap-dtcp]`

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [flow-tap-control on page 186](#)

flow-tap-control

Can view the flow-tap configuration in configuration mode and can configure flow-tap configuration information at the `[edit services flow-tap]`, `[edit services radius-flow-tap]`, and `[edit system services flow-tap-dtcp]` hierarchy levels.

Commands No associated CLI commands.

Configuration Hierarchy Levels `[edit services flow-tap]`
`[edit services radius-flow-tap]`
`[edit system services flow-tap-dtcp]`

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [flow-tap on page 186](#)

flow-tap-operation

	Can make flow-tap requests to the router.
Commands	No associated CLI commands.
Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.
Related Documentation	<ul style="list-style-type: none"> • Access Privilege User Permission Flags Overview on page 110 • Understanding Junos OS Access Privilege Levels on page 26 • Example: Configuring User Permissions with Access Privilege Levels on page 65 • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76 • Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87

idp-profiler-operation

	Can view profiler data.
Commands	No associated CLI commands.
CLI Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.

interface

	Can view the interface configuration in configuration mode.
Commands	No associated CLI commands.
Configuration Hierarchy Levels	<pre>[edit accounting-options] [edit chassis] [edit class-of-service] [edit class-of-service interfaces] [edit dynamic-profiles class-of-service] [edit dynamic-profiles class-of-service interfaces] [edit dynamic-profiles interfaces] [edit dynamic-profiles routing-instances instance system services dhcp-local-server] [edit dynamic-profiles routing-instances instance system services static-subscribers group] [edit forwarding-options] [edit interfaces] [edit jnx-example] [edit logical-systems forwarding-options] [edit logical-systems interfaces] [edit logical-systems routing-instances instance system services dhcp-local-server]</pre>

```
[edit logical-systems routing-instances instance system services
static-subscribers group]
[edit logical-systems system services dhcp-local-server]
[edit logical-systems system services static-subscribers group]
[edit routing-instances instance system services dhcp-local-server]
[edit routing-instances instance system services static-subscribers group]
[edit services logging]
[edit services radius-flow-tap]
[edit services radius-flow-tap interfaces]
[edit system services dhcp-local-server]
[edit system services static-subscribers group]
```

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
 - [interface-control on page 188](#)

interface-control

Can view chassis, class of service (CoS), groups, forwarding options, and interfaces configuration information. Can edit configuration at the **[edit chassis]**, **[edit class-of-service]**, **[edit groups]**, **[edit forwarding-options]**, and **[edit interfaces]** hierarchy levels.

Commands No associated CLI commands.

Configuration Hierarchy Levels

```
[edit accounting-options]
[edit chassis]
[edit class-of-service]
[edit class-of-service interfaces]
[edit dynamic-profiles class-of-service]
[edit dynamic-profiles class-of-service interfaces]
[edit dynamic-profiles interfaces]
[edit dynamic-profiles routing-instances instance system services
dhcp-local-server]
[edit dynamic-profiles routing-instances instance system services
static-subscribers group]
[edit forwarding-options]
[edit interfaces]
[edit jnx-example]
[edit logical-systems forwarding-options]
[edit logical-systems interfaces]
[edit logical-systems routing-instances instance system services
dhcp-local-server]
[edit logical-systems routing-instances instance system services
static-subscribers group]
[edit logical-systems system services dhcp-local-server]
[edit logical-systems system services static-subscribers group]
[edit routing-instances instance system services dhcp-local-server]
```

```
[edit routing-instances instance system services static-subscribers group]
[edit services logging]
[edit services radius-flow-tap]
[edit services radius-flow-tap interfaces]
[edit system services dhcp-local-server]
[edit system services static-subscribers group]
```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [interface on page 187](#)

maintenance

Can perform system maintenance, including starting a local shell on the router and becoming the superuser in the shell, and can halt and reboot the router.

Commands

```
clear system commit synchronize-server pending-jobs
<clear-pending-commit-sync-jobs>
clear system reboot
<clear-reboot>

clear-system-services-reverse-information
file archive
<file-archive>
file change-owner
<file-change-owner>
<extract-file>
monitor traffic
request chassis afeb
request chassis beacon
<request-chassis-beacon>
request chassis cb
<request-chassis-cb>
request chassis ccg
<request-chassis-ccg>

request chassis cfeb
request chassis cfeb master
request chassis cip
request chassis fabric
request chassis fabric device
request chassis fabric guided-cabling
request chassis fabric plane
request chassis fabric upgrade-bandwidth
request chassis fabric upgrade-bandwidth fpc
request chassis fabric upgrade-bandwidth info
request chassis fan-tray
request chassis feb
```

```
<request-feb>

request chassis fpc
<request-chassis-fpc>
request chassis fpm
request chassis mcs
request chassis mic
request chassis optics
request chassis pcg
request chassis pic
<request-chassis-pic>
request chassis port-led
request chassis port-led start
<request-chassis-port-led-switch-on>
request chassis port-led stop
<request-chassis-port-led-switch-off>

request chassis redundancy
request chassis redundancy feb
  <request-redundancy-feb>
request chassis routing-engine
<request-chassis-routing-engine>
request chassis routing-engine hard-disk-test
request chassis routing-engine master
request chassis satellite device-mode
request chassis satellite disable
<request-chassis-satellite-disable>
request chassis satellite enable
<request-chassis-satellite-enable>
request chassis satellite file-copy
<request-chassis-satellite-file-copy>
request chassis satellite install
<request-chassis-satellite-install>
request chassis satellite interface
request chassis satellite login
<request-chassis-satellite-login>
request chassis satellite reboot
<request-chassis-satellite-reboot>
request chassis satellite restart
<request-chassis-satellite-restart>
request chassis satellite restart process
request chassis satellite shell-command
<request-chassis-satellite-shell-command>

request chassis scg
request chassis sfb
request chassis sfm
request chassis sfm master
request chassis sib
<request-chassis-sib>
request chassis sib f13

request chassis sib f2s
request chassis sib optics
request chassis spmb
<request-chassis-spmb>
request chassis ssb
request chassis ssb master
request chassis synchronization
request chassis synchronization force
request chassis synchronization force automatic-switching
```

```

request chassis synchronization force mark-failed
request chassis synchronization force unmark-failed
request chassis synchronization switch
request chassis tfcb
request chassis vcpu
request chassis vnpu
request diagnostics
request diagnostics tdr
request diagnostics tdr abort
request diagnostics tdr abort interface
<abort-tdr-interface-diagnostics>
request diagnostics tdr start
request diagnostics tdr start interface
<request-tdr-interface-diagnostics>
request extension-service
request extension-service start
<extension-service-start>
request extension-service stop
<extension-service-stop>
request l2circuit-switchover
request mpls
request mpls lsp
request mpls lsp adjust-autobandwidth
<request-mpls-lsp-autobandwidth-adjust>
request security
request security certificate
request security certificate enroll
request security datapath-debug
request security datapath-debug action-profile
request security datapath-debug action-profile reload-all
    <reload-eedebg-action-profile>

request security idp
    <request-idp-security-policy-load>

request security idp security-package
request security idp security-package download
    <request-idp-security-package-download>

request security idp security-package download version
    <request-idp-security-package-download-version>

request security idp security-package install
    <request-idp-security-package-install>
request security idp security-package offline-download
<request-idp-security-package-offline-download>
request security idp ssl-inspection
request security idp ssl-inspection key
request security idp ssl-inspection key add
    <request-idp-ssl-key-add>

request security idp ssl-inspection key delete
    <request-idp-ssl-key-delete>
request security idp storage-cleanup
    <request-idp-storage-cleanup>
request security ike
request security key-pair
request security pki
request security pki ca-certificate
request security pki ca-certificate ca-profile-group
request security pki ca-certificate ca-profile-group load

```

```
request security pki ca-certificate enroll
request security pki local-certificate export
request security pki ca-certificate load
    <load-pki-ca-certificate>
request security pki ca-certificate verify
    <verify-pki-ca-certificate>
request security pki crl
request security pki crl load
    <load-pki-crl>
request security pki generate-certificate-request
    <generate-pki-certificate-request>
request security pki generate-key-pair
    <generate-pki-key-pair>
request security pki local-certificate
request security pki local-certificate enroll
request security pki local-certificate generate-self-signed
    <generate-pki-self-signed-local-certificate>
request security pki local-certificate load
    <load-pki-local-certificate>
request security pki local-certificate verify
    <verify-pki-local-certificate>
request security pki verify-integrity-status
<verify-integrity-status>
request services fips
request services fips authorize
request services fips authorize pic
request services fips zeroize
request services fips zeroize pic
request services flow-collector
request services flow-collector change-destination
    <request-services-flow-collector-destination>

request services ggsn
request services ggsn pdp
request services ggsn pdp terminate
request services ggsn pdp terminate apn
    <request-ggsn-terminate-contexts-apn>

request services ggsn pdp terminate context
    <request-ggsn-terminate-context>

request services ggsn pdp terminate context msisdn
    <request-ggsn-terminate-msisdn-context>

request services ggsn restart
request services ggsn restart interface
    <request-ggsn-restart-interface>

request services ggsn restart node
    <request-ggsn-restart-node>

request services ggsn start
request services ggsn start interface
request services ggsn stop
request services ggsn stop interface
    <request-ggsn-stop-interface>

request services ggsn stop node
    <request-ggsn-stop-node>

request services ggsn trace
```

```

request services ggsn trace software
request services ggsn trace software update
    <request-ggsn-software-update>

request services ggsn trace start
request services ggsn trace start imsi
    <request-ggsn-start-imsi-trace>

request services ggsn trace start msisdn
    <request-ggsn-start-msisdn-trace>

request services ggsn trace stop
request services ggsn trace stop all
    <request-ggsn-stop-trace-activity>

request services ggsn trace stop imsi
    <request-ggsn-stop-imsi-trace>

request services ggsn trace stop msisdn
    <request-ggsn-stop-msisdn-trace>

request support
request support information
request system
request system boot-media
    <request-boot-media>
request system certificate
request system certificate add
request system commit
request system commit server
request system commit server pause
    <request-commit-server-pause>
request system commit server queue
request system commit server queue cleanup
    <request-commit-server-cleanup>
request system commit server start
    <request-commit-server-start>
request system configuration
request system configuration rescue
request system configuration rescue delete
    <request-delete-rescue-configuration>

request system configuration rescue save
    <request-save-rescue-configuration>
request system decrypt
    <security-decrypt-password>
request system diagnostics
request system diagnostics log-archive
    <request-log>
request system diagnostics transfer-control
    <transfer-control>
request system firmware
request system firmware downgrade
request system firmware downgrade cb
    <request-fpc-fpga-upgrade>
request system firmware downgrade feb
request system firmware downgrade fpc
request system firmware downgrade pic
request system firmware downgrade poe
request system firmware downgrade re
request system firmware downgrade scb

```

```
request system firmware downgrade sfm
request system firmware downgrade spmb
request system firmware downgrade ssb
request system firmware downgrade vcpu
request system firmware upgrade
request system firmware upgrade feb
request system firmware upgrade fpc
request system firmware upgrade fpga
request system firmware upgrade fpga cb
<request-cb-fpga-upgrade>
request system firmware upgrade fpga fpc
request system firmware upgrade fpga fpd
<request-fpd-fpga-upgrade>
request system firmware upgrade fpga ftc
<request-ftc-fpga-upgrade>
request system firmware upgrade fpga re
<request-re-fpga-upgrade>

request system firmware upgrade fpga scb
<request-scb-fpga-upgrade>
request system firmware upgrade fpga sib
<request-sib-fpga-upgrade>
request system firmware upgrade pic
request system firmware upgrade poe
request system firmware upgrade re
request system firmware upgrade re bios
request system firmware upgrade scb
request system firmware upgrade sfm
request system firmware upgrade spmb
request system firmware upgrade ssb
request system firmware upgrade vcpu
request system halt
    <request-halt>

request system keep-alive
request system license
request system license add
request system license delete
    <request-license-delete>
request system license revoke-licenses
<license-revoke-licenses>

request system license save
request system license update
    <request-license-update>
request system logout

request system partition
request system partition abort
request system partition compact-flash
request system partition hard-disk
request system power-off
    <request-power-off>

request system power-on
<request-power-on-other-re>
request system process
request system process terminate
<request-process-terminate>
request system reboot
    <request-reboot>
```

```
request system recover

request system scripts
request system scripts add
    <request-scripts-package-add>

request system scripts convert
request system scripts convert slax-to-xslt
request system scripts convert xslt-to-slax
request system scripts delete
    <request-scripts-package-delete>

request system scripts event-scripts
request system scripts event-scripts reload
    <reload-event-scripts>

request system scripts refresh-from
    <request-script-refresh-from>

request system scripts rollback
    <request-scripts-package-rollback>

request system scripts synchronize
<request-scripts-synchronize>

request system snapshot
    <request-snapshot>

request system software
request system software abort
request system software abort in-service-upgrade
    <abort-in-service-upgrade>

request system software add
    <request-package-add>

request system software delete
    <request-package-delete>

request system software delete-backup
    <request-package-delete-backup>

request system software in-service-upgrade
    <request-package-in-service-upgrade>

request system software nonstop-upgrade
    <request-package-nonstop-upgrade>
request system software recovery-package
request system software recovery-package add
request system software recovery-package delete
request system software recovery-package extract
request system software recovery-package extract ex-8200-package
request system software recovery-package extract ex-xre200-package
request system software rollback
    <request-package-rollback>

request system software validate
    <request-package-validate>
request system software validate in-service-upgrade
    <check-in-service-upgrade>
```

```
request system storage
request system storage cleanup
  <request-system-storage-cleanup>
request system storage cleanup qfabric
  <remove-qfabric-repository-contents>
request system storage mount
<request-mount>
request system storage unified-edge
request system storage unified-edge charging
request system storage unified-edge charging media
request system storage unified-edge media
request system storage unified-edge media eject
request system storage unified-edge media prepare
request system storage unmount
<request-unmount>
request system subscriber-management
request system subscriber-management new-sessions-disable
<request-sm-new-sessions-disable>
request system subscriber-management new-sessions-enable
<request-sm-new-sessions-enable>
request system yang enable
<request-yang-enable>
request system yang update
<request-yang-update>
request system yang validate
<request-yang-validate>
request system zeroize
request vmhost
request vmhost cleanup
<request-vmhost-file-cleanup>
request vmhost file-copy
<request-vmhost-file-copy>
request vmhost halt
<request-vmhost-halt>
request vmhost hard-disk-test
<request-vmhost-hard-disk-test>
request vmhost power-off
<request-vmhost-poweroff>
request vmhost power-on
<request-power-on-other-re>
request vmhost reboot
<request-vmhost-reboot>
request vmhost snapshot
<request-vmhost-snapshot>
request vmhost snapshot partition
<request-vmhost-snapshot-partition>
request vmhost snapshot recovery
<request-vmhost-snapshot-recovery>
request vmhost snapshot recovery partition
<request-vmhost-snapshot-recovery-partition>
request vmhost software
request vmhost software abort
request vmhost software abort in-service-upgrade
<abort-in-service-upgrade>
request vmhost software add
<request-vmhost-package-add>
request vmhost software in-service-upgrade
<request-vmhost-package-in-service-upgrade>
request vmhost software rollback
<request-package-rollback>
request vmhost zeroize
```

```

<request-vmhost-zeroize>
request vpls-switchover
set date
set date ntp
show chassis usb
show chassis usb storage
<get-usb-storage-status>
show services fips
show system configuration database
show system configuration database usage
<get-database-usage>
start shell
start shell user
test access
test access profile
    <get-radius-profile-access-test-result>

test access radius-server
    <get-radius-server-access-test-result>
get-test-services-l2tp-tunnel-result

```

Configuration Hierarchy Levels

```

[edit event-options]
[edit security ipsec internal]
[edit security ipsec trusted-channel]
[edit services dynamic-flow-capture traceoptions]
[edit services ggsn]
[edit system fips]
[edit services ggsn rule-space]
[edit system processes daemon-process command]
[edit system scripts]
[edit system scripts commit]
[edit system scripts op]
[edit system scripts snmp]

```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

network

Can access the network by using the **ping**, **ssh**, **telnet**, and **traceroute** commands.

Commands

```

mtrace
mtrace from-source
mtrace monitor
mtrace to-gateway
ping
    <ping>

```

```
ping atm
ping clns
ping ethernet
    <request-ping-ethernet>
ping fibre-channel
ping mpls
ping mpls bgp
    <request-ping-bgp-lsp>
ping mpls l2circuit
ping mpls l2circuit interface
    <request-ping-l2circuit-interface>

ping mpls l2circuit virtual-circuit
    <request-ping-l2circuit-virtual-circuit>

ping mpls l2vpn
ping mpls l2vpn fec129
ping mpls l2vpn fec129 interface
    <request-ping-l2vpn-fec129-interface>
ping mpls l2vpn instance
    <request-ping-l2vpn-instance>

ping mpls l2vpn interface
    <request-ping-l2vpn-interface>

ping mpls l3vpn
    <request-ping-l3vpn>

ping mpls ldp
    <request-ping-ldp-lsp>

ping mpls ldp p2mp
    <request-ping-ldp-p2mp-lsp>

ping mpls lsp-end-point
    <request-ping-lsp-end-point>

ping mpls rsvp
    <request-ping-rsvp-lsp>

ping overlay
    <request-ping-overlay>
ping vpls
ping vpls instance
    <request-ping-vpls-instance>

request routing-engine
request routing-engine login
    <request-routing-engine-login>
request routing-engine login other-routing-engine
    <request-login-to-other-routing-engine>
request services flow-collector
request services flow-collector test-file-transfer
    <request-services-flow-collector-test-file-transfer>

show host
show interfaces level-extra descriptions
show multicast mrinfo
ssh
telnet
traceroute
```

```

<traceroute>

traceroute clns
traceroute ethernet
  <request-traceroute-ethernet>

traceroute monitor
traceroute mpls
traceroute mpls l2vpn
<traceroute-mpls-l2vpn>
traceroute mpls l2vpn fec129
<traceroute-mpls-mspw>
traceroute mpls ldp
<traceroute-mpls-ldp>
traceroute mpls rsvp
<traceroute-mpls-rsvp>
traceroute overlay
<request-traceroute-overlay>

```

Configuration Hierarchy Levels No associated CLI configuration hierarchy levels and statements.

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

pgcp-session-mirroring

Can view session mirroring configuration by using the **pgcp** command.

Commands `show services pgcp gates gate-way display session-mirroring`

Configuration Hierarchy Levels `[edit services pgcp gateway session-mirroring]`
`[edit services pgcp session-mirroring]`

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
 - [pgcp-session-mirroring-control on page 200](#)

pgcp-session-mirroring-control

Can modify PGCP session mirroring configuration

Commands	show services pgcp gates gate-way display session-mirroring
Configuration Hierarchy Levels	[edit services pgcp gateway session-mirroring] [edit services pgcp session-mirroring]
Related Documentation	<ul style="list-style-type: none">• Access Privilege User Permission Flags Overview on page 110• Understanding Junos OS Access Privilege Levels on page 26• Example: Configuring User Permissions with Access Privilege Levels on page 65• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76• Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87• pgcp-session-mirroring on page 199

reset

Can restart software processes by using the **restart** command and can configure whether software processes configured at the **[edit system processes]** hierarchy level are enabled or disabled.

Commands	<pre>request chassis cfeb master switch request chassis cfeb master switch no-confirm request chassis routing-engine master acquire request chassis routing-engine master acquire force request chassis routing-engine master acquire force no-confirm request chassis routing-engine master acquire no-confirm request chassis routing-engine master release request chassis routing-engine master release no-confirm request chassis routing-engine master switch request chassis routing-engine master switch no-confirm request chassis satellite install no-confirm request chassis sfm master switch request chassis sfm master switch no-confirm request chassis ssb master switch request chassis ssb master switch no-confirm restart restart kernel-replication <restart-kernel-replication> restart-named-service restart routing <routing-restart> restart services restart services border-signaling-gateway <restart-border-signaling-gateway-service> restart services pgcp <restart-pgcp-service></pre>
----------	---

```
restart web-management
<restart-web-management>
```

Configuration Hierarchy Levels No associated CLI configuration hierarchy levels and statements.

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

rollback

Can roll back to previous configurations.

Commands `rollback`

Configuration Hierarchy Levels `[edit]`

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

routing

Can view general routing, routing protocol, and routing policy configuration information.

Commands

```
request mpls
request mpls lsp
request mpls lsp adjust-autobandwidth
<request-mpls-lsp-autobandwidth-adjust>
```

Configuration Hierarchy Levels

```
[edit bridge-domains]
[edit bridge-domains domain multicast-snooping-options]
[edit bridge-domains domain multicast-snooping-options traceoptions]
[edit dynamic-profiles protocols igmp traceoptions]
[edit dynamic-profiles protocols mld traceoptions]
[edit dynamic-profiles protocols router-advertisement traceoptions]
[edit dynamic-profiles routing-instances]
```

```
[edit dynamic-profiles routing-instances instance bridge-domains]
[edit dynamic-profiles routing-instances instance bridge-domains domain
multicast-snooping-options]
[edit dynamic-profiles routing-instances instance bridge-domains domain
multicast-snooping-options traceoptions]
[edit dynamic-profiles routing-instances instance multicast-snooping-options]
[edit dynamic-profiles routing-instances instance multicast-snooping-options
traceoptions]
[edit dynamic-profiles routing-instances instance pbb-options]
[edit dynamic-profiles routing-instances instance protocols]
[edit dynamic-profiles routing-instances instance protocols bgp group neighbor
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp group
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp traceoptions]
[edit dynamic-profiles routing-instances instance protocols esis traceoptions]
[edit dynamic-profiles routing-instances instance protocols isis traceoptions]
[edit dynamic-profiles routing-instances instance protocols l2vpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ldp traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group peer
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp peer
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp traceoptions]
[edit dynamic-profiles routing-instances instance protocols mvpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ospf traceoptions]
[edit dynamic-profiles routing-instances instance protocols pim traceoptions]
[edit dynamic-profiles routing-instances instance protocols rip traceoptions]
[edit dynamic-profiles routing-instances instance protocols ripng traceoptions]
[edit dynamic-profiles routing-instances instance protocols router-discovery
traceoptions]
[edit dynamic-profiles routing-instances instance protocols vpls traceoptions]
[[edit dynamic-profiles routing-instances instance routing-options]
[edit dynamic-profiles routing-instances instance routing-options multicast
traceoptions]
[edit dynamic-profiles routing-instances instance routing-options traceoptions]
[edit dynamic-profiles routing-instances instance service-groups]
[edit dynamic-profiles routing-instances instance switch-options]
[edit dynamic-profiles routing-options multicast traceoptions]
[edit jnx-example]
[edit fabric protocols]
[edit fabric protocols bgp group neighbor traceoptions]
[edit fabric protocols bgp group traceoptions]
[edit fabric protocols bgp traceoptions]
[edit fabric routing-instances]
[edit fabric routing-instances instance routing-options]
[edit fabric routing-instances instance routing-options traceoptions]
[edit fabric routing-options]
[edit fabric routing-options traceoptions]
[edit logical-systems bridge-domains]
[edit logical-systems bridge-domains domain multicast-snooping-options]
[edit logical-systems bridge-domains domain multicast-snooping-options
traceoptions]
[edit logical-systems policy-options]
[edit logical-systems protocols]
[edit logical-systems protocols bgp group neighbor traceoptions]
[edit logical-systems protocols bgp group traceoptions]
[edit logical-systems protocols bgp traceoptions]
[edit logical-systems protocols dvmrp traceoptions]
```

```

[edit logical-systems protocols isis traceoptions]
[edit logical-systems protocols igmp traceoptions]
[edit logical-systems protocols igmp-host traceoptions]
[edit logical-systems protocols isis traceoptions]
[edit logical-systems protocols l2circuit traceoptions]
[edit logical-systems protocols l2iw traceoptions]
[edit logical-systems protocols ldp traceoptions]
[edit logical-systems protocols mld traceoptions]
[edit logical-systems protocols mld-host traceoptions]
[edit logical-systems protocols msdp group peer traceoptions]
[edit logical-systems protocols msdp group traceoptions]
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[edit logical-systems protocols mvpn traceoptions]
[edit logical-systems protocols ospf traceoptions]
[edit logical-systems protocols pim traceoptions]
[edit logical-systems protocols rip traceoptions]
[edit logical-systems protocols ripng traceoptions]
[edit logical-systems protocols router-advertisement traceoptions]
[edit logical-systems protocols router-discovery traceoptions]
[edit logical-systems protocols rsvp lsp-set]
[edit logical-systems protocols rsvp traceoptions]
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[edit logical-systems routing-instances instance bridge-domains domain
multicast-snooping-options]
[edit logical-systems routing-instances instance bridge-domains domain
multicast-snooping-options traceoptions]
[edit logical-systems routing-instances instance igmp-snooping-options]
[edit logical-systems routing-instances instance multicast-snooping-options]
[edit logical-systems routing-instances instance multicast-snooping-options
traceoptions]
[edit logical-systems routing-instances instance pbb-options]
[edit logical-systems routing-instances instance protocols]
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traceoptions]
[edit logical-systems routing-instances instance protocols bgp group
traceoptions]
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[edit logical-systems routing-instances instance protocols isis traceoptions]
[edit logical-systems routing-instances instance protocols evpn traceoptions]
[edit logical-systems routing-instances instance protocols isis traceoptions]
[edit logical-systems routing-instances instance protocols l2vpn traceoptions]
[edit logical-systems routing-instances instance protocols ldp traceoptions]
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[edit logical-systems routing-instances instance protocols ospf traceoptions]
[edit logical-systems routing-instances instance protocols pim traceoptions]
[edit logical-systems routing-instances instance protocols rip traceoptions]
[edit logical-systems routing-instances instance protocols ripng traceoptions]
[edit logical-systems routing-instances instance protocols router-discovery
traceoptions]
[edit logical-systems routing-instances instance protocols rsvp]
[edit logical-systems routing-instances instance protocols rsvp lsp-set
traceoptions]

```

```
[edit logical-systems routing-instances instance protocols vpls traceoptions]
[edit logical-systems routing-instances instance routing-options]
[edit logical-systems routing-instances instance routing-options multicast
traceoptions]
[edit logical-systems routing-instances instance routing-options validation
group session traceoptions]
[edit logical-systems routing-instances instance routing-options validation
traceoptions]
[edit logical-systems routing-instances instance routing-options traceoptions]
[edit logical-systems routing-options validation group session traceoptions]
sho[edit logical-systems routing-instances instance service-groups]
[edit logical-systems routing-instances instance switch-options]
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multicast-snooping-options]
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multicast-snooping-options traceoptions]
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[edit logical-systems routing-options validation traceoptions]
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[edit multicast-snooping-options traceoptions]
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[edit protocols]
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[edit protocols bgp group neighbor traceoptions]
[edit protocols bgp group traceoptions]
[edit protocols bgp traceoptions]
[edit protocols connections]
[edit protocols dot1x]
[edit protocols dvmrp traceoptions]
[edit protocols esis traceoptions]
[edit protocols igmp traceoptions]
[edit protocols igmp-host traceoptions]
[edit protocols igmp-snooping]
[edit protocols isis traceoptions]
[edit protocols l2circuit traceoptions]
[edit protocols l2iw traceoptions]
[edit protocols ldp traceoptions]
[edit protocols lldp]
[edit protocols lldp-med]
[edit protocols mld traceoptions]
[edit protocols mld-host traceoptions]
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[edit protocols msdp group traceoptions]
[edit protocols msdp peer traceoptions]
[edit protocols msdp traceoptions]
[edit protocols mstp]
[edit protocols mvrp]
[edit protocols oam]
[edit protocols ospf traceoptions]
[edit protocols pim traceoptions]
[edit protocols rip traceoptions]
[edit protocols ripng traceoptions]
[edit protocols router-advertisement traceoptions]
```

```

[edit protocols router-discovery traceoptions]
[edit protocols rsvp traceoptions]
[edit protocols sflow]
[edit protocols stp]
[edit protocols uplink-failure-detection]
[edit protocols vstp]
[edit routing-instances]
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multicast-snooping-options traceoptions]
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[edit routing-instances instance multicast-snooping-options traceoptions]
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[edit routing-instances instance protocols mld-snooping vlan traceoptions]
[edit routing-instances instance protocols msdp group peer traceoptions]
[edit routing-instances instance protocols msdp group traceoptions]
[edit routing-instances instance protocols msdp peer traceoptions]
[edit routing-instances instance protocols msdp traceoptions]
[edit routing-instances instance protocols mvpn traceoptions]
[edit routing-instances instance protocols ospf traceoptions]
[edit routing-instances instance protocols pim traceoptions]
[edit routing-instances instance protocols rip traceoptions]
[edit routing-instances instance protocols ripng traceoptions]
[edit routing-instances instance protocols router-discovery traceoptions]
[edit routing-instances instance protocols vpls traceoptions]
[edit routing-instances instance routing-options]
[edit routing-instances instance routing-options validation group session
traceoptions]
[edit routing-instances instance routing-options validation traceoptions]
[edit routing-instances instance routing-options multicast traceoptions]
[edit routing-instances instance routing-options traceoptions]
[edit routing-instances instance service-groups]
[edit routing-instances instance switch-options]
[edit routing-instances instance vlans]
[edit routing-instances instance vlans vlan multicast-snooping-options]
[edit routing-instances instance vlans vlan multicast-snooping-options
traceoptions]
[edit routing-options]
[edit routing-options validation group session]
[edit routing-options multicast traceoptions]
[edit routing-options validation]
[edit routing-options traceoptions]
[edit switch-options]
[edit vlans]
[edit vlans vlan multicast-snooping-options]
[edit vlans vlan multicast-snooping-options traceoptions]

```

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
 - [routing-control on page 206](#)

routing-control

Can view general routing, routing protocol, and routing policy configuration information and can configure general routing at the **[edit routing-options]** hierarchy level, routing protocols at the **[edit protocols]** hierarchy level, and routing policy at the **[edit policy-options]** hierarchy level.

Commands No associated CLI commands.

Configuration Hierarchy Levels

```
[edit bridge-domains]
[edit bridge-domains domain multicast-snooping-options]
[edit bridge-domains domain multicast-snooping-options traceoptions]
[edit dynamic-profiles protocols igmp traceoptions]
[edit dynamic-profiles protocols mld traceoptions]
[edit dynamic-profiles protocols router-advertisement traceoptions]
[edit dynamic-profiles routing-instances]
[edit dynamic-profiles routing-instances instance bridge-domains]
[edit dynamic-profiles routing-instances instance bridge-domains domain
multicast-snooping-options]
[edit dynamic-profiles routing-instances instance bridge-domains domain
multicast-snooping-options traceoptions]
[edit dynamic-profiles routing-instances instance multicast-snooping-options]
[edit dynamic-profiles routing-instances instance multicast-snooping-options
traceoptions]
[edit dynamic-profiles routing-instances instance pbb-options]
[edit dynamic-profiles routing-instances instance protocols]
[edit dynamic-profiles routing-instances instance protocols bgp group neighbor
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp group
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp traceoptions]
[edit dynamic-profiles routing-instances instance protocols esis traceoptions]
[edit dynamic-profiles routing-instances instance protocols isis traceoptions]
[edit dynamic-profiles routing-instances instance protocols l2vpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ldp traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group peer
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp peer
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp traceoptions]
[edit dynamic-profiles routing-instances instance protocols mvpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ospf traceoptions]
```

```

[edit dynamic-profiles routing-instances instance protocols pim traceoptions]
[edit dynamic-profiles routing-instances instance protocols rip traceoptions]
[edit dynamic-profiles routing-instances instance protocols ripng traceoptions]
[edit dynamic-profiles routing-instances instance protocols router-discovery
  traceoptions]
[edit dynamic-profiles routing-instances instance protocols vpls traceoptions]
[edit dynamic-profiles routing-instances instance routing-options]
[edit dynamic-profiles routing-instances instance routing-options multicast
  traceoptions]
[edit dynamic-profiles routing-instances instance routing-options traceoptions]
[edit dynamic-profiles routing-instances instance service-groups]
[edit dynamic-profiles routing-instances instance switch-options]
[edit dynamic-profiles routing-options multicast traceoptions]
[edit jnx-example]
[edit fabric protocols]
[edit fabric protocols bgp group neighbor traceoptions]
[edit fabric protocols bgp group traceoptions]
[edit fabric protocols bgp traceoptions]
[edit fabric routing-instances]
[edit fabric routing-instances instance routing-options]
[edit fabric routing-instances instance routing-options traceoptions]
[edit fabric routing-options]
[edit fabric routing-options traceoptions]
[edit logical-systems bridge-domains]
[edit logical-systems bridge-domains domain multicast-snooping-options]
[edit logical-systems bridge-domains domain multicast-snooping-options
  traceoptions]
[edit logical-systems policy-options]
[edit logical-systems protocols]
[edit logical-systems protocols bgp group neighbor traceoptions]
[edit logical-systems protocols bgp group traceoptions]
[edit logical-systems protocols bgp traceoptions]
[edit logical-systems protocols dvmrp traceoptions]
[edit logical-systems protocols esis traceoptions]
[edit logical-systems protocols igmp traceoptions]
[edit logical-systems protocols igmp-host traceoptions]
[edit logical-systems protocols isis traceoptions]
[edit logical-systems protocols l2circuit traceoptions]
[edit logical-systems protocols l2iw traceoptions]
[edit logical-systems protocols ldp traceoptions]
[edit logical-systems protocols mld traceoptions]
[edit logical-systems protocols mld-host traceoptions]
[edit logical-systems protocols msdp group peer traceoptions]
[edit logical-systems protocols msdp group traceoptions]
[edit logical-systems protocols msdp peer traceoptions]
[edit logical-systems protocols msdp traceoptions]
[edit logical-systems protocols ospf traceoptions]
[edit logical-systems protocols pim traceoptions]
[edit logical-systems protocols rip traceoptions]
[edit logical-systems protocols ripng traceoptions]
[edit logical-systems protocols router-advertisement traceoptions]
[edit logical-systems protocols router-discovery traceoptions]
[edit logical-systems protocols rsvp traceoptions]
[edit logical-systems routing-instances]
[edit logical-systems routing-instances instance bridge-domains]
[edit logical-systems routing-instances instance bridge-domains domain
  multicast-snooping-options]
[edit logical-systems routing-instances instance bridge-domains domain
  multicast-snooping-options traceoptions]
[edit logical-systems routing-instances instance forwarding-options satellite]
[edit logical-systems routing-instances instance multicast-snooping-options]

```

```
[edit logical-systems routing-instances instance multicast-snooping-options
traceoptions]
[edit logical-systems routing-instances instance pbb-options]
[edit logical-systems routing-instances instance protocols]
[edit logical-systems routing-instances instance protocols bgp group neighbor
traceoptions]
[edit logical-systems routing-instances instance protocols bgp group
traceoptions]
[edit logical-systems routing-instances instance protocols bgp traceoptions]
[edit logical-systems routing-instances instance protocols esis traceoptions]
[edit logical-systems routing-instances instance protocols isis traceoptions]
[edit logical-systems routing-instances instance protocols l2vpn traceoptions]
[edit logical-systems routing-instances instance protocols ldp traceoptions]
[edit logical-systems routing-instances instance protocols msdp group peer
traceoptions]
[edit logical-systems routing-instances instance protocols msdp group
traceoptions]
[edit logical-systems routing-instances instance protocols msdp peer
traceoptions]
[edit logical-systems routing-instances instance protocols msdp traceoptions]
[edit logical-systems routing-instances instance protocols mvpn traceoptions]
[edit logical-systems routing-instances instance protocols ospf traceoptions]
[edit logical-systems routing-instances instance protocols pim traceoptions]
[edit logical-systems routing-instances instance protocols rip traceoptions]
[edit logical-systems routing-instances instance protocols ripng traceoptions]
[edit logical-systems routing-instances instance protocols router-discovery
traceoptions]
[edit logical-systems routing-instances instance protocols vpls traceoptions]
[edit logical-systems routing-instances instance routing-options]
[edit logical-systems routing-instances instance routing-options multicast
traceoptions]
[edit logical-systems routing-instances instance routing-options traceoptions]
[edit logical-systems routing-instances instance service-groups]
[edit logical-systems routing-instances instance switch-options]
[edit logical-systems routing-options]
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[edit logical-systems routing-options traceoptions]
[edit logical-systems switch-options]
[edit multicast-snooping-options]
[edit multicast-snooping-options traceoptions]
[edit policy-options]
[edit protocols]
[edit protocols amt traceoptions]
[edit protocols bgp group neighbor traceoptions]
[edit protocols bgp group traceoptions]
[edit protocols bgp traceoptions]
[edit protocols connections][edit protocols dot1x]
[edit protocols dvmrp traceoptions]
[edit protocols esis traceoptions]
[edit protocols igmp traceoptions]
[edit protocols igmp-host traceoptions]
[edit protocols igmp-snooping]
[edit protocols isis traceoptions]
[edit protocols l2circuit traceoptions]
[edit protocols l2iw traceoptions]
[edit protocols ldp traceoptions]
[edit protocols lldp]
[edit protocols lldp-med]
[edit protocols mld traceoptions]
[edit protocols mld-host traceoptions]
[edit protocols msdp group peer traceoptions]
```

```

[edit protocols msdp group traceoptions]
[edit protocols msdp peer traceoptions]
[edit protocols msdp traceoptions]
[edit protocols mstp]
[edit protocols mvrp]
[edit protocols oam]
[edit protocols ospf traceoptions]
[edit protocols pim traceoptions]
[edit protocols rip traceoptions]
[edit protocols ripng traceoptions]
[edit protocols router-advertisement traceoptions]
[edit protocols router-discovery traceoptions]
[edit protocols rsvp traceoptions]
[edit protocols sflow]
[edit protocols stp]
[edit protocols uplink-failure-detection]
[edit protocols vstp]
[edit routing-instances]
[edit routing-instances instance bridge-domains]
[edit routing-instances instance bridge-domains domain
multicast-snooping-options]
[edit routing-instances instance bridge-domains domain
multicast-snooping-options traceoptions]
[edit routing-instances instance multicast-snooping-options]
[edit routing-instances instance multicast-snooping-options traceoptions]
[edit routing-instances instance pbb-options]
[edit routing-instances instance protocols]
[edit routing-instances instance protocols bgp group neighbor traceoptions]
[edit routing-instances instance protocols bgp group traceoptions]
[edit routing-instances instance protocols bgp traceoptions]
[edit routing-instances instance protocols esis traceoptions]
[edit routing-instances instance protocols isis traceoptions]
[edit routing-instances instance protocols l2vpn traceoptions]
[edit routing-instances instance protocols ldp traceoptions]
[edit routing-instances instance protocols msdp group peer traceoptions]
[edit routing-instances instance protocols msdp group traceoptions]
[edit routing-instances instance protocols msdp peer traceoptions]
[edit routing-instances instance protocols msdp traceoptions]
[edit routing-instances instance protocols mvpn traceoptions]
[edit routing-instances instance protocols ospf traceoptions]
[edit routing-instances instance protocols pim traceoptions]
[edit routing-instances instance protocols rip traceoptions]
[edit routing-instances instance protocols ripng traceoptions]
[edit routing-instances instance protocols router-discovery traceoptions]
[edit routing-instances instance protocols vpls traceoptions]
[edit routing-instances instance routing-options]
[edit routing-instances instance routing-options multicast traceoptions]
[edit routing-instances instance routing-options traceoptions]
[edit routing-instances instance service-groups]
[edit routing-instances instance switch-options]
[edit routing-options]
[edit routing-options multicast traceoptions]
[edit routing-options traceoptions]
[edit switch-options]

```

**Related
Documentation**

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)

- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [routing on page 201](#)

secret

Can view passwords and other authentication keys in the configuration.

Commands No associated CLI commands.

Configuration Hierarchy Levels

```
[edit access profile client chap-secret]
[edit access profile client firewall-user password]
[edit access profile client l2tp shared-secret]
[edit access profile client pap-password]
[edit access profile radius-server secret]
[edit access radius clients accounting secret]
[edit access radius snoop-segments shared-secret]
[edit access radius-disconnect preauthentication-secret]
[edit access radius-disconnect secret]
[edit access radius-server preauthentication-secret]
[edit access radius-server secret]
[edit dynamic-profiles interfaces interface ppp-options chap
default-chap-secret]
[edit dynamic-profiles interfaces interface ppp-options pap default-password]
[edit dynamic-profiles interfaces interface ppp-options pap local-password]
[edit dynamic-profiles interfaces interface unit ppp-options chap
default-chap-secret]
[edit dynamic-profiles interfaces interface unit ppp-options pap
default-password]
[edit dynamic-profiles interfaces interface unit ppp-options pap local-password]
[edit interfaces interface ppp-options chap default-chap-secret]
[edit interfaces interface ppp-options pap default-password]
[edit interfaces interface ppp-options pap local-password]
[edit interfaces interface unit ppp-options chap default-chap-secret]
[edit interfaces interface unit ppp-options pap default-password]
[edit interfaces interface unit ppp-options pap local-password]
[edit logical-systems interfaces interface unit ppp-options chap]
[edit logical-systems interfaces interface unit ppp-options pap
default-password]
[edit logical-systems interfaces interface unit ppp-options pap local-password]
[edit logical-systems routing-instances instance system services
static-subscribers authentication password]
[edit logical-systems routing-instances instance system services
static-subscribers group authentication password]
[edit logical-systems system services static-subscribers authentication
password]
[edit logical-systems system services static-subscribers group authentication
password]
[edit routing-instances instance system services static-subscribers
authentication password]
[edit routing-instances instance system services static-subscribers group
authentication password]
[edit services ggsn apn radius accounting server secret]
[edit services ggsn apn radius authentication server secret]
```

```
[edit services ggsn radius server secret]
[edit system accounting destination radius server preauthentication-secret]
[edit system accounting destination radius server secret]
[edit system accounting destination radius server secret]
[edit system accounting destination tacplus server secret]
[edit system radius-server preauthentication-secret]
[edit system radius-server secret]
[edit system services outbound-ssh client secret]
[edit system services packet-triggered-subscribers partition-radius
accounting-shared-secret]
[edit system services static-subscribers authentication password]
[edit system services static-subscribers group authentication password]
[edit system tacplus-server secret]
```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [secret-control on page 211](#)

secret-control

Can view passwords and other authentication keys in the configuration and can modify them in configuration mode.

Commands No associated CLI commands.

Configuration Hierarchy Levels

```
[edit access profile client chap-secret]
[edit access profile client firewall-user password]
[edit access profile client l2tp shared-secret]
[edit access profile client pap-password]
[edit access profile radius-server secret]
[edit access radius-disconnect secret]
[edit dynamic-profiles interfaces interface ppp-options chap
default-chap-secret]
[edit dynamic-profiles interfaces interface ppp-options pap default-password]
[edit dynamic-profiles interfaces interface ppp-options pap local-password]
[edit dynamic-profiles interfaces interface unit ppp-options chap
default-chap-secret]
[edit dynamic-profiles interfaces interface unit ppp-options pap
default-password]
[edit dynamic-profiles interfaces interface unit ppp-options pap local-password]
[edit interfaces interface ppp-options chap default-chap-secret]
[edit interfaces interface ppp-options pap default-password]
[edit interfaces interface ppp-options pap local-password]
[edit interfaces interface unit ppp-options chap default-chap-secret]
[edit interfaces interface unit ppp-options pap default-password]
[edit interfaces interface unit ppp-options pap local-password]
[edit logical-systems interfaces interface unit ppp-options chap]
```

```
[edit logical-systems interfaces interface unit ppp-options pap
default-password]
[edit logical-systems interfaces interface unit ppp-options pap local-password]
[edit logical-systems routing-instances instance system services
static-subscribers authentication password]
[edit logical-systems routing-instances instance system services
static-subscribers group authentication password]
[edit logical-systems system services static-subscribers authentication
password]
[edit logical-systems system services static-subscribers group authentication
password]
[edit routing-instances instance system services static-subscribers
authentication password]
[edit routing-instances instance system services static-subscribers group
authentication password]
[edit services ggsn apn radius accounting server secret]
[edit services ggsn apn radius authentication server secret]
[edit services ggsn radius server secret]
[edit system accounting destination radius server secret]
[edit system accounting destination tacplus server secret]
[edit system radius-server secret]
[edit system services outbound-ssh client secret]
[edit system services packet-triggered-subscribers partition-radius
accounting-shared-secret]
[edit system services static-subscribers authentication password]
[edit system services static-subscribers group authentication password]
[edit system tacplus-server secret]
```

**Related
Documentation**

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [secret on page 210](#)

security

Can view security configuration.

Commands

```
clear security
clear security alarms
  <clear-security-alarm-information>
clear security idp
clear security idp application-ddos
clear security idp application-ddos cache
  <clear-idp-appddos-cache>

clear security idp application-identification
clear security idp application-identification application-system-cache
  <clear-idp-application-system-cache>
```

```

clear security idp application-statistics
    <clear-idp-applications-information>

clear security idp attack
clear security idp attack table
    <clear-idp-attack-table>

clear security idp counters
    <clear-idp-counters-by-counter-class>
clear security idp counters action
clear security idp counters application-ddos
clear security idp counters application-identification
clear security idp counters dfa
clear security idp counters flow
clear security idp counters http-decoder
clear security idp counters ips
clear security idp counters log
clear security idp counters memory
clear security idp counters packet
clear security idp counters packet-log
clear security idp counters pdf-decoder
clear security idp counters policy-manager
clear security idp counters ssl-inspection
clear security idp counters tcp-reassembler

clear security idp ssl-inspection
clear security idp ssl-inspection session-id-cache
    <clear-idp-ssl-session-cache-information>
clear security idp status
    <clear-idp-status-information>
clear security log
    <clear-security-log-information>
clear security pki
clear security pki ca-certificate
    <clear-pki-ca-certificate>
clear security pki certificate-request
    <clear-pki-certificate-request>
clear security pki crl
    <clear-pki-crl>
clear security pki key-pair
    <clear-pki-key-pair>
clear security pki local-certificate
    <clear-pki-local-certificate>
request security
request security certificate
request security certificate enroll
request security datapath-debug
request security datapath-debug action-profile
request security datapath-debug action-profile reload-all
request security idp
    <request-idp-policy-load>
request security idp security-package
request security idp security-package download
    <request-idp-security-package-download>

request security idp security-package download version
    <request-idp-security-package-download-version>

request security idp security-package install
    <request-idp-security-package-install>

```

```
request security idp ssl-inspection
request security idp ssl-inspection key
request security idp ssl-inspection key add
  <request-idp-ssl-key-add>

request security idp ssl-inspection key delete
  <request-idp-ssl-key-delete>
request security idp storage-cleanup
  <request-idp-storage-cleanup>
request security key-pair
request security pki
request security pki ca-certificate
request security pki ca-certificate verify
  <verify-pki-ca-certificate>
request security pki ca-certificate enroll
request security pki ca-certificate load
  <load-pki-ca-certificate>
request security pki crl
request security pki crl load
  <request security pki crl load>
request security pki generate-certificate-request
  <generate-pki-certificate-request>
request security pki generate-key-pair
  <generate-pki-key-pair>
request security pki local-certificate
request security pki local-certificate verify
  <verify-pki-local-certificate>
request security pki verify-integrity-status
  <verify-integrity-status>
request security pki local-certificate enroll
request security pki local-certificate generate-self-signed
  <generate-pki-self-signed-local-certificate>
request security pki local-certificate load
  <load-pki-local-certificate>
request system set-encryption-key
show security
show security alarms
  <get-security-alarm-information>
show security idp
show security idp application-ddos
show security idp application-ddos application
  <get-idp-addos-application-information>

show security idp application-identification
show security idp application-identification application-system-cache
  <get-idp-application-system-cache>

show security idp application-statistics
  <get-idp-applications-information>

show security idp attack
show security idp attack description
  <get-idp-attack-description-information>
show security idp attack detail
  <get-idp-attack-detail-information>
show security idp attack table
  <get-idp-attack-table-information>

show security idp counters
  <get-idp-counter-information>
```

```
show security idp counters action
show security idp counters application-ddos
show security idp counters application-identification
show security idp counters dfa
show security idp counters flow
show security idp counters http-decoder
show security idp counters ips
show security idp counters log
show security idp counters memory
show security idp counters packet
show security idp counters packet-log
show security idp counters pdf-decoder
show security idp counters policy-manager
show security idp counters ssl-inspection
show security idp counters tcp-reassembler

show security idp logical-system
show security idp logical-system policy-association
show security idp memory
  <get-idp-memory-information>

show security idp policies
  <get-idp-subscriber-policy-list>

show security idp policy-templates-list
  <get-idp-policy-template-information>
  <get-idp-predefined-attack-groups>
  <get-idp-predefined-attack-group-filters>
  <get-idp-predefined-attacks>
  <get-idp-predefined-attack-filters>
  <get-idp-recent-security-package-information>
show security idp policy-commit-status
  <get-idp-policy-commit-status>

<get-idp-recent-security-package-information>

show security idp security-package-version
  <get-idp-security-package-information>

show security idp ssl-inspection
show security idp ssl-inspection key
  <get-idp-ssl-key-information>

show security idp ssl-inspection session-id-cache
  <get-idp-ssl-session-cache-information>

show security idp status
  <get-idp-status-information>

show security idp status detail
  <get-idp-detail-status-information>
show security keychain
  <get-hakr-keychain-information>
show security log
  <get-security-log-information>

show security pki
show security pki ca-certificate
  <get-pki-ca-certificate>
show security pki certificate-request
  <get-pki-certificate-request>
```

	<pre>show security pki crl <get-pki-crl> show security pki local-certificate <get-pki-local-certificate></pre>
Configuration Hierarchy Levels	<pre>[edit security] [edit security alarms] [edit security log]</pre>
Related Documentation	<ul style="list-style-type: none">• Access Privilege User Permission Flags Overview on page 110• Understanding Junos OS Access Privilege Levels on page 26• Example: Configuring User Permissions with Access Privilege Levels on page 65• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76• Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87• security-control on page 216

security-control

Can view and configure security information at the **[edit security]** hierarchy level.

Commands

```
clear security
clear security alarms
  <clear-security-alarm-information>
clear security idp
clear security idp application-ddos
clear security idp application-ddos cache
  <clear-idp-appddos-cache>

clear security idp application-identification
clear security idp application-identification application-system-cache
  <clear-idp-application-system-cache>

clear security idp application-statistics
  <clear-idp-applications-information>

clear security idp attack
clear security idp attack table
  <clear-idp-attack-table>

clear security idp counters
  <clear-idp-counters-by-counter-class>

clear security idp ssl-inspection
clear security idp ssl-inspection session-id-cache
  <clear-idp-ssl-session-cache-information>
clear security idp status
  <clear-idp-status-information>
clear security log
  <clear-security-log-information>
clear security pki
clear security pki ca-certificate
```

```

    <clear-pki-ca-certificate>
clear security pki certificate-request
    <clear-pki-certificate-request>
clear security pki crl
    <clear-pki-crl>
clear security pki key-pair
    <clear-pki-key-pair>
clear security pki local-certificate
    <clear-pki-local-certificate>
request security
request security certificate
request security certificate enroll
request security datapath-debug
request security datapath-debug action-profile
request security datapath-debug action-profile reload-all
request security idp
    <request-idp-policy-load>
request security idp security-package
request security idp security-package download
    <request-idp-security-package-download>

request security idp security-package download version
    <request-idp-security-package-download-version>

request security idp security-package install
    <request-idp-security-package-install>
request security idp security-package offline-download
<request-idp-security-package-offline-download>
request security idp ssl-inspection
request security idp ssl-inspection key
request security idp ssl-inspection key add
    <request-idp-ssl-key-add>

request security idp ssl-inspection key delete
    <request-idp-ssl-key-delete>
request security idp storage-cleanup
    <request-idp-storage-cleanup>
request security key-pair
request security pki
request security pki ca-certificate
request security pki ca-certificate verify
    <verify-pki-ca-certificate>
request security pki ca-certificate enroll
request security pki ca-certificate load
    <load-pki-ca-certificate>
request security pki crl
request security pki crl load
    <request security pki crl load>
request security pki generate-certificate-request
    <generate-pki-certificate-request>
request security pki generate-key-pair
    <generate-pki-key-pair>
request security pki local-certificate
request security pki local-certificate verify
    <verify-pki-local-certificate>
request security pki local-certificate enroll
request security pki local-certificate generate-self-signed
    <generate-pki-self-signed-local-certificate>
request security pki local-certificate load
    <load-pki-local-certificate>
request system set-encryption-key

```

```
show security
show security alarms
    <get-security-alarm-information>
show security idp
show security idp application-ddos
show security idp application-ddos application
    <get-idp-addos-application-information>

show security idp application-identification
show security idp application-identification application-system-cache
    <get-idp-application-system-cache>

show security idp application-statistics
    <get-idp-applications-information>

show security idp attack
show security idp attack description
    <get-idp-attack-description-information>
show security idp attack detail
    <get-idp-attack-detail-information>
show security idp attack table
    <get-idp-attack-table-information>

show security idp counters
    <get-idp-counter-information>
show security idp counters action
show security idp counters application-ddos
show security idp counters application-identification
show security idp counters dfa
show security idp counters flow
show security idp counters http-decoder
show security idp counters ips
show security idp counters log
show security idp counters memory
show security idp counters packet
show security idp counters packet-log
show security idp counters pdf-decoder
show security idp counters policy-manager
show security idp counters ssl-inspection
show security idp counters tcp-reassembler

show security idp logical-system
show security idp logical-system policy-association
show security idp memory
    <get-idp-memory-information>

show security idp policies
    <get-idp-subscriber-policy-list>

show security idp policy-templates-list
    <get-idp-policy-template-information>
    <get-idp-predefined-attack-groups>
    <get-idp-predefined-attack-group-filters>
    <get-idp-predefined-attacks>
    <get-idp-predefined-attack-filters>
    <get-idp-recent-security-package-information>
show security idp policy-commit-status
    <get-idp-policy-commit-status>

<get-idp-recent-security-package-information>
```

```

show security idp security-package-version
  <get-idp-security-package-information>

show security idp ssl-inspection
show security idp ssl-inspection key
  <get-idp-ssl-key-information>

show security idp ssl-inspection session-id-cache
  <get-idp-ssl-session-cache-information>

show security idp status
  <get-idp-status-information>

show security idp status detail
  <get-idp-detail-status-information>
show security keychain
  <get-hakr-keychain-information>
show security log
  <get-security-log-information>

show security pki
show security pki ca-certificate
  <get-pki-ca-certificate>
show security pki certificate-request
  <get-pki-certificate-request>
show security pki crl
  <get-pki-crl>
show security pki local-certificate
  <get-pki-local-certificate>

```

**Configuration
Hierarchy Levels**

```

[edit security]
[edit security alarms]
[edit security log]

```

**Related
Documentation**

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [security on page 212](#)

shell

Can start a local shell on the router.

Commands

```

start shell
start shell user

```

Configuration Hierarchy Levels	No associated CLI configuration hierarchy levels and statements.
Related Documentation	<ul style="list-style-type: none">• Access Privilege User Permission Flags Overview on page 110• Understanding Junos OS Access Privilege Levels on page 26• Example: Configuring User Permissions with Access Privilege Levels on page 65• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76• Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87

snmp

	Can view Simple Network Management Protocol (SNMP) configuration.
Commands	No associated CLI commands.
Configuration Hierarchy Levels	<code>[edit snmp]</code>
Related Documentation	<ul style="list-style-type: none">• Access Privilege User Permission Flags Overview on page 110• Understanding Junos OS Access Privilege Levels on page 26• Example: Configuring User Permissions with Access Privilege Levels on page 65• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76• Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87

snmp-control

	Can view SNMP configuration information and can modify SNMP configuration at the <code>[edit snmp]</code> hierarchy level.
Commands	No associated CLI commands.
Configuration Hierarchy Levels	<code>[edit snmp]</code>
Related Documentation	<ul style="list-style-type: none">• Access Privilege User Permission Flags Overview on page 110• Understanding Junos OS Access Privilege Levels on page 26• Example: Configuring User Permissions with Access Privilege Levels on page 65• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76

- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [snmp on page 220](#)

system

Can view system-level configuration information.

Commands

```
request chassis synchronization
request chassis synchronization force
request chassis synchronization force automatic-switching
request chassis synchronization force mark-failed
request chassis synchronization force unmark-failed
request chassis synchronization switch
request path-computation-client retry-delegation
<request-path-computation-retry-delegation>
request virtual-chassis
request virtual-chassis device-reachability
<get-virtual-chassis-diagnostic-information>
request virtual-chassis member-id
request virtual-chassis member-id delete
delete-virtual-chassis-member-id
request virtual-chassis member-id set
<set-virtual-chassis-member-id>
request virtual-chassis mode
request virtual-chassis mode mixed
<request-virtual-chassis-mode-mixed>
request virtual-chassis reactivate
<request-virtual-chassis-reactivate>
request virtual-chassis recycle
<request-virtual-chassis-recycle>
request virtual-chassis renumber
<request-virtual-chassis-renumber>
request virtual-chassis routing-engine
request virtual-chassis routing-engine master
request virtual-chassis routing-engine master switch
<switch-vc-routing-engine-protocol-master>
request virtual-chassis vc-port
request virtual-chassis vc-port delete
request virtual-chassis vc-port delete fpc-slot
<request-virtual-chassis-vc-port-delete-fpc-slot>
request virtual-chassis vc-port delete pic-slot
<request-virtual-chassis-vc-port-delete-pic-slot>
request virtual-chassis vc-port set
request virtual-chassis vc-port set fpc-slot
<request-virtual-chassis-vc-port-set-fpc-slot>
request virtual-chassis vc-port set interface
<request-virtual-chassis-vc-port-set-interface>
request virtual-chassis vc-port set pic-slot
<request-virtual-chassis-vc-port-set-pic-slot>
<set-virtual-chassis-mode>
```

Configuration Hierarchy Levels

```
[edit applications]
[edit chassis system-domains]
[edit dynamic-profiles routing-instances instance forwarding-options helpers
  tftp]
[edit dynamic-profiles routing-instances instance routing-options fate-sharing]
```

```
[edit ethernet-switching-options]
[edit fabric virtual-chassis]
[edit forwarding-options helpers bootp]
[edit forwarding-options helpers domain]
[edit forwarding-options helpers port]
[edit forwarding-options helpers tftp]
[edit logical-systems]
[edit logical-systems protocols uplink-failure-detection]
[edit logical-systems routing-instances instance forwarding-options helpers
bootp]
[edit logical-systems routing-instances instance forwarding-options helpers
domain]
[edit logical-systems routing-instances instance forwarding-options helpers
port]
[edit logical-systems routing-instances instance forwarding-options helpers
tftp]
[edit logical-systems routing-instances instance routing-options fate-sharing]
[edit logical-systems routing-options fate-sharing]
[edit logical-systems system]
[edit logical-systems system syslog]
[edit poe]
[edit protocols uplink-failure-detection]
[edit routing-instances instance forwarding-options helpers bootp]
[edit routing-instances instance forwarding-options helpers domain]
[edit routing-instances instance forwarding-options helpers port]
[edit routing-instances instance forwarding-options helpers tftp]
[edit routing-instances instance routing-options fate-sharing]
[edit routing-options fate-sharing]
[edit services]
[edit services ggsn charging charging-log traceoptions]
[edit system]
[edit system archival]
[edit system backup-router]
[edit system boot loader authentication]
[edit system compress-configuration-files]
[edit system default-address-selection]
[edit system domain-name]
[edit system domain-search]
[edit system encrypt-configuration-files]
[edit system host-name]
[edit system inet6-backup-router]
[edit system internet-options gre-path-mtu-discovery]
[edit system internet-options ipip-path-mtu-discovery]
[edit system internet-options ipv6-path-mtu-discovery]
[edit system internet-options ipv6-path-mtu-discovery-timeout]
[edit system internet-options ipv6-reject-zero-hop-limit]
[edit system internet-options no-tcp-reset]
[edit system internet-options no-tcp-rfc1323]
[edit system internet-options no-tcp-rfc1323-paws]
[edit system internet-options path-mtu-discovery]
[edit system internet-options source-port upper-limit]
[edit system internet-options source-quench]
[edit system internet-options tcp-drop-synfin-set]
[edit system internet-options tcp-mss]
[edit system license]
[edit system max-configuration-rollback]
[edit system max-configurations-on-flash]
[edit system mirror-flash-on-disk]
[edit system no-debugger-on-alt-break]
[edit system no-redirects-ipv6]
[edit system name-server]
```

```
[edit no-hidden-commands system]
[edit system no-multicast-echo]
[edit system no-neighbor-learn]
[edit system no-redirects]
[edit system ports auxiliary log-out-on-disconnect]
[edit system ports auxiliary port-type]
[edit system ports auxiliary silent-with-modem]
[edit system ports console log-out-on-disconnect]
[edit system ports console port-type]
[edit system ports console silent-with-modem]
[edit system processes]
[edit system proxy]
[edit system saved-core-context]
[edit system saved-core-files]
[edit system services]
[edit system services web-management]
[edit system static-host-mapping]
[edit system syslog]
[edit system time-zone]
[edit virtual-chassis]
[edit virtual-chassis locality-bias]
[edit vlans]
```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [system-control on page 223](#)

system-control

Can view system-level configuration information and configure it at the **[edit system]** hierarchy level.

Configuration Hierarchy Levels

```
[edit applications]
[edit chassis system-domains]
[edit dynamic-profiles routing-instances instance forwarding-options helpers
  tftp]
[edit dynamic-profiles routing-instances instance routing-options fate-sharing]
[edit ethernet-switching-options]
[edit forwarding-options helpers bootp]
[edit forwarding-options helpers domain]
[edit forwarding-options helpers port]
[edit forwarding-options helpers tftp]
[edit logical-systems]
[edit logical-systems routing-instances instance forwarding-options helpers
  bootp]
[edit logical-systems routing-instances instance forwarding-options helpers
  domain]
[edit logical-systems routing-instances instance forwarding-options helpers
  port]
```

```
[edit logical-systems routing-instances instance forwarding-options helpers
tftp]
[edit logical-systems routing-instances instance routing-options fate-sharing]
[edit logical-systems routing-options fate-sharing]
[edit logical-systems system]
[edit poe]
[edit routing-instances instance forwarding-options helpers bootp]
[edit routing-instances instance forwarding-options helpers domain]
[edit routing-instances instance forwarding-options helpers port]
[edit routing-instances instance forwarding-options helpers tftp]
[edit routing-instances instance routing-options fate-sharing]
[edit routing-options fate-sharing]
[edit services]
[edit services ggsn charging charging-log traceoptions]
[edit system]
[edit system archival]
[edit system backup-router]
[edit system compress-configuration-files]
[edit system default-address-selection]
[edit system dgas-p-in]
[edit system dgas-p-usb]
[edit system domain-name]
[edit system domain-search]
[edit system encrypt-configuration-files]
[edit system host-name]
[edit system inet6-backup-router]
[edit system internet-options gre-path-mtu-discovery]
[edit system internet-options ipip-path-mtu-discovery]
[edit system internet-options ipv6-path-mtu-discovery]
[edit system internet-options ipv6-path-mtu-discovery-timeout]
[edit system internet-options ipv6-reject-zero-hop-limit]
[edit system internet-options no-tcp-reset]
[edit system internet-options no-tcp-rfc1323]
[edit system internet-options no-tcp-rfc1323-paws]
[edit system internet-options path-mtu-discovery]
[edit system internet-options source-port upper-limit]
[edit system internet-options source-quench]
[edit system internet-options tcp-drop-synfin-set]
[edit system internet-options tcp-mss]
[edit system license]
[edit system max-configuration-rollback]
[edit system max-configurations-on-flash]
[edit system mirror-flash-on-disk]
[edit system name-server]
[edit system no-multicast-echo]
[edit system no-neighbor-learn]
[edit system no-redirects]
[edit system ports auxiliary log-out-on-disconnect]
[edit system ports auxiliary port-type]
[edit system ports console log-out-on-disconnect]
[edit system ports console port-type]
[edit system processes]
[edit system saved-core-context]
[edit system saved-core-files]
[edit system services]
[edit system services web-management]
[edit system static-host-mapping]
[edit system syslog]
[edit system time-zone]
[edit virtual-chassis]
[edit vlans]
```

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
 - [system on page 221](#)

trace

Can view trace file settings and configure trace file properties.

Commands

```
clear log
  <clear-log>
clear log satellite
  <clear-log-satellite>
monitor
  request-monitor-ethernet-delay-measurement
    <request-monitor-ethernet-loss-measurement>
monitor interface
monitor interface traffic
monitor label-switched-path
monitor list
monitor start
monitor static-lsp
monitor stop
show log
  <get-log>
show log user
  <get-syslog-events>
```

Configuration Hierarchy Levels

```
[edit vlans domain multicast-snooping-options traceoptions]
[edit vlans domain protocols igmp-snooping]
[edit vlans domain forwarding-options dhcp-relay traceoptions]
[edit vlans domain protocols igmp-snooping traceoptions]
[edit vlans domain forwarding-options dhcp-relay interface-traceoptions]
[edit vlans domain multicast-snooping-options traceoptions]
[edit vlans domain protocols igmp-snooping traceoptions]
[edit class-of-service application-traffic-control traceoptions]
[edit demux traceoptions]
[edit dynamic-profiles protocols igmp traceoptions]
[edit dynamic-profiles protocols mld traceoptions]
[edit dynamic-profiles class-of-service application-traffic-control traceoptions]
[edit dynamic-profiles protocols oam ethernet link-fault-management traceoptions]
[edit dynamic-profiles protocols oam ethernet lmi]
[edit dynamic-profiles protocols router-advertisement traceoptions]
[edit dynamic-profiles protocols oam gre-tunnel traceoptions]
[edit dynamic-profiles routing-instances instance vlans domain forwarding-options dhcp-relay traceoptions]
```

```
[edit dynamic-profiles routing-instances instance vlans domain
multicast-snooping-options traceoptions]
[edit dynamic-profiles routing-instances instance vlans domain protocols
igmp-snooping traceoptions]
[edit dynamic-profiles routing-instances instance forwarding-options dhcp-relay
traceoptions]
[edit dynamic-profiles routing-instances instance multicast-snooping-options
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp group neighbor
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp group
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp traceoptions]
[edit dynamic-profiles routing-instances instance protocols esis traceoptions]
[edit dynamic-profiles routing-instances instance protocols igmp-snooping
traceoptions]
[edit dynamic-profiles routing-instances instance protocols isis traceoptions]
[edit dynamic-profiles routing-instances instance protocols l2vpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ldp traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group peer
traceoptions]
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traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp peer
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp traceoptions]
[edit dynamic-profiles routing-instances instance protocols mvpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ospf traceoptions]
[edit dynamic-profiles routing-instances instance protocols pim traceoptions]
[edit dynamic-profiles routing-instances instance protocols rip traceoptions]
[edit dynamic-profiles routing-instances instance protocols ripng traceoptions]
[edit dynamic-profiles routing-instances instance protocols router-discovery
traceoptions]
[edit dynamic-profiles routing-instances instance protocols vpls traceoptions]
[edit dynamic-profiles routing-instances instance routing-options multicast
traceoptions]
[edit dynamic-profiles routing-instances instance routing-options traceoptions]
[edit dynamic-profiles routing-instances instance services mobile-ip
traceoptions]
[edit dynamic-profiles routing-instances instance system services
dhcp-local-server traceoptions]
[edit dynamic-profiles routing-options multicast traceoptions]
[edit fabric protocols bgp group neighbor traceoptions]
[edit fabric protocols bgp group traceoptions]
[edit fabric protocols bgp traceoptions]
[edit fabric routing-instances instance routing-options traceoptions]
[edit fabric routing-options traceoptions]
[edit jnx-example traceoptions]
[edit logical-systems vlans domain forwarding-options dhcp-relay traceoptions]
[edit logical-systems vlans domain forwarding-options dhcp-relay
interface-traceoptions]
[edit logical-systems vlans domain multicast-snooping-options traceoptions]
[edit logical-systems vlans domain protocols igmp-snooping traceoptions]
[edit logical-systems forwarding-options dhcp-relay traceoptions]
[edit logical-systems protocols ancp traceoptions]
[edit logical-systems protocols bgp group neighbor traceoptions]
[edit logical-systems protocols bgp group traceoptions]
[edit logical-systems protocols bgp traceoptions]
[edit logical-systems protocols dot1x traceoptions]
[edit logical-systems protocols dvmrp traceoptions]
[edit logical-systems protocols esis traceoptions]
```

```

[edit logical-systems protocols igmp traceoptions]
[edit logical-systems protocols igmp-host traceoptions]
[edit logical-systems protocols ilmi traceoptions]
[edit logical-systems protocols isis traceoptions]
[edit logical-systems protocols l2circuit traceoptions]
[edit logical-systems protocols l2iw traceoptions]
[edit logical-systems protocols lacp traceoptions]
[edit logical-systems protocols layer2-control traceoptions]
[edit logical-systems protocols ldp traceoptions]
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[edit logical-systems protocols mld-host traceoptions]
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[edit logical-systems protocols mpls label-switched-path primary oam
traceoptions]
[edit logical-systems protocols mpls label-switched-path secondary oam
traceoptions]
[edit logical-systems protocols mpls oam traceoptions]
[edit logical-systems protocols msdp group peer traceoptions]
[edit logical-systems protocols msdp group traceoptions]
[edit logical-systems protocols msdp peer traceoptions]
[edit logical-systems protocols msdp traceoptions]
[edit logical-systems protocols neighbor-discovery secure traceoptions]
[edit logical-systems protocols oam ethernet fnp traceoptions]
[edit logical-systems protocols oam ethernet link-fault-management traceoptions]
[edit logical-systems protocols oam ethernet lmi traceoptions]
[edit logical-systems protocols ospf traceoptions]
[edit logical-systems protocols pim traceoptions]
[edit logical-systems protocols ppp monitor-session]
[edit logical-systems protocols ppp traceoptions]
[edit logical-systems protocols ppp-service traceoptions]
[edit logical-systems protocols pppoe traceoptions]
[edit logical-systems protocols rip traceoptions]
[edit logical-systems protocols ripng traceoptions]
[edit logical-systems protocols router-advertisement traceoptions]
[edit logical-systems protocols router-discovery traceoptions]
[edit logical-systems protocols rsvp lsp-set traceoptions]
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[edit logical-systems routing-instances instance vlans domain
multicast-snooping-options traceoptions]
[edit logical-systems routing-instances instance vlans domain protocols
igmp-snooping traceoptions]
[edit logical-systems routing-instances instance forwarding-options dhcp-relay
traceoptions]
[edit logical-systems routing-instances instance multicast-snooping-options
traceoptions]
[edit logical-systems routing-instances instance protocols bgp group neighbor
traceoptions]
[edit logical-systems routing-instances instance protocols bgp group
traceoptions]
[edit logical-systems routing-instances instance protocols bgp traceoptions]
[edit logical-systems routing-instances instance protocols esis traceoptions]
[edit logical-systems routing-instances instance protocols igmp-snooping
traceoptions]
[edit logical-systems routing-instances instance protocols isis traceoptions]
[edit logical-systems routing-instances instance protocols l2vpn traceoptions]
[edit logical-systems routing-instances instance protocols ldp traceoptions]
[edit logical-systems routing-instances instance protocols msdp group peer
traceoptions]
[edit logical-systems routing-instances instance protocols msdp group
traceoptions]

```

```
[edit logical-systems routing-instances instance protocols msdp peer
traceoptions]
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[edit logical-systems routing-instances instance protocols mvpn traceoptions]
[edit logical-systems routing-instances instance protocols ospf traceoptions]
[edit logical-systems routing-instances instance protocols pim traceoptions]
[edit logical-systems routing-instances instance protocols rip traceoptions]
[edit logical-systems routing-instances instance protocols ripng traceoptions]
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[edit logical-systems routing-instances instance protocols vpls traceoptions]
[edit logical-systems routing-instances instance routing-options multicast
traceoptions]
[edit logical-systems routing-instances instance routing-options traceoptions]
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traceoptions]
[edit logical-systems routing-instances instance system services
dhcp-local-server traceoptions]
[edit logical-systems routing-instances instance system services
dhcp-local-server interface-traceoptions]
[edit logical-systems routing-options multicast traceoptions]
[edit logical-systems routing-options traceoptions]
[edit logical-systems services mobile-ip traceoptions]
[edit logical-systems system services dhcp-local-server traceoptions]
[edit logical-systems system services dhcp-local-server interface-traceoptions]
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[edit protocols bgp group traceoptions]
[edit protocols bgp traceoptions]
[edit protocols dot1x traceoptions]
[edit protocols dvmrp traceoptions]
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[edit protocols igmp traceoptions]
[edit protocols igmp-host traceoptions]
[edit protocols ilmi traceoptions]
[edit protocols isis traceoptions]
[edit protocols l2circuit traceoptions]
[edit protocols l2iw traceoptions]
[edit protocols lacp traceoptions]
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[edit protocols ldp traceoptions]
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[edit protocols mld-host traceoptions]
[edit protocols mpls label-switched-path oam traceoptions]
[edit protocols mpls label-switched-path primary oam traceoptions]
[edit protocols mpls label-switched-path secondary oam traceoptions]
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[edit protocols msdp group peer traceoptions]
[edit protocols msdp group traceoptions]
[edit protocols msdp peer traceoptions]
[edit protocols msdp traceoptions]
[edit protocols neighbor-discovery secure traceoptions]
[edit protocols protocols oam ethernet fnp]
[edit protocols oam ethernet connectivity-fault-management traceoptions]
[edit protocols oam ethernet link-fault-management traceoptions]
[edit protocols oam ethernet lmi traceoptions]
[edit protocols ospf traceoptions]
[edit protocols pim traceoptions]
[edit protocols ppp monitor-session]
[edit protocols ppp traceoptions]
```

```
[edit protocols ppp-service traceoptions]
[edit protocols pppoe traceoptions]
[edit protocols rip traceoptions]
[edit protocols ripng traceoptions]
[edit protocols router-advertisement traceoptions]
[edit protocols router-discovery traceoptions]
[edit protocols rsvp lsp-set traceoptions]
[edit protocols rsvp traceoptions]
[edit routing-instances instance vlans domain multicast-snooping-options
traceoptions]
[edit routing-instances instance vlans domain protocols igmp-snooping
traceoptions]
[edit routing-instances instance multicast-snooping-options traceoptions]
[edit routing-instances instance protocols bgp group neighbor traceoptions]
[edit routing-instances instance protocols bgp group traceoptions]
[edit routing-instances instance protocols bgp traceoptions]
[edit routing-instances instance protocols esis traceoptions]
[edit routing-instances instance protocols igmp-snooping traceoptions]
[edit routing-instances instance protocols isis traceoptions]
[edit routing-instances instance protocols l2vpn traceoptions]
[edit routing-instances instance protocols ldp traceoptions]
[edit routing-instances instance protocols msdp group peer traceoptions]
[edit routing-instances instance protocols msdp group traceoptions]
[edit routing-instances instance protocols msdp peer traceoptions]
[edit routing-instances instance protocols msdp traceoptions]
[edit routing-instances instance protocols mvpn traceoptions]
[edit routing-instances instance protocols ospf traceoptions]
[edit routing-instances instance protocols pim traceoptions]
[edit routing-instances instance protocols rip traceoptions]
[edit routing-instances instance protocols ripng traceoptions]
[edit routing-instances instance protocols router-discovery traceoptions]
[edit routing-instances instance protocols vpls traceoptions]
[edit routing-instances instance routing-options multicast traceoptions]
[edit routing-instances instance routing-options traceoptions]
[edit routing-options multicast traceoptions]
[edit routing-options traceoptions]
[edit security idp traceoptions]
[edit security pki traceoptions]
[edit services adaptive-services-pics traceoptions]
[edit services captive-portal-content-delivery]
[edit services l2tp traceoptions]
[edit services server-load-balance traceoptions]
[edit services logging traceoptions]
[edit services mobile-ip traceoptions]
[edit services ssl traceoptions]
[edit system accounting traceoptions]
[edit system auto-configuration traceoptions]
[edit system ddos-protection traceoptions]
[edit system license traceoptions]
[edit system processes app-engine-virtual-machine-management-service
traceoptions]
[edit system processes datapath-trace-service traceoptions]
[edit system processes dhcp-service interface-traceoptions]
[edit system processes dhcp-service traceoptions]
[edit system processes diameter-service traceoptions]
[edit system processes general-authentication-service traceoptions]
[edit system processes mac-validation traceoptions]
[edit system processes mag-service traceoptions]
[edit system processes process-monitor traceoptions]
[edit system processes resource-cleanup traceoptions]
[edit system processes sdk-service traceoptions]
```

```
[edit system processes static-subscribers traceoptions]
[edit system services database-replication traceoptions]
[edit system services dhcp traceoptions]
[edit system services local-policy-decision-function traceoptions]
[edit system services outbound-ssh traceoptions]
[edit system services service-deployment traceoptions]
[edit system services subscriber-management traceoptions]
[edit system services subscriber-management-helper traceoptions]
[edit system services web-management traceoptions]
```

**Related
Documentation**

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [trace-control on page 230](#)

trace-control

Can modify trace file settings and configure trace file properties.

**Configuration
Hierarchy Levels**

```
[edit vlans domain forwarding-options dhcp-relay interface-traceoptions]
[edit vlans domain forwarding-options dhcp-relay traceoptions]
[edit vlans domain multicast-snooping-options traceoptions]
[edit vlans domain protocols igmp-snooping traceoptions]
[edit demux traceoptions]
[edit dynamic-profiles protocols igmp traceoptions]
[edit dynamic-profiles protocols mld traceoptions]
[edit dynamic-profiles protocols oam ethernet link-fault-management
traceoptions]
[dynamic-profiles protocols oam ethernet lmi]
[edit dynamic-profiles protocols router-advertisement traceoptions]
[edit dynamic-profiles protocols oam gre-tunnel traceoptions]
[edit dynamic-profiles routing-instances instance vlans domain
forwarding-options dhcp-relay traceoptions]
[edit dynamic-profiles routing-instances instance vlans domain
multicast-snooping-options traceoptions]
[edit dynamic-profiles routing-instances instance vlans domain protocols
igmp-snooping traceoptions]
[edit dynamic-profiles routing-instances instance forwarding-options dhcp-relay
traceoptions]
[edit dynamic-profiles routing-instances instance multicast-snooping-options
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp group neighbor
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp group
traceoptions]
[edit dynamic-profiles routing-instances instance protocols bgp traceoptions]
[edit dynamic-profiles routing-instances instance protocols esis traceoptions]
[edit dynamic-profiles routing-instances instance protocols igmp-snooping
traceoptions]
```

```

[edit dynamic-profiles routing-instances instance protocols isis traceoptions]
[edit dynamic-profiles routing-instances instance protocols l2vpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ldp traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group peer
traceoptions]
[edit dynamic-profiles routing-instances instance protocols msdp group
traceoptions]
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traceoptions]
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[edit dynamic-profiles routing-instances instance protocols mvpn traceoptions]
[edit dynamic-profiles routing-instances instance protocols ospf traceoptions]
[edit dynamic-profiles routing-instances instance protocols pim traceoptions]
[edit dynamic-profiles routing-instances instance protocols rip traceoptions]
[edit dynamic-profiles routing-instances instance protocols ripng traceoptions]
[edit dynamic-profiles routing-instances instance protocols router-discovery
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traceoptions]
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traceoptions]
[edit dynamic-profiles routing-instances instance system services
dhcp-local-server traceoptions]
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[edit fabric protocols bgp group traceoptions]
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[edit fabric routing-instances instance routing-options traceoptions]
[edit fabric routing-options traceoptions]
[edit forwarding-options dhcp-relay interface-traceoptions]
[edit forwarding-options dhcp-relay traceoptions]
[edit jnx-example traceoptions]
[edit logical-systems vlans domain forwarding-options dhcp-relay
interface-traceoptions]
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[edit logical-systems vlans domain multicast-snooping-options traceoptions]
[edit logical-systems vlans domain protocols igmp-snooping traceoptions]
[edit logical-systems forwarding-options dhcp-relay traceoptions]
[edit logical-systems protocols ancp traceoptions]
[edit logical-systems protocols bgp group neighbor traceoptions]
[edit logical-systems protocols bgp group traceoptions]
[edit logical-systems protocols bgp traceoptions]
[edit logical-systems protocols dot1x traceoptions]
[edit logical-systems protocols dvmrp traceoptions]
[edit logical-systems protocols esis traceoptions]
[edit logical-systems protocols igmp traceoptions]
[edit logical-systems protocols igmp-host traceoptions]
[edit logical-systems protocols ilmi traceoptions]
[edit logical-systems protocols isis traceoptions]
[edit logical-systems protocols l2circuit traceoptions]
[edit logical-systems protocols l2iw traceoptions]
[edit logical-systems protocols lacp traceoptions]
[edit logical-systems protocols layer2-control traceoptions]
[edit logical-systems protocols ldp traceoptions]
[edit logical-systems protocols mld traceoptions]
[edit logical-systems protocols mld-host traceoptions]
[edit logical-systems protocols mpls label-switched-path oam traceoptions]
[edit logical-systems protocols mpls label-switched-path primary oam
traceoptions]

```

```
[edit logical-systems protocols mpls label-switched-path secondary oam
traceoptions]
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[edit logical-systems protocols msdp group peer traceoptions]
[edit logical-systems protocols msdp group traceoptions]
[edit logical-systems protocols msdp peer traceoptions]
[edit logical-systems protocols msdp traceoptions]
[edit logical-systems protocols neighbor-discovery secure traceoptions]
[edit logical-systems protocols oam ethernet link-fault-management traceoptions]
[edit logical-systems protocols oam ethernet lmi traceoptions]
[edit logical-systems protocols ospf traceoptions]
[edit logical-systems protocols pim traceoptions]
[edit logical-systems protocols ppp monitor-session]
[edit logical-systems protocols ppp traceoptions]
[edit logical-systems protocols ppp-service traceoptions]
[edit logical-systems protocols pppoe traceoptions]
[edit logical-systems protocols rip traceoptions]
[edit logical-systems protocols ripng traceoptions]
[edit logical-systems protocols router-advertisement traceoptions]
[edit logical-systems protocols router-discovery traceoptions]
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dhcp-relay interface-traceoptions]
[edit logical-systems routing-instances instance vlans domain forwarding-options
dhcp-relay traceoptions]
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multicast-snooping-options traceoptions]
[edit logical-systems routing-instances instance vlans domain protocols
igmp-snooping traceoptions]
[edit logical-systems routing-instances instance forwarding-options dhcp-relay
traceoptions]
[edit logical-systems routing-instances instance multicast-snooping-options
traceoptions]
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traceoptions]
[edit logical-systems routing-instances instance protocols bgp group
traceoptions]
[edit logical-systems routing-instances instance protocols bgp traceoptions]
[edit logical-systems routing-instances instance protocols esis traceoptions]
[edit logical-systems routing-instances instance protocols igmp-snooping
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[edit logical-systems routing-instances instance protocols l2vpn traceoptions]
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[edit logical-systems routing-instances instance protocols msdp peer
traceoptions]
[edit logical-systems routing-instances instance protocols msdp traceoptions]
[edit logical-systems routing-instances instance protocols mvpn traceoptions]
[edit logical-systems routing-instances instance protocols ospf traceoptions]
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[edit logical-systems routing-instances instance protocols rip traceoptions]
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[edit logical-systems routing-instances instance protocols vpls traceoptions]
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traceoptions]
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dhcp-local-server interface-traceoptions]
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[edit protocols dvmrp traceoptions]
[edit protocols esis traceoptions]
[edit protocols igmp traceoptions]
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[edit protocols ilmi traceoptions]
[edit protocols isis traceoptions]
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[edit protocols l2iw traceoptions]
[edit protocols lacp traceoptions]
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[edit protocols mpls label-switched-path primary oam traceoptions]
[edit protocols mpls label-switched-path secondary oam traceoptions]
[edit protocols mpls oam traceoptions]
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[edit protocols oam ethernet link-fault-management traceoptions]
[edit protocols oam ethernet lmi traceoptions]
[edit protocols ospf traceoptions]
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[edit protocols ripng traceoptions]
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interface-traceoptions]
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traceoptions]
[edit routing-instances instance vlans domain protocols igmp-snooping

```

```
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interface-traceoptions]
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[edit routing-options traceoptions]
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[edit security pki traceoptions]
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[edit services captive-portal-content-delivery]
[edit system ddos-protection traceoptions]
[edit services l2tp traceoptions]
[edit services logging traceoptions]
[edit services mobile-ip traceoptions]
[edit services server-load-balance traceoptions]
[edit services ssl traceoptions]
[edit system accounting traceoptions]
[edit system auto-configuration traceoptions]
[edit system license traceoptions]
[edit system processes datapath-trace-service traceoptions]
[edit system processes diameter-service traceoptions]
[edit system processes general-authentication-service traceoptions]
[edit system processes mac-validation traceoptions]
[edit system processes process-monitor traceoptions]
[edit system processes resource-cleanup traceoptions]
[edit system processes sdk-service traceoptions]
[edit system processes static-subscribers traceoptions]
[edit system services database-replication traceoptions]
[edit system services dhcp traceoptions]
[edit system services dhcp-local-server traceoptions]
[edit system services dhcp-local-server interface-traceoptions]
[edit system services local-policy-decision-function traceoptions]
[edit system services outbound-ssh traceoptions]
[edit system services service-deployment traceoptions]
[edit system services subscriber-management traceoptions]
[edit system services subscriber-management-helper traceoptions]
```

```
[edit unified-edge aaa traceoptions]
[edit unified-edge gateways tdf charging traceoptions]
```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)
- [trace on page 225](#)

view

Can view current system-wide, routing table, and protocol-specific values and statistics.

Commands

```
clear ipv6 router-advertisement
<clear-ipv6-router-advertisement-information>clear l2circuit auto-sensing
<clear-l2ckt-pw-auto-sensing>
<request-validation-policy>
show
show access-security
show access-security router-advertisement-guard
show access-security router-advertisement-guard entries
<show-as-router-advertisement-entry>
show access-security router-advertisement-guard state
<show-as-ra-state>
show access-security router-advertisement-guard statistics
<get-as-router-advertisement-statistics>
show access-security router-advertisement-guard statistics interface
<get-as-router-advertisement-interface>
show accounting

show accounting profile
<get-accounting-profile-information>

show accounting records
<get-accounting-record-information>

show amt
show amt statistics
<get-amt-statistics>
show amt summary
<get-amt-summary>
show amt tunnel
<get-amt-tunnel-information>
show amt tunnel gateway-address
<get-amt-tunnel-gateway-address>
show amt tunnel tunnel-interface
<get-amt-tunnel-interface>
show analytics collector
<get-analytics-collector>
show ancp
```

```
show ancp cos
  <get-ancp-cos-information>
show ancp cos last-update
  <get-ancp-cos-last-update-information>

show ancp cos pending-update
  <get-ancp-cos-pending-information>

show ancp neighbor
  <get-ancp-neighbor-information>
show ancp statistics
  <get-ancp-stats-information>
show ancp subscriber
  <get-ancp-subscriber-information>

show ancp subscriber identifier
  <get-ancp-subscriber-identifier-information>
show ancp subscriber neighbor
show app-engine
show app-engine information
show app-engine packages
show app-engine packages remote
  <get-virtual-machine-package-remote>
show app-engine packages system
  <get-virtual-machine-package-system>
show app-engine processes
show app-engine resource-usage
show app-engine route-table
show app-engine routing-instance
show app-engine routing-instance compute-clusters
show app-engine routing-instance virtual-machines
show app-engine status
show app-engine virtual-machine package
  <get-virtual-machine-package-information>
show application-monitor
  <get-application-monitor-information>
show application-monitor probe
show application-monitor probe flows
  <get-application-monitor-probe-flows-information>
show application-monitor probe measurements
  <get-application-monitor-probe-measurements>
show application-monitor probe mirrors
  <get-application-monitor-probe-mirrors>
show app-engine virtual-machine vm-instance
show aps
  <get-aps-information>

show aps group
  <get-aps-group-information>
show aps interface
  <get-aps-interface-information>
show arp
  <get-arp-table-information>

show as-path
  <get-as-path>
show as-path domain
  <get-as-path-domain>
show auto-configuration
show auto-configuration interfaces
show backup-selection
```

```
<get-backup-selection>
show backup-selection instance
<get-backup-selection-instance>
show bfd
show bfd session
    <get-bfd-session-information>

show bfd session address
    <get-bfd-session-address>
show bfd session client
    <get-bfd-session-client>
show bfd session client rsvp-oam
    <get-bfd-session-client-rsvp>
show bfd session client vpls-oam
    <get-bfd-session-client-vpls>
show bfd session client vpls-oam instance
    <get-bfd-session-client-vpls-instance>
show bfd session discriminator
    <get-bfd-session-discriminator>
show bfd session prefix
    <get-bfd-session-prefix>
show bfd subscriber
show bfd subscriber session
    <get-bfd-subscriber-session>
show bgp
show bgp bmp
    <get-bgp-monitoring-protocol-statistics>
show bgp group
    <get-bgp-group-information>
show bgp group output-queues
    <get-bgp-group-output-queue-information>

show bgp group rtf
    <get-bgp-rtf-information>

show bgp group traffic-statistics
    <get-bgp-traffic-statistics-information>

show bgp neighbor
    <get-bgp-neighbor-information>

show bgp neighbor orf
    <get-bgp-orf-information>
show bgp neighbor output-queue
    <get-bgp-output-queue-information>
show bgp output-scheduler

show bgp replication
    <get-bgp-replication-information>
show bgp summary
    <get-bgp-summary-information>

show bridge
show bridge domain
    <get-bridge-instance-information>

show bridge domain operational
    <get-operational-bridge-instance-information>
show bridge domain satellite
    <get-satellite-control-bridge-domain>
show bridge evpn
```

```
show bridge evpn arp-table
<get-bridge-evpn-arp-table>
show bridge evpn peer-gateway-macs
<get-bridge-peer-gateway-mac>
<get-bridge-flood-information>
show bridge flood
show bridge flood event-queue
    <get-bridge-domain-event-queue-information>
show bridge flood next-hops
show bridge flood next-hops satellite
<get-satellite-control-composite-next-hop>
show bridge flood route
show bridge flood route all-ce-flood
    <get-show-bridge-domain-all-ce-flood-route-information>

show bridge flood route all-ve-flood
    <get-show-bridge-domain-ve-flood-route-information>
show bridge flood route alt-root-flood
    <get-bridge-domain-alt-root-flood-route-information>
show bridge flood route bd-flood
    <get-bridge-domain-bd-flood-route-information>
show bridge flood route mlp-flood
    <get-bridge-domain-mlp-flood-route-information>
show bridge flood route re-flood
    <get-bridge-domain-re-flood-route-information>
show bridge flood satellite
<get-satellite-control-flood>
show bridge interface
show bridge interface satellite
<get-satellite-control-bridge-interface>
show bridge mac-table
    <get-bridge-mac-table>
show bridge mac-table interface
    <get-bridge-interface-mac-table>
show bridge mac-table satellite
<get-satellite-control-bridge-mac-table>
show bridge satellite
show bridge satellite device
<get-satellite-device-db>
show bridge satellite events
<get-satellite-control-history-information>
show bridge satellite logging
<get-satellite-control-logging-information>
show bridge satellite summary
<get-satellite-control-bridge-summary>

show bridge statistics
    <get-bridge-statistics-information>
show chassis
show chassis adc
show chassis alarms
    <get-alarm-information>
show chassis alarms fpc
<get-fpc-alarm-information>
show chassis alarms satellite
<get-chassis-alarm-satellite-information>
show chassis beacon
    <get-chassis-beacon-information>
show chassis beacon cb
    <get-chassis-cb-beacon-information>
show chassis environment adc
```

```

show chassis environment ccg
<get-environment-ccg-information>
show chassis cfeb
<get-cfeb-information>
show chassis cip
show chassis craft-interface
<get-craft-information>
show chassis environment
<get-environment-information>
show chassis environment cb
<get-environment-cb-information>
show chassis environment cip
<get-environment-cip-information>
show chassis environment feb
<get-environment-feb-information>
show chassis environment fan
show chassis environment fpc
<get-environment-fpc-information>
show chassis environment fpc satellite
<get-chassis-environment-fpc-satellite-info>
show chassis environment fpm
<get-environment-fpm-information>
show chassis environment mcs
<get-environment-mcs-information>
show chassis environment pcg
<get-environment-pcg-information>
show chassis environment pdu
<get-environment-pdu-information>
show chassis environment pem
<get-environment-pem-information>
show chassis environment pem satellite
<get-chassis-environment-pem-satellite-info>
show chassis environment psm
show chassis environment psu
<get-environment-psu-information>
show chassis environment routing-engine
<get-environment-re-information>
show chassis environment routing-engine satellite
<get-chassis-environment-re-satellite-info>
show chassis environment satellite
<get-chassis-environment-satellite-information>
show chassis environment scg
<get-environment-scg-information>
show chassis environment service-node
<get-environment-service-node-information>
show chassis environment sfb
show chassis environment sfm
<get-environment-sfm-information>

show chassis environment sib
<get-environment-sib-information>

show chassis environment sib f13
show chassis environment sib f2s
show chassis ethernet-switch
show chassis ethernet-switch errors
show chassis ethernet-switch statistics
show chassis ethernet-switch temperature
show chassis fabric
show chassis fabric degraded-fabric-reachability
show chassis fabric device

```

```
<get-chassis-fabric-information-device>
show chassis fabric connectivity
<get-chassis-fabric-connectivity-information>
show chassis fabric degradation
<get-fm-degradation-information>
show chassis fabric degradation actions
<get-fm-degradation-information-details>
show chassis fabric destinations
<get-fm-fabric-destinations-state>
show chassis fabric errors
show chassis fabric errors autoheal
<get-fm-plane-autoheal-errors>
show chassis fabric errors fpc
  <get-fm-fpc-errors>

show chassis fabric errors sib
  <get-fm-sib-errors>

show chassis fabric errors sib f13
show chassis fabric errors sib f2s
show chassis fabric feb
show chassis fabric fpcs
  <get-fm-fpc-state-information>

show chassis fabric links
  <get-chassis-fabric-link-information>
show chassis fabric map
show chassis fabric plane
  <get-fm-plane-state-information>

show chassis fabric plane-location
show chassis fabric reachability
  <get-fm-fabric-reachability-information>
show chassis fabric sibs
  <get-fm-sib-state-information>
show chassis fabric spray-weights
  <get-chassis-fabric-spray-weight-information>
show chassis fabric spray-weights from
show chassis fabric spray-weights to
show chassis fabric summary
  <get-fm-state-information>

show chassis fabric topology
  <get-chassis-fabric-topology-information>
show chassis fabric unreachable-destinations
  <get-fm-unreachable-dest-information>
show chassis fan
show chassis fan satellite
get-chassis-fan-satellite-information
show chassis feb
  <get-feb-brief-information>

show chassis feb detail
  <get-feb-information>

show chassis firmware
  <get-firmware-information>

show chassis firmware detail
  <get-firmware-information-detail>
show chassis firmware satellite
```

```
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show chassis forwarding
  <get-fwdd-information>

show chassis fpc
  <get-fpc-information>

show chassis fpc errors
  <get-fpc-error-information>

show chassis fpc pic-status
  <get-pic-information>

show chassis fpc-feb-connectivity
  <get-fpc-feb-connectivity-information>

show chassis hardware
  <get-chassis-inventory>
show chassis hardware satellite
  <get-chassis-hardware-satellite-information>
show chassis hss
show chassis hss link-quality
show chassis in-service-upgrade
show chassis ioc-npc-connectivity
  <get-ioc-npc-connectivity-information>
show chassis jam-test
  <get-jam-test-information>
show chassis lcc-mode
  <get-chassis-lcc-mode-information>

show chassis lccs
  <get-fru-information>
  <get-chassis-led-satellite-information>
show chassis location
  <get-chassis-location>

show chassis location fpc
show chassis location interface
show chassis location interface by-name
  <get-interface-location-name-information>

show chassis location interface by-slot
  <get-interface-location-information>
show chassis mac-addresses
show chassis multicast-loadbalance
  <get-chassis-ae-lb-information>

show chassis network-services
  <network-services>

show chassis nonstop-upgrade
show chassis pic
  <get-pic-detail>

show chassis power
  <get-power-usage-information>

show chassis power detail
  <get-power-usage-information-detail>
show chassis power sequence
show chassis power upgrade
```

```
show chassis power-ratings
  <get-power-management>

show chassis psd
  <get-psd-information>

show chassis redundancy
show chassis redundancy feb
  <get-feb-redundancy-information>

show chassis redundancy feb errors
  <get-feb-redundancy-error-information>

show chassis redundancy feb redundancy-group
  <get-feb-redundancy-group-information>

show chassis redundant-power-system
  <get-rps-chassis-information>

show chassis routing-engine
  <get-route-engine-information>

show chassis routing-engine bios
  <get-bios-version-information>
show chassis routing-engine bios satellite
  <get-chassis-routing-engine-bios-satellite-info>
show chassis routing-engine errors
  <get-chassis-routing-engine-errors>
show chassis routing-engine satellite
  <get-chassis-routing-engine-satellite-information>
show chassis satellite
  <get-chassis-satellite-information>
show chassis satellite extended-port
  <get-chassis-satellite-extended-port-information>
show chassis satellite interface
  <get-chassis-satellite-interface-information>
show chassis satellite neighbor
  <get-chassis-satellite-neighbor-information>
show chassis satellite neighbor statistics
  <get-chassis-satellite-neighbor-statistics>
  show chassis satellite power-budget-statistics
    <get-power-budget-information>
show chassis satellite redundancy-group
  <get-chassis-satellite-redundancy-group-info>
show chassis satellite redundancy-group devices
  <get-chassis-satellite-redundacy-grp-devices-info>
show chassis satellite redundancy-group devices history
  <get-chassis-satellite-redundancy-grp-dev-history>
show chassis satellite software
  <get-satellite-management-software-information>
show chassis satellite statistics
  <get-chassis-satellite-statistics>
  show chassis satellite unprovision
    <get-chassis-satellite-unprovision-information>
  show chassis satellite upgrade-group
    <get-chassis-satellite-upgrade-group-information>
show chassis satellite-cluster
  <get-chassis-satellite-cluster-information>
  show chassis satellite-cluster route
    <get-chassis-satellite-cluster-route>
```

```

show chassis satellite-cluster statistics
<get-chassis-satellite-cluster-statistics>
show chassis scb
<get-scb-information>

show chassis service-node
<get-service-node-information>

show chassis sfm
<get-sfm-information>

show chassis sfm detail
show chassis sibs
<get-sib-information>

show chassis spmb
<get-spmb-information>
show chassis spmb errors
<get-spmb-error-information>

show chassis spmb sibs
<get-spmb-sib-information>

show chassis ssb
<get-ssb-information>

show chassis synchronization
<get-clock-synchronization-information>

show chassis synchronization backup
show chassis synchronization gnss
show chassis synchronization master
show chassis system-mode
<get-system-mode-information>
show chassis temperature-thresholds
<get-temperature-threshold-information>
show chassis temperature-thresholds satellite
<get-chassis-temp-thresholds-satellite-info>
show chassis vcpu
show chassis zones
<get-chassis-zones-information>
show class-of-service
<get-cos-information>

show class-of-service adaptive-shaper
<get-cos-adaptive-shaper-information>

show class-of-service application-traffic-control
show class-of-service application-traffic-control counter
show class-of-service application-traffic-control rate-limiters
show class-of-service application-traffic-control rate-limiters rl-all
<get-appqos-swrl-stat-all>
show class-of-service application-traffic-control rate-limiters rl-name
<get-appqos-swrl-stat-name>
show class-of-service application-traffic-control rate-limiters summary
<get-appqos-swrl-stat-summary>
show class-of-service application-traffic-control statistics
show class-of-service application-traffic-control statistics rate-limiter
show class-of-service application-traffic-control statistics rule
<get-appqos-rule-statistics>
show class-of-service classifier

```

```
<get-cos-classifier-information>

show class-of-service code-point-aliases
<get-cos-code-point-map-information>

show class-of-service congestion-notification
<get-cos-congestion-notification-information>
show class-of-service drop-profile
<get-cos-drop-profile-information>

show class-of-service fabric
show class-of-service fabric scheduler-map
<get-cos-fabric-scheduler-map-information>

show class-of-service fabric statistics
<get-fabric-queue-information>

show class-of-service fabric statistics detail
<get-fabric-queue-detailed-information>

show class-of-service forwarding-class
<get-cos-forwarding-class-information>

show class-of-service forwarding-class-set
<get-cos-forwarding-class-set-information>
show class-of-service forwarding-table
<get-cos-table-information>

show class-of-service forwarding-table classifier
<get-cos-classifier-table-information>

show class-of-service forwarding-table classifier mapping
<get-cos-classifier-table-map-information>

show class-of-service forwarding-table drop-profile
<get-cos-red-information>

show class-of-service forwarding-table fabric
show class-of-service forwarding-table fabric scheduler-map
<get-cos-fwtab-fabric-scheduler-map-information>

show class-of-service forwarding-table forwarding-class-map
<get-cos-forwarding-class-map-table-information>

show class-of-service forwarding-table forwarding-class-map mapping
<get-cos-forwarding-class-map-interface-table-information>

show class-of-service forwarding-table loss-priority-map
<get-cos-loss-priority-map-table-information>

show class-of-service forwarding-table loss-priority-map mapping
<get-cos-loss-priority-map-table-binding-information>

show class-of-service forwarding-table loss-priority-rewrite
<get-cos-loss-priority-rewrite-table-information>
show class-of-service forwarding-table loss-priority-rewrite mapping
<get-cos-loss-priority-rewrite-table-binding-information>
show class-of-service forwarding-table policer
<get-cos-policer-table-map-information>
show class-of-service forwarding-table policy-map
<get-cos-policy-map-table-information>
```

```
show class-of-service forwarding-table policy-map mapping
<get-cos-policy-map-table-map-information>show class-of-service forwarding-table
rewrite-rule
  <get-cos-rewrite-table-information>

show class-of-service forwarding-table rewrite-rule mapping
  <get-cos-rewrite-table-map-information>

show class-of-service forwarding-table scheduler-map
  <get-cos-scheduler-map-table-information>
show class-of-service forwarding-table scheduler-map mapping
<get-scheduler-map-table-map-information>

show class-of-service forwarding-table shaper
  <get-cos-shaper-table-map-information>

show class-of-service forwarding-table translation-table
  <get-cos-translation-table-information>

show class-of-service forwarding-table translation-table mapping
  <get-cos-translation-table-mapping-information>

show class-of-service fragmentation-map
  <get-cos-fragmentation-map-information>

show class-of-service interface
  <get-cos-interface-map-information>

show class-of-service interface-set
  <get-cos-interface-set-map-information>

show class-of-service l2tp-session
  <get-cos-l2tp-session-map-information>

show class-of-service loss-priority-map
  <get-cos-loss-priority-map-information>

show class-of-service loss-priority-rewrite
  <get-cos-loss-priority-rewrite-information>
show class-of-service multi-destination
  <get-cos-multi-destination-information>
show class-of-service multi-destination classifier-binding
<get-cos-multi-destination-classifier-binding-information>

show class-of-service packet-buffer
<get-cos-packet-buffer-information>
show class-of-service packet-buffer usage
<get-cos-packet-buffer-usage-information>
show class-of-service policy-map
<get-cos-policy-map-information>

show class-of-service rewrite-rule
  <get-cos-rewrite-information>

show class-of-service routing-instance
  <get-cos-routing-instance-map-information>

show class-of-service scheduler-hierarchy
show class-of-service scheduler-hierarchy interface
  <get-interface-scheduler-hierarchy-information>
```

```
show class-of-service scheduler-hierarchy interface-set
    <get-interface-set-scheduler-hierarchy-information>

show class-of-service scheduler-map
    <get-cos-scheduler-map-information>

show class-of-service traffic-control-profile
    <get-cos-traffic-control-profile-information>

show class-of-service translation-table
    <get-cos-translation-table-map-information>

show class-of-service virtual-channel
    <get-cos-virtual-channel-information>

show class-of-service virtual-channel-group
    <get-cos-virtual-channel-group-information>

show cli
show cli authorization
    <get-authorization-information>
show cli commands
show cli commands
show cli directory
    <get-current-working-directory>
show cli history
show cloud-analytics
show cloud-analytics connections
    <get-cloud-analytics-connections>
show cloud-analytics discovery-service
    <get-cloud-analytics-discovery-service>
show cloud-analytics linecard
    <get-cloud-analytics-lc>
show cloud-analytics resources
    <get-cloud-analytics-resources>
show cloud-analytics resources-sampling
    <get-cloud-analytics-resources-sampling>
show cloud-analytics resources-summary
    <get-cloud-analytics-resources-summary>
show cloud-analytics sensors
    <sensor-information>
show cloud-analytics streaming-policies
    <get-cloud-analytics-streaming-policies>
show configuration
show connections
    <get-ccc-information>
show database-replication
show database-replication statistics
    <get-database-replication-statistics-information>

show database-replication summary
    <get-database-replication-summary-information>
show ddos-protection
show ddos-protection protocols
    <get-ddos-protocols-information>
show ddos-protection protocols all-fiber-channel-enode
    <get-ddos-all-fc-enode-information>
show ddos-protection protocols all-fiber-channel-enode aggregate
    <get-ddos-all-fc-enode-aggregate>
show ddos-protection protocols all-fiber-channel-enode aggregate culprit-flows
    <get-ddos-all-fc-enode-aggregate-flows>
```

```

show ddos-protection protocols all-fiber-channel-enode culprit-flows
<get-ddos-all-fc-enode-flows>
show ddos-protection protocols all-fiber-channel-enode flow-detection
<get-ddos-all-fc-enode-flow-parameters>
show ddos-protection protocols all-fiber-channel-enode parameters
<get-ddos-all-fc-enode-parameters>
show ddos-protection protocols all-fiber-channel-enode statistics
<get-ddos-all-fc-enode-statistics>
show ddos-protection protocols all-fiber-channel-enode violations
<get-ddos-all-fc-enode-violations>
show ddos-protection protocols amtv4
show ddos-protection protocols amtv4 aggregate
show ddos-protection protocols amtv4 aggregate culprit-flows
show ddos-protection protocols amtv4 culprit-flows
show ddos-protection protocols amtv4 flow-detection
show ddos-protection protocols amtv4 parameters
show ddos-protection protocols amtv4 statistics
show ddos-protection protocols amtv4 violations
show ddos-protection protocols amtv6
show ddos-protection protocols amtv6 aggregate
show ddos-protection protocols amtv6 aggregate culprit-flows
show ddos-protection protocols amtv6 culprit-flows
show ddos-protection protocols amtv6 flow-detection
show ddos-protection protocols amtv6 statistics
show ddos-protection protocols amtv6 violations

```

```

show ddos-protection protocols ancp
<get-ddos-ancp-information>

```

```

show ddos-protection protocols ancp aggregate
<get-ddos-ancp-aggregate>
show ddos-protection protocols ancp parameters
<get-ddos-ancp-parameters>

```

```

show ddos-protection protocols ancp statistics
<get-ddos-ancp-statistics>
show ddos-protection protocols ancp violations
<get-ddos-ancp-violations>
show ddos-protection protocols ancpv6
<get-ddos-ancpv6-information>
show ddos-protection protocols ancpv6 aggregate
get-ddos-ancpv6-aggregate
show ddos-protection protocols ancpv6 parameters
get-ddos-ancpv6-parameters
show ddos-protection protocols ancpv6 statistics
get-ddos-ancpv6-statistics
show ddos-protection protocols ancpv6 violations
get-ddos-ancpv6-violations
show ddos-protection protocols arp
get-ddos-arp-information
show ddos-protection protocols arp aggregate
get-ddos-arp-aggregate
show ddos-protection protocols arp parameters
get-ddos-arp-parameters
show ddos-protection protocols arp statistics
get-ddos-arp-statistics
show ddos-protection protocols arp violations
get-ddos-arp-violations
show ddos-protection protocols arp-snoop
<get-ddos-arp-snoop-information>

```

```
show ddos-protection protocols arp-snoop aggregate
<get-ddos-arp-snoop-aggregate>
show ddos-protection protocols arp-snoop aggregate culprit-flows
<get-ddos-arp-snoop-aggregate-flows>
show ddos-protection protocols arp-snoop culprit-flows
<get-ddos-arp-snoop-flows>
show ddos-protection protocols arp-snoop flow-detection
<get-ddos-arp-snoop-flow-parameters>
show ddos-protection protocols arp-snoop parameters
<get-ddos-arp-snoop-parameters>
  show ddos-protection protocols arp-snoop statistics
<get-ddos-arp-snoop-statistics>
show ddos-protection protocols arp-snoop violations
<get-ddos-arp-snoop-violations>
show ddos-protection protocols atm
  get-ddos-atm-information
show ddos-protection protocols atm aggregate
  get-ddos-atm-aggregate
show ddos-protection protocols atm parameters
  get-ddos-atm-parameters
show ddos-protection protocols atm statistics
  get-ddos-atm-statistics
show ddos-protection protocols atm violations
  get-ddos-atm-violations
show ddos-protection protocols bfd
  get-ddos-bfd-information
show ddos-protection protocols bfd aggregate
  get-ddos-bfd-aggregate
show ddos-protection protocols bfd parameters
  get-ddos-bfd-parameters
show ddos-protection protocols bfd statistics
  get-ddos-bfd-statistics
show ddos-protection protocols bfd violations
  get-ddos-bfd-violations
show ddos-protection protocols bfdv6
  get-ddos-bfdv6-information
show ddos-protection protocols bfdv6 aggregate
  get-ddos-bfdv6-aggregate
show ddos-protection protocols bfdv6 parameters
  get-ddos-bfdv6-parameters
show ddos-protection protocols bfdv6 statistics
  get-ddos-bfdv6-statistics
show ddos-protection protocols bfdv6 violations
  get-ddos-bfdv6-violations
show ddos-protection protocols bgp
  get-ddos-bgp-information
show ddos-protection protocols bgp aggregate
  get-ddos-bgp-aggregate
show ddos-protection protocols bgp parameters
  get-ddos-bgp-parameters
show ddos-protection protocols bgp statistics
  get-ddos-bgp-statistics
show ddos-protection protocols bgp violations
  get-ddos-bgp-violations
show ddos-protection protocols bgpv6
  get-ddos-bgpv6-information
show ddos-protection protocols bgpv6 aggregate
  get-ddos-bgpv6-aggregate
show ddos-protection protocols bgpv6 parameters
  get-ddos-bgpv6-parameters
show ddos-protection protocols bgpv6 statistics
```

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    get-ddos-bgpv6-statistics
show ddos-protection protocols bgpv6 violations
    get-ddos-bgpv6-violations
show ddos-protection protocols bridge-control
<get-ddos-brg-ctrl-information>
show ddos-protection protocols bridge-control aggregate
<get-ddos-brg-ctrl-aggregate>
show ddos-protection protocols bridge-control aggregate culprit-flows
<get-ddos-brg-ctrl-aggregate-flows>
show ddos-protection protocols bridge-control culprit-flows
<get-ddos-brg-ctrl-flows>
show ddos-protection protocols bridge-control flow-detection
<get-ddos-brg-ctrl-flow-parameters>
show ddos-protection protocols bridge-control parameters
<get-ddos-brg-ctrl-parameters>
show ddos-protection protocols bridge-control statistics
<get-ddos-brg-ctrl-statistics>
show ddos-protection protocols bridge-control violations
<get-ddos-brg-ctrl-violations>show ddos-protection protocols demux-autosense
    get-ddos-demuxauto-information
show ddos-protection protocols demux-autosense aggregate
    get-ddos-demuxauto-aggregate
show ddos-protection protocols demux-autosense parameters
    get-ddos-demuxauto-parameters
show ddos-protection protocols demux-autosense statistics
    get-ddos-demuxauto-statistics
show ddos-protection protocols demux-autosense violations
    get-ddos-demuxauto-violations
show ddos-protection protocols dhcpv4
    get-ddos-dhcpv4-information
show ddos-protection protocols dhcpv4 ack
    get-ddos-dhcpv4-ack
show ddos-protection protocols dhcpv4 aggregate
    get-ddos-dhcpv4-aggregate
show ddos-protection protocols dhcpv4 bad-packets
    get-ddos-dhcpv4-bad-pack
show ddos-protection protocols dhcpv4 bootp
    get-ddos-dhcpv4-bootp
show ddos-protection protocols dhcpv4 decline
    get-ddos-dhcpv4-decline
show ddos-protection protocols dhcpv4 discover
    get-ddos-dhcpv4-discover
show ddos-protection protocols dhcpv4 force-renew
    get-ddos-dhcpv4-forcerenew
show ddos-protection protocols dhcpv4 inform
    get-ddos-dhcpv4-inform
show ddos-protection protocols dhcpv4 lease-active
    get-ddos-dhcpv4-leaseact
show ddos-protection protocols dhcpv4 lease-query
    get-ddos-dhcpv4-leasequery
show ddos-protection protocols dhcpv4 lease-unassigned
    get-ddos-dhcpv4-leaseuna
show ddos-protection protocols dhcpv4 lease-unknown
    get-ddos-dhcpv4-leaseunk
show ddos-protection protocols dhcpv4 nak
    get-ddos-dhcpv4-nak
show ddos-protection protocols dhcpv4 no-message-type
    get-ddos-dhcpv4-no-msgtype
show ddos-protection protocols dhcpv4 offer
    get-ddos-dhcpv4-offer
show ddos-protection protocols dhcpv4 offer culprit-flows

```

```
show ddos-protection protocols dhcpv4 parameters
  get-ddos-dhcpv4-parameters
show ddos-protection protocols dhcpv4 release
  get-ddos-dhcpv4-release
show ddos-protection protocols dhcpv4 renew
  get-ddos-dhcpv4-renew
show ddos-protection protocols dhcpv4 request
  get-ddos-dhcpv4-request
show ddos-protection protocols dhcpv4 statistics
  get-ddos-dhcpv4-statistics
show ddos-protection protocols dhcpv4 unclassified
  get-ddos-dhcpv4-unclass
show ddos-protection protocols dhcpv4 violations
  get-ddos-dhcpv4-violations
show ddos-protection protocols dhcpv4v6
  <get-ddos-dhcpv4v6-information>
show ddos-protection protocols dhcpv4v6 aggregate
  <get-ddos-dhcpv4v6-aggregate>
show ddos-protection protocols dhcpv4v6 aggregate culprit-flows
  <get-ddos-dhcpv4v6-aggregate-flows>
show ddos-protection protocols dhcpv4v6 culprit-flows
  <get-ddos-dhcpv4v6-flows>
show ddos-protection protocols dhcpv4v6 flow-detection
  <get-ddos-dhcpv4v6-flow-parameters>
show ddos-protection protocols dhcpv4v6 parameters
  <get-ddos-dhcpv4v6-parameters>
show ddos-protection protocols dhcpv4v6 statistics
  <get-ddos-dhcpv4v6-statistics>
show ddos-protection protocols dhcpv4v6 violations
  <get-ddos-dhcpv4v6-violations>
show ddos-protection protocols dhcpv6
  get-ddos-dhcpv6-information
show ddos-protection protocols dhcpv6 advertise
  get-ddos-dhcpv6-advertise
show ddos-protection protocols dhcpv6 advertise culprit-flows
show ddos-protection protocols dhcpv6 aggregate
  get-ddos-dhcpv6-aggregate
show ddos-protection protocols dhcpv6 confirm
  get-ddos-dhcpv6-confirm
show ddos-protection protocols dhcpv6 decline
  get-ddos-dhcpv6-decline
show ddos-protection protocols dhcpv6 information-request
  get-ddos-dhcpv6-info-req
show ddos-protection protocols dhcpv6 leasequery
  get-ddos-dhcpv6-leasequery
show ddos-protection protocols dhcpv6 leasequery culprit-flows
show ddos-protection protocols dhcpv6 leasequery-data
  get-ddos-dhcpv6-leaseq-da
show ddos-protection protocols dhcpv6 leasequery-done
  get-ddos-dhcpv6-leaseq-do
show ddos-protection protocols dhcpv6 leasequery-reply
  get-ddos-dhcpv6-leaseq-re
show ddos-protection protocols dhcpv6 parameters
  get-ddos-dhcpv6-parameters
show ddos-protection protocols dhcpv6 rebind
  get-ddos-dhcpv6-rebind
show ddos-protection protocols dhcpv6 reconfigure
  get-ddos-dhcpv6-reconfig
show ddos-protection protocols dhcpv6 relay-forward
  get-ddos-dhcpv6-relay-for
show ddos-protection protocols dhcpv6 relay-reply
```

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get-ddos-dhcpv6-relay-rep
show ddos-protection protocols dhcpv6 release
get-ddos-dhcpv6-release
show ddos-protection protocols dhcpv6 renew
get-ddos-dhcpv6-renew
show ddos-protection protocols dhcpv6 reply
get-ddos-dhcpv6-reply
show ddos-protection protocols dhcpv6 request
get-ddos-dhcpv6-request
show ddos-protection protocols dhcpv6 solicit
get-ddos-dhcpv6-solicit
show ddos-protection protocols dhcpv6 statistics
get-ddos-dhcpv6-statistics
show ddos-protection protocols dhcpv6 unclassified
get-ddos-dhcpv6-unclass
show ddos-protection protocols dhcpv6 unclassified culprit-flows
show ddos-protection protocols dhcpv6 violations
get-ddos-dhcpv6-violations
show ddos-protection protocols diameter
get-ddos-diameter-information
show ddos-protection protocols diameter aggregate
get-ddos-diameter-aggregate
show ddos-protection protocols diameter parameters
get-ddos-diameter-parameters
show ddos-protection protocols diameter statistics
get-ddos-diameter-statistics
show ddos-protection protocols diameter violations
get-ddos-diameter-violations
show ddos-protection protocols dns
get-ddos-dns-information
show ddos-protection protocols dns aggregate
get-ddos-dns-aggregate
show ddos-protection protocols dns parameters
get-ddos-dns-parameters
show ddos-protection protocols dns statistics
get-ddos-dns-statistics
show ddos-protection protocols dns violations
get-ddos-dns-violations
show ddos-protection protocols dtcp
get-ddos-dtcp-information
show ddos-protection protocols dtcp aggregate
get-ddos-dtcp-aggregate
show ddos-protection protocols dtcp aggregate culprit-flows
show ddos-protection protocols dtcp parameters
get-ddos-dtcp-parameters
show ddos-protection protocols dtcp statistics
get-ddos-dtcp-statistics
show ddos-protection protocols dtcp violations
get-ddos-dtcp-violations
show ddos-protection protocols dynamic-vlan
get-ddos-dynvlan-information
show ddos-protection protocols dynamic-vlan aggregate
get-ddos-dynvlan-aggregate
show ddos-protection protocols dynamic-vlan parameters
get-ddos-dynvlan-parameters
show ddos-protection protocols dynamic-vlan statistics
get-ddos-dynvlan-statistics
show ddos-protection protocols dynamic-vlan violations
get-ddos-dynvlan-violations
show ddos-protection protocols egpv6
get-ddos-egpv6-information
```

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show ddos-protection protocols egpv6 aggregate
  get-ddos-egpv6-aggregate
show ddos-protection protocols egpv6 parameters
  get-ddos-egpv6-parameters
show ddos-protection protocols egpv6 statistics
  get-ddos-egpv6-statistics
show ddos-protection protocols egpv6 violations
  get-ddos-egpv6-violations
show ddos-protection protocols eoam
  get-ddos-eoam-information
show ddos-protection protocols eoam aggregate
  get-ddos-eoam-aggregate
show ddos-protection protocols eoam parameters
  get-ddos-eoam-parameters
show ddos-protection protocols eoam statistics
  get-ddos-eoam-statistics
show ddos-protection protocols eoam violations
  get-ddos-eoam-violations
show ddos-protection protocols esmc
  get-ddos-esmc-information
show ddos-protection protocols esmc aggregate
  get-ddos-esmc-aggregate
show ddos-protection protocols esmc parameters
  get-ddos-esmc-parameters
show ddos-protection protocols esmc statistics
  get-ddos-esmc-statistics
show ddos-protection protocols esmc violations
  get-ddos-esmc-violations
show ddos-protection protocols ethernet-tcc
<get-ddos-eth-tcc-information>
show ddos-protection protocols ethernet-tcc aggregate
<get-ddos-eth-tcc-aggregate>
show ddos-protection protocols ethernet-tcc aggregate culprit-flows
<get-ddos-eth-tcc-aggregate-flows>
show ddos-protection protocols ethernet-tcc culprit-flows
<get-ddos-eth-tcc-flows>
show ddos-protection protocols ethernet-tcc flow-detection
<get-ddos-eth-tcc-flow-parameters>
show ddos-protection protocols ethernet-tcc parameters
<get-ddos-eth-tcc-parameters>
show ddos-protection protocols ethernet-tcc statistics
<get-ddos-eth-tcc-statistics>
show ddos-protection protocols ethernet-tcc violations
<get-ddos-eth-tcc-violations>
show ddos-protection protocols exceptions
<get-ddos-exception-information>
show ddos-protection protocols exceptions aggregate
<get-ddos-exception-aggregate>
show ddos-protection protocols exceptions aggregate culprit-flows
<get-ddos-exception-aggregate-flows>
show ddos-protection protocols exceptions culprit-flows
<get-ddos-exception-flows>
show ddos-protection protocols exceptions flow-detection
<get-ddos-exception-flow-parameters>
show ddos-protection protocols exceptions mcast-rpf-err
<get-ddos-exception-mcast-rpf>
show ddos-protection protocols exceptions mcast-rpf-err culprit-flows
<get-ddos-exception-mcast-rpf-flows>
show ddos-protection protocols exceptions mtu-exceeded
<get-ddos-exception-mtu-exceed>
show ddos-protection protocols exceptions mtu-exceeded culprit-flows
```

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<get-ddos-exception-mtu-exceed-flows>
show ddos-protection protocols exceptions parameters
<get-ddos-exception-parameters>
show ddos-protection protocols exceptions statistics
<get-ddos-exception-statistics>
show ddos-protection protocols exceptions unclassified
<get-ddos-exception-unclass>
show ddos-protection protocols exceptions unclassified culprit-flows
<get-ddos-exception-unclass-flows>
show ddos-protection protocols exceptions violations
<get-ddos-exception-violations>

show ddos-protection protocols fab-probe
<get-ddos-fab-probe-information>
show ddos-protection protocols fab-probe aggregate
<get-ddos-fab-probe-aggregate>
show ddos-protection protocols fab-probe parameters
<get-ddos-fab-probe-parameters>
show ddos-protection protocols fab-probe statistics
<get-ddos-fab-probe-statistics>
show ddos-protection protocols fab-probe violations
<get-ddos-fab-probe-violations>
show ddos-protection protocols firewall-host
  get-ddos-fw-host-information
show ddos-protection protocols firewall-host aggregate
  get-ddos-fw-host-aggregate
show ddos-protection protocols firewall-host parameters
  get-ddos-fw-host-parameters
show ddos-protection protocols firewall-host statistics
  get-ddos-fw-host-statistics
show ddos-protection protocols firewall-host violations
  get-ddos-fw-host-violations

show ddos-protection protocols ftp
  get-ddos-ftp-information
show ddos-protection protocols ftp aggregate
  get-ddos-ftp-aggregate
show ddos-protection protocols ftp parameters
  get-ddos-ftp-parameters
show ddos-protection protocols ftp statistics
  get-ddos-ftp-statistics
show ddos-protection protocols ftp violations
  get-ddos-ftp-violations
show ddos-protection protocols ftpv6
  get-ddos-ftp6-information
show ddos-protection protocols ftpv6 aggregate
  get-ddos-ftp6-aggregate
show ddos-protection protocols ftpv6 parameters
  get-ddos-ftp6-parameters
show ddos-protection protocols ftpv6 statistics
  get-ddos-ftp6-statistics
show ddos-protection protocols ftpv6 violations
  get-ddos-ftp6-violations
show ddos-protection protocols garp-reply
<get-ddos-garp-reply-information>
show ddos-protection protocols garp-reply aggregate
<get-ddos-garp-reply-aggregate>
show ddos-protection protocols garp-reply aggregate culprit-flows
<get-ddos-garp-reply-aggregate-flows>
show ddos-protection protocols garp-reply culprit-flows

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<get-ddos-garp-reply-flows>
show ddos-protection protocols garp-reply flow-detection
<get-ddos-garp-reply-flow-parameters>
show ddos-protection protocols garp-reply parameters
<get-ddos-garp-reply-parameters>
show ddos-protection protocols garp-reply statistics
<get-ddos-garp-reply-statistics>
show ddos-protection protocols garp-reply violations
<get-ddos-garp-reply-violations>
show ddos-protection protocols gre
    get-ddos-gre-information
show ddos-protection protocols gre aggregate
    get-ddos-gre-aggregate
show ddos-protection protocols gre hbc
<get-ddos-gre-hbc>
show ddos-protection protocols gre hbc culprit-flows
<get-ddos-gre-hbc-flows>
show ddos-protection protocols gre parameters
    get-ddos-gre-parameters
show ddos-protection protocols gre punt
<get-ddos-gre-punt>
show ddos-protection protocols gre punt culprit-flows
<get-ddos-gre-punt-flows>
show ddos-protection protocols gre statistics
    get-ddos-gre-statistics
show ddos-protection protocols gre violations
    get-ddos-gre-violations
show ddos-protection protocols icmp
    get-ddos-icmp-information
show ddos-protection protocols icmp aggregate
    get-ddos-icmp-aggregate
show ddos-protection protocols icmp parameters
    get-ddos-icmp-parameters
show ddos-protection protocols icmp statistics
    get-ddos-icmp-statistics
show ddos-protection protocols icmp violations
    get-ddos-icmp-violations
show ddos-protection protocols icmpv6
<get-ddos-icmpv6-information>
show ddos-protection protocols icmpv6 aggregate
<get-ddos-icmpv6-aggregate>
show ddos-protection protocols icmpv6 aggregate culprit-flows
<get-ddos-icmpv6-aggregate-flows>
show ddos-protection protocols icmpv6 parameters
<get-ddos-icmpv6-parameters>
show ddos-protection protocols icmpv6 statistics
<get-ddos-icmpv6-statistics>
show ddos-protection protocols icmpv6 violations
<get-ddos-icmpv6-violations>
show ddos-protection protocols igmp
    get-ddos-igmp-information
show ddos-protection protocols igmp aggregate
    get-ddos-igmp-aggregate
show ddos-protection protocols igmp aggregate culprit-flows
show ddos-protection protocols igmp parameters
    get-ddos-igmp-parameters
show ddos-protection protocols igmp statistics
    get-ddos-igmp-statistics
show ddos-protection protocols igmp violations
    get-ddos-igmp-violations
show ddos-protection protocols igmp-snoop
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    get-ddos-igmp-snoop-information
show ddos-protection protocols igmp-snoop aggregate
    get-ddos-igmp-snoop-aggregate
show ddos-protection protocols igmp-snoop parameters
    get-ddos-igmp-snoop-parameters
show ddos-protection protocols igmp-snoop statistics
    get-ddos-igmp-snoop-statistics
show ddos-protection protocols igmp-snoop violations
    get-ddos-igmp-snoop-violations
show ddos-protection protocols igmpv4v6
    get-ddos-igmpv4v6-information
show ddos-protection protocols igmpv4v6 aggregate
    get-ddos-igmpv4v6-aggregate
show ddos-protection protocols igmpv4v6 aggregate culprit-flows
show ddos-protection protocols igmpv4v6 parameters
    get-ddos-igmpv4v6-parameters
show ddos-protection protocols igmpv4v6 statistics
    get-ddos-igmpv4v6-statistics
show ddos-protection protocols igmpv4v6 violations
    get-ddos-igmpv4v6-violations
show ddos-protection protocols igmpv6
    get-ddos-igmpv6-information
show ddos-protection protocols igmpv6 aggregate
    get-ddos-igmpv6-aggregate
show ddos-protection protocols igmpv6 parameters
    get-ddos-igmpv6-parameters
show ddos-protection protocols igmpv6 statistics
    get-ddos-igmpv6-statistics
show ddos-protection protocols igmpv6 violations
    get-ddos-igmpv6-violations
show ddos-protection protocols ip-fragments
    get-ddos-ip-frag-information
show ddos-protection protocols ip-fragments aggregate
    get-ddos-ip-frag-aggregate
show ddos-protection protocols ip-fragments first-fragment
    get-ddos-ip-frag-first-frag
show ddos-protection protocols ip-fragments parameters
    get-ddos-ip-frag-parameters
show ddos-protection protocols ip-fragments statistics
    get-ddos-ip-frag-statistics
show ddos-protection protocols ip-fragments trail-fragment
    get-ddos-ip-frag-trail-frag
show ddos-protection protocols ip-fragments violations
    get-ddos-ip-frag-violations
show ddos-protection protocols ip-options
    get-ddos-ip-opt-information
show ddos-protection protocols ip-options aggregate
    get-ddos-ip-opt-aggregate
show ddos-protection protocols ip-options non-v4v6
<get-ddos-ip-opt-non-v4v6>
show ddos-protection protocols ip-options parameters
    get-ddos-ip-opt-parameters
show ddos-protection protocols ip-options router-alert
    get-ddos-ip-opt-rt-alert
show ddos-protection protocols ip-options statistics
    get-ddos-ip-opt-statistics
show ddos-protection protocols ip-options unclassified
    get-ddos-ip-opt-unclass
show ddos-protection protocols ipmc-reserved culprit-flows
<get-ddos-ipmc-reserved-flows>
show ddos-protection protocols ipmc-reserved flow-detection

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<get-ddos-ipmc-reserved-flow-parameters>
show ddos-protection protocols ipmc-reserved parameters
<get-ddos-ipmc-reserved-parameters>
show ddos-protection protocols ipmc-reserved statistics
<get-ddos-ipmc-reserved-statistics>
show ddos-protection protocols ipmc-reserved violations
<get-ddos-ipmc-reserved-violations>
show ddos-protection protocols ipmcast-miss
<get-ddos-ipmcast-miss-information>
show ddos-protection protocols ipmcast-miss aggregate
<get-ddos-ipmcast-miss-aggregate>
show ddos-protection protocols ipmcast-miss aggregate culprit-flows
<get-ddos-ipmcast-miss-aggregate-flows>
show ddos-protection protocols ipmcast-miss culprit-flows
<get-ddos-ipmcast-miss-flows>
show ddos-protection protocols ipmcast-miss flow-detection
<get-ddos-ipmcast-miss-flow-parameters>
show ddos-protection protocols ipmcast-miss parameters
<get-ddos-ipmcast-miss-parameters>
show ddos-protection protocols ipmcast-miss statistics
<get-ddos-ipmcast-miss-statistics>
show ddos-protection protocols ipmcast-miss violations
<get-ddos-ipmcast-miss-violations>
show ddos-protection protocols ip-options violations
  get-ddos-ip-opt-violations
show ddos-protection protocols ipv4-unclassified
  get-ddos-ipv4-uncls-information
show ddos-protection protocols ipv4-unclassified aggregate
  get-ddos-ipv4-uncls-aggregate
show ddos-protection protocols ipv4-unclassified parameters
  get-ddos-ipv4-uncls-parameters
show ddos-protection protocols ipv4-unclassified statistics
  get-ddos-ipv4-uncls-statistics
show ddos-protection protocols ipv4-unclassified violations
  get-ddos-ipv4-uncls-violations
show ddos-protection protocols ipv6-unclassified
  get-ddos-ipv6-uncls-information
show ddos-protection protocols ipv6-unclassified aggregate
  get-ddos-ipv6-uncls-aggregate
show ddos-protection protocols ipv6-unclassified parameters
  get-ddos-ipv6-uncls-parameters
show ddos-protection protocols ipv6-unclassified statistics
  get-ddos-ipv6-uncls-statistics
show ddos-protection protocols ipv6-unclassified violations
  get-ddos-ipv6-uncls-violations
show ddos-protection protocols isis
  get-ddos-isis-information
show ddos-protection protocols isis aggregate
  get-ddos-isis-aggregate
show ddos-protection protocols isis parameters
  get-ddos-isis-parameters
show ddos-protection protocols isis statistics
  get-ddos-isis-statistics
show ddos-protection protocols isis violations
  get-ddos-isis-violations
show ddos-protection protocols iso-tcc
<get-ddos-iso-tcc-information>
show ddos-protection protocols iso-tcc aggregate
<get-ddos-iso-tcc-aggregate>
show ddos-protection protocols iso-tcc aggregate culprit-flows
<get-ddos-iso-tcc-aggregate-flows>
```

```
show ddos-protection protocols iso-tcc culprit-flows
<get-ddos-iso-tcc-flows>
show ddos-protection protocols iso-tcc flow-detection
<get-ddos-iso-tcc-flow-parameters>
show ddos-protection protocols iso-tcc parameters
<get-ddos-iso-tcc-parameters>
show ddos-protection protocols iso-tcc statistics
<get-ddos-iso-tcc-statistics>
show ddos-protection protocols iso-tcc violations
<get-ddos-iso-tcc-violations>
show ddos-protection protocols jfm
  get-ddos-jfm-information
show ddos-protection protocols jfm aggregate
  get-ddos-jfm-aggregate
show ddos-protection protocols jfm parameters
  get-ddos-jfm-parameters
show ddos-protection protocols jfm statistics
  get-ddos-jfm-statistics
show ddos-protection protocols jfm violations
  get-ddos-jfm-violations
show ddos-protection protocols l2tp
  get-ddos-l2tp-information
show ddos-protection protocols l2tp aggregate
  get-ddos-l2tp-aggregate
show ddos-protection protocols l2tp parameters
  get-ddos-l2tp-parameters
show ddos-protection protocols l2tp statistics
  get-ddos-l2tp-statistics
show ddos-protection protocols l2tp violations
  get-ddos-l2tp-violations
show ddos-protection protocols l3dest-miss
  <get-ddos-l3dest-miss-information>
show ddos-protection protocols l3dest-miss aggregate
  <get-ddos-l3dest-miss-aggregate>
show ddos-protection protocols l3dest-miss aggregate culprit-flows
  <get-ddos-l3dest-miss-aggregate-flows>
show ddos-protection protocols l3dest-miss culprit-flows
  <get-ddos-l3dest-miss-flows>
show ddos-protection protocols l3dest-miss flow-detection
  <get-ddos-l3dest-miss-flow-parameters>
show ddos-protection protocols l3dest-miss parameters
  <get-ddos-l3dest-miss-parameters>
show ddos-protection protocols l3dest-miss statistics
  <get-ddos-l3dest-miss-statistics>
show ddos-protection protocols l3dest-miss violations
  <get-ddos-l3dest-miss-violations>
show ddos-protection protocols l3mc-sgv-hit-icl
  <get-ddos-l3mc-sgv-hit-icl-information>
show ddos-protection protocols l3mc-sgv-hit-icl aggregate
  <get-ddos-l3mc-sgv-hit-icl-aggregate>
show ddos-protection protocols l3mc-sgv-hit-icl aggregate culprit-flows
  <get-ddos-l3mc-sgv-hit-icl-aggregate-flows>
show ddos-protection protocols l3mc-sgv-hit-icl culprit-flows
  <get-ddos-l3mc-sgv-hit-icl-flows>
show ddos-protection protocols l3mc-sgv-hit-icl flow-detection
  <get-ddos-l3mc-sgv-hit-icl-flow-parameters>
show ddos-protection protocols l3mc-sgv-hit-icl parameters
  <get-ddos-l3mc-sgv-hit-icl-parameters>
show ddos-protection protocols l3mc-sgv-hit-icl statistics
  <get-ddos-l3mc-sgv-hit-icl-statistics>
show ddos-protection protocols l3mc-sgv-hit-icl violations
```

```
<get-ddos-l3mc-sgv-hit-icl-violations>
show ddos-protection protocols l3mtu-fail
  <get-ddos-l3mtu-fail-information>
show ddos-protection protocols l3mtu-fail aggregate
  <get-ddos-l3mtu-fail-aggregate>
show ddos-protection protocols l3mtu-fail aggregate culprit-flows
  <get-ddos-l3mtu-fail-aggregate-flows>
show ddos-protection protocols l3mtu-fail culprit-flows
  <get-ddos-l3mtu-fail-flows>
show ddos-protection protocols l3mtu-fail flow-detection
  <get-ddos-l3mtu-fail-flow-parameters>
show ddos-protection protocols l3mtu-fail parameters
  <get-ddos-l3mtu-fail-parameters>
show ddos-protection protocols l3mtu-fail statistics
  <get-ddos-l3mtu-fail-statistics>
show ddos-protection protocols l3mtu-fail violations
  <get-ddos-l3mtu-fail-violations>
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  <get-ddos-l3nhop-information>
show ddos-protection protocols l3nhop aggregate
  <get-ddos-l3nhop-aggregate>
show ddos-protection protocols l3nhop aggregate culprit-flows
  <get-ddos-l3nhop-aggregate-flows>
show ddos-protection protocols l3nhop culprit-flows
  <get-ddos-l3nhop-flows>
show ddos-protection protocols l3nhop flow-detection
  <get-ddos-l3nhop-flow-parameters>
show ddos-protection protocols l3nhop parameters
  <get-ddos-l3nhop-parameters>
show ddos-protection protocols l3nhop statistics
  <get-ddos-l3nhop-statistics>
show ddos-protection protocols l3nhop violations
  <get-ddos-l3nhop-violations>
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  <get-ddos-lacp-information>
show ddos-protection protocols lacp aggregate
  <get-ddos-lacp-aggregate>
show ddos-protection protocols lacp parameters
  <get-ddos-lacp-parameters>
show ddos-protection protocols lacp statistics
  <get-ddos-lacp-statistics>
show ddos-protection protocols lacp violations
  <get-ddos-lacp-violations>
show ddos-protection protocols ldp
  <get-ddos-ldp-information>
show ddos-protection protocols ldp aggregate
  <get-ddos-ldp-aggregate>
show ddos-protection protocols ldp parameters
  <get-ddos-ldp-parameters>
show ddos-protection protocols ldp statistics
  <get-ddos-ldp-statistics>
show ddos-protection protocols ldp violations
  <get-ddos-ldp-violations>
show ddos-protection protocols ldp-hello
  <get-ddos-ldp-hello-information>
show ddos-protection protocols ldp-hello aggregate
  <get-ddos-ldp-hello-aggregate>
show ddos-protection protocols ldp-hello aggregate culprit-flows
  <get-ddos-ldp-hello-aggregate-flows>
show ddos-protection protocols ldp-hello culprit-flows
  <get-ddos-ldp-hello-flows>
```

```
show ddos-protection protocols ldp-hello flow-detection
<get-ddos-ldp-hello-flow-parameters>
show ddos-protection protocols ldp-hello parameters
<get-ddos-ldp-hello-parameters>
show ddos-protection protocols ldp-hello statistics
<get-ddos-ldp-hello-statistics>
show ddos-protection protocols ldp-hello violations
<get-ddos-ldp-hello-violations>
show ddos-protection protocols ldpv6
<get-ddos-ldpv6-information>
show ddos-protection protocols ldpv6 aggregate
<get-ddos-ldpv6-aggregate>
show ddos-protection protocols ldpv6 parameters
<get-ddos-ldpv6-parameters>
show ddos-protection protocols ldpv6 statistics
<get-ddos-ldpv6-statistics>
show ddos-protection protocols ldpv6 violations
<get-ddos-ldpv6-violations>
show ddos-protection protocols lldp
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show ddos-protection protocols lldp aggregate
<get-ddos-lldp-aggregate>
show ddos-protection protocols lldp parameters
<get-ddos-lldp-parameters>
show ddos-protection protocols lldp statistics
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show ddos-protection protocols lldp violations
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show ddos-protection protocols lmp aggregate
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show ddos-protection protocols lmp parameters
<get-ddos-lmp-parameters>
show ddos-protection protocols lmp statistics
<get-ddos-lmp-statistics>
show ddos-protection protocols lmp violations
<get-ddos-lmp-violations>
show ddos-protection protocols lmpv6
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show ddos-protection protocols lmpv6 aggregate
<get-ddos-lmpv6-aggregate>
show ddos-protection protocols lmpv6 parameters
<get-ddos-lmpv6-parameters>
show ddos-protection protocols lmpv6 statistics
<get-ddos-lmpv6-statistics>
show ddos-protection protocols lmpv6 violations
<get-ddos-lmpv6-violations>
show ddos-protection protocols localnh
  <get-ddos-localnh-information>
show ddos-protection protocols localnh aggregate
  <get-ddos-localnh-aggregate>
show ddos-protection protocols localnh aggregate culprit-flows
  <get-ddos-localnh-aggregate-flows>
show ddos-protection protocols localnh culprit-flows
  <get-ddos-localnh-flows>
show ddos-protection protocols localnh flow-detection
  <get-ddos-localnh-flow-parameters>
show ddos-protection protocols localnh parameters
  <get-ddos-localnh-parameters>
show ddos-protection protocols localnh statistics
```

```
<get-ddos-localnh-statistics>
show ddos-protection protocols localnh violations
  <get-ddos-localnh-violations>
show ddos-protection protocols mac-host
  <get-ddos-mac-host-information>
show ddos-protection protocols mac-host aggregate
  <get-ddos-mac-host-aggregate>
show ddos-protection protocols mac-host aggregate culprit-flows
  <get-ddos-mac-host-aggregate-flows>
show ddos-protection protocols mac-host culprit-flows
  <get-ddos-mac-host-flows>
show ddos-protection protocols mac-host flow-detection
  <get-ddos-mac-host-flow-parameters>
show ddos-protection protocols mac-host parameters
  <get-ddos-mac-host-parameters>
show ddos-protection protocols mac-host statistics
  <get-ddos-mac-host-statistics>
show ddos-protection protocols mac-host violations
  <get-ddos-mac-host-violations>
show ddos-protection protocols martian-address
  <get-ddos-martian-address-information>
show ddos-protection protocols martian-address aggregate
  <get-ddos-martian-address-aggregate>
show ddos-protection protocols martian-address aggregate culprit-flows
  <get-ddos-martian-address-aggregate-flows>
show ddos-protection protocols martian-address culprit-flows
  <get-ddos-martian-address-flows>
show ddos-protection protocols martian-address flow-detection
  <get-ddos-martian-address-flow-parameters>
show ddos-protection protocols martian-address parameters
  <get-ddos-martian-address-parameters>
show ddos-protection protocols martian-address statistics
  <get-ddos-martian-address-statistics>
show ddos-protection protocols martian-address violations
  <get-ddos-martian-address-violations>
show ddos-protection protocols mac-host
  <get-ddos-mac-host-information>
show ddos-protection protocols mac-host aggregate
  <get-ddos-mac-host-aggregate>
show ddos-protection protocols mac-host parameters
  <get-ddos-mac-host-parameters>
show ddos-protection protocols mac-host statistics
  <get-ddos-mac-host-statistics>
show ddos-protection protocols mac-host violations
  <get-ddos-mac-host-violations>
show ddos-protection protocols mcast-snoop mld
  <get-ddos-mcast-snoop-mld>
show ddos-protection protocols mcast-snoop mld culprit-flows
  <get-ddos-mcast-snoop-mld-flows>
show ddos-protection protocols mld
  <get-ddos-mld-information>
show ddos-protection protocols mld aggregate
  <get-ddos-mld-aggregate>
show ddos-protection protocols mld aggregate culprit-flows
show ddos-protection protocols mld culprit-flows
  <get-ddos-mld-flows>
show ddos-protection protocols mld flow-detection
  <get-ddos-mld-flow-parameters>
show ddos-protection protocols mld parameters
  <get-ddos-mld-parameters>
show ddos-protection protocols mld statistics
```

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<get-ddos-mld-statistics>
show ddos-protection protocols mld violations
<get-ddos-mld-violations>
show ddos-protection protocols mlp
  <get-ddos-mlp-information>
show ddos-protection protocols mlp add
<get-ddos-mlp-add>
show ddos-protection protocols mlp add culprit-flows
<get-ddos-mlp-add-flows>
show ddos-protection protocols mlp aggregate
  <get-ddos-mlp-aggregate>
show ddos-protection protocols mlp aggregate culprit-flows
<get-ddos-mlp-aggregate-flows>
show ddos-protection protocols mlp culprit-flows
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show ddos-protection protocols mlp delete
<get-ddos-mlp-delete>
show ddos-protection protocols mlp delete culprit-flows
get-ddos-mlp-delete-flows
show ddos-protection protocols mlp flow-detection
get-ddos-mlp-flow-parameters
show ddos-protection protocols mlp lookup
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show ddos-protection protocols mlp lookup culprit-flows
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show ddos-protection protocols mlp macpin-exception
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show ddos-protection protocols mlp macpin-exception culprit-flows
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  <get-ddos-mlp-aging-exc>
show ddos-protection protocols mlp packets
  <get-ddos-mlp-packets>
show ddos-protection protocols mlp parameters
  get-ddos-mlp-parameters
show ddos-protection protocols mlp statistics
  <get-ddos-mlp-statistics>
show ddos-protection protocols mlp unclassified
  <get-ddos-mlp-unclass>
show ddos-protection protocols mlp violations
  <get-ddos-mlp-violations>
show ddos-protection protocols msdp
  <get-ddos-msdp-information>
show ddos-protection protocols msdp aggregate
  <get-ddos-msdp-aggregate>
show ddos-protection protocols msdp parameters
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show ddos-protection protocols msdp statistics
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show ddos-protection protocols msdp violations
  <get-ddos-msdp-violations>
show ddos-protection protocols msdpv6
  <get-ddos-msdpv6-information>
show ddos-protection protocols msdpv6 aggregate
  <get-ddos-msdpv6-aggregate>
show ddos-protection protocols msdpv6 parameters
  <get-ddos-msdpv6-parameters>
show ddos-protection protocols msdpv6 statistics
  <get-ddos-msdpv6-statistics>
show ddos-protection protocols msdpv6 violations
  <get-ddos-msdpv6-violations>

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show ddos-protection protocols multihop-bfd
<get-ddos-mhop-bfd-information>
show ddos-protection protocols multihop-bfd aggregate
<get-ddos-mhop-bfd-aggregate>
show ddos-protection protocols multihop-bfd aggregate culprit-flows
<get-ddos-mhop-bfd-aggregate-flows>
show ddos-protection protocols multihop-bfd culprit-flows
<get-ddos-mhop-bfd-flows>
show ddos-protection protocols multihop-bfd flow-detection
<get-ddos-mhop-bfd-flow-parameters>
show ddos-protection protocols multihop-bfd parameters
<get-ddos-mhop-bfd-parameters>
show ddos-protection protocols multihop-bfd statistics
<get-ddos-mhop-bfd-statistics>
show ddos-protection protocols multihop-bfd violations
<get-ddos-mhop-bfd-violations>
show ddos-protection protocols multicast-copy
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show ddos-protection protocols multicast-copy aggregate
<get-ddos-mcast-copy-aggregate>
show ddos-protection protocols multicast-copy parameters
<get-ddos-mcast-copy-parameters>
show ddos-protection protocols multicast-copy statistics
<get-ddos-mcast-copy-statistics>
show ddos-protection protocols multicast-copy violations
<get-ddos-mcast-copy-violations>
show ddos-protection protocols mvrp
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show ddos-protection protocols mvrp aggregate
<get-ddos-mvrp-aggregate>
show ddos-protection protocols mvrp parameters
<get-ddos-mvrp-parameters>
show ddos-protection protocols mvrp statistics
<get-ddos-mvrp-statistics>
show ddos-protection protocols mvrp violations
<get-ddos-mvrp-violations>
show ddos-protection protocols ndpv6
<get-ddos-ndpv6-information>
show ddos-protection protocols ndpv6 aggregate
<get-ddos-ndpv6-aggregate>
show ddos-protection protocols ndpv6 aggregate culprit-flows
<get-ddos-ndpv6-aggregate-flows>
show ddos-protection protocols ndpv6 culprit-flows
<get-ddos-ndpv6-flows>
show ddos-protection protocols ndpv6 flow-detection
<get-ddos-ndpv6-flow-parameters>
show ddos-protection protocols ndpv6 neighbor-advertisement
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show ddos-protection protocols ndpv6 neighbor-advertisement culprit-flows
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show ddos-protection protocols ndpv6 neighbor-solicitation
<get-ddos-ndpv6-neighb-sol>
show ddos-protection protocols ndpv6 neighbor-solicitation culprit-flows
<get-ddos-ndpv6-neighb-sol-flows>
show ddos-protection protocols ndpv6 parameters
<get-ddos-ndpv6-parameters>
show ddos-protection protocols ndpv6 redirect
<get-ddos-ndpv6-redirect>
show ddos-protection protocols ndpv6 redirect culprit-flows
<get-ddos-ndpv6-redirect-flows>
show ddos-protection protocols ndpv6 router-advertisement
<get-ddos-ndpv6-router-adv>
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show ddos-protection protocols ndpv6 router-advertisement culprit-flows
<get-ddos-ndpv6-router-adv-flows>
show ddos-protection protocols ndpv6 router-solicitation
<get-ddos-ndpv6-router-sol>
show ddos-protection protocols ndpv6 router-solicitation culprit-flows
<get-ddos-ndpv6-router-sol-flows>
show ddos-protection protocols nonucast-switch
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show ddos-protection protocols nonucast-switch aggregate
<get-ddos-nonucast-switch-aggregate>
show ddos-protection protocols nonucast-switch aggregate culprit-flows
<get-ddos-nonucast-switch-aggregate-flows>
show ddos-protection protocols nonucast-switch culprit-flows
<get-ddos-nonucast-switch-flows>
show ddos-protection protocols nonucast-switch flow-detection
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show ddos-protection protocols nonucast-switch parameters
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show ddos-protection protocols ntp aggregate
  get-ddos-ntp-aggregate
show ddos-protection protocols ntp parameters
  get-ddos-ntp-parameters
show ddos-protection protocols ntp statistics
  get-ddos-ntp-statistics
show ddos-protection protocols ntp violations
  get-ddos-ntp-violations
show ddos-protection protocols oam-cfm
  get-ddos-oam-cfm-information
show ddos-protection protocols oam-cfm aggregate
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show ddos-protection protocols oam-cfm aggregate culprit-flows
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show ddos-protection protocols oam-cfm statistics
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show ddos-protection protocols oam-cfm violations
  <get-ddos-oam-cfm-violations>
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  get-ddos-oam-lfm-information
show ddos-protection protocols oam-lfm aggregate
  get-ddos-oam-lfm-aggregate
show ddos-protection protocols oam-lfm parameters
  get-ddos-oam-lfm-parameters
show ddos-protection protocols oam-lfm statistics
  get-ddos-oam-lfm-statistics
show ddos-protection protocols oam-lfm violations
  get-ddos-oam-lfm-violations
show ddos-protection protocols ospf
  get-ddos-ospf-information
show ddos-protection protocols ospf aggregate
```

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get-ddos-ospf-aggregate
show ddos-protection protocols ospf parameters
get-ddos-ospf-parameters
show ddos-protection protocols ospf statistics
get-ddos-ospf-statistics
show ddos-protection protocols ospf violations
get-ddos-ospf-violations
show ddos-protection protocols ospf-hello
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show ddos-protection protocols ospf-hello aggregate
<get-ddos-ospf-hello-aggregate>
show ddos-protection protocols ospf-hello aggregate culprit-flows
<get-ddos-ospf-hello-aggregate-flows>
show ddos-protection protocols ospf-hello culprit-flows
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show ddos-protection protocols ospf-hello flow-detection
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show ddos-protection protocols ospf-hello parameters
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show ddos-protection protocols ospf-hello violations
<get-ddos-ospf-hello-violations>
show ddos-protection protocols ospfv3v6
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show ddos-protection protocols ospfv3v6 aggregate
get-ddos-ospfv3v6-aggregate
show ddos-protection protocols ospfv3v6 parameters
get-ddos-ospfv3v6-parameters
show ddos-protection protocols ospfv3v6 statistics
get-ddos-ospfv3v6-statistics
show ddos-protection protocols ospfv3v6 violations
get-ddos-ospfv3v6-violations
show ddos-protection protocols parameters
get-ddos-protocols-parameters
show ddos-protection protocols pfe-alive
get-ddos-pfe-alive-information
show ddos-protection protocols pfe-alive aggregate
get-ddos-pfe-alive-aggregate
show ddos-protection protocols pfe-alive parameters
get-ddos-pfe-alive-parameters
show ddos-protection protocols pfe-alive statistics
get-ddos-pfe-alive-statistics
show ddos-protection protocols pfe-alive violations
get-ddos-pfe-alive-violations
show ddos-protection protocols pim
get-ddos-pim-information
show ddos-protection protocols pim aggregate
get-ddos-pim-aggregate
show ddos-protection protocols pim aggregate culprit-flows
show ddos-protection protocols pim parameters
get-ddos-pim-parameters
show ddos-protection protocols pim statistics
get-ddos-pim-statistics
show ddos-protection protocols pim violations
get-ddos-pim-violations
show ddos-protection protocols pim-ctrl
<get-ddos-pim-ctrl-information>
show ddos-protection protocols pim-ctrl aggregate
<get-ddos-pim-ctrl-aggregate>
show ddos-protection protocols pim-ctrl aggregate culprit-flows
```

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    <get-ddos-pim-ctrl-aggregate-flows>
show ddos-protection protocols pim-ctrl culprit-flows
    <get-ddos-pim-ctrl-flows>
show ddos-protection protocols pim-ctrl flow-detection
    <get-ddos-pim-ctrl-flow-parameters>
show ddos-protection protocols pim-ctrl parameters
    <get-ddos-pim-ctrl-parameters>
show ddos-protection protocols pim-ctrl statistics
    <get-ddos-pim-ctrl-statistics>
show ddos-protection protocols pim-ctrl violations
    <get-ddos-pim-ctrl-violations>
show ddos-protection protocols pim-data
    <get-ddos-pim-data-information>
show ddos-protection protocols pim-data aggregate
    <get-ddos-pim-data-aggregate>
show ddos-protection protocols pim-data aggregate culprit-flows
    <get-ddos-pim-data-aggregate-flows>
show ddos-protection protocols pim-data culprit-flows
    <get-ddos-pim-data-flows>
show ddos-protection protocols pim-data flow-detection
    <get-ddos-pim-data-flow-parameters>
show ddos-protection protocols pim-data parameters
    <get-ddos-pim-data-parameters>
show ddos-protection protocols pim-data statistics
    <get-ddos-pim-data-statistics>
show ddos-protection protocols pim-data violations
    <get-ddos-pim-data-violations>
show ddos-protection protocols pimv6
    <get-ddos-pimv6-information>
show ddos-protection protocols pimv6 aggregate
    <get-ddos-pimv6-aggregate>
show ddos-protection protocols pimv6 aggregate culprit-flows
show ddos-protection protocols pimv6 parameters
    <get-ddos-pimv6-parameters>
show ddos-protection protocols pimv6 statistics
    <get-ddos-pimv6-statistics>
show ddos-protection protocols pimv6 violations
    <get-ddos-pimv6-violations>

show ddos-protection protocols pmvrp
    get-ddos-pmvrp-information
show ddos-protection protocols pmvrp aggregate
    get-ddos-pmvrp-aggregate
show ddos-protection protocols pmvrp parameters
    get-ddos-pmvrp-parameters
show ddos-protection protocols pmvrp statistics
    get-ddos-pmvrp-statistics
show ddos-protection protocols pmvrp violations
    get-ddos-pmvrp-violations
show ddos-protection protocols pos
    get-ddos-pos-information
show ddos-protection protocols pos aggregate
    get-ddos-pos-aggregate
show ddos-protection protocols pos aggregate culprit-flows
show ddos-protection protocols pos parameters
    get-ddos-pos-parameters
show ddos-protection protocols pos statistics
    get-ddos-pos-statistics
show ddos-protection protocols pos violations
    get-ddos-pos-violations

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```
show ddos-protection protocols ppp
  get-ddos-ppp-information
show ddos-protection protocols ppp aggregate
  get-ddos-ppp-aggregate
show ddos-protection protocols ppp authentication
  get-ddos-ppp-auth
show ddos-protection protocols ppp authentication culprit-flows
show ddos-protection protocols ppp ipcp
  get-ddos-ppp-ipcp
show ddos-protection protocols ppp ipv6cp
  get-ddos-ppp-ipv6cp
show ddos-protection protocols ppp isis
  get-ddos-ppp-isis
show ddos-protection protocols ppp isis culprit-flows
show ddos-protection protocols ppp lcp
  get-ddos-ppp-lcp
show ddos-protection protocols ppp lcp culprit-flows
show ddos-protection protocols ppp mplscp
  get-ddos-ppp-mplscp
show ddos-protection protocols ppp mplscp culprit-flows
show ddos-protection protocols ppp parameters
  get-ddos-ppp-parameters
show ddos-protection protocols ppp statistics
  get-ddos-ppp-statistics
show ddos-protection protocols ppp unclassified
<get-ddos-ppp-unclass>
show ddos-protection protocols ppp violations
  get-ddos-ppp-violations
show ddos-protection protocols pppoe
  get-ddos-pppoe-information
show ddos-protection protocols pppoe aggregate
  get-ddos-pppoe-aggregate
show ddos-protection protocols pppoe padi
  get-ddos-pppoe-padi
show ddos-protection protocols pppoe padm
  get-ddos-pppoe-padm
show ddos-protection protocols pppoe padn
  get-ddos-pppoe-padn
show ddos-protection protocols pppoe pado
  get-ddos-pppoe-pado
show ddos-protection protocols pppoe padr
  get-ddos-pppoe-padr
show ddos-protection protocols pppoe pads
  get-ddos-pppoe-pads
show ddos-protection protocols pppoe padt
  get-ddos-pppoe-padt
show ddos-protection protocols pppoe parameters
  get-ddos-pppoe-parameters
show ddos-protection protocols pppoe statistics
  get-ddos-pppoe-statistics
show ddos-protection protocols pppoe violations
  get-ddos-pppoe-violations
show ddos-protection protocols proto-802-1x
<get-ddos-8021x-information>
show ddos-protection protocols proto-802-1x aggregate
<get-ddos-8021x-aggregate>
show ddos-protection protocols proto-802-1x aggregate culprit-flows
  get-ddos-8021x-aggregate-flows
show ddos-protection protocols proto-802-1x culprit-flows
<get-ddos-8021x-flows>
show ddos-protection protocols proto-802-1x flow-detection
```

```

<get-ddos-8021x-flow-parameters>
show ddos-protection protocols proto-802-1x parameters
<get-ddos-8021x-parameters>
show ddos-protection protocols proto-802-1x statistics
<get-ddos-8021x-statistics>
show ddos-protection protocols proto-802-1x violations
<get-ddos-8021x-violations>
show ddos-protection protocols ptp
    get-ddos-ntp-information
show ddos-protection protocols ptp aggregate
    get-ddos-ntp-aggregate
show ddos-protection protocols ptp aggregate culprit-flows
show ddos-protection protocols ptp parameters
    get-ddos-ntp-parameters
show ddos-protection protocols ptp statistics
    get-ddos-ntp-statistics
show ddos-protection protocols ptp violations
    get-ddos-ntp-violations
show ddos-protection protocols pvstp
    get-ddos-pvstp-information
show ddos-protection protocols pvstp aggregate
    get-ddos-pvstp-aggregate
show ddos-protection protocols pvstp parameters
    get-ddos-pvstp-parameters
show ddos-protection protocols pvstp statistics
    get-ddos-pvstp-statistics
show ddos-protection protocols pvstp violations
    get-ddos-pvstp-violations
show ddos-protection protocols radius
    get-ddos-radius-information
show ddos-protection protocols radius accounting
    get-ddos-radius-account
show ddos-protection protocols radius aggregate
    get-ddos-radius-aggregate
show ddos-protection protocols radius accounting culprit-flows
show ddos-protection protocols radius authorization
    get-ddos-radius-auth
show ddos-protection protocols radius parameters
    get-ddos-radius-parameters
show ddos-protection protocols radius server
    get-ddos-radius-server
show ddos-protection protocols radius statistics
    get-ddos-radius-statistics
show ddos-protection protocols radius violations
    get-ddos-radius-violations
show ddos-protection protocols re-services
    <get-ddos-re-services-information>
show ddos-protection protocols re-services aggregate
    <get-ddos-re-services-aggregate>
show ddos-protection protocols re-services aggregate culprit-flows
    <get-ddos-re-services-aggregate-flows>
show ddos-protection protocols re-services captive-portal
    <get-ddos-re-services-captive-portal>
show ddos-protection protocols re-services captive-portal culprit-flows
    <get-ddos-re-services-captive-portal-flows>
show ddos-protection protocols re-services culprit-flows
    <get-ddos-re-services-flows>
show ddos-protection protocols re-services flow-detection
    <get-ddos-re-services-flow-parameters>
show ddos-protection protocols re-services parameters
    <get-ddos-re-services-parameters>

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```
show ddos-protection protocols re-services statistics
  <get-ddos-re-services-statistics>
show ddos-protection protocols re-services violations
  <get-ddos-re-services-violations>
show ddos-protection protocols re-services-v6
  <get-ddos-re-services-v6-information>
show ddos-protection protocols re-services-v6 aggregate
  <get-ddos-re-services-v6-aggregate>
show ddos-protection protocols re-services-v6 aggregate culprit-flows
  <get-ddos-re-services-v6-aggregate-flows>
show ddos-protection protocols re-services-v6 captive-portal
  <get-ddos-re-services-v6-captive-portal-v6>
show ddos-protection protocols re-services-v6 captive-portal culprit-flows
  <get-ddos-re-services-v6-captive-portal-v6-flows>
show ddos-protection protocols re-services-v6 culprit-flows
  <get-ddos-re-services-v6-flows>
show ddos-protection protocols re-services-v6 flow-detection
  <get-ddos-re-services-v6-flow-parameters>
show ddos-protection protocols re-services-v6 parameters
  <get-ddos-re-services-v6-parameters>
show ddos-protection protocols re-services-v6 statistics
  <get-ddos-re-services-v6-statistics>
show ddos-protection protocols re-services-v6 violations
  <get-ddos-re-services-v6-violations>
show ddos-protection protocols redirect
  get-ddos-redirect-information
show ddos-protection protocols redirect aggregate
  get-ddos-redirect-aggregate
show ddos-protection protocols redirect parameters
  get-ddos-redirect-parameters
show ddos-protection protocols redirect statistics
  get-ddos-redirect-statistics
show ddos-protection protocols redirect violations
  get-ddos-redirect-violations

show ddos-protection protocols reject
  <get-ddos-reject-information>
show ddos-protection protocols reject aggregate
  <get-ddos-reject-aggregate>
show ddos-protection protocols reject parameters
  <get-ddos-reject-parameters>
show ddos-protection protocols reject statistics
  <get-ddos-reject-statistics>
show ddos-protection protocols reject violations
  <get-ddos-reject-violations>
show ddos-protection protocols rejectv6show ddos-protection protocols rejectv6
  aggregate
show ddos-protection protocols rejectv6 aggregate culprit-flows
show ddos-protection protocols rejectv6 flow-detection
show ddos-protection protocols rejectv6 parameters
show ddos-protection protocols rejectv6 statistics
show ddos-protection protocols rejectv6 violations
show ddos-protection protocols rip
  get-ddos-rip-information
show ddos-protection protocols rip aggregate
  get-ddos-rip-aggregate
show ddos-protection protocols rip aggregate culprit-flows
show ddos-protection protocols rip culprit-flows
show ddos-protection protocols rip parameters
  get-ddos-rip-parameters
```

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show ddos-protection protocols rip statistics
  get-ddos-rip-statistics
show ddos-protection protocols rip violations
  get-ddos-rip-violations
show ddos-protection protocols ripv6
  get-ddos-ripv6-information
show ddos-protection protocols ripv6 aggregate
  get-ddos-ripv6-aggregate
show ddos-protection protocols ripv6 aggregate culprit-flows
show ddos-protection protocols ripv6 parameters
  get-ddos-ripv6-parameters
show ddos-protection protocols ripv6 statistics
  get-ddos-ripv6-statistics
show ddos-protection protocols ripv6 violations
  get-ddos-ripv6-violations
show ddos-protection protocols rsvp
  get-ddos-rsvp-information
show ddos-protection protocols rsvp aggregate
  get-ddos-rsvp-aggregate
show ddos-protection protocols rsvp aggregate culprit-flows
show ddos-protection protocols rsvp parameters
  get-ddos-rsvp-parameters
show ddos-protection protocols rsvp statistics
  get-ddos-rsvp-statistics
show ddos-protection protocols rsvp violations
  get-ddos-rsvp-violations
show ddos-protection protocols rsvpv6
  get-ddos-rsvpv6-information
show ddos-protection protocols rsvpv6 aggregate
  get-ddos-rsvpv6-aggregate
show ddos-protection protocols rsvpv6 aggregate culprit-flows
show ddos-protection protocols rsvpv6 parameters
  get-ddos-rsvpv6-parameters
show ddos-protection protocols rsvpv6 statistics
  get-ddos-rsvpv6-statistics
show ddos-protection protocols rsvpv6 violations
  get-ddos-rsvpv6-violations
show ddos-protection protocols sample
  <get-ddos-sample-information>
show ddos-protection protocols sample aggregate
  <get-ddos-sample-aggregate>
show ddos-protection protocols sample aggregate culprit-flows
show ddos-protection protocols sample host
  <get-ddos-sample-host>
show ddos-protection protocols sample parameters
  <get-ddos-sample-parameters>
show ddos-protection protocols sample pfe
  <get-ddos-sample-pfe>
show ddos-protection protocols sample pfe culprit-flows
show ddos-protection protocols sample sflow
  <get-ddos-sample-sflow>
show ddos-protection protocols sample sflow culprit-flows
  <get-ddos-sample-sflow-flows>
show ddos-protection protocols sample statistics
  <get-ddos-sample-statistics>
show ddos-protection protocols sample syslog
show ddos-protection protocols sample tap
  <get-ddos-sample-tap>
show ddos-protection protocols sample tap culprit-flows
show ddos-protection protocols sample violations
  <get-ddos-sample-violations>

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```
show ddos-protection protocols services
    get-ddos-services-information
show ddos-protection protocols sample-dest
<get-ddos-sample-dest-information>
show ddos-protection protocols sample-dest aggregate
<get-ddos-sample-dest-aggregate>
show ddos-protection protocols sample-dest aggregate culprit-flows
<get-ddos-sample-dest-aggregate-flows>
show ddos-protection protocols sample-dest culprit-flows
<get-ddos-sample-dest-flows>
show ddos-protection protocols sample-dest flow-detection
<get-ddos-sample-dest-flow-parameters>
show ddos-protection protocols sample-dest parameters
<get-ddos-sample-dest-parameters>
show ddos-protection protocols sample-dest statistics
<get-ddos-sample-dest-statistics>
show ddos-protection protocols sample-dest violations
<get-ddos-sample-dest-violations>
show ddos-protection protocols sample-source
<get-ddos-sample-source-information>
show ddos-protection protocols sample-source aggregate
<get-ddos-sample-source-aggregate>
show ddos-protection protocols sample-source aggregate culprit-flows
<get-ddos-sample-source-aggregate-flows>
show ddos-protection protocols sample-source culprit-flows
<get-ddos-sample-source-flows>
show ddos-protection protocols sample-source flow-detection
<get-ddos-sample-source-flow-parameters>
show ddos-protection protocols sample-source parameters
<get-ddos-sample-source-parameters>
show ddos-protection protocols sample-source statistics
<get-ddos-sample-source-statistics>
show ddos-protection protocols sample-source violations
<get-ddos-sample-source-violations>
show ddos-protection protocols services aggregate
    <get-ddos-services-aggregate>
show ddos-protection protocols services parameters
    <get-ddos-services-parameters>
show ddos-protection protocols services statistics
    <get-ddos-services-statistics>
show ddos-protection protocols syslog
    <get-ddos-syslog-information>
show ddos-protection protocols syslog aggregate
    <get-ddos-syslog-aggregate>
show ddos-protection protocols syslog aggregate culprit-flows
    <get-ddos-syslog-aggregate-flows>
show ddos-protection protocols syslog culprit-flows
    <get-ddos-syslog-flows>
show ddos-protection protocols syslog flow-detection
    <get-ddos-syslog-flow-parameters>
show ddos-protection protocols syslog parameters
    <get-ddos-syslog-parameters>
show ddos-protection protocols syslog statistics
    <get-ddos-syslog-statistics>
show ddos-protection protocols syslog violations
    <get-ddos-syslog-violations>
show ddos-protection protocols services violations
    get-ddos-services-violations
show ddos-protection protocols snmp
    get-ddos-snmp-information
show ddos-protection protocols snmp aggregate
```

```
get-ddos-snmp-aggregate
show ddos-protection protocols snmp aggregate culprit-flows
show ddos-protection protocols snmp parameters
get-ddos-snmp-parameters
show ddos-protection protocols snmp statistics
get-ddos-snmp-statistics
show ddos-protection protocols snmp violations
get-ddos-snmp-violations
show ddos-protection protocols snmpv6
get-ddos-snmpv6-information
show ddos-protection protocols snmpv6 aggregate
get-ddos-snmpv6-aggregate
show ddos-protection protocols snmpv6 aggregate culprit-flows
show ddos-protection protocols snmpv6 parameters
get-ddos-snmpv6-parameters
show ddos-protection protocols snmpv6 statistics
get-ddos-snmpv6-statistics
show ddos-protection protocols snmpv6 violations
get-ddos-snmpv6-violations
show ddos-protection protocols ssh
get-ddos-ssh-information
show ddos-protection protocols ssh aggregate
get-ddos-ssh-aggregate
show ddos-protection protocols ssh parameters
get-ddos-ssh-parameters
show ddos-protection protocols ssh statistics
get-ddos-ssh-statistics
show ddos-protection protocols ssh violations
get-ddos-ssh-violations
show ddos-protection protocols sshv6
get-ddos-sshv6-information
show ddos-protection protocols sshv6 aggregate
get-ddos-sshv6-aggregate
show ddos-protection protocols sshv6 parameters
get-ddos-sshv6-parameters
show ddos-protection protocols sshv6 statistics
<get-ddos-sshv6-statistics>
show ddos-protection protocols sshv6 violations
<get-ddos-sshv6-violations>
show ddos-protection protocols statistics
<get-ddos-protocols-statistics>
show ddos-protection protocols stp
<get-ddos-stp-information>
show ddos-protection protocols stp aggregate
<get-ddos-stp-aggregate>
show ddos-protection protocols stp parameters
<get-ddos-stp-parameters>
show ddos-protection protocols stp statistics
<get-ddos-stp-statistics>
show ddos-protection protocols stp violations
<get-ddos-stp-violations>
show ddos-protection protocols tacacs
<get-ddos-tacacs-information>
show ddos-protection protocols tacacs aggregate
<get-ddos-tacacs-aggregate>
show ddos-protection protocols tacacs parameters
<get-ddos-tacacs-parameters>
show ddos-protection protocols tacacs statistics
<get-ddos-tacacs-statistics>
show ddos-protection protocols tacacs violations
<get-ddos-tacacs-violations>
```

```
show ddos-protection protocols tcp-flags
  <get-ddos-tcp-flags-information>
show ddos-protection protocols tcp-flags aggregate
  <get-ddos-tcp-flags-aggregate>
show ddos-protection protocols tcp-flags established
  <get-ddos-tcp-flags-establish>
show ddos-protection protocols tcp-flags initial
  <get-ddos-tcp-flags-initial>
show ddos-protection protocols tcp-flags parameters
  <get-ddos-tcp-flags-parameters>
show ddos-protection protocols tcp-flags statistics
  <get-ddos-tcp-flags-statistics>
show ddos-protection protocols tcp-flags unclassified
  <get-ddos-tcp-flags-unclass>
show ddos-protection protocols tcp-flags violations
  <get-ddos-tcp-flags-violations>
show ddos-protection protocols telnet
  <get-ddos-telnet-information>
show ddos-protection protocols telnet aggregate
  <get-ddos-telnet-aggregate>
show ddos-protection protocols telnet aggregate culprit-flows
show ddos-protection protocols telnet parameters
  <get-ddos-telnet-parameters>
show ddos-protection protocols telnet statistics
  <get-ddos-telnet-statistics>
show ddos-protection protocols telnet violations
  <get-ddos-telnet-violations>
show ddos-protection protocols telnetv6
  <get-ddos-telnetv6-information>
show ddos-protection protocols telnetv6 aggregate
  <get-ddos-telnetv6-aggregate>
show ddos-protection protocols telnetv6 aggregate culprit-flows
show ddos-protection protocols telnetv6 parameters
  <get-ddos-telnetv6-parameters>
show ddos-protection protocols telnetv6 statistics
  <get-ddos-telnetv6-statistics>
show ddos-protection protocols telnetv6 violations
  <get-ddos-telnetv6-violations>
show ddos-protection protocols ttl
  <get-ddos-ttl-information>
show ddos-protection protocols ttl aggregate
  <get-ddos-ttl-aggregate>
show ddos-protection protocols ttl parameters
  <get-ddos-ttl-parameters>
show ddos-protection protocols ttl statistics
  <get-ddos-ttl-statistics>
show ddos-protection protocols ttl violations
  <get-ddos-ttl-violations>
show ddos-protection protocols tunnel-fragment
  <get-ddos-tun-frag-information>
show ddos-protection protocols tunnel-fragment aggregate
  <get-ddos-tun-frag-aggregate>
show ddos-protection protocols tunnel-fragment aggregate culprit-flows
show ddos-protection protocols tunnel-fragment parameters
  <get-ddos-tun-frag-parameters>
show ddos-protection protocols tunnel-fragment statistics
  <get-ddos-tun-frag-statistics>
show ddos-protection protocols tunnel-fragment violations
  <get-ddos-tun-frag-violations>
show ddos-protection protocols tunnel-ka
  <get-ddos-tunnel-ka-information>
```

```

show ddos-protection protocols tunnel-ka aggregate
  <get-ddos-tunnel-ka-aggregate>
show ddos-protection protocols tunnel-ka aggregate culprit-flows
  <get-ddos-tunnel-ka-aggregate-flows>
show ddos-protection protocols tunnel-ka culprit-flows
  <get-ddos-tunnel-ka-flows>
show ddos-protection protocols tunnel-ka flow-detection
  <get-ddos-tunnel-ka-flow-parameters>
show ddos-protection protocols tunnel-ka parameters
  <get-ddos-tunnel-ka-parameters>
show ddos-protection protocols tunnel-ka statistics
  <get-ddos-tunnel-ka-statistics>
show ddos-protection protocols tunnel-ka violations
  <get-ddos-tunnel-ka-violations>
show ddos-protection protocols unknown-l2mc
  <get-ddos-unknown-l2mc-information>
show ddos-protection protocols unknown-l2mc aggregate
  <get-ddos-unknown-l2mc-aggregate>
show ddos-protection protocols unknown-l2mc aggregate culprit-flows
  <get-ddos-unknown-l2mc-aggregate-flows>
show ddos-protection protocols unknown-l2mc culprit-flows
  <get-ddos-unknown-l2mc-flows>
show ddos-protection protocols unknown-l2mc flow-detection
  <get-ddos-unknown-l2mc-flow-parameters>
show ddos-protection protocols unknown-l2mc parameters
  <get-ddos-unknown-l2mc-parameters>
show ddos-protection protocols unknown-l2mc statistics
  <get-ddos-unknown-l2mc-statistics>
show ddos-protection protocols unknown-l2mc violations
  <get-ddos-unknown-l2mc-violations>
show ddos-protection protocols unclassified
  <get-ddos-uncls-information>
show ddos-protection protocols unclassified aggregate
  <get-ddos-uncls-aggregate>
show ddos-protection protocols unclassified parameters
  <get-ddos-uncls-parameters>
show ddos-protection protocols unclassified resolve-v4
show ddos-protection protocols unclassified resolve-v4 culprit-flows
show ddos-protection protocols unclassified resolve-v6
show ddos-protection protocols unclassified resolve-v6 culprit-flows
show ddos-protection protocols unclassified statistics
  <get-ddos-uncls-statistics>
show ddos-protection protocols unclassified violations
  <get-ddos-uncls-violations>
show ddos-protection protocols urpf-fail
  <get-ddos-urpf-fail-information>
show ddos-protection protocols urpf-fail aggregate
  <get-ddos-urpf-fail-aggregate>
show ddos-protection protocols urpf-fail aggregate culprit-flows
  <get-ddos-urpf-fail-aggregate-flows>
show ddos-protection protocols urpf-fail culprit-flows
  <get-ddos-urpf-fail-flows>
show ddos-protection protocols urpf-fail flow-detection
  <get-ddos-urpf-fail-flow-parameters>
show ddos-protection protocols urpf-fail parameters
  <get-ddos-urpf-fail-parameters>
show ddos-protection protocols urpf-fail statistics
  <get-ddos-urpf-fail-statistics>
show ddos-protection protocols urpf-fail violations
  <get-ddos-urpf-fail-violations>
show ddos-protection protocols vcipc-udp

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```
<get-ddos-vcipc-udp-information>
show ddos-protection protocols vcipc-udp aggregate
  <get-ddos-vcipc-udp-aggregate>
show ddos-protection protocols vcipc-udp aggregate culprit-flows
  <get-ddos-vcipc-udp-aggregate-flows>
show ddos-protection protocols vcipc-udp culprit-flows
  <get-ddos-vcipc-udp-flows>
show ddos-protection protocols vcipc-udp flow-detection
  <get-ddos-vcipc-udp-flow-parameters>
show ddos-protection protocols vcipc-udp parameters
  <get-ddos-vcipc-udp-parameters>
show ddos-protection protocols vcipc-udp statistics
  <get-ddos-vcipc-udp-statistics>
show ddos-protection protocols vcipc-udp violations
  <get-ddos-vcipc-udp-violations>
show ddos-protection protocols violations
  get-ddos-protocols-violations
show ddos-protection protocols virtual-chassis
  get-ddos-vchassis-information
show ddos-protection protocols virtual-chassis aggregate
  get-ddos-vchassis-aggregate
show ddos-protection protocols virtual-chassis aggregate culprit-flows
show ddos-protection protocols virtual-chassis control-high
  get-ddos-vchassis-control-hi
show ddos-protection protocols virtual-chassis control-low
  get-ddos-vchassis-control-lo
show ddos-protection protocols virtual-chassis parameters
  get-ddos-vchassis-parameters
show ddos-protection protocols virtual-chassis statistics
  get-ddos-vchassis-statistics
show ddos-protection protocols virtual-chassis unclassified
  get-ddos-vchassis-unclass
show ddos-protection protocols virtual-chassis vc-packets
  get-ddos-vchassis-vc-packets
show ddos-protection protocols virtual-chassis vc-ttl-errors
  get-ddos-vchassis-vc-ttl-err
show ddos-protection protocols virtual-chassis violations
  get-ddos-vchassis-violations
show ddos-protection protocols vrrp
  get-ddos-vrrp-information
show ddos-protection protocols vrrp aggregate
  get-ddos-vrrp-aggregate
show ddos-protection protocols vrrp aggregate culprit-flows
show ddos-protection protocols vrrp parameters
  get-ddos-vrrp-parameters
show ddos-protection protocols vrrp statistics
  get-ddos-vrrp-statistics
show ddos-protection protocols vrrp violations
  get-ddos-vrrp-violations
show ddos-protection protocols vrrpv6
  get-ddos-vrrpv6-information
show ddos-protection protocols vrrpv6 aggregate
  get-ddos-vrrpv6-aggregate
show ddos-protection protocols vrrpv6 aggregate culprit-flows
show ddos-protection protocols vrrpv6 parameters
  get-ddos-vrrpv6-parameters
show ddos-protection protocols vrrpv6 statistics
  get-ddos-vrrpv6-statistics
show ddos-protection protocols vrrpv6 violations
  get-ddos-vrrpv6-violations
show ddos-protection statistics
```

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    get-ddos-statistics-information
show ddos-protection version
    get-ddos-version
show ddos-protection protocols vxlan
    <get-ddos-vxlan-information>
show ddos-protection protocols vxlan aggregate
    <get-ddos-vxlan-aggregate>
show ddos-protection protocols vxlan aggregate culprit-flows
    <get-ddos-vxlan-aggregate-flows>
show ddos-protection protocols vxlan culprit-flows
    <get-ddos-vxlan-flows>
show ddos-protection protocols vxlan flow-detection
    <get-ddos-vxlan-flow-parameters>
show ddos-protection protocols vxlan parameters
    <get-ddos-vxlan-parameters>
show ddos-protection protocols vxlan statistics
    <get-ddos-vxlan-statistics>
show ddos-protection protocols vxlan violations
    <get-ddos-vxlan-violations>
show dhcp
show dhcp proxy-client
show dhcp proxy-client binding
show dhcp proxy-client servers
show dhcp proxy-client statistics
    <get-proxy-dhcp-client-statistics-information>
show dhcp relay
show dhcp relay binding
    <get-dhcp-relay-binding-information>

show dhcp relay binding interface
<get-dhcp-relay-interface-bindings>
show dhcp relay binding lease-time-violation
<get-dhcp-relay-binding-ltv-information>
show dhcp relay statistics
    <get-dhcp-relay-statistics-information>
show dhcp relay statistics bulk-leasequery-connections
<get-dhcp-relay-bulk-leasequery-conn-statistics>
show dhcp relay statistics leasequery
<get-dhcp-relay-leasequery-statistics>

show dhcp server
show dhcp server binding
    <get-dhcp-server-binding-information>

show dhcp server binding interface
<get-dhcp-relay-binding-interface>
show dhcp server binding lease-time-violation
<get-dhcp-server-binding-ltv-information>
show dhcp server statistics
    <get-dhcp-server-statistics-information>
show dhcp statistics
    <get-dhcp-service-statistics-information>
show dhcp-security
<get-dhcp-security-arp-inspection-statistics>
show dhcp-security binding
<get-dhcp-security-binding>
show dhcp-security binding interface
<get-dhcp-security-binding-interface>
show dhcp-security binding ip-address
<get-dhcp-security-binding-ip-address>
show dhcp-security binding ip-source-guard

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<get-dhcp-security-ip-source-guard>
show dhcp-security binding statistics
<get-dhcp-security-binding-statistics>
show dhcp-security binding vlan
get-dhcp-security-binding-vlan
show dhcp-security ipv6
show dhcp-security ipv6 binding
<get-dhcpv6-security-binding>
show dhcp-security ipv6 binding interface
<get-dhcpv6-security-binding-interface>
show dhcp-security ipv6 binding ipv6-address
<get-dhcpv6-security-binding-ip-address>
show dhcp-security ipv6 binding vlan
<get-dhcpv6-security-binding-vlan>
show dhcp-security ipv6 statistics
<get-dhcp-ipv6-statistics>
show dhcp-security neighbor-discovery-inspection
show dhcp-security neighbor-discovery-inspection statistics
<get-dhcp-security-nd-inspection-statistics>
show dhcp-security neighbor-discovery-inspection statistics interface
<get-dhcp-security-ndi-interface>
show dhcp-security statistics
<get-dhcp-security-statistics>

show dhcpv6
show dhcpv6 client
show dhcpv6 client binding
get-dhcpv6-client-binding-information
show dhcpv6 client binding interface
<get-dhcpv6-client-binding-information-by-interface>
show dhcpv6 client statistics
<get-dhcpv6-client-statistics-information>
show dhcpv6 proxy-client
show dhcpv6 proxy-client binding
show dhcpv6 proxy-client statistics
  <get-proxy-dhcpv6-client-statistics-information>
show dhcpv6 relay
show dhcpv6 relay binding
  <get-dhcpv6-relay-binding-information>
show dhcpv6 relay binding interface
<get-dhcpv6-relay-binding-interface>
show dhcpv6 relay binding lease-time-violation
<get-dhcpv6-relay-binding-ltv-information>
show dhcpv6 relay statistics
  <get-dhcpv6-relay-statistics-information>
show dhcpv6 relay statistics bulk-leasequery-connections
<get-dhcpv6-relay-bulk-leasequery-conn-statistics>
show dhcpv6 relay statistics leasequery
<get-dhcpv6-relay-leasequery-statistics>
show dhcpv6 server
show dhcpv6 server binding
  <get-dhcpv6-server-binding-information>

show dhcpv6 server binding interface
<get-dhcpv6-server-binding-interface>
show dhcpv6 server binding lease-time-violation
<get-dhcpv6-server-binding-ltv-information>
show dhcpv6 server statistics
  <get-dhcpv6-server-statistics-information>
show dhcpv6 server statistics bulk-leasequery-connections
<get-dhcpv6-server-bulk-leasequery-conn-statistics>
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show dhcpv6 statistics
  <get-dhcpv6-service-statistics-information>
show diagnostics
show diagnostics tdr
  <get-tdr-interface-information>
show diagnostics tdr interface
  <get-tdr-interface-status>
show diameter
  <get-diameter-information>
show diameter function
  <get-diameter-function-information>
show diameter function statistics
  <get-diameter-function-statistics>
show diameter instance
  <get-diameter-instance-information>
show diameter network-element
  <get-diameter-network-element-information>
show diameter network-element map
  <get-diameter-network-element-map-information>
show diameter peer
  <get-diameter-peer-information>
show diameter peer map
  <get-diameter-peer-map-information>
show diameter peer statistics
  <get-diameter-peer-statistics>
show diameter route
  <get-diameter-route-information>
show dot1x
show dot1x accounting-attributes
  <get-dot1x-accounting-attributes>
show dot1x accounting-attributes interface
  <get-dot1x-interface-accounting-attributes>
show dot1x authentication-failed-users
  <get-dot1x-authentication-failed-users>
show dot1x interface
  <get-dot1x-interface-information>
show dot1x static-mac-address
  <get-dot1x-static-mac-addresses>
show dot1x static-mac-address interface
  <get-dot1x-interface-mac-addresses>
show dvmp
show dvmp interfaces
  <get-dvmp-interfaces-information>
show dvmp neighbors
  <get-dvmp-neighbors-information>
show dvmp prefix
  <get-dvmp-prefix-information>
show dvmp prunes
  <get-dvmp-prunes-information>
show dynamic-profile
  <get-dynamic-profile>
show dynamic-profile session
  <get-dynamic-profile-session-information>
show dynamic-tunnels
show dynamic-tunnels database
  <get-dynamic-tunnels-database>
show ethernet-switching mac-learning-log
  <get-ethernet-switching-log-information>
show ethernet-switching mac-notification
  <get-ethernet-switching-mac-notification-information>
show ethernet-switching flood next-hops

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show ethernet-switching flood next-hops satellite
<get-satellite-control-composite-next-hop>
show ethernet-switching flood satellite
<get-satellite-control-flood>
show ethernet-switching nh-learn-entity
<get-l2-learning-nh-learn-entries>
show ethernet-switching redundancy-groups
<get-ethernet-switching-redundancy-groups>
show ethernet-switching satellite
show ethernet-switching satellite device
<get-satellite-device-db>
show ethernet-switching satellite events
<get-satellite-control-history-information>
show ethernet-switching satellite logging
<get-satellite-control-logging-information>
show ethernet-switching satellite summary
<get-satellite-control-bridge-summary>
show ethernet-switching table satellite
<get-satellite-control-bridge-mac-table>
show ethernet-switching vxlan-tunnel-end-point esi
<get-ethernet-switching-vxlan-esi-info>
show ethernet-switching vxlan-tunnel-end-point remote
<get-ethernet-switching-vxlan-rvtep-info>
show ethernet-switching vxlan-tunnel-end-point remote esi
<get-ethernet-switching-vxlan-esi-info>
show ethernet-switching vxlan-tunnel-end-point remote vtep-source-interface
<get-ethernet-switching-vxlan-remote-svtep-ip-information>
show ethernet-switching vxlan-tunnel-end-point source ip
<get-ethernet-switching-vxlan-svtep-ip-information>
show ephemeral-configuration
show esis
show esis adjacency
  <get-esis-adjacency-information>
show esis interface
  <get-esis-interface-information>
show esis statistics
  <get-esis-statistics-information>
show event-options
show event-options event-scripts
show event-options event-scripts policies
  <get-event-scripts-policies>
<get-event-summary>
show evpn
show evpn arp-table
<get-evpn-arp-table>
show evpn flood
<get-evpn-flood-information>
show evpn flood event-queue
<get-evpn-event-queue-information>
show evpn flood route
show evpn flood route all-ce-flood
<get-evpn-all-ce-flood-route-information>
show evpn flood route all-flood
<get-evpn-all-flood-route-information>
show evpn flood route alt-root-flood
<get-evpn-alt-root-flood-route-information>
show evpn flood route ce-flood
<get-evpn-ce-flood-route-information>
show evpn flood route mlp-flood
<get-evpn-mlp-flood-route-information>
show evpn flood route re-flood
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<get-evpn-re-flood-route-information>
show evpn instance
<get-evpn-instance-information>
show evpn mac-table
<get-evpn-mac-table>
show evpn mac-table interface
<get-evpn-interface-mac-table>
show evpn peer-gateway-macs
<get-evpn-peer-gateway-mac>
show evpn statistics
<get-evpn-statistics-information>
show extensible-subscriber-services
show extensible-subscriber-services accounting
<get-extensible-subscriber-services-accounting>
show extensible-subscriber-services counters
<get-extensible-subscriber-services-counters>
show extensible-subscriber-services dictionary
<get-extensible-subscriber-services-dictionary>
show extensible-subscriber-services services
<get-extensible-subscriber-services-services>
show extensible-subscriber-services sessions
<get-extensible-subscriber-services-sessions>
show extension-provider
show extension-provider system
show extension-provider system connections
  <get-mspinfo-connections>
show extension-provider system packages
  <get-mspinfo-packages>
show extension-provider system processes
  <get-mspinfo-processes>
show extension-provider system processes brief
  <get-mspinfo-processes-brief>
show extension-provider system processes extensive
  <get-mspinfo-processes-extensive>
show extension-provider system uptime
  <get-mspinfo-uptime>
show extension-provider system virtual-memory
  <get-core-key-list>
  <get-fabric-summary-information>
  <get-key-vg-binding>
  <get-mac-ip-binding-information>
  <get-mc-ccpc-cache-ccpc-select>
  <get-mc-ccpc-cache-root-candidates>
  <get-mc-ccpc-cache-spf>
  <get-mc-ccpc-src-mod-filters>
  <get-mc-edge-cache-ccpc-select>
  <get-mc-edge-map-to-key-binding>
  <get-mc-edge-key-to-map-binding>
  <get-mc-edge-vg-portmap>
  <get-mc-nsf>
  <get-mc-root-cache-trunk>
  <get-mc-root-key-to-map-binding>
  <get-layer2-group-membership-entries>
  <get-layer3-group-membership-entries>
  <get-layer3-multicast-pending-routes>
  <get-layer3-multicast-receivers>
  <get-mc-root-map-to-key-binding>
  <get-mc-root-vg-pfemap>
  <get-fabric-multicast-statistics>
  <get-mc-vccpdf-adjacency-database>
  <get-mspinfo-virtual-memory>

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get-fabric-statistics
get-fabric-summary-information
  <get-vlan-domain-map-information>
show fabric multicast dirty-key-info
<get-mc-dirty-key-info>
show fabric multicast edge corekey-ifls-filters
<get-mc-edge-corekey-ifls-filters>
show fabric multicast edge ine-ifls-filters
<get-mc-edge-ine-ifls-filters>
show fabric multicast edge src-mod-filters
<get-mc-edge-src-mod-filters>
show fabric multicast graph
show fabric multicast graph core-tree
<get-fabric-multicast-graph>
show fabric multicast steal-key-info
<get-mc-steal-key-info>
show forwarding-options
show forwarding-options enhanced-hash-key
show forwarding-options enhanced-hash-key fpc
show forwarding-options hyper-mode
<get forwarding-options hyper-mode>
show forwarding-options next-hop-group
<get-forwarding-options-next-hop-group>
show forwarding-options port-mirroring
<get-forwarding-options-port-mirroring>
show helper
show helper statistics
  <get-helper-statistics-information>
show hfrr
show hfrr profiles
show iccp
  <get-inter-chassis-control-protocol-information>
show igmp
show igmp group
  <get-igmp-group-information>
show igmp interface
  <get-igmp-interface-information>
show igmp output-group
  <get-igmp-output-group-information>
show igmp snooping
show igmp snooping interface
  <get-igmp-snooping-interface-information>
show igmp snooping interface bridge-domain
  <get-igmp-snooping-bridge-domain-interface>
show igmp snooping membership
  <get-igmp-snooping-membership-information>
show igmp snooping membership bridge-domain
show igmp snooping options
  <get-igmp-snooping-options-information>
show igmp snooping options
get-igmp-snooping-options-information
show igmp snooping statistics
  <get-igmp-snooping-statistics-information>
show igmp snooping statistics bridge-domain
  <get-igmp-snooping-bridge-domain-membership>
show igmp statistics
  <get-igmp-statistics-information>

show ike
show ike security-associations
  <get-ike-security-associations-information>
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show ilmi
<get-ilmi-information>
show ilmi interface
<get-ilmi-interface-information>
show ilmi statistics
<get-ilmi-statistics>
show ingress-replication
  <get-ingress-replication-information>
show interfaces
  <get-interface-information>
show interfaces anchor-group
show interfaces controller
<get-interface-controller-information>
show interfaces destination-class
  <get-destination-class-statistics>

show interfaces destination-class all
<get-all-destination-class-statistics>
show interfaces diagnostics
show interfaces diagnostics optics
  <get-interface-optics-diagnostics-information>
show interfaces diagnostics optics satellite
<show-interface-optics-diagnostics-satellite>
show interfaces distribution-list
<get-distribution-list-information>

show interfaces far-end-interval
  <show-interfaces-far-end-interval>
show interfaces filters
  <get-interface-filter-information>

show interfaces forwarding-class-counters
<get-interface-fc-counters-information>

show interfaces interface-set
<get-interface-set-information>
show interfaces interface-set queue
  <get-interface-set-queue-information>

show interfaces interval
  <show-interfaces-interval>
show interfaces load-balancing
  <interface-load-balancing>
show interfaces mac-database
  <get-mac-database>

show interfaces mc-ae
  <get-mc-ae-interface-information>
show interfaces mc-ae revertive-info
  <get-mc-ae-revertive-information>
show interfaces policers
  <get-interface-policer-information>

show interfaces queue
  <get-interface-queue-information>

show interfaces redundancy
  <get-redundancy-status>
show interfaces redundancy detail
  <get-redundancy-status-details>
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show interfaces routing
show interfaces source-class
    <get-source-class-statistics>

show interfaces source-class all
<get-all-source-class-statistics>
show interfaces targeting
    <get-targeting-information>
show interfaces transport
<get-interface-transport-information>
show interfaces transport optics
<get-interface-transport-optics-information>
show interfaces transport optics interval
<get-interface-transport-optics-interval-information>
show interfaces voq
<get-interface-voq-information>
show ipsec
show ipsec redundancy
show ipsec redundancy interface
    <get-ipsec-pic-redundancy-information>

show ipsec redundancy security-associations
    <get-ipsec-tunnel-redundancy-information>

show ipsec security-associations
    <get-security-associations-information>

show ipv6
show ipv6 neighbors
    <get-ipv6-nd-information>

show ipv6 router-advertisement
    <get-ipv6-ra-information>

show isis
show isis adjacency
    <get-isis-adjacency-information>

show isis authentication
    <get-isis-authentication-information>

show isis backup
show isis backup coverage
    <get-isis-backup-coverage-information>

show isis backup label-switched-path
    <get-isis-backup-lsp-information>

show isis backup spf

show isis backup spf results
    <get-isis-backup-spf-results-information>
show isis bgp-orr
    <get-isis-bgporr-information>

show isis context-identifier
    <get-isis-context-identifier-information>

show isis context-identifier identifier
    <get-isis-context-identifier-origin-information>
show isis database
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    <get-isis-database-information>

show isis hostname
    <get-isis-hostname-information>

show isis interface
    <get-isis-interface-information>
show isis interface-group
    <get-isis-interface-group-information>
show isis layer2-map
    <get-isis-layer2-map-information>

show isis overview
    <get-isis-overview-information>

show isis route
    <get-isis-route-information>

show isis spf
show isis spf brief
    <get-isis-spf-results-brief-information>

show isis spf log
    <get-isis-spf-log-information>

show isis spf results
    <get-isis-spf-results-information>

show isis statistics
    <get-isis-statistics-information>

show l2-learning
show l2-learning backbone-instance
    <get-l2-learning-backbone-instance>
show l2-learning evpn
show l2-learning evpn arp-statistics
    <get-evpn-arp-statistics>
show l2-learning evpn arp-statistics interface
    <get-evpn-arp-statistics-interface>
show l2-learning global-information
    <get-l2-learning-global-information>
show l2-learning global-mac-count
    <get-l2-learning-global-mac-count>
show l2-learning instance
    <get-l2-learning-routing-instances>
show l2-learning interface
    <get-l2-learning-interface-information>
show l2-learning mac-move-buffer
    <get-l2-learning-mac-move-buffer-information>
show l2-learning provider-instance
    <get-l2-learning-provider-instance>
show l2-learning redundancy-groups
    <get-l2-learning-redundancy-groups>
show l2-learning remote-backbone-edge-bridges
    <get-l2-learning-remote-backbone-edge-bridges>
show l2-learning vxlan-tunnel-end-point
show l2-learning vxlan-tunnel-end-point esi
    <get-l2-learning-vxlan-esi-info>show l2-learning vxlan-tunnel-end-point remote
    <get-l2-learning-vxlan-rvtep-info>
show l2-learning vxlan-tunnel-end-point remote ip
    <get-l2-learning-vxlan-rvtep-ip-information>

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show l2-learning vxlan-tunnel-end-point remote mac-table
<get-l2-learning-vxlan-rvtep-mactable-information>
show l2-learning vxlan-tunnel-end-point remote vtep-source-interface
<get-l2-learning-vxlan-remote-svtep-ip-information>
show l2-learning vxlan-tunnel-end-point source
<get-l2-learning-vxlan-svtep-info>
show l2-learning vxlan-tunnel-end-point source ip
<get-l2-learning-vxlan-svtep-ip-information>
show l2circuit
show l2circuit auto-sensing
<get-l2ckt-pw-auto-sensing-information>
show l2circuit connections
  <get-l2ckt-connection-information>

show l2cpd
show l2cpd task
<get-l2cpd-task-information>
show l2cpd task io
  <get-l2cpd-tasks-io-statistics>
show l2cpd task memory
  <get-l2cpd-task-memory>
show l2cpd task replication
  <get-l2cpd-replication-information>
show l2vpn
show l2vpn connections
  <get-l2vpn-connection-information>

show lacp
show lacp interfaces
  <get-lacp-interface-information>
show lacp statistics
show lacp statistics interfaces
  <get-lacp-interface-statistics>
show lacp timeouts
show ldp
show ldp database
  <get-ldp-database-information>

show ldp fec-filters
  <get-ldp-fec-filters-information>

show ldp interface
  <get-ldp-interface-information>

show ldp neighbor
  <get-ldp-neighbor-information>

show ldp oam
<get-ldp-oam-information>
show ldp overview
  <get-ldp-overview-information>
show ldp p2mp
show ldp p2mp fec
  <get-ldp-p2mp-fec-information>
show ldp p2mp path
  <get-ldp-p2mp-path-information>
show ldp p2mp tunnel
<get-ldp-p2mp-tunnel-information>
show ldp path
  <get-ldp-path-information>
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show ldp rib-groups
<get-ldp-rib-groups-information>
show ldp route
<get-ldp-route-information>

show ldp session
<get-ldp-session-information>

show ldp statistics
<get-ldp-statistics-information>

show ldp traffic-statistics
<get-ldp-traffic-statistics-information>

show link-management
<get-lm-information>

show link-management peer
<get-lm-peer-information>

show link-management routing
<get-lm-routing-information>

show link-management routing peer
<get-lm-routing-peer-information>

show link-management routing resource
<get-lm-routing-resource-information>

show link-management routing te-link
<get-lm-routing-te-link-information>

show lldp
<get-lldp-information>

show lldp detail
<get-lldp-information-detail>

show lldp local-information
<get-lldp-local-info>

show lldp neighbors
<get-lldp-neighbors-information>

show lldp neighbors interface
<get-lldp-interface-neighbors>
show lldp remote-global-statistics
<get-lldp-remote-global-statistics>

show lldp statistics
<get-lldp-statistics-information>

show lldp statistics interface
<get-lldp-interface-statistics>
show loop-detect
show loop-detect interface
<get-loop-detect-interface-information>
show loop-detect statistics
show loop-detect statistics interface
<get-loop-detect-interface-statistics-information>
show link-management statistics
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<get-lm-statistics-information>

show link-management statistics peer
  <get-lm-peer-statistics>

show link-management te-link
  <get-lm-te-link-information>

show mac-rewrite
show mac-rewrite interface
  <get-mac-rewrite-interface-information>
show mld
show mld group
  <get-mld-group-information>

show mld interface
  <get-mld-interface-information>

show mld output-group
  <get-mld-output-group-information>

show mld snooping
show mld snooping interface
  <get-mld-snooping-interface-information>
show mld snooping interface bridge-domain
  <get-mld-snooping-bridge-domain-interface>
show mld snooping interface vlan
  <get-mld-snooping-vlan-interface>
show mld snooping membership
  <get-mld-snooping-membership-information>
show mld snooping membership bridge-domain
  <get-mld-snooping-bridge-domain-membership>
show mld snooping membership vlan
  <get-mld-snooping-vlan-membership>
show mld snooping statistics
  <get-mld-snooping-statistics-information>
show mld snooping statistics bridge-domain
  <get-mld-snooping-bridge-domain-statistics>
show mld snooping statistics vlan
  <get-mld-snooping-vlan-statistics>
show mld statistics
  <get-mld-statistics-information>

show mobile-ip
show mobile-ip home-agent
show mobile-ip home-agent binding
  <get-mip-binding-information>

show mobile-ip home-agent binding ip-address
  <get-ip-mip-binding-information>

show mobile-ip home-agent binding nai
  <get-nai-mip-binding-information>

show mobile-ip home-agent binding summary
  <get-summary-mip-binding-information>

show mobile-ip home-agent interface
  <get-mip-ha-interface-information>

show mobile-ip home-agent overview
```

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<get-mip-ha-overview-information>

show mobile-ip home-agent traffic
<get-mip-ha-traffic-information>

show mobile-ip home-agent virtual-network
<get-mip-ha-virtual-network-information>

show mobile-ip tunnel
<get-mip-tunnel-information>
show mobile-ip wimax
show mobile-ip wimax release
<get-mip-wimax-release-information>

show mpls
show mpls admin-groups
<get-mpls-admin-group-information>

show mpls admin-groups-extended
<get-mpls-admin-group-extended-information>
show mpls association
show mpls association iif
<get-mpls-association-iif-information>
show mpls association oif
<get-mpls-association-oif-information>
show mpls association path
<get-mpls-association-path-information>
show mpls call-admission-control
<get-mpls-call-admission-control-information>

show mpls context-identifier
<get-mpls-context-identifier-information>
show mpls correlation
show mpls correlation label
<get-mpls-correlation-label-information>
show mpls correlation nexthop-id
<get-mpls-correlation-nexthop-information>

show network-access address-assignment preserved
<get-address-assignment-preserved-table>
show network-access domain-map
show network-access domain-map statistics
<get-domain-map-statistics>
show mpls cspf
<get-mpls-cspf-information>

show mpls diffserv-te
<get-mpls-diffserv-te-information>
show mpls egress-protection
show mpls interface
<get-mpls-interface-information>
show mpls label
<get mpls-label-space>
show mpls label usage
<get mpls-label-space-usage>

show mpls lsp
<get-mpls-lsp-information>

show mpls lsp autobandwidth
<get-mpls-lsp-autobandwidth>
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show mpls srlg
    <get-mpls-srlg-information>
show oam ethernet fnp
show oam ethernet fnp interface
show oam ethernet fnp messages
show oam ethernet fnp status
    <get-fnp-status>
show mpls lsp defaults
    <get-mpls-lsp-defaults-information>

show mpls path
    <get-mpls-path-information>

show mpls static-lsp
    <get-mpls-static-lsp-information>
show mpls traceroute
show mpls traceroute database
show mpls traceroute database ldp
    <get-mpls-traceroute-database-ldp>
show msdp
    <get-msdp-information>
show msdp source
    <get-msdp-source-information>

show msdp source-active
    <get-msdp-source-active-information>

show msdp statistics
    <get-msdp-statistics-information>
show multi-chassis
show multi-chassis mc-lag
show multi-chassis mc-lag configuration-consistency
    <get-mclag-config-consistency-information>
show multi-chassis mc-lag configuration-consistency global-config
    <get-mclag-global-config-consistency-information>
show multi-chassis mc-lag configuration-consistency icl-config
    <get-mclag-icl-config-consistency-information>
show multi-chassis mc-lag configuration-consistency
list-of-parameters<get-mclag-config-consistency-information-params>
show multi-chassis mc-lag configuration-consistency mcae-config
get-mclag-config-consistency-information-mcae
show multi-chassis mc-lag configuration-consistency vlan-config
    <get-mclag-vlan-config-consistency-information>
show multi-chassis mc-lag configuration-consistency vrrp-config
    <get-mclag-vrrp-config-consistency-information>
show multicast
show multicast backup-pe-groups
    <get-multicast-backup-pe-groups-information>

show multicast backup-pe-groups address
    <get-multicast-backup-pe-address-information>

show multicast backup-pe-groups group
    <get-multicast-backup-pe-group-information>
show multicast ecid-mapping
show multicast ecid-mapping satellite
    <get-satellite-control-ecid>
show multicast flow-map
    <get-multicast-flow-maps-information>

show multicast interface
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<get-multicast-interface-information>

show multicast next-hops
  <get-multicast-next-hops-information>
show multicast next-hops satellite
  <get-satellite-control-next-hop>

show multicast pim-to-igmp-proxy
  <get-multicast-pim-to-igmp-proxy-information>

show multicast pim-to-mld-proxy
  <get-multicast-pim-to-mld-proxy-information>

show multicast route
  <get-multicast-route-information>

show multicast rpf
  <get-multicast-rpf-information>

show multicast scope
  <get-multicast-scope-information>

show multicast sessions
  <get-multicast-sessions-information>

show multicast snooping
show multicast snooping next-hops
  <get-multicast-snooping-next-hops-information>

show multicast snooping next-hops satellite
  <get-satellite-control-indirect-next-hop>
show multicast snooping route
  <get-multicast-snooping-route-information>
show multicast snooping route satellite
get-satellite-control-multicast

show multicast statistics
  <get-multicast-statistics-information>
show multicast statistics satellite
  <get-satellite-control-statistics>
show multicast summary
show multicast summary satellite
  <get-satellite-control-summary>

show multicast usage
  <get-multicast-usage-information>

show mvpn
show mvpn c-multicast
  <get-mvpn-c-multicast-route>
show mvpn instance
  <get-mvpn-instance-information>

show mvpn neighbor
  <get-mvpn-neighbor-information>
show mvpn suppressed
get-mvpn-suppressed-information
show mvrp
  <get-mvrp-information>
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show mvrp applicant-state
  <get-mvrp-applicant-information>

show mvrp dynamic-vlan-memberships
  <get-mvrp-dynamic-vlan-memberships>

show mvrp interface
  <get-mvrp-interface-information>

show mvrp registration-state
  <get-mvrp-registration-state>

show mvrp statistics
  <get-mvrp-interface-statistics>

show network-access
show network-access aaa
show network-access aaa radius-servers
  <get-radius-servers-table>
show network-access aaa statistics
  <get-aaa-module-statistics>

show network-access aaa statistics address-assignment
show network-access aaa statistics address-assignment client
  <get-address-assignment-client-statistics>
show network-access aaa statistics address-assignment pool
  <get-address-assignment-pool-statistics>
show network-access aaa subscribers
  <get-aaa-subscriber-table>

show network-access aaa subscribers session-id

show network-access aaa subscribers statistics
  <get-aaa-subscriber-statistics>

show network-access aaa terminate-code
  <get-aaa-terminate-code>
show network-access aaa terminate-code aaa
  <get-aaa-terminate-code-aaa>
show network-access aaa terminate-code dhcp
  <get-aaa-terminate-code-dhcp>
show network-access aaa terminate-code l2tp
  <get-aaa-terminate-code-l2tp>
show network-access aaa terminate-code ppp
  <get-aaa-terminate-code-ppp>
show network-access aaa terminate-code reverse
  <get-aaa-terminate-code-reverse>
show network-access aaa terminate-code reverse aaa
  <get-aaa-terminate-code-reverse-aaa>
show network-access aaa terminate-code reverse dhcp
  <get-aaa-terminate-code-reverse-dhcp>
show network-access aaa terminate-code reverse l2tp
  <get-aaa-terminate-code-reverse-l2tp>
show network-access aaa terminate-code reverse ppp
  <get-aaa-terminate-code-reverse-ppp>
show network-access address-assignment
show network-access address-assignment pool
  <get-address-assignment-pool-table>
show network-access nasreq
show network-access nasreq statistics
get-nasreq-counters
```

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show network-access ocs
show network-access ocs state
<get-ocs-state-information>
show network-access ocs statistics
<get-ocs-statistics-information>
show network-access pcrf
show network-access pcrf state
<get-pcrf-state-information>
show network-access pcrf statistics
<get-pcrf-statistics-information>

show network-access requests
show network-access requests pending
  <get-authentication-pending-table>

show network-access requests statistics
  <get-authentication-statistics>

show network-access securid-node-secret-file
  <get-node-secret-file-table>

show nonstop-routing
<get-nonstop-routing-information>

show ntp
show ntp associations
show ntp status
show oam
show oam ethernet
show oam ethernet connectivity-fault-management sla-iterator-history
<get-cfm-iterator-history>
show oam ethernet connectivity-fault-management
show oam ethernet connectivity-fault-management adjacencies
<get-cfm-adjacency-information>
show oam ethernet connectivity-fault-management delay-statistics
  <get-cfm-delay-statistics>

show oam ethernet connectivity-fault-management forwarding-state
show oam ethernet connectivity-fault-management forwarding-state instance
  <get-cfm-forwarding-state-instance-information>

show oam ethernet connectivity-fault-management forwarding-state interface
  <get-cfm-forwarding-state-interface-information>

show oam ethernet connectivity-fault-management interfaces
  <get-cfm-interfaces-information>
show oam ethernet connectivity-fault-management loss-statistics
  <get-cfm-loss-statistics>
show oam ethernet connectivity-fault-management mep-database
  <get-cfm-mep-database>

show oam ethernet connectivity-fault-management mep-statistics
  <get-cfm-mep-statistics>

show oam ethernet connectivity-fault-management mip
  <get-cfm-mip-information>

show oam ethernet connectivity-fault-management path-database
  <get-cfm-linktrace-path-database>

show oam ethernet connectivity-fault-management policer
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```
<get-evc-information>

show oam ethernet connectivity-fault-management sla-iterator-statistics
  <get-cfm-iterator-statistics>
show oam ethernet evc
  <get-evc-infomation>
show oam ethernet link-fault-management
  <get-lfmd-information>

show oam ethernet lmi
  <get-elmi-information>

show oam ethernet lmi statistics
  <get-elmi-statistics>

show openflow
show openflow capability
show openflow controller
show openflow filters
show openflow flows
show openflow interfaces
show openflow statistics
show openflow statistics flows
show openflow statistics interfaces
show openflow statistics packet
show openflow statistics packet in
show openflow statistics packet out
show openflow statistics queue
show openflow statistics summary
show openflow statistics tables
show openflow summary
show openflow switch

show ospf
show ospf backup
show ospf backup coverage
  <get-ospf-backup-coverage-information>

show ospf backup lsp
  <get-ospf-backup-lsp-information>

show ospf backup neighbor
  <get-ospf-backup-neighbor-information>

show ospf backup spf
  <get-ospf-backup-spf-information>
show ospf bgp-orr
  <get-ospf-bgporr-information>

show ospf context-identifier
  <get-ospf-context-id-information>

show ospf database
  <get-ospf-database-information>

show ospf interface
  <get-ospf-interface-information>

show ospf io-statistics
  <get-ospf-io-statistics-information>
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show ospf log
  <get-ospf-log-information>

show ospf neighbor
  <get-ospf-neighbor-information>

show ospf overview
  <get-ospf-overview-information>

show ospf route
  <get-ospf-route-information>

show ospf statistics
  <get-ospf-statistics-information>

show ospf3
show ospf3 backup
show ospf3 backup coverage
  <get-ospf3-backup-coverage-information>

show ospf3 backup lsp
  <get-ospf3-backup-lsp-information>

show ospf3 backup neighbor
  <get-ospf3-backup-neighbor-information>

show ospf3 backup spf
  <get-ospf3-backup-spf-information>
show ospf3 bgp-orr
  <get-ospf-bgprr-information>

show ospf3 database
  <get-ospf3-database-information>

show ospf3 interface
  <get-ospf3-interface-information>

show ospf3 io-statistics
  <get-ospf3-io-statistics-information>

show ospf3 log
  <get-ospf3-log-information>

show ospf3 neighbor
  <get-ospf3-neighbor-information>

show ospf3 overview
  <get-ospf3-overview-information>

show ospf3 route
  <get-ospf3-route-information>

show ospf3 statistics
  <get-ospf3-statistics-information>
show overlay
  <get-cloud-analytics-overlay-information>
show overlay vxlan
  <get-cloud-analytics-overlay-vxlan-information>
show overlay vxlan vni
  <get-application-monitor-overlay-vxlan-information>
show overlay vxlan vtep
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<get-application-monitor-overlay-vtep-information>
show ovsdb
show ovsdb commit
show ovsdb commit failures
<get-ovsdb-commit-failure-information>

show ovsdb tunnels
<get-ovsdb-tunnels-information>
show ovsdb virtual-tunnel-end-point
<get-ovsdb-vtep-information>
show passive-monitoring
    <get-passive-monitoring-information>

show passive-monitoring error
    <get-passive-monitoring-error-information>

show passive-monitoring flow
    <get-passive-monitoring-flow-information>

show passive-monitoring memory
    <get-passive-monitoring-memory-information>

show passive-monitoring status
    <get-passive-monitoring-status-information>

show passive-monitoring usage
    <get-passive-monitoring-usage-information>
show path-computation-client
show path-computation-client active-pce
show path-computation-client lsp-retry-pending
<get-path-computation-client-lsp-retry-pending>
show path-computation-client statistics
show performance-monitoring
show performance-monitoring mpls
show performance-monitoring mpls lsp
<get-pm-mpls-lsp-information>
show pfe
show pfe cfeb
show pfe data
<get-pfe-data>
show pfe feb
show pfe filter
show pfe filter hw
show pfe filter hw summary
show pfe fpc
show pfe fwdd
show pfe lcc
show pfe next-hop
show pfe pfem
show pfe pfem detail
show pfe pfem extensive
show pfe route
show pfe route clnp
show pfe route clnp table
show pfe route inet6
show pfe route inet6 hw
show pfe route inet6 hw host
show pfe route inet6 hw lpm
show pfe route inet6 hw multicast

show pfe route inet6 table
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show pfe route ip
show pfe route ip table
show pfe route iso
show pfe route iso table
show pfe scb
show pfe sfm
show pfe ssb
show pfe statistics
show pfe statistics exceptions
show pfe statistics fabric
show pfe statistics ip
show pfe route ip hw
show pfe route ip hw host
show pfe route ip hw lpm
show pfe route ip hw multicast
show pfe route summary
show pfe route summary hw
show pfe statistics ip6
show pfe statistics traffic
    <get-pfe-statistics>
show pfe statistics traffic bandwidth
    <get-pfe-traffic-statistics-bandwidth>

show pfe statistics traffic cpu
show pfe statistics traffic cpu fpe
show pfe statistics traffic detail
    <get-pfe-traffic-statistics>
show pfe statistics traffic egress-queues
show pfe statistics traffic egress-queues fpc
show pfe statistics traffic multicast
show pfe statistics traffic multicast fpcshow pfe statistics traffic protocol
show pfe tcam
show pfe tcam app
    <get-pfe-tcam-app-list>
show pfe tcam app bd-dtag-validate
    <get-pfe-tcam-app-list-bd-dtag-validate>
show pfe tcam app bd-dtag-validate detail
show pfe tcam app bd-dtag-validate list-related-apps
show pfe tcam app bd-dtag-validate list-shared-apps
show pfe tcam app bd-dtag-validate shared-usage
show pfe tcam app bd-dtag-validate shared-usage detail
show pfe tcam app bd-tpid-swap
    <get-pfe-tcam-app-list-bd-tpid-swap>
show pfe tcam app bd-tpid-swap detail
show pfe tcam app bd-tpid-swap list-related-apps
show pfe tcam app bd-tpid-swap list-shared-apps
show pfe tcam app bd-tpid-swap shared-usage
show pfe tcam app bd-tpid-swap shared-usage detail
show pfe tcam app cfm-bd-filter
    <get-pfe-tcam-app-list-cfm-bd-filter>
show pfe tcam app cfm-bd-filter detail
show pfe tcam app cfm-bd-filter list-related-apps
show pfe tcam app cfm-bd-filter list-shared-apps
show pfe tcam app cfm-bd-filter shared-usage
show pfe tcam app cfm-bd-filter shared-usage detail
show pfe tcam app cfm-filter
    <get-pfe-tcam-app-list-cfm-filter>
show pfe tcam app cfm-filter list-related-apps
show pfe tcam app cfm-filter list-shared-apps
show pfe tcam app cfm-filter shared-usage
show pfe tcam app cfm-filter shared-usage detail
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show pfe tcam app cfm-vpls-filter
<get-pfe-tcam-app-list-cfm-vpls-filter>
show pfe tcam app cfm-vpls-filter detail
show pfe tcam app cfm-vpls-filter list-related-apps
show pfe tcam app cfm-vpls-filter list-shared-apps
show pfe tcam app cfm-vpls-filter shared-usage
show pfe tcam app cfm-vpls-filter shared-usage detail
show pfe tcam app cfm-vpls-ifl-filter
<get-pfe-tcam-app-list-cfm-vpls-ifl-filter>
show pfe tcam app cfm-vpls-ifl-filter detail
show pfe tcam app cfm-vpls-ifl-filter list-related-apps
show pfe tcam app cfm-vpls-ifl-filter list-shared-apps
show pfe tcam app cfm-vpls-ifl-filter shared-usage
show pfe tcam app cfm-vpls-ifl-filter shared-usage detail
show pfe tcam app cos-fc
<get-pfe-tcam-app-list-cos-fc>
show pfe tcam app cos-fc detail
show pfe tcam app cos-fc list-related-apps
show pfe tcam app cos-fc list-shared-apps
show pfe tcam app cos-fc shared-usage
show pfe tcam app cos-fc shared-usage detail
show pfe tcam app fw-ccc-in
<get-pfe-tcam-app-list-fw-ccc-in>
show pfe tcam app fw-ccc-in detail
show pfe tcam app fw-ccc-in list-related-apps
show pfe tcam app fw-ccc-in list-shared-apps
show pfe tcam app fw-ccc-in shared-usage
show pfe tcam app fw-ccc-in shared-usage detail
show pfe tcam app fw-family-out
<get-pfe-tcam-app-list-fw-family-out>
show pfe tcam app fw-family-out detail
show pfe tcam app fw-family-out list-related-apps
show pfe tcam app fw-family-out list-shared-apps
show pfe tcam app fw-family-out shared-usage
show pfe tcam app fw-family-out shared-usage detail
show pfe tcam app fw-fbf
<get-pfe-tcam-app-list-fw-fbf>
show pfe tcam app fw-fbf detail
show pfe tcam app fw-fbf list-related-apps
show pfe tcam app fw-fbf list-shared-apps
show pfe tcam app fw-fbf shared-usage
show pfe tcam app fw-fbf shared-usage detail
show pfe tcam app fw-fbf-inet6
<get-pfe-tcam-app-list-fw-fbf-inet6>
show pfe tcam app fw-fbf-inet6 detail
show pfe tcam app fw-fbf-inet6 list-related-apps
show pfe tcam app fw-fbf-inet6 list-shared-apps
show pfe tcam app fw-fbf-inet6 shared-usage
show pfe tcam app fw-fbf-inet6 shared-usage detail
show pfe tcam app fw-ifl-in
<get-pfe-tcam-app-list-fw-ifl-in>
show pfe tcam app fw-ifl-in detail
show pfe tcam app fw-ifl-in list-related-apps
show pfe tcam app fw-ifl-in list-shared-apps
show pfe tcam app fw-ifl-in shared-usage
show pfe tcam app fw-ifl-in shared-usage detail
show pfe tcam app fw-ifl-out
<get-pfe-tcam-app-list-fw-ifl-out>
show pfe tcam app fw-ifl-out detail
show pfe tcam app fw-ifl-out list-related-apps
show pfe tcam app fw-ifl-out list-shared-apps
```

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show pfe tcam app fw-ifl-out shared-usage
show pfe tcam app fw-ifl-out shared-usage detail
show pfe tcam app fw-inet-ftf
<get-pfe-tcam-app-list-fw-inet-ftf>
show pfe tcam app fw-inet-ftf detail
show pfe tcam app fw-inet-ftf list-related-apps
show pfe tcam app fw-inet-ftf list-shared-apps
show pfe tcam app fw-inet-ftf shared-usage
show pfe tcam app fw-inet-ftf shared-usage detail
show pfe tcam app fw-inet-in
<get-pfe-tcam-app-list-fw-inet-in>
show pfe tcam app fw-inet-in detail
show pfe tcam app fw-inet-in list-related-apps
show pfe tcam app fw-inet-in list-shared-apps
show pfe tcam app fw-inet-in shared-usage
show pfe tcam app fw-inet-in shared-usage detail
show pfe tcam app fw-inet-pm
<get-pfe-tcam-app-list-fw-inet-pm>
show pfe tcam app fw-inet-pm detail
show pfe tcam app fw-inet-pm list-related-apps
show pfe tcam app fw-inet-pm list-shared-apps
show pfe tcam app fw-inet-pm shared-usage
show pfe tcam app fw-inet-pm shared-usage detail
show pfe tcam app fw-inet-rpf
<get-pfe-tcam-app-list-fw-inet-rpf>
show pfe tcam app fw-inet-rpf detail
show pfe tcam app fw-inet-rpf list-related-apps
show pfe tcam app fw-inet-rpf list-shared-apps
show pfe tcam app fw-inet-rpf shared-usage
show pfe tcam app fw-inet-rpf shared-usage detail
show pfe tcam app fw-inet6-family-out
<get-pfe-tcam-app-list-fw-inet6-family-out>
show pfe tcam app fw-inet6-family-out detail
show pfe tcam app fw-inet6-family-out list-related-apps
show pfe tcam app fw-inet6-family-out list-shared-apps
show pfe tcam app fw-inet6-family-out shared-usage
show pfe tcam app fw-inet6-family-out shared-usage detail
show pfe tcam app fw-inet6-ftf
<get-pfe-tcam-app-list-fw-inet6-ftf>
show pfe tcam app fw-inet6-ftf detail
show pfe tcam app fw-inet6-ftf list-related-apps
show pfe tcam app fw-inet6-ftf list-shared-apps
show pfe tcam app fw-inet6-ftf shared-usage
show pfe tcam app fw-inet6-ftf shared-usage detail
show pfe tcam app fw-inet6-in
<get-pfe-tcam-app-list-fw-inet6-in>
show pfe tcam app fw-inet6-in detail
show pfe tcam app fw-inet6-in list-related-apps
show pfe tcam app fw-inet6-in list-shared-apps
show pfe tcam app fw-inet6-in shared-usage
show pfe tcam app fw-inet6-in shared-usage detail
show pfe tcam app fw-inet6-rpf
<get-pfe-tcam-app-list-fw-inet6-rpf>
show pfe tcam app fw-inet6-rpf detail
show pfe tcam app fw-inet6-rpf list-related-apps
show pfe tcam app fw-inet6-rpf list-shared-apps
show pfe tcam app fw-inet6-rpf shared-usage
show pfe tcam app fw-inet6-rpf shared-usage detail
show pfe tcam app fw-l2-in
<get-pfe-tcam-app-list-fw-l2-in>
show pfe tcam app fw-l2-in detail
```

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show pfe tcam app fw-l2-in list-related-apps
show pfe tcam app fw-l2-in list-shared-apps
show pfe tcam app fw-l2-in shared-usage
show pfe tcam app fw-l2-in shared-usage detail
show pfe tcam app fw-mpls-in
<get-pfe-tcam-app-list-fw-mpls-in>
show pfe tcam app fw-mpls-in detail
show pfe tcam app fw-mpls-in list-related-apps
show pfe tcam app fw-mpls-in list-shared-apps
show pfe tcam app fw-mpls-in shared-usage
show pfe tcam app fw-mpls-in shared-usage detail
show pfe tcam app fw-semantics
<get-pfe-tcam-app-list-fw-semantics>
show pfe tcam app fw-semantics detail
show pfe tcam app fw-semantics list-related-apps
show pfe tcam app fw-semantics list-shared-apps
show pfe tcam app fw-semantics shared-usage
show pfe tcam app fw-semantics shared-usage detail
show pfe tcam app fw-vpls-in
<get-pfe-tcam-app-list-fw-vpls-in>
show pfe tcam app fw-vpls-in detail
  show pfe tcam app fw-vpls-in list-related-apps
show pfe tcam app fw-vpls-in list-shared-apps
show pfe tcam app fw-vpls-in shared-usage
  show pfe tcam app fw-vpls-in shared-usage detail
show pfe tcam app ifd-src-mac-fil
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show pfe tcam app ip-mac-val-bcast
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show pfe tcam app lo0-inet6-fil
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show pfe tcam errors app ing-out-iff
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show pfe tcam usage tcam-stage ingress app lo0-inet6-fil list-shared-apps
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show pfe tcam usage tcam-stage ingress app mac-drop-cnt
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show pfe tcam usage tcam-stage ingress app mac-drop-cnt detail
show pfe tcam usage tcam-stage ingress app mac-drop-cnt list-related-apps
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show pfe tcam usage tcam-stage ingress app mac-drop-cnt shared-usage
show pfe tcam usage tcam-stage ingress app mac-drop-cnt shared-usage detail
<get-pfe-tcam-usage-ingress-app-mrouter-port-in>
show pfe tcam usage tcam-stage ingress app mrouter-port-in detail
show pfe tcam usage tcam-stage ingress app mrouter-port-in list-related-apps
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show pfe tcam usage tcam-stage ingress app napt-reverse-fil
<get-pfe-tcam-usage-ingress-app-napt-reverse-fil>
show pfe tcam usage tcam-stage ingress app napt-reverse-fil detail
show pfe tcam usage tcam-stage ingress app napt-reverse-fil list-related-apps
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show pfe tcam usage tcam-stage ingress app napt-reverse-fil shared-usage
show pfe tcam usage tcam-stage ingress app napt-reverse-fil shared-usage detail
show pfe tcam usage tcam-stage ingress app no-local-switching
<get-pfe-tcam-usage-ingress-app-no-local-switching>
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show pfe tcam usage tcam-stage ingress app no-local-switching list-related-apps
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show pfe tcam usage tcam-stage ingress detail
<get-pfe-tcam-usage-ingress-tcam-stage-detail>
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<get-pfe-tcam-usage-pre-ingress-tcam-stage>
show pfe tcam usage tcam-stage pre-ingress app
<get-pfe-tcam-usage-pre-ingress-app>
show pfe tcam usage tcam-stage pre-ingress app cos-fc
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show pfe tcam usage tcam-stage pre-ingress app cos-fc detail
show pfe tcam usage tcam-stage pre-ingress app cos-fc list-related-apps
show pfe tcam usage tcam-stage pre-ingress app cos-fc list-shared-apps
show pfe tcam usage tcam-stage pre-ingress app cos-fc shared-usage
show pfe tcam usage tcam-stage pre-ingress app cos-fc shared-usage detail
show pfe tcam usage tcam-stage pre-ingress app fw-fbf
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show pfe tcam usage tcam-stage pre-ingress app fw-fbf detail
show pfe tcam usage tcam-stage pre-ingress app fw-fbf list-related-apps
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show pfe tcam usage tcam-stage pre-ingress app fw-fbf shared-usage detail
show pfe tcam usage tcam-stage pre-ingress app fw-fbf-inet6
<get-pfe-tcam-usage-pre-ingress-app-fw-fbf-inet6>
show pfe tcam usage tcam-stage pre-ingress app fw-fbf-inet6 detail
show pfe tcam usage tcam-stage pre-ingress app fw-fbf-inet6 list-related-apps
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show pfe tcam usage tcam-stage pre-ingress app fw-fbf-inet6 shared-usage detail
show pfe tcam usage tcam-stage pre-ingress app fw-semantics
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show pfe tcam usage tcam-stage pre-ingress app fw-semantics list-related-apps
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show pfe tcam usage tcam-stage pre-ingress app ifd-src-mac-fil list-shared-apps
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show pfe tcam usage tcam-stage pre-ingress app ing-out-iff list-related-apps
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show pfe tcam usage tcam-stage pre-ingress app ing-out-iff shared-usage detail
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<get-pfe-tcam-usage-pre-ingress-app-ip-mac-val>
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show pfe tcam usage tcam-stage pre-ingress app ip-mac-val list-related-apps
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show pfe tcam usage tcam-stage pre-ingress app ip-mac-val shared-usage detail
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show pfe tcam usage tcam-stage pre-ingress app ip-mac-val-bcast
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detail
show pfe tcam usage tcam-stage pre-ingress app rfc2544-layer2-in
<get-pfe-tcam-usage-pre-ingress-app-rfc2544-layer2-in>
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show pfe tcam usage tcam-stage pre-ingress app rfc2544-layer2-in
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show pfe tcam usage tcam-stage pre-ingress app rfc2544-layer2-in shared-usage
show pfe tcam usage tcam-stage pre-ingress app rfc2544-layer2-in shared-usage
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<get-pfe-tcam-usage-pre-ingress-tcam-stage-detail>
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    <get-pgm-nak>

show pgm source-path-messages
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show pgm statistics
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show pim bidirectional
show pim bidirectional df-election
    <get-pim-bidir-df-election-information>
show pim bidirectional df-election interface
    <get-pim-bidir-df-election-interface-information>
show pim bootstrap
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    <get-pim-interfaces-information>

show pim join
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show pim mdt
    <get-pim-mdt-information>

show pim mdt data-mdt-joins
    <get-pim-data-mdt-join-information>
show pim mvpn
    <get-pim-mvpn-information>

show pim neighbors
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show pim rps
    <get-pim-rps-information>
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show ppp address-pool
    <get-ppp-address-pool-information>

show ppp interface
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show ppp statistics
    <get-ppp-statistics-information>

show ppp summary
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show pppoe
show pppoe interfaces
    <get-pppoe-interface-information>
show pppoe lockout
    <get-pppoe-lockout-information>
show pppoe lockout atm-identifier
    <get-pppoe-lockout-atm-information>
show pppoe lockout vlan-identifier
    <get-pppoe-lockout-vlan-information>

show pppoe service-name-tables
    <get-pppoe-service-name-table-information>

show pppoe statistics
    <get-pppoe-statistics-information>

show pppoe underlying-interfaces
    <get-pppoe-underlying-interface-information>

show pppoe version
    <get-pppoe-version>
show programmable-rpd
show programmable-rpd clients
    <get-programmable-rpd-client-information>

show protection-group
show protection-group ethernet-aps
    <show-protection-group-ethernet-aps>
show protection-group ethernet-ring
show protection-group ethernet-ring aps
    <get-raps-pdu-information>
show protection-group ethernet-ring data-channel
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<get-ring-data-channel-information>
show protection-group ethernet-ring interface
  <get-ring-interface-information>
show protection-group ethernet-ring node-state
  <get-raps-state-machine-information>
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show protection-group ethernet-ring statistics
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show protection-group ethernet-ring vlan
  <get-ring-vlan-information>
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show ptp clock
  get-ptp-clock>
show ptp global-information
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show ptp hybrid
show ptp hybrid config
  <get-ptp-hybrid-mapping>
show ptp hybrid status
  <get-ptp-hybrid-status>
show ptp last-tod-update
  <get-last-tod-update>
show ptp lock-status
  get-ptp-lock-status>
show ptp master
  <get-ptp-master>
show ptp path-trace
  <get-ptp-path-trace>
show ptp port
  <get-ptp-port>
show ptp quality-level-mapping
  <get-ptp-quality-level-mapping>
show ptp slave
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  <get-ptp-statistics>
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  <get-r2cp-interface-information>
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  <get-r2cp-radio-information>
show r2cp sessions
  <get-r2cp-session-information>
show r2cp statistics
  <get-r2cp-statistics>
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show redundant-power-system led
show redundant-power-system multi-backup
  <get-rps-scale-information>
show redundant-power-system network
  <get-rps-network-information>
show redundant-power-system power-supply
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show redundant-power-system upgrade
  <get-rps-upgrade-information>
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show rip
show rip general-statistics
  <get-rip-general-statistics-information>
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show rip neighbor
  <get-rip-neighbor-information>

show rip statistics
  <get-rip-statistics-information>
show rip statistics peer
  <get-rip-peer-information>
show ripng
show ripng general-statistics
  <get-ripng-general-statistics-information>

show ripng neighbor
  <get-ripng-neighbor-information>
show ripng statistics
  <get-ripng-statistics-information>
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  <get-route-information>

show route cumulative
  <get-route-cumulative>

show route export
  <get-rteexport-table-information>

show route export instance
  <get-rteexport-instance-information>

show route localization
  <get-fib-localization-information>
show route export vrf-target
  <get-rteexport-target-information>

show route flow
show route flow validation
  <get-rtflow-dep-information>

show route forwarding-table
  <get-forwarding-table-information>

show route instance
  <get-instance-information>

show route instance operational
  <get-operational-routing-instance-information>

show route martians
  <get-route-martians>
show route resolution
  <get-route-resolution-information>
show route resolution summary
  <get-route-resolution-summary>
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show route rib-groups
  <get-route-rib-groups>
show route snooping
  <get-route-snooping-information>
show route snooping summary
  <get-route-snooping-summary>
show route summary
  <get-route-summary-information>
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show rsvp
show rsvp interface
  <get-rsvp-interface-information>

show rsvp neighbor
  <get-rsvp-neighbor-information>

show rsvp route-session-id
  <get-rsvp-route-session-id-information>

show rsvp session
  <get-rsvp-session-information>

show rsvp statistics
  <get-rsvp-statistics-information>

show rsvp version
  <get-rsvp-version-information>

show sap
show sap listen
  <get-sap-listen-information>
show security group-vpn member kek
show security group-vpn member kek security-associations
  <get-gvpn-kek-security-associations-information>

show services
show services accounting
  <get-service-accounting-information>

show services accounting aggregation
  <get-service-accounting-aggregation-information>

show services accounting aggregation as
  <get-service-accounting-aggregation-as-information>

show services accounting aggregation destination-prefix
  <get-service-accounting-aggregation-destination-prefix-information>

show services accounting aggregation protocol-port
  <get-service-accounting-aggregation-protocol-port-information>

show services accounting aggregation source-destination-prefix
  <get-service-accounting-aggregation-source-destination-prefix-information>

show services accounting aggregation source-prefix
  <get-service-accounting-aggregation-source-prefix-information>

show services accounting aggregation template
  <get-service-accounting-aggregation-template-information>

show services accounting errors
  <get-service-accounting-errors-information>

show services accounting flow
  <get-service-accounting-flow-information>

show services accounting flow-detail
  <get-service-accounting-flow-detail>
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show services accounting memory
    <get-service-accounting-memory-information>

show services accounting packet-size-distribution
    <get-packet-distribution-information>

show services accounting status
    <get-service-accounting-status-information>

show services accounting usage
    <get-service-accounting-usage-information>

show services alg
show services alg conversations
    <get-service-msp-alg-conversation-information>
show services alg sip-globals
    <get-service-msp-alg-sip-globals-information>
show services alg statistics
show services application-aware-access-list
show services application-aware-access-list flows
show services application-aware-access-list flows interface
    <get-application-aware-access-list-flows-interface>
show services application-aware-access-list flows subscriber
    <get-application-aware-access-list-flows-subscriber>
show services application-aware-access-list statistics
show services application-aware-access-list statistics interface
    <get-application-aware-access-list-statistics-interface>
show services application-aware-access-list statistics subscriber
    <get-application-aware-access-list-statistics-subscriber>
show services application-identification
show services application-identification application
show services application-identification application detail
    <get-appid-application-signature-detail>
show services application-identification application summary
    <get-appid-application-signature-summary>
show services application-identification application-system-cache
    <get-appid-application-system-cache>

show services application-identification counter
    <get-appid-counter>
show services application-identification counter ssl-encrypted-sessions
    <get-appid-counter-encrypted>
show services application-identification group
show services application-identification group detail
    <get-appid-application-group-detail>
show services application-identification group summary
    <get-appid-application-group-summary>
show services application-identification statistics
show services application-identification statistics application-groups
    <get-appid-application-group-statistics>
show services application-identification statistics applications
    <get-appid-application-statistics>
show services application-identification status
    <get-appid-staus-information>
show services application-identification version
    <get-appid-package-version>

show services border-signaling-gateway
show services border-signaling-gateway accounting
show services border-signaling-gateway accounting statistics

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<get-service-border-signaling-gateway-charging-statistics>
show services border-signaling-gateway accounting status
<get-service-border-signaling-gateway-charging-status>
show services border-signaling-gateway admission-control
<get-service-border-signaling-gateway-statistics-admission-control>

show services border-signaling-gateway by-call-context-id
<get-service-bsg-information-by-call-context-id>

show services border-signaling-gateway by-contact
<get-service-border-signaling-gateway-information-by-contact>

show services border-signaling-gateway by-request-uri
<get-service-border-signaling-gateway-information-by-request-uri>

show services border-signaling-gateway calls
<get-service-border-signaling-gateway-statistics-calls>

show services border-signaling-gateway calls-duration
<get-service-border-signaling-gateway-calls-duration>

show services border-signaling-gateway calls-failed

how services border-signaling-gateway charging
show services border-signaling-gateway charging statistics
<get-service-border-signaling-gateway-charging-statistics>
show services border-signaling-gateway charging status
<get-service-border-signaling-gateway-charging-status>
show services border-signaling-gateway denied-messages
<get-service-bsg-denied-messages>

show services border-signaling-gateway embedded-spdf
<get-service-border-signaling-gateway-embedded-spdf>

show services border-signaling-gateway embedded-spdf status
<get-service-border-signaling-gateway-embedded-spdf-status>

show services border-signaling-gateway name-resolution-cache

show services border-signaling-gateway name-resolution-cache all
<get-service-border-signaling-gateway-name-resolution-cache-all>

show services border-signaling-gateway name-resolution-cache by-fqdn
<get-border-signaling-gateway-name-resolution-cache-by-fqdn>
show services border-signaling-gateway status
<get-service-bsg-status-information>
show services captive-portal-content-delivery
show services captive-portal-content-delivery pic
<get-cpcd-pic-information>
show services captive-portal-content-delivery profile
<get-cpcd-profile>
show services captive-portal-content-delivery rule
<get-cpcd-rule>
show services captive-portal-content-delivery ruleset
<get-cpcd-rule-set>
show services captive-portal-content-delivery sset
<get-cpcd-service-set>
show services captive-portal-content-delivery statistics
<get-cpcd-pic-statistics>
show services captive-portal-content-delivery statistics interface
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show services capture
<get-service-capture>
show services cos
show services cos statistics
  <get-service-cos-statistics-information>

show services cos statistics diffserv
  <get-service-cos-diffserv-statistics>

show services cos statistics forwarding-class
  <get-service-cos-forwarding-class-statistics>

show services crtp
  <get-service-crtp-params-information>

show services crtp extensive
  <get-service-crtp-extensive-information>

show services crtp flows
  <get-service-crtp-flow-table-information>

show services dynamic-flow-capture
show services dynamic-flow-capture content-destination
  <get-services-dynamic-flow-capture-content-destination-information>

show services dynamic-flow-capture control-source
  <get-services-dynamic-flow-capture-control-source-information>

show services dynamic-flow-capture statistics
  <get-services-dfc-statistics-information>
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<jet-application-status>
show services fips
show system commit synchronize-server pending-jobs
<get-pending-commit-sync-jobs>
show services fips pic
show services fips pic status
  <get-fips-pic-status-information>

show services flow-collector
  <get-services-flow-collector-information>

show services flow-collector file
  <get-services-flow-collector-file-information>

show services flow-collector input
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show services flow-table
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  <get-flow-table-statistics-information>

show services flows
  <get-service-msp-flow-table-information>

show services ggsn
show services ggsn diagnostics
show services ggsn diagnostics pdp
  <get-pdp-diagnostics-per-apn>
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show services ggsn statistics
    <get-ggsn-statistics>

show services ggsn statistics apn
    <get-ggsn-apn-statistics-information>

show services ggsn statistics charging
    <get-ggsn-charging-statistics-information>

show services ggsn statistics gtp
    <get-ggsn-gtp-statistics-information>

show services ggsn statistics gtp-prime
    <get-ggsn-gtp-prime-statistics-information>

show services ggsn statistics imsi
    <get-ggsn-imsi-user-information>

show services ggsn statistics l2tp-tunnel
    <get-ggsn-l2tp-tunnel-statistics-information>

show services ggsn statistics msisdn
show services ggsn statistics radius
    <get-ggsn-radius-statistics-information>

show services ggsn statistics sgsn
    <get-ggsn-sgsn-statistics-information>

show services ggsn status
    <get-ggsn-interface-information>

show services ggsn trace
show services ggsn trace all
    <get-ggsn-trace>

show services ggsn trace imsi
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show services ggsn trace msisdn
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show services ha
    <get-service-ha-info>
show services hcm
show services hcm pic-statistics
    <get-service-hcm-pic-statistics-information>
show services ids
show services ids destination-table
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show services ids pair-table
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show services ids source-table
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show services inline
show services inline ip-reassembly
show services inline ip-reassembly statistics
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show services inline nat mappings nptv6
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<get-inline-nat-mapping-nptv6-information>
show services inline nat pool
  <get-inline-nat-pool-information>
show services inline nat statistics
  <get-inline-nat-statistics-information>
show services inline software
show services inline software statistics
<get-inline-service-sw-statistics-information>
show services inline stateful-firewall
show services inline stateful-firewall flows
<get-inline-sfw-flow-table-information>
show services inline stateful-firewall statistics
<get-inline-sfw-statistics-information>
show services ipsec-vpn
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show services ipsec-vpn ike security-associations
  <get-ike-services-security-associations-information>

show services ipsec-vpn ike statistics
<get-ike-services-statistics>
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  <get-services-security-associations-information>

show services ipsec-vpn ipsec statistics
  <get-services-ipsec-statistics-information>

show services l2tp
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  <get-l2tp-client-information>
show services l2tp destination
  <get-l2tp-destination-information>
show services l2tp destination lockout
  <get-services-l2tp-destination-lockout>
show services l2tp disconnect-cause-summary<
  <get-l2tp-disconnect-cause-summary>
show services l2tp multilink
  <get-l2tp-multilink-information>

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show services l2tp radius accounting servers
  <get-services-l2tp-radius-accounting-servers-information>

show services l2tp radius accounting statistics
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  <get-services-l2tp-radius-authentication-servers-information>

show services l2tp radius authentication statistics
  <get-services-l2tp-radius-authentication-statistics-information>

show services l2tp radius servers
  <get-services-l2tp-radius-authentication-accounting-servers-information>

show services l2tp radius statistics
  <get-services-l2tp-radius-authentication-accounting-statistics-information>

show services l2tp session
```

```
<get-l2tp-session-information>
show services l2tp session-limit-group
<get-l2tp-session-limit-group-information>

show services l2tp summary
<get-l2tp-summary-information>

show services l2tp tunnel
<get-l2tp-tunnel-information>
show services l2tp tunnel-group
<get-l2tp-tunnel-group-information>

show services l2tp user
<get-l2tp-user-information>
show services link-services
show services link-services cpu-usage
<get-link-services-cpu-usage>

show services local-policy-decision-function
show services local-policy-decision-function flows
show services local-policy-decision-function flows interface
<get-local-policy-decision-function-flows-interface>
show services local-policy-decision-function flows subscriber
<get-local-policy-decision-function-flows-subscriber>
show services local-policy-decision-function statistics
show services local-policy-decision-function statistics interface
<get-local-policy-decision-function-statistics-interface>
show services local-policy-decision-function statistics subscriber
<get-local-policy-decision-function-statistics-subscriber>
show services logging
show services logging history
show services logging history client
show services logging logfiles
show services mobile
show services mobile hcm
show services mobile hcm statistics
show services nat
show services nat ipv6-multicast-interfaces
<get-service-nat-ipv6-multicast-information>

show services nat deterministic-nat
show services nat deterministic-nat internal-host
show services nat deterministic-nat nat-port-block
show services nat mappings
<get-service-nat-mapping-address-pooling-paired>
show services nat mappings brief
<get-service-nat-mapping-brief>
show services nat mappings detail
show services nat mappings endpoint-independent
<get-service-nat-mapping-endpoint-independent>
show services nat mappings brief
<get-service-nat-mapping-brief>
show services nat mappings detail
<get-service-nat-mapping-detail>
show services nat mappings pcg
show services nat mappings summary
<get-service-nat-mapping-summary>
show services nat pool
<get-service-nat-pool-information>
show services pcg
show services pgcp
```

```
show services pgcp active-configuration
  <get-pgcpd-active-configuration>

show services pgcp active-configuration gateway
  <get-service-pgcp-active-configuration-gateway>

show services pgcp conversations
  <get-service-pgcp-conversation-information>

show services pgcp conversations gateway
  <get-service-pgcp-conversation-information-gateway>

show services pgcp flows
  <get-service-pgcp-flow-table-information>

show services pgcp flows gateway
  <get-service-pgcp-flow-table-information-gateway>

show services pgcp gate
  <get-service-pgcp-gate>

show services pgcp gate gateway
  <get-service-pgcp-gate-gateway>

show services pgcp gates
  <get-service-pgcp-gates>

show services pgcp gates gateway
  <get-service-pgcp-gates-gateway>

show services pgcp root-termination
  <get-services-pgcpd-root-termination>

show services pgcp root-termination gateway
  <get-services-pgcpd-root-termination-gateway>

show services pgcp statistics
  <get-service-pgcp-statistics>

show services pgcp statistics gateway
  <get-service-pgcp-statistics-gateway>

show services pgcp terminations
  <get-service-pgcp-terminations>

show services pgcp terminations gateway
  <get-service-pgcp-terminations-gateway>
show services redundancy-group
  <get-services-redundancy-group-information>
show services redundancy-group rg-id
  <get-services-redundancy-group-id-information>

show services rpm
show services rpm active-servers
  <get-active-servers>

show services rpm history-results
  <get-history-results>

show services rpm probe-results
  <get-probe-results>
```

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show services rpm twamp
  <twamp-information>
show services rpm twamp client
  <twamp-client-information>
show services rpm twamp client connection
  <twamp-client-connection-information>
show services rpm twamp client history-results
  <twamp-get-history-results>
show services rpm twamp client probe-results
  <twamp-get-probe-results>
show services rpm twamp client session
  <twamp-client-test-session>
show services rpm twamp server
  <twamp-server-information>
show services rpm twamp server connection
  <twamp-server-connection-information>
show services rpm twamp server session
  <twamp-server-session-information>
show services server-load-balance
show services server-load-balance external-manager
show services server-load-balance external-manager information
show services server-load-balance external-manager statistics
  <get-external-manager-statistics-information>
show services server-load-balance hash-table
  <get-hash-table-information>
show services server-load-balance health-monitor
show services server-load-balance health-monitor information
  <get-real-server-health-monitor-information>
show services server-load-balance health-monitor statistics
  <get-real-server-health-monitor-statistics-information>
show services server-load-balance real-server
show services server-load-balance real-server statistics
  <get-real-server-statistics-information>
show services server-load-balance real-server-group
show services server-load-balance real-server-group information
  <get-real-server-group-information>
show services server-load-balance real-server-group statistics
  <get-real-server-group-statistics-information>
show services server-load-balance sticky
  <get-sticky-table-information>
show services server-load-balance virtual-server
show services server-load-balance virtual-server information
  <get-virtual-server-information>
show services server-load-balance virtual-server statistics
  <get-virtual-server-statistics-information>
show services service-identification
show services service-identification header-redirect
show services service-identification header-redirect statistics
  <get-header-redirect-set-statistics-information>

show services service-identification statistics
  <get-service-identification-statistics-information>

show services service-identification uri-redirect
show services service-identification uri-redirect statistics
  <get-uri-redirect-set-statistics-information>

show services service-sets
show services service-sets cpu-usage
  <get-service-set-cpu-statistics>
```

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show services service-sets memory-usage
  <get-service-set-memory-statistics>

show services service-sets memory-usage zone
show services service-sets plug-ins
  <get-service-set-plugin-summary>

show services service-sets statistics
show services service-sets statistics drop-flow-limit
  <get-service-set-drop-flow-statistics>
show services service-sets statistics jflow-log
  <get-service-set-jflow-log-statistics>
show services service-sets statistics packet-drops
  <get-service-set-packet-drop-statistics>

show services service-sets statistics syslog
  <get-service-set-syslog-statistics>
show services service-sets statistics tcp
  <get-service-set-tcp-tracker-statistics>
show services service-sets statistics tcp-mss
  <get-service-set-tcp-mss-statistics>

show services service-sets summary
  <get-service-set-summary-information>

show services sessions
  <get-msp-session-table>
show services sessions analysis
  <show-service-msp-session-analysis-information>
show services sessions count
  <get-service-msp-sess-count-information>
show services sessions utilization
  <get-services-sessions-utilization>

show services software
  <get-service-software-table-information>

show services software flows
  <get-service-fwnat-flow-table-information>

show services software statistics
  <get-service-software-statistics-information>

show services stateful-firewall
show services stateful-firewall flow-analysis
  <get-service-flow-analysis-information>
show services stateful-firewall conversations
  <get-service-sfw-conversation-information>

show services stateful-firewall flows
  <get-service-sfw-flow-table-information>
show services stateful-firewall redundancy-statistics
  <get-service-sfw-redundancy-statistics>

show services stateful-firewall sip-call
  <get-service-sfw-sip-call-information>

show services stateful-firewall sip-register
  <get-service-sfw-sip-register-information>
```

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show services stateful-firewall statistics
  <get-service-sfw-statistics-information>

show services stateful-firewall statistics application-protocol
  <et-sfw-application-protocol-statistics>
show services stateful-firewall subscriber-analysis
  <get-service-subs-analysis-information>
show services subscriber
show services subscriber bandwidth
show services subscriber bandwidth client-id
  <get-services-subscriber-bandwidth-by-session-id>
show services subscriber bandwidth interface
  <get-services-subscriber-bandwidth-by-interface>
show services subscriber bandwidth ip-address
  <get-services-subscriber-bandwidth-by-ip-address>
show services subscriber bandwidth service-interface
  <get-services-subscriber-bandwidth-by-service-interface>
show services subscriber dynamic-policies
  <get-services-subscriber-dynamic-policies>
show services subscriber flows
  <get-services-subscriber-flows>
show services subscriber sessions
  <get-services-subscriber-session>
show services subscriber statistics
  <get-services-subscriber-statistics>
show services traffic-detection-function
show services traffic-detection-function hcm
show services traffic-detection-function hcm statistics
  <get-service-tdf-hcm-sessions-stats>
show services traffic-detection-function sessions
  <get-service-tdf-sessions-information>
show services unified-access-control
show services unified-access-control authentication-table
  <get-uac-auth-table>
show services unified-access-control counters
  <get-uac-counters>
show services unified-access-control policies
  <get-uac-policies>
show services unified-access-control roles
  <get-uac-role-entries>
show services unified-access-control status
  <get-uac-status>
show services video-monitoring
  <get-service-video-monitoring-information>
show services video-monitoring mdi
  <get-service-video-monitoring-mdi-information>
show services video-monitoring mdi alarms
  <get-services-video-monitoring-mdi-alarms-information>
show services video-monitoring mdi alarms errors
  <get-services-video-monitoring-mdi-alarms-errors-information>
show services video-monitoring mdi alarms stats
  <get-services-video-monitoring-mdi-alarms-stats-information>
show services video-monitoring mdi errors
  <get-service-video-monitoring-mdi-errors-information>
show services video-monitoring mdi flow
  <get-service-video-monitoring-mdi-flows-information>
show services video-monitoring mdi stats
  <get-service-video-monitoring-mdi-stats-information>
show shmlog
show shmlog entries
```

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<show-shmlog-entries>
show snmp
show snmp health-monitor
    <get-health-monitor-information>

show snmp health-monitor alarms
    <get-health-monitor-alarm-information>

show snmp health-monitor logs
    <get-health-monitor-log-information>
show snmp health-monitor routing-engine
show snmp health-monitor routing-engine history
    <get-health-monitor-routing-engine-history>
show snmp health-monitor routing-engine history cpu
    <get-routing-engine-cpu-history>
show snmp health-monitor routing-engine history memory
    <get-routing-engine-memory-history>
show snmp health-monitor routing-engine history open-files-count
    <get-routing-engine-fd-history>
show snmp health-monitor routing-engine history process-count
    <get-routing-engine-pcount-history>
show snmp health-monitor routing-engine history storage
    <get-routing-engine-storage-history>
show snmp health-monitor routing-engine history temperature
    <get-routing-engine-temperature-history>
show snmp health-monitor routing-engine status
    <get-health-monitor-routing-engine-information>
show snmp health-monitor routing-engine status detail

show snmp inform-statistics
    <get-snmp-inform-statistics>

show snmp mib
show snmp mib get
    <get-snmp-object>

show snmp mib get-next
    <get-next-snmp-object>

show snmp mib walk
    <get-walk-snmp-object>

show snmp proxy
show snmp rmon
    <get-rmon-information>

show snmp rmon alarms
    <get-rmon-alarm-information>

show snmp rmon events
    <get-rmon-event-information>

show snmp rmon history
    <get-rmon-history-information>

show snmp rmon logs
    <get-rmon-log-information>

show snmp statistics
    <get-snmp-information>
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show snmp v3
    <get-snmp-v3-information>

show snmp v3 access
    <get-snmp-v3-access-information>

show snmp v3 community
    <get-snmp-v3-community-information>

show snmp v3 general
    <get-snmp-v3-general-information>

show snmp v3 groups
    <get-snmp-v3-group-information>

show snmp v3 notify
    <get-snmp-v3-notify-information>

show snmp v3 notify filter
    <get-snmp-v3-notify-filter-information>

show snmp v3 target
    <get-snmp-v3-target-information>

show snmp v3 target address
    <get-snmp-v3-target-address-information>

show snmp v3 target parameters
    <get-snmp-v3-target-parameters-information>

show snmp v3 users
    <get-snmp-v3-usm-user-information>

show spanning-tree
show spanning-tree bridge
    <get-stp-bridge-information>
show spanning-tree interface
    <get-stp-interface-information>
show spanning-tree mstp
show spanning-tree mstp configuration
    <get-mstp-configuration-information>
show spanning-tree statistics
    <get-stp-interface-statistics>
show spanning-tree statistics bridge
show spanning-tree statistics interface
show spanning-tree statistics routing-instance
    <get-stp-routing-instance-statistics>
show spanning-tree stp-buffer
show spanning-tree stp-buffer see-all
show ssl-certificates
    <get-ssl-certificate-information>
show static-subscribers
show static-subscribers sessions
    <show subscribers>
        <get-subscribers>
show subscribers summary
    <get-subscribers-summary>
    <get-syslog-filenames>

show synchronous-ethernet
show synchronous-ethernet esmc
```

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show synchronous-ethernet esmc statistics
show synchronous-ethernet esmc transmit
show synchronous-ethernet global-information
show system
show system alarms
    <get-system-alarm-information>

show system auto-snapshot
show system boot-messages
show system buffers
show system certificate
show system commit
    <get-commit-information>
show system commit revision
    <get-commit-revision-information>
show system commit server
    <get-commit-server-information>
show system commit ephemeral
    <get-ephemeral-commit-information>
show system commit server queue
    <get-commit-server-queue-information>
show system commit synchronize-server
show system configuration
show system configuration archival
    <get-system-archival>

show system configuration rescue
    <get-rescue-information>

show system connections
show system core-dumps
    <get-system-core-dumps>
show system core-dumps core-file-info
    <get-core-file-information>

show system core-dumps kernel-crashinfo
show system core-dumps satellite
    <get-core-file-satellite>
show system core-dumps transfer-status
show system diagnostics
show system diagnostics inventory
show system diagnostics usage
show system directory-usage
    <get-directory-usage-information>

show system firmware
    <get-system-firmware-information>
show system khms-stats

show system license
    <get-license-summary-information>

show system license installed
    <get-license-information>
show system license key-content
show system license keys
    <get-license-key-information>

show system license usage
    <get-license-usage-summary>
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show system login
show system login lockout
  <get-system-login-lockout-information>
show system memory
<show system processes
show system processes brief
show system processes esc-node
show system processes extensive
show system processes health
  <get-process-health-information>

show system processes providers
show system processes host-processes detail
show system processes providers
show system processes resource-limits
<get-system-process-resource-limits>
show system processes summary
show system queues
show system reboot
show system resource-cleanup
show system resource-cleanup processes
  <get-system-resource-cleanup-processes-information>
<get-resource-monitor-fpc-information>
<get-resource-monitor-fpc-slot-information>

show system rollback
  <get-rollback-information>

show system services
show system services dhcp
show system services dhcp binding
  <get-dhcp-binding-information>

show system services dhcp conflict
  <get-dhcp-conflict-information>

show system services dhcp global
  <get-dhcp-global-information>

show system services dhcp pool
  <get-dhcp-pool-information>

show system services dhcp statistics
  <get-dhcp-statistics-information>

show system services reverse
  <get-system-services-reverse-information>

show system services service-deployment
  <get-service-deployment-service-information>

show system snapshot
  <get-snapshot-information>

show system software
show system software backup
  <get-package-backup-information>
  <get-software-installation-status>
show system software recovery-package
show system software rollback
  <show-package-rollback>
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show system statistics
  <get-statistics-information>

show system statistics bridge
  <get-system-bridge-statistics>
show system statistics extended
show system statistics vpls
show system storage
  <get-system-storage>
show system storage partitions
  <get-system-storage-partitions>
show system subscriber-management
show system subscriber-management arp
  <get-subscriber-management-arp>
show system subscriber-management arp address
  <get-subscriber-management-arp-address>
show system subscriber-management arp interface
  <get-subscriber-management-arp-interface>
show system subscriber-management ipv6-neighbors
  <get-subscriber-management-ipv6-neighbors>
show system subscriber-management ipv6-neighbors address
  <get-subscriber-management-ipv6-neighbor-address>
show system subscriber-management ipv6-neighbors interface
  <get-subscriber-management-ipv6-neighbor-interface>.
show system subscriber-management route
  <get-subscriber-management-route>
show system subscriber-management route next-hop
  <get-subscriber-management-route-nh>
show system subscriber-management route prefix
show system subscriber-management route summary
  <get-subscriber-management-route-summary>
show system subscriber-management statistics
  <get-subscriber-management-statistics>
show system subscriber-management summary
show system switchover
  <get-switchover-information>

show system uptime
  <get-system-uptime-information>

show system users
  <get-system-users-information>

show system virtual-memory
show system yang
show system yang package
  <get-system-yang-packages>
show task
show task io
show task logical-system-mux
  <get-lrmuxd-task-information>
show task logical-system-mux io
  <get-lrmuxd-tasks-io-statistics>
show task logical-system-mux memory
  <get-lrmuxd-task-memory>
show task memory
show task replication
  <get-routing-task-replication-state>
show task snooping
show task snooping io
```

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show task snooping memory
<get-snooping-task-memory-information>
show ted
show ted database
  <get-ted-database-information>

show ted link
  <get-ted-link-information>

show ted protocol
  <get-ted-protocol-information>
show unified-edge
show unified-edge gateways
show unified-edge ggsn-pgw
show unified-edge ggsn-pgw aaa
show unified-edge ggsn-pgw aaa network-element
show unified-edge ggsn-pgw aaa network-element status
show unified-edge ggsn-pgw aaa network-element-group
show unified-edge ggsn-pgw aaa network-element-group status
show unified-edge ggsn-pgw aaa radius
show unified-edge ggsn-pgw aaa radius statistics
show unified-edge ggsn-pgw aaa statistics
show unified-edge ggsn-pgw address-assignment
show unified-edge ggsn-pgw address-assignment group
show unified-edge ggsn-pgw address-assignment pool
show unified-edge ggsn-pgw address-assignment service-mode
show unified-edge ggsn-pgw address-assignment statistics
show unified-edge ggsn-pgw apn
show unified-edge ggsn-pgw apn service-mode
show unified-edge ggsn-pgw apn statistics
show unified-edge ggsn-pgw call-rate
show unified-edge ggsn-pgw call-rate statistics
show unified-edge ggsn-pgw charging
show unified-edge ggsn-pgw charging global
show unified-edge ggsn-pgw charging global statistics
show unified-edge ggsn-pgw charging local-persistent-storage
show unified-edge ggsn-pgw charging local-persistent-storage statistics
show unified-edge ggsn-pgw charging path
show unified-edge ggsn-pgw charging path statistics
show unified-edge ggsn-pgw charging path status
show unified-edge ggsn-pgw charging service-mode
show unified-edge ggsn-pgw charging transfer
show unified-edge ggsn-pgw charging transfer statistics
show unified-edge ggsn-pgw charging transfer status
show unified-edge ggsn-pgw charging trigger-profile
show unified-edge ggsn-pgw gtp
show unified-edge ggsn-pgw gtp peer
show unified-edge ggsn-pgw gtp peer count
show unified-edge ggsn-pgw gtp peer history
show unified-edge ggsn-pgw gtp peer statistics
show unified-edge ggsn-pgw gtp statistics
show unified-edge ggsn-pgw ip-reassembly
show unified-edge ggsn-pgw ip-reassembly statistics
show unified-edge ggsn-pgw resource-manager
show unified-edge ggsn-pgw resource-manager clients
show unified-edge ggsn-pgw service-mode
show unified-edge ggsn-pgw statistics
show unified-edge ggsn-pgw statistics traffic-class
show unified-edge ggsn-pgw status
show unified-edge ggsn-pgw status gtp-peer
show unified-edge ggsn-pgw status preemption-list
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show unified-edge ggsn-pgw status session-state
show unified-edge ggsn-pgw subscribers
show unified-edge ggsn-pgw subscribers charging
show unified-edge ggsn-pgw subscribers traffic-class
show unified-edge ggsn-pgw system
show unified-edge ggsn-pgw system interfaces
show unified-edge ggsn-pgw system interfaces service-mode
show unified-edge sgw
show unified-edge sgw call-rate
show unified-edge sgw call-rate statistics
show unified-edge sgw charging
show unified-edge sgw charging global
show unified-edge sgw charging global statistics
show unified-edge sgw charging local-persistent-storage
show unified-edge sgw charging local-persistent-storage statistics
show unified-edge sgw charging path
show unified-edge sgw charging path statistics
show unified-edge sgw charging path status
show unified-edge sgw charging service-mode
show unified-edge sgw charging transfer
show unified-edge sgw charging transfer statistics
show unified-edge sgw charging transfer status
show unified-edge sgw charging trigger-profile
show unified-edge sgw gtp
show unified-edge sgw gtp peer
show unified-edge sgw gtp peer count
show unified-edge sgw gtp peer history
show unified-edge sgw gtp peer statistics
show unified-edge sgw gtp statistics
show unified-edge sgw idle-mode-buffering
show unified-edge sgw idle-mode-buffering statistics
show unified-edge sgw ip-reassembly
show unified-edge sgw ip-reassembly statistics
show unified-edge sgw resource-manager
show unified-edge sgw resource-manager clients
show unified-edge sgw service-mode
show unified-edge sgw statistics
show unified-edge sgw status
show unified-edge sgw status gtp-peer
show unified-edge sgw status preemption-list
show unified-edge sgw status session-state
show unified-edge sgw subscribers
show unified-edge sgw subscribers charging
show unified-edge sgw system
show unified-edge sgw system interfaces
show unified-edge sgw system interfaces service-mode
<get-mobile-serving-gateway-interface-service-mode>
show unified-edge tdf
show unified-edge tdf aaa
show unified-edge tdf aaa radius
show unified-edge tdf aaa radius client
show unified-edge tdf aaa radius client statistics
<radius-client-statistics>
show unified-edge tdf aaa radius client status
show unified-edge tdf aaa radius network-element
show unified-edge tdf aaa radius network-element statistics
<get-aaa-radius-element-statistics>
show unified-edge tdf aaa radius network-element status>
<get-aaa-radius-element-status>
show unified-edge tdf aaa radius server
show unified-edge tdf aaa radius server statistics
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radius-server-statistics
show unified-edge tdf aaa radius server status
<get-aaa-radius-server-status>
show unified-edge tdf aaa radius snoop-segment
show unified-edge tdf aaa radius snoop-segment statistics
<radius-snoop-segment-statistics>
show unified-edge tdf aaa statistics
<get-tdf-gateway-aaa-statistics>
show unified-edge tdf address-assignment
show unified-edge tdf address-assignment pool
<get-tdf-gateway-sm-ippool-pool-information>
show unified-edge tdf address-assignment service-mode
<get-tdf-address-assign-service-mode>
show unified-edge tdf address-assignment statistics
<get-tdf-gateway-sm-ippool-statistics>
show unified-edge tdf call-admission-control
show unified-edge tdf call-admission-control statistics
<get-tdf-cac-statistics>
show unified-edge tdf call-rate
show unified-edge tdf call-rate statistics
<get-tdf-call-rate-statistics>
show unified-edge tdf diameter
show unified-edge tdf diameter network-element
show unified-edge tdf diameter network-element statistics
<get-diameter-network-element-statistics>
show unified-edge tdf diameter network-element status
<get-diameter-network-element-status>
show unified-edge tdf diameter pcc-gx
show unified-edge tdf diameter pcc-gx statistics
<get-diameter-statistics-gx>
show unified-edge tdf diameter peer
show unified-edge tdf diameter peer statistics
<get-gateway-diameter-peer-statistics>
show unified-edge tdf diameter peer status
<get-diameter-peer-status>
show unified-edge tdf domain
show unified-edge tdf domain service-mode
<get-mobile-gateways-domain-service-mode>
show unified-edge tdf domain statistics
<get-mobile-gateways-domain-statistics>
show unified-edge tdf resource-manager
show unified-edge tdf resource-manager clients
<get-mobile-gateway-tdf-client-status-information>
show unified-edge tdf service-mode
<get-tdf-gateway-service-mode>
show unified-edge tdf statistics
<get-tdf-statistics>
show unified-edge tdf status
<get-tdf-gateway-status>
show unified-edge tdf status subscriber-state
<get-tdf-gateways-status-state>
show unified-edge tdf subscribers
<get-tdf-gateway-subscribers>
show unified-edge tdf subscribers data-plane
<get-tdf-gateway-subscriber-dataplane-statistics>
show unified-edge tdf subscribers stuck
<get-tdf-gateway-stuck-subscribers>
show unified-edge tdf system
show unified-edge tdf system interfaces
<get-tdf-interfaces-information>
show unified-edge tdf system interfaces service-mode
```

```
<get-mobile-tdf-interface-service-mode>
show version
  <get-software-information>

show virtual-chassis
show virtual-chassis active-topology
<get-virtual-chassis-active-topology>
show virtual-chassis device-topology
<get-virtual-chassis-device-topology>
show virtual-chassis fast-failover
<get-virtual-chassis-fast-failover>
show virtual-chassis heartbeat
<get-virtual-chassis-heartbeat-information>
show virtual-chassis login
<get-virtual-chassis-login>
show virtual-chassis mode
<get-virtual-chassis-mode-information>
show virtual-chassis protocol
show virtual-chassis protocol adjacency
<get-virtual-chassis-adjacency-information>
show virtual-chassis protocol database
<get-virtual-chassis-database-information>
show virtual-chassis protocol interface
<get-virtual-chassis-interface-information>
show virtual-chassis protocol route
<get-virtual-chassis-route-information>
show virtual-chassis protocol statistics
<get-virtual-chassis-statistics-information>
show virtual-chassis status
<get-virtual-chassis-information>
show virtual-chassis vc-path
<get-virtual-chassis-packet-path>
show virtual-chassis vc-port
<get-virtual-chassis-port-information>
show virtual-chassis vc-port diagnostics
show virtual-chassis vc-port diagnostics optics
<get-virtual-chassis-optics-diagnostics>
show virtual-chassis vc-port lag-hash
<get-virtual-chassis-port-lag-hash-information>
show virtual-chassis vc-port statistics
<get-virtual-chassis-port-statistics>
show vlans
<get-vlan-information>
show vlans operational
<get-operational-vlan-instance-information>
show vlans satellite
<get-satellite-control-bridge-domain>
show vmhost
show vmhost bridge
<get-vmhost-bridge-information>
show vmhost crash
<get-vmhost-crash-information>
show vmhost hardware
<get-vmhost-hardware>
show vmhost information
<get-vmhost-information>
show vmhost logs
<get-vmhost-logs-information>
show vmhost management-if
<get-vmhost-management-if-info>
show vmhost netstat
```

```
<get-vmhost-netstat>
show vmhost processes
<get-vmhost-processes-information>
show vmhost resource-usage
<get-vmhost-resource-usage-information>
show vmhost snapshot
<get-vmhost-snapshot-information>
show vmhost status
<get-vmhost-staus>
show vmhost uptime
<get-vmhost-uptime>
show vmhost version
<get-vmhost-version-information>

show vpls
show vpls connections
    <get-vpls-connection-information>

show vpls flood
show vpls flood event-queue
    <get-vpls-event-queue-information>

show vpls flood route
show vpls flood route all-ce-flood
    <get-vpls-all-ce-flood-route-information>

show vpls flood route all-flood
    <get-vpls-all-flood-route-information>

show vpls flood route alt-root-flood
    <get-vpls-alt-root-flood-route-information>

show vpls flood route ce-flood
    <get-vpls-ce-flood-route-information>

show vpls flood route mlp-flood
    <get-vpls-mlp-flood-route-information>

show vpls flood route re-flood
    <get-vpls-re-flood-route-information>

show vpls mac-table
    <get-vpls-mac-table>

show vpls mac-table interface
    <get-vpls-interface-mac-table>

show vpls statistics
    <get-vpls-statistics-information>

show vrrp
show vrrp interface
show vrrp track
test interface
test interface fdl-line-loop
test interface fdl-line-loop ansi
test interface fdl-line-loop ansi initiate
test interface fdl-line-loop ansi terminate
test interface fdl-line-loop bellcore
test interface fdl-line-loop bellcore initiate
test interface fdl-line-loop bellcore terminate
```

```

test interface fd1-payload-loop
test interface fd1-payload-loop ansi
test interface fd1-payload-loop ansi initiate
test interface fd1-payload-loop ansi terminate
test interface fd1-payload-loop bellcore
test interface fd1-payload-loop bellcore initiate
test interface fd1-payload-loop bellcore terminate
test interface inband-line-loop
test interface inband-line-loop ansi
test interface inband-line-loop ansi initiate
test interface inband-line-loop ansi terminate
test interface inband-line-loop bellcore
test interface inband-line-loop bellcore initiate
test interface inband-line-loop bellcore terminate
test interface inband-line-loop initiate
test interface inband-line-loop terminate
test interface inband-payload-loop
test interface inband-payload-loop ansi
test interface inband-payload-loop ansi initiate
test interface inband-payload-loop ansi terminate
test interface inband-payload-loop bellcore
test interface inband-payload-loop bellcore initiate
test interface inband-payload-loop bellcore terminate
test msdp
test msdp dependent-peers
test msdp rpf-peer
test policy
<

```

Configuration Hierarchy Levels

```

[edit dynamic-profiles routing-instances instance services mobile-ip home-agent
enable-service]
[edit logical-systems routing-instances instance services mobile-ip home-agent
enable-service]
[edit logical-systems services mobile-ip home-agent enable-service]
[edit routing-instances instance services mobile-ip home-agent enable-service]
[edit services mobile-ip home-agent enable-service]

```

Related Documentation

- [Access Privilege User Permission Flags Overview on page 110](#)
- [Understanding Junos OS Access Privilege Levels on page 26](#)
- [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
- [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
- [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

view-configuration

Can view all of the configuration (not including secrets).

Commands

No associated CLI commands.

Configuration Hierarchy Levels No associated CLI configuration hierarchy levels and statements.

- Related Documentation**
- [Access Privilege User Permission Flags Overview on page 110](#)
 - [Understanding Junos OS Access Privilege Levels on page 26](#)
 - [Example: Configuring User Permissions with Access Privilege Levels on page 65](#)
 - [Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76](#)
 - [Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87](#)

CHAPTER 6

Configuring Passwords for User Access

- [Configuring the Root Password on page 333](#)
- [Example: Protecting Network Security by Configuring the Root Password on page 335](#)
- [Example: Configuring a Plain-Text Password for Root Logins on page 335](#)
- [Example: Configuring SSH Authentication for Root Logins on page 337](#)
- [Recovering the Root Password on page 338](#)
- [Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)
- [Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)
- [Configuring MS-CHAPv2 for Password-Change Support on page 342](#)

Configuring the Root Password

The Junos OS is preinstalled on the router or switch. When the router or switch is powered on, it is ready to be configured. Initially, you log in as the user **root** with no password. The root directory of a UNIX device is the entry point to all other folders and files on that device. As a result, access to the root directory is restricted by default to a predefined user account known as the *root user*. The root user (also referred to as *superuser*) has unrestricted access and full permissions within the system. The expression “log in as root” is commonly used when an action requires the user to log into the device as the root user.



NOTE: If you configure a blank password using the **encrypted-password** statement at the **[edit system root-authentication]** hierarchy level for root authentication, you can commit a configuration but you *cannot* log in as the root user and gain root level access to the router or switch.

After you log in, you should configure the root (superuser) password by including the **root-authentication** statement at the **[edit system]** hierarchy level and configuring one of the password options:

```
[edit system]
root-authentication {
  (encrypted-password "password"| plain-text-password);
  load-key-file URL filename;
  ssh-dsa "public-key" <from hostname>;
```

```
ssh-ecdsa "public-key" <from hostname>;  
ssh-rsa "public-key" <from hostname>;  
}
```

If you configure the **plain-text-password** option, you are prompted to enter and confirm the password:

```
[edit system]  
user@host# set root-authentication plain-text-password  
New password: type password here  
Retype new password: retype password here
```

The default requirements for plain-text passwords are:

- The password must be between 6 and 128 characters long
 - You can include most character classes in a password (uppercase letters, lowercase letters, numbers, punctuation marks, and other special characters). Control characters are not recommended.
 - Valid passwords must contain at least one change of case or character class.

You can use the **load-key-file** *URL filename* statement to load an SSH key file that was previously generated using **ssh-keygen**. The *URL filename* is the path to the file's location and name. When using this option, the contents of the key file are copied into the configuration immediately after entering the **load-key-file** *URL* statement. This command loads RSA (SSH version 1 and SSH version 2) and DSA (SSH version 2) public keys.

Optionally, you can use the **ssh-dsa**, **ssh-ecdsa**, or **ssh-rsa** statements to directly configure SSH RSA, DSA, or ECDSA keys to authenticate root logins. You can configure more than one public key for SSH authentication of root logins as well as for user accounts. When a user logs in as root, the public keys are referenced to determine whether the private key matches any of them.

To view the SSH keys entries, use the configuration mode **show** command. For example:

```
[edit system]  
user@host# set root-authentication load-key-file my-host:.ssh/id_dsa.pub  
.file.19692 | 0 KB | 0.3 kB/s | ETA: 00:00:00 | 100%  
[edit system]  
user@host# show  
root-authentication {  
  ssh-rsa "$ABC123"; #  
  SECRET-DATA  
}
```

Junos-FIPS software has special password requirements. FIPS passwords must be between 10 and 20 characters in length. Passwords must use at least three of the five defined character sets (uppercase letters, lowercase letters, digits, punctuation marks, and other special characters). If Junos-FIPS is installed on the router or switch, you cannot configure passwords unless they meet this standard. If you use the **encrypted-password** option, then a null-password (empty) is not permitted.

You cannot configure a blank password for **encrypted-password** using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.

Related Documentation

- *Protecting Network Security by Configuring the Root Password*
- [Example: Configuring a Plain-Text Password for Root Logins on page 335](#)
- [Example: Configuring SSH Authentication for Root Logins on page 337](#)
- [Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)
- [Recovering the Root Password on page 338](#)

Example: Protecting Network Security by Configuring the Root Password

Configuring the root password on your Junos OS-enabled router helps prevent unauthorized users from making changes to your network. The root user (also referred to as superuser) has unrestricted access and full permissions within the system, so it is crucial to protect these functions by setting a strong password when setting up a new router.

After a new router is initially powered on, you log in as the user **root** with no password. Junos OS requires configuration of the root password before it accepts a commit operation. On a new device, the root password must always be a part of the configuration submitted with your initial commit.

The following example shows how to configure the root password:

```
[edit]
user@switch# set system root-authentication encrypted-password "$ABC123"
[edit]
user@switch# show
system {
  root-authentication {
    encrypted-password "$ABC123";
  }
}
```

Related Documentation

- *Protecting Network Security by Configuring the Root Password*
- [Example: Configuring a Plain-Text Password for Root Logins on page 335](#)
- *Configuring the Root Password*

Example: Configuring a Plain-Text Password for Root Logins

This example shows how to configure a plain-text password for the root-level user (whose username is *root*). Configuring a plain-text password is one way to protect access to the root level by unauthorized users. You must prevent unauthorized users from gaining access to superuser commands that can be used to alter your system configuration.

- [Requirements on page 336](#)
- [Overview on page 336](#)

- [Configuration on page 336](#)
- [Verification on page 337](#)

Requirements

No special configuration beyond device initialization is required before configuring this example.

Make sure that you understand the requirements for a valid plain-text password. For Junos OS, the default requirements for a plain-text password are as follows:

- Must be from 6 up to 128 characters long.
- Can include most character classes (uppercase letters, lowercase letters, numbers, punctuation marks, and other special characters). Control characters are not recommended.
- Must contain at least one change of case or character class.

Overview

Junos OS is preinstalled on the router. When the router is powered on, it is ready to be configured. Initially, you log in as the root-level user with no password. To set the root password, you have several options. This example shows how to enter a plain-text password that Junos OS then encrypts for you.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following command and paste it into the window. When prompted, type the new password, and then when prompted, retype it.

```
set system root-authentication plain-text-password
```

Configuring a Plain-Text Password for User Root

Step-by-Step Procedure

To configure a plain-text password for the root-level user:

1. Type the **set** command for the plain-text password and press Enter.

```
[edit]  
user@host# set system root-authentication plain-text-password  
New password:
```
2. Type the new password next to the **New password** prompt and press Enter.

```
New password: new-password  
Retype new password:
```
3. Retype the same password next to the **Retype new password** prompt and press Enter.

Results

From configuration mode, confirm your configuration by using the **show** command. It should look something like this:

```
[edit ]
user@host# show system
root-authentication {
  encrypted-password "$ABC123"; ## SECRET-DATA
}
```

If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

After you have confirmed that the configuration is correct, enter **commit** from configuration mode.

Verification

Verifying the Configuration of a Plain-Text Password for User Root

Purpose Verify the configuration of a plain-text password for the root-level user.

Action From operational mode, confirm your configuration by entering the **show configuration system** command.

```
user@host> show configuration system
root-authentication {
  encrypted-password "$ABC123"; ## SECRET-DATA
}
```

Meaning If you use a clear-text password, Junos OS displays the password as an encrypted string so that users viewing the configuration cannot see the unencrypted password. That is, as you enter the password in plain text, Junos OS encrypts it immediately. You do not have to configure Junos OS to encrypt the password as in some other systems. Plain-text passwords are hidden and marked as ## SECRET-DATA in the configuration.

Related Documentation

- *root-authentication*
- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)
- *Configuring Special Requirements for Plain-Text Passwords*
- [Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)

Example: Configuring SSH Authentication for Root Logins

The following example shows how to configure two public DSA keys for SSH authentication of root logins:

```
[edit system]
root-authentication {
  encrypted-password "$ABC123";
  ## SECRET-DATA;
  ssh-dsa "2354 95 9304@user.device";
  ssh-dsa "0483 02 8362@user.device";
}
```

- Related Documentation**
- [Configuring the Root Password on page 333](#)
 - [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)

Recovering the Root Password

If you forget the root password for the router, you can use the password recovery procedure to reset the root password.



NOTE: You need console access to recover the root password.



Video: [Recovering the Root Password](#)

To recover the root password:

1. Power off the router by pressing the power button on the front panel.
2. Turn off the power to the management device, such as a PC or laptop computer, that you want to use to access the CLI.
3. Plug one end of the Ethernet rollover cable supplied with the router into the RJ-45-to-DB-9 serial port adapter supplied with the router.
4. Plug the RJ-45-to-DB-9 serial port adapter into the serial port on the management device.
5. Connect the other end of the Ethernet rollover cable to the console port on the router.
6. Turn on the power to the management device.
7. On the management device, start your asynchronous terminal emulation application (such as Microsoft Windows Hyperterminal) and select the appropriate COM port to use (for example, COM1).
8. Configure the port settings as follows:
 - Bits per second: 9600
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None
9. Power on the router by pressing the power button on the front panel.

Verify that the POWER LED on the front panel turns green.

The terminal emulation screen on your management device displays the router's boot sequence.

10. When the following prompt appears, press the Spacebar to access the router's bootstrap loader command prompt:

Depending on your device hardware, the bootstrap loader might proceed quite quickly at this step without pausing for input. Therefore, you might need to press the spacebar multiple times at the beginning of the boot sequence.

Hit [Enter] to boot immediately, or space bar for command prompt.
Booting [kernel] in 9 seconds...

11. At the following prompt, type **boot -s** to start the system in single-user mode.

ok **boot -s**

12. At the following prompt, type **recovery** to start the root password recovery procedure.

Enter full pathname of shell or 'recovery' for root password recovery or RETURN for /bin/sh: **recovery**

13. Enter configuration mode in the CLI.

14. Set the root password.

When you configure a plain-text password, Junos OS encrypts the password for you.



CAUTION: Do not use the **encrypted-password** option unless the password is *already* encrypted, and you are entering the encrypted version of the password. If you commit the **encrypted-password** option with a plain-text password or with blank quotation marks (" "), you will not be able to log in to the device as root, and you will need to repeat this password recovery process.

Optionally, instead of configuring the root password at the **[edit system]** hierarchy level, you can use a configuration group, as shown in this procedure. This is a recommended best practice for configuring the root password.

For example:

```
user@host# set groups global system root-authentication plain-text-password
```

15. At the following prompt, enter the new root password, for example:

New password: **password**
Retype new password:

16. At the second prompt, reenter the new root password.

17. If you used a configuration group, apply the configuration group, substituting **global** with the appropriate group name.

```
[edit]
user@host# set apply-groups global
```

18. After you have finished configuring the password, commit the configuration.

```
root@host# commit
commit complete
```

19. Exit configuration mode in the CLI.

20. Exit operational mode in the CLI.
21. At the prompt, type **y** to reboot the router.

```
Reboot the system? [y/n] y
```

Related Documentation

- [Configuring the Root Password on page 333](#)

Changing the Requirements for Junos OS Plain-Text Passwords

To change the requirements for plain-text passwords, include the **password** statement at the **[edit system login]** hierarchy level:

```
[edit system login]
password {
  change-type (set-transitions | character-set);
  format (md5 | sha1);
  maximum-length length;
  minimum-changes number;
  minimum-length length;
  minimum-lower-cases number;
  minimum-numeric number;
  minimum-punctuations number;
  minimum-upper-cases number;
}
```



NOTE: These statements apply to plain-text passwords only, not encrypted passwords.

Related Documentation

- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)
- [Configuring the Root Password on page 333](#)
- [Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)

Example: Changing the Requirements for Junos OS Plain-Text Passwords

This example shows how to set various maximum and minimum requirements for plain-text passwords to increase password strength.

- [Requirements on page 341](#)
- [Overview on page 341](#)
- [Configuration on page 341](#)

Requirements

This example requires a device running Junos 12.2 or greater. The **minimum-length** and **maximum-length** password requirements statements are available in earlier releases, however, you must have Junos OS Release 12.2 or greater to configure **minimum-lower-cases**, **minimum-numeric**s, **minimum-punctuations**, or **minimum-upper-cases**.

Overview

You can use a variety of requirements to strengthen plain-text passwords for greater security. Junos OS provides a number of possible configurations at the **[edit system login password]** hierarchy level that allow you to require users to create plain-text passwords that conform to a particular set of requirements that may include such things as length, number of changes, type of characters, numbers, or letter case.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

```
set system login password minimum-length 12
set system login password maximum-length 22
set system login password minimum-numeric 1
set system login password minimum-upper-cases 1
set system login password minimum-lower-cases 1
set system login password minimum-punctuations 1
```

Configuring Requirements for Plain-Text Passwords

Step-by-Step Procedure This example configures password requirements that require the user to create a password that has a minimum length of 12 characters, a maximum length of 22 characters, and that includes at least one lower-case letter, at least one upper-case letter, at least one punctuation character, and at least one numeric character.

1. Navigate to configuration mode in the **[system login password]** hierarchy level.


```
user@host> edit
[edit]
user@host# edit system login password
```
2. Set a minimum length requirement of 12 characters and a maximum length requirement of 22 characters for user passwords.


```
[edit system login password]
user@host# set minimum-length 12
[edit system login password]
user@host# set maximum-length 22
```
3. Require users to set a password that has at least one lower-case letter and at least one upper-case letter.


```
[edit system login password]
```

```
user@host# set minimum-lower-cases 1
[edit system login password]
user@host# set minimum-upper-cases 1
```

4. Require users to set a password that has at least one punctuation-class character and at least one number.

```
[edit system login password]
user@host# set minimum-punctuations 1
[edit system login password]
user@host# set minimum-numeric 1
```

Results

From configuration mode, confirm your configuration by entering the show command at the edit system login password hierarchy level. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit system login password]
user@host# show
minimum-length 12;
maximum-length 22;
minimum-numeric 1;
minimum-upper-cases 1;
minimum-lower-cases 1;
```

- Related Documentation**
- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)
 - [password \(Login\) on page 530](#)

Configuring MS-CHAPv2 for Password-Change Support

You can configure the Microsoft implementation of the Challenge Handshake Authentication Protocol version 2 (MS-CHAPv2) on the router or switch to support changing of passwords. This feature provides users accessing a router or switch the option of changing the password when the password expires, is reset, or is configured to be changed at next logon.

Before you configure MS-CHAPv2 for password-change support, ensure that you have done the following:

- Configured RADIUS server authentication parameters.
- Set the first tried option in the authentication order to RADIUS server.

To configure MS-CHAP-v2, include the following statements at the **[edit system radius-options]** hierarchy level:

```
[edit system radius-options]
password-protocol mschap-v2;
```

The following example shows statements for configuring the MS-CHAPv2 password protocol, password authentication order, and user accounts:

```
[edit]
system {
  authentication-order [ radius password ];
  radius-server {
    192.168.69.149 secret "$9$G-j.5Qz6tpBk.1hrlXxUj1q5Qn/C"; ## SECRET-DATA
  }
  radius-options {
    password-protocol mschap-v2;
  }
  login {
    user bob {
      class operator;
    }
  }
}
```

Related Documentation

- *Configuring Access Profiles for L2TP or PPP Parameters*

Configuring Local Password Authentication

- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)
- [Changing the Requirements for Junos OS Plain-Text Passwords on page 348](#)
- [Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 348](#)
- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 351](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 352](#)

Special Requirements for Junos OS Plain-Text Passwords

Junos OS has special requirements when you create plain-text passwords on a router or switch. [Table 11 on page 345](#) shows the default requirements.

Table 11: Special Requirements for Plain-Text Passwords

Junos OS	Junos-FIPS
The password must be between 6 and 128 characters long.	FIPS passwords must be between 10 and 20 characters long
You can include most character classes in a password (uppercase letters, lowercase letters, numbers, punctuation marks, and other special characters). Control characters are not recommended.	You can include most character classes in a password (uppercase letters, lowercase letters, numbers, punctuation marks, and other special characters). Control characters are not recommended.
Valid passwords must contain at least one change of case or character class.	Passwords must use at least three of the five defined character classes (uppercase letters, lowercase letters, numbers, punctuation marks, and other special characters).

You can change the requirements for plain-text passwords.

Junos OS supports the following five character classes for plain-text passwords:

- Lowercase letters
- Uppercase letters
- Numbers
- Punctuation
- Special characters: ! @ # \$ % ^ & * , + < >



NOTE: "!" and "," are punctuation characters, but are listed under "special characters".

Control characters are not recommended.

You can include the **plain-text-password** statement at the following hierarchy levels:

- [edit system diag-port-authentication]
- [edit system pic-console-authentication]
- [edit system root-authentication]
- [edit system login user *username* authentication]

The **change-type** statement specifies whether the password is checked for the following:

- The total number of character sets used (**character-set**)
- The total number of character set changes (**set-transitions**)

For example, the following password:

MyPassWd@2

has four character sets (uppercase letters, lowercase letters, special characters, and numbers) and seven character set changes (**M–y**, **y–P**, **P–a**, **s–W**, **W–d**, **d–@**, and **@–2**).

The **change-type** statement is optional. If you omit the **change-type** option, Junos-FIPS plain-text passwords are checked for character sets, and Junos OS plain-text passwords are checked for character set changes.

The **minimum-changes** statement specifies how many character sets or character set changes are required for the password. This statement is optional. If you do not use the **minimum-changes** statement, character sets are not checked for Junos OS. If the **change-type** statement is configured for the **character-set** option, then the **minimum-changes** value must be **5** or less, because Junos OS only supports five character sets.

The **format** statement specifies the hash algorithm (**md5**, **sha1**, **sha256**, **sha512** or **des**) for authenticating plain-text passwords. This statement is optional. For Junos OS, the default format is **md5**. For Junos-FIPS, only **sha1** is supported.



NOTE: Starting with Junos OS Release 13.3, the **sha1** does not enable secure, protected specification of passwords. Instead, you can use the **sha256** or **sha512** to specify passwords. Using a 256-bit or 512-bit cryptographic hash algorithm results in robust and reliable operation.

The **maximum-length** statement specifies the maximum number of characters allowed in a password. This statement is optional. By default, Junos OS passwords have no maximum; however, only the first 128 characters are significant. Junos-FIPS passwords must be 20 characters or less. The range for Junos OS maximum-length passwords is from 20 to 128 characters.

The **minimum-length** statement specifies the minimum number of characters required for a password. This statement is optional. By default, Junos OS passwords must be at least 6 characters long, and Junos-FIPS passwords must be at least 10 characters long. The range is from 6 to 20 characters.

Changes to password requirements do not take effect until the configuration is committed. When requirements change, only newly created, plain-text passwords are checked; existing passwords are not checked against the new requirements.

The default configuration for Junos OS plain-text passwords is:

```
[edit system login]
passwords {
  change-type character-sets;
  format md5;
  minimum-changes 1;
  minimum-length 6;
}
```

The default configuration for Junos-FIPS plain-text passwords is:

```
[edit system login]
passwords {
  change-type set-transitions;
  format sha1;
  maximum-length 20;
  minimum-changes 3;
  minimum-length 10;
}
```

Release History Table

Release	Description
13.3	Starting with Junos OS Release 13.3, the sha1 does not enable secure, protected specification of passwords. Instead, you can use the sha256 or sha512 to specify passwords.

Related Documentation

- [Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)
- [Configuring the Root Password on page 333](#)

Changing the Requirements for Junos OS Plain-Text Passwords

To change the requirements for plain-text passwords, include the **password** statement at the **[edit system login]** hierarchy level:

```
[edit system login]
password {
  change-type (set-transitions | character-set);
  format (md5 | sha1);
  maximum-length length;
  minimum-changes number;
  minimum-length length;
  minimum-lower-cases number;
  minimum-numeric number;
  minimum-punctuations number;
  minimum-upper-cases number;
}
```



NOTE: These statements apply to plain-text passwords only, not encrypted passwords.

Related Documentation

- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)
- [Configuring the Root Password on page 333](#)
- [Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340](#)

Example: Changing the Requirements for Junos OS Plain-Text Passwords

This example shows how to set various maximum and minimum requirements for plain-text passwords to increase password strength.

- [Requirements on page 348](#)
- [Overview on page 348](#)
- [Configuration on page 349](#)

Requirements

This example requires a device running Junos 12.2 or greater. The **minimum-length** and **maximum-length** password requirements statements are available in earlier releases, however, you must have Junos OS Release 12.2 or greater to configure **minimum-lower-cases**, **minimum-numeric**, **minimum-punctuations**, or **minimum-upper-cases**.

Overview

You can use a variety of requirements to strengthen plain-text passwords for greater security. Junos OS provides a number of possible configurations at the **[edit system login password]** hierarchy level that allow you to require users to create plain-text passwords

that conform to a particular set of requirements that may include such things as length, number of changes, type of characters, numbers, or letter case.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

```
set system login password minimum-length 12
set system login password maximum-length 22
set system login password minimum-numeric 1
set system login password minimum-upper-cases 1
set system login password minimum-lower-cases 1
set system login password minimum-punctuations 1
```

Configuring Requirements for Plain-Text Passwords

Step-by-Step Procedure This example configures password requirements that require the user to create a password that has a minimum length of 12 characters, a maximum length of 22 characters, and that includes at least one lower-case letter, at least one upper-case letter, at least one punctuation character, and at least one numeric character.

1. Navigate to configuration mode in the `[system login password]` hierarchy level.


```
user@host> edit
[edit]
user@host# edit system login password
```
2. Set a minimum length requirement of 12 characters and a maximum length requirement of 22 characters for user passwords.


```
[edit system login password]
user@host# set minimum-length 12
[edit system login password]
user@host# set maximum-length 22
```
3. Require users to set a password that has at least one lower-case letter and at least one upper-case letter.


```
[edit system login password]
user@host# set minimum-lower-cases 1
[edit system login password]
user@host# set minimum-upper-cases 1
```
4. Require users to set a password that has at least one punctuation-class character and at least one number.


```
[edit system login password]
user@host# set minimum-punctuations 1
[edit system login password]
user@host# set minimum-numeric 1
```

Results

From configuration mode, confirm your configuration by entering the show command at the edit system login password hierarchy level. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit system login password]
user@host# show
minimum-length 12;
maximum-length 22;
minimum-numeric 1;
minimum-upper-cases 1;
minimum-lower-cases 1;
```

- Related Documentation**
- [Special Requirements for Junos OS Plain-Text Passwords on page 345](#)
 - [password \(Login\) on page 530](#)

Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication

Using the **authentication-order** statement, you can prioritize the order in which Junos OS tries the different authentication methods when verifying user access to a router or switch. If you do not set the authentication order, users are verified based on their configured passwords.

When configuring a password using plain text and relying on Junos OS to encrypt it, you are still passing the password over the wire in plain text. Using pre-encrypted passwords is more secure because it means that the plain text of the password never has to pass over the Internet. Also, with passwords, only one user can be assigned to a password at a time.

On the other hand, both RADIUS and TACACS+ pre-encrypt passwords. Both let you assign a set of users at a time instead of one by one. But here are how these authentication systems differ:

- RADIUS uses UDP TACACS+ uses TCP.
- RADIUS encrypts only the password during transmission whereas TACACS+ encrypts the entire session.
- RADIUS combines authentication (device) and authorization (user) whereas TACACS+ separates authentication, authorization, and accountability.

In short, TACACS+ is the more secure of the two. But RADIUS has better performance and is more interoperable. RADIUS is widely supported, but TACACS is a proprietary product of Cisco and not widely supported outside of Cisco.

Configure the authentication order based on your system, its restrictions, and your preferences.

To configure the authentication order, include the **authentication-order** statement at the **[edit system]** hierarchy level:

```
[edit system]
  authentication-order [ authentication-methods ];
```

For a list of hierarchy levels at which you can include this statement, see the statement summary section for this statement.

Specify one or more of the following authentication methods in the preferred order, from first tried to last tried:

- **radius**—Verify the user using RADIUS authentication services
- **tacplus**—Verify the user using TACACS+ authentication services.
- **password**—Verify the user using the username and password configured locally by including the authentication statement at the **[edit system login user]** hierarchy level.

The CHAP authentication sequence cannot take more than 30 seconds. If it takes longer to authenticate a client, the authentication is abandoned and a new sequence is initiated.

For example, if you configure three RADIUS servers so that the router or switch attempts to contact each server three times, and with each retry the server times out after 3 seconds, then the maximum time given to the RADIUS authentication method before CHAP considers it a failure is 27 seconds. If you add more RADIUS servers to this configuration, they might not be contacted because the authentication process might be abandoned before these servers are tried.

The Junos OS enforces a limit on the number of standing authentication server requests that the CHAP authentication can have at one time. Thus, an authentication server method—RADIUS, for example—might fail to authenticate a client when this limit is exceeded. If it fails, the authentication sequence is reinitiated by the router or switch until authentication succeeds and the link is brought up. However, if the RADIUS servers are not available and if additional authentication methods such as **tacplus** or **password** are configured along with **radius**, the next authentication method is tried.

The following example shows how to configure **radius** and **password** authentication:

```
[edit system]
user@switch# authentication-order [ radius password ];
```

The following example shows how to delete the **radius** statement from the authentication order:

```
[edit system]
user@switch# delete authentication-order radius
```

The following example shows how to insert the **tacplus** statement after the **radius** statement:

```
[edit system]
user@switch# insert authentication-order tacplus after radius
```

Related Documentation

- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)
- [Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands on page 366](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 352](#)
- [authentication-order on page 461](#)

Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication

The following example shows how to configure system authentication for RADIUS, TACACS+, and password authentication.

In this example, only the user Philip and users authenticated by a remote RADIUS server can log in. If a user logs in and is not authenticated by the RADIUS server, the user is

denied access to the router or switch. If the RADIUS server is not available, the user is authenticated using the **password** authentication method and allowed access to the router or switch. For more information about the password authentication method, see [“Using Local Password Authentication” on page 33](#).

When Philip tries to log in to the system, if the RADIUS server authenticates him, he is given access and privileges for the **super-user** class. Local accounts are not configured for other users. When they log in to the system and the RADIUS server authenticates them, they are given access using the same user ID (UID) 9999 and the privileges associated with the **operator** class.

```
[edit]
system {
  authentication-order radius;
  login {
    user philip {
      full-name "Philip";
      uid 1001;
      class super-user;
    }
    user remote {
      full-name "All remote users";
      uid 9999;
      class operator;
    }
  }
}
```



NOTE: For authorization purposes, you can use a template account to create a single account that can be shared by a set of users at the same time. For example, when you create a remote template account, a set of remote users can concurrently share a single UID. For more information about template accounts, see [“Overview of Template Accounts for RADIUS and TACACS+ Authentication” on page 368](#).

When a user logs in to a device, the user's login name is used by the RADIUS or TACACS+ server for authentication. If the user is authenticated successfully by the authentication server and the user is not configured at the **[edit system login user]** hierarchy level, the device uses the default remote template user account for the user, provided a remote template account is configured at the **edit system login user remote** hierarchy level. The remote template account serves as a default template user account for all users that are authenticated by the authentication server but not having a locally configured user account on the device. Such users share the same login class and UID.

To configure an alternate template user, specify the **user-name** parameter returned in the RADIUS authentication response packet. Not all RADIUS servers allow you to change this parameter. The following shows a sample Junos OS configuration:

```
[edit]
system {
  authentication-order radius;
```

```
login {  
  user philip {  
    full-name "Philip";  
    uid 1001;  
    class super-user;  
  }  
  user operator {  
    full-name "All operators";  
    uid 9990;  
    class operator;  
  }  
  user remote {  
    full-name "All remote users";  
    uid 9999;  
    class read-only;  
  }  
}
```

Assume your RADIUS server is configured with the following information:

- User Philip with password “olympia”
- User Alexander with password “bucephalus” and username “operator”
- User Darius with password “redhead” and username “operator”
- User Roxane with password “athena”

Philip would be given access as a superuser (**super-user**) because he has his own local user account. Alexander and Darius share UID 9990 and have access as operators. Roxane has no template-user override, so she shares access with all the other remote users, getting read-only access.

**Related
Documentation**

- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 351](#)

CHAPTER 8

Configuring Radius Authentication

- [Configuring RADIUS Server Authentication on page 355](#)
- [Example: Configuring RADIUS Authentication on page 359](#)
- [Example: Configuring RADIUS Template Accounts on page 360](#)
- [Juniper Networks Vendor-Specific RADIUS Attributes on page 360](#)
- [Configuring RADIUS System Accounting on page 363](#)
- [Example: Configuring RADIUS System Accounting on page 366](#)
- [Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands on page 366](#)
- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 368](#)
- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 369](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 370](#)

Configuring RADIUS Server Authentication

RADIUS authentication is a method of authenticating users who attempt to access the router or switch.

The Junos OS supports two protocols for central authentication of users on multiple routers: RADIUS and TACACS+. We recommend RADIUS because it is a multivendor IETF standard, and its features are more widely accepted than those of TACACS+ or other proprietary systems. In addition, we recommend using a one-time-password system for increased security, and all vendors of these systems support RADIUS.

You should use RADIUS when your priorities are interoperability and performance:

- **Interoperability**—RADIUS is more interoperable than TACACS+, primarily because of the proprietary nature of TACACS+. While TACACS+ supports more protocols, RADIUS is universally supported.
- **Performance**—RADIUS is much lighter on your routers and switches and for this reason, network engineers generally prefer RADIUS over TACACS+.

To use RADIUS authentication on the device, configure information about one or more RADIUS servers on the network by including one **radius-server** statement at the **[edit system]** hierarchy level for each RADIUS server.

Because remote authentication is configured on multiple devices, it is commonly configured inside of a configuration group. As such, the steps shown here are in a configuration group called **global**. Using a configuration group is optional.

To configure authentication by a RADIUS server:

1. Add an IPv4 or IPv6 server address.

- Configure an IPv4 source-address and server-address:

```
[edit groups global]
user@host# set system radius-server server-address source-address source-address
```

For example:

```
[edit groups global]
user@host# set system radius-server 192.168.17.28 source-address 192.168.17.1
```

- Configure an IPv6 source-address and server address:

```
[edit groups global system radius-server server-address]
user@host# set server-address secret "secretkey" source-address-inet6
source-address
```

For example:

```
[edit groups global system radius-server ::17.22.22.162]
user@host# set secret $9$!POv87ZGiH.5JGn/AtOB7-dVgo source-address-inet6
::17.22.22.1
```

Source address is a valid IPv4 or IPv6 address configured on one of the router or switch interfaces. This sets a fixed address as the source address for locally generated IP packets.

Server address is a unique IPv4 or IPv6 address that is assigned to a particular server and used to route information to the server. If the Junos OS device has several interfaces that can reach the RADIUS server, assign an IP address that Junos OS can use for all its communication with the RADIUS server.

2. Include a shared secret password.

You must specify a password in the **secret password** statement. If the password contains spaces, enclose it in quotation marks. The secret password used by the local router or switch must match that used by the server. The secret password configures the password that the Junos OS device uses to access the RADIUS server.

```
[edit groups global system radius-server server-address]
user@host# set secret password
```

For example:

```
[edit groups global system radius-server 192.168.69.162]
user@host# set secret $9$gQ4UHf5F36CiH.5Tz9CuO1hreM8xw2oIENVwgZG
```

3. If necessary, specify a port on which to contact the RADIUS server.

By default, port number 1812 is used (as specified in RFC 2865).



NOTE: You can also specify an accounting port to send accounting packets with the **accounting-port** statement. The default is 1813 (as specified in RFC 2866).

```
[edit groups global system radius-server server-address]
user@host# set port port-number
```

For example:

```
[edit groups global system radius-server 192.168.69.162]
user@host# set port 1845
```

4. Specify the order in which Junos OS attempts authentication.

You must include the **authentication-order** statement in your remote authentication configuration.

The example assumes your network includes both RADIUS and TACACS+ servers. In this example, whenever a user attempts to log in, Junos OS begins by querying the RADIUS server for authentication. If it fails, it next attempts authentication with locally configured user accounts. Finally the TACACS+ server is tried.

```
[edit groups global system]
user@host# set authentication-order [ authentication-methods ]
```

For example:

```
[edit groups global system]
user@host# set authentication-order [ radius password tacplus ]
```

5. Assign a login class to RADIUS-authenticated users.

You can assign different user templates and login classes to RADIUS-authenticated users. This allows RADIUS-authenticated users to be granted different administrative permissions on the Junos OS device. By default, RADIUS-authenticated users use the **remote** user template and are assigned to the associated class, which is specified in the **remote** user template, if the **remote** user template is configured. The username **remote** is a special case in Junos OS. It acts as a template for users who are authenticated by a remote server, but do not have a locally-configured user account on the device. In this method, Junos OS applies the permissions of the remote template to those authenticated users without a locally defined account. All users mapped to the remote template are of the same login class.

In the Junos OS configuration, a user template is configured in the same way as a regular local user account, except that no local authentication password is configured because the authentication is remotely performed on the RADIUS server.

- To use the same permissions for all RADIUS-authenticated users:

```
[edit groups global system login]
user@host# set user remote class class
```

For example:

```
[edit groups global system login]
user@host# set user remote class super-user
```

- To have different login classes be used for different RADIUS-authenticated users, granting them different permissions:
 - a. Create multiple user templates in the Junos OS configuration.

Every user template can be assigned a different login class.

For example:

```
[edit groups global system login]
set user RO class read-only
set user OP class operator
set user SU class super-user
set user remote full-name "default remote access user template"
set user remote class read-only
```

- b. Have the RADIUS server specify the name of the user template to be applied to the authenticated user.

For a RADIUS server to indicate which user template is to be applied, it needs to include the Juniper-Local-User-Name attribute (Vendor 2636, type 1, string) Juniper VSA (vendor-specific attribute) in the RADIUS Access-Accept message. The string value in the Juniper-Local-User-Name must correspond to the name of a configured user template on the device. For a list of relevant Juniper RADIUS VSAs, see [“Juniper Networks Vendor-Specific RADIUS Attributes” on page 360](#).

If the Juniper-Local-User-Name is not included in the Access-Accept message or the string contains a user template name that does not exist on the device, the user is assigned to the **remote** user template, if configured. If it is not configured, authentication fails for the user.

After logging in, the remotely authenticated user retains the same username that was used to log in. However, the user inherits the user class from the assigned user template.

In a RADIUS server, users can be assigned a Juniper-Local-User-Name string, which indicates the user template to be used in the Junos OS device. From the previous example, the string would be RO, OP, or SU.

Configuration of the RADIUS server depends on the server being used. For instructions for the Juniper Steel-Belted Radius server, see *Steel-Belted Radius (SBR) Enterprise*. For information on using FreeRADIUS, see <http://kb.juniper.net/InfoCenter/index?page=content&id=KB19446>.

Related Documentation

- [Example: Configuring RADIUS Authentication on page 359](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 352](#)
- [Juniper Networks Vendor-Specific RADIUS Attributes on page 360](#)
- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 368](#)

- [Example: Configuring RADIUS Template Accounts on page 360](#)
- [Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands on page 366](#)
- [Junos OS User Authentication Methods on page 30](#)
- [Example: Configuring RADIUS System Accounting on page 366](#)

Example: Configuring RADIUS Authentication

The Junos OS supports two protocols for central authentication of users on multiple routers: RADIUS and TACACS+. We recommend RADIUS because it is a multivendor IETF standard, and its features are more widely accepted than those of TACACS+ or other proprietary systems. In addition, we recommend using a one-time-password system for increased security, and all vendors of these systems support RADIUS.

The Junos OS uses one or more template accounts to perform user authentication. You create the template account or accounts, and then configure the user access to use that account. If the RADIUS server is unavailable, the fallback is for the login process to use the local account that set up on the router or switch.

The following example shows how to configure RADIUS authentication:

```
[edit]
system {
  authentication-order [ radius password ];
  root-authentication {
    encrypted-password "$ABC123; # SECRET-DATA"
  }
  name-server {
    10.1.1.1;
    10.1.1.2;
  }
}
```

The following example shows how to enable RADIUS authentication and define the shared secret between the client and the server. The secret enables the client and server to determine that they are talking to the trusted peer.

Define a timeout value for each server, so that if there is no response within the specified number of seconds, the router can try either the next server or the next authentication mechanism.

```
[edit]
system {
  radius-server {
    10.1.2.1 {
      secret "$ABC123"; # SECRET-DATA
      timeout 5;
    }
    10.1.2.2 {
      secret "$ABC123"; # SECRET-DATA
      timeout 5;
    }
  }
}
```

```
    }  
  }  
}
```

- Related Documentation
- [Configuring RADIUS Server Authentication on page 355](#)

Example: Configuring RADIUS Template Accounts

The following example shows how to configure RADIUS template accounts for different users or groups of users:

```
[edit]  
system {  
  login {  
    user observation {  
      uid 1001;  
      class observation;  
    }  
    user operation {  
      uid 1002;  
      class operation;  
    }  
    user engineering {  
      uid 1003;  
      class engineering;  
    }  
  }  
}
```

- Related Documentation
- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 368](#)

Juniper Networks Vendor-Specific RADIUS Attributes

Junos OS supports the configuration of Juniper Networks RADIUS vendor-specific attributes (VSAs). These VSAs are encapsulated in a RADIUS vendor-specific attribute with the vendor ID set to the Juniper Networks ID number, 2636. [Table 12 on page 360](#) lists the Juniper Networks VSAs you can configure.

Table 12: Juniper Networks Vendor-Specific RADIUS Attributes

Name	Description	Type	Length	String
Juniper-Local-User-Name	Indicates the name of the user template used by this user when logging in to a device. This attribute is used only in Access-Accept packets.	1	≥3	One or more octets containing printable ASCII characters.

Table 12: Juniper Networks Vendor-Specific RADIUS Attributes (*continued*)

Name	Description	Type	Length	String
Juniper-Allow-Commands	Contains an extended regular expression that enables the user to run operational mode commands in addition to the commands authorized by the user's login class permission bits. This attribute is used only in Access-Accept packets.	2	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.
Juniper-Deny-Commands	Contains an extended regular expression that denies the user permission to run operation mode commands authorized by the user's login class permission bits. This attribute is used only in Access-Accept packets.	3	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.
Juniper-Allow-Configuration	Contains an extended regular expression that enables the user to run configuration mode commands in addition to the commands authorized by the user's login class permission bits. This attribute is used only in Access-Accept packets.	4	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.
Juniper-Deny-Configuration	Contains an extended regular expression that denies the user permission to run configuration commands authorized by the user's login class permission bits. This attribute is used only in Access-Accept packets.	5	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.

Table 12: Juniper Networks Vendor-Specific RADIUS Attributes (*continued*)

Name	Description	Type	Length	String
Juniper-Interactive-Command	Indicates the interactive command entered by the user. This attribute is used only in Accounting-Request packets.	8	≥3	One or more octets containing printable ASCII characters.
Juniper-Configuration-Change	Indicates the interactive command that results in a configuration (database) change. This attribute is used only in Accounting-Request packets.	9	≥3	One or more octets containing printable ASCII characters.
Juniper-User-Permissions	<p>Contains information the server uses to specify user permissions. This attribute is used only in Access-Accept packets.</p> <p>NOTE: When the Juniper-User-Permissions attribute is configured to grant the Junos OS maintenance or all permissions on a RADIUS server, the UNIX wheel group membership is not automatically added to a user's list of group memberships. Some operations such as running the su root command from a local shell require wheel group membership permissions. However, when a user is configured locally with the permissions maintenance or all, the user is automatically granted membership to the UNIX wheel group. Therefore, we recommend that you create a template user account with the required permissions and associate individual user accounts with the template user account.</p>	10	≥3	<p>One or more octets containing printable ASCII characters.</p> <p>The string is a list of permission flags separated by a space. The exact name of each flag must be specified in its entirety. See Table 4 on page 26.</p>
Juniper-Authentication-Type	Indicates the authentication method (local database, or RADIUS server) used to authenticate a user. If the user is authenticated using a local database, the attribute value shows 'local'. If the user is authenticated using RADIUS server, the attribute value shows 'remote'.	11	≥5	One or more octets containing printable ASCII characters.

Table 12: Juniper Networks Vendor-Specific RADIUS Attributes (*continued*)

Name	Description	Type	Length	String
Juniper-Session-Port	Indicates the source port number of the established session.	12	size of integer	Integer

For more information about the VSAs, see RFC 2138, *Remote Authentication Dial In User Service (RADIUS)*.

Related Documentation

- [Configuring RADIUS Server Authentication on page 355](#)

Configuring RADIUS System Accounting

With RADIUS accounting enabled, Juniper Networks routers or switches, acting as RADIUS clients, can notify the RADIUS server about user activities such as software logins, configuration changes, and interactive commands. The framework for RADIUS accounting is described in RFC 2866.

Tasks for configuring RADIUS system accounting are:

1. [Configuring Auditing of User Events on a RADIUS Server on page 363](#)
2. [Specifying RADIUS Server Accounting and Auditing Events on page 363](#)
3. [Configuring RADIUS Server Accounting on page 364](#)

Configuring Auditing of User Events on a RADIUS Server

To audit user events, include the following statements at the **[edit system accounting]** hierarchy level:

```
[edit system accounting]
events [ events ];
destination {
  radius {
    server {
      server-address {
        accounting-port port-number;
        secret password;
        source-address address;
        retry number;
        timeout seconds;
      }
    }
  }
}
```

Specifying RADIUS Server Accounting and Auditing Events

To specify the events you want to audit when using a RADIUS server for authentication, include the **events** statement at the **[edit system accounting]** hierarchy level:

```
[edit system accounting]  
events [ events ];
```

events is one or more of the following:

- **login**—Audit logins
- **change-log**—Audit configuration changes
- **interactive-commands**—Audit interactive commands (any command-line input)

Configuring RADIUS Server Accounting

To configure RADIUS server accounting, include the **server** statement at the **[edit system accounting destination radius]** hierarchy level:

```
server {  
  server-address {  
    accounting-port port-number;  
    secret password;  
    source-address address;  
    retry number;  
    timeout seconds;  
  }  
}
```

server-address specifies the address of the RADIUS server. To configure multiple RADIUS servers, include multiple **server** statements.



NOTE: If no RADIUS servers are configured at the **[edit system accounting destination radius]** statement hierarchy level, the Junos OS uses the RADIUS servers configured at the **[edit system radius-server]** hierarchy level.

accounting-port *port-number* specifies the RADIUS server accounting port number.

The default port number is 1813.



NOTE: If you enable RADIUS accounting at the **[edit access profile *profile-name* accounting-order]** hierarchy level, accounting is triggered on the default port of 1813 even if you do not specify a value for the **accounting-port** statement.

You must specify a secret (password) that the local router or switch passes to the RADIUS client by including the **secret** statement. If the password contains spaces, enclose the entire password in quotation marks (" ").

In the **source-address** statement, specify a source address for the RADIUS server. Each RADIUS request sent to a RADIUS server uses the specified source address. The source address is a valid IPv4 address (in case if radius-server address is IPv4) or IPv6 address (in case if radius-server address is IPv6) configured on one of the router or switch interfaces.

Optionally, you can specify the number of times that the router or switch attempts to contact a RADIUS authentication server by including the **retry** statement. By default, the router or switch retries three times. You can configure the router or switch to retry from 1 through 10 times.

Optionally, you can specify the length of time that the local router or switch waits to receive a response from a RADIUS server by including the **timeout** statement. By default, the router or switch waits 3 seconds. You can configure the timeout to be from 1 through 90 seconds.

Starting with Junos OS Release 14.1, you can configure the **enhanced-accounting** statement to view the attribute values of a logged in user. If you use the **enhanced-accounting** statement at the **[edit system radius-options]** hierarchy level, the RADIUS attributes such as access method, remote port, and access privileges can be audited. You can limit the number of attribute values to be displayed for auditing by using the **enhanced-avs-max <number>** statement at the **[edit system accounting]** hierarchy level.

```
[edit system radius-options]
enhanced-accounting;

[edit system accounting]
enhanced-avs-max <number>;
```

When a Juniper Networks router or switch is configured with RADIUS accounting, it sends **Accounting-Start** and **Accounting-Stop** messages to the RADIUS server. These messages contain information about user activities such as software logins, configuration changes, and interactive commands. This information is typically used for monitoring a network, collecting usage statistics, and ensuring that users are billed properly.

The following example shows three servers (10.5.5.5, 10.6.6.6, and 10.7.7.7) configured for RADIUS accounting:

```
system {
  accounting {
    events [ login change-log interactive-commands ];
    destination {
      radius {
        server {
          10.5.5.5 {
            accounting-port 3333;
            secret $ABC123;
            source-address 10.1.1.1;
            retry 3;
            timeout 3;
          }
          10.6.6.6 secret $ABC123;
          10.7.7.7 secret $ABC123;
        }
      }
    }
  }
}
```

Release History Table

Release	Description
14.1	Starting with Junos OS Release 14.1, you can configure the enhanced-accounting statement to view the attribute values of a logged in user.

Example: Configuring RADIUS System Accounting

When a Juniper Networks router or switch is configured with RADIUS accounting, it sends **Accounting-Start** and **Accounting-Stop** messages to the RADIUS server. These messages contain information about user activities such as software logins, configuration changes, and interactive commands. This information is typically used for monitoring a network, collecting usage statistics, and ensuring that users are billed properly.

The following example shows three servers (10.5.5.5, 10.6.6.6, and 10.7.7.7) configured for RADIUS accounting:

```
system {
  accounting {
    events [ login change-log interactive-commands ];
    destination {
      radius {
        server {
          10.5.5.5 {
            accounting-port 3333;
            secret $ABC123;
            source-address 10.1.1.1;
            retry 3;
            timeout 3;
          }
          10.6.6.6 secret $ABC123;
          10.7.7.7 secret $ABC123;
        }
      }
    }
  }
}
```

Related Documentation • [Configuring RADIUS System Accounting on page 363](#)

Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands

Use regular expressions to specify which operational or configuration mode commands are allowed or denied when you use a RADIUS or TACACS+ server for user authentication. You can specify the regular expressions using the appropriate Juniper Networks vendor-specific RADIUS or TACACS+ attributes in your authentication server configuration.

You can specify **allow-configuration**, **deny-configuration**, **allow-commands**, or **deny-commands** in a single extended regular expression, enclosing multiple commands

in parentheses and separating them using the pipe symbol. For example, you can specify multiple **allow-commands** parameters using: **allow-commands= (cmd1 | cmd2 | cmdn)**. You can specify **user-permissions** as a list of comma-separated values, and not as a regular expression.

On a RADIUS or TACACS+ server, you can also use a simplified version for regular expressions where you specify each individual expression on a separate line. The simplified version is valid for **allow-commands**, **deny-commands**, **allow-configuration**, **deny-configuration**, and **permissions** vendor-specific attributes.

For a RADIUS server, specify the individual regular expressions using the following syntax:

```
Juniper-Allow-Commands+= "cmd1"
Juniper-Allow-Commands+= "cmd2"
Juniper-Allow-Commands+= "cmdn"
Juniper-Deny-Commands+= "cmd1"
Juniper-Deny-Commands+= "cmd2"
Juniper-Deny-Commands+= "cmdn"
Juniper-Allow-Configuration+= "regex1"
Juniper-Allow-Configuration+= "regex2"
Juniper-Allow-Configuration+= "regexn"
Juniper-Deny-Configuration+= "regex1"
Juniper-Deny-Configuration+= "regex2"
Juniper-Deny-Configuration+= "regexn"
Juniper-User-Permissions+= "permission-flag1"
Juniper-User-Permissions+= "permission-flag2"
Juniper-User-Permissions+= "permission-flagn"
```

For TACACS+ server, specify the individual regular expressions using the following syntax:

```
allow-commands1= "cmd1"
allow-commands2= "cmd2"
allow-commandsn= "cmdn"
deny-commands1= "cmd1"
deny-commands2= "cmd2"
deny-commandsn= "cmdn"
allow-configuration1= "regex1"
allow-configuration2= "regex2"
allow-configurationn= "regexn"
deny-configuration1= "regex1"
deny-configuration2= "regex2"
deny-configurationn= "regexn"
user-permissions1= "permission-flag1"
user-permissions2= "permission-flag2"
user-permissionsn= "permission-flagn "
```

**NOTE:**

- Numeric values 1 to n in the syntax (for TACACS+ server) must be unique but need not be sequential. For example, the following syntax is valid:

```
allow-commands1="cmd1"  
allow-commands3="cmd3"  
allow-commands2="cmd2"  
deny-commands3="cmd3"  
deny-commands2="cmd2"  
deny-commands1="cmd1"
```

- The limit on the number of lines of individual regular expressions is imposed by the TACACS+ or RADIUS server.
- When you issue the `show cli authorization` command, the command output displays the regular expression in a single line, even if you specify each individual expression on a separate line.

For more information about Juniper Networks vendor-specific RADIUS and TACACS+ attributes, see [“Juniper Networks Vendor-Specific RADIUS Attributes” on page 360](#) and [“Juniper Networks Vendor-Specific TACACS+ Attributes” on page 377](#).



NOTE: When RADIUS or TACACS+ authentication is configured for a router, regular expressions configured on the RADIUS or TACACS+ server merge with any regular expressions configured on the local router at the [edit system login class] hierarchy level using the `allow-commands`, `deny-commands`, `allow-configuration`, `deny-configuration`, or `permissions` statements. If the final expression has a syntax error, the overall result is an invalid regular expression.

Related Documentation

- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)

Overview of Template Accounts for RADIUS and TACACS+ Authentication

When you use local password authentication, you must create a local user account for every user who wants to access the system. However, when you are using RADIUS or TACACS+ authentication, you can create single accounts (for authorization purposes) that are shared by a set of users. You create these accounts using the remote and local user template accounts. When a user is using a template account, the command-line interface (CLI) username is the login name; however, the privileges, file ownership, and effective user ID are inherited from the template account.

Related Documentation

- [Understanding Remote Authentication Servers on page 31](#)
- [Configuring Remote Template Accounts for User Authentication on page 52](#)
- [Configuring Local User Template Accounts for User Authentication on page 50](#)

Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication

Using the **authentication-order** statement, you can prioritize the order in which Junos OS tries the different authentication methods when verifying user access to a router or switch. If you do not set the authentication order, users are verified based on their configured passwords.

When configuring a password using plain text and relying on Junos OS to encrypt it, you are still passing the password over the wire in plain text. Using pre-encrypted passwords is more secure because it means that the plain text of the password never has to pass over the Internet. Also, with passwords, only one user can be assigned to a password at a time.

On the other hand, both RADIUS and TACACS+ pre-encrypt passwords. Both let you assign a set of users at a time instead of one by one. But here are how these authentication systems differ:

- RADIUS uses UDP TACACS+ uses TCP.
- RADIUS encrypts only the password during transmission whereas TACACS+ encrypts the entire session.
- RADIUS combines authentication (device) and authorization (user) whereas TACACS+ separates authentication, authorization, and accountability.

In short, TACACS+ is the more secure of the two. But RADIUS has better performance and is more interoperable. RADIUS is widely supported, but TACACS is a proprietary product of Cisco and not widely supported outside of Cisco.

Configure the authentication order based on your system, its restrictions, and your preferences.

To configure the authentication order, include the **authentication-order** statement at the **[edit system]** hierarchy level:

```
[edit system]  
  authentication-order [ authentication-methods ];
```

For a list of hierarchy levels at which you can include this statement, see the statement summary section for this statement.

Specify one or more of the following authentication methods in the preferred order, from first tried to last tried:

- **radius**—Verify the user using RADIUS authentication services
- **tacplus**—Verify the user using TACACS+ authentication services.
- **password**—Verify the user using the username and password configured locally by including the authentication statement at the **[edit system login user]** hierarchy level.

The CHAP authentication sequence cannot take more than 30 seconds. If it takes longer to authenticate a client, the authentication is abandoned and a new sequence is initiated.

For example, if you configure three RADIUS servers so that the router or switch attempts to contact each server three times, and with each retry the server times out after 3 seconds, then the maximum time given to the RADIUS authentication method before CHAP considers it a failure is 27 seconds. If you add more RADIUS servers to this configuration, they might not be contacted because the authentication process might be abandoned before these servers are tried.

The Junos OS enforces a limit on the number of standing authentication server requests that the CHAP authentication can have at one time. Thus, an authentication server method—RADIUS, for example—might fail to authenticate a client when this limit is exceeded. If it fails, the authentication sequence is reinitiated by the router or switch until authentication succeeds and the link is brought up. However, if the RADIUS servers are not available and if additional authentication methods such as **tacplus** or **password** are configured along with **radius**, the next authentication method is tried.

The following example shows how to configure **radius** and **password** authentication:

```
[edit system]
user@switch# authentication-order [ radius password ];
```

The following example shows how to delete the **radius** statement from the authentication order:

```
[edit system]
user@switch# delete authentication-order radius
```

The following example shows how to insert the **tacplus** statement after the **radius** statement:

```
[edit system]
user@switch# insert authentication-order tacplus after radius
```

Related Documentation

- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)
- [Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands on page 366](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 352](#)
- [authentication-order on page 461](#)

Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication

The following example shows how to configure system authentication for RADIUS, TACACS+, and password authentication.

In this example, only the user Philip and users authenticated by a remote RADIUS server can log in. If a user logs in and is not authenticated by the RADIUS server, the user is

denied access to the router or switch. If the RADIUS server is not available, the user is authenticated using the **password** authentication method and allowed access to the router or switch. For more information about the password authentication method, see [“Using Local Password Authentication” on page 33](#).

When Philip tries to log in to the system, if the RADIUS server authenticates him, he is given access and privileges for the **super-user** class. Local accounts are not configured for other users. When they log in to the system and the RADIUS server authenticates them, they are given access using the same user ID (UID) 9999 and the privileges associated with the **operator** class.

```
[edit]
system {
  authentication-order radius;
  login {
    user philip {
      full-name "Philip";
      uid 1001;
      class super-user;
    }
    user remote {
      full-name "All remote users";
      uid 9999;
      class operator;
    }
  }
}
```



NOTE: For authorization purposes, you can use a template account to create a single account that can be shared by a set of users at the same time. For example, when you create a remote template account, a set of remote users can concurrently share a single UID. For more information about template accounts, see [“Overview of Template Accounts for RADIUS and TACACS+ Authentication” on page 368](#).

When a user logs in to a device, the user's login name is used by the RADIUS or TACACS+ server for authentication. If the user is authenticated successfully by the authentication server and the user is not configured at the **[edit system login user]** hierarchy level, the device uses the default remote template user account for the user, provided a remote template account is configured at the **edit system login user remote** hierarchy level. The remote template account serves as a default template user account for all users that are authenticated by the authentication server but not having a locally configured user account on the device. Such users share the same login class and UID.

To configure an alternate template user, specify the **user-name** parameter returned in the RADIUS authentication response packet. Not all RADIUS servers allow you to change this parameter. The following shows a sample Junos OS configuration:

```
[edit]
system {
  authentication-order radius;
```

```
login {  
  user philip {  
    full-name "Philip";  
    uid 1001;  
    class super-user;  
  }  
  user operator {  
    full-name "All operators";  
    uid 9990;  
    class operator;  
  }  
  user remote {  
    full-name "All remote users";  
    uid 9999;  
    class read-only;  
  }  
}
```

Assume your RADIUS server is configured with the following information:

- User Philip with password “olympia”
- User Alexander with password “bucephalus” and username “operator”
- User Darius with password “redhead” and username “operator”
- User Roxane with password “athena”

Philip would be given access as a superuser (**super-user**) because he has his own local user account. Alexander and Darius share UID 9990 and have access as operators. Roxane has no template-user override, so she shares access with all the other remote users, getting read-only access.

**Related
Documentation**

- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 351](#)

CHAPTER 9

Configuring TACACS+ Authentication

- [Configuring TACACS+ Authentication on page 373](#)
- [Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands on page 376](#)
- [Juniper Networks Vendor-Specific TACACS+ Attributes on page 377](#)
- [Configuring TACACS+ System Accounting on page 379](#)
- [Configuring TACACS+ Accounting on a TX Matrix Router on page 381](#)
- [Overview of Template Accounts for RADIUS and TACACS+ Authentication on page 381](#)
- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 382](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 383](#)

Configuring TACACS+ Authentication

TACACS+ authentication is a method of authenticating users who attempt to access the router or switch. Tasks to configure TACACS+ configuration are:

- [Configuring TACACS+ Server Details on page 373](#)
- [Specifying a Source Address for the Junos OS to Access External TACACS+ Servers on page 374](#)
- [Configuring the Same Authentication Service for Multiple TACACS+ Servers on page 375](#)
- [Configuring Juniper Networks Vendor-Specific TACACS+ Attributes on page 375](#)

Configuring TACACS+ Server Details

To use TACACS+ authentication on the router or switch, configure information about one or more TACACS+ servers on the network by including the **tacplus-server** statement at the **[edit system]** hierarchy level:

```
[edit system]
tacplus-server server-address {
  port port-number;
  secret password;
  single-connection;
  timeout seconds;
}
```

server-address is the address of the TACACS+ server.

port-number is the TACACS+ server port number.

You must specify a secret (password) that the local router or switch passes to the TACACS+ client by including the **secret** statement. If the password included spaces, enclose the password in quotation marks. The secret used by the local router or switch must match that used by the server.

Optionally, you can specify the length of time that the local router or switch waits to receive a response from a TACACS+ server by including the **timeout** statement. By default, the router or switch waits 3 seconds. You can configure this to be a value in the range from 1 through 90 seconds.

Optionally, you can have the software maintain one open Transmission Control Protocol (TCP) connection to the server for multiple requests, rather than opening a connection for each connection attempt by including the **single-connection** statement.



NOTE: Early versions of the TACACS+ server do not support the **single-connection** option. If you specify this option and the server does not support it, the Junos OS will be unable to communicate with that TACACS+ server.

To configure multiple TACACS+ servers, include multiple **tacplus-server** statements.

To configure a set of users that share a single account for authorization purposes, you create a template user. To do this, include the **user** statement at the **[edit system login]** hierarchy level, as described in [“Overview of Template Accounts for RADIUS and TACACS+ Authentication” on page 368](#).

Specifying a Source Address for the Junos OS to Access External TACACS+ Servers

You can specify which source address the Junos OS uses when accessing your network to contact an external TACACS+ server for authentication. You can also specify which source address the Junos OS uses when contacting a TACACS+ server for sending accounting information.

To specify a source address for a TACACS+ server for authentication, include the **source-address** statement at the **[edit system tacplus-server server-address]** hierarchy level:

```
[edit system tacplus-server server-address]
source-address source-address;
```

source-address is a valid IP address configured on one of the router or switch interfaces.

To specify a source address for a TACACS+ server for system accounting, include the **source-address** statement at the **[edit system accounting destination tacplus server server-address]** hierarchy level:

```
[edit system accounting destination tacplus server server-address]
source-address source-address;
```

source-address is a valid IP address configured on one of the router or switch interfaces.

Configuring the Same Authentication Service for Multiple TACACS+ Servers

To configure the same authentication service for multiple TACACS+ servers, include statements at the **[edit system tacplus-server]** and **[edit system tacplus-options]** hierarchy levels. For information about how to configure a TACACS+ server at the **[edit system tacplus-server]** hierarchy level, see [“Configuring TACACS+ Authentication” on page 373](#).

To assign the same authentication service to multiple TACACS+ servers, include the **service-name** statement at the **[edit system tacplus-options]** hierarchy level:

```
[edit system tacplus-options]
service-name service-name;
```

service-name is the name of the authentication service. By default, the service name is set to **junos-exec**.

The following example shows how to configure the same authentication service for multiple TACACS+ servers:

```
[edit system]
tacplus-server {
  10.2.2.2 secret "$ABC123"; ## SECRET-DATA
  10.3.3.3 secret "$ABC123"; ## SECRET-DATA
}
tacplus-options {
  service-name bob;
}
```

Configuring Juniper Networks Vendor-Specific TACACS+ Attributes

The Juniper Networks Vendor-Specific TACACS+ Attributes enable you to configure access privileges for users on a TACACS+ server. They are specified in the TACACS+ server configuration file on a per-user basis. The Junos OS retrieves these attributes through an authorization request of the TACACS+ server after authenticating a user. You do not need to configure these attributes to run the Junos OS with TACACS+.

To specify these attributes, include a **service** statement of the following form in the TACACS+ server configuration file:

```
service = junos-exec {
  local-user-name = <username-local-to-router>
  allow-commands = "<allow-commands-regex>"
  allow-configuration-regexps = "<allow-configuration-regex>"
  deny-commands = "<deny-commands-regex>"
  deny-configuration-regexps = "<deny-configuration-regex>"
}
```

This **service** statement can appear in a **user** or **group** statement.

Related Documentation

- [Example: Configuring a TACACS+ Server for System Authentication](#)

Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands

Use regular expressions to specify which operational or configuration mode commands are allowed or denied when you use a RADIUS or TACACS+ server for user authentication. You can specify the regular expressions using the appropriate Juniper Networks vendor-specific RADIUS or TACACS+ attributes in your authentication server configuration.

You can specify **allow-configuration**, **deny-configuration**, **allow-commands**, or **deny-commands** in a single extended regular expression, enclosing multiple commands in parentheses and separating them using the pipe symbol. For example, you can specify multiple **allow-commands** parameters using: **allow-commands= (cmd1 | cmd2 | cmdn)**. You can specify **user-permissions** as a list of comma-separated values, and not as a regular expression.

On a RADIUS or TACACS+ server, you can also use a simplified version for regular expressions where you specify each individual expression on a separate line. The simplified version is valid for **allow-commands**, **deny-commands**, **allow-configuration**, **deny-configuration**, and **permissions** vendor-specific attributes.

For a RADIUS server, specify the individual regular expressions using the following syntax:

```
Juniper-Allow-Commands+= "cmd1"  
Juniper-Allow-Commands+= "cmd2"  
Juniper-Allow-Commands+= "cmdn"  
Juniper-Deny-Commands+= "cmd1"  
Juniper-Deny-Commands+= "cmd2"  
Juniper-Deny-Commands+= "cmdn"  
Juniper-Allow-Configuration+= "regex1"  
Juniper-Allow-Configuration+= "regex2"  
Juniper-Allow-Configuration+= "regexn"  
Juniper-Deny-Configuration+= "regex1"  
Juniper-Deny-Configuration+= "regex2"  
Juniper-Deny-Configuration+= "regexn"  
Juniper-User-Permissions+= "permission-flag1"  
Juniper-User-Permissions+= "permission-flag2"  
Juniper-User-Permissions+= "permission-flagn"
```

For TACACS+ server, specify the individual regular expressions using the following syntax:

```
allow-commands1= "cmd1"  
allow-commands2= "cmd2"  
allow-commandsn= "cmdn"  
deny-commands1= "cmd1"  
deny-commands2= "cmd2"  
deny-commandsn= "cmdn"  
allow-configuration1= "regex1"  
allow-configuration2= "regex2"  
allow-configurationn= "regexn"  
deny-configuration1= "regex1"  
deny-configuration2= "regex2"  
deny-configurationn= "regexn"  
user-permissions1= "permission-flag1"
```

```
user-permissions2="permission-flag2"  
user-permissionsn="permission-flagn "
```



NOTE:

- Numeric values 1 to *n* in the syntax (for TACACS+ server) must be unique but need not be sequential. For example, the following syntax is valid:

```
allow-commands1="cmd1"  
allow-commands3="cmd3"  
allow-commands2="cmd2"  
deny-commands3="cmd3"  
deny-commands2="cmd2"  
deny-commands1="cmd1"
```
- The limit on the number of lines of individual regular expressions is imposed by the TACACS+ or RADIUS server.
- When you issue the `show cli authorization` command, the command output displays the regular expression in a single line, even if you specify each individual expression on a separate line.

For more information about Juniper Networks vendor-specific RADIUS and TACACS+ attributes, see [“Juniper Networks Vendor-Specific RADIUS Attributes” on page 360](#) and [“Juniper Networks Vendor-Specific TACACS+ Attributes” on page 377](#).



NOTE: When RADIUS or TACACS+ authentication is configured for a router, regular expressions configured on the RADIUS or TACACS+ server merge with any regular expressions configured on the local router at the [edit system login class] hierarchy level using the `allow-commands`, `deny-commands`, `allow-configuration`, `deny-configuration`, or `permissions` statements. If the final expression has a syntax error, the overall result is an invalid regular expression.

- Related Documentation
- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)

Juniper Networks Vendor-Specific TACACS+ Attributes

Junos OS supports the configuration of Juniper Networks TACACS+ vendor-specific attributes (VSAs). These VSAs are encapsulated in a TACACS+ vendor-specific attribute with the vendor ID set to the Juniper Networks ID number, 2636. [Table 13 on page 377](#) lists the Juniper Networks VSAs you can configure.

Table 13: Juniper Networks Vendor-Specific TACACS+ Attributes

Name	Description	Length	String
local-user-name	Indicates the name of the user template used by this user when logging in to a device.	≥3	One or more octets containing printable ASCII characters.

Table 13: Juniper Networks Vendor-Specific TACACS+ Attributes (*continued*)

Name	Description	Length	String
allow-commands	Contains an extended regular expression that enables the user to run operational mode commands in addition to those commands authorized by the user's login class permission bits.	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.
allow-configuration	Contains an extended regular expression that enables the user to run configuration mode commands in addition to those commands authorized by the user's login class permission bits.	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.
deny-commands	Contains an extended regular expression that denies the user permission to run operational mode commands authorized by the user's login class permission bits.	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See “Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies” on page 69.
deny-configuration	Contains an extended regular expression that denies the user permission to run configuration mode commands authorized by the user's login class permission bits.	≥3	One or more octets containing printable ASCII characters, in the form of an extended regular expression. See Table 8 on page 73.

Table 13: Juniper Networks Vendor-Specific TACACS+ Attributes (*continued*)

Name	Description	Length	String
user-permissions	<p>Contains information the server uses to specify user permissions.</p> <p>NOTE: When the user-permissions attribute is configured to grant the Junos OS maintenance or all permissions on an IPv4 or IPv6 TACACS+ server, the UNIX wheel group membership is not automatically added to a user's list of group memberships. Some operations such as running the su root command from a local shell require wheel group membership permissions. However, when a user is configured locally with the permissions maintenance or all, the user is automatically granted membership to the UNIX wheel group. Therefore, we recommend that you create a template user account with the required permissions and associate individual user accounts with the template user account.</p>	≥3	One or more octets containing printable ASCII characters. See Table 4 on page 26.
authentication-type	Indicates the authentication method (local database, or TACACS+ server) used to authenticate a user. If the user is authenticated using a local database, the attribute value shows 'local'. If the user is authenticated using TACACS+ server, the attribute value shows 'remote'.	≥5	One or more octets containing printable ASCII characters.
session-port	Indicates the source port number of the established session.	size of integer	Integer

Related Documentation • [Configuring Juniper Networks Vendor-Specific TACACS+ Attributes on page 375](#)

Configuring TACACS+ System Accounting

You can use TACACS+ to track and log software logins, configuration changes, and interactive commands. To audit these events, include the following statements at the **[edit system accounting]** hierarchy level:

```
[edit system accounting]
events [ events ];
destination {
  tacplus {
    server {
      server-address {
        port port-number;
        secret password;
        single-connection;
        timeout seconds;
      }
    }
  }
}
```

Tasks for configuring TACACS+ system accounting are:

1. [Specifying TACACS+ Auditing and Accounting Events on page 380](#)
2. [Configuring TACACS+ Server Accounting on page 380](#)

Specifying TACACS+ Auditing and Accounting Events

To specify the events you want to audit when using a TACACS+ server for authentication, include the **events** statement at the **[edit system accounting]** hierarchy level:

```
[edit system accounting]
events [ events ];
```

events is one or more of the following:

- **login**—Audit logins
- **change-log**—Audit configuration changes
- **interactive-commands**—Audit interactive commands (any command-line input)

Configuring TACACS+ Server Accounting

To configure TACACS+ server accounting, include the **server** statement at the **[edit system accounting destination tacplus]** hierarchy level:

```
[edit system accounting destination tacplus]
server {
  server-address {
    port port-number;
    secret password;
    single-connection;
    timeout seconds;
  }
}
```

server-address specifies the address of the TACACS+ server. To configure multiple TACACS+ servers, include multiple **server** statements.



NOTE: If no TACACS+ servers are configured at the **[edit system accounting destination tacplus]** statement hierarchy level, the Junos OS uses the TACACS+ servers configured at the **[edit system tacplus-server]** hierarchy level.

port-number specifies the TACACS+ server port number.

You must specify a secret (password) that the local router or switch passes to the TACACS+ client by including the **secret** statement. If the password contains spaces, enclose the entire password in quotation marks (" "). The password used by the local router or switch must match that used by the server.

Optionally, you can specify the length of time that the local router or switch waits to receive a response from a TACACS+ server by including the **timeout** statement. By default,

the router or switch waits 3 seconds. You can configure this to be a value in the range from 1 through 90 seconds.

Optionally, you can maintain one open TCP connection to the server for multiple requests, rather than opening a connection for each connection attempt, by including the **single-connection** statement.

To ensure that start and stop requests for accounting of login events are correctly logged in the Accounting file instead of the Administration log file on a TACACS+ server, include either the **no-cmd-attribute-value** statement or the **exclude-cmd-attribute** at the **[edit system tacplus-options]** hierarchy level.

If you use the **no-cmd-attribute-value** statement, the value of the **cmd** attribute is set to a null string in the start and stop requests. If you use the **exclude-cmd-attribute** statement, the **cmd** attribute is totally excluded from the start and stop requests. Both statements support the correct logging of accounting requests in the Accounting file, instead of the Administration file.

```
[edit system tacplus-options]
(no-cmd-attribute-value | exclude-cmd-attribute);
```

**Related
Documentation**

- [Configuring TACACS+ Accounting on a TX Matrix Router on page 381](#)
- [Configuring TACACS+ Authentication on page 373](#)

Configuring TACACS+ Accounting on a TX Matrix Router

On a TX Matrix router, TACACS+ accounting should be configured only under the groups **re0** and **re1**.



NOTE: Accounting should *not* be configured at the **[edit system]** hierarchy; on a TX Matrix router, control is done under the switch-card chassis only.

**Related
Documentation**

- [Configuring TACACS+ System Accounting on page 379](#)

Overview of Template Accounts for RADIUS and TACACS+ Authentication

When you use local password authentication, you must create a local user account for every user who wants to access the system. However, when you are using RADIUS or TACACS+ authentication, you can create single accounts (for authorization purposes) that are shared by a set of users. You create these accounts using the remote and local user template accounts. When a user is using a template account, the command-line interface (CLI) username is the login name; however, the privileges, file ownership, and effective user ID are inherited from the template account.

**Related
Documentation**

- [Understanding Remote Authentication Servers on page 31](#)
- [Configuring Remote Template Accounts for User Authentication on page 52](#)

- [Configuring Local User Template Accounts for User Authentication on page 50](#)

Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication

Using the **authentication-order** statement, you can prioritize the order in which Junos OS tries the different authentication methods when verifying user access to a router or switch. If you do not set the authentication order, users are verified based on their configured passwords.

When configuring a password using plain text and relying on Junos OS to encrypt it, you are still passing the password over the wire in plain text. Using pre-encrypted passwords is more secure because it means that the plain text of the password never has to pass over the Internet. Also, with passwords, only one user can be assigned to a password at a time.

On the other hand, both RADIUS and TACACS+ pre-encrypt passwords. Both let you assign a set of users at a time instead of one by one. But here are how these authentication systems differ:

- RADIUS uses UDP TACACS+ uses TCP.
- RADIUS encrypts only the password during transmission whereas TACACS+ encrypts the entire session.
- RADIUS combines authentication (device) and authorization (user) whereas TACACS+ separates authentication, authorization, and accountability.

In short, TACACS+ is the more secure of the two. But RADIUS has better performance and is more interoperable. RADIUS is widely supported, but TACACS is a proprietary product of Cisco and not widely supported outside of Cisco.

Configure the authentication order based on your system, its restrictions, and your preferences.

To configure the authentication order, include the **authentication-order** statement at the **[edit system]** hierarchy level:

```
[edit system]  
authentication-order [ authentication-methods ];
```

For a list of hierarchy levels at which you can include this statement, see the statement summary section for this statement.

Specify one or more of the following authentication methods in the preferred order, from first tried to last tried:

- **radius**—Verify the user using RADIUS authentication services
- **tacplus**—Verify the user using TACACS+ authentication services.
- **password**—Verify the user using the username and password configured locally by including the authentication statement at the **[edit system login user]** hierarchy level.

The CHAP authentication sequence cannot take more than 30 seconds. If it takes longer to authenticate a client, the authentication is abandoned and a new sequence is initiated.

For example, if you configure three RADIUS servers so that the router or switch attempts to contact each server three times, and with each retry the server times out after 3 seconds, then the maximum time given to the RADIUS authentication method before CHAP considers it a failure is 27 seconds. If you add more RADIUS servers to this configuration, they might not be contacted because the authentication process might be abandoned before these servers are tried.

The Junos OS enforces a limit on the number of standing authentication server requests that the CHAP authentication can have at one time. Thus, an authentication server method—RADIUS, for example—might fail to authenticate a client when this limit is exceeded. If it fails, the authentication sequence is reinitiated by the router or switch until authentication succeeds and the link is brought up. However, if the RADIUS servers are not available and if additional authentication methods such as **tacplus** or **password** are configured along with **radius**, the next authentication method is tried.

The following example shows how to configure **radius** and **password** authentication:

```
[edit system]
user@switch# authentication-order [ radius password ];
```

The following example shows how to delete the **radius** statement from the authentication order:

```
[edit system]
user@switch# delete authentication-order radius
```

The following example shows how to insert the **tacplus** statement after the **radius** statement:

```
[edit system]
user@switch# insert authentication-order tacplus after radius
```

Related Documentation

- [Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32](#)
- [Using Regular Expressions on a RADIUS or TACACS+ Server to Allow or Deny Access to Commands on page 366](#)
- [Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication on page 352](#)
- [authentication-order on page 461](#)

Example: Configuring System Authentication for RADIUS, TACACS+, and Password Authentication

The following example shows how to configure system authentication for RADIUS, TACACS+, and password authentication.

In this example, only the user Philip and users authenticated by a remote RADIUS server can log in. If a user logs in and is not authenticated by the RADIUS server, the user is

denied access to the router or switch. If the RADIUS server is not available, the user is authenticated using the **password** authentication method and allowed access to the router or switch. For more information about the password authentication method, see [“Using Local Password Authentication” on page 33](#).

When Philip tries to log in to the system, if the RADIUS server authenticates him, he is given access and privileges for the **super-user** class. Local accounts are not configured for other users. When they log in to the system and the RADIUS server authenticates them, they are given access using the same user ID (UID) 9999 and the privileges associated with the **operator** class.

```
[edit]
system {
  authentication-order radius;
  login {
    user philip {
      full-name "Philip";
      uid 1001;
      class super-user;
    }
    user remote {
      full-name "All remote users";
      uid 9999;
      class operator;
    }
  }
}
```



NOTE: For authorization purposes, you can use a template account to create a single account that can be shared by a set of users at the same time. For example, when you create a remote template account, a set of remote users can concurrently share a single UID. For more information about template accounts, see [“Overview of Template Accounts for RADIUS and TACACS+ Authentication” on page 368](#).

When a user logs in to a device, the user's login name is used by the RADIUS or TACACS+ server for authentication. If the user is authenticated successfully by the authentication server and the user is not configured at the **[edit system login user]** hierarchy level, the device uses the default remote template user account for the user, provided a remote template account is configured at the **edit system login user remote** hierarchy level. The remote template account serves as a default template user account for all users that are authenticated by the authentication server but not having a locally configured user account on the device. Such users share the same login class and UID.

To configure an alternate template user, specify the **user-name** parameter returned in the RADIUS authentication response packet. Not all RADIUS servers allow you to change this parameter. The following shows a sample Junos OS configuration:

```
[edit]
system {
  authentication-order radius;
```

```
login {  
  user philip {  
    full-name "Philip";  
    uid 1001;  
    class super-user;  
  }  
  user operator {  
    full-name "All operators";  
    uid 9990;  
    class operator;  
  }  
  user remote {  
    full-name "All remote users";  
    uid 9999;  
    class read-only;  
  }  
}
```

Assume your RADIUS server is configured with the following information:

- User Philip with password “olympia”
- User Alexander with password “bucephalus” and username “operator”
- User Darius with password “redhead” and username “operator”
- User Roxane with password “athena”

Philip would be given access as a superuser (**super-user**) because he has his own local user account. Alexander and Darius share UID 9990 and have access as operators. Roxane has no template-user override, so she shares access with all the other remote users, getting read-only access.

**Related
Documentation**

- [Configuring the Junos OS Authentication Order for RADIUS, TACACS+, and Local Password Authentication on page 351](#)

CHAPTER 10

Configuring DHCP Access Service for IP Address Management

- [DHCP Access Service Overview on page 388](#)
- [DHCP Statement Hierarchy and Inheritance on page 391](#)
- [Configuring Address Pools for DHCP Dynamic Bindings on page 393](#)
- [Configuring Manual \(Static\) DHCP Bindings Between a Fixed IP Address and a Client MAC Address on page 394](#)
- [Specifying DHCP Lease Times for IP Address Assignments on page 396](#)
- [Configuring a DHCP Boot File and DHCP Boot Server on page 396](#)
- [Configuring a Static IP Address as DHCP Server Identifier on page 397](#)
- [Configuring a Domain Name and Domain Search List for a DHCP Server Host on page 398](#)
- [Configuring Routers Available to the DHCP Client on page 399](#)
- [Creating User-Defined DHCP Options Not Included in the Default Junos Implementation of the DHCP Server on page 399](#)
- [Example: Complete DHCP Server Configuration on page 400](#)
- [Example: Viewing DHCP Bindings on page 402](#)
- [Example: Viewing DHCP Address Pools on page 402](#)
- [Example: Viewing and Clearing DHCP Conflicts on page 403](#)
- [Configuring Tracing Operations for DHCP Processes on page 403](#)
- [DHCP Processes Tracing Flags on page 405](#)
- [Configuring the Router as an Extended DHCP Local Server on page 407](#)
- [Interaction Among the DHCP Client, Extended DHCP Local Server, and Address-Assignment Pools on page 409](#)
- [Extended DHCP Local Server and Address-Assignment Pools on page 409](#)
- [Methods Used by the Extended DHCP Local Server to Determine Which Address-Assignment Pool to Use on page 410](#)
- [Default Options Provided by the Extended DHCP Server for the DHCP Client on page 411](#)
- [Using External AAA Authentication Services to Authenticate DHCP Clients on page 411](#)
- [Client Configuration Information Exchanged Between the External Authentication Server, DHCP Application, and DHCP Client on page 416](#)

- [Example: Configuring the Minimum Extended DHCP Local Server Configuration on page 417](#)
- [Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 417](#)
- [Verifying and Managing the DHCP Server Configuration on page 417](#)
- [Tracing Extended DHCP Local Server Operations on page 418](#)

DHCP Access Service Overview

DHCP access service consists of two components: a protocol for delivering host-specific configuration information from a server to a client host and a method for allocating network addresses to a client host. The client sends a message to request configuration information. A DHCP server sends the configuration information back to the client.

With DHCP, clients can be assigned a network address for a fixed *lease*, enabling serial reassignment of network addresses to different clients. A DHCP server leases IP addresses for specific times to various clients. If a client does not use its assigned address for some period of time, the DHCP server can assign that IP address to another host. When assignments are made or changed, the DHCP server updates information in the DNS server. The DHCP server provides clients with their previous lease assignments whenever possible.

A DHCP server provides persistent storage of network parameters for clients. Because DHCP is an extension of BOOTP, DHCP servers can handle BOOTP requests.

The DHCP server includes IPv4 address assignment and commonly used DHCP options. The server is compatible with DHCP servers from other vendors on the network. The server does not support IPv6 address assignment, user class-specific configuration, DHCP failover protocol, dynamic DNS updates, or VPN connections. The Junos-FIPS software does not support the DHCP server.



NOTE: You cannot configure a router as a DHCP server and a BOOTP relay agent at the same time.

The following topics describe these concepts in detail:

- [Network Address Assignments \(Allocating a New Address\) on page 388](#)
- [Network Address Assignments \(Reusing a Previously Assigned Address\) on page 390](#)
- [Static and Dynamic Bindings on page 390](#)
- [Compatibility with Autoinstallation on page 391](#)
- [Conflict Detection and Resolution on page 391](#)

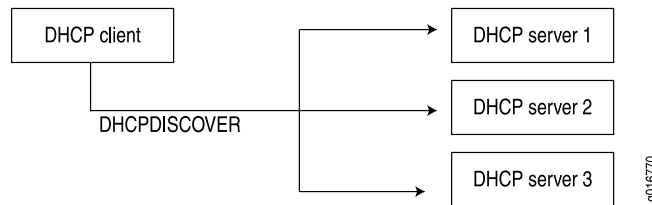
Network Address Assignments (Allocating a New Address)

To receive configuration information and a network address assignment, a DHCP client negotiates with DHCP servers in a series of messages. The following steps show the messages exchanged between a DHCP client and servers to allocate a new network

address. When allocating a new network address, the DHCP process can involve more than one server, but only one server is selected by the client.

1. When a client computer is started, it broadcasts a **DHCPDISCOVER** message on the local subnet, requesting a DHCP server. This request includes the hardware address of the requesting client.

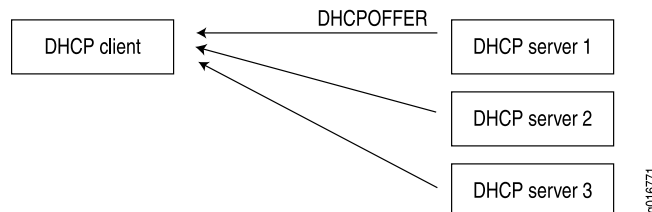
Figure 4: DHCP Discover



NOTE: For improved operation with DHCP clients that do not strictly conform to RFC 2131, the DHCP server accepts and processes **DHCPDISCOVER** messages even if the overload options in the messages are not properly terminated with an end statement.

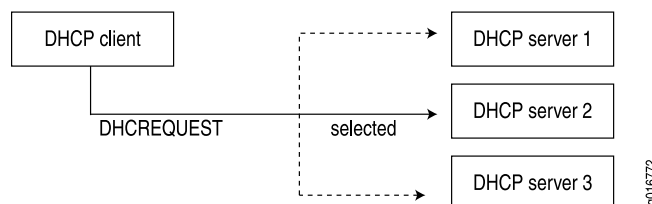
2. Each DHCP server receiving the broadcast sends a **DHCPOFFER** message to the client, offering an IP address for a set period of time, known as the lease period.

Figure 5: DHCP Offer



3. The client receives one or more **DHCPOFFER** messages from one or more servers and selects one of the offers received. Normally, a client looks for the longest lease period.
4. The client broadcasts a **DHCPREQUEST** message indicating the client has selected an offered leased IP address and identifies the selected server.

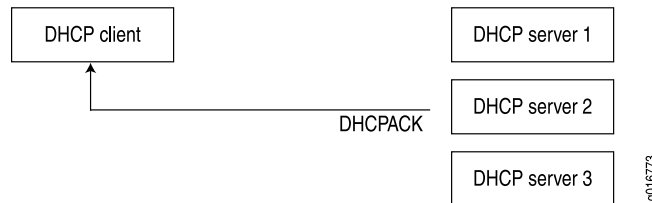
Figure 6: DHCP Request



5. Those servers not selected by the **DHCPREQUEST** message return the unselected IP addresses to the pool of available addresses.

6. The selected DHCP server sends a **DHCPACK** acknowledgment that includes configuration information such as the IP address, subnet mask, default gateway, and the lease period.

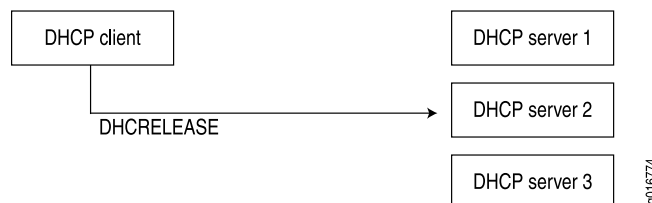
Figure 7: DHCP ACK



The information offered by the server is configurable.

7. The client receives the **DHCPACK** message with configuration information. The process is complete. The client is configured and has access to the network.
 - If the client receives a **DHCPNAK** message (for example, if the client has moved to a new subnet), the client restarts the negotiation process.
 - The client can relinquish its lease on a network address by sending a **DHCPRELEASE** message to the server (for example, when the client is restarted). When the server receives the **DHCPRELEASE** message, it marks the lease as free and the IP address becomes available again.

Figure 8: DHCP Release



Network Address Assignments (Reusing a Previously Assigned Address)

To enable reuse of a previously allocated network address, the following events occur:

1. A client that previously had a lease broadcasts a **DHCPREQUEST** message on the local subnet.
2. The server with knowledge of the client's configuration responds with a **DHCPACK** message.
3. The client verifies the DHCP configuration information sent by the server and uses this information to reestablish the lease.

Static and Dynamic Bindings

DHCP supports both dynamic and static bindings. For dynamic bindings, IP addresses are assigned to clients from a pool of addresses. Static bindings provide configuration information for a specific client and can include one or more fixed IP addresses for the

client. You can configure a DHCP server to include both address pools and static bindings. For any individual client, static bindings take priority over address pools.

Compatibility with Autoinstallation

The DHCP server is compatible with the autoinstallation feature on J Series Services Routers. The server automatically checks autoinstallation settings for conflicts and gives autoinstallation settings priority over corresponding DHCP settings. For example, an IP address set by autoinstallation takes priority over an IP address set by the DHCP server.



NOTE: The autoinstallation feature includes a fixed address pool and a fixed lease time. With DHCP, you can create address pools and modify lease times.

Conflict Detection and Resolution

When a client receives an IP address from the DHCP server, the client performs a series of ARP tests to verify that the IP address is available and no conflicts exist. If the client detects an address conflict, the client notifies the DHCP server about the conflict and may request another IP address from the DHCP server.

The DHCP server keeps a log of all conflicts and removes addresses with conflicts from the pool. These addresses remain excluded until you manually clear the conflicts list with the **clear system services dhcp conflict** command.

Related Documentation

- [DHCP Statement Hierarchy and Inheritance on page 391](#)

DHCP Statement Hierarchy and Inheritance

DHCP configuration statements are organized hierarchically. Statements at the top of the hierarchy apply to the DHCP server and network, branches contain statements that apply to address pools in a subnetwork, and leaves contain statements that apply to static bindings for individual clients. See [Table 14 on page 392](#).

The **pool** and **static-binding** statements appear at the **[edit system services dhcp]** hierarchy level. You can include the remaining statements at the following hierarchy levels:

```
[edit system services dhcp]
[edit system services dhcp pool]
[edit system services dhcp static-binding]
```

Table 14: Pool and Binding Statements

Statement	Description	Hierarchy Level
<code>pool</code>	Configure a pool of IP addresses for DHCP clients on a subnet. When a client joins the network, the DHCP server dynamically allocates an IP address from this pool.	<code>[edit system services dhcp]</code>
<code>static-binding</code>	Set static bindings for DHCP clients. A static binding is a mapping between a fixed IP address and the client's MAC address.	

To minimize configuration changes, include common configuration statements shown in [Table 15 on page 393](#) (for example, the `domain-name` statement) at the highest applicable level of the hierarchy (network or subnetwork). Configuration statements at lower levels of the hierarchy override statements inherited from a higher level. For example, if a statement appears at both the `[edit system services dhcp]` and `[edit system services dhcp pool]` hierarchy levels, the value assigned to the statement at the `[edit system services dhcp pool]` level takes priority.

Table 15: Common Configuration Statements

Statement	Description	Hierarchy Level
<code>boot-file</code>	Set the boot filename advertised to clients. The client uses the boot image stored in the boot file to complete configuration.	[edit system services dhcp] [edit system services dhcp pool] [edit system services dhcp static-binding]
<code>boot-server</code>	Set the server that contains the boot file.	
<code>default-lease-time</code>	Set the default lease time assigned to any client that does not request a specific lease time.	
<code>domain-name</code>	Configure the name of the domain in which clients will search for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified.	
<code>domain-search</code>	Define a domain search list.	
<code>maximum-lease-time</code>	Set the maximum lease time allowed by the server.	
<code>name-server</code>	Specify the DNS server that maintains the database of client name to IP address mappings.	
<code>option</code>	Configure user-defined DHCP options.	
<code>router</code>	Specify IP address for routers on the client's subnetwork. Routers are listed in order of preference.	
<code>server-identifier</code>	Set the IP address of the DHCP server.	

Related Documentation • [DHCP Access Service Overview on page 388](#)

Configuring Address Pools for DHCP Dynamic Bindings

For dynamic bindings, set aside a pool of IP addresses that can be assigned to clients. Addresses in a pool must be available to clients on the same subnet.

To configure an address pool, include the following statements at the [edit system services dhcp] hierarchy level:

```
[edit system services dhcp]
```

```
pool address</prefix-length> {  
    address-range {  
        low address;  
        high address;  
    }  
    exclude-address {  
        address;  
    }  
}
```

The pool definition must include the client subnet number and prefix length (in bits). Optionally, the definition can include an address range and a list of excluded addresses.

The **address-range** statement defines the lowest and highest IP addresses in the pool that are available for dynamic address assignment. This statement is optional. If no range is specified, the pool will use all available addresses within the subnet specified. (Broadcast addresses, interface addresses, and excluded addresses are not available.)

The **exclude-address** statement specifies addresses within the range that are not used for dynamic address assignment. You can exclude one or more addresses within the range. This statement is optional.

The following is an example of a pool configuration.

```
[edit system services dhcp]  
pool 10.3.3.0/24 {  
    address-range low 10.3.3.2 high 10.3.3.254;  
    exclude-address {  
        10.3.3.33;  
    }  
}
```

For dynamic address assignment, configure an address pool for each client subnet the DHCP server supports. You can configure multiple address pools for a DHCP server, but only one address range per pool is supported.

DHCP maintains the state information for all pools configured. Clients are assigned addresses from pools with subnets that match the interface on which the **DHCPDISCOVER** packet is received. When more than one pool exists on the same interface, addresses are assigned on a rotating basis from all available pools.

- Related Documentation**
- [DHCP Access Service Overview on page 388](#)
 - [Configuring Manual \(Static\) DHCP Bindings Between a Fixed IP Address and a Client MAC Address on page 394](#)

Configuring Manual (Static) DHCP Bindings Between a Fixed IP Address and a Client MAC Address

Static bindings provide configuration information for specific clients. This information can include one or more fixed Internet addresses, the client hostname, and a client identifier.

To configure static bindings, include the following statements at the **[edit system services dhcp]** hierarchy level:

```
[edit system services dhcp]
static-binding mac-address {
  fixed-address {
    address;
  }
  host client-hostname;
  client-identifier (ascii client-id | hexadecimal client-id);
}
```

A static binding defines a mapping between a fixed IP address and the client's MAC address.

The *mac-address* variable specifies the MAC address of the client. This is a hardware address that uniquely identifies each client on the network.

The **fixed-address** statement specifies the fixed IP address assigned to the client. Typically a client has one address assigned, but you can assign more.

The **host** statement specifies the hostname of the client requesting the DHCP server. The name can include the local domain name. Otherwise, the name is resolved based on the **domain-name** statement.

The **client-identifier** statement is used by the DHCP server to index the database of address bindings. The client identifier is either an ASCII string or hexadecimal digits. It can include a type-value pair as specified in RFC 1700, *Assigned Numbers*. Either a client identifier or the client's MAC address must be configured to uniquely identify the client on the network.



NOTE: For each unique client-identifier *client-id* value, the DHCP server issues a unique lease and IP address from the pool. Previously, when the client provided an incorrect client-identifier *client-id* value, the DHCP server did not issue a lease.

The following is an example of a static binding configuration:

```
[edit system services dhcp]
static-binding 00:0d:56:f4:01:ab {
  fixed-address {
    10.5.5.5;
    10.6.6.6;
  }
  host-name "another-host.domain.tld";
  client-identifier hexadecimal 01001122aabbcc;
}
```

Related Documentation

- [DHCP Access Service Overview on page 388](#)
- [Specifying DHCP Lease Times for IP Address Assignments on page 396](#)

Specifying DHCP Lease Times for IP Address Assignments

For clients that do not request a specific lease time, the default lease time is one day. You can configure a maximum lease time for IP address assignments or change the default lease time.

To configure lease times, include the **maximum-lease-time** and **default-lease-time** statements:

```
maximum-lease-time;  
default-lease-time;
```

You can include these statements at the following hierarchy levels:

```
[edit system services dhcp]  
[edit system services dhcp pool]  
[edit system services dhcp static-binding]
```

Lease times defined for static bindings and address pools take priority over lease times defined at the **[edit system services dhcp]** hierarchy level.

The **maximum-lease-time** statement configures the maximum length of time in seconds for which a client can request and hold a lease. If a client requests a lease longer than the maximum specified, the lease is granted only for the maximum time configured on the server. After a lease expires, the client must request a new lease.



NOTE: Maximum lease times do not apply to dynamic BOOTP leases. These leases are not specified by the client and can exceed the maximum lease time configured.

The following example shows a configuration for maximum and default lease times:

```
[edit system services dhcp]  
maximum-lease-time 7200;  
default-lease-time 3600;
```

Related Documentation

- [DHCP Access Service Overview on page 388](#)
- [Configuring a DHCP Boot File and DHCP Boot Server on page 396](#)

Configuring a DHCP Boot File and DHCP Boot Server

When a DHCP client starts, it contacts a boot server to download the boot file.

To configure a boot file and boot server, include the **boot-file** and **boot-server** statements:

```
boot-file filename;  
boot-server (address | hostname);
```

You can include these statements at the following hierarchy levels:

```
[edit system services dhcp]
```

```
[edit system services dhcp pool]
[edit system services dhcp static-binding]
```

After a client receives a **DHCPOFFER** response from a DHCP server, the client can communicate directly with the boot server (instead of the DHCP server) to download the boot file. This minimizes network traffic and enables you to specify separate boot server/file pairs for each client pool or subnetwork.

The **boot-file** statement configures the name and location of the initial boot file that the DHCP client loads and executes. This file stores the boot image for the client. In most cases, the boot image is the operating system the client uses to load.

The **boot-server** statement configures the IP address of the TFTP server that contains the client's initial boot file. You must configure an IP address or a hostname for the server.

You must configure at least one boot file and boot server. Optionally, you can configure multiple boot files and boot servers. For example, you might configure two separate boot servers and files: one for static binding and one for address pools. Boot file configurations for pools or static bindings take precedence over boot file configurations at the **[edit system services dhcp]** hierarchy level.

The following example specifies a boot file and server for an address pool:

```
[edit system services dhcp]
pool 10.4.4.0/24 {
  boot-file "boot.client";
  boot-server 10.4.4.1;
}
```

Related Documentation

- [DHCP Access Service Overview on page 388](#)
- [Configuring a Static IP Address as DHCP Server Identifier on page 397](#)

Configuring a Static IP Address as DHCP Server Identifier

The host running the DHCP server must itself use a manually assigned, static IP address. It cannot send a request and receive an IP address from itself or another DHCP server.

To configure a DHCP server identifier, include the **server-identifier** statement:

```
server-identifier address;
```

You can include this statement at the following hierarchy levels:

```
[edit system services dhcp]
[edit system services dhcp pool]
[edit system services dhcp static-binding]
```

The **server-identifier** statement specifies the IP address of the DHCP server. The host must be a TFTP server that is accessible by all clients served within a range of IP addresses (based on either an address pool or static binding).

The following example shows a DHCP server identifier configured for an address pool:

```
[edit system services dhcp]
```

```
pool 10.3.3.0/24 {  
    address-range low 10.3.3.2 high 10.3.3.254;  
    exclude-address {  
        10.3.3.33;  
    }  
    router {  
        10.3.3.1;  
    }  
    server-identifier 10.3.3.1;  
}
```

Related Documentation • [DHCP Access Service Overview on page 388](#)

Configuring a Domain Name and Domain Search List for a DHCP Server Host

To configure the name of the domain in which clients search for a DHCP server host, include the **domain-name** statement:

```
domain-name domain;
```

You can include this statement at the following hierarchy levels:

```
[edit system services dhcp]  
[edit system services dhcp pool]  
[edit system services dhcp static-binding]
```

The **domain-name** statement sets the domain name that is appended to hostnames that are not fully qualified. This statement is optional. If you do not configure a domain name, the default is the client's current domain.

To configure a domain search list, include the **domain-search** statement:

```
domain-search [ domain-list ];
```

You can include this statement at the following hierarchy levels:

```
[edit system services dhcp]  
[edit system services dhcp pool]  
[edit system services dhcp static-binding]
```

The **domain-search** statement sets the order in which clients append domain names when searching for the IP address of a host. You can include one or more domain names in the list. For more information, see RFC 3397, *Dynamic Host Configuration Protocol (DHCP) Domain Search Option*.

The **domain-search** statement is optional, if you do not configure a domain search list, the default is the client's current domain.

Related Documentation • [DHCP Access Service Overview on page 388](#)

Configuring Routers Available to the DHCP Client

After a DHCP client loads the boot image and has booted, the client sends packets to a router.

To configure routers available to the DHCP client, include the **router** statement:

```
router {
  address;
}
```

You can include this statement at the following hierarchy levels:

```
[edit system services dhcp]
[edit system services dhcp pool]
[edit system services dhcp static-binding]
```

The **router** statement specifies a list of IP addresses for routers on the client's subnet. List routers in order of preference. You must configure at least one router for each client subnet.

The following example shows routers configured at the **[edit system services dhcp]** hierarchy level:

```
[edit system services dhcp]
router {
  10.6.6.1;
  10.7.7.1;
}
```

Related Documentation

- [DHCP Access Service Overview on page 388](#)

Creating User-Defined DHCP Options Not Included in the Default Junos Implementation of the DHCP Server

You can configure one or more user-defined options that are not included in the Junos default implementation of the DHCP server. For example, if a client requests a DHCP option that is not included in the DHCP server, you can create a user-defined option that enables the server to respond to the client's request.

To configure a user-defined DHCP option, include the **option** statement:

```
option {
  [ (id-number option-type option-value) | (id-number array option-type option-value) ];
}
```

The **option** statement specifies the following values:

- *id-number*—Any whole number. The ID number is used to index the option and must be unique across a DHCP server.
- *option-type*—Any of the following types: **byte**, **byte-stream**, **flag**, **integer**, **ip-address**, **short**, **string**, **unsigned-integer**, **unsigned-short**.
- *array*—An option can include an array of values.
- *option-value*—Value associated with an option. The option value must be compatible with the option type (for example, an **On** or **Off** value for a **flag** type).

You can include this statement at the following hierarchy levels:

```
[edit system services dhcp]
[edit system services dhcp pool]
[edit system services dhcp static-binding]
```

The following example shows user-defined DHCP options:

```
[edit system services dhcp]
option 19 flag off; # 19: "IP Forwarding" option
option 40 string "domain.tld"; # 40: "NIS Domain" option
option 16 ip-address 10.3.3.33; # 16: "Swap Server" option
```

User-defined options that conflict with DHCP configuration statements are ignored by the server. For example, in the following configuration, the DHCP server ignores the user-defined **option 3 router** statement and uses the **router** statement instead:

```
[edit system services dhcp]
option 3 router 10.7.7.2; # 3: "Default Router" option
router {
  10.7.7.1;
}
```

Related Documentation

- [DHCP Access Service Overview on page 388](#)

Example: Complete DHCP Server Configuration

This topic shows a complete DHCP server configuration with address pools, static bindings, and user-defined options.

The following example shows statements at the **[edit interfaces]** hierarchy level. The interface's primary address (10.3.3.1/24) has a corresponding address pool (10.3.3.0/24) defined at the **[edit system services]** hierarchy level.

```
[edit interfaces]
fe-0/0/1 {
  unit 0 {
    family inet {
      address 10.3.3.1/24;
    }
  }
}
```



NOTE: You can configure a DHCP server only on an interface's primary IP address. The primary address on an interface is the address that is used by default as the local address for broadcast and multicast packets sourced locally and sent out the interface.

Statements at the **[edit system services]** hierarchy level include the following:

```
[edit system services]
dhcp {
  domain-name "domain.tld";
  maximum-lease-time 7200;
  default-lease-time 3600;
  name-server {
    10.6.6.6;
    10.6.6.7;
  }
  domain-search [ subnet1.domain.tld subnet2.domain.tld ];
  wins-server {
    10.7.7.7;
    10.7.7.9;
  }
  router {
    10.6.6.1;
    10.7.7.1;
  }
  option 19 flag off; # 19: "IP Forwarding" option
  option 40 string "domain.tld"; # 40: "NIS Domain" option
  option 16 ip-address 10.3.3.33; # 16: "Swap Server" option
  pool 10.3.3.0/24 {
    address-range low 10.3.3.2 high 10.3.3.254;
    exclude-address {
      10.3.3.33;
    }
    router {
      10.3.3.1;
    }
    server-identifier 10.3.3.1;
  }
  pool 10.4.4.0/24 {
    boot-file "boot.client";
    boot-server 10.4.4.1;
  }
  static-binding 00:0d:56:f4:20:01 {
    fixed-address 10.4.4.4;
    host-name "host.domain.tld";
  }
  static-binding 00:0d:56:f4:01:ab {
    fixed-address {
      10.5.5.5;
      10.6.6.6;
    }
    host-name "another-host.domain.tld";
    client-identifier "01aa.001a.bc65.3e";
  }
}
```

```
}  
}
```

Example: Viewing DHCP Bindings

Use the CLI command **show system services dhcp binding** to view information about DHCP address bindings, lease times, and address conflicts.

The following example shows the binding type and lease expiration times for IP addresses configured on a router that supports a DHCP server:

```
user@host> show system services dhcp binding  
IP Address      Hardware Address  Type    Lease expires at  
192.168.1.2     00:a0:12:00:12:ab static        never  
192.168.1.3     00:a0:12:00:13:02 dynamic    2004-05-03 13:01:42 PDT
```

Enter an IP address to show binding for a specific IP address:

```
user@host> show system services dhcp binding 192.168.1.3  
DHCP binding information:  
IP address      192.168.1.3  
Hardware address 00:a0:12:00:12:ab  
Client identifier  
61 63 65 64 2d 30 30 3a 61 30 3a 31 32 3a 30 30 aced-00:a0:12:00  
3a 31 33 3a 30 32  
Lease information:  
Type            dynamic  
Obtained at      2004-05-02 13:01:42 PDT  
Expires at       2004-05-03 13:01:42 PDT
```

Use the **detail** option to show detailed binding information:

```
user@host> show system services dhcp binding detail  
DHCP binding information:  
IP address      192.168.1.3  
Hardware address 00:a0:12:00:12:ab  
Pool            192.168.1.0/24  
Interface       fe-0/0/0, relayed by 192.168.4.254  
Lease information:  
Type            dynamic  
Obtained at      2004-05-02 13:01:42 PDT  
Expires at       2004-05-03 13:01:42 PDT  
DHCP options:  
name-server foo.mydomain.tld  
domain-name mydomain.tld  
option 19 flag off
```

Example: Viewing DHCP Address Pools

Use the CLI **show system services dhcp pool** command to view information about DHCP address pools.

The following example show address pools configured on a DHCP server:

```
user@ host> show system services dhcp pool  
Pool name      Low address      High address      Excluded addresses  
10.40.1.0/24   10.40.1.1        10.40.1.254      10.40.1.254
```

Example: Viewing and Clearing DHCP Conflicts

When the DHCP server provides an IP address, the client performs an ARP check to make sure the address is not being used by another client and reports any conflicts back to the server. The server keeps track of addresses with conflicts and removes them from the address pool. Use the CLI command **show system services dhcp conflict** to show conflicts.

```
user@host> show system services dhcp conflict
Detection time      Detection method      Address
2004-08-03 19:04:00 PDT    client      192.168.1.5
2004-08-04 04:23:12 PDT    ping        192.168.1.8
```

Use the **clear system services dhcp conflicts** command to clear the conflicts list and return IP addresses to the pool. The following command shows how to clear an address on the server that has a conflict:

```
user@host> clear system services dhcp conflict 192.168.1.5
```

For more information about CLI commands you can use with the DHCP server, see the [CLI Explorer](#).

Configuring Tracing Operations for DHCP Processes

DHCP tracing operations track all DHCP operations and record them to a log file. By default, no DHCP processes are traced. If you include the **traceoptions** statement at the **[edit system services dhcp]** hierarchy level, the default tracing behavior is the following:

- Important events are logged in a file called **dhcpcd** located in the **/var/log** directory.
- When the file **dhcpcd** reaches 128 kilobytes (KB), it is renamed **dhcpcd.0**, then **dhcpcd.1**, and so on, until there are three trace files. Then the oldest trace file (**dhcpcd.2** is overwritten). For more information about how log files are created, see the [System Log Explorer](#).
- Log files can be accessed only by the user who configures the tracing operation.

You cannot change the directory in which trace files are located. However, you can customize the other trace file settings by including the following statements at the **[edit system services dhcp traceoptions]** hierarchy level:

```
[edit system services dhcp traceoptions]
file filename <files number> <match regex> <size size> <world-readable |
  no-world-readable>;
flag {
  all;
}
```

Tasks for configuring DHCP tracing operations are:

1. [Configuring the DHCP Processes Log Filename on page 404](#)
2. [Configuring the Number and Size of DHCP Processes Log Files on page 404](#)
3. [Configuring Access to the DHCP Log File on page 404](#)

4. [Configuring a Regular Expression for Refining the Output of DHCP Logged Events on page 404](#)
5. [Configuring DHCP Trace Operation Events on page 405](#)

Configuring the DHCP Processes Log Filename

By default, the name of the file that records trace output is **dhcpcd**. You can specify a different name by including the file statement at the **[edit system services dhcp traceoptions]** hierarchy level:

```
[edit system services dhcp traceoptions]
file filename;
```

Configuring the Number and Size of DHCP Processes Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed **filename.0**, then **filename.1**, and so on, until there are three trace files. Then the oldest trace file (**filename.2**) is overwritten.

You can configure the limits on the number and size of trace files by including the following statements at the **[edit system services dhcp traceoptions]** hierarchy level:

```
[edit system services dhcp traceoptions]
file files number size size;
```

For example, set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracking operation (**filename**) reaches 2 MB, **filename** is renamed **filename.0**, and a new file called **filename** is created. When the new **filename** reaches 2 MB, **filename.0** is renamed **filename.1** and **filename** is renamed **filename.0**. This process repeats until there are 20 trace files. Then the oldest file (**filename.19**) is overwritten by the newest file (**filename.0**).

The number of files can be from 2 through 1000 files. The file size of each file can be from 10KB through 1 gigabyte (GB).

Configuring Access to the DHCP Log File

By default, log files can be accessed only by the user who configures the tracing operation.

To specify that any user can read all log files, include the **file world-readable** statement at the **[edit system services dhcp traceoptions]** hierarchy level:

```
[edit system services dhcp traceoptions]
file world-readable;
```

To set the default behavior explicitly, include the **file no-world-readable** statement at the **[edit system services dhcp traceoptions]** hierarchy level:

```
[edit system services dhcp traceoptions]
file no-world-readable;
```

Configuring a Regular Expression for Refining the Output of DHCP Logged Events

By default, the trace operations output includes all lines relevant to the logged events.

You can refine the output by including the match statement at the **[edit system services dhcp traceoptions file *filename*]** hierarchy level and specifying a regular expression (regex) to be matched:

```
[edit system services dhcp traceoptions]
file filename match regex;
```

Configuring DHCP Trace Operation Events

By default, only important events are logged. You can configure the trace operations to be logged by including the following options at the **[edit system services dhcp traceoptions]** hierarchy level:

```
[edit dhcp system services dhcp traceoptions]
flag {
  all;
  binding;
  config;
  conflict;
  event;
  ifdb;
  io;
  lease;
  main;
  misc;
  packet;
  options;
  pool;
  protocol;
  rtsock;
  scope;
  signal;
  trace;
  ui;
}
```

DHCP Processes Tracing Flags

Table 16 on page 405 describes which operation or event is recorded by each DHCP tracing flag. By default, all flags are disabled.

Table 16: DHCP Processes Tracing Flags

Flag	Operation or Event
all	All operations.
binding	Binding operations.
config	Logins to the configuration database.
conflict	Client-detected conflicts for IP addresses.
event	Important events.

Table 16: DHCP Processes Tracing Flags (*continued*)

Flag	Operation or Event
ifdb	Interface database operations.
io	I/O operations.
lease	Lease operations.
main	Main loop operations.
misc	Miscellaneous operations.
packet	DHCP packets.
options	DHCP options.
pool	Address pool operations.
protocol	Protocol operations.
rtsock	Routing socket operations.
scope	Scope operations.
signal	DHCP signal operations.
trace	Tracing operations.
ui	User interface operations.

Configuring the Router as an Extended DHCP Local Server

You can enable the router to function as an extended DHCP local server and configure the extended DHCP local server options on the router. The extended DHCP local server provides an IP address and other configuration information in response to a client request.

The extended DHCP local server enhances traditional DHCP server operation in which the client address pool and client configuration information reside on the DHCP server. With the extended DHCP local server, the client address and configuration information reside in centralized address-assignment pools, which are managed independently of the DHCP local server and which can be shared by different client applications.

The extended DHCP local server also supports advanced pool matching and the use of named address ranges. You can also configure the local server to use DHCP option 82 information in the client PDU to determine which named address range to use for a particular client. The client configuration information, which is configured in the address-assignment pool, includes user-defined options, such as boot server, grace period, and lease time.

Configuring the DHCP environment that includes the extended DHCP local server requires two independent configuration operations, which you can complete in any order. In one operation, you configure the extended DHCP local server on the router and specify how the DHCP local server determines which address-assignment pool to use. In the other operation, you configure the address-assignment pools used by the DHCP local server. The address-assignment pools contain the IP addresses, named address ranges, and configuration information for DHCP clients. See *Configuring Address-Assignment Pools* for details about creating and using address-assignment pools.



NOTE: The extended DHCP local server and the address-assignment pools used by the server must be configured in the same logical system and routing instance.

You cannot configure the extended DHCP local server and extended DHCP relay on the same interface.

To configure the extended DHCP local server on the router, include the **dhcp-local-server** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
dhcp-local-server {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
```

```

    option-82 <circuit-id> <remote-id>;
    routing-instance-name;
    user-prefix user-prefix-string;
  }
}
group group-name {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 <circuit-id> <remote-id>;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  interface interface-name <upto upto-interface-name> <exclude>;
}
pool-match-order {
  ip-address-first;
  option-82;
}
}

```

You can also include these statements at the following hierarchy levels:

- [edit logical-systems *logical-system-name* system services]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services]
- [edit routing-instances *routing-instance-name* system services]

In addition, you can configure tracing for DHCP local server operations by including the **traceoptions** statement at the [edit system processes dhcp-service] hierarchy level:

```

[edit system processes]
traceoptions {
  file filename <files number> <match regular-expression> <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag;
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}

```

Related Documentation

- [Example: Configuring the Minimum Extended DHCP Local Server Configuration on page 417](#)
- [Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 417](#)

Interaction Among the DHCP Client, Extended DHCP Local Server, and Address-Assignment Pools

In a typical carrier edge network configuration, the DHCP client is on the subscriber's computer, and the DHCP local server is configured on the router. The following steps provide a high-level description of the interaction among the DHCP local server, DHCP client, and address-assignment pools:

1. The DHCP client sends a discover packet to one or more DHCP local servers in the network to obtain configuration parameters and an IP address for the subscriber.
2. Each DHCP local server that receives the discover packet then searches its address-assignment pool for the client address and configuration options. Each local server creates an entry in its internal client table to keep track of the client state, then sends a DHCP offer packet to the client.
3. On receipt of the offer packet, the DHCP client selects the DHCP local server from which to obtain configuration information and sends a request packet indicating the DHCP local server that will grant the address and configuration information.
4. The selected DHCP local server sends an acknowledgement packet to the client that contains the client address lease and configuration parameters. The server also installs the host route and ARP entry, and then monitors the lease state.

Extended DHCP Local Server and Address-Assignment Pools

The extended DHCP local server enhances traditional DHCP server operation in which the client address pool and client configuration information reside on the DHCP server. With the extended DHCP local server, the client address and configuration information reside in centralized address-assignment pools, which are managed independently of the DHCP local server and which can be shared by different client applications.

The extended DHCP local server also supports advanced pool matching and the use of named address ranges. You can also configure the local server to use DHCP option 82 information in the client PDU to determine which named address range to use for a particular client. The client configuration information, which is configured in the address-assignment pool, includes user-defined options, such as boot server, grace period, and lease time.

Configuring the DHCP environment that includes the extended DHCP local server requires two independent configuration operations, which you can complete in any order. In one operation, you configure the extended DHCP local server on the router and specify how the DHCP local server determines which address-assignment pool to use. In the other operation, you configure the address-assignment pools used by the DHCP local server. The address-assignment pools contain the IP addresses, named address ranges, and configuration information for DHCP clients. See *Configuring Address-Assignment Pools* for details about creating and using address-assignment pools.



NOTE: The extended DHCP local server and the address-assignment pools used by the server must be configured in the same logical system and routing instance.

Methods Used by the Extended DHCP Local Server to Determine Which Address-Assignment Pool to Use

You can specify the method that the extended DHCP local server uses to determine which address-assignment pool provides the IP address and configuration for a DHCP client. By default, the server matches the IP address in the client DHCP request to the address of the address-assignment pool.

The following sections describe the methods used by the DHCP local server to determine which address-assignment pool to use:

- [Matching the Client IP Address to the Address-Assignment Pool on page 410](#)
- [Matching Option 82 Information to Named Address Ranges on page 410](#)

Matching the Client IP Address to the Address-Assignment Pool

In the default configuration, the server selects the address-assignment pool to use by matching the IP address in the client DHCP request with the network address of the address-assignment pool. If the client request contains the gateway IP address (giaddr), the local server matches the giaddr to the address-assignment pool's address. If there is no giaddr in the request, the DHCP local server matches the IP address of the receiving interface to the address of the address-assignment pool.

Matching Option 82 Information to Named Address Ranges

You can also configure the extended DHCP local server to match the DHCP relay agent information option (option 82) in the client DHCP packets to a named range in the address-assignment pool used for the client. Named ranges are subsets within the overall address-assignment pool address range, and are configured when you create the address-assignment pool. To use the DHCP local server option 82 matching feature, you must ensure that the **option-82** statement is included in the **dhcp-attributes** statement for the address-assignment pool.



NOTE: To enable the option 82 matching method, you must first specify the **ip-address-first** statement in the **pool-match-order** statement, and then specify the **option-82** statement.

Default Options Provided by the Extended DHCP Server for the DHCP Client

The extended DHCP local server provides a minimal configuration to the DHCP client if the client does not have DHCP option 55 configured. The server provides the subnet mask of the address-assignment pool that is selected for the client. In addition to the subnet mask, the server provides the following values to the client if the information is configured in the selected address-assignment pool:

- **router**—A router located on the client's subnet. This statement is the equivalent of DHCP option 3.
- **domain name**—The name of the domain in which the client searches for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified. This is equivalent to DHCP option 15.
- **domain name server**—A Domain Name System (DNS) name server that is available to the client to resolve hostname-to-client mappings. This is equivalent to DHCP option 6.

Using External AAA Authentication Services to Authenticate DHCP Clients

Both the extended DHCP local server and the extended DHCP relay agent support the use of external AAA authentication services, such as RADIUS, to authenticate DHCP clients. When the extended DHCP local server or relay agent receives a discover PDU from a client, the extended DHCP application contacts the AAA server to authenticate the DHCP client. The extended DHCP application can obtain client addresses and DHCP configuration options from the external AAA authentication server.



NOTE: This topic uses the term extended DHCP application to refer to both the extended DHCP local server and the extended DHCP relay agent.

The external authentication feature also supports AAA directed logout. If the external AAA service supports a user logout directive, the extended DHCP application honors the logout and views it as if it was requested by a CLI management command. All of the client state information and allocated resources are deleted at logout. The extended DHCP application supports directed logout using the list of configured authentication servers you specify with the **authentication-server** statement at the **[edit access profile profile-name]** hierarchy level.

Tasks for configuring External AAA authentication services are:

1. [Configuring Authentication Support for an Extended DHCP Application on page 412](#)
2. [Grouping Interfaces with Common DHCP Configurations on page 413](#)
3. [Configuring Passwords for Usernames the DHCP Application Presents to the External AAA Authentication Service on page 414](#)
4. [Creating Unique Usernames the Extended DHCP Application Passes to the External AAA Authentication Service on page 414](#)

Configuring Authentication Support for an Extended DHCP Application

To configure authentication support for an extended DHCP application, include the **authentication** statement at these hierarchy levels. You can configure either global authentication support or group-specific support.

You must configure the **username-include** statement to enable the use of authentication. The **password** statement is not required and does not cause DHCP to use authentication if the **username-include** statement is not included.

Extended DHCP local server hierarchies:

- [edit system services dhcp-local-server]
- [edit system services dhcp-local-server group *group-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*]
- [edit logical-systems *logical-system-name* system services dhcp-local-server]
- [edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*]
- [edit routing-instances *routing-instance-name* system services dhcp-local-server]
- [edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name*]

Extended DHCP relay agent hierarchies:

- [edit forwarding-options dhcp-relay]
- [edit forwarding-options dhcp-relay group *group-name*]
- [edit logical-systems *logical-system-name* forwarding-options dhcp-relay]
- [edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

- [edit routing-instances *routing-instance-name* forwarding-options dhcp-relay]
- [edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name*]

```
authentication {
  password password-string;
  username-include {
    circuit-type;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 <circuit-id> <remote-id>;
    routing-instance-name;
    user-prefix user-prefix-string;
  }
}
```

Grouping Interfaces with Common DHCP Configurations

The extended DHCP applications enable you to group together a set of interfaces and apply a common DHCP configuration to the named interface group.

To configure an interface group, use the **group** statement.

```
group group-name {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 <circuit-id> <remote-id>;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  interface interface-name <upto upto-interface-name> <exclude>;
}
```

You can specify the names of one or more interfaces on which the extended DHCP application is enabled. You can repeat the **interface** *interface-name* statement to specify multiple interfaces within a group, but you cannot specify the same interface in more than one group. For example:

```
group boston {
  interface 192.168.10.1;
  interface 192.168.15.5;
}
```

You can use the *upto* option to specify a range of interfaces on which the extended DHCP application is enabled. For example:

```
group quebec {  
  interface 192.168.10.1 upto 192.168.10.255;  
}
```

You can use the **exclude** option to exclude a specific interface or a specified range of interfaces from the group. For example:

```
group paris {  
  interface 192.168.100.1 exclude;  
  interface 192.168.100.100 upto 192.168.100.125 exclude;  
}
```

Configuring Passwords for Usernames the DHCP Application Presents to the External AAA Authentication Service

You can configure an optional password that the extended DHCP application presents to the external AAA authentication service to authenticate the specified username.

To configure a password that authenticates the username, use the **password** statement. See [“Special Requirements for Junos OS Plain-Text Passwords” on page 345](#) for information about supported characters in passwords. For example:

```
authentication {  
  password myPassword1234;  
}
```

Creating Unique Usernames the Extended DHCP Application Passes to the External AAA Authentication Service

You can configure the extended DHCP application to include additional fields in the username passed to the external AAA authentication service when the DHCP client logs in. This additional information enables you to construct usernames that uniquely identify subscribers.



NOTE: No authentication is performed if you do not include a username in the authentication configuration; however, the IP address is provided by the local pool if it is configured.

To configure unique usernames, use the **username-include** statement. You can include any or all of the additional statements.

```
authentication {  
  username-include {  
    circuit-type;  
    delimiter delimiter-character;  
    domain-name domain-name-string;  
    logical-system-name;  
    mac-address;  
    option-60;  
    option-82 <circuit-id> <remote-id>;
```

```

    routing-instance-name;
    user-prefix user-prefix-string;
}

```

The following list describes the attributes that can be included as part of the username:

- **circuit-type**—The circuit type used by the DHCP client, for example **enet**.
- **delimiter**—The delimiter character that separates components that make up the concatenated username. The semicolon (;) is not supported as a delimiter character.
- **domain-name**—The client domain name as string. The router adds the @ delimiter to the username.
- **logical-system-name**—The name of the logical system, if the receiving interface is in a logical system.
- **mac-address**—The client MAC address, in a string of format **xxxx.xxxx.xxxx**.
- **option-60**—The portion of the option 60 payload that follows the length field.
- **option-82 <circuit-id> <remote-id>**—The specified contents of the option 82 payload.
 - **circuit-id**—The payload of the agent circuit ID suboption.
 - **remote-id**—The payload of the Agent Remote ID suboption.
 - Both **circuit-id** and **remote-id**—The payloads of both suboptions, in the format: **circuit-id[delimiter]remote-id**.
 - Neither **circuit-id** or **remote-id**—The raw payload of the option 82 from the PDU is concatenated to the username.
- **routing-instance-name**—The name of the routing instance, if the receiving interface is in a routing instance.
- **user-prefix**—A string indicating the user prefix.

The router creates the unique username by including the specified additional information in the following order, with the fields separated by a delimiter. The default delimiter is a period (.). You can specify a different delimiter; however, the semicolon character (;) is not allowed.

```

user-prefix[delimiter]mac-address[delimiter]logical-system-name[delimiter]
routing-instance-name[delimiter]circuit-type[delimiter]option-82[delimiter]
option-60@domain-name

```

The following example shows a sample configuration that creates a unique username. The username is shown after the configuration.

```

authentication {
  username-include {
    circuit-type;
    domain-name isp55.com;
    mac-address;
    user-prefix wallybrown;
  }
}

```

The resulting unique username is:

wallybrown.0090.1a01.1234.enet@isp55.com

Client Configuration Information Exchanged Between the External Authentication Server, DHCP Application, and DHCP Client

When the extended DHCP application receives a response from an external authentication server, the response might include information in addition to the IP address and subnet mask. The extended DHCP application uses the information from the authentication grant for the response the DHCP application sends to the DHCP client. The DHCP application can either send the information in its original form or the application might merge the information with local configuration specifications. For example, if the authentication grant includes an address pool name and a local configuration specifies DHCP attributes for that pool, the extended DHCP application merges the authentication results and the attributes in the reply that the server sends to the client.

A local configuration is optional—a client can be fully configured by the external authentication service. However, if the external authentication service does not provide client configuration, you must configure the local address assignment pool to provide the configuration for the client. When a local configuration specifies options, the extended DHCP application adds the local configuration options to the offer PDU the server sends to the client. If the two sets of options overlap, the options in the authentication response from the external service take precedence.

When you use RADIUS to provide the authentication, the additional information might be in the form of RADIUS attributes and Juniper Networks VSAs. The following list shows the information that RADIUS might include in the authentication grant. See *RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework* for a complete list of RADIUS attributes and Juniper Networks VSAs that the extended DHCP applications supports for subscriber access management.

- Client IP address—RADIUS attribute 8, Framed-IP-Address
- Subnet mask for client IP address (DHCP option 1)—RADIUS attribute 9, Framed-IP-Netmask
- Primary domain server (DHCP option 6)—VSA 26-4, Primary-DNS
- Secondary domain server (DHCP option 6)—VSA 26-5 Secondary-DNS
- Primary WINS server (DHCP option 44)—VSA 26-6, Primary-WINS
- Secondary WINS server (DHCP option 44)—VSA 26-7, Secondary-WINS
- Address assignment pool name—RADIUS attribute 88, Framed-Pool
- Lease time—RADIUS attribute 27, Session-Timeout
- DHCP relay server—VSA 26-109, DHCP-Guided-Relay-Server

Example: Configuring the Minimum Extended DHCP Local Server Configuration

The following example shows the minimum configuration you need to use the extended DHCP local server on the router:

This example creates the server group named **group_one**, and specifies that the DHCP local server is enabled on interface **fe-0/0/2.0** within the group. The DHCP local server uses the default pool match configuration of **ip-address-first**.

```
[edit system services]
dhcp-local-server {
  group group_one {
    interface fe-0/0/2.0;
  }
}
```

Example: Extended DHCP Local Server Configuration with Optional Pool Matching

The following example shows an extended DHCP local server configuration that includes optional pool matching and interface groups. This configuration specifies that the DHCP local server uses option 82 information to match the named address range for client IP address assignment. The option 82 matching must also be included in the address-assignment pool configuration.

```
[edit system services]
dhcp-local-server {
  group group_one {
    interface fe-0/0/2.0;
    interface fe-0/0/2.1;
  }
  group group_two {
    interface fe-0/0/3.0;
    interface fe-0/0/3.1;
  }
  pool-match-order {
    ip-address-first;
    option-82;
  }
}
```

Verifying and Managing the DHCP Server Configuration

To display the client address bindings for the extended DHCP local server, use the following operational commands:

- **show dhcp server binding**
- **show dhcp server statistics**

To clear client address bindings and DHCP local server statistics, use the following operational commands:

- **clear dhcp server binding**

- **clear dhcp server statistics**

For information about using these operations commands, see the *Junos System Basics and Services Reference*.

Tracing Extended DHCP Local Server Operations

The extended DHCP tracing operations track the extended DHCP local server operations and record them in a log file. By default, no extended DHCP local server processes are traced. If you include the **traceoptions** statement at the **[edit system processes dhcp-service]** hierarchy level, the default tracing behavior is the following:

- Important extended DHCP local server events are logged in a file called **jdhcpd** located in the **/var/log** directory.
- When the file **jdhcpd** reaches 128 kilobytes (KB), it is renamed **jdhcpd.0**, then **jdhcpd.1**, and so on, until there are three trace files. Then the oldest trace file (**jdhcpd.2**) is overwritten. For more information about how log files are created, see the *Junos System Log Messages Reference*.
- Log files can be accessed only by the user who configures the tracing operation.



NOTE: In software releases earlier than Junos OS 11.4, you configured tracing statements at the **[edit system services dhcp-local-server]** and **[edit forwarding-options dhcp-relay]** hierarchy levels. Starting in Junos OS Release 11.4, these statements have been deprecated and hidden in favor of a new statement at the **[edit system processes dhcp-service]** hierarchy level. The deprecated statements may be removed from a future release; we recommend that you transition to the new statement.

To trace DHCP local server operations, include the **traceoptions** statement at the **[edit system processes dhcp-service]** hierarchy level:

```
traceoptions {  
  file filename <files number> <match regular-expression > <size maximum-file-size>  
    <world-readable | no-world-readable>;  
  flag flag;  
  level (all | error | info | notice | verbose | warning);  
  no-remote-trace;  
}
```

The following topics describe the tracing operation configuration statements:

1. [Configuring the Filename of the Extended DHCP Local Server Processes Log on page 419](#)
2. [Configuring the Number and Size of Extended DHCP Local Server Processes Log Files on page 419](#)
3. [Configuring Access to the Log File on page 419](#)
4. [Configuring a Regular Expression for Lines to Be Logged on page 419](#)
5. [Configuring Trace Option Flags on page 420](#)

Configuring the Filename of the Extended DHCP Local Server Processes Log

By default, the name of the file that records trace output is **jdhcpd**. You can specify a different name by including the **file** statement at the **[edit system processes dhcp-service traceoptions]** hierarchy level:

```
[edit system processes dhcp-service traceoptions]
file filename;
```

Configuring the Number and Size of Extended DHCP Local Server Processes Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed **jdhcpd.0**, then **jdhcpd.1**, and so on, until there are three trace files. Then the oldest trace file (**jdhcpd.2**) is overwritten.

You can configure the limits on the number and size of trace files by including the following statements at the **[edit system processes dhcp-service traceoptions]** hierarchy level:

```
[edit system processes dhcp-service traceoptions]
file filename files number size size;
```

For example, set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracking operation (**jdhcpd**) reaches 2 MB, **jdhcpd** is renamed **jdhcpd.0**, and a new file called **jdhcpd** is created. When the new **jdhcpd** reaches 2 MB, **jdhcpd.0** is renamed **jdhcpd.1** and **filename** is renamed **jdhcpd.0**. This process repeats until there are 20 trace files. Then the oldest file (**jdhcpd.19**) is overwritten by the newest file (**jdhcpd.0**).

The number of files can be from 2 through 1000 files. The file size of each file can be from 10KB through 1 gigabyte (GB).

Configuring Access to the Log File

By default, log files can be accessed only by the user who configures the tracing operation.

To specify that any user can read all log files, include the **file world-readable** statement at the **[edit system processes dhcp-service traceoptions]** hierarchy level:

```
[edit system processes dhcp-service traceoptions]
file filename world-readable;
```

To set the default behavior explicitly, include the **file no-world-readable** statement at the **[edit system processes dhcp-service traceoptions]** hierarchy level:

```
[edit system processes dhcp-service traceoptions]
file filename no-world-readable;
```

Configuring a Regular Expression for Lines to Be Logged

By default, the trace operations output includes all lines relevant to the logged events.

You can refine the output by including the **match** statement at the **[edit system processes dhcp-service traceoptions]** hierarchy level and specifying a regular expression (regex) to be matched:

```
[edit system processes dhcp-service traceoptions]  
file filename match regex;
```

Configuring Trace Option Flags

By default, only important events are logged. You can configure the trace operations to be logged by including extended DHCP local server tracing flags at the **[edit system processes dhcp-service traceoptions]** hierarchy level:

```
[edit system processes dhcp-service traceoptions]  
flag flag;
```

You can configure the following tracing flags:

- **all**—Trace all operations.
- **auth**—Trace authentication operations.
- **database**—Trace database events.
- **fwd**—Trace firewall process events.
- **general**—Trace miscellaneous events.
- **ha**—Trace high availability-related events.
- **interface**—Trace interface operations.
- **io**—Trace I/O operations.
- **packet**—Trace packet decoding operations.
- **performance**—Trace performance measurement operations.
- **profile**—Trace profile operations.
- **rpd**—Trace routing protocol process events.
- **rtsock**—Trace routing socket operations.
- **session-db**—Trace session database operations.
- **state**—Trace changes in state.
- **statistics**—Trace baseline statistics.
- **ui**—Trace user interface operations.

CHAPTER 11

Configuring Remote Access to a Router or Switch

- [System Services Overview on page 421](#)
- [Configuring Telnet Service for Remote Access to a Router or Switch on page 422](#)
- [Configuring FTP Service for Remote Access to the Router or Switch on page 423](#)
- [Configuring Finger Service for Remote Access to the Router on page 423](#)
- [Configuring SSH Service for Remote Access to the Router or Switch on page 424](#)
- [Configuring the SSH Service to Support Legacy Cryptography on page 427](#)
- [Configuring Outbound SSH Service on page 429](#)
- [Configuring DTCP-over-SSH Service for the Flow-Tap Application on page 432](#)
- [Configuring NETCONF-Over-SSH Connections on a Specified TCP Port on page 433](#)
- [Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434](#)
- [Configuring the Junos OS to Work with SRC Software on page 435](#)

System Services Overview

For security reasons, remote access to the router is disabled by default. You must configure the router explicitly so that users on remote systems can access it. The router can be accessed from a remote system by means of the DHCP, finger, FTP, rlogin, SSH, and Telnet services. In addition, Junos XML protocol client applications can use Secure Sockets Layer (SSL) or the Junos XML protocol-specific clear-text service, among other services.



NOTE: To protect system resources, you can limit the number of simultaneous connections that a service accepts and the number of processes owned by a single user. If either limit is exceeded, connection attempts fail.

Related Documentation

- [Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434](#)
- [Configuring the Router or Interface to Act as a DHCP Server on J Series Services Routers](#)
- [DHCP Access Service Overview on page 388](#)

- [Configuring the Router as an Extended DHCP Local Server on page 407](#)
- [Interaction Among the DHCP Client, Extended DHCP Local Server, and Address-Assignment Pools on page 409](#)
- [Configuring DTCP-over-SSH Service for the Flow-Tap Application on page 432](#)
- [Configuring Finger Service for Remote Access to the Router on page 423](#)
- [Configuring FTP Service for Remote Access to the Router or Switch on page 423](#)
- [Configuring SSH Service for Remote Access to the Router or Switch on page 424](#)
- [Configuring Outbound SSH Service on page 429](#)
- [Configuring NETCONF-Over-SSH Connections on a Specified TCP Port on page 433](#)

Configuring Telnet Service for Remote Access to a Router or Switch

To configure the router or switch to accept Telnet as an access service, include the **telnet** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
telnet {
  connection-limit limit;
  rate-limit limit;
}
```

By default, the router or switch supports a limited number of simultaneous Telnet sessions and connection attempts per minute.

Optionally, you can include either or both of the following statements to change the defaults:

- **connection-limit *limit***—Maximum number of simultaneous connections per protocol (IPv4 and IPv6). The range is from 1 through 250. The default is 75. When you configure a connection limit, the limit is applicable to the number of telnet sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 telnet sessions and 10 IPv4 telnet sessions.
- **rate-limit *limit***—Maximum number of connection attempts accepted per minute (from 1 through 250). The default is 150. When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6 telnet session connection attempts per minute and 10 IPv4 telnet session connection attempts per minute.

You cannot include the **telnet** statement on devices that run the Junos-FIPS software. We recommend that you do not use Telnet in a Common Criteria environment.

Related Documentation

- [telnet on page 607](#)

Configuring FTP Service for Remote Access to the Router or Switch

To configure the router or switch to accept FTP as an access service, include the **ftp** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
ftp {
  connection-limit limit;
  rate-limit limit;
}
```

By default, the router or switch supports a limited number of simultaneous FTP sessions and connection attempts per minute. You can include either or both of the following statements to change the defaults:

- **connection-limit *limit***—Maximum number of simultaneous connections per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 75. When you configure a connection limit, the limit is applicable to the number of sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 FTP sessions and 10 IPv4 FTP sessions.
- **rate-limit *limit***—Maximum number of connection attempts accepted per minute (a value from 1 through 250). The default is 150. When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6 FTP session connection attempts and 10 IPv4 FTP session connection attempts.

You can use passive FTP to access devices that accept only passive FTP services. All commands and statements that use FTP also accept passive FTP. Include the **ftp** statement at the **[edit system services]** hierarchy level to use either active FTP or passive FTP.

To start a passive FTP session, use **pasvftp** (instead of **ftp**) in the standard FTP format (**ftp://*destination***). For example:

```
request system software add pasvftp://name.com/jinstall.tgz
```

You cannot include the **ftp** statement on routers or switches that run the Junos-FIPS software. We recommend that you do not use the finger service in a Common Criteria environment.

Configuring Finger Service for Remote Access to the Router

To configure the router to accept finger as an access service, include the **finger** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
finger {
  connection-limit limit;
  rate-limit limit;
}
```

By default, the router supports a limited number of simultaneous finger sessions and connection attempts per minute. Optionally, you can include either or both of the following statements to change the defaults:

- **connection-limit *limit***—Maximum number of simultaneous connections per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 75. When you configure a connection limit, the limit is applicable to the number of sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 clear-text service sessions and 10 IPv4 clear-text service sessions
- **rate-limit *limit***—Maximum number of connection attempts accepted per minute (a value from 1 through 250). The default is 150. When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6 session connection attempts per minute and 10 IPv4 session connection attempts per minute.

You cannot include the **finger** statement on routers that run the Junos-FIPS software. We recommend that you do not use the finger service in a Common Criteria environment.

Configuring SSH Service for Remote Access to the Router or Switch

To configure the router or switch to accept SSH as an access service, include the **ssh** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
ssh {
  authentication-order [method1 method2...];
  ciphers [cipher-1 cipher-2 cipher-3 ...];
  client-alive-count-max seconds;
  client-alive-interval seconds;
  connection-limit limit;
  fingerprint-hash (md5 | sha2-256);
  hostkey-algorithm (algorithm | no-algorithm);
  key-exchange [algorithm1 algorithm2...];
  macs [algorithm1 algorithm2...];
  max-sessions-per-connection <number>;
  no-passwords;
  no-public-keys;
  no-tcp-forwarding;
  protocol-version [v1 v2];
  rate-limit limit;
  root-login (allow | deny | deny-password);
}
```

By default, the router or switch supports a limited number of simultaneous SSH sessions and connection attempts per minute. Use the following statements to change the defaults:

- **connection-limit *limit***—Maximum number of simultaneous connections per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 75. When you configure a connection limit, the limit is applicable to the number of SSH sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 SSH sessions and 10 IPv4 SSH sessions.

- **max-sessions-per-connection *number***—Include this statement to specify the maximum number of SSH sessions allowed per single SSH connection. This allows you to limit the number of cloned sessions tunneled within a single SSH connection. The default value is 10.
- **rate-limit *limit***—Maximum number of connection attempts accepted per minute (a value from 1 through 250). The default is 150. When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6 SSH session connection attempts per minute and 10 IPv4 SSH session connection attempts per minute.

By default, a user can create an SSH tunnel over a CLI session to a router running Junos OS via SSH. This type of tunnel could be used to forward TCP traffic, bypassing any firewall filters or access control lists allowing access to resources beyond the router. Use the **no-tcp-forwarding** option to prevent a user from creating an SSH tunnel to a router via SSH.

For information about other configuration settings, see the following topics:

- [Configuring the Root Login Through SSH on page 425](#)
- [Configuring the SSH Protocol Version on page 425](#)
- [Configuring the Client Alive Mechanism on page 426](#)
- [Configuring the SSH Fingerprint Hash Algorithm on page 426](#)

Configuring the Root Login Through SSH

By default, users are allowed to log in to the router or switch as **root** through SSH when the authentication method does not require a password. To control user access through SSH, include the **root-login** statement at the **[edit system services ssh]** hierarchy level:

```
[edit system services ssh]
root-login (allow | deny | deny-password);
```

allow—Allows users to log in to the router or switch as root through SSH.

deny—Disables users from logging in to the router or switch as root through SSH.

deny-password—Allows users to log in to the router or switch as root through SSH when the authentication method (for example, RSA) does not require a password.

The default is **deny-password**.

Configuring the SSH Protocol Version

By default, only version 2 of the SSH protocol is enabled. To enable version 1, you must explicitly configure it.

To configure the router or switch to use version 1 and 2 of the SSH protocol, include the **protocol-version** statement and specify **v1** and **v2** at the **[edit system services ssh]** hierarchy level:

```
[edit system services ssh]
protocol-version [ v1 v2 ];
```

Systems in FIPS mode always use SSH protocol version **v2**.

To configure the router or switch to use only version 1 of the SSH protocol, include the **protocol-version** statement and specify **v1** at the **[edit system services ssh]** hierarchy level:

```
[edit system services ssh]
protocol-version v1;
```

Configuring the Client Alive Mechanism

The client alive mechanism is valuable when the client or server depends on knowing when a connection has become inactive. It differs from the standard keepalive mechanism because the client alive messages are sent through the encrypted channel. The client alive mechanism is not enabled at default. To enable it, configure the **client-alive-count-max** and **client-alive-interval** statements. This option applies to SSH protocol version 2 only.

In the following example, unresponsive SSH clients will be disconnected after approximately 100 seconds (20 x 5).

```
[edit system services ssh]
client-alive-count-max 5;
client-alive-interval 20;
```

Configuring the SSH Fingerprint Hash Algorithm

To configure the hash algorithm used by the SSH server when it displays key fingerprints, include the **fingerprint-hash** statement and specify **md5** or **sha2-256** at the **[edit system services ssh]** hierarchy level:

```
[edit system services ssh]
fingerprint-hash (md5 | sha2-256);
```

The **md5** hash algorithm is unavailable on systems in FIPS mode.

Configuring the SSH Service to Support Legacy Cryptography

Starting in Junos OS Release 16.1, the SSH server in Junos OS is based on OpenSSH 7 and defaults to a more secure set of ciphers and key-exchange algorithms. OpenSSH 7 omits some legacy cryptography.



NOTE: Lack of support for legacy cryptography in devices causes Junos Space device discovery to fail. To work around this issue, configure the device to support the `3des-cbc` or `blowfish-cbc` cipher, or both, and the `dh-group1-sha1` key-exchange method. This issue does not affect devices running Junos OS with upgraded FreeBSD.



NOTE: See the OpenSSH 7 documentation at <https://www.openssh.com/> for more information about these extensions.

Junos OS Release 16.1 supports the following set of ciphers by default:

- `chacha20-poly1305@openssh.com`
- `aes128-ctr`
- `aes192-ctr`
- `aes256-ctr`
- `aes128-gcm@openssh.com`
- `aes256-gcm@openssh.com`

In Junos OS Release 16.1, the following ciphers are not supported by default, but you can configure your device to support them. They are listed from the most secure to the least secure:

- `aes256-cbc`
- `aes192-cbc`
- `aes128-cbc`
- `3des-cbc`
- `blowfish-cbc`
- `cast128-cbc`
- `arcfour256`
- `arcfour128`
- `arcfour`

Junos OS Release 16.1 supports the following set of key-exchange methods by default:

- **curve25519-sha256**
- **ecdh-sha2-nistp256**
- **ecdh-sha2-nistp384**
- **ecdh-sha2-nistp521**
- **group-exchange-sha2**
- **dh-group14-sha1**

In Junos OS Release 16.1, the following key-exchange methods are not supported by default, but you can configure your device to support them:

- **group-exchange-sha1**
- **dh-group1-sha1**

To configure the SSH service to support legacy cryptography:



NOTE: By configuring an ordered set of ciphers, key-exchange methods, or message authentication codes (MACs), the newly defined set is applied to both server and client commands. Changes to the defaults affect the file copy command when you use Secure Copy Protocol (SCP).

1. Add support for ciphers by using the **set system services ssh ciphers [cipher 1 cipher 2 ...]** command. We recommend that you add the ciphers to the end of the configuration list so that they are among the last options used. In the following example, the **3des-cbc** and **blowfish-cbc** ciphers are added to the default set:

```
[edit system services ssh]
user@device# set ciphers [ chacha20-poly1305@openssh.com aes128-ctr aes192-ctr
aes256-ctr aes128-gcm@openssh.com aes256-gcm@openssh.com 3des-cbc
blowfish-cbc ]
```

2. Add support for key-exchange methods by using the **set system services ssh key-exchange [method 1 method 2 ...]** command. We recommend that you add the key-exchange methods to the end of the configuration list so that they are among the last options used. In the following example, the **dh-group1-sha1** key-exchange method is added to the default set:

```
[edit system services ssh]
user@device# set key-exchange [ curve25519-sha256 ecdh-sha2-nistp256
ecdh-sha2-nistp384 ecdh-sha2-nistp521 group-exchange-sha2 dh-group14-sha1
dh-group1-sha1 ]
```

3. Commit the configuration:

```
[edit]
user@device# commit
```

- Related Documentation
- [ciphers on page 465](#)
 - [key-exchange on page 501](#)
 - [macs on page 509](#)

Configuring Outbound SSH Service

You can configure a device running the Junos OS to initiate a TCP/IP connection with a client management application that would be blocked if the client attempted to initiate the connection (for example, if the device is behind a firewall). The **outbound-ssh** command instructs the device to create a TCP/IP connection with the client management application and to forward the identity of the device. Once the connection is established, the management application acts as the client and initiates the SSH sequence, and the device acts as the server and authenticates the client.



NOTE: There is no initiation command with outbound SSH. Once outbound SSH is configured and committed, the device begins to initiate an outbound SSH connection based on the committed configuration. The device repeatedly attempts to create this connection until successful. If the connection between the device and the client management application is dropped, the device again attempts to create a new outbound SSH connection until successful. This connection is maintained until the outbound SSH stanza is removed from the configuration.

To configure the device for outbound SSH connections, include the **outbound-ssh** statement at the **[edit system services]** hierarchy level:

```
[edit system services outbound-ssh]
```

The following topics describe the tasks for configuring the outbound SSH service:

- [Configuring the Device Identifier for Outbound SSH Connections on page 429](#)
- [Sending the Public SSH Host Key to the Outbound SSH Client on page 430](#)
- [Configuring Keepalive Messages for Outbound SSH Connections on page 431](#)
- [Configuring a New Outbound SSH Connection on page 431](#)
- [Configuring the Outbound SSH Client to Accept NETCONF as an Available Service on page 431](#)
- [Configuring Outbound SSH Clients on page 432](#)

Configuring the Device Identifier for Outbound SSH Connections

Each time the device establishes an outbound SSH connection, it first sends an initiation sequence to the management client. This sequence identifies the device to the management client. Within this transmission is the value of **device-id**.

To configure the device identifier of the device, include the **device-id** statement at the **[edit system services outbound-ssh client *client-id*]** hierarchy level:

```
[edit system services outbound-ssh client client-id]  
device-id device-id;
```

The initiation sequence when **secret** is not configured:

```
MSG-ID: DEVICE-CONN-INFO\r\n  
MSG-VER: V1\r\n  
DEVICE-ID: <device-id>\r\n
```

Sending the Public SSH Host Key to the Outbound SSH Client

Each time the router or switch establishes an outbound SSH connection, it first sends an initiation sequence to the management client. This sequence identifies the router or switch to the management client. Within this transmission is the value of *device-id*.

To configure the device identifier of the router or switch, include the **device-id** statement at the `[edit system services outbound-ssh client client-id]` hierarchy level:

```
[edit system services outbound-ssh client client-id]  
device-id device-id;
```

The initiation sequence when **secret** is not configured:

```
MSG-ID: DEVICE-CONN-INFO\r\n  
MSG-VER: V1\r\n  
DEVICE-ID: <device-id>\r\n
```

During the initialization of an SSH connection, the client authenticates the identity of the device using the public SSH host key of the device. Therefore, before the client can initiate the SSH sequence, it needs the public SSH key of the device. When you configure the **secret** statement, the device passes its public SSH key as part of the outbound SSH connection initiation sequence.

When the **secret** statement is set and the device establishes an outbound SSH connection, the device communicates its device ID, its public SSH key, and an SHA1 hash derived in part from the **secret** statement. The value of the **secret** statement is shared between the device and the management client. The client uses the shared secret to authenticate the public SSH host key it is receiving to determine whether the public key is from the device identified by the **device-id** statement.

Using the **secret** statement to transport the public SSH host key is optional. You can manually transport and install the public key onto the client system.



NOTE: Including the **secret** statement means that the device sends its public SSH host key every time it establishes a connection to the client. It is then up to the client to decide what to do with the SSH host key if it already has one for that device. We recommend that you replace the client's copy with the new key. Host keys can change for various reasons and by replacing the key each time a connection is established, you ensure that the client has the latest key.

To send the router's or switch's public SSH host key when the device connects to the client, include the **secret** statement at the **[edit system services outbound-ssh client *client-id*]** hierarchy level:

```
[edit system services outbound-ssh client client-id]
secret password;
```

The following message is sent by the device when the **secret** attribute is configured:

```
MSG-ID: DEVICE-CONN-INFO\r\n
MSG-VER: V1\r\n
DEVICE-ID: <device-id>\r\n
HOST-KEY: <public-hot-key>\r\n
HMAC: <HMAC(pub-SSH-host-key, <secret>>)>\r\n
```

Configuring Keepalive Messages for Outbound SSH Connections

Once the client application has the router's or switch's public SSH host key, it can then initiate the SSH sequence as if it had created the TCP/IP connection and can authenticate the device using its copy of the router's or switch's public host SSH key as part of that sequence. The device authenticates the client user through the mechanisms supported in the Junos OS (RSA/DSA public string or password authentication).

To enable the device to send SSH protocol keepalive messages to the client application, configure the **keep-alive** statement at the **[edit system services outbound-ssh client *client-id*]** hierarchy level:

```
[edit system services outbound-ssh client client-id]
keep-alive {
  retry number;
  timeout seconds;
}
```

Configuring a New Outbound SSH Connection

When disconnected, the device begins to initiate a new outbound SSH connection. To specify how the device reconnects to the server after a connection is dropped, include the **reconnect-strategy** statement at the **[edit system services outbound-ssh client *client-id*]** hierarchy level:

```
[edit system services outbound-ssh client-id]
reconnect-strategy (sticky | in-order);
```

You can also specify the number of retry attempts and set the amount of time before the reconnection attempts stop. See [“Configuring Keepalive Messages for Outbound SSH Connections” on page 431](#).

Configuring the Outbound SSH Client to Accept NETCONF as an Available Service

To configure the application to accept NETCONF as an available service, include the **services netconf** statement at the **[edit system services outbound-ssh client *client-id*]** hierarchy level:

```
[edit system services outbound-ssh client client-id]
services {
  netconf;
```

```
}
```

Configuring Outbound SSH Clients

To configure the clients available for this outbound SSH connection, list each client with a separate address statement at the **[edit system services outbound-ssh client *client-id*]** hierarchy level:

```
[edit system services outbound-ssh client client-id]  
  address address {  
    retry number;  
    timeout seconds;  
    port port-number;  
  }
```



NOTE: Outbound SSH connections support IPv4 and IPv6 address formats.

Configuring DTCP-over-SSH Service for the Flow-Tap Application

The active monitoring flow-tap application requires Dynamic Tasking Control Protocol, by configuring the flow-tap DTCP-over-SSH service. Flow-tap enables you to intercept IPv4 packets transiting an active monitoring router and send a copy of matching packets to one or more content destinations, for use in flexible trend analysis of security threats and in lawful intercept of data.



NOTE: The flow-tap feature is not supported on outbound, or egress, traffic. Only inbound, or ingress, traffic is supported.

To enable the flow-tap DTCP-over-SSH service, include the following statements at the **[edit system services]** hierarchy level:

```
flow-tap-dtcp {  
  ssh {  
    connection-limit limit;  
    rate-limit limit;  
  }  
}
```

By default, the router supports a limited number of simultaneous flow-tap DTCP-over-SSH sessions and connection attempts per minute. Optionally, you can include either or both of the following statements to change the defaults:

- **connection-limit *limit***—Maximum number of simultaneous connections per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 75. When you configure a connection limit, the limit is applicable to the number of sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 clear-text service sessions and 10 IPv4 clear-text service sessions.
- **rate-limit *limit***—Maximum number of connection attempts accepted per minute per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 150.

When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6 session connection attempts per minute and 10 IPv4 session connection attempts per minute.

You must also define user permissions that enable flow-tap users to configure flow-tap services. Specify a login class and access privileges for flow-tap users at the **[edit system login class *class-name* permissions]** hierarchy level:

```
[edit system login class class-name permissions]
(flow-tap | flow-tap-control | flow-tap-operation);
```

The permission bit for a flow-tap login class can be one of the following:

- **flow-tap**—Can view the flow-tap configuration in configuration mode.
- **flow-tap-control**—Can view the flow-tap configuration in configuration mode and configure flow-tap configuration information at the **[edit services flow-tap]** hierarchy level.
- **flow-tap-operation**—Can make flow-tap requests to the router from a remote location using a DTCP client.



NOTE: Only users with a configured access privilege of **flow-tap-operation** can initiate flow-tap requests.

You can also specify user permissions through the Juniper-User-Permissions RADIUS attribute.

To enable the flow-tap DTCP-over-SSH service, you must also include statements at the **[edit interfaces]** hierarchy level to specify an Adaptive Services PIC that runs the flow-tap service and conveys flow-tap filters from the mediation device to the router. In addition, you must include the **flow-tap** statement at the **[edit services]** hierarchy level.

Configuring NETCONF-Over-SSH Connections on a Specified TCP Port

The Junos OS enables you to restrict incoming NETCONF connections to a specified TCP port without configuring a firewall. To configure the TCP port used for NETCONF-over-SSH connections, include the **port** statement at the **[edit system services netconf ssh]** hierarchy level. The configured port accepts only NETCONF-over-SSH sessions. Regular SSH session requests for this port are rejected.

You can either configure the default port 830 for NETCONF connections over SSH, as specified in RFC 4742, *Using the NETCONF Configuration Protocol over Secure Shell (SSH)*, or configure any port from 1 through 65535.

**NOTE:**

- The default SSH port (22) continues to accept NETCONF sessions even with a configured NETCONF server port. To disable the SSH port from accepting NETCONF sessions, specify this in the login event script.
 - We do not recommend configuring the default ports for FTP (21) and Telnet (23) services for configuring NETCONF-over-SSH connections.
-

Related Documentation • [port \(NETCONF\) on page 535](#)

Configuring clear-text or SSL Service for Junos XML Protocol Client Applications

A Junos XML protocol client application can use one of four protocols to connect to the Junos XML protocol server on a router: clear-text (a Junos XML protocol-specific protocol for sending unencrypted text over a TCP connection), SSH, SSL, or Telnet. For clients to use the clear-text or SSL protocol, you must include Junos XML protocol-specific statements in the router configuration.

For more information, see the following topics:

1. [Configuring clear-text Service for Junos XML Protocol Client Applications on page 434](#)
2. [Configuring SSL Service for Junos XML Protocol Client Applications on page 435](#)

Configuring clear-text Service for Junos XML Protocol Client Applications

To configure the router to accept clear-text connections from Junos XML protocol client applications on port 3221, include the **xnm-clear-text** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
xnm-clear-text {
  connection-limit limit;
  rate-limit limit;
}
```

By default, the Junos XML protocol server supports a limited number of simultaneous clear-text sessions and connection attempts per minute. Optionally, you can include either or both of the following statements to change the defaults:

- **connection-limit *limit***—Maximum number of simultaneous connections per protocol (IPv4 and IPv6) (a value from 1 through 250). The default is 75. When you configure a connection limit, the limit is applicable to the number of sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 clear-text service sessions and 10 IPv4 clear-text service sessions.
- **rate-limit *limit***—Maximum number of connection attempts accepted per minute per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 150. When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6

session connection attempts per minute and 10 IPv4 session connection attempts per minute.

You cannot include the **xnm-clear-text** statement on routers that run the Junos-FIPS software. We recommend that you do not use the clear-text protocol in a Common Criteria environment.

Configuring SSL Service for Junos XML Protocol Client Applications

To configure the router to accept SSL connections from Junos XML protocol client applications on port 3220, include the **xnm-ssl** statement at the **[edit system services]** hierarchy level:

```
[edit system services]
xnm-ssl {
  local-certificate name;
  connection-limit limit;
  rate-limit limit;
}
```

local-certificate is the name of the X.509 authentication certificate used to establish an SSL connection. You must obtain the certificate and copy it to the router before referencing it.

By default, the Junos XML protocol server supports a limited number of simultaneous SSL sessions and connection attempts per minute. Optionally, you can include either or both of the following statements to change the defaults:

- **connection-limit limit**—Maximum number of simultaneous connections per protocol (IPv4 and IPv6). The range is a value from 1 through 250. The default is 75. When you configure a connection limit, the limit is applicable to the number of sessions per protocol (IPv4 and IPv6). For example, a connection limit of 10 allows 10 IPv6 SSL sessions and 10 IPv4 SSL sessions.
- **rate-limit limit**—Maximum number of connection attempts accepted per protocol per minute. The range is a value from 1 through 250. The default is 150. When you configure a rate limit, the limit is applicable to the number of connection attempts per protocol (IPv4 and IPv6). For example, a rate limit of 10 allows 10 IPv6 SSL session connection attempts per minute and 10 IPv4 SSL session connection attempts per minute.

Configuring the Junos OS to Work with SRC Software

You can enable Junos OS to work with the Session and Resource Control (SRC) software. The SRC software supports dynamic service activation engine (SAE) functionality on routers and switches running under Junos OS. To do this, include the following statements at the **[edit system services service-deployment]** hierarchy level:

```
[edit system services service-deployment]
servers server-address {
  port port-number;
}
source-address source-address;
```

server-address is the IPv4 address of the SRC server.

By default, *port-number* is set to 3333 and is a TCP port number.

source-address is optional and is the local IP version 4 (IPv4) address to be used as the source address for traffic to the SRC server.



NOTE: By default, when a connection between SRC and a Juniper Networks router or switch is established, the SRC process (sdxd) starts a Junos XML protocol session as user *root*. You have the option of configuring user *sdx* with a different classification at the `[edit system login]` hierarchy level.

For more information about SRC software, see the SRC documentation set.

**Related
Documentation**

- [Configuring Finger Service for Remote Access to the Router on page 423](#)
- [Configuring FTP Service for Remote Access to the Router or Switch on page 423](#)
- [Configuring SSH Service for Remote Access to the Router or Switch on page 424](#)
- [Configuring Outbound SSH Service on page 429](#)
- [Configuring NETCONF-Over-SSH Connections on a Specified TCP Port on page 433](#)
- [Configuring Telnet Service for Remote Access to a Router or Switch on page 422](#)
- [Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434](#)

Configuring Authentication for Routing Protocols

- [Example: Configuring the BGP and IS-IS Routing Protocols on page 437](#)
- [Configuring the Authentication Key Update Mechanism for BGP and LDP Routing Protocols on page 439](#)

Example: Configuring the BGP and IS-IS Routing Protocols

The main task of a router is to use its routing and forwarding tables to forward user traffic to its intended destination. Attackers can send forged routing protocol packets to a router with the intent of changing or corrupting the contents of its routing table or other databases, which in turn can degrade the functionality of the router and the network. To prevent such attacks, routers must ensure that they form routing protocol relationships (peering or neighboring relationships) to trusted peers. One way of doing this is by authenticating routing protocol messages. We strongly recommend using authentication when configuring routing protocols. The Junos OS supports HMAC-MD5 authentication for BGP, Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), Routing Information Protocol (RIP), and Resource Reservation Protocol (RSVP). HMAC-MD5 uses a secret key that is combined with the data being transmitted to compute a hash. The computed hash is transmitted along with the data. The receiver uses the matching key to recompute and validate the message hash. If an attacker has forged or modified the message, the hash will not match and the data will be discarded.

In the following examples, we configure BGP as the exterior gateway protocol (EGP) and IS-IS as the interior gateway protocol (IGP). If you use OSPF, configure it similarly to the IS-IS configuration shown.

Configuring BGP

The following example shows the configuration of a single authentication key for the BGP peer group internal peers. You can also configure BGP authentication at the neighbor or routing instance levels, or for all BGP sessions. As with any security configuration, there is a trade-off between the degree of granularity (and to some extent the degree of security) and the amount of management necessary to maintain the system. This example also configures a number of tracing options for routing protocol events and errors, which can be good indicators of attacks against routing protocols. These events include protocol authentication failures, which might point to an attacker that is sending spoofed or

otherwise malformed routing packets to the router in an attempt to elicit a particular behavior.

```
[edit]
protocols {
  bgp {
    group ibgp {
      type internal;
      traceoptions {
        file bgp-trace size 1m files 10;
        flag state;
        flag general;
      }
      local-address 10.10.5.1;
      log-updown;
      neighbor 10.2.1.1;
      authentication-key "$9$aHlj8gqQ1gjyjjhgjgiiiiii";
    }
    group ebgp {
      type external;
      traceoptions {
        file ebgp-trace size 10m files 10;
        flag state;
        flag general;
      }
      local-address 10.10.5.1;
      log-updown;
      peer-as 2;
      neighbor 10.2.1.2;
      authentication-key "$9$aHlj8gqQ1gjyjjhgjgiiiiii";
    }
  }
}
```

Configuring IS-IS

Although all IGPs supported by the Junos OS support authentication, some are inherently more secure than others. Most service providers use OSPF or IS-IS to allow fast internal convergence and scalability and to use traffic engineering capabilities with Multiprotocol Label Switching (MPLS). Because IS-IS does not operate at the network layer, it is more difficult to spoof than OSPF, which is encapsulated in IP and is therefore subject to remote spoofing and DoS attacks.

The following example also shows how to configure a number of tracing options for routing protocol events and errors, which can be good indicators of attacks against routing protocols. These events include protocol authentication failures, which might point to an attacker that is sending spoofed or otherwise malformed routing packets to the router in an attempt to elicit a particular behavior.

```
[edit]
protocols {
  isis {
    authentication-key "$9$aHlj8gqQ1gjyjjhgjgiiiiii"; # SECRET-DATA
    authentication-type md5;
    traceoptions {
```

```

        file isis-trace size 10m files 10;
        flag normal;
        flag error;
    }
    interface at-0/0/0.131 {
        lsp-interval 50;
        level 2 disable;
        level 1 {
            metric 3;
            hello-interval 5;
            hold-time 60;
        }
    }
    interface lo0.0 {
        passive;
    }
}
}

```

**Related
Documentation**

- [Configuring the Authentication Key Update Mechanism for BGP and LDP Routing Protocols on page 439](#)

Configuring the Authentication Key Update Mechanism for BGP and LDP Routing Protocols

You can configure an authentication key update mechanism for the Border Gateway Protocol (BGP) and Label Distribution Protocol (LDP) routing protocols. This mechanism allows you to update authentication keys without interrupting associated routing and signaling protocols such as Open Shortest Path First (OSPF) and Resource Reservation Setup Protocol (RSVP).

To configure this feature, include the **authentication-key-chains** statement at the **[edit security]** level, and include the **authentication-algorithm *algorithm*** and **authentication-key-chain** statements for the BGP or LDP routing protocols at the **[edit protocols]** level .

The following topics provide more details about configuring authentication key updates for BGP and LDP Routing Protocols:

- [Configuring Authentication Key Updates on page 439](#)
- [Configuring BGP and LDP for Authentication Key Updates on page 440](#)

Configuring Authentication Key Updates

To configure the authentication key update mechanism, include the **key-chain** statement at the **[edit security authentication-key-chains]** hierarchy level, and specify the **key** option to create a keychain consisting of several authentication keys.

```

[edit security authentication-key-chains]
key-chain key-chain-name {
    key key {
        secret secret-data;
    }
}

```

```
        start-time yyyy-mm-dd.hh:mm:ss;
    }
}
```

key-chain—Assigns a name to the keychain mechanism. This name is also configured at the **[edit protocols bgp]** or the **[edit protocols ldp]** hierarchy levels to associate unique **authentication key-chain** attributes as specified using the following options:

- **key**—Each key within a keychain is identified by a unique integer value. The range is from 0 through 63.
- **secret**—Each key must specify a secret in encrypted text or plain text format. Even if you enter the secret data in plain-text format, the secret always appears in encrypted format.
- **start-time**—Start times for authentication key updates are specified in UTC (Coordinated Universal Time), and must be unique within the keychain.

Configuring BGP and LDP for Authentication Key Updates

To configure the authentication key update mechanism for the BGP and LDP routing protocols, include the **authentication-key-chain** statement at the **[edit protocols (bgp | ldp)]** hierarchy level to associate each routing protocol with the **[edit security authentication-key-chains]** authentication keys. You must also configure the **authentication-algorithm** *algorithm* statement at the **[edit protocols (bgp | ldp)]** hierarchy level.

```
[edit protocols (bgp | ldp)]
group group-name {
  neighbor address {
    authentication-algorithm algorithm;
    authentication-key-chain key-chain-name;
  }
}
```



NOTE: When configuring the authentication key update mechanism for BGP, you cannot commit the 0.0.0.0/allow statement with authentication keys or key chains. The CLI issues a warning and fails to commit such configurations.

For information about the BGP protocol, see the *Junos OS Routing Protocols Library*.

Related Documentation

- [Example: Configuring the BGP and IS-IS Routing Protocols on page 437](#)
- [Example: Configuring Route Authentication for BGP](#)
- [authentication-algorithm](#)
- [authentication-key-chain](#) (Protocols BGP and BMP)
- [authentication-key-chain](#) (Protocol LDP)

CHAPTER 13

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System Management Configuration Statements

This topic lists all the configuration statements that you can include at the **[edit system]** hierarchy level to configure system management features:

```

system {
  accounting {
    destination {
      radius {
        server {
          server-address {
            accounting-port port-number;
            retry number;
            secret password;
            source-address address;
            timeout seconds;
          }
        }
      }
    }
    tacplus {
      server {
        server-address {
          port port-number;
          secret password;
          single-connection;
          timeout seconds;
        }
      }
    }
  }
  enhanced-avs-max;
  events [ login change-log interactive-commands ];
}
archival {
  configuration {
    archive-sites {
      ftp://<username>:<password>@<host>:<port>/<url-path>;
      ftp://<username>:<password>@<host>:<port>/<url-path>;
    }
    transfer-interval interval;
    transfer-on-commit;
  }
}
allow-v4mapped-packets;
arp {
  aging-timer minutes;
  gratuitous-arp-delay;
  gratuitous-arp-on-ifup;
  interfaces;
  passive-learning;
  purging;
}
authentication-order [ authentication-methods ];
backup-router address <destination destination-address>;
commit {
  delta-export;
  fast-synchronize;
  persist-groups-inheritance ;
  server;
  synchronize
}

```

```
synchronize;
(compress-configuration-files | no-compress-configuration-files);
default-address-selection;
dump-device (compact-flash | remove-compact | usb);
diag-port-authentication (encrypted-password "password" | plain-text-password);
dynamic-profile-options {
    versioning;
}
domain-name domain-name;
domain-search [ domain-list ];
host-name hostname;
inet6-backup-router address <destination destination-address>;
internet-options {
    tcp-mss mss-value;
    (gre-path-mtu-discovery | no-gre-path-mtu-discovery);
    icmpv4-rate-limit bucket-size bucket-size packet-rate packet-rate;
    icmpv6-rate-limit bucket-size bucket-size packet-rate packet-rate;
    (ipip-path-mtu-discovery | no-ipip-path-mtu-discovery);
    (ipv6-path-mtu-discovery | no-ipv6-path-mtu-discovery);
    ipv6-path-mtu-discovery-timeout;
    no-tcp-rfc1323-paws;
    no-tcp-rfc1323;
    (path-mtu-discovery | no-path-mtu-discovery);
    source-port upper-limit <upper-limit>;
    (source-quench | no-source-quench);
    tcp-drop-synfin-set;
}
location {
    altitude feet;
    building name;
    country-code code;
    floor number;
    hcoord horizontal-coordinate;
    lata service-area;
    latitude degrees;
    longitude degrees;
    npa-nxx number;
    postal-code postal-code;
    rack number;
    vcoord vertical-coordinate;
}
login {
    announcement text;
    class class-name {
        access-end;
        access-start;
        allow-commands "regular-expression";
        ( allow-configuration | allow-configuration-regexps ) "regular expression 1" "regular
        expression 2";
        allowed-days;
        deny-commands "regular-expression";
        ( deny-configuration | deny-configuration-regexps ) "regular expression 1" "regular
        expression 2 ";
        idle-timeout minutes;
        login-script
        login-tip;
```

```

    permissions [ permissions ];
}
message text;
password {
    change-type (set-transitions | character-set);
    format (md5 | sha1 | des);
    maximum-length length;
    minimum-changes number;
    minimum-length length;
}
retry-options {
    backoff-threshold number;
    backoff-factor seconds;
    minimum-time seconds;
    tries-before-disconnect number;
}
user username {
    full-name complete-name;
    uid uid-value;
    class class-name;
    authentication {
        (encrypted-password "password" | plain-text-password);
        ssh-rsa "public-key";
        ssh-dsa "public-key";
    }
}
}
login-tip number;
mirror-flash-on-disk;
name-server {
    address;
}
no-multicast-echo;
no-redirects;
no-ping-record-route;
no-ping-time-stamp;
ntp {
    authentication-key key-number type type value password;
    boot-server address;
    broadcast <address> <key key-number> <version value> <ttl value>;
    broadcast-client;
    multicast-client <address>;
    peer address <key key-number> <version value> <prefer>;
    source-address source-address;
    server address <key key-number> <version value> <prefer>;
    trusted-key [ key-numbers ];
}
ports {
    auxiliary {
        type terminal-type;
    }
    pic-console-authentication {
        encrypted-password encrypted-password;
        plain-text-password;
        console {
            insecure;

```

```
        log-out-on-disconnect;
        type terminal-type;
        disable;
    }
}
processes {
    process--name (enable | disable) failover (alternate-media | other-routing-engine);
    timeout seconds;
}
}
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry number;
    secret password;
    source-address source-address;
    timeout seconds;
}
radius-options {
    enhanced-accounting
    password-protocol mschap-v2;
}
attributes {
    nas-ip-address ip-address;
}
enhanced-accounting;
password-protocol mschap-v2;
}
root-authentication {
    (encrypted-password "password" | plain-text-password);
    ssh-rsa "public-key";
    ssh-dsa "public-key";
}
(saved-core-context | no-saved-core-context);
saved-core-files saved-core-files;
scripts {
    commit {
        allow-transients;
        file filename {
            optional;
            refresh;
            refresh-from url;
            source url;
        }
        traceoptions {
            file <filename> <files number> <size size> <world-readable | no-world-readable>;
            flag flag;
            no-remote-trace;
        }
    }
    op {
        file filename {
            arguments {
                argument-name {
                    description descriptive-text;
                }
            }
        }
    }
}
```

```

        command filename-alias;
        description descriptive-text;
        refresh;
        refresh-from url;
        source url;
    }
    refresh;
    refresh-from url;
    traceoptions {
        file <filename> <files number> <size size> <world-readable | no-world-readable>;
        flag flag;
        no-remote-trace;
    }
}
services {
    finger {
        connection-limit limit;
        rate-limit limit;
    }
    flow-tap-dtcp {
        ssh {
            connection-limit limit;
            rate-limit limit;
        }
    }
    ftp {
        connection-limit limit;
        rate-limit limit;
    }
    rest {
        control {
            allowed-sources [ value-list ];
            connection-limit limit;
        }
        enable-explorer;
        http {
            addresses [ addresses ];
            port port-number;
        }
        https {
            addresses [ addresses ];
            cipher-list [ cipher-1 cipher-2 cipher-3 ... ];
            mutual-authentication {
                certificate-authority certificate-authority-profile-name;
            }
            port port-number;
            server-certificate local-certificate-identifier;
        }
        traceoptions {
            flag flag;
        }
    }
}
service-deployment {
    servers server-address {
        port port-number;
    }
}

```

```

    }
    source-address source-address;
}
ssh {
    root-login (allow | deny | deny-password);
    protocol-version [v1 v2];
    connection-limit limit;
    rate-limit limit;
}
telnet {
    connection-limit limit;
    rate-limit limit;
}
web-management {
    http {
        interfaces [ interface-names ];
        port port;
    }
    https {
        interfaces [ interface-names ];
        local-certificate name;
        port port;
    }
    session {
        idle-timeout [ minutes ];
        session-limit [ session-limit ];
    }
}
xnm-clear-text {
    connection-limit limit;
    rate-limit limit;
}
xnm-ssl {
    connection-limit limit;
    local-certificate name;
    rate-limit limit;
}
}
static-host-mapping {
    hostname {
        alias [ alias ];
        inet [ address ];
        sysid system-identifier;
    }
}
syslog {
    archive <files number> <size size> <world-readable | no-world-readable>;
    console {
        facility severity;
    }
    file filename {
        facility severity;
        archive <archive-sites {ftp-url <password password>}> <files number> <size size>
            <start-time "YYYY-MM-DD.hh:mm"> <transfer-interval minutes> <world-readable |
            no-world-readable>;
        explicit-priority;
    }
}

```

```

    match "regular-expression";
    match-string string-name;
    structured-data {
        brief;
    }
}
host (hostname | other-routing-engine | scc-master) {
    facility severity;
    explicit-priority;
    facility-override facility;
    log-prefix string;
    match "regular-expression";
    source-address source-address;
    structured-data {
        brief;
    }
}
source-address source-address;
time-format (year | millisecond | year millisecond);
user (username | *) {
    facility severity;
    match "regular-expression";
}
}
tacplus-options {
    enhanced-accounting;
    service-name service-name;
    (no-cmd-attribute-value | exclude-cmd-attribute);
}
tacplus-server server-address {
    secret password;
    single-connection;
    source-address source-address;
    timeout seconds;
}
time-zone (GMThour-offset | time-zone);
}
tracing {
    destination-override {
        syslog host;
    }
}
}
use-imported-time-zones;
}

```

accounting

```
Syntax  accounting {
        events [login change-log interactive-commands];
        destination {
            radius {
                server {
                    server-address {
                        accounting-port port-number;
                        secret password;
                        source-address address;
                        retry number;
                        timeout seconds;
                    }
                }
            }
            tacplus {
                server {
                    server-address {
                        port port-number;
                        secret password;
                        single-connection;
                        timeout seconds;
                    }
                }
            }
        }
        enhanced-avs-max <number>;
    }
```

Hierarchy Level [edit [system](#)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
enhanced-avs-max statement introduced in Junos OS Release 14.1.
Support for the **source-address-inet6** statement introduced in Junos OS Release 14.1X53-D10 for EX Series switches.

Description Configure audit of TACACS+ or RADIUS authentication events, configuration changes, and interactive commands. Auditing these factors helps you track network usage for auditing and billing purposes.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- [Configuring RADIUS System Accounting on page 363](#)
- [Configuring TACACS+ System Accounting on page 379](#)
- [enhanced-avs-max on page 488](#)

access-end

Syntax	access-end <i>HH:MM</i> ;
Hierarchy Level	[edit system login class]
Release Information	Statement introduced in Junos OS Release 10.1.
Description	Configure the end time for login access.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Time-Based User Access on page 48

access-start

Syntax	access-start <i>HH:MM</i> ;
Hierarchy Level	[edit system login class]
Release Information	Statement introduced in Junos OS Release 10.1.
Description	Configure the start time for login access.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Time-Based User Access on page 48

accounting-port (RADIUS Server)

Syntax	<code>accounting-port <i>port-number</i>;</code>
Hierarchy Level	[edit system accounting destination radius server <i>server-address</i>], [edit system radius-server <i>server-address</i>]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	Configure the accounting port number on which to contact the RADIUS server.
Options	number —Port number on which to contact the RADIUS server. Default: 1813
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS Server Authentication on page 355• Configuring RADIUS System Accounting on page 363

allow-commands

Syntax	<code>allow-commands "(<i>regular-expression</i>) (<i>regular-expression1</i>) (<i>regular-expression2</i>)..."</code> ;
Hierarchy Level	[edit system login class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Specify the operational mode commands that members of a login class can use. When specifying extended regular expressions using the allow/deny-commands and allow/deny-configuration statements, each expression separated by a pipe () symbol must be a complete standalone expression, and must be enclosed in parentheses (). Do not use spaces between regular expressions separated with parentheses and connected with the pipe () symbol.
Default	If you omit this statement and the deny-commands statement, users can issue only those commands for which they have access privileges through the permissions statement.
Options	<i>regular-expression</i> —Extended (modern) regular expression as defined in POSIX 1003.2. If the regular expression contains any spaces, operators, or wildcard characters, enclose it in quotation marks.
Required Privilege Level	admin —To view this statement in the configuration. admin-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76 • deny-commands on page 472 • user on page 577

allow-configuration

Syntax	<code>allow-configuration "(regular-expression) (regular-expression1) (regular-expression2)..."</code> ;
Hierarchy Level	[edit system login class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Explicitly allow configuration access to the specified levels in the hierarchy even if the permissions set with the **permissions** statement do not grant such access by default.


When specifying extended regular expressions using the **allow/deny-commands** and **allow/deny-configuration** statements, each expression separated by a pipe (|) symbol must be a complete standalone expression, and must be enclosed in parentheses (). Do not use spaces between regular expressions separated with parentheses and connected with the pipe (|) symbol.



NOTE: The **allow/deny-configuration** and **allow/deny-configuration-regexps** statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the **allow/deny-configuration** statement, or the **allow/deny-configuration-regexps** statement. If you have existing configurations using the **allow/deny-configuration** statements, using the same configuration options with the **allow/deny-configuration-regexps** statements might not produce the same results, as the search and match methods differ in the two forms of these statements.

Default	If you omit this statement and the deny-configuration statement, users can edit only those commands for which they have access privileges through the permissions statement.
Options	regular-expression —Extended (modern) regular expression as defined in POSIX 1003.2. If the regular expression contains any spaces, operators, or wildcard characters, enclose it in quotation marks.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies on page 99• Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69• deny-configuration on page 473• user on page 577

allow-configuration-regexps

Syntax	<code>allow-configuration-regexps ["regular expression 1" "regular expression 2"];</code>
Hierarchy Level	[edit system login class <i>class-name</i>]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	<p>Explicitly allow configuration access to specified hierarchies using regular expressions even if the permissions set with the permissions statement allow that access.</p> <p>The statement deny-configuration-regexps takes precedence if it is used in the same login class definition.</p>
	<p> NOTE: The allow/deny-configuration and allow/deny-configuration-regexps statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the allow/deny-configuration statement, or the allow/deny-configuration-regexps statement. If you have existing configurations using the allow/deny-configuration statements, using the same configuration options with the allow/deny-configuration-regexps statements might not produce the same results, as the search and match methods differ in the two forms of these statements.</p>
Default	If you do not configure this statement or the deny-configuration-regexps statement, users can edit only those commands for which they have access privileges set with the permissions statement.
Options	<p>regular expression—Extended (modern) regular expression as defined in POSIX 1003.2. If the regular expression contains any spaces, operators, or wildcard characters, enclose it in quotation marks. Enter as many expressions as needed..</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87 • Regular Expressions for Allowing and Denying Junos OS Operational Mode Commands, Configuration Statements, and Hierarchies on page 69 • deny-configuration-regexps on page 474 • user on page 577

allowed-days

Syntax	<code>allowed-days [<i>days-of-the-week</i>];</code>
Hierarchy Level	[edit system login class <i>class-name</i>]
Release Information	Statement introduced in Junos OS Release 10.1.
Description	Specify the days of the week when users can log in.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Time-Based User Access on page 48

authentication (DHCP Local Server)

Syntax	<pre> authentication { password <i>password-string</i>; username-include { circuit-type; client-id; delimiter <i>delimiter-character</i>; domain-name <i>domain-name-string</i>; interface-name ; logical-system-name; mac-address; option-60; option-82 <circuit-id> <remote-id>; relay-agent-interface-id; relay-agent-remote-id; relay-agent-subscriber-id; routing-instance-name; user-prefix <i>user-prefix-string</i>; } }</pre>
Hierarchy Level	<pre> [edit system services dhcp-local-server], [edit system services dhcp-local-server dhcpv6], [edit system services dhcp-local-server dhcpv6 group <i>group-name</i>], [edit system services dhcp-local-server group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...], [edit logical-systems <i>logical-system-name</i> system services dhcp-local-server ...], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...]</pre>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	<p>Configure the parameters the router sends to the external AAA server. A group configuration takes precedence over a global DHCP relay or DHCP local server configuration.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Using External AAA Authentication Services with DHCP</i>

authentication (Login)

Syntax	<pre>authentication { (encrypted-password "password" plain-text-password); load-key-file URL filename; no-public-keys; ssh-dsa "public-key"; ssh-ecdsa "public-key"; ssh-rsa "public-key"; }</pre>
Hierarchy Level	[edit system login user username]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Option no-public-keys introduced in Junos OS Release 15.1.
Description	Authentication methods that a user can use to log in to the router or switch. You can assign multiple authentication methods to a single user.
Options	<p>encrypted-password "password"—Message Digest 5 (MD5) or other encrypted authentication. Specify the MD5 or other password. You can specify only one encrypted password for each user.</p> <p>You cannot configure a blank password for encrypted-password using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.</p> <p>load-key-file URL filename—Load previously-generated RSA (SSH version 1 and SSH version 2) and DSA (SSH version 2) public keys from a named file at a specified URL location. The file contains one or more SSH keys.</p> <p>For information on valid filename and URL formats, see <i>Format for Specifying Filenames and URLs in Junos OS CLI Commands</i>.</p> <p>plain-text-password—When using this option, the command-line interface (CLI) prompts you for the password and then encrypts it.</p> <p>no-public-keys—Disables public key authentication for the user specified.</p> <p>ssh-dsa "public-key"—SSH version 2 authentication. Specify the DSA public key. You can specify one or more public keys for each user.</p> <p>ssh-ecdsa "public-key"—SSH version 2 authentication. Specify the ECDSA public key. You can specify one or more public keys for each user.</p> <p>ssh-rsa "public-key"—SSH version 1 and SSH version 2 authentication. Specify the RSA public key. You can specify one or more public keys for each user.</p>
Required Privilege Level	admin —To view this statement in the configuration. admin-control —To add this statement to the configuration.

- Related Documentation**
- [Configuring Junos OS User Accounts by Using a Configuration Group on page 53](#)
 - *root-authentication*

authentication-order

Syntax	authentication-order [<i>method1 method2...</i>];
Hierarchy Level	[edit system]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the order in which the software tries different user authentication methods when attempting to authenticate a user. For each login attempt, the software tries the authentication methods in order, starting with the first one, until the password matches.
Default	If you do not include the authentication-order statement, users are verified based on their configured passwords.
Options	One or more of the following authentication methods listed in the order in which they must be tried: <ul style="list-style-type: none"> • password—Use the password configured for the user with the authentication statement at the [edit system login user] hierarchy level. • radius—Use RADIUS authentication services. • tacplus—Use TACACS+ authentication services.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Understanding User Authentication Methods</i>

backoff-factor

Syntax	<code>backoff-factor <i>seconds</i>;</code>
Hierarchy Level	<code>[edit system login retry-options]</code>
Release Information	Statement introduced in Junos OS Release 8.0.
Description	Configure the length of delay after each failed login attempt, which increases for each subsequent login attempt after the value specified in the backoff-threshold statement.
Options	<p><i>seconds</i>—Length of delay after each failed login attempt. The length of delay increases by this value for each subsequent login attempt after the value specified in the backoff-threshold option.</p> <p>Range: 5 through 10</p> <p>Default: 5</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57• retry-options on page 543

backoff-threshold

Syntax	<code>backoff-threshold <i>number</i>;</code>
Hierarchy Level	<code>[edit system login retry-options]</code>
Release Information	Statement introduced in Junos OS Release 8.0.
Description	Configure the threshold for the number of failed login attempts on the router before the user experiences a delay when attempting to reenter a password.
Options	<p><i>number</i>—Threshold for the number of failed login attempts before the user experiences a delay when attempting to reenter a password. Use the backoff-factor option to specify the length of delay, in seconds.</p> <p>Range: 1 through 3</p> <p>Default: 2</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57• retry-options on page 543

boot-file

Syntax	<code>boot-file <i>filename</i>;</code>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp pool], [edit system services dhcp static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For J Series Services Routers and EX Series switches only. Set the boot file advertised to DHCP clients. After the client receives an IP address and the boot file location from the DHCP server, the client uses the boot image stored in the boot file to complete DHCP setup.
Options	<i>filename</i> —The location of the boot file on the boot server. The filename can include a pathname.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • boot-server on page 463

boot-server (DHCP)

Syntax	<code>boot-server (<i>address</i> <i>hostname</i>);</code>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp pool], [edit system services dhcp static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the name of the boot server advertised to DHCP clients. The client uses a boot file located on the boot server to complete DHCP setup.
Options	<ul style="list-style-type: none"> • <i>address</i>—IP address of a DHCP boot server. • <i>hostname</i>—Hostname of a DHCP boot server.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • boot-file on page 463

change-type

Syntax	change-type (character-sets set-transitions);
Hierarchy Level	[edit system login password]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Set requirements for using character sets in plain-text passwords. When you combine this statement with the minimum-changes statement, you can check for the total number of character sets included in the password or for the total number of character-set changes in the password. Newly created passwords must meet these requirements.
Options	Specify one of the following: <ul style="list-style-type: none">• character-sets—The number of character sets in the password. Valid character sets include uppercase letters, lowercase letters, numbers, punctuation, and other special characters.• set-transitions—The number of transitions between character sets.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Special Requirements for Junos OS Plain-Text Passwords on page 345• minimum-changes on page 513

ciphers

Syntax	<code>ciphers [<i>cipher-1 cipher-2 cipher-3</i> ...]</code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Specify the set of ciphers the SSH server can use to perform encryption and decryption functions.
Options	<ul style="list-style-type: none"> • 3des-cbc—Triple Data Encryption Standard (DES) in Cipher Block Chaining (CBC) mode. • aes128-cbc—128-bit Advanced Encryption Standard (AES) in CBC mode. • aes128-ctr—128-bit AES in counter mode. • aes128-gcm@openssh.com—128-bit AES in Galois/Counter Mode. • aes192-cbc—192-bit AES in CBC mode. • aes192-ctr—192-bit AES in counter mode. • aes256-cbc—256-bit AES in CBC mode. • aes256-ctr—256-bit AES in counter mode. • aes256-gcm@openssh.com—256-bit AES in Galois/Counter Mode. • arcfour—128-bit RC4-stream cipher in CBC mode. • arcfour128—128-bit RC4-stream cipher in CBC mode. • arcfour256—256-bit RC4-stream cipher in CBC mode. • blowfish-cbc—128-bit blowfish-symmetric block cipher in CBC mode. • cast128-cbc—128-bit cast in CBC mode. • chacha20-poly1305@openssh.com—ChaCha20 stream cipher and Poly1305 MAC



NOTE: Ciphers represent a set. To configure SSH ciphers use the `set` command as shown in the following example:

```
user@host#set system services ssh ciphers [ aes256-cbc aes192-cbc ]
```

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring SSH Service for Remote Access to the Router or Switch on page 424 • key-exchange on page 501 • macs on page 509

circuit-type

Syntax	circuit-type;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> authentication username-include]</p>
Release Information	Statement introduced in Junos OS Release 9.1.
Description	Specify that the circuit type is concatenated with the username during the subscriber authentication process.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Using External AAA Authentication Services to Authenticate DHCP Clients on page 411

class (Assigning a Class to an Individual User)

Syntax	<code>class <i>class-name</i>;</code>
Hierarchy Level	[edit system login user <i>username</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Assign a user to a login class. You must assign each user to a login class.
Options	<i>class-name</i> —One of the classes defined at the [edit system login class] hierarchy level.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Junos OS User Accounts by Using a Configuration Group on page 53

class (Defining Login Classes)

Syntax	<pre>class <i>class-name</i> { allow-commands "<i>regular-expression</i>"; (allow-configuration allow-configuration-regexps) "<i>regular expression 1</i>" "<i>regular expression 2</i>"; configuration-breadcrumbs; deny-commands "<i>regular-expression</i>"; (deny-configuration deny-configuration-regexps) "<i>regular expression 1</i>" "<i>regular expression 2</i>"; idle-timeout <i>minutes</i>; login-script <i>filename</i>; login-tip; permissions [<i>permissions</i>]; }</pre>
Hierarchy Level	[edit system login]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Define a login class.
Options	<p><i>class-name</i>—A name you choose for the login class.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Defining Junos OS Login Classes on page 39• user on page 577


client-alive-count-max

Syntax	<code>client-alive-count-max <i>number</i>;</code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Configure the number of client alive messages that can be sent without sshd receiving any messages back from the client. If this threshold is reached while client alive messages are being sent, sshd will disconnect the client, terminating the session. Client alive messages are sent through the encrypted channel. Use in conjunction with client-alive-interval to disconnect unresponsive SSH clients.
Default	3 messages
Options	Range: 0 through 255
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring SSH Service for Remote Access to the Router or Switch on page 424

client-alive-interval

Syntax	<code>client-alive-interval <i>seconds</i>;</code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 12.1.
Description	Configure a timeout interval in seconds, after which if no data has been received from the client, sshd will send a message through the encrypted channel to request a response from the client. This option applies to SSH protocol version 2 only. Use in conjunction with client-alive-count-max to disconnect unresponsive SSH clients.
Default	0 seconds
Options	Range: 1 through 65535
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring SSH Service for Remote Access to the Router or Switch on page 424

connection-limit

Syntax	connection-limit <i>limit</i> ;
Hierarchy Level	[edit system services finger], [edit system services ftp], [edit system services netconf ssh], [edit system services ssh], [edit system services telnet], [edit system services xnm-clear-text], [edit system services xnm-ssl]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.
Description	Configure the maximum number of connections sessions for each type of system services (finger, ftp, ssh, telnet, xnm-clear-text, or xnm-ssl) per protocol (either IPv6 or IPv4).
Options	<i>limit</i> —(Optional) Maximum number of established connections per protocol (either IPv6 or IPv4). Range: 1 through 250 Default: 75
<div> NOTE: The actual number of maximum connections depends on the availability of system resources, and might be fewer than the configured connection-limit value if the system resources are limited.</div>	
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434• Configuring DTCP-over-SSH Service for the Flow-Tap Application on page 432• Configuring Finger Service for Remote Access to the Router on page 423• Configuring FTP Service for Remote Access to the Router or Switch on page 423• Configuring SSH Service for Remote Access to the Router or Switch on page 424• Configuring Telnet Service for Remote Access to a Router or Switch on page 422

delimiter (DHCP Local Server)


Syntax	<code>delimiter <i>delimiter-character</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server group group-name authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify the character used as the delimiter between the concatenated components of the username.
Options	<i>delimiter-character</i> —Character that separates components that make up the concatenated username. You cannot use the semicolon (;) as a delimiter.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>

- Related Documentation**
- [Using External AAA Authentication Services with DHCP](#)


deny-commands

Syntax	deny-commands "(regular-expression) (regular-expression1) (regular-expression2)...";
Hierarchy Level	[edit system login class]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Specify the operational mode commands that the user is denied permission to issue even though the permissions set with the permissions statement would allow it.</p> <p>When specifying extended regular expressions using the allow/deny-commands and allow/deny-configuration statements, each expression separated by a pipe () symbol must be a complete standalone expression, and must be enclosed in parentheses (). Do not use spaces between regular expressions separated with parentheses and connected with the pipe () symbol.</p>
Default	If you omit this statement and the allow-commands statement, users can issue only those commands for which they have access privileges through the permissions statement.
Options	regular-expression —Extended (modern) regular expression as defined in POSIX 1003.2. If the regular expression contains any spaces, operators, or wildcard characters, enclose it in quotation marks.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring User Permissions with Access Privileges for Operational Mode Commands on page 76• allow-commands on page 455• user on page 577

deny-configuration

Syntax	<code>deny-configuration "(regular-expression) (regular-expression1) (regular-expression2)...";</code>
Hierarchy Level	[edit system login class]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Explicitly deny configuration access to the specified levels in the hierarchy even if the permissions set with the permissions statement grant such access by default. Note that the user cannot view a particular hierarchy if configuration access is denied for that hierarchy.</p> <p>When specifying extended regular expressions using the allow/deny-commands and allow/deny-configuration statements, each expression separated by a pipe () symbol must be a complete standalone expression, and must be enclosed in parentheses (). Do not use spaces between regular expressions separated with parentheses and connected with the pipe () symbol.</p>
	<p> NOTE: The allow/deny-configuration and allow/deny-configuration-regexps statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the allow/deny-configuration statement, or the allow/deny-configuration-regexps statement. If you have existing configurations using the allow/deny-configuration statements, using the same configuration options with the allow/deny-configuration-regexps statements might not produce the same results, as the search and match methods differ in the two forms of these statements.</p>
Default	If you omit this statement and the allow-configuration statement, users can edit those levels in the configuration hierarchy for which they have access privileges through the permissions statement.
Options	<p>regular-expression—Extended (modern) regular expression as defined in POSIX 1003.2. If the regular expression contains any spaces, operators, or wildcard characters, enclose it in quotation marks.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring User Permissions with Access Privileges for Operational Mode Commands, Configuration Statements, and Hierarchies on page 99 • allow-configuration on page 456 • user on page 577

deny-configuration-regexps

Syntax	<code>deny-configuration-regexps ["regular expression 1" "regular expression 2"];</code>
Hierarchy Level	[edit system login class class-name]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	<p>Explicitly deny configuration access to specified hierarchies using regular expressions even if the permissions set with the permissions statement allow that access.</p> <p>Expressions configured with this statement take precedence over allow-configuration-regexps if the two statements are used in the same login class definition.</p>
	<div> NOTE: The allow/deny-configuration and allow/deny-configuration-regexps statements are mutually exclusive and cannot be configured together for a login class. At a given point in time, a login class can include either the allow/deny-configuration statement, or the allow/deny-configuration-regexps statement. If you have existing configurations using the allow/deny-configuration statements, using the same configuration options with the allow/deny-configuration-regexps statements might not produce the same results, as the search and match methods differ in the two forms of these statements.</div>
Default	If you do not configure this statement or the deny-configuration-regexps statement, users can edit only those commands for which they have access privileges set with the permissions statement.
Options	regular expression —Extended (modern) regular expression as defined in POSIX 1003.2. If the regular expression contains any spaces, operators, or wildcard characters, enclose it in quotation marks. Enter as many expressions as needed.
Required Privilege Level	admin —To view this statement in the configuration. admin-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring User Permissions with Access Privileges for Configuration Statements and Hierarchies on page 87• allow-configuration-regexps on page 457• user on page 577

destination (Accounting)

```
Syntax destination {
    radius {
        server {
            server-address {
                accounting-port port-number;
                retry number;
                secret password;
                source-address address;
                source-address-inet6 IPv6-source-address;
                timeout seconds;
            }
        }
    }
    tacplus {
        server {
            server-address {
                port port-number;
                secret password;
                single-connection;
                timeout seconds;
            }
        }
    }
}
```

Hierarchy Level [edit system [accounting](#)]

Release Information Statement introduced before Junos OS Release 7.4.
radius statement added in Junos OS Release 7.4.
 Statement introduced in Junos OS Release 9.0 for EX Series switches.
 Statement introduced in Junos OS Release 11.1 for the QFX Series.
 Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description Configure the authentication server.

Options **source-address-inet6 IPv6-source-address**—A valid IPv6 address configured on one of the routers or switch interfaces.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
 system-control—To add this statement to the configuration.

Related Documentation

- [Configuring RADIUS System Accounting on page 363](#)
- [Configuring TACACS+ System Accounting on page 379](#)

dhcp

```
Syntax  dhcp {
        boot-file filename;
        boot-server (address | hostname);
        default-lease-time seconds;
        domain-name domain-name;
        domain-search [domain-list];
        maximum-lease-time seconds;
        name-server {
            address;
        }
        next-server next-server
        option option-identifier-code ;
        pool address/prefix-length {
            address-range {
                low address;
                high address;
            }
            exclude-address {
                address;
            }
        }
        router {
            address;
        }
        static-binding mac-address {
            fixed-address {
                address;
            }
            host-name hostname;
            client-identifier (ascii client-id | hexadecimal client-id);
        }
        wins-server {
            address;
        }
    }
```

Hierarchy Level [edit system services]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a router, or a switch as a DHCP server. A DHCP server can allocate network addresses and deliver configuration information to client hosts on a TCP/IP network.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- [System Management Configuration Statements on page 444](#)
- [Example: Complete DHCP Server Configuration on page 400](#)

dhcpv6 (DHCP Local Server)

```

Syntax  dhcpv6 {
        access-profile profile-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                client-id;
                delimiter delimiter-character;
                domain-name domain-name-string;
                logical-system-name;
                relay-agent-interface-id;
                relay-agent-remote-id;
                relay-agent-subscriber-id;
                routing-instance-name;
                user-prefix user-prefix-string;
            }
        }
        duplicate-clients incoming-interface;
        group group-name {
            access-profile profile-name;
            authentication {
                ...
            }
            interface interface-name {
                access-profile profile-name;
                exclude;
                liveness-detection {
                    failure-action (clear-binding | clear-binding-if-interface-up | log-only);
                    method {
                        bfd {
                            version (0 | 1 | automatic);
                            minimum-interval milliseconds;
                            minimum-receive-interval milliseconds;
                            multiplier number;
                            no-adaptation;
                            transmit-interval {
                                minimum-interval milliseconds;
                                threshold milliseconds;
                            }
                            detection-time {
                                threshold milliseconds;
                            }
                        }
                        session-mode (automatic | multihop | singlehop);
                        holddown-interval milliseconds;
                    }
                }
            }
        }
        overrides {
            client-negotiation-match incoming-interface;
            delete-binding-on-renegotiation;
            interface-client-limit number;
            multi-address-embedded-option-response;
            process-inform {

```

```
        pool pool-name;
    }
    rapid-commit;
}
service-profile dynamic-profile-name;
trace;
upto upto-interface-name;
}
overrides {
    client-negotiation-match incoming-interface;
    delegated-pool;
    delete-binding-on-renegotiation;
    interface-client-limit number;
    multi-address-embedded-option-response;
    process-inform {
        pool pool-name;
    }
    rapid-commit;
}
route-suppression;
service-profile dynamic-profile-name;
}
liveness-detection {
    failure-action (clear-binding | clear-binding-if-interface-up | log-only);
    method {
        bfd {
            version (0 | 1 | automatic);
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
            detection-time {
                threshold milliseconds;
            }
            session-mode (automatic | multihop | singlehop);
            holddown-interval milliseconds;
        }
    }
}
overrides {
    client-negotiation-match incoming-interface;
    delegated-pool;
    delete-binding-on-renegotiation;
    delete-binding-on-renegotiation;
    interface-client-limit number;
    multi-address-embedded-option-response;
    process-inform {
        pool pool-name;
    }
    rapid-commit;
    reconfigure {
        attempts attempt-count;
    }
}
```

```

        clear-on-abort;
        strict;
        timeout timeout-value;
        token token-value;
        trigger {
            radius-disconnect;
        }
    }
}
reconfigure {
    attempts attempt-count;
    clear-on-abort;
    strict;
    timeout timeout-value;
    token token-value;
    trigger {
        radius-disconnect;
    }
}
requested-ip-network-match subnet-mask;
route-suppression;
server-duid-type type;
service-profile dynamic-profile-name;
}

```

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services [dhcp-local-server](#)],
[edit logical-systems *logical-system-name* system services [dhcp-local-server](#)],
[edit routing-instances *routing-instance-name* system services [dhcp-local-server](#)],
[edit system services [dhcp-local-server](#)]

Release Information Statement introduced in Junos OS Release 9.6.
Statement introduced in Junos OS Release 12.3 for EX Series switches.

Description Configure DHCPv6 local server options on the router or switch and enable the router or switch to function as a server for the DHCP protocol for IP version 6 (IPv6). The DHCPv6 local server sends and receives packets using the IPv6 protocol and informs IPv6 of the routing requirements of router clients. The local server works together with the AAA service framework to control subscriber access (or DHCP client access) and accounting.

The DHCPv6 local server is fully compatible with the extended DHCP local server and DHCP relay agent.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation • [DHCPv6 Local Server Overview](#)

dhcp-local-server

```
Syntax  dhcp-local-server {
        access-profile profile-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                delimiter delimiter-character;
                domain-name domain-name-string;
                interface-name;
                logical-system-name;
                mac-address;
                option-60;
                option-82 <circuit-id> <remote-id>;
                routing-instance-name;
                user-prefix user-prefix-string;
            }
        }
        dhcpv6 {
            access-profile profile-name;
            authentication {
                ...
            }
            duplicate-clients incoming-interface;
            group group-name {
                access-profile profile-name;
                authentication {
                    ...
                }
            }
            interface interface-name {
                access-profile profile-name;
                exclude;
                liveness-detection {
                    failure-action (clear-binding | clear-binding-if-interface-up | log-only);
                    method {
                        bfd {
                            version (0 | 1 | automatic);
                            minimum-interval milliseconds;
                            minimum-receive-interval milliseconds;
                            multiplier number;
                            no-adaptation;
                            transmit-interval {
                                minimum-interval milliseconds;
                                threshold milliseconds;
                            }
                        }
                        detection-time {
                            threshold milliseconds;
                        }
                        session-mode (automatic | multihop | singlehop);
                        holddown-interval milliseconds;
                    }
                }
            }
        }
    }
```

```

    overrides {
        interface-client-limit number;
        multi-address-embedded-option-response;
        process-inform {
            pool pool-name;
        }
        rapid-commit;
    }
    service-profile dynamic-profile-name;
    trace;
    upto upto-interface-name;
}
overrides {
    delegated-pool;
    interface-client-limit number;
    multi-address-embedded-option-response;
    process-inform {
        pool pool-name;
    }
    rapid-commit;
}
route-suppression;
server-duid-type type;
service-profile dynamic-profile-name;
}
liveness-detection {
    failure-action (clear-binding | clear-binding-if-interface-up | log-only);
    method {
        bfd {
            version (0 | 1 | automatic);
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
            detection-time {
                threshold milliseconds;
            }
            session-mode (automatic | multihop | singlehop);
            holddown-interval milliseconds;
        }
    }
}
overrides {
    delegated-pool;
    include-option-82 {
        forcerenew;
        nak;
    }
    interface-client-limit number;
    multi-address-embedded-option-response;
    process-inform {
        pool pool-name;
    }
}

```

```

    }
    rapid-commit;
}
reconfigure {
    attempts attempt-count;
    clear-on-abort;
    strict;
    timeout timeout-value;
    token token-value;
    trigger {
        radius-disconnect;
    }
}
route-suppression;
service-profile dynamic-profile-name;
}
duplicate-clients-in-subnet (incoming-interface | option-82);
dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
forward-snooped-clients (all-interfaces | configured-interfaces |
    non-configured-interfaces);
group group-name {
    authentication {
        ...
    }
}
dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
interface interface-name {
    exclude;
    liveness-detection {
        failure-action (clear-binding | clear-binding-if-interface-up | log-only);
        method {
            bfd {
                version (0 | 1 | automatic);
                minimum-interval milliseconds;
                minimum-receive-interval milliseconds;
                multiplier number;
                no-adaptation;
                transmit-interval {
                    minimum-interval milliseconds;
                    threshold milliseconds;
                }
                detection-time {
                    threshold milliseconds;
                }
                session-mode (automatic | multihop | singlehop);
                holddown-interval milliseconds;
            }
        }
    }
}
overrides {
    client-discover-match (option60-and-option82 | incoming-interface);
    include-option-82 {
        forcerenew;
        nak;
    }
}

```

```

        interface-client-limit number;
        process-inform {
            pool pool-name;
        }
    }
    service-profile dynamic-profile-name;
    trace;
    upto upto-interface-name;
}
overrides {
    client-discover-match (option60-and-option82 | incoming-interface);
    include-option-82 {
        forcerenew;
        nak;
    }
    interface-client-limit number;
    process-inform {
        pool pool-name;
    }
}
requested-ip-network-match subnet-mask
route-suppression;
service-profile dynamic-profile-name;
}
liveness-detection {
    failure-action (clear-binding | clear-binding-if-interface-up | log-only);
    method {
        bfd {
            version (0 | 1 | automatic);
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
        }
        detection-time {
            threshold milliseconds;
        }
        session-mode (automatic | multihop | singlehop);
        holddown-interval milliseconds;
    }
}
}
overrides {
    client-discover-match <option60-and-option82 | incoming-interface>;
    interface-client-limit number;
    process-inform {
        pool pool-name;
    }
}
}
pool-match-order {
    external-authority;
    ip-address-first;
    option-82;
}

```

```

}
reconfigure {
  attempts attempt-count;
  clear-on-abort;
  strict;
  timeout timeout-value;
  token token-value;
  trigger {
    radius-disconnect;
  }
}
requested-ip-network-match subnet-mask;
route-suppression;
service-profile dynamic-profile-name;
}

```

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services],
 [edit logical-systems *logical-system-name* system services],
 [edit routing-instances *routing-instance-name* system services],
 [edit system services]

Release Information Statement introduced in Junos OS Release 9.0.
 Statement introduced in Junos OS Release 12.1 for EX Series switches.
 Statement introduced in Junos OS Release 13.2X51 for the QFX Series.
 Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description Configure Dynamic Host Configuration Protocol (DHCP) local server options on the router or switch and enable the router or switch to function as an extended DHCP local server. The DHCP local server receives DHCP request and reply packets from DHCP clients and then responds with an IP address and other optional configuration information to the client.

The extended DHCP local server is incompatible with the DHCP server on J Series routers and so is not supported on J Series routers. Also, the DHCP local server and the DHCP/BOOTP relay server, which are configured under the **[edit forwarding-options helpers]** hierarchy level, cannot both be enabled on the router or switch at the same time. The extended DHCP local server is fully compatible with the extended DHCP relay feature.

The **dhcipv6** stanza configures the router or switch to support Dynamic Host Configuration Protocol for IPv6 (DHCPv6). The DHCPv6 local server is fully compatible with the extended DHCP local server and the extended DHCP relay feature.



NOTE: When you configure the **dhcp-local-server** statement at the routing instance hierarchy level, you must use a routing instance type of **virtual-router**.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
 system-control—To add this statement to the configuration.

- Related Documentation**
- *Extended DHCP Local Server Overview*
 - *DHCPv6 Local Server Overview*

domain-name (DHCP)

Syntax	<code>domain-name <i>domain-name</i>;</code>
Hierarchy Level	[edit system services dhcp [edit system services dhcp], [edit system services dhcp pool], [edit system services dhcp static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the name of the domain in which clients search for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified.
Options	<i>domain-name</i> —Name of the domain.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring a DHCP Server on Switches (CLI Procedure)</i>

domain-name (DHCP Local Server)

Syntax	<code>domain-name <i>domain-name-string</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit system services dhcp],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server group group-name authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify the domain name that is concatenated with the username during the subscriber authentication or DHCP client authentication process.
Options	<i>domain-name-string</i> —Domain name formatted string.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>

- Related Documentation**
- *Using External AAA Authentication Services with DHCP*

dynamic-profile-options

Syntax	dynamic-profile-options { versioning ; }
Hierarchy Level	[edit system]
Release Information	Statement introduced in Junos OS Release 11.4.
Description	Configure global dynamic profile options. The remaining statement is explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Enabling Dynamic Profiles to Use Multiple Versions</i>

enhanced-accounting

Syntax	enhanced-accounting;
Hierarchy Level	[edit system radius-options] [edit system tacplus-options],
Release Information	Statement introduced in Junos OS Release 14.1.
Description	Configure audit of TACACS+ or RADIUS authentication events such as access method, remote port, and access privileges.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • radius-options on page 539 • tacplus-options on page 562 • Configuring RADIUS System Accounting on page 363 • Configuring TACACS+ System Accounting on page 379

enhanced-avs-max

Syntax	enhanced-avs-max <i><number></i> ;
Hierarchy Level	[edit system accounting]
Release Information	Statement introduced in Junos OS Release 14.1.
Description	Configure the number of attribute values to be displayed.
Options	<i><number></i> —Number of attribute values. Range: 7 through 15 Default: 7
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• accounting on page 452• enhanced-accounting on page 487• Configuring RADIUS System Accounting on page 363• Configuring TACACS+ System Accounting on page 379

finger

Syntax	finger { connection-limit <i>limit</i> ; rate-limit <i>limit</i> ; }
Hierarchy Level	[edit system services]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Allow finger requests from remote systems to the local router. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Finger Service for Remote Access to the Router on page 423

flow-tap-dtcp

Syntax	<pre> flow-tap-dtcp { ssh { connection-limit <i>limit</i>; rate-limit <i>limit</i>; } } </pre>
Hierarchy Level	[edit system services]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	Configure Dynamic Tasking Control Protocol (DTCP) sessions to run over SSH in support of the flow-tap application. Note that the flow-tap feature is not supported on outbound, or egress, traffic. Only inbound, or ingress, traffic is supported.
Options	<p>connection-limit <i>limit</i>—(Optional) Maximum number of connections allowed. Range: 1 through 250 Default: 75</p> <p>rate-limit <i>limit</i>—(Optional) Maximum number of connection attempts allowed per minute. Range: 1 through 250 Default: 150</p>
Required Privilege Level	<p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring DTCP-over-SSH Service for the Flow-Tap Application on page 432

format

Syntax	<code>format (md5 sha1 sha256 sha512);</code>
Hierarchy Level	[edit system login password]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the authentication algorithm for plain-text passwords.
Default	For Junos OS, the default encryption format is md5 . For Junos-FIPS software, the default encryption format is sha1 .
Options	The hash algorithm that authenticates the password can be one of these algorithms: <ul style="list-style-type: none">• md5—Produces a 128-bit digest.• sha1—Produces a 160-bit digest.• sha256—Produces a 256-bit digest.• sha512—Produces a 512-bit digest.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Special Requirements for Junos OS Plain-Text Passwords on page 345

ftp

Syntax	ftp { authentication-order [<i>authentication-methods</i>]; connection-limit <i>limit</i> ; rate-limit <i>limit</i> ; }
Hierarchy Level	[edit system services]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Allow FTP requests from remote systems to the local router or switch.
Options	The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring FTP Service for Remote Access to the Router or Switch on page 423

full-name

Syntax	full-name <i>complete-name</i> ;
Hierarchy Level	[edit system login user]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.
Description	Configure the complete name of a user.
Options	<i>complete-name</i> —Full name of the user. If the name contains spaces, enclose it in quotation marks.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Junos OS User Accounts by Using a Configuration Group on page 53 • user on page 577

group (DHCP Local Server)

```
Syntax  group group-name {
        access-profile profile-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                client-id;
                delimiter delimiter-character;
                domain-name domain-name-string;
                logical-system-name;
                mac-address;
                option-60;
                option-82 <circuit-id> <remote-id>;
                relay-agent-interface-id
                relay-agent-remote-id;
                relay-agent-subscriber-id;
                routing-instance-name;
                user-prefix user-prefix-string;
            }
        }
        dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
            primary-profile-name>;
        interface interface-name {
            access-profile profile-name;
            exclude;
            overrides {
                client-discover-match <option60-and-option82>;
                client-negotiation-match incoming-interface;
                interface-client-limit number;
                process-inform {
                    pool pool-name;
                }
                rapid-commit;
            }
            service-profile dynamic-profile-name;
            trace;
            upto upto-interface-name;
        }
        liveness-detection {
            failure-action (clear-binding | clear-binding-if-interface-up | log-only);
            method {
                bfd {
                    version (0 | 1 | automatic);
                    minimum-interval milliseconds;
                    minimum-receive-interval milliseconds;
                    multiplier number;
                    no-adaptation;
                    transmit-interval {
                        minimum-interval milliseconds;
                        threshold milliseconds;
                    }
                }
                detection-time {
```

```

        threshold milliseconds;
    }
    session-mode(automatic | multihop | singlehop);
    holddown-interval milliseconds;
}
}
}
overrides {
    client-discover-match <option60-and-option82>;
    client-negotiation-match incoming-interface;
    delegated-pool;
    delete-binding-on-renegotiation;
    interface-client-limit number;
    process-inform {
        pool pool-name;
    }
    rapid-commit;
}
reconfigure {
    attempts attempt-count;
    clear-on-abort;
    strict;
    timeout timeout-value;
    token token-value;
    trigger {
        radius-disconnect;
    }
}
route-suppression;
service-profile dynamic-profile-name;
}

```

Hierarchy Level	<p>[edit system services dhcp-local-server], [edit system services dhcp-local-server dhcpv6], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...], [edit logical-systems <i>logical-system-name</i> system services dhcp-local-server ...], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.0. Statement introduced in Junos OS Release 12.1 for EX Series switches.</p>
Description	Configure a group of interfaces that have a common configuration, such as authentication parameters. A group must contain at least one interface.
Options	<p><i>group-name</i>—Name of the group.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration. system-control—To add this statement to the configuration.</p>

- Related Documentation**
- *Extended DHCP Local Server Overview*
 - *Grouping Interfaces with Common DHCP Configurations*
 - *Using External AAA Authentication Services with DHCP*
 - *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*


http

- Syntax** `http {
 interfaces [interface-names];
 port port;
}`
- Hierarchy Level** [edit [system services web-management](#)]
- Release Information** Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
- Description** Configure the port and interfaces for HTTP service, which is unencrypted.
- Options** **interfaces [*interface-names*]**—Name of one or more interfaces on which to allow the HTTP service. By default, HTTP access is allowed through built-in Fast Ethernet or Gigabit Ethernet interfaces only.
- The remaining statement is explained separately.
- Required Privilege Level** **system**—To view this statement in the configuration.
system-control—To add this statement to the configuration.
- Related Documentation**
- *Configuring Management Access for the EX Series Switch (J-Web Procedure)*
 - *J-Web Interface User Guide*
 - [https on page 495](#)
 - [port on page 534](#)
 - [web-management on page 582](#)

https

Syntax	<pre>https { interfaces [<i>interface-names</i>]; local-certificate <i>name</i>; port <i>port</i>; }</pre>
Hierarchy Level	[edit system services web-management]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
Description	Configure the secure version of HTTP (HTTPS) service, which is encrypted.
Options	<p>interfaces [<i>interface-names</i>]—Name of one or more interfaces on which to allow the HTTPS service. By default, HTTPS access is allowed through any ingress interface, but HTTP access is allowed through built-in Fast Ethernet or Gigabit Ethernet interfaces only.</p> <p>local-certificate <i>name</i>—Name of the X.509 certificate for a Secure Sockets Layer (SSL) connection. An SSL connection is configured at the [edit security certificates local] hierarchy.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring Management Access for the EX Series Switch (J-Web Procedure)</i> • <i>J-Web Interface User Guide</i> • http on page 494 • port on page 534 • web-management on page 582

hostkey-algorithm

Syntax	hostkey-algorithm (<i>algorithm</i> <i>no-algorithm</i>);
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 11.2. (<i>algorithm</i> <i>no-algorithm</i>) statements introduced in Junos OS Release 12.2.
Description	Allow or disallow a host-key signature algorithm for the SSH host to use to authenticate another host.
Options	<p><i>algorithm</i>—Allow the following host-key signature algorithms:</p> <ul style="list-style-type: none">• <i>ssh-ecdsa</i>—Allow generation of an ECDSA host-key.• <i>ssh-dss</i>—Allow generation of a 1024-bit DSA host-key. <div> NOTE: DSA keys are not supported in FIPS, so the <i>ssh-dss</i> option is not available on systems operating in FIPS mode.</div> <ul style="list-style-type: none">• <i>ssh-rsa</i>—Allow generation of an RSA host-key. <p><i>no-algorithm</i>—Do not allow the following host-key signature algorithms:</p> <ul style="list-style-type: none">• <i>no-ssh-dss</i>—Do not allow generation of a 1024-bit Digital Signature Algorithm (DSA) host-key.• <i>no-ssh-ecdsa</i>—Do not allow generation of an Elliptic Curve Digital Signature Algorithm (ECDSA) host-key.• <i>no-ssh-rsa</i>—Do not allow generation of an RSA host-key.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Generating an SSL Certificate Using the openssl Command</i>• <i>Generating a Self-Signed SSL Certificate</i>

idle-timeout (System-Login)

Syntax	<code>idle-timeout <i>minutes</i>;</code>
Hierarchy Level	[edit system login class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For a login class, configure the maximum time that a session can be idle before the user is logged out of the router or switch. The session times out after remaining at the CLI operational mode prompt for the specified time.
Default	If you omit this statement, a user is never forced off the system after extended idle times.



NOTE: After you log in to a device from a shell prompt such as `csch`, if you start another program to run in the foreground of the CLI, the idle timer control is stopped from being computed. The calculation of idle time of the CLI session is restarted only after the foreground process exits and the control is returned to the shell prompt. When the restart of the idle-timer occurs, if no interaction from the user occurs on the shell, the user is automatically logged out after the expiry of the idle timeout value.

Options *minutes*—Maximum idle time.
Range: 0 through 4294967295 minutes




NOTE: The timeout feature is disabled if the value of *minutes* is set to 0.

Required Privilege Level `admin`—To view this statement in the configuration.
`admin-control`—To add this statement to the configuration.

Related Documentation

- [Configuring the Timeout Value for Idle Login Sessions on page 41](#)
- [user on page 577](#)

interface (DHCP Local Server)

Syntax	<pre> interface <i>interface-name</i> { access-profile <i>profile-name</i>; exclude; overrides { client-discover-match <option60-and-option82 incoming-interface>; client-negotiation-match incoming-interface; interface-client-limit <i>number</i>; rapid-commit; } service-profile <i>dynamic-profile-name</i>; trace; upto <i>upto-interface-name</i>; } </pre>
Hierarchy Level	<p>[edit system services dhcp-local-server group <i>group-name</i>],</p> <p>[edit system services dhcp-local-server dhcpv6 <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server ...],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.0.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Options upto and exclude introduced in Junos OS Release 9.1.</p>
Description	<p>Specify one or more interfaces, or a range of interfaces, that are within a specified group on which the DHCP local server is enabled. You can repeat the interface <i>interface-name</i> statement to specify multiple interfaces within a group, but you cannot specify the same interface in more than one group. Also, you cannot use an interface that is being used by the DHCP relay agent.</p>
<div>  <p>NOTE: DHCP values are supported in Integrated Routing and Bridging (IRB) configurations. When you configure an IRB interface in a network that is using DHCP, the DHCP information (for example, authentication, address assignment, and so on) is propagated in the associated bridge domain. This enables the DHCP server to configure client IP addresses residing within the bridge domain. IRB currently only supports static DHCP configurations.</p> </div>	
Options	<p>exclude—Exclude an interface or a range of interfaces from the group. This option and the overrides option are mutually exclusive.</p> <p>interface-name—Name of the interface. You can repeat this option multiple times.</p> <p>upto-interface-name—Upper end of the range of interfaces; the lower end of the range is the interface-name entry. The interface device name of the upto-interface-name must be the same as the device name of the interface-name.</p>

The remaining statements are explained separately.

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Extended DHCP Local Server Overview</i> • <i>Grouping Interfaces with Common DHCP Configurations</i> • <i>Using External AAA Authentication Services with DHCP</i>

idle-timeout (System)

Syntax	<code>idle-timeout <i>idle-timeout</i>;</code>
Hierarchy Level	[edit system login]
Release Information	Statement introduced in Junos OS Release 16.1 for the M Series, MX Series, and PTX Series. Statement introduced in Junos OS Release 15.1X49-D70 for the vSRX, SRX4100, SRX4200 and SRX1500 Series.
Description	Configure the maximum time for which the C shell or CLI console session can be idle. The user (including the root user) is logged out after the expiry of idle-timeout .
Options	idle-timeout — Maximum idle time before logout. Range: 1 through 60 minutes
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.

ip-address-first

Syntax	ip-address-first;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server pool-match-order], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order], [edit system services dhcp-local-server pool-match-order]
Release Information	Statement introduced in Junos OS Release 9.0. Statement introduced in Junos OS Release 12.1 for EX Series switches.
Description	Configure the extended DHCP local server to use the IP address method to determine which address-assignment pool to use. The local server uses the IP address in the gateway IP address if one is present in the DHCP client PDU. If no gateway IP address is present, the local server uses the IP address of the receiving interface to find the address-assignment pool. The DHCP local server uses this method by default when no method is explicitly specified.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool to Use</i>• <i>Extended DHCP Local Server Overview</i>• <i>Address-Assignment Pools Overview</i>

key-exchange

Syntax	<code>key-exchange [algorithm1 algorithm2...];</code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 11.2. Support for curve25519-sha256 added in Junos OS Release 12.1X47-D10.
Description	Specify the set of Diffie-Hellman key exchange methods that the SSH server can use.
Options	<p>One or more of the following Diffie-Hellman key exchange methods:</p> <ul style="list-style-type: none"> • curve25519-sha256—The EC Diffie-Hellman key exchange method on Curve25519 with SHA2-256. • dh-group1-sha1—The Diffie-Hellman group1 algorithm using SHA-1. • dh-group14-sha1—The Diffie-Hellman group14 algorithm using SHA-1. • ecdh-sha2-nistp256—The ECDH key exchange method with ephemeral keys generated on the nistp256 curve. • ecdh-sha2-nistp384—The ECDH key exchange method with ephemeral keys generated on the nistp384 curve. • ecdh-sha2-nistp521—The ECDH key exchange method with ephemeral keys generated on the nistp521 curve. • group-exchange-sha1—The group exchange algorithm using SHA-1. • group-exchange-sha2—The group exchange algorithm using SHA-2.



NOTE: The key-exchange represents a set. To configure key-exchange:

```
user@host#set system services ssh key-exchange [ecdh-sha2-nistp256
group-exchange-sha1]
```



NOTE: The following options are not available on systems operating in FIPS mode: group-exchange-sha1, dh-group14-sha1, and dh-group1-sha1.

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
---------------------------------	---

Related Documentation	<ul style="list-style-type: none"> • Configuring SSH Service for Remote Access to the Router or Switch on page 424 • ciphers on page 465 • macs on page 509
------------------------------	--

load-key-file

Syntax	<code>load-key-file URL filename;</code>
Hierarchy Level	[edit system root-authentication], [edit system login user <i>username</i> authentication]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description

NOTE: ECDSA is not supported on the QFabric system.

Load RSA (SSH version 1 and SSH version 2) and DSA or ECDSA (SSH version 2) public keys from a previously-generated named file at a specified URL location or local path. The file contains one or more SSH keys that are copied into the configuration when the command is issued.

Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Root Password on page 333• Configuring the Root Password• Configuring Junos OS User Accounts by Using a Configuration Group on page 53

local-certificate

Syntax	local-certificate <i>name</i> ;
Hierarchy Level	[edit system services service-deployment], [edit system services web-management https], [edit system services xnm-ssl], [edit system services extension-service request-response thrift]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced for the [edit system services extension-service request-response thrift] hierarchy level in Junos OS Release 16.1 for MX80, MX480, MX960, MX2010, MX2020, vMX, and PTX Series
Description	Import or reference an SSL certificate. Specify the name of the local certificate to use. There is no default for local-certificate . The value for local-certificate should be the same as the name provided during the import of the certificate using the CLI configuration statement local at the [edit security certificates] hierarchy level.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434 • <i>Importing SSL Certificates for Junos XML Protocol Support</i> • <i>local</i>

lockout-period

Syntax	lockout-period <i>minutes</i> ;
Hierarchy Level	[edit system login retry-options]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Configure the amount of time before the user can attempt to log in to the router after being locked out due to the number of failed login attempts specified in the tries-before-disconnect statement.
Options	<i>minutes</i> —Amount of time before the user can attempt to log in after being locked out. Default: Off Range: 1 through 43200
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of User Login Attempts for SSH and Telnet Sessions• Handling Authorization Failure on page 59• Example: Configuring System Retry Options on page 60• retry-options on page 543• <i>clear system login lockout</i>• <i>show system login lockout</i>

logical-system-name (DHCP Local Server)

Syntax	logical-system-name;
Hierarchy Level	<p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server group group-name authentication username-include]</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...]</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server ...],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server ...]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify that the logical system name be concatenated with the username during the subscriber authentication or DHCP client process. No logical system name is concatenated if the configuration is in the default logical system.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Using External AAA Authentication Services with DHCP</i>

login

```
Syntax login {
    announcement text;
    class class-name {
        allow-commands "regular-expression";
        allow-configuration-regexps "regular expression 1" "regular expression 2";
        configuration-breadcrumbs;
        deny-commands "regular-expression";
        ( deny-configuration | deny-configuration-regexps ) "regular expression 1" "regular
            expression 2 ";
        idle-timeout minutes;
        login-script filename;
        login-tip;
        permissions [ permissions ];
        satellite;
    }
    message text;
    password {
        change-type (set-transitions | character-set);
        format (md5 | sha1 | des);
        maximum-length length;
        minimum-changes number;
        minimum-length length;
    }
    retry-options {
        backoff-threshold number;
        backoff-factor seconds;
        minimum-time seconds;
        tries-before-disconnect number;
    }
    user username {
        full-name complete-name;
        uid uid-value;
        class class-name;
        authentication authentication;
        (encrypted-password "password" | plain-text-password);
        ssh-rsa "public-key";
        ssh-dsa "public-key";
    }
}
```

Hierarchy Level [edit system]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure user access to the router or switch.



NOTE: The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation • [Defining Junos OS Login Classes on page 39](#)

login-alarms

Syntax login-alarms;

Hierarchy Level [edit system login class *class-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 11.1 for the QFX Series.
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description Show system alarms automatically when an **admin** user logs in to the router or switch.

Options *class-name*—Login class name.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation • [Configuring System Alarms to Appear Automatically Upon Login on page 46](#)

login-script (Login)

Syntax login-script *filename*;

Hierarchy Level [edit system [login class](#) *class-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Execute the specified op script when a user belonging to the class logs in to the CLI. The script must be enabled in the configuration.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation • [Executing an Op Script](#)

mac-address (DHCP Local Server)

Syntax	mac-address;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server group group-name authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify that the MAC address from the client PDU be concatenated with the username during the subscriber authentication or DHCP client authentication process.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• <i>Using External AAA Authentication Services with DHCP</i>

macs

Syntax	<code>macs [algorithm1 algorithm2...]</code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 11.2. SHA-2 options introduced in Junos OS Release 12.1.
Description	Specify the set of message authentication code (MAC) algorithms that the SSH server can use to authenticate messages.
Options	<p>Specify one or more of the following MAC algorithms to authenticate messages:</p> <ul style="list-style-type: none"> • <code>hmac-md5</code>—Hash-based MAC using Message-Digest 5 (MD5) • <code>hmac-md5-96</code>—96-bits of hash-based MAC using MD5 • <code>hmac-md5-96-etm@openssh.com</code>—96-bits of hash-based Encrypt-then-MAC using MD5 • <code>hmac-md5-etm@openssh.com</code>—Hash-based Encrypt-then-MAC using MMD5 • <code>hmac-ripemd160</code>—Hash-based MAC using RIPEMD • <code>hmac-ripemd160-etm@openssh.com</code>—Hash-based Encrypt-then-MAC using RIPEMD • <code>hmac-sha1</code>—Hash-based MAC using secure hash algorithm-1 (SHA-1) • <code>hmac-sha1-96</code>—96-bits of hash-based MAC using SHA-1 • <code>hmac-sha1-96-etm@openssh.com</code>—96-bits of hash-based Encrypt-then-MAC using SHA-1 • <code>hmac-sha1-etm@openssh.com</code>—Hash-based Encrypt-then-MAC using SHA-1 • <code>hmac-sha2-256</code>—256-bits of hash-based MAC using secure hash algorithm-2 (SHA-2) • <code>hmac-sha2-256-etm@openssh.com</code>—Hash-based Encrypt-then-Mac using SHA-2 • <code>hmac-sha2-512</code>—512-bits of hash-based MAC using SHA-2 • <code>hmac-sha2-512-etm@openssh.com</code>—Hash-based Encrypt-then-Mac using SHA-2 • <code>umac-128-etm@openssh.com</code>—Encrypt-then-MAC using UMAC-128 algorithm specified in RFC4418 • <code>umac-128@openssh.com</code>—UMAC-128 algorithm specified in RFC4418 • <code>umac-64-etm@openssh.com</code>—Encrypt-then-MAC using UMAC-64 algorithm specified in RFC4418 • <code>umac-64@openssh.com</code>—UMAC-64 algorithm specified in RFC4418



NOTE: The *macs* configuration statement represents a set. Therefore, it must be configured as shown in the following example.

```
user@host#set system services ssh macs [hmac-md5 hmac-sha1]
```

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *System Configuration Statement Hierarchy*
- [key-exchange on page 501](#)
- [ciphers on page 465](#)

maximum-lease-time (DHCP)

Syntax maximum-lease-time *seconds*;

Hierarchy Level [edit system services [dhcp](#)],

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description For J Series Services Routers and EX Series switches only. Specify the maximum length of time in seconds for which a client can request and hold a lease on a DHCP server.

An exception is that the dynamic BOOTP lease length can exceed the maximum lease length specified.

Options *seconds*—The maximum number of seconds the lease can be held.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration

Related Documentation

- *default-lease-time*

maximum-length

Syntax	<code>maximum-length <i>length</i>;</code>
Hierarchy Level	[edit system login passwords]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Specify the maximum number of characters allowed in plain-text passwords. Newly created passwords must meet this requirement.
Default	For Junos-FIPS software, the maximum number of characters for plain-text passwords is 20. For Junos OS, no maximum is set.
Options	length —The maximum number of characters the password can include. Range: 1 to 64 characters
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Special Requirements for Junos OS Plain-Text Passwords on page 345 • Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340 • password (Login) on page 530

max-sessions-per-connection

Syntax	<code>max-sessions-per-connection <i>number</i></code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Release 11.4 of Junos OS.
Description	Specify the maximum number of ssh sessions allowed per single SSH connection.
Options	Default: 10
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring SSH Service for Remote Access to the Router or Switch on page 424 • ssh on page 558 • Junos OS Security Configuration Guide

maximum-time

Syntax	<code>maximum-time <i>seconds</i>;</code>
Hierarchy Level	<code>[edit system login retry-options]</code>
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Configure the maximum time available for the user to enter the username and password for logging on to a router before the connection is closed.
Options	<p><i>seconds</i>—Maximum length of time that the connection remains open for the user to enter a username and password to log in. If the user remains idle and does not enter a username and password within the configured maximum-time, the connection is closed.</p> <p>Range: 20 through 300</p> <p>Default: 120</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57• retry-options on page 543

minimum-changes

Syntax	<code>minimum-changes <i>number</i>;</code>
Hierarchy Level	[edit system login passwords]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Specify the minimum number of character sets (or character set changes) required in plain-text passwords. Newly created passwords must meet this requirement.</p> <p>This statement is used in combination with the change-type statement. If the change-type is character-sets, then the number of character sets included in the password is checked against the specified minimum. If change-type is set-transitions, then the number of character set changes in the password is checked against the specified minimum.</p>
Default	For Junos OS, the minimum number of changes is 1. For Junos-FIPS Software, the minimum number of changes is 3.
Options	<i>number</i> —The minimum number of character sets (or character set changes) required for the password.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Special Requirements for Junos OS Plain-Text Passwords on page 345 • change-type on page 464

minimum-length

Syntax	minimum-length <i>length</i> ;
Hierarchy Level	[edit system login passwords]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Specify the minimum number of characters required in plain-text passwords. Newly created passwords must meet this requirement.</p> <p>This statement can be used in combination with all of the other requirement options for plain-text passwords, such as minimum-upper-cases, minimum-punctuations, minimum-lower-cases, and so on.</p> <p>Using several password minimum requirement options will cause the minimum-length to be reset if the total sum of the required minimums exceeds the minimum-length setting.</p>
Default	For Junos OS, the minimum number of characters for plain-text passwords is six. For Junos-FIPS software, the minimum number of characters for plain-text passwords is 10.
Options	length —The minimum number of characters the password must include. Range: 6 to 20 characters
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Special Requirements for Junos OS Plain-Text Passwords on page 345• Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340• maximum-length on page 511

minimum-lower-cases

Syntax	<code>minimum-lower-cases <i>number</i>;</code>
Hierarchy Level	[edit system login password]
Release Information	Statement introduced in Junos OS Release 12.1. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	<p>Specify the minimum number of lower-case letters required in plain-text passwords. Newly created passwords must meet this requirement.</p> <p>This statement can be used in combination with all of the other requirement options for plain-text passwords, such as minimum-length, minimum-punctuations, minimum-upper-cases, and so on.</p> <p>Using several password minimum requirement options will cause the minimum-length to be reset if the total sum of the required minimums exceeds the minimum-length setting.</p>
Options	<i>number</i> —The minimum number of lower-case letters required for the password.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Special Requirements for Junos OS Plain-Text Passwords on page 345 • Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340 • password (Login) on page 530

minimum-numeric

Syntax	<code>minimum-numeric <i>number</i>;</code>
Hierarchy Level	[edit system login password]
Release Information	Statement introduced in Junos OS Release 12.1. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	<p>Specify the minimum number of numeric class characters required in plain-text passwords. Newly created passwords must meet this requirement.</p> <p>This statement can be used in combination with all of the other requirement options for plain-text passwords, such as minimum-length, minimum-punctuations, minimum-lower-cases, and so on.</p> <p>Using several password minimum requirement options will cause the minimum-length to be reset if the total sum of the required minimums exceeds the minimum-length setting.</p>
Options	<i>number</i> —The minimum number of numeric class characters required for the password.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Special Requirements for Junos OS Plain-Text Passwords on page 345• Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340• password (Login) on page 530

minimum-punctuations

Syntax	<code>minimum-punctuations <i>number</i>;</code>
Hierarchy Level	[edit system login password]
Release Information	Statement introduced in Junos OS Release 12.1. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	<p>Specify the minimum number of punctuation class characters required in plain-text passwords. Newly created passwords must meet this requirement.</p> <p>This statement can be used in combination with all of the other requirement options for plain-text passwords, such as minimum-length, minimum-upper-cases, minimum-lower-cases, and so on.</p> <p>Using several password minimum requirement options will cause the minimum-length to be reset if the total sum of the required minimums exceeds the minimum-length setting.</p>
Options	<i>number</i> —The minimum number of punctuation class characters required for the password.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Special Requirements for Junos OS Plain-Text Passwords on page 345 • Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340 • password (Login) on page 530

minimum-time

Syntax	minimum-time <i>seconds</i> ;
Hierarchy Level	[edit system login retry-options]
Release Information	Statement introduced in Junos OS Release 8.0.
Description	Configure the minimum time available for the user to enter a password to log on to a router before the connection is closed.
Options	<p><i>seconds</i>—Minimum length of time that the connection remains open while the user is attempting to enter a password to log in.</p> <p>Range: 20 through 60</p> <p>Default: 20</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57• retry-options on page 543


minimum-upper-cases

Syntax	<code>minimum-upper-cases <i>number</i>;</code>
Hierarchy Level	[edit system login password]
Release Information	Statement introduced in Junos OS Release 12.1. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	<p>Specify the minimum number of upper-case letters required in plain-text passwords. Newly created passwords must meet this requirement.</p> <p>This statement can be used in combination with all of the other requirement options for plain-text passwords, such as minimum-length, minimum-punctuations, minimum-lower-cases, and so on.</p> <p>Using several password minimum requirement options will cause the minimum-length to be reset if the total sum of the required minimums exceeds the minimum-length setting.</p>
Options	<i>number</i> —The minimum number of upper-case letters required for the password.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Special Requirements for Junos OS Plain-Text Passwords on page 345 • Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340 • password (Login) on page 530

next-server

Syntax	<code>next-server <i>next-server</i>;</code>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp pool <i>pool-id</i>], [edit system services dhcp static-binding <i>mac-address</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	(J Series Services Routers only) Specify the IP address for the next DHCP server used for communication after a DHCP boot client establishes initial contact.
Options	<i>next-server</i> —The IP address of the DHCP server that is used as the “siaddr” in a DHCP protocol packet.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring the Next DHCP Server to Contact After a Boot Client Establishes Initial Communication</i>

no-passwords

Syntax	<code>no-passwords;</code>
Hierarchy Level	[edit system services ssh]
Description	Disable ssh password based authentication.
<div> NOTE: Enabling this option under [edit system services ssh] applies to SSH login service and NETCONF running over ssh services.</div>	
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring SSH Service for Remote Access to the Router or Switch on page 424

no-public-keys

Syntax	no-public-keys;
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Junos OS Release 15.1.
Description	Disable public key authentication system wide. Another statement (system login user <i>username</i> authentication) is used to disable public key authentication by individual user.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • authentication on page 460 • ssh on page 558

no-tcp-forwarding

Syntax	no-tcp-forwarding
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced in Release 11.4 of Junos OS.
Description	Use this configuration option to prevent a user from creating an SSH tunnel over a CLI session to a Junos router via SSH. This type of tunnel could be used to forward TCP traffic, bypassing any firewall filters or ACLs, allowing access to resources beyond the router.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring SSH Service for Remote Access to the Router or Switch on page 424 • ssh on page 558 • <i>Junos OS Security Configuration Guide</i>

option (DHCP server)

Syntax	<pre>option { [(id-number option-type option-value) (id-number array option-type option-value)]; }</pre>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp pool], [edit system services dhcp static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure one or more user-defined options that are not included in the Junos default implementation of the DHCP server. For example, if a client requests a DHCP option that is not included in the DHCP server, you can create a user-defined option that enables the server to respond to the client's request.
Options	<ul style="list-style-type: none">• id-number—Any whole number. The ID number is used to index the option and must be unique across a DHCP server.• option-type—Any of the following types: byte, byte-stream, flag, integer, ip-address, short, string, unsigned-integer, unsigned-short.• array—An option can include an array of values.• option-value—Value associated with an option. The option value must be compatible with the option type (for example, an On or Off value for a flag type).
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Creating User-Defined DHCP Options Not Included in the Default Junos Implementation of the DHCP Server on page 399

option-60 (DHCP Local Server)

Syntax	option-60;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify that the payload of Option 60 (Vendor Class Identifier) from the client PDU be concatenated with the username during the subscriber authentication or DHCP client authentication process.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Using External AAA Authentication Services with DHCP</i>

option-82 (DHCP Local Server Authentication)

Syntax	<code>option-82 <circuit-id> <remote-id>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group <i>group-name</i> authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server group <i>group-name</i> authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	<p>Specify the type of Option 82 information from the client PDU that is concatenated with the username during the subscriber authentication or DHCP client authentication process. You can specify either, both, or neither of the Agent Circuit ID and Agent Remote ID suboptions. If you specify both, the Agent Circuit ID is supplied first, followed by a delimiter, and then the Agent Remote ID. If you specify that neither suboption is supplied, the raw payload of Option 82 from the PDU is concatenated to the username.</p>
Options	<p>circuit-id—(Optional) Agent Circuit ID suboption (suboption 1).</p> <p>remote-id—(Optional) Agent Remote ID suboption (suboption 2).</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> <i>Using External AAA Authentication Services with DHCP</i>

option-82 (DHCP Local Server Pool Matching)

Syntax	option-82;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order], [edit logical-systems <i>logical-system-name</i> system services dhcp-local-server pool-match-order], [edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server pool-match-order], [edit system services dhcp-local-server pool-match-order]
Release Information	Statement introduced in Junos OS Release 9.0. Statement introduced in Junos OS Release 12.3R2 for EX Series switches.
Description	Configure the extended DHCP local server to use the option 82 value in the DHCP client DHCP PDU together with the ip-address-first method to determine which address-assignment pool to use. You must configure the ip-address-first statement before configuring the option-82 statement. The DHCP local server first determines which address-assignment pool to use based on the ip-address-first method. Then, the local server matches the option 82 value in the client PDU with the option 82 configuration in the address-assignment pool. This statement is supported for IPv4 address-assignment pools only.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool to Use</i> • <i>Extended DHCP Local Server Overview</i> • <i>Address-Assignment Pools Overview</i>

outbound-ssh

Syntax	<pre> [edit system services] outbound-ssh { client <i>client-id</i> { address { port <i>port-number</i>; retry <i>number</i>; timeout <i>seconds</i>; } device-id <i>device-id</i>; keep-alive { retry <i>number</i>; timeout <i>seconds</i>; } reconnect-strategy (in-order sticky); secret <i>password</i>; services netconf; } traceoptions { file filename <files <i>number</i>> <match <i>regex</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i>; no-remote-trace; } } </pre>
Hierarchy Level	[edit system services]
Release Information	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
Description	Configure a router or switch running the Junos OS behind a firewall to communicate with client management applications on the other side of the firewall.
Default	To configure transmission of the router's or switch's device ID to the application, include the device-id statement at the [edit system services] hierarchy level.
Options	<p>client-id—Identifies the outbound-ssh configuration stanza on the router or switch. Each outbound-ssh stanza represents a single outbound SSH connection. This attribute is not sent to the client.</p> <p>device-id—Identifies the router or switch to the client during the initiation sequence.</p> <p>keep-alive—(Optional) When configured, specifies that the router or switch send keepalive messages to the management server. To configure the keepalive message, you must set both the timeout and retry attributes.</p> <p>reconnect-strategy—(Optional) Specify the method the router or switch uses to reestablish a disconnected outbound SSH connection. Two methods are available:</p>

- **in-order**—Specify that the router or switch first attempt to establish an outbound SSH session based on the management server address list. The router or switch attempts to establish a session with the first server on the list. If this connection is not available, the router or switch attempts to establish a session with the next server, and so on down the list until a connection is established.
- **sticky**—Specify that the router or switch first attempt to reconnect to the management server that it was last connected to. If the connection is unavailable, it attempts to establish a connection with the next client on the list and so forth until a connection is made.

retry—Number of keepalive messages the router or switch sends without receiving a response from the client before the current SSH connection is disconnected. The default is three messages.

secret—(Optional) Router's or switch's public SSH host key. If added to the **outbound-ssh** statement, during the initialization of the outbound SSH service, the router or switch passes its public key to the management server. This is the recommended method of maintaining a current copy of the router's or switch's public key.

timeout—Length of time that the Junos server waits for data before sending a keep alive signal. The default is 15 seconds.

When reconnecting to a client, the router or switch attempts to reconnect to the client based on the **retry** and **timeout** values for each client listed.

address—Hostname or the IPv4 address or IPv6 address of the NSM application server. You can list multiple clients by adding each client's IP address or hostname along with the following connection parameters:

- **port**—Outbound SSH port for the client. The default is port 22.
- **retry**—Number of times the router or switch attempts to establish an outbound SSH connection before giving up. The default is three tries.
- **timeout**—Length of time that the router or switch attempts to establish an outbound SSH connection before giving up. The default is fifteen seconds.



NOTE: Starting with Release 15.1, Junos OS supports outbound-SSH connections with devices having IPv6 addresses.

filename—(Optional) By default, the filename of the log file used to record the trace options is the name of the traced process (for example, **mib2d** or **snmpd**). Use this option to override the default value.

files—(Optional) Maximum number of trace files generated. By default, the maximum number of trace files is 10. Use this option to override the default value.

When a trace file reaches its maximum size, the system archives the file and starts a new file. The system archives trace files by appending a number to the filename in sequential order from 1 to the maximum value (specified by the default value or the options value set here). Once the maximum value is reached, the numbering sequence is restarted at 1, overwriting the older file.

size—(Optional) Maximum size of the trace file in kilobytes (KB). Once the maximum file size is reached, the system archives the file. The default value is 1000 KB. Use this option to override the default value.

match—(Optional) When used, the system only adds lines to the trace file that match the regular expression specified. For example, if the match value is set to **=error**, the system only records lines to the trace file that include the string **error**.

services—Services available for the session. Currently, NETCONF is the only service available.

world-readable | no-world-readable—(Optional) Whether the files are accessible by the originator of the trace operation only or by any user. By default, log files are only accessible by the user that started the trace operation (**no-world-readable**).

all | configuration | connectivity—(Optional) Type of tracing operation to perform.

all—Log all events.

configuration—Log all events pertaining to the configuration of the router or switch.

connectivity—Log all events pertaining to the establishment of a connection between the client server and the router or switch.

no-remote-trace—(Optional) Disable remote tracing.

Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.

Related Documentation	<ul style="list-style-type: none">• Configuring Outbound SSH Service on page 429• System Management Configuration Statements on page 444
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password (DHCP Local Server)

Syntax	<code>password password-string;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 group group-name authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group group-name authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication],</p> <p>[edit system services dhcp-local-server authentication],</p> <p>[edit system services dhcp-local-server dhcpv6],</p> <p>[edit system services dhcp-local-server dhcpv6 group group-name authentication],</p> <p>[edit system services dhcp-local-server group group-name authentication]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Configure the password that is sent to the external AAA authentication server for subscriber authentication or DHCP client authentication.
Options	<i>password-string</i> —Authentication password.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Using External AAA Authentication Services with DHCP</i>

password (Login)

Syntax	<pre>password { change-type (set-transitions character-set); format (md5 sha1 sha256 sha512); maximum-length length; minimum-changes number; minimum-length length; minimum-lower-cases number; minimum-numeric number; minimum-punctuations number; minimum-upper-cases number; }</pre>
Hierarchy Level	[edit system login]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Configure special requirements such as character length and encryption format for plain-text passwords. Newly created passwords must meet these requirements.</p> <p>Using several password minimum requirement options will cause the minimum-length to be reset if the total sum of the required minimums exceeds the minimum-length setting.</p> <p>The individual statements are explained separately.</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Special Requirements for Junos OS Plain-Text Passwords on page 345• Example: Changing the Requirements for Junos OS Plain-Text Passwords on page 340

permissions

Syntax	<code>permissions [<i>permissions</i>];</code>
Hierarchy Level	[edit system login class]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the login access privileges to be provided on the router or switch.
Options	<i>permissions</i> —Privilege type. For a list of permission flag types, see Table 4 on page 26 .
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring User Permissions with Access Privilege Levels on page 65• user on page 577

pool (System)

Syntax	<pre>pool address/prefix-length { address-range { low address; high address; } exclude-address { address; } }</pre>
Hierarchy Level	[edit system services dhcp],
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For J Series Services Routers and EX Series switches only. Configure a pool of IP addresses for DHCP clients on a subnet. When a client joins the network, the DHCP server dynamically allocates an IP address from this pool.
Options	<p>address-range—Lowest and highest IP addresses in the pool that are available for dynamic address assignment. If no range is specified, the pool will use all available addresses within the subnet specified. (Broadcast addresses, interface addresses, and excluded addresses are not available.)</p> <p>exclude-address—Addresses within the range that are not used for dynamic address assignment. You can exclude one or more addresses within the range.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"><i>address-assignment (Address-Assignment Pools)</i>


pool-match-order

Syntax	<pre>pool-match-order { external-authority; ip-address-first; option-82; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server],</p> <p>[edit system services dhcp-local-server]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.0.</p> <p>Statement introduced in Junos OS Release 12.1.</p>
Description	<p>Configure the order in which the DHCP local server uses information in the DHCP client PDU to determine how to obtain an address for the client.</p> <p>The remaining statements are explained separately.</p>
Default	DHCP local server uses the ip-address-first method to determine which address pool to use.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool to Use</i> • <i>Extended DHCP Local Server Overview</i>

port (HTTP/HTTPS)

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit system services web-management]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the port on which the HTTP or HTTPS service is connected.
Options	<i>port-number</i> —The TCP port number on which the specified service listens.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring Management Access for the EX Series Switch (J-Web Procedure)</i>• <i>J-Web Interface User Guide</i>• http on page 494• https on page 495• web-management on page 582

port (NETCONF)

Syntax	<code>port port-number;</code>
Hierarchy Level	[edit system services netconf]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Configure the TCP port used for NETCONF-over-SSH connections.
<div>  NOTE: <ul style="list-style-type: none"> The configured port accepts only NETCONF-over-SSH connections. Regular SSH session requests for this port are rejected. The default SSH port (22) continues to accept NETCONF sessions even with a configured NETCONF server port. To disable the SSH port from accepting NETCONF sessions, you can specify this in the login event script. We do not recommend configuring the default ports for FTP (21) and Telnet (23) services for configuring NETCONF-over-SSH connections. </div>	
Options	<p>port port-number—Port number on which to enable incoming NETCONF connections over SSH.</p> <p>Default: 830 (as specified in RFC 4742, <i>Using the NETCONF Configuration Protocol over Secure Shell (SSH)</i>)</p> <p>Range: 1 through 65535</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> <i>NETCONF XML Management Protocol Guide</i> Configuring NETCONF-Over-SSH Connections on a Specified TCP Port on page 433

port (RADIUS Server)

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit system radius-server <i>address</i>], [edit system accounting destination radius server <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	Configure the port number on which to contact the RADIUS server.
Options	<i>number</i> —Port number on which to contact the RADIUS server. Default: 1812 (as specified in RFC 2865)



NOTE: The [edit system accounting] hierarchy is not available on QFabric systems.

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS Server Authentication on page 355

port (SRC Server)

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit system services service-deployment servers <i>server-address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the port number on which to contact the SRC server.
Options	<i>port-number</i> —(Optional) The TCP port number for the SRC server. Default: 3333
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Junos OS to Work with SRC Software on page 435

port (TACACS+ Server)

Syntax	<code>port <i>port-number</i>;</code>
Hierarchy Level	[edit system accounting destination tacplus server <i>server-address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the port number on which to contact the TACACS+ server.
Options	<i>number</i> —Port number on which to contact the TACACS+ server. Default: 49
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring TACACS+ System Accounting on page 379


protocol-version

Syntax	<code>protocol-version [<i>v1 v2</i>];</code>
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.
Description	Specify the Secure Shell (SSH) protocol version.
Default	v2 —SSH protocol version 2 is the default, introduced in Junos OS Release 11.4.
Options	SSH protocol version v1 , v2 , or both.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the SSH Protocol Version on page 425

radius (System)

Syntax	<pre>radius { server { server-address { accounting-port port-number; secret password; source-address address; retry number; timeout seconds; } } }</pre>
Hierarchy Level	[edit system accounting destination]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	Configure the RADIUS accounting server.
Options	server-address —Address of the RADIUS accounting server. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS System Accounting on page 363

radius-options (edit system)

Syntax	<pre>radius-options { attributes { nas-ip-address <i>ip-address</i>; } enhanced-accounting; password-protocol <i>mschap-v2</i>; }</pre>
Hierarchy Level	[edit system]
Release Information	<p>Statement introduced in Junos OS Release 8.3.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>MS-CHAPv2 password protocol configuration option introduced in Junos OS Release 9.2.</p> <p>MS-CHAPv2 password protocol configuration option introduced in Junos OS Release 9.2 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.</p>
	<p> NOTE: The radius-options statement is not available on QFabric systems.</p>
	<p>enhanced-accounting statement introduced in Junos OS Release 14.1.</p>
Description	Configure RADIUS options for the NAS-IP address for outgoing RADIUS packets and password protocol used in RADIUS packets.
Options	<p>enhanced-accounting—View the attribute values of a logged in user.</p> <p>nas-ip-address <i>ip-address</i>—IP address of the network access server (NAS) that requests user authentication.</p> <p>password-protocol <i>mschap-v2</i>—Protocol MS-CHAPv2, used for password authentication and password changing.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring MS-CHAPv2 for Password-Change Support • Configuring RADIUS System Accounting on page 363 • enhanced-accounting on page 487

radius-server (System)

Syntax	<pre>radius-server { server-address { accounting-port port-number; port number; retry number; secret password; source-address source-address; timeout seconds; } }</pre>
Hierarchy Level	[edit system]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure a RADIUS server for Point-to-Point Protocol (PPP).</p> <p>To configure multiple RADIUS servers, include multiple radius-server statements. The servers are tried in order and in a round-robin fashion until a valid response is received from one of the servers or until all the configured retry limits are reached.</p>
Options	<p>server-address—Address of the RADIUS authentication server.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS Server Authentication on page 355

rate-limit

Syntax	<code>rate-limit <i>limit</i>;</code>
Hierarchy Level	<code>[edit system services finger],</code> <code>[edit system services ftp],</code> <code>[edit system services netconf ssh],</code> <code>[edit system services ssh],</code> <code>[edit system services telnet],</code> <code>[edit system services tftp-server],</code> <code>[edit system services xnm-clear-text],</code> <code>[edit system services xnm-ssl]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	Configure the maximum number of connections attempts per minute, per protocol (either IPv6 or IPv4) on an access service. For example, a rate limit of 10 allows 10 IPv6 telnet session connection attempts per minute and 10 IPv4 telnet session connection attempts per minute.
Default	150 connections
Options	<p>rate-limit <i>limit</i>—(Optional) Maximum number of connection attempts allowed per minute, per IP protocol (either IPv4 or IPv6).</p> <p>Range: 1 through 250</p> <p>Default: 150</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434

retry (RADIUS)

Syntax	<code>retry number;</code>
Hierarchy Level	[edit system radius-server server-address], [edit system accounting destination radius server <i>server-address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Number of times the router or switch is allowed to try to contact a RADIUS authentication or accounting server.
Options	<i>number</i> —Number of retries allowed for contacting a RADIUS server. Range: 1 through 10 Default: 3
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS Server Authentication on page 355• Configuring RADIUS System Accounting on page 363• timeout on page 565

retry-options

Syntax	<pre> retry-options { backoff-factor <i>seconds</i>; backoff-threshold <i>number</i>; maximum-time <i>seconds</i>; minimum-time <i>seconds</i>; tries-before-disconnect <i>number</i>; } </pre>
Hierarchy Level	[edit system login]
Release Information	<p>Statement introduced in Junos OS Release 8.0.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>maximum-time option introduced in Junos OS Release 9.6.</p> <p>maximum-time option introduced in Junos OS Release 9.6 for EX Series switches.</p>
Description	Maximum number of times a user can attempt to enter a password while logging in through SSH or Telnet before being disconnected.
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57 • rate-limit on page 541 • lockout-period on page 504

root-login

Syntax	root-login (allow deny deny-password);
Hierarchy Level	[edit system services ssh]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.
Description	Control user access through SSH.
Default	root-login deny-password is the default.
Options	allow —Allow users to log in to the router or switch as root through SSH. deny —Disable users from logging in to the router or switch as root through SSH. deny-password —Allow users to log in to the router or switch as root through SSH when the authentication method (for example, RSA authentication) does not require a password.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Root Login Through SSH on page 425

router

Syntax	<pre>router { address; }</pre>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp], [edit system services dhcp-service], [edit system services dhcp-service pool], [edit system services dhcp-service static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement for EX Series switches introduced in Junos OS Release 9.0.
Description	For J Series Services Routers and EX Series switches only, specify IPv4 addresses for one or more devices available to a DHCP client. List devices (switches or routers) in order of preference.
Options	address —IPv4 address of the router or switch. To configure multiple devices, include multiple address options.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring a DHCP Server on Switches (CLI Procedure)</i>

routing-instance-name (DHCP Local Server)

Syntax	routing-instance-name;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server group group-name authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify that the routing instance name be concatenated with the username during the subscriber authentication or DHCP client authentication process. No routing instance name is concatenated if the configuration is in the default routing instance.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>

- Related Documentation**
- *Using External AAA Authentication Services with DHCP*

secret

Syntax	<code>secret password;</code>
Hierarchy Level	[edit system accounting destination radius server <i>server-address</i>], [edit system accounting destination tacplus server <i>server-address</i>], [edit system radius-server <i>server-address</i>], [edit system tacplus-server <i>server-address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the password to use with the RADIUS or TACACS+ server. The secret password used by the local router or switch must match that used by the server.
Options	<i>password</i> —Password to use; can include spaces included in quotation marks.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring RADIUS Server Authentication on page 355 • Configuring TACACS+ Authentication on page 373 • Configuring TACACS+ System Accounting on page 379 • Configuring RADIUS System Accounting on page 363

server (RADIUS Accounting)

Syntax	<pre>server { server-address { accounting-port port-number; retry number secret password; source-address address; timeout seconds; } }</pre>
Hierarchy Level	[edit system accounting destination radius]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Support for the source-address-inet6 statement introduced in Junos OS Release 14.1X53-D10 for EX Series switches.
Description	Configure RADIUS logging. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS System Accounting on page 363

server (TACACS+ Accounting)

Syntax	<pre>server { server-address { port port-number; secret password; single-connection; timeout seconds; } }</pre>
Hierarchy Level	[edit system accounting destination tacplus]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure TACACS+ logging. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring TACACS+ System Accounting on page 379

servers

Syntax	<pre>servers server-address { port port-number; }</pre>
Hierarchy Level	[edit system services service-deployment]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure an IPv4 address for the Session and Resource Control (SRC) server.
Options	<p>server-address—The TCP port number.</p> <p>Default: 3333</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the Junos OS to Work with SRC Software on page 435

server-identifier

Syntax	<code>server-identifier <i>address</i>;</code>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp pool], [edit system services dhcp static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Configure a server identifier. The identifier can be used to identify a DHCP server in a DHCP message. It can also be used as a destination address from clients to servers (for example, when the boot file is set, but not the boot server).</p> <p>Servers include the server identifier in DHCPOFFER messages so that clients can distinguish between multiple lease offers. Clients include the server identifier in DHCPREQUEST messages to select a lease and indicate which offer is accepted from multiple lease offers. Also, clients can use the server identifier to send unicast request messages to specific DHCP servers to renew a current lease.</p> <p>This address must be a manually assigned, static IP address. The server cannot send a request and receive an IP address from itself or another DHCP server.</p>
Default	If no server identifier is set, the DHCP server sets the server identifier based on the primary interface address used by the server to receive a client request. For example, if the client sends a DHCP request and the server receives it on fe-0/0/0 and the primary interface address is 1.1.1.1 , then the server identifier is set to 1.1.1.1 .
Options	address —IPv4 address of the server. This address must be accessible by all clients served within a specified range of addresses (based on an address pool or static binding).
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>DHCP Overview</i>

service-deployment

Syntax	<pre>service-deployment { servers <i>server-address</i> { port <i>port-number</i>; } source-address <i>source-address</i>; }</pre>
Hierarchy Level	[edit system services]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Enable Junos OS to work with the Session and Resource Control (SRC) software. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Junos OS to Work with SRC Software on page 435

services (System Services)

```
Syntax  services {
    dhcp { # DHCP is not supported on a DCF
        dhcp_services;
    }
    extension-service {
        request-response {
            grpc {
                (clear-text | ssl) {
                    address ip-address;
                    local-certificate local-certificate; # Not specified for clear-text option
                    port port;
                }
            }
            max-connections max-connections;
        }
    }
    notification {
        port port;
        max-connections max-connections;
        allow-clients {
            address ip-address;
        }
    }
    }
    traceoptions {
        file <filename> <files number> <match regex> <size size> <world-readable |
        no-world-readable>;
        flag flag;
        no-remote-trace;
    }
    }
    finger {
        connection-limit limit;
        rate-limit limit;
    }
    }
    ftp {
        authentication-order [authentication-methods];
        connection-limit limit;
        rate-limit limit;
    }
    }
    service-deployment {
        servers address {
            port-number port-number;
        }
        source-address address;
    }
    }
    ssh {
        authentication-order [authentication-methods];
        ciphers [ cipher-1 cipher-2 cipher-3 ...];
        client-alive-count-max seconds;
        client-alive-interval seconds;
        connection-limit limit;
        fingerprint-hash (md5 | sha2-256);
        hostkey-algorithm (algorithm | no-algorithm);
    }
    }
```

```

key-exchange [algorithm];
macs [algorithm];
max-sessions-per-connection <number>;
no-passwords;
no-public-keys;
no-tcp-forwarding;
protocol-version [v1 v2];
rate-limit limit;
root-login (allow | deny | deny-password);
}
telnet {
  authentication-order [authentication-methods];
  connection-limit limit;
  rate-limit limit;
}
web-management {
  http {
    interfaces [ names ];
    port port;
  }
  https {
    interfaces [ names ];
    local-certificate name;
    port port;
  }
  session {
    idle-timeout [ minutes ];
    session-limit [ limit ];
  }
}
xnm-clear-text {
  connection-limit limit;
  rate-limit limit;
}
xnm-ssl {
  connection-limit limit;
  local-certificate name;
  rate-limit limit;
  ssl-renegotiation;
}
}

```

Hierarchy Level [edit system]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Option **extension-service** introduced in Junos OS Release 16.1 for MX80, MX104, MX240, MX480, MX960, MX2010, MX2020, vMX Series.
Option **grpc** introduced in Junos OS Release 16.2 for MX80, MX104, MX240, MX480, MX960, MX2010, MX2020, vMX Series.

Description	Configure the router or switch so that users on remote systems can access the local router or switch through the DHCP server, finger, rlogin, SSH, telnet, Web management, Junos XML protocol clear-text, Junos XML protocol SSL, and network utilities, or enable Junos OS to work with the Session and Resource Control (SRC) software. Also, enable configuration of third-party applications developed using the Juniper Extension Toolkit (JET) to run on Junos OS. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434• Configuring the Junos OS to Work with SRC Software on page 435• Understanding JET Interaction with Junos OS

session (Time-out)

Syntax	<pre>session { idle-timeout <i>minutes</i>; session-limit <i>session-limit</i>; }</pre>
Hierarchy Level	[edit system services web-management]
Release Information	Statement introduced in Junos OS Release 8.3. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure limits for the number of minutes a session can be idle before it times out, and configure the number of simultaneous J-Web user login sessions.
Options	<p>idle-timeout <i>minutes</i>—Configure the number of minutes a session can be idle before it times out. Range: 1 through 1440 Default: 1440</p> <p>session-limit <i>session-limit</i>—Configure the maximum number of simultaneous J-Web user login sessions. Range: 1 through 1024 Default: Unlimited</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• J-Web Interface User Guide

single-connection

Syntax	single-connection;
Hierarchy Level	[edit system accounting destination tacplus server <i>server-address</i>] [edit system tacplus-server <i>server-address</i>],
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Optimize attempts to connect to a TACACS+ server. The software maintains one open TCP connection to the server for multiple requests rather than opening a connection for each connection attempt.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring TACACS+ Authentication on page 373• Configuring TACACS+ System Accounting on page 379

source-address (NTP, RADIUS, System Logging, or TACACS+)

Syntax	<code>source-address <i>source-address</i> <routing-instance <i>routing-instance-name</i>>;</code>
Hierarchy Level	<code>[edit system accounting destination radius <i>server</i> <i>server-address</i>],</code> <code>[edit system accounting destination tacplus <i>server</i> <i>server-address</i>],</code> <code>[edit system ntp],</code> <code>[edit system <i>radius-server</i> <i>server-address</i>],</code> <code>[edit system syslog],</code> <code>[edit system <i>tacplus-server</i> <i>server-address</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. routing-instance option added in Junos OS Release 14.1
Description	Specify a source address for each configured IPv4 or IPv6 TACACS+ server, RADIUS server, NTP server, or the source address to record in system log messages that are directed to a remote machine.
Options	<i>source-address</i> —A valid IP address configured on one of the router or switch interfaces. For system logging, the address is recorded as the message source in messages sent to the remote machines specified in all host <i>hostname</i> statements at the [edit system syslog] hierarchy level, but not for messages directed to the other Routing Engine or to the TX Matrix router or TX Matrix Plus router in a routing matrix based on a TX Matrix router or TX Matrix Plus router. routing-instance <i>routing-instance-name</i> —(Optional) The routing instance name in which the source address is defined. (Not supported on all platforms.) Default: The primary address of the interface
Required Privilege Level	system —To view this statement in the configuration. system-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring RADIUS Server Authentication on page 355• Synchronizing and Coordinating Time Distribution Using NTP• Specifying an Alternative Source Address for System Log Messages

source-address (SRC Software)

Syntax	<code>source-address <i>source-address</i>;</code>
Hierarchy Level	[edit system services service-deployment]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Enable Junos OS to work with the Session and Resource Control (SRC) software.
Options	<i>source-address</i> — Local IPv4 address to be used as source address for traffic to the SRC server. The source address restricts traffic within the out-of-band network.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the Junos OS to Work with SRC Software on page 435

source-port (Port Addresses)

Syntax	<code>source-port upper-limit <<i>upper-limit</i>>;</code>
Hierarchy Level	[edit system internet-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	Configure the range of port addresses.
Options	<i>upper-limit upper-limit</i> —(Optional) The range of port addresses and can be a value from 5000 through 65,355.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Junos OS to Extend the Default Port Address Range

ssh

Syntax	<pre>ssh { authentication-order [method 1 method2...]; ciphers [cipher-1 cipher-2 cipher-3 ...]; client-alive-count-max seconds; client-alive-interval seconds; connection-limit limit; fingerprint-hash (md5 sha2-256); hostkey-algorithm (algorithm no-algorithm); key-exchange [algorithm1 algorithm2...]; macs [algorithm1 algorithm2...]; max-sessions-per-connection <number>; no-passwords; no-public-keys; no-tcp-forwarding; protocol-version [v1 v2]; rate-limit limit; root-login (allow deny deny-password); } tcp-forwarding (JDM)</pre>
Hierarchy Level	[edit system services]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>client-alive-interval and client-alive-max-count statements introduced in Junos OS Release 12.2.</p> <p>no-passwords statement introduced in Junos OS Release 13.3.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.</p> <p>no-public-keys statement introduced in Junos OS release 15.1.</p> <p>tcp-forwarding statement introduced in Junos OS Release 15.1X53-D50 for the NFX250 Network Services Platform.</p> <p>fingerprint-hash statement introduced in Junos OS Release 16.1.</p>
Description	<p>Allow SSH requests from remote systems to access the local router or switch.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring SSH Service for Remote Access to the Router or Switch on page 424

ssl-renegotiation

Syntax	ssl-renegotiation;
Hierarchy Level	[edit system services xnm-ssl]
Release Information	Statement introduced in Junos Os Release 13.3.
Description	Enable or disable SSL re-negotiation for xnm-ssl service.
Default	SSL re-negotiation for xnm-ssl service is disabled by default.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434

static-binding

Syntax	<pre>static-binding <i>mac-address</i> { client-identifier (ascii <i>client-id</i> hexadecimal <i>client-id</i>); fixed-address { <i>address</i>; } host-name <i>client-hostname</i>; }</pre>
Hierarchy Level	[edit system services dhcp], [edit system services dhcp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For J Series Services routers and EX Series switches only. Set static bindings for DHCP clients. A static binding is a mapping between a fixed IP address and the client's MAC address or client identifier.
Options	<p><i>mac-address</i>—The MAC address of the client. This is a hardware address that uniquely identifies a client on the network.</p> <p><i>fixed-address address</i>—Fixed IP address assigned to the client. Typically a client has one address assigned, but you can assign more.</p> <p><i>host-name client-hostname</i>—Hostname of the client requesting the DHCP server. The name can include the local domain name. Otherwise, the name is resolved based on the domain-name statement.</p> <p><i>client-identifier (ascii client-id hexadecimal client-id)</i>—Used by the DHCP server to index the database of address bindings. The client identifier is an ASCII string or hexadecimal number and can include a type-value pair as specified in RFC 1700, <i>Assigned Numbers</i>. Either a client identifier or the client's MAC address must be configured to uniquely identify the client on the network.</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>DHCP Overview</i>

system

Syntax	<code>system { ... }</code>
Hierarchy Level	[edit]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure system management properties.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • System Management Configuration Statements on page 444

tacplus

Syntax	<pre> tacplus { server { server-address { port port-number; secret password; single-connection; timeout seconds; } } } </pre>
Hierarchy Level	[edit system accounting destination]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the Terminal Access Controller Access Control System Plus (TACACS+).
Options	<p>server-address—Address of the TACACS+ authentication server.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring TACACS+ System Accounting on page 379

tacplus-options

Syntax	<pre>tacplus-options { (exclude-cmd-attribute no-cmd-attribute-value); enhanced-accounting; service-name <i>service-name</i>; timestamp-and-timezone; }</pre>
Hierarchy Level	[edit system]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>no-cmd-attribute-value and exclude-cmd-attribute options introduced in Junos OS Release 9.3.</p> <p>Statement introduced in Junos OS Release 11.1 for QFX Series.</p> <p>timestamp-and-timezone option introduced in Junos OS Release 12.2.</p> <p>enhanced-accounting option introduced in Junos OS Release 14.1.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.</p>
Description	Configure TACACS+ options for authentication and accounting.
Options	<p>enhanced-accounting—View the attribute values of a logged in user.</p> <p>exclude-cmd-attribute—Exclude the cmd attribute value completely from start and stop accounting records to enable logging of accounting records in the correct log file on a TACACS+ server.</p> <p>no-cmd-attribute-value—Set the cmd attribute value to an empty string in the TACACS+ accounting start and stop requests to enable logging of accounting records in the correct log file on a TACACS+ server.</p> <p>service-name <i>service-name</i>—Name of the authentication service used when you configure multiple TACACS+ servers to use the same authentication service.</p> <p>Default: junos-exec</p> <p>timestamp-and-timezone—Include this statement if you want start time, stop time, and timezone attributes included in start/stop accounting records.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the Same Authentication Service for Multiple TACACS+ Servers on page 375• Configuring TACACS+ Server Accounting on page 380• Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication on page 32• enhanced-accounting on page 487

tacplus-server

Syntax	<code>tacplus-server server-address { secret password; single-connection; source-address source-address; timeout seconds; }</code>
Hierarchy Level	[edit system]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the IPv4 or IPv6 TACACS+ server.
Options	server-address —Address of the IPv4 or IPv6 TACACS+ authentication server.



NOTE: Wildcard characters cannot be used in the TACACS server address or source address. This is because the TACACS server and source can accept both IPv4 and IPv6 addresses and, if you use wildcard characters for these addresses, Junos OS cannot validate mismatching server and source address families.

The remaining statements are explained separately.

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring TACACS+ Authentication on page 373

telnet

Syntax	<pre>telnet { authentication-order [<i>authentication-methods</i>]; connection-limit <i>limit</i>; rate-limit <i>limit</i>; }</pre>
Hierarchy Level	[edit system services]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	Provide Telnet connections from remote systems to the local router or switch. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Telnet Service for Remote Access to a Router or Switch on page 422

timeout (System)

Syntax	<code>timeout seconds;</code>
Hierarchy Level	[edit system radius-server server-address], [edit system tacplus-server server-address], [edit system accounting destination radius server server-address], [edit system accounting destination tacplus server server-address]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure the amount of time that the local router or switch waits to receive a response from a RADIUS or TACACS+ server.
Options	seconds —Amount of time to wait. Range: 1 through 90 seconds Default: 3 seconds
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring RADIUS Server Authentication on page 355 • Configuring TACACS+ Authentication on page 373 • retry on page 542

traceoptions (Address-Assignment Pool)

Syntax	<pre>traceoptions { file <i>filename</i> { files <i>number</i>; size <i>maximum-file-size</i>; match <i>regex</i>; (world-readable no-world-readable); } flag address-assignment; flag all; flag configuration; flag framework; flag ldap; flag local-authentication; flag radius; }</pre>
Hierarchy Level	[edit system processes general-authentication-service]
Release Information	Flag for tracing address-assignment pool operations introduced in Junos OS Release 9.0. option-name option introduced in Junos OS Release 8.3. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure tracing options.
Options	<p>file <i>filename</i>—Name of the file that receives the output of the tracing operation. Enclose the name in quotation marks. All files are placed in the directory /var/log.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none">• address-assignment—All address-assignment events• all—All tracing operations• configuration—Configuration events• framework—Authentication framework events• ldap—LDAP authentication events• local-authentication—Local authentication events

- **radius**—RADIUS authentication events

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-world-readable—(Optional) Restrict access to the originator of the trace operation only.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option and filename.

Syntax: **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
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Related Documentation	<ul style="list-style-type: none">• <i>Configuring Address-Assignment Pools</i>
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traceoptions (DHCP)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>number</i>> <match <i>regular-expression</i> > <size <i>maximum-file-size</i>> <world-readable no-world-readable>; flag <i>flag</i>; level (all error info notice verbose warning); no-remote-trace; }</pre>
Hierarchy Level	[edit system processes dhcp-service]
Release Information	Statement introduced in Junos OS Release 11.4. Statement introduced in Junos OS Release 12.1 for EX Series switches.
Description	<p>Define global tracing operations for extended DHCP local server and extended DHCP relay agent processes.</p> <p>This statement replaces the deprecated traceoptions statements at the [edit forwarding-options dhcp-relay] and [edit system services dhcp-local-server] hierarchy levels.</p>
Options	<p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files to create before overwriting the oldest one. If you specify a maximum number of files, you also must specify a maximum file size with the size option.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements:</p> <ul style="list-style-type: none">• all—Trace all events.• auth—Trace authentication events.• database—Trace database events.• fwd—Trace firewall process events.• general—Trace miscellaneous events.• ha—Trace high availability-related events.• interface—Trace interface operations.• io—Trace I/O operations.• liveness-detection—Trace liveness detection operations.• packet—Trace packet and option decoding operations.• performance—Trace performance measurement operations.

- **profile**—Trace profile operations.
- **rpd**—Trace routing protocol process events.
- **rtsock**—Trace routing socket operations.
- **security-persistence**—Trace security persistence events.
- **session-db**—Trace session database events.
- **state**—Trace changes in state.
- **statistics**—Trace baseline statistics.
- **ui**—Trace user interface operations.

level—Level of tracing to perform; also known as severity level. The option you configure enables tracing of events at that level and all higher (more restrictive) levels. You can specify any of the following levels:

- **all**—Match messages of all levels.
- **error**—Match error messages.
- **info**—Match informational messages.
- **notice**—Match notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages. This is the lowest (least restrictive) severity level; when you configure **verbose**, messages at all higher levels are traced. Therefore, the result is the same as when you configure **all**.
- **warning**—Match warning messages.

Default: **error**

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access, allowing only the user **root** and users who have the Junos OS **maintenance** permission to access the trace files.

size *maximum-file-size*—(Optional) Maximum size of each trace file. By default, the number entered is treated as bytes. Alternatively, you can include a suffix to the number to indicate kilobytes (***maximum-file-sizek***), megabytes (***maximum-file-sizem***), or gigabytes (***maximum-file-sizeg***). If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option.

Range: 10,240 through 1,073,741,824

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level	trace —To view this statement in the configuration. trace-control —To add this statement to the configuration.
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Related Documentation

- *Tracing Extended DHCP Operations*

traceoptions (DHCP Server)

Syntax	<pre> traceoptions { file <i>filename</i> <files <i>number</i>> <match <i>regex</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i>; } </pre>
Hierarchy Level	[edit system services dhcp]
Release Information	Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Define tracing operations for DHCP processes.
Options	<p>file <i>filename</i>—Name of the file that receives the output of the tracing operation. Enclose the name in quotation marks. All files are placed in the directory <code>/var/log</code>.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named <i>trace-file</i> reaches its maximum size, it is renamed <i>trace-file.0</i>, then <i>trace-file.1</i>, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none"> • all—All tracing operations • binding—Trace binding operations • config—Log reading of configuration • conflict—Trace user-detected conflicts for IP addresses • event—Trace important events • ifdb—Trace interface database operations • io— Trace I/O operations • lease—Trace lease operations • main—Trace main loop operations • misc— Trace miscellaneous operations • packet—Trace DHCP packets • options—Trace DHCP options • pool—Trace address pool operations

- **protocol**—Trace protocol operations
- **rtsock**—Trace routing socket operations
- **scope**—Trace scope operations
- **signal**—Trace DHCP signal operations
- **trace**—All tracing operations
- **ui**—Trace user interface operations

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

- **all**—All tracing operations
- **binding**—Trace binding operations
- **config**—Log reading of configuration
- **conflict**—Trace user-detected conflicts for IP addresses
- **event**—Trace important events
- **ifdb**—Trace interface database operations
- **io**—Trace I/O operations
- **lease**—Trace lease operations
- **main**—Trace main loop operations
- **match *regex***—Refine the output to include lines that contain the regular expression.
- **misc**—Trace miscellaneous operations
- **packet**—Trace DHCP packets
- **options**—Trace DHCP options
- **pool**—Trace address pool operations
- **protocol**—Trace protocol operations
- **rtsock**—Trace routing socket operations
- **scope**—Trace scope operations
- **signal**—Trace DHCP signal operations
- **trace**—All tracing operations
- **ui**—Trace user interface operations

no-world-readable—(Optional) Disable unrestricted file access.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches this size, it is renamed **trace-file.0**. When the **trace-file** again reaches its maximum size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option and filename.

Syntax: *xk* to specify KB, *xm* to specify MB, or *xg* to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level	system—To view this statement in the configuration.
	system-control—To add this statement to the configuration.

Related Documentation	<ul style="list-style-type: none"> • Configuring Tracing Operations for DHCP Processes on page 403 • System Management Configuration Statements on page 444
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traceoptions (SBC Configuration Process)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>number</i>> <match <i>regex</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i>; }</pre>
Hierarchy Level	[edit system processes sbc-configuration-process]
Release Information	Statement introduced in Junos OS Release 9.5. Statement introduced in Junos OS Release 9.5 for EX Series switches.
Description	Configure trace options for the session border controller (SBC) process of the border signaling gateway (BSG).
Options	<p>file <i>filename</i>—Name of the file that receives the output of the tracing operation. Enclose the name in quotation marks. All files are placed in the directory /var/log. You can include the following file options:</p> <ul style="list-style-type: none">• files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. <p>If you specify a maximum number of files, you must also specify a maximum file size with the size option and a filename.</p> <p>Range: 2 through 1000 Default: 3 files</p> <ul style="list-style-type: none">• match <i>regex</i>—(Optional) Refine the output to include lines that contain the regular expression.• no-world-readable—(Optional) Disable unrestricted file access.• size <i>size</i>—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When the trace-file again reaches its maximum size, trace-file.0 is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum file size, you also must specify a maximum number of trace files with the files option and filename. <p>Syntax: xk to specify KB, xm to specify MB, or xg to specify GB. Range: 10 KB through 1 GB Default: 128 KB</p> <ul style="list-style-type: none">• world-readable—(Optional) Enable unrestricted file access.

flag flag—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements. You can include the following flags:

- **all trace-level**—Trace all SBC process operations.
- **common trace-level**—Trace common events.
- **configuration trace-level**—Trace configuration events.
- **device-monitor trace-level**—Trace device monitor events.
- **ipc trace-level**—Trace IPC events.
- **memory—pool trace-level**—Trace memory pool events.
- **trace-level**—Trace level options are related to the severity of the event being traced. When you choose a trace level, messages at that level and higher levels are captured. Enter one of the following trace levels as the **trace-level**:
 - **debug**—Log all code flow of control.
 - **error**—Log failures with a short-term effect.
 - **info**—Log summary for normal operations, such as the policy decisions made for a call.
 - **trace**—Log program trace START and EXIT macros.
 - **warning**—Log failure recovery events or failure of an external entity.
- **ui trace-level**—Trace user interface operations.

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
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Related Documentation	<ul style="list-style-type: none"> • See “Troubleshooting the IMSG” in the <i>Junos Multiplay Solutions Guide</i> • System Management Configuration Statements on page 444
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tries-before-disconnect

Syntax	<code>tries-before-disconnect <i>number</i>;</code>
Hierarchy Level	[edit system login retry-options]
Release Information	Statement introduced in Junos OS Release 8.0.
Description	Configure the maximum number of times the user is allowed to enter a password to attempt to log in to the router through SSH or Telnet.
Options	<i>number</i> —Maximum number of times a user is allowed to attempt to enter a password to log in through SSH or Telnet. Range: 1 through 10 Default: 10
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of User Login Attempts for SSH and Telnet Sessions on page 57• retry-options on page 543

uid

Syntax	<code>uid <i>uid-value</i>;</code>
Hierarchy Level	[edit system login user]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Numeric identifier associated with the user account name, either assigned by an administrator or assigned automatically when you commit the user configuration. It is used by applications that request numeric identifiers, such as some RADIUS queries or secure applications such as flow-tap monitoring.
Options	<i>uid-value</i> —Number associated with the login account. This value must be unique on the router or switch. Range: 100 through 64000
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Junos OS User Accounts by Using a Configuration Group on page 53

user (Access)

Syntax	<pre> user username { authentication { class class-name; (encrypted-password "password" plain-text-password); full-name complete-name; load-key-file URL filename; ssh-dsa "public-key" <from hostname>; ssh-rsa "public-key" <from hostname>; uid uid-value; } } </pre>
Hierarchy Level	[edit system login]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
Description	Configure access permission for individual users.
Options	The remaining statements are explained separately.
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Junos OS User Accounts by Using a Configuration Group on page 53 • class on page 467

username-include (DHCP Local Server)

Syntax username-include {
 circuit-type;
 client-id;
 delimiter *delimiter-character*;
 domain-name *domain-name-string*;
 interface-name ;
 logical-system-name;
 mac-address;
 option-60;
 option-82 <circuit-id> <remote-id>;
 relay-agent-interface-id;
 relay-agent-remote-id;
 relay-agent-subscriber-id;
 routing-instance-name;
 user-prefix *user-prefix-string*;
 }

Hierarchy Level [edit system services [dhcp-local-server authentication](#)],
 [edit system services dhcp-local-server [dhcpv6 authentication](#)],
 [edit system services dhcp-local-server dhcpv6 [group group-name authentication](#)],
 [edit system services dhcp-local-server [group group-name authentication](#)],
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system
 services [dhcp-local-server ...](#)],
 [edit logical-systems *logical-system-name* system services [dhcp-local-server ...](#)],
 [edit routing-instances *routing-instance-name* system services [dhcp-local-server ...](#)]

Release Information Statement introduced in Junos OS Release 9.1.
 Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description Configure the username that the router or switch passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router (or switch) accesses the local authentication service only and does not use external authentication services, such as RADIUS.

The following statements are not supported in the DHCPv6 hierarchy levels:

- **mac-address**
- **option-60**
- **option-82**

The following statements are supported in the DHCPv6 hierarchy levels only:

- **relay-agent-interface-id**
- **relay-agent-remote-id**
- **relay-agent-subscriber-id**

The remaining statements are explained separately.

Required Privilege	system—To view this statement in the configuration.
Level	system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Using External AAA Authentication Services with DHCP</i>• <i>Creating Unique Usernames for DHCP Clients</i>

user-prefix (DHCP Local Server)

Syntax	<code>user-prefix <i>user-prefix-string</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit routing-instances <i>routing-instance-name</i> system services dhcp-local-server group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 authentication username-include],</p> <p>[edit system services dhcp-local-server dhcpv6 group group-name authentication username-include],</p> <p>[edit system services dhcp-local-server group group-name authentication username-include]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
Description	Specify the user prefix that is concatenated with the username during the subscriber authentication or DHCP client authentication process.
Options	<i>user-prefix-string</i> —User prefix string.
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>

Related Documentation • *Using External AAA Authentication Services with DHCP*

versioning

Syntax	versioning;
Hierarchy Level	[edit system dynamic-profile-options]
Release Information	Statement introduced in Junos OS Release 11.4.
Description	Enable version support for dynamic profiles on the system.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	• <i>Enabling Dynamic Profiles to Use Multiple Versions</i>

web-management

Syntax web-management {
 http {
 interfaces [*interface-names*];
 port *port*;
 }
 https {
 interfaces [*interface-names*];
 local-certificate *name*;
 port *port*;
 }
 }

Hierarchy Level [edit [system services](#)]

Release Information Statement introduced before Junos OS Release 7.4.
 Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure settings for HTTP or HTTPS access. HTTP access allows management of the router or switch using the browser-based J-Web graphical user interface. HTTPS access allows secure management of the router or switch using the J-Web interface. With HTTPS access, communication between the router or switch Web server and your browser is encrypted.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
 system-control—To add this statement to the configuration.

Related Documentation

- *Configuring Management Access for the EX Series Switch (J-Web Procedure)*
- *J-Web Interface User Guide*
- [http on page 494](#)
- [https on page 495](#)
- [port on page 534](#)

wins-server (System)

Syntax	wins-server { <code>address</code> ; }
Hierarchy Level	[edit system services dhcp], [edit system services <code>dhcp</code>], [edit system services dhcp pool], [edit system services dhcp static-binding]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For J Series Services Routers and EX Series switches only. Specify one or more NetBIOS Name Servers. When a DHCP client is added to the network and assigned an IP address, the NetBIOS Name Server manages the Windows Internet Name Service (WINS) database that matches IP addresses (such as 192.168.1.3) to Windows NetBIOS names (such as <code>\\Marketing</code>). List servers in order of preference.
Options	<code>address</code> —IPv4 address of the NetBIOS Name Server running WINS. To configure multiple servers, include multiple <code>address</code> options.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> <i>DHCP Overview</i>

xnm-clear-text

Syntax	xnm-clear-text { <code>connection-limit</code> <i>limit</i> ; <code>rate-limit</code> <i>limit</i> ; }
Hierarchy Level	[edit system <code>services</code>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Allow Junos XML protocol clear-text requests from remote systems to the local router. The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434

xnm-ssl

Syntax	<pre>xnm-ssl { connection-limit limit; rate-limit limit; ssl-renegotiation ; }</pre>
Hierarchy Level	[edit system services]
Release Information	Statement introduced before Junos OS Release 7.4. Support for the ssl-renegotiation statement added in Junos OS Release 13.3.
Description	Allow Junos XML protocol SSL requests from remote systems to the local router. The remaining statements are explained separately.



WARNING: Starting with Junos OS Release 15.1, the **sslv3-support** option is not available for configuration with the **set system services xnm-ssl** and **file copy** commands. SSLv3 is no longer supported and available.

For all releases prior to and including Junos OS Release 14.2, SSLv3 is disabled by default at runtime. The **sslv3-support** option is hidden and deprecated in Junos OS Release 14.2 and earlier releases. However, you can use the **set system services xnm-ssl sslv3-support** command to enable SSLv3 for a Junos XML protocol client application to use as the protocol to connect to the Junos XML protocol server on a router, and you can use the **file copy source destination sslv3-support** command to enable the copying of files from an SSLv3 URL.

Using SSLv3 presents a potential security vulnerability, and we recommend that you not use SSLv3. For more details about this security vulnerability, go to <http://kb.juniper.net/InfoCenter/index?page=content&id=JSA10656>.

Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring clear-text or SSL Service for Junos XML Protocol Client Applications on page 434

CHAPTER 14

Operational Commands

- `show cli authorization`
- `show cli directory`
- `clear system services dhcp binding`
- `clear system services dhcp conflict`
- `clear system services dhcp statistics`
- `show system services dhcp conflict`
- `show system services dhcp global`
- `show system services dhcp pool`
- `show system services dhcp statistics`
- `show system services service-deployment`
- `show system users`
- `ssh`
- `telnet`
- `test access profile`
- `test access radius-server`

show cli authorization

Syntax show cli authorization

Release Information Command introduced before Junos OS Release 7.4.

Description Display the permissions for the current user.

```
user@host> show cli authorization
Current user: 'root' login: 'boojum' class '(root)'
Permissions:
Permissions:
  admin      -- Can view user accounts
  admin-control-- Can modify user accounts
  clear      -- Can clear learned network info
  configure  -- Can enter configuration mode
  control    -- Can modify any config
  edit       -- Can edit full files
  field      -- Can use field debug commands
  floppy     -- Can read and write the floppy
  interface  -- Can view interface configuration
  interface-control-- Can modify interface configuration
  network    -- Can access the network
  reset      -- Can reset/restart interfaces and daemons
  routing    -- Can view routing configuration
  routing-control-- Can modify routing configuration
  shell      -- Can start a local shell
  snmp       -- Can view SNMP configuration
  snmp-control-- Can modify SNMP configuration
  system     -- Can view system configuration
  system-control-- Can modify system configuration
  trace      -- Can view trace file settings
  trace-control-- Can modify trace file settings
  view       -- Can view current values and statistics
  maintenance -- Can become the super-user
  firewall   -- Can view firewall configuration
  firewall-control-- Can modify firewall configuration
  secret     -- Can view secret statements
  secret-control-- Can modify secret statements
  rollback   -- Can rollback to previous configurations
  security   -- Can view security configuration
  security-control-- Can modify security configuration
  access     -- Can view access configuration
  access-control-- Can modify access configuration
  view-configuration-- Can view all configuration (not including secrets)
  flow-tap   -- Can view flow-tap configuration
  flow-tap-control-- Can modify flow-tap configuration
  idp-profiler-operation-- Can Profiler data
  pgcp-session-mirroring-- Can view pgcp session mirroring configuration
  pgcp-session-mirroring-control-- Can modify pgcp session mirroring configuration
  storage    -- Can view fibre channel storage protocol configuration
  storage-control-- Can modify fibre channel storage protocol configuration
  all-control -- Can modify any configuration
```

Required Privilege Level view

show cli directory

Syntax	show cli directory
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display the current working directory. user@host> show cli directory Current directory: /var/tmp
Required Privilege Level	view

clear system services dhcp binding

Syntax	<code>clear system services dhcp binding</code> <code><address></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers and EX Series switches only) Remove obsolete IP address bindings on a Dynamic Host Configuration Protocol (DHCP) server and return them to the IP address pool.
Options	address —(Optional) Remove a specific IP address binding and return it to the address pool.
Required Privilege Level	view and system
Related Documentation	<ul style="list-style-type: none">• show system services dhcp binding
List of Sample Output	clear system services dhcp binding on page 588
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear system services dhcp binding

```
user@host> clear system services dhcp binding
```

clear system services dhcp conflict

Syntax	clear system services dhcp conflict <address>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers and EX Series switches only) Remove IP addresses from the Dynamic Host Configuration Protocol (DHCP) server conflict list and return them to the IP address pool.
Options	address —(Optional) Remove a specific IP address from the conflict list and return it to the address pool.
Required Privilege Level	view and system
Related Documentation	<ul style="list-style-type: none">• show system services dhcp conflict on page 591
List of Sample Output	clear system services dhcp conflict on page 589
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear system services dhcp conflict

```
user@host> clear system services dhcp conflict
```

clear system services dhcp statistics

Syntax	clear system services dhcp statistics
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers and EX Series switches only) Clear Dynamic Host Configuration Protocol (DHCP) server statistics.
Options	This command has no options.
Required Privilege Level	view and system
Related Documentation	<ul style="list-style-type: none">• show system services dhcp statistics on page 596
List of Sample Output	clear system services dhcp statistics on page 590
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear system services dhcp statistics

```
user@host> clear system services dhcp statistics
```

show system services dhcp conflict

Syntax	show system services dhcp conflict
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers only and EX Series switches) Display Dynamic Host Configuration Protocol (DHCP) client-detected conflicts for IP addresses. When a conflict is detected, the DHCP server removes the address from the address pool.
Options	This command has no options.
Required Privilege Level	view and system
Related Documentation	<ul style="list-style-type: none"> • clear system services dhcp conflict on page 589
List of Sample Output	show system services dhcp conflict on page 591
Output Fields	Table 17 on page 591 describes the output fields for the show system services dhcp conflict command. Output fields are listed in the approximate order in which they appear.

Table 17: show system services dhcp conflict Output Fields

Field Name	Field Description
Detection time	Date and time the client detected the conflict.
Detection method	How the conflict was detected.
Address	IP address where the conflict occurs. The addresses in the conflicts list remain excluded from the pool until you use a clear system services dhcp conflict command to manually clear the list.

Sample Output

show system services dhcp conflict

```
user@host> show system services dhcp conflict
```

```

Detection time      Detection method  Address
2004-08-03 19:04:00 PDT  ARP              10.0.0.1
2004-08-04 04:23:12 PDT  Ping             10.0.0.2
2004-08-05 21:06:44 PDT  Client           10.0.0.3
```

show system services dhcp global

Syntax	show system services dhcp global
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers and EX Series switches only) Display Dynamic Host Configuration Protocol (DHCP) global configuration options. Global options apply to all scopes and clients served by the DHCP server. Global options are overridden if specified otherwise in scope or client options. Scope options apply to specific subnets or ranges of addresses. Client options apply to specific clients.
Options	This command has no options.
Required Privilege Level	view and system
List of Sample Output	show system services dhcp global on page 593
Output Fields	Table 18 on page 592 describes the output fields for the show system services dhcp global command. Output fields are listed in the approximate order in which they appear.

Table 18: show system services dhcp global Output Fields

Field Name	Field Description
BOOTP lease length	Length of lease time assigned to BOOTP clients.
Default lease time	Lease time assigned to clients that do not request a specific lease time.
Minimum lease time	Minimum time a client retains an IP address lease on the server.
Maximum lease time	Maximum time a client can retain an IP address lease on the server.
DHCP options	User-defined options created for the DHCP server. If no options have been defined, this field is blank.

Sample Output

show system services dhcp global

```
user@host> show system services dhcp global

Global settings:
  BOOTP lease length      infinite

DHCP lease times:
  Default lease time      1 hour
  Minimum lease time      2 hours
  Maximum lease time      infinite

DHCP options:
  Name: name-server, Value: { 6.6.6.6, 6.6.6.7 }
  Name: domain-name, Value: mydomain.tld
  Code: 19, Type: flag, Value: off
  Code: 40, Type: string, Value: domain.tld
  Code: 32, Type: ip-address, Value: 3.3.3.33
```

show system services dhcp pool

Syntax	show system services dhcp pool <detail> <subnet-address>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers and EX Series switches only) Display Dynamic Host Configuration Protocol (DHCP) server IP address pools.
Options	none —Display brief information about all IP address pools. detail —(Optional) Display detailed information. subnet-address —(Optional) Display information for the specified subnet address.
Required Privilege Level	view and system
List of Sample Output	show system services dhcp pool on page 595 show system services dhcp pool subnet-address on page 595 show system services dhcp pool subnet-address detail on page 595
Output Fields	Table 19 on page 594 describes the output fields for the show system services dhcp pool command. Output fields are listed in the approximate order in which they appear.

Table 19: show system services dhcp pool Output Fields

Field Name	Field Description	Level of Output
Pool name	Subnet on which the IP address pool is defined.	None specified
Low address	Lowest address in the IP address pool.	None specified
High address	Highest address in the IP address pool.	None specified
Excluded addresses	Addresses excluded from the address pool.	None specified
Subnet	(<i>subnet-address</i> option only) Subnet to which the specified address pool belongs.	None specified
Address range	(<i>subnet-address</i> option only) Range of IP addresses in the address pool.	None specified
Addresses assigned	Number of IP addresses in the pool that are assigned to DHCP clients and the total number of IP addresses in the pool.	detail
Active	Number of assigned IP addresses in the pool that are active.	detail
Excluded	Number of assigned IP addresses in the pool that are excluded.	detail
Default lease time	Lease time assigned to clients that do not request a specific lease time.	detail

Table 19: show system services dhcp pool Output Fields (*continued*)

Field Name	Field Description	Level of Output
Minimum lease time	Minimum time a client can retain an IP address lease on the server.	detail
Maximum lease time	Maximum time a client can retain an IP address lease on the server.	detail
DHCP options	User-defined options created for the DHCP server. If no options have been defined, this field is blank.	detail

Sample Output

show system services dhcp pool

```
user@host> show system services dhcp pool

Pool name      Low address    High address    Excluded addresses
192.0.2.0/24   192.0.2.2      192.0.2.254     192.0.2.1
```

show system services dhcp pool subnet-address

```
user@host> show system services dhcp pool 192.0.2.0/24

Pool information:
  Subnet                192.0.2.0/24
  Address range          192.0.2.2 - 192.0.2.254
  Addresses assigned      2/253
```

show system services dhcp pool subnet-address detail

```
user@host> show system services dhcp pool 192.0.2.0/24 detail

Pool information:
  Subnet                192.0.2.0/24
  Address range          192.0.2.2 - 192.0.2.254
  Addresses assigned      2/253
  Active: 1, Excluded: 1

DHCP lease times:
  Default lease time     1 hour
  Minimum lease time     2 hours
  Maximum lease time     infinite

DHCP options:
  Name: name-server, Value: { 6.6.6.6, 6.6.6.7 }
  Name: domain-name, Value: mydomain.tld
  Name: router, Value: { 192.0.2.1 }
  Name: server-identifier, Value: 192.0.2.1
  Code: 19, Type: flag, Value: off
  Code: 40, Type: string, Value: domain.tld
  Code: 32, Type: ip-address, Value: 192.0.2.1
```

show system services dhcp statistics

Syntax	show system services dhcp statistics
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	(J Series routers and EX Series switches only) Display Dynamic Host Configuration Protocol (DHCP) server statistics.
Options	This command has no options.
Required Privilege Level	view and system
Related Documentation	<ul style="list-style-type: none"> • clear system services dhcp statistics on page 590
List of Sample Output	show system services dhcp statistics on page 597
Output Fields	Table 20 on page 596 describes the output fields for the show system services dhcp statistics command. Output fields are listed in the approximate order in which they appear.

Table 20: show system services dhcp statistics Output Fields

Field Name	Field Description
Default lease time	Lease time assigned to clients that do not request a specific lease time.
Minimum lease time	Minimum time a client can retain an IP address lease on the server.
Maximum lease time	Maximum time a client can retain an IP address lease on the server.
Packets dropped	Total number of packets dropped and number of packets dropped because of: <ul style="list-style-type: none"> • Invalid hardware address • Invalid opcode • Invalid server address • No available address • No interface match • No routing instance match • No valid local addresses • Packet too short • Read error • Send error

Table 20: show system services dhcp statistics Output Fields (*continued*)

Field Name	Field Description
Messages received	<p>Number of the following message types sent from DHCP clients and received by the DHCP server:</p> <ul style="list-style-type: none"> • BOOTREQUEST • DHCPDECLINE • DHCPDISCOVER • DHCPINFORM • DHCPRELEASE • DHCPREQUEST
Messages sent	<p>Number of the following message types sent from the DHCP server to DHCP clients:</p> <ul style="list-style-type: none"> • BOOTREPLY • DHCPACK • DHCPOFFER • DHCPNAK

Sample Output

show system services dhcp statistics

```
user@host> show system services dhcp statistics
```

```
DHCP lease times:
  Default lease time      1 hour
  Minimum lease time      2 hours
  Maximum lease time      infinite
```

```
Packets dropped:
  Total                    0
  Bad hardware address     0
  Bad opcode               0
  Invalid server address   0
  No available addresses   0
  No interface match       0
  No routing instance match 0
  No valid local address   0
  Packet too short         0
  Read error               0
  Send error               0
```

```
Messages received:
  BOOTREQUEST             0
  DHCPDECLINE             0
  DHCPDISCOVER            0
  DHCPINFORM              0
  DHCPRELEASE             0
  DHCPREQUEST             0
```

```
Messages sent:
  BOOTREPLY               0
  DHCPACK                 0
  DHCPOFFER               0
  DHCPNAK                 0
```


show system services service-deployment

Syntax	show system services service-deployment
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 11.1 for the QFX Series. Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	Display information about a Session and Resource Control (SRC) client.
Options	This command has no options.
Required Privilege Level	system view
List of Sample Output	show system services service-deployment on page 599
Output Fields	Table 21 on page 599 lists the output fields for the show system services service-deployment command. Output fields are listed in the approximate order in which they appear.

Table 21: show system services service-deployment Output Fields

Field Name	Field Description
PDT Keepalive settings	Configured PDT keepalive interval, in seconds.
Keepalives sent	Number of keepalives sent.
Notifications sent	Number of notifications sent.
Last update from peer	Time at which the last update from a peer was received.

Sample Output

show system services service-deployment

```
user@host> show system services service-deployment
Connected to 192.0.2.0 port 10288 since 2004-05-03 11:04:34 PDT Keepalive settings:
Interval 15 seconds Keepalives sent: 750 Notifications sent: 0 Last update from
peer: 00:00:06 ago
```

show system users

List of Syntax	Syntax on page 600 Syntax (TX Matrix Router) on page 600 Syntax (TX Matrix Plus Router) on page 600 Syntax (MX Series Router) on page 600
Syntax	show system users <no-resolve>
Syntax (TX Matrix Router)	show system users <all-chassis all-lcc lccnumber scc> <no-resolve>
Syntax (TX Matrix Plus Router)	show system users <detail> <all-chassis all-lcc lcc number sfc number> <no-resolve>
Syntax (MX Series Router)	show system users <all-members> <local> <member member-id> <no-resolve>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. sfc option introduced for the TX Matrix Plus router in JUNOS OS Release 9.6. Command introduced in Junos OS Release 11.1 for the QFX Series. Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	List information about the users who are currently logged in to the router or switch.



NOTE: The **show system users** command lists the information about administrative users that are logged in to a router or switch using the CLI, J-Web, or an SSH client. The output does not list information about web users or automated users that are logged in from a remote client application using Junos XML APIs, such as NETCONF.

- Options** **none**—List information about the users who are currently logged in to the router or switch.
- all-chassis**—(TX Matrix routers and TX Matrix Plus routers only) (Optional) Show users currently logged in to all the routers in the chassis.
- all-lcc**—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, show users currently logged in to all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, show users currently logged in to all connected T1600 or T4000 LCCs.

all-members—(MX Series routers only) (Optional) Display users currently logged in to all members of the Virtual Chassis configuration.

lcc *number*—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, show users currently logged in to a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, show users currently logged in to a specific router that is connected to the TX Matrix Plus router. Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local—(MX Series routers only) (Optional) Display users currently logged in to the local Virtual Chassis member.

member *member-id*—(MX Series routers only) (Optional) Display users currently logged in to the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

no-resolve—(Optional) Do not attempt to resolve IP addresses to hostnames.

scc—(TX Matrix routers only) (Optional) Show users currently logged in to the TX Matrix router (or switch-card chassis).

sfc *number*—(TX Matrix Plus routers only) (Optional) Show users currently logged in to the TX Matrix Plus router. Replace *number* with 0.

Additional Information By default, when you issue the **show system users** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level view

Related Documentation • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

List of Sample Output [show system users on page 602](#)
[show system users lcc no-resolve \(TX Matrix, TX Matrix Plus Router\) on page 602](#)
[show system users \(TX Matrix Plus Router\) on page 602](#)

[show system users \(QFX Series\) on page 603](#)

[show system users no-resolve \(QFX Series\) on page 603](#)

Output Fields [Table 22 on page 602](#) describes the output fields for the **show system users** command. Output fields are listed in the approximate order in which they appear.

Table 22: show system users Output Fields

Field Name	Field Description
<i>time and up</i>	Current time, in the local time zone, and how long the router or switch has been operational.
<i>users</i>	Number of users logged in to the router or switch.
<i>load averages</i>	Load averages for the last 1 minute, 5 minutes, and 15 minutes.
<i>USER</i>	Username.
<i>TTY</i>	Terminal through which the user is logged in.
<i>FROM</i>	System from which the user has logged in. A hyphen indicates that the user is logged in through the console.
<i>LOGIN@</i>	Time when the user logged in.
<i>IDLE</i>	How long the user has been idle.
<i>WHAT</i>	Processes that the user is running.

Sample Output

show system users

```
user@host> show system users
7:30PM up 4 days, 2:26, 2 users, load averages: 0.07, 0.02, 0.01
USER   TTY FROM          LOGIN@  IDLE WHAT
root   d0  -              Fri05PM 4days -csh (csh)
blue   p0  leve15.compan.net 7:30PM  - cli
```

show system users lcc no-resolve (TX Matrix, TX Matrix Plus Router)

```
user@host> show system users lcc 2 no-resolve
```

```
lcc2-re0:
```

```
-----
10:34AM PDT up 1 day, 7:11, 5 users, load averages: 0.03, 0.01, 0.00
USER   TTY FROM          LOGIN@  IDLE WHAT
root   d0  -              3:21AM  7:12 /bin/csh
user1   p0  scc-re0        10:15AM  - telnet hostA
user1   p1  scc-re0        10:16AM  - telnet hostA
user1   p2  scc-re0        10:19AM  - telnet hostA
user1   p3  scc-re0        10:24AM  - telnet hostA
```

show system users (TX Matrix Plus Router)

```
user@host> show system users
```

sfc0-re0:

```

-----
1:41AM up 26 mins, 3 users, load averages: 0.08, 0.04, 0.03
USER   TTY   FROM                               LOGIN@  IDLE WHAT
user2  p0    10.209.208.123                    1:18AM  21 cli
user2  p1    192.0.2.207                      1:37AM  2 cli
user2  p2    192.0.2.19                      1:40AM  - cli

```

lcc0-re0:

```

-----
1:41AM up 26 mins, 0 users, load averages: 0.00, 0.00, 0.03

```

lcc1-re0:

```

-----
1:41AM up 26 mins, 0 users, load averages: 0.00, 0.02, 0.03

```

lcc2-re0:

```

-----
1:41AM up 26 mins, 0 users, load averages: 0.16, 0.06, 0.02

```

lcc3-re0:

```

-----
1:41AM up 26 mins, 0 users, load averages: 0.12, 0.04, 0.04

```

user3@aj> show system users

sfc0-re0:

```

-----
1:42AM up 28 mins, 4 users, load averages: 0.02, 0.03, 0.02
USER   TTY   FROM                               LOGIN@  IDLE WHAT
user   p0    device1.example.com              1:18AM  22 cli
user   p1    device2.example.com              1:37AM  - cli
user   p2    device3.example.com              1:40AM  - cli
user   p3    device4.example.com              1:42AM  - -csh (csh)

```

lcc0-re0:

```

-----
1:42AM up 28 mins, 0 users, load averages: 0.02, 0.01, 0.03

```

lcc1-re0:

```

-----
1:42AM up 28 mins, 0 users, load averages: 0.07, 0.04, 0.03

```

lcc2-re0:

```

-----
1:42AM up 27 mins, 0 users, load averages: 0.07, 0.06, 0.02

```

lcc3-re0:

```

-----
1:42AM up 28 mins, 0 users, load averages: 0.05, 0.04, 0.04

```

show system users (QFX Series)

user@switch> show system users

```

USER   TTY   FROM                               LOGIN@  IDLE WHAT
user1  p0    192.0.2.117                      2:54AM  39 -cli (cli)
user2  p1    192.0.2.116                      3:01AM  - -cli (cli)
user3  p2    192.0.2.97                      3:08AM  11 -cli (cli)

```

show system users no-resolve (QFX Series)

user@switch> show system users no-resolve

USER	TTY	FROM	LOGIN@	IDLE	WHAT
user1	p0	192.0.2.117	2:54AM	39	-cli (cli)
user2	p1	192.0.2.116	3:01AM	-	-cli (cli)
user3	p2	192.0.2.97	3:08AM	11	-cli (cli)

ssh

List of Syntax [Syntax on page 605](#)
 [Syntax \(EX Series Switch and the QFX Series\) on page 605](#)

Syntax `ssh host`
 `<bypass-routing>`
 `<inet | inet6>`
 `<interface interface-name>`
 `<logical-system logical-system-name>`
 `<routing-instance routing-instance-name>`
 `<source address>`
 `<v1 | v2>`

Syntax (EX Series Switch and the QFX Series) `ssh host`
 `<bypass-routing>`
 `<inet | inet6>`
 `<interface interface-name>`
 `<routing-instance routing-instance-name>`
 `<source address>`
 `<v1 | v2>`

Release Information Command introduced before Junos OS Release 7.4.
 Command introduced in Junos OS Release 9.0 for EX Series switches.
 Command introduced in Junos OS Release 11.1 for the QFX Series.
 Command introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.

Description Use the SSH program to open a connection between a local router or switch and a remote system and execute commands on the remote system. You can issue the **ssh** command from the Junos OS CLI to log in to a remote system or from a remote system to log in to the local router or switch. When executing this command, you include one or more CLI commands by enclosing them in quotation marks and separating the commands with semicolons:

```
ssh address 'cli-command1 ; cli-command2 '
```

Options **host**—Name or address of the remote system.

bypass-routing—(Optional) Bypass the normal routing tables and send ping requests directly to a system on an attached network. If the system is not on a directly attached network, an error is returned. Use this option to ping a local system through an interface that has no route through it.

inet | inet6—(Optional) Create an IPv4 or IPv6 connection, respectively.

interface interface-name—(Optional) Interface name for the SSH session. (This option does not work when **default-address-selection** is configured at the **[edit system]** hierarchy level, because this configuration uses the loopback interface as the source address for all locally generated IP packets.)

logical-system logical-system-name—(Optional) Name of a particular logical system for the SSH attempt.

routing-instance *routing-instance-name*—(Optional) Name of the routing instance for the SSH attempt.

source address—(Optional) Source address of the SSH connection.

v1 | v2—(Optional) Use SSH version 1 or 2, respectively, when connecting to a remote host.

Additional Information To configure an SSH (version 1) key for your user account, include the **authentication ssh-rsa** statement at the **[edit system login user *user-name*]** hierarchy level. To configure an SSH (version 2) key for your user account, include the **authentication dsa-rsa** statement at the **[edit system login user *user-name*]** hierarchy level.

You can limit the number of times a user can attempt to enter a password while logging in through SSH. To specify the number of times a user can attempt to enter a password to log in through SSH, include the **retry-options** statement at the **[edit system login]** hierarchy level. For details, see the .

Required Privilege Level network

Related Documentation

- *Configuring SSH Host Keys for Secure Copying of Data*

List of Sample Output [ssh on page 606](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

ssh

```
user@switch> ssh user
Host key not found from the list of known hosts.
Are you sure you want to continue connecting (yes/no)? yes

Host ?user' added to the list of known hosts.
user@device's password:
Last login: Sun Jun 21 10:43:42 1998 from junos-router
% ...
```

telnet

List of Syntax [Syntax on page 607](#)
 [Syntax \(EX Series Switches\) on page 607](#)

Syntax `telnet host`
 `<8bit>`
 `<bypass-routing>`
 `<inet | inet6>`
 `<interface interface-name>`
 `<logical-system logical-system-name>`
 `<no-resolve>`
 `<port port-number>`
 `<routing-instance routing-instance-name>`
 `<source source-address>`

Syntax (EX Series Switches) `telnet host`
 `<8bit>`
 `<bypass-routing>`
 `<inet | inet6>`
 `<interface interface-name>`
 `<no-resolve>`
 `<port port-number>`
 `<routing-instance routing-instance-name>`
 `<source source-address>`

Release Information Command introduced before Junos OS Release 7.4.
 Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Open a telnet session to a remote system. Type Ctrl+] to escape from the telnet session to the telnet command level, and then type **quit** to exit from telnet.

Options *host*—Name or address of the remote system.

8bit—(Optional) Use an 8-bit data path.

bypass-routing—(Optional) Bypass the normal routing tables and send ping requests directly to a system on an attached network. If the system is not on a directly attached network, an error is returned. Use this option to ping a local system through an interface that has no route through it.

inet | inet6—(Optional) Open an IPv4 or IPv6 session, respectively.

interface *interface-name*—(Optional) Interface name for the telnet session. (This option does not work when **default-address-selection** is configured at the **[edit system]** hierarchy level, because this configuration uses the loopback interface as the source address for all locally generated IP packets.)

logical-system *logical-system-name*—(Optional) Name of a particular logical system for the telnet attempt.

no-resolve—(Optional) Do not attempt to determine the hostname that corresponds to the IP address.

port *port-number*—(Optional) Port number or service name on the remote system.

routing-instance *routing-instance-name*—(Optional) Name of the routing instance for the telnet attempt.

source *source-address*—(Optional) Source address of the telnet connection.

Additional Information You can limit the number of times a user can attempt to enter a password while logging in through telnet. To specify the number of times a user can attempt to enter a password to log in through telnet, include the **retry-options** statement at the [edit system login] hierarchy level. For details, see the *Junos OS Administration Library for Routing Devices*.

Required Privilege Level network

List of Sample Output [telnet on page 608](#)

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

telnet

```
user@host> telnet 192.154.1.254
Trying 192.154.169.254...
Connected to level5.company.net.
Escape character is '^]'.
ttypa
login:
```

test access profile

Syntax	<code>test access profile <i>profile-name</i> user <i>username</i> password <i>password</i> <detail></code>
Release Information	Command introduced in Junos OS Release 9.1.
Description	Specify a profile to use to get information from a RADIUS server, which includes all the information from the test access radius-server command.
Options	<p>detail—(Optional) Show the RADIUS attributes returned by the server.</p> <p>profile-name—Access profile name configured.</p> <p>password—Password for the username.</p> <p>username—User name to be authenticated to the RADIUS server.</p>
Required Privilege Level	view
List of Sample Output	<p>test access profile on page 610</p> <p>test access profile detail on page 610</p>
Output Fields	Table 23 on page 609 lists the output fields for the test access profile command. Output fields are listed in the approximate order in which they appear.

Table 23: test access profile Output Fields

Field Name	Field Description
Profile Name	Name of the configured access profile.
Client Username	The user name authenticated by the RADIUS server.
Client Password	The user password authenticated by the RADIUS server.
Num Servers	Number of RADIUS servers in the configured access profile.
Server List	List of RADIUS servers in the configure access profile.
IP Address	The IP address of the RADIUS server authenticated.
UDP Port	The RADIUS server port utilized during the authentication test.
Source Address	The source IP address of the client making the RADIUS request. If no address is shown, it defaults to the address of the outgoing interface.
Timeout	The RADIUS server timeout period.
Retry Count	The number of authentication attempts allowed by the RADIUS server.

Table 23: test access profile Output Fields (*continued*)

Field Name	Field Description
Secret	The shared secret used for authentication with the RADIUS server.
Status	The test result status (Accepted or Rejected) and the number of retransmits utilized during authentication.
Attempts	The number of authentication attempts on the RADIUS server.
Attribute List	The list of returned RADIUS attributes, sorted by the attribute name, and including parameter length and value. See your RADIUS server documentation for attribute descriptions.
(Attribute) Name	The name of the attribute.
(Attribute) Length	The attribute length in bytes.
(Attribute) Value	The attribute value.

Sample Output

test access profile

The following example uses the **test access profile** command to access and display basic information about the RADIUS server(s) shown in the resulting output:

```

user@host> test access profile alpha user TEST password TEST
user@host> test access profile alpha user TEST password TEST
Test Radius Profile Access
  Profile Name      : alpha
  Client Username   : TEST
  Client Password   : TEST
  Num Servers       : 5
  Server List
    IP Address      UDP    Source      Retry
    Attempts        Port    Address      Timeout Count Secret      Status
1.1.1.1            1812  10.10.10.10  2        1    TEST      Timeout
2
1.2.3.4            1812  Default      1        2    TEST      Timeout
3
192.168.10.10      1812  Default      3        3    TEST      Accepted
1

```

test access profile detail

The following example uses the **test access profile detail** command to access and display detailed information about the RADIUS server(s) shown in the resulting output:

```

user@host> test access profile alpha user TEST password TEST detail
user@host> test access profile alpha user TEST password TEST detail
Test Radius Profile Access Detailed
  Profile Name      : alpha
  Client Username   : TEST

```


Vendor-Specific	10	137
Vendor-Specific	38	137
Vendor-Specific	10	137
Vendor-Specific	9	137
Vendor-Specific	16	137
Vendor-Specific	10	137
Vendor-Specific	10	137
Vendor-Specific	10	137
Vendor-Specific	9	137
Vendor-Specific	10	137
Vendor-Specific	10	137
Vendor-Specific	10	137
Vendor-Specific	10	137
Password-Retry	4	3
Port-Limit	4	100
Prompt	4	
Reply-Message	18	Radius Server SB
Service-Type	4	2
Session-Timeout	4	10
Termination-Action	4	1
Tunnel-Assignment-ID	4	
Tunnel-Client-Auth-ID	6	
Tunnel-Client-Endpoint	4	
Tunnel-Password	19	
Tunnel-Type	4	12
MS BAP Usage	4	0
MS-CHAP MPPE-Keys	32	-1234567890
MS-CHAP2 Success	3	123456789
MS Filter	10	ms-filter
MS Link Drop Time Limit	4	5
MS Link Utilization Threshold	4	6
MS MPPE Encryption Policy	4	1
MS MPPE Encryption Types	3	-556677889
MS Primary DNS Server	4	1:1:1:1
MS Primary NBNS Server	4	2:2:2:2
MS Secondary DNS Server	4	3:3:3:3
MS Secondary NBNS Server	4	4:4:4:4

test access radius-server

Syntax	<code>test access radius-server address user username password password secret secret</code> <code><authentication-port port></code> <code><retry number></code> <code><source-address address></code> <code><timeout number></code>
Release Information	Command introduced in Junos OS Release 9.1.
Description	Verify RADIUS server authentication parameters.
Options	<p>address—RADIUS server under test IP address.</p> <p>password—Password for the user.</p> <p>secret—Secret shared with the RADIUS server.</p> <p>user—User name to be authenticated to the RADIUS server.</p> <p>authentication-port—(Optional) RADIUS server authentication port number (1through 65535).</p> <p>retry—(Optional) Retry attempts (1through 10).</p> <p>source-address—(Optional) Use an alternate address as the source address.</p> <p>timeout—(Optional) Request timeout period (1through 90 seconds).</p>
Required Privilege Level	view
List of Sample Output	test access radius-server user password secret on page 614
Output Fields	Table 24 on page 613 lists the output fields for the test access radius-server command. Output fields are listed in the approximate order in which they appear.

Table 24: test access radius-server Output Fields

Field Name	Field Description
Server	The IP address of the RADIUS server authenticated.
UDP port	The RADIUS server port utilized during the authentication test.
Source IP Address	"Default" is shown if the IP address is the same as that of the RADIUS server. Alternatively, an IP address specified for authentication is shown.
Server timeout	The RADIUS server timeout period.
Sever retry count	The number of authentication attempts allowed by the RADIUS server.

Table 24: test access radius-server Output Fields (*continued*)

Field Name	Field Description
Secret	The shared secret used for authentication with the RADIUS server.
Client Username	The user name authenticated by the RADIUS server.
Client Password	The user password authenticated by the RADIUS server.
Status	The test result status (Accepted or Rejected) and the number of retransmits utilized during authentication.

Sample Output

test access radius-server user password secret

The following example command tests RADIUS authentication with a specific server (172.28.30.95), user (JOHNDOE), secret (No1Knows), and password (JohnPass); and displays the resulting output:

```
user@host> test access radius-server 172.28.30.95 user JOHNDOE password JohnPass secret
No1Knows
Test Radius Server Access
  Server          : 172.28.30.95
  UDP port        : 1812
  Source IP Address : Default
  Server timeout  : 3
  Sever retry count : 3
  Secret          : No1Knows
  Client Username  : JOHNDOE
  Client Password  : JohnPass
  Status          : Accepted, retransmits: 0
```

CHAPTER 15

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- [Index on page 617](#)

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