VYATTA, INC. | Vyatta System

Firewall

REFERENCE GUIDE

IPv4 Firewall
IPv6 Firewall
Zone-Based Firewall

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Quick Reference to Commands

Use this section to help you quickly locate a command.

Quick List of Examples

Use this list to help you locate examples you'd like to try or look at.

Preface

This document describes the various deployment, installation, and upgrade options for Vyatta software.

This preface provides information about using this guide. The following topics are presented:

Intended Audience

This guide is intended for experienced system and network administrators. Depending on the functionality to be used, readers should have specific knowledge in the following areas:

- Networking and data communications
- TCP/IP protocols
- General router configuration
- Routing protocols
- Network administration
- Network security
- IP services

Organization of This Guide

This guide has the following aid to help you find the information you are looking for:

- Quick Reference to Commands

  Use this list to help you quickly locate commands.

- Quick List of Examples

  Use this list to help you locate examples you'd like to try or look at.

This guide has the following chapters:

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Document Conventions

This guide uses the following advisory paragraphs, as follows.

WARNING *Warnings alert you to situations that may pose a threat to personal safety.*

CAUTION *Cautions alert you to situations that might cause harm to your system or damage to equipment, or that may affect service.*

NOTE *Notes provide information you might need to avoid problems or configuration errors.*

This document uses the following typographic conventions.

`Monospace`	Examples, command-line output, and representations of configuration nodes.
`bold Monospace`	Your input: something you type at a command line.
bold	Commands, keywords, and file names, when mentioned inline. Objects in the user interface, such as tabs, buttons, screens, and panes.
italics	An argument or variable where you supply a value.
<key>	A key on your keyboard, such as <Enter>. Combinations of keys are joined by plus signs (“+”), as in <Ctrl>+c.

[key1 | key2]	Enumerated options for completing a syntax. An example is [enable | disable].
num1–numN	A inclusive range of numbers. An example is 1–65535, which means 1 through 65535, inclusive.
arg1..argN	A range of enumerated values. An example is eth0..eth3, which means eth0, eth1, eth2, or eth3.
arg[*arg*...] *arg*[,*arg*...]	A value that can optionally represent a list of elements (a space-separated list and a comma-separated list, respectively).

Vyatta Publications

Full product documentation is provided in the Vyatta technical library. To see what documentation is available for your release, see the *Guide to Vyatta Documentation*. This guide is posted with every release of Vyatta software and provides a great starting point for finding the information you need.

Additional information is available on www.vyatta.com and www.vyatta.org.

Chapter 1: Firewall Overview

This chapter provides an overview of firewall protection features on the Vyatta system.

This section presents the following topics:

Vyatta System Firewall Functionality

Firewall functionality analyzes and filters IP packets between network interfaces. The most common application of this is to protect traffic between an internal network and the Internet. It allows you to filter packets based on their characteristics and perform actions on packets that match the rule. Vyatta system firewall functionality provides the following:

- Packet filtering for traffic traversing the router, using the **in** and **out** keywords on an interface
- Packets filtering for traffic destined to the router itself, using the **local** keyword
- Definable criteria for packet-matching rules, including source IP address, destination IP address, source port, destination port, IP protocol, and ICMP type
- General detection on IP options such as source routing and broadcast packets

The Vyatta firewall features IPv4/IPv6 stateful packet inspection to intercept and inspect network activity and allow or deny the attampt. Vyatta advanced firewall capabilities include stateful failover, zone and time-based firewalling, P2P filtering and more.

Defining Firewall Instances

To use the firewall feature, you define a firewall rule set, or "instance," and save it under a name. A firewall instance is made up of a series of rules. You then apply the instance to an interface as a packet filter.

Firewall Rules

Firewall rules specify the match conditions for traffic and the action to be taken if the match conditions are satisfied. Traffic can be matched on a number of characteristics, including source IP address, destination IP address, source port, destination port, IP protocol, and ICMP type.

Rules are executed in sequence, according to the rule number. If the traffic matches the characteristics specified by the rule, the rule's action is executed; if not, the system "falls through" to the next rule.

The action can be one of the following:

- **Accept**. Traffic is allowed and forwarded.
- **Drop**. Traffic is silently discarded.
- **Reject**. Traffic is discarded with an ICMP "Port Unreachable" message.
- **Inspect**. Traffic is processed by the intrusion protection system (IPS).

All firewall rule sets have, by default, an implicit final action of **drop all**; that is, traffic not matching any rule in the rule set is silently discarded. This default action can be changed using the **firewall name <name> default-action <action>** command.

Exclusion Rules

Note that you should take care in using more than one "exclusion" rule (that is, a rule using the negation operation ("!") to exclude a rule from treatment). Rules are evaluated sequentially, and a sequence of exclusion rules could result in unexpected behavior.

Stateful Firewall and Connection Tracking

The Vyatta system command-line interface (CLI) interacts with Netfilter's Connection Tracking System, which is a module providing connection tracking for various system functions, including firewall, NAT, and WAN load balancing. On the firewall, connection tracking allows for stateful packet inspection.

Unlike stateless firewalls, which filter packets in isolation, based on static source and destination information, stateful firewalls track the state of network connections and traffic flows and allow or restrict traffic based on whether its connection state is known and authorized. While typically slower under heavy load than stateless firewalls, stateful firewalls are better at blocking unauthorized communications.

The default stateful settings can be modified using the **firewall conntrack-table-size <size>** and **firewall conntrack-tcp-loose <state>** commands.

Applying Firewall Instances to Interfaces

Once a firewall instance is defined it can be applied to an interface, where the instance acts as a packet filter. The firewall instance filters packets in one of the following ways, depending on what you specify when you apply the firewall instance:

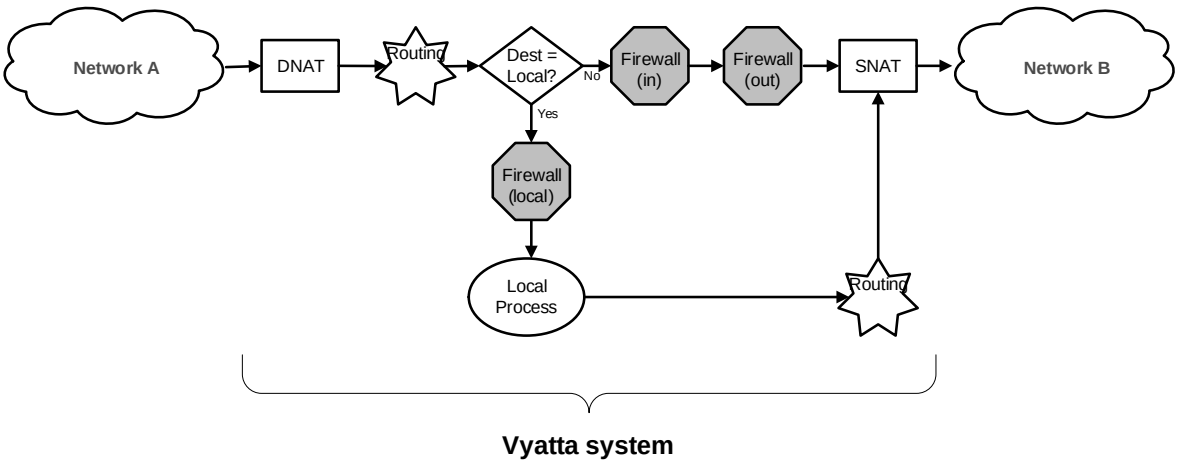
- **in.** If you apply the instance as **in**, the firewall will filter packets entering the interface and traversing the Vyatta system. You can apply one **in** packet filter.
- **out.** If you apply the instance as **out**, the firewall will filter packets leaving the interface. These can be packets traversing the Vyatta system or packets originated on the system. You can apply one **out** packet filter.
- **local.** If you apply the instance as **local**, the firewall will filter packets destined for the Vyatta system. One firewall instance can be applied as a **local** packet filter.

A total of three firewall instances can be applied to an interface: one instance as an **in** filter, one instance as an **out** filter, and one instance as a **local** filter.

Interaction Between Firewall, NAT, and Routing

One of the most important things to understand when working with firewall is the processing order of the various services that might be configured within the Vyatta system. If processing order is not considered, the results achieved may not be as intended. Figure 1-1shows how traffic flows through the firewall, NAT, and routing services within the Vyatta system.

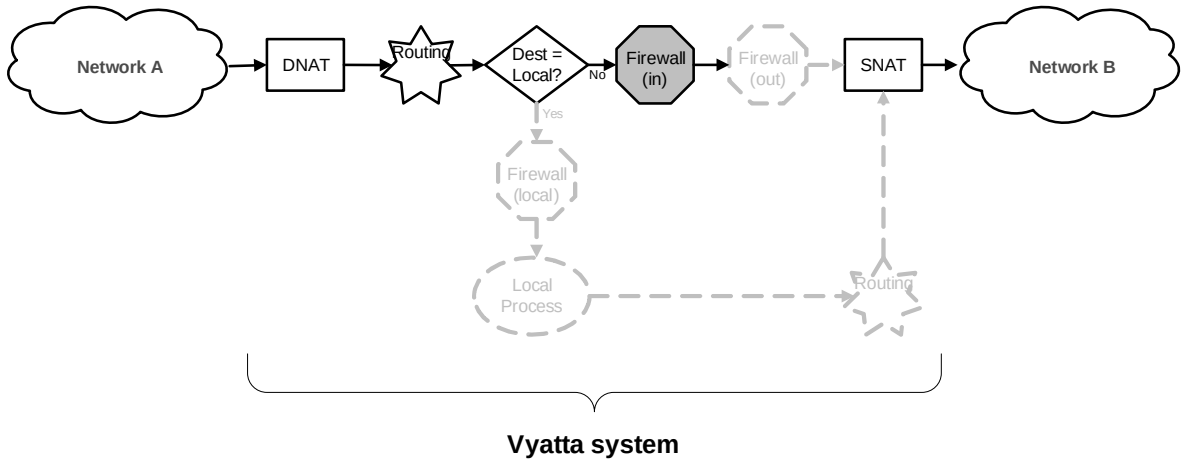
Figure 1-1 Traffic flow through firewall, NAT, and routing components



Scenario 1: Firewall instances applied to inbound traffic

The following diagram shows the traffic flow relationships between firewall, NAT, and routing, within the Vyatta system for traffic flowing through the system and firewall instances applied to **in**-bound traffic on an interface.

Figure 1-2 Inbound traffic flows through the Vyatta system

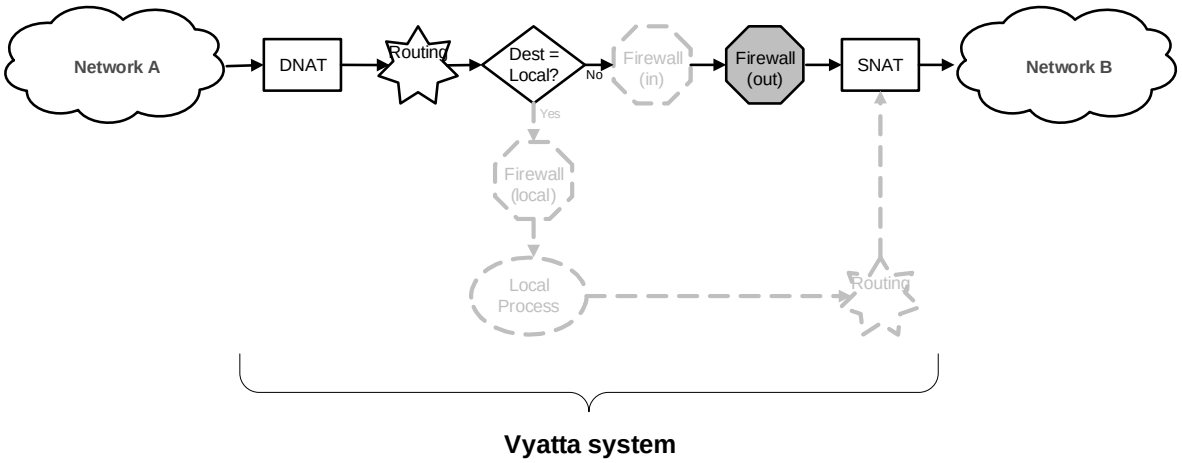


Notice that firewall instances are evaluated after DNAT and routing decisions, but prior to SNAT.

Scenario 2: Firewall instances applied to outbound traffic

The following diagram shows the traffic flow relationships between firewall, NAT, and routing, within the Vyatta system for traffic flowing through the system and firewall instances applied to **out**-bound traffic on an interface.

Figure 1-3 Outbound traffic flows through the Vyatta system

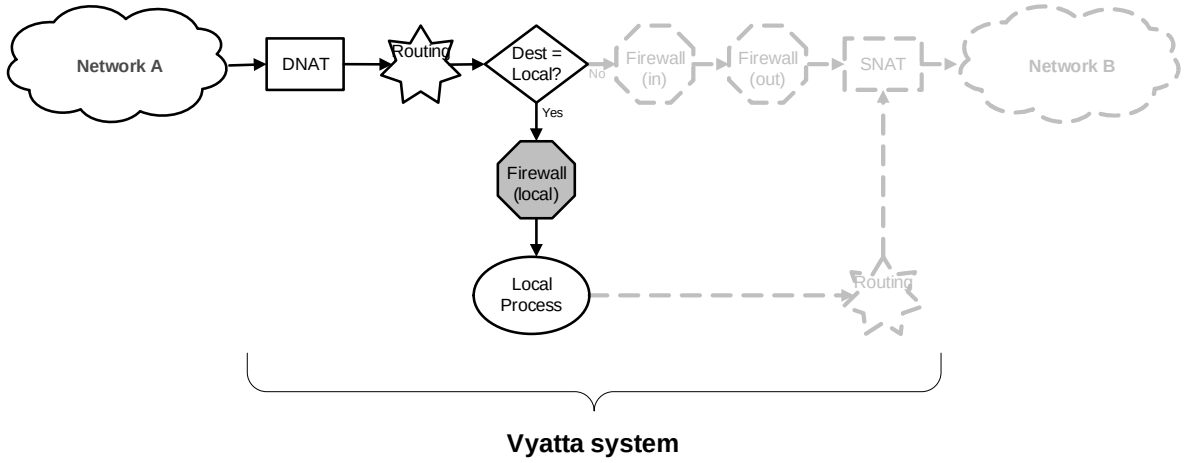


Notice that firewall instances are evaluated after DNAT and routing decisions, but prior to SNAT.

Scenario 3: Firewall instances applied to locally bound traffic

The following diagram shows the traffic flow relationships between firewall, NAT, and routing, within the Vyatta system for traffic flowing to the Vyatta system itself (firewall instances applied to **local** traffic on an interface).

Figure 1-4 Traffic flows destined for the Vyatta system

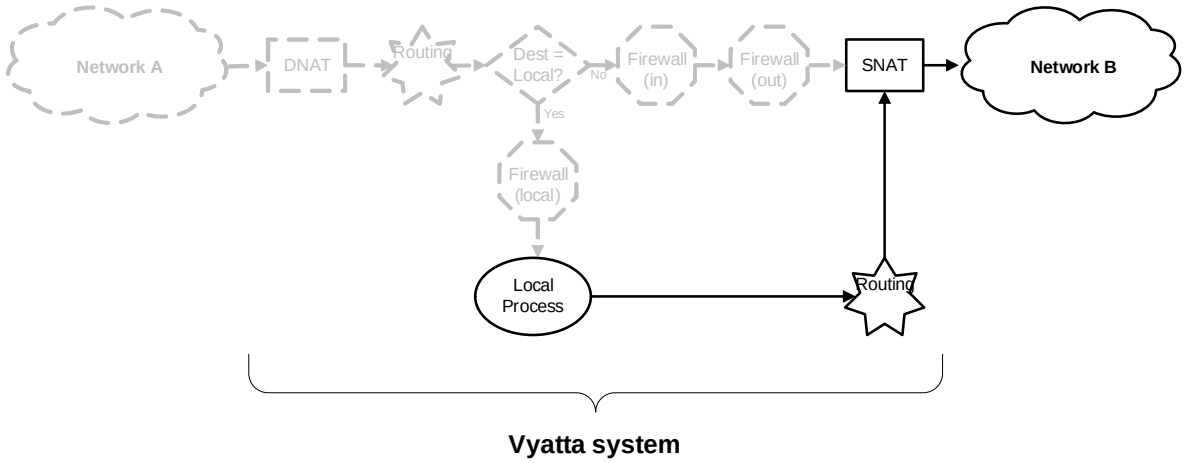


Notice that the firewall instance is evaluated after DNAT and routing. In this scenario, SNAT is not performed.

Scenario 4: Firewall instances applied to locally originated traffic

The following diagram shows the traffic flow relationships between firewall, NAT, and routing, within the Vyatta system for traffic flowing from the Vyatta system itself.

Figure 1-5 Traffic flows originating from the Vyatta system itself



Notice that no firewall instances are evaluated in this case. In this scenario, DNAT is not performed.

Zone-Based Firewall

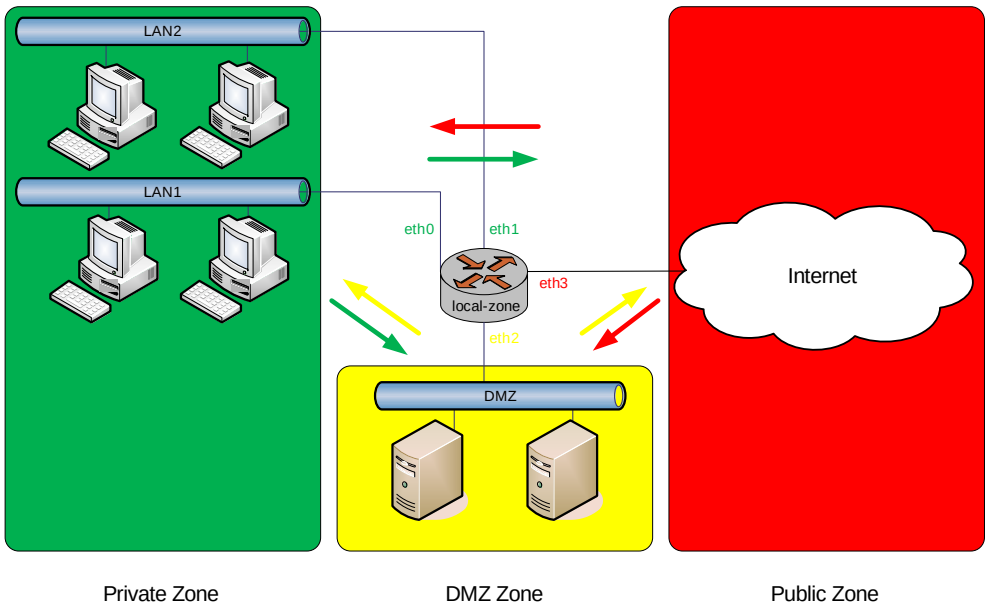
Ordinary firewall rule sets are applied on a per-interface basis to act as a packet filter for the interface. In zone-based firewall, interfaces are grouped into security "zones," where each interface in the zone has the same security level.

Packet-filtering policies are applied to traffic flowing between zones. Traffic flowing traffic flowing between interfaces lying in the same zone is not filtered and flows freely, as the interfaces share the same security level.

Figure 1-6 shows an example of a zone-based firewall implementation. In this example:

- There are three transit zones (that is, points where traffic transits the router): the Private Zone, the DMZ Zone, and the Public Zone.
- The eth3 interface lies in the Public Zone; eth0 and eth1 lie in the Private Zone; and eth2 lies in the DMZ zone.
- The arrows from one zone to another represent traffic filtering policies applied to traffic flowing between zones.
- Traffic flowing between LAN 1 and LAN 2 remains within a single security zone, Thus, traffic from LAN1 to LAN2, and vice-versa, flows unfiltered.

Figure 1-6 Zone-based firewall overview



In addition to the three transit zones in Figure 1-6, there is a fourth zone: the "Local Zone." The Local Zone is the router itself. By default, all traffic coming into the router and originating from the router is allowed.

You can, however, configure traffic filtering policies that allow traffic to the Local Zone from specific zones, and likewise from the Local Zone to only specific zones. As soon as you apply a filtering policy explicitly allowing traffic destined to Local Zone from another zone, traffic from all other zones to the Local Zone is dropped unless explicitly allowed by a filtering policy. Similarly, as soon as you apply a filtering policy to allow traffic originating from the Local Zone to another zone, traffic to all other zones is dropped unless explicitly allowed by a filtering policy.

Note the following additional points about zone-based firewalls:

- An interface can be associated with only one zone.
- An interface belonging to a zone cannot have a per-interface firewall rule set applied and vice versa.
- Traffic between interfaces not belonging to any zone flows unfiltered and per-interface firewall rule sets can be applied to those interfaces.
- By default, all traffic to a zone is dropped unless explicitly allowed by a filtering policy for a **from_zone**.
- Filtering policies are unidirectional: they are defined as a "zone pair" defining the zone from which traffic is sourced (the **from_zone**) and the zone to which traffic is destined (the **to_zone**). In Figure 1-6, these unidirectional policies can be seen as follows:
  - From Private to DMZ
  - From Public to DMZ
  - From Private to Public
  - From DMZ to Public
  - From Public to Private
  - From DMZ to Private

IPv6 Firewall

The protection offered by a firewall is even more important to sites using IPv6 because IPv6 does not offer NAT functionality. Therefore, a firewall is the only way to protect an IPv6 network.

Note that IPv4 firewall rules and IPv6 firewall rules are completely independent. IPv4 packets are not inspected by rules in IPv6 rule sets, and IPv6 rules are not inspected by rules in IPv4 rule sets. and IPv6 packets are not inspected by rules in the other IP version's table; IPv6 packets are ONLY inspected by the rules in the IPv6 filter table, while IPv4 packets are ONLY inspected by the rules in the IPv4 filter table.

In general, IPv6 support for firewall parallels that for IPv4 firewall. Some IPv4-specific parameters do not apply to IPv6 firewalls, and vice versa, for example:

- The ICMP protocol has an IPv6-specific version: “ICMP for IPv6.” Therefore, the IPv6 firewall has the additional **icmpv6** keyword available for the **protocol** filtering option. For the same reason, the **icmp** keyword is not supported for IPv6 firewall.
- The fragment parameter is not supported for IPv6 firewall, since fragmentation does not apply to IPv6.

Chapter 2: Configuration Examples

This chapter provides configuration examples and examples of how to display firewall information.

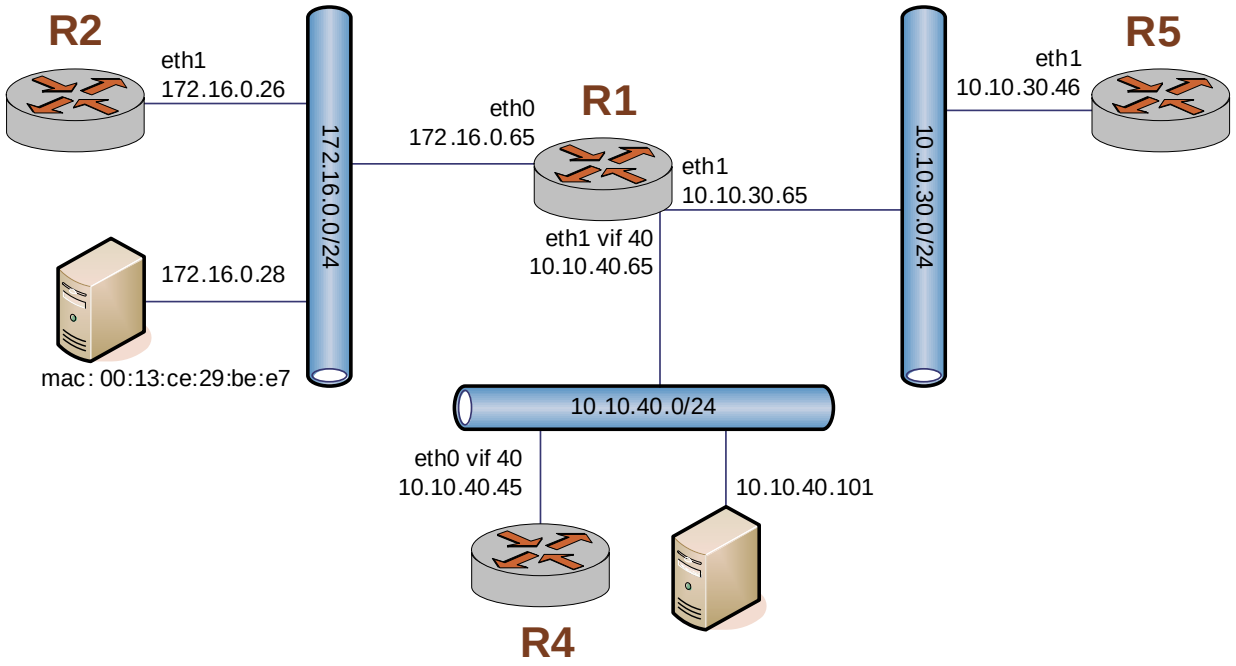
This chapter presents the following topics:

Configuration Examples

This section presents the following topics:

This section describes a sample configuration for firewall. When you have finished, the firewall will be configured on router R1 as shown in Figure 2-1.

Figure 2-1 Firewall



This section includes the following examples:

- Example 2-1 Filtering on source IP
- Example 2-2 Filtering on source and destination IP
- Example 2-3 Filtering on source IP and destination protocol
- Example 2-4 Defining a network-to-network filter
- Example 2-5 Filtering on source MAC address
- Example 2-6 Excluding an address
- Example 2-7 Activate during specified time periods
- Example 2-8 Limit the rate of specific incoming packets
- Example 2-9 Accept packets with specific TCP flags set.
- Example 2-10 Accept ICMP packets with specific type names.
- Example 2-11 Reject traffic based on groups of addresses, networks, and ports.
- Example 2-12 Drop connection attempts from the same source over a specified threshold in a given period.

Filtering on Source IP

Example 2-1 defines a firewall instance containing one rule, which filters on source IP address only. This rule will deny packets coming from router R2. It then applies the firewall instance to packets inbound on interface eth0.

To create a instance that filters on source IP, perform the following steps in configuration mode:

Example 2-1 Filtering on source IP

Step	Command
Create the configuration node for FWTEST-1 and its rule Rule 1. This rule rejects traffic matching the specified criteria.	`vyatta@R1# set firewall name FWTEST-1 rule 1 action reject`
This rule applies to traffic that has 176.16.0.26 as the source.	`vyatta@R1# set firewall name FWTEST-1 rule 1 source address 172.16.0.26`
Apply FWTEST-1 to inbound packets on eth0.	`vyatta@R1# set interfaces ethernet eth0 firewall in name FWTEST-1`
Commit the configuration.	`vyatta@R1# commit`

Filtering on Source and Destination IP

Example 2-2 defines another firewall instance. It contains one rule, which filters on both source and destination IP address. This rule accepts packets leaving R5 through eth1 using 10.10.30.46, and destined for 10.10.40.101. It then applies the firewall instance to packets outbound from vif 1 on interface eth1.

To create a instance that filters on source and destination IP, perform the following steps in configuration mode:

Example 2-2 Filtering on source and destination IP

Step	Command
Create the configuration node for FWTEST-2 and its rule Rule 1. This rule accepts traffic matching the specified criteria.	`vyatta@R1# set firewall name FWTEST-2 rule 1 action accept`
This rule applies to traffic that has 10.10.30.46 as the source.	`vyatta@R1# set firewall name FWTEST-2 rule 1 source address 10.10.30.46`

Example 2-2 Filtering on source and destination IP

This rule applies to traffic that has 10.10.40.101 as the destination.	`vyatta@R1# set firewall name FWTEST-2 rule 1 destination address 10.10.40.101`
Apply FWTEST-2 to outbound packets on eth1 vif 40.	`vyatta@R1# set interfaces ethernet eth1 vif 40 firewall out name FWTEST-2`
Commit the configuration.	`vyatta@R1# commit`

Filtering on Source IP and Destination Protocol

Example 2-3 defines a firewall rule that filters on source IP address and destination protocol. This rule allows TCP packets originating from address 10.10.30.46 (that is, R5), and destined for the Telnet port of R1. The instance is applied to local packets (that is, packets destined for this router, R1) through eth1.

To create a instance that filters on source IP and destination protocol, perform the following steps in configuration mode:

Example 2-3 Filtering on source IP and destination protocol

Step	Command
Create the configuration node for FWTEST-3 and its rule Rule 1. This rule accepts traffic matching the specified criteria.	`vyatta@R1# set firewall name FWTEST-3 rule 1 action accept`
This rule applies to traffic that has 10.10.30.46 as the source.	`vyatta@R1# set firewall name FWTEST-3 rule 1 source address 10.10.30.46`
This rule applies to TCP traffic.	`vyatta@R1# set firewall name FWTEST-3 rule 1 protocol tcp`
This rule applies to traffic that is destined for the Telnet service.	`vyatta@R1# set firewall name FWTEST-3 rule 1 destination port telnet`
Apply FWTEST-3 to packets bound for this router arriving on eth1.	`vyatta@R1# set interfaces ethernet eth1 firewall local name FWTEST-3`
Commit the configuration.	`vyatta@R1# commit`

Defining a Network-to-Network Filter

Example 2-4 creates a network-to-network packet filter, allowing packets originating from 10.10.40.0/24 and destined for 172.16.0.0/24. It then applies the firewall instance to packets inbound through vif 40 on interface eth1.

To create a network-to-network filter, perform the following steps in configuration mode:

Example 2-4 Defining a network-to-network filter

Step	Command
Create the configuration node for FWTEST-4 and its rule Rule 1. This rule accepts traffic matching the specified criteria.	`vyatta@R1# set firewall name FWTEST-4 rule 1 action accept`
This rule applies to traffic coming from the network 10.10.40.0/24.	`vyatta@R1# set firewall name FWTEST-4 rule 1 source address 10.10.40.0/24`
This rule applies to traffic destined for the network 172.16.0.0/24.	`vyatta@R1# set firewall name FWTEST-4 rule 1 destination address 172.16.0.0/24`
Apply FWTEST-4 to packets bound for this router arriving through vif 40 on eth1.	`vyatta@R1# set interfaces ethernet eth1 vif 40 firewall in name FWTEST-4`
Commit the configuration.	`vyatta@R1# commit`

Filtering on Source MAC Address

Example 2-5 defines a firewall instance containing one rule, which filters on source MAC address only. This rule will allow packets coming from a specific computer, identified by its MAC address rather than its IP address. The instance is applied to packets inbound on interface eth0.

To create a instance that filters on source MAC address, perform the following steps in configuration mode:

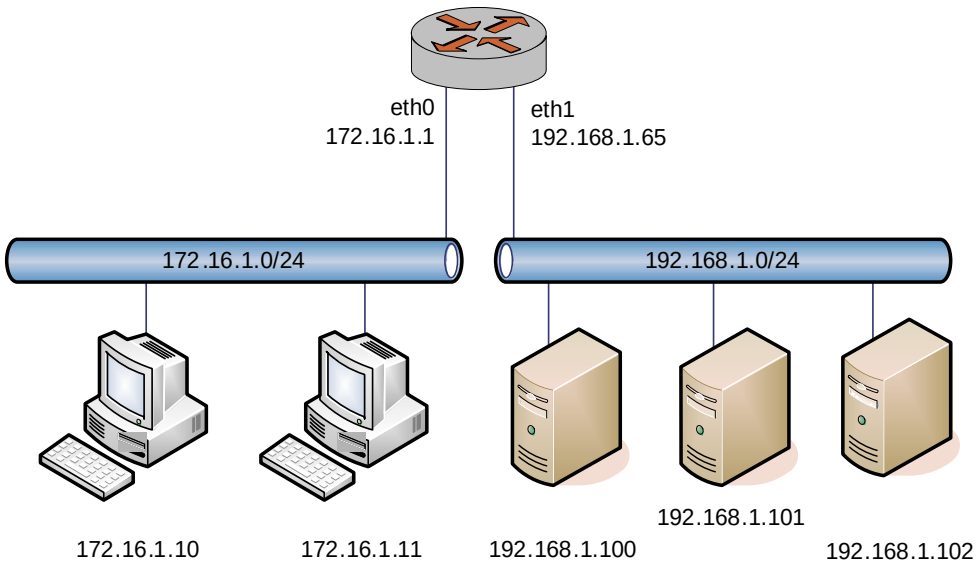
Example 2-5 Filtering on source MAC address

Step	Command
Create the configuration node for FWTEST-5 and its rule Rule 1. This rule accepts traffic matching the specified criteria.	`vyatta@R1# set firewall name FWTEST-5 rule 1 action accept`
This rule applies to traffic that has 00:13:ce:29:be:e7 as the source MAC address.	`vyatta@R1# set firewall name FWTEST-5 rule 1 source mac-address 00:13:ce:29:be:e7`
Apply FWTEST-5 to inbound packets on eth0.	`vyatta@R1# set interfaces ethernet eth0 firewall in name FWTEST-5`
Commit the configuration.	`vyatta@R1# commit`

Excluding an Address

The firewall rule shown in Example 2-6 allows all traffic from the 172.16.1.0/24 network except to server 192.168.1.100.

Figure 2-2 Excluding an address



To create a instance that excludes an address, perform the following steps in configuration mode:

Example 2-6 Excluding an address

Step	Command
Create the configuration node for FWTEST-5 and its rule 10. Give a description for the rule.	vyatta@R1# **set firewall name NEGATED-EXAMPLE rule 10 description "Allow all traffic from LAN except to server 192.168.1.100"**
All traffic that matches the rule will be accepted.	vyatta@R1# **set firewall name NEGATED-EXAMPLE rule 10 action accept**
Any traffic from network 172.16.1.0/24 matches the rule.	vyatta@R1# **set firewall name NEGATED-EXAMPLE rule 10 source address 172.16.1.0/24**
Traffic destined anywhere EXCEPT 192.168.1.100 matches the rule. That traffic does not match the rule, and invokes the implicit “reject all” rule.	vyatta@R1# **set firewall name NEGATED-EXAMPLE rule 10 destination address !192.168.1.100**
Apply the instance NEGATED-EXAMPLE to inbound packets on eth0.	vyatta@R1# **set interfaces ethernet eth0 firewall in name NEGATED-EXAMPLE**
Commit the configuration.	vyatta@R1# **commit**

Show the configuration.	vyatta@R1# **show firewall**
	name NEGATED-EXAMPLE {
	rule 10 {
	action accept
	description "Allow all traffic from LAN except to server 192.168.1.100"
	destination {
	address !192.168.1.100
	}
	source {
	address 172.16.1.0/24
	}
	}
	}
	
	vyatta@R1# **show interfaces ethernet eth0**
	address 172.16.1.1/24
	firewall {
	in {
	name NEGATED-EXAMPLE
	}
	}
	hw-id 00:0c:29:99:d7:74

Activating during Specific Time Periods

The Vyatta system supportes time-based firewall rules, which limit the operation of a rule to specific periods of time.

The firewall rule shown in Example 2-7 limits the rule configured in Example 2-6 to being active only on weekdays from 9:00 AM until 5:00 PM. To add this limitation to the rule, perform the following steps in configuration mode:

Example 2-7 Activate during specified time periods

Step	Command
Set a start time of 9:00am.	`vyatta@R1# set firewall name NEGATED-EXAMPLE rule 10 time starttime 09:00:00`
Set a stop time of 5:00pm.	`vyatta@R1# set firewall name NEGATED-EXAMPLE rule 10 time stoptime 17:00:00`
Set the days of the week.	`vyatta@R1# set firewall name NEGATED-EXAMPLE rule 10 time weekdays Mon,Tue,Wed,Thu,Fri`
Commit the configuration.	`vyatta@R1# commit`

Example 2-7 Activate during specified time periods

Show the configuration.

```
vyatta@R1# show firewall
name NEGATED-EXAMPLE {
    rule 10 {
        action accept
        description "Allow all traffic from LAN except to
server 192.168.1.100"
        destination {
            address !192.168.1.100
        }
        source {
            address 172.16.1.0/24
        }
        time {
            starttime 09:00:00
            stoptime 17:00:00
            weekdays Mon,Tue,Wed,Thu,Fri
        }
    }
}

vyatta@R1# show interfaces ethernet eth0
    address 172.16.1.1/24
    firewall {
        in {
            name NEGATED-EXAMPLE
        }
    }
    hw-id 00:0c:29:99:d7:74
```

Limiting Traffic Rates

The Token Bucket Filter (TBF) queuing mechanism can be activated by a firewall rule to limit the rate of incoming packets. Packets are limited to an administatively set rate, but may have short bursts in excess of this rate. Two rules are required to achieve this; one to accept traffic within the limit, and one to drop traffic in excess of the limit.

For example, to create a rule that accepts a limited rate of two ICMP Echo Request packets (pings) per second, but provides for short bursts without dropping packets, and a rule that will drop packets that do not get matched by the first rule, perform the following steps in configuration mode:

Example 2-8 Limit the rate of specific incoming packets

Step	Command
Set the protocol to match to ICMP.	vyatta@R1# **set firewall name RATE-LIMIT rule 20 protocol icmp**
Set ICMP type of 8 (echo-request).	vyatta@R1# **set firewall name RATE-LIMIT rule 20 icmp type 8**
Set ICMP code of 0 for type 8	vyatta@R1# **set firewall name RATE-LIMIT rule 20 icmp code 0**
Set the desired rate of 2 packets per second.	vyatta@R1# **set firewall name RATE-LIMIT rule 20 limit rate 2/second**
Set the burst size of 5 packets.	vyatta@R1# **set firewall name RATE-LIMIT rule 20 limit burst 5**
Set the action to accept.	vyatta@R1# **set firewall name RATE-LIMIT rule 20 action accept**
Set the description.	vyatta@R1# **set firewall name RATE-LIMIT rule 20 description "Rate-limit incoming icmp echo-request packets to 2/second allowing short bursts of 5 packets"**
Set the protocol to match to ICMP.	vyatta@R1# **set firewall name RATE-LIMIT rule 30 protocol icmp**
Set ICMP type of 8 (echo-request).	vyatta@R1# **set firewall name RATE-LIMIT rule 30 icmp type 8**
Set ICMP code of 0 for type 8	vyatta@R1# **set firewall name RATE-LIMIT rule 30 icmp code 0**
Set the action to drop.	vyatta@R1# **set firewall name RATE-LIMIT rule 30 action drop**
Set the description.	vyatta@R1# **set firewall name RATE-LIMIT rule 30 description "Drop remaining echo requests in excess of the rate in rule 20"**
Commit the configuration.	vyatta@R1# **commit**

Example 2-8 Limit the rate of specific incoming packets

Show the configuration.

```
vyatta@R1# show firewall name RATE-LIMIT
rule 20 {
    action accept
    description "Rate-limit incoming icmp echo-request packets
to 2/second allowing short bursts of 5 packets"
    icmp {
        code 0
        type 8
    }
    limit {
        burst 5
        rate 2/second
    }
    protocol icmp
}
rule 30 {
    action drop
    description "Drop remaining echo requests in excess of the
rate in rule 20"
    icmp {
        code 0
        type 8
    }
    protocol icmp
}
vyatta@R1#
```

Matching TCP Flags

The Vyatta system supports filtering on the TCP flags within TCP packets. For example, to create a rule to accept packets with the SYN flag set, and the ACK, FIN, and RST flags unset, perform the following steps in configuration mode:

Example 2-9 Accept packets with specific TCP flags set.

Step	Command
Set the protocol to match to tcp.	`vyatta@R1# set firewall name TCP-FLAGS rule 30 protocol tcp`
Set the TCP flags to match.	`vyatta@R1# set firewall name TCP-FLAGS rule 30 tcp flags SYN,!ACK,!FIN,!RST`
Set the action to accept.	`vyatta@R1# set firewall name TCP-FLAGS rule 30 action accept`
Commit the configuration.	`vyatta@R1# commit`

Example 2-9 Accept packets with specific TCP flags set.

Show the configuration.	vyatta@R1# **show firewall name TCP-FLAGS**
	rule 30 {
	action accept
	protocol tcp
	tcp {
	flags SYN,!ACK,!FIN,!RST
	}
	}
	vyatta@R1#

Matching ICMP Type Names

Packets can be filtered for ICMP type names. For example, to create a rule that allows only ICMP Echo Request packets through, perform the following steps in configuration mode:

Example 2-10 Accept ICMP packets with specific type names.

Step	Command
Set the protocol to match to icmp.	vyatta@R1# **set firewall name ICMP-NAME rule 40 protocol icmp**
Set the ICMP packet type to match.	vyatta@R1# **set firewall name ICMP-NAME rule 40 icmp type-name echo-request**
Set the action to accept.	vyatta@R1# **set firewall name ICMP-NAME rule 40 action accept**
Commit the configuration.	vyatta@R1# **commit**

Show the configuration.	vyatta@R1# **show firewall name ICMP-NAME**
	rule 40 {
	action accept
	protocol icmp
	icmp {
	type-name echo-request
	}
	}
	vyatta@R1#

Matching Groups

Groups of addresses, ports, and networks can be defined for similar filtering. For example, to create a rule that rejects traffic to a group of addresses and ports and from a group of networks, perform the following steps in configuration mode:

Example 2-11 Reject traffic based on groups of addresses, networks, and ports.

Step	Command
Add a range of addresses to an address group.	vyatta@R1# **set firewall group address-group SERVERS address 1.1.1.1-1.1.1.5**
Add another address to an address group.	vyatta@R1# **set firewall group address-group SERVERS address 1.1.1.7**
Add a network to a network group.	vyatta@R1# **set firewall group network-group NETWORKS network 10.0.10.0/24**
Add a port to a port group.	vyatta@R1# **set firewall group port-group PORTS port 22**
Add a port name to a port group.	vyatta@R1# **set firewall group port-group PORTS port ftp**
Add a range of ports to a port group.	vyatta@R1# **set firewall group port-group PORTS port 1000-2000**
Commit the configuration.	vyatta@R1# **commit**

Show the configuration.	vyatta@R1# **show firewall group**
	group {
	address-group SERVERS {
	address 1.1.1.1-1.1.1.5
	address 1.1.1.7
	}
	network-group NETWORKS {
	network 10.0.10.0/24
	}
	port-group PORTS {
	port 22
	port ftp
	port 1000-2000
	}
	}
	vyatta@R1#

Specify a reject action within a firewall instance.	vyatta@R1# **set firewall name REJECT-GROUPS rule 10 action reject**
Specify an address group to match as a destination.	vyatta@R1# **set firewall name REJECT-GROUPS rule 10 destination group address-group SERVERS**

Example 2-11 Reject traffic based on groups of addresses, networks, and ports.

Specify an port group to match as a destination.	`vyatta@R1# set firewall name REJECT-GROUPS rule 10 destination group port-group PORTS`
Specify an network group to match as a source.	`vyatta@R1# set firewall name REJECT-GROUPS rule 10 source group network-group NETWORKS`
Commit the configuration.	`vyatta@R1# commit`

Show the configuration.	`vyatta@R1# show firewall name REJECT-GROUPS`
	`rule 10{`
	`  action reject`
	`  destination {`
	`  group {`
	`  address-group SERVERS`
	`  port-group PORTS`
	`  }`
	`  }`
	`  source {`
	`  group {`
	`  network-group NETWORKS`
	`  }`
	`  }`
	`}`
	`vyatta@R1#`

Matching Recently-Seen Sources

The **recent** command can be used to help prevent "brute force" attacks where an external device opens a continuous flow of connections (for example, to the SSH port) in an attempt to break into the system. In these cases, the external source address may be unknown; however, this command enables matching based on the external host's behavior without initially knowing its IP address.

For example, to create a rule that limits incoming SSH connection attempts from the same host to three within 30 seconds, perform the following steps in configuration mode:

Example 2-12 Drop connection attempts from the same source over a specified threshold in a given period.

Step	Command
Match TCP packets.	`vyatta@R1# set firewall name STOP-BRUTE rule 10 protocol tcp`

Example 2-12 Drop connection attempts from the same source over a specified threshold in a given period.

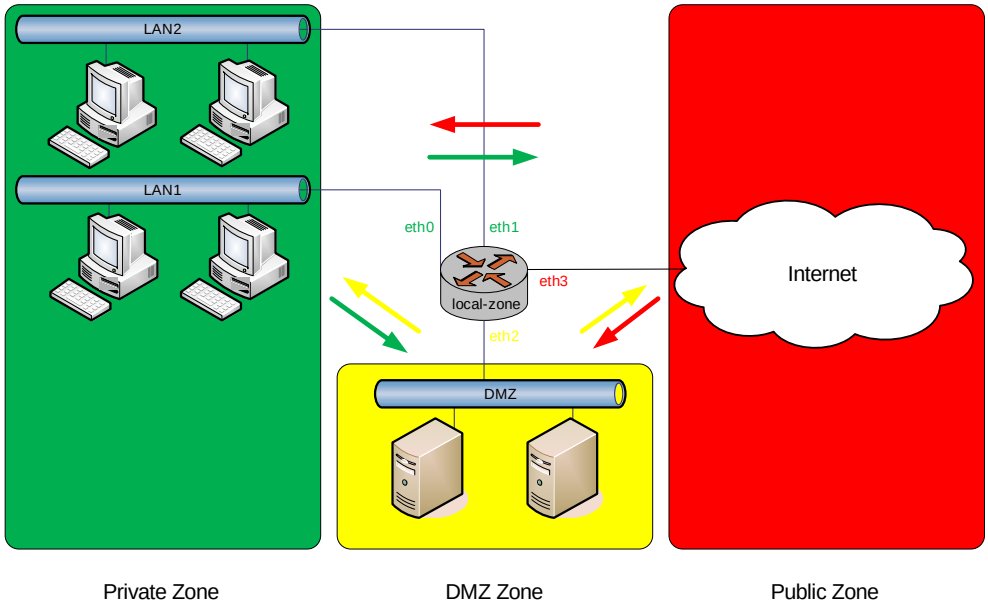
Match a destination port of 22 (i.e. ssh).	`vyatta@R1# set firewall name STOP-BRUTE rule 10 destination port 22`
Match connection attempts.	`vyatta@R1# set firewall name STOP-BRUTE rule 10 state new enable`
Match the same source address 3 times in ...	`vyatta@R1# set firewall name STOP-BRUTE rule 10 recent count 3`
... 30 seconds.	`vyatta@R1# set firewall name STOP-BRUTE rule 10 recent time 30`
Drop packets that match these criteria.	`vyatta@R1# set firewall name STOP-BRUTE rule 10 action drop`
Commit the configuration.	`vyatta@R1# commit`

Show the configuration.	`vyatta@R1# show firewall name STOP-BRUTE`
	`rule 10{`
	`  action drop`
	`  destination {`
	`  port 22`
	`  }`
	`  protocol tcp`
	`  recent {`
	`  count 3`
	`  time 30`
	`  }`
	`  state {`
	`  new enable`
	`  }`
	`}`
	`vyatta@R1#`

Zone-Based Firewall Configuration

The other firewall model supported by the Vyatta system is the Zone-based model. Figure 2-3 shows a Zone-based configuration with three user-defined zones. The examples that follow show the configuration for this diagram.

Figure 2-3 Zone-based firewall configuration



This section presents the following topics:

- Filtering traffic between the transit zones
- Filtering traffic to/from the Local Zone
- Considerations for Remote Access VPN
- Using per interface firewall rule-sets simultaneously with Zone-Based firewall

Filtering traffic between the transit zones

To create the zone policies, perform the following steps in configuration mode:

Example 2-13 Creating the zone policies

Step	Command
Create the configuration node for the DMZ zone and give a description for the zone.	`vyatta@R1# set zone-policy zone dmz description “DMZ ZONE”`
Add the interface contained in the zone.	`vyatta@R1# set zone-policy zone dmz interface eth2`
Create the configuration node for the Private zone and give a description for the zone.	`vyatta@R1# set zone-policy zone private description “PRIVATE ZONE”`

Example 2-13 Creating the zone policies

Add one of the interfaces contained in the zone.	vyatta@R1# **set zone-policy zone private interface eth0**
Add the other interface contained in the zone.	vyatta@R1# **set zone-policy zone private interface eth1**
Create the configuration node for the Public Zone and give a description for the zone.	vyatta@R1# **set zone-policy zone public description “PUBLIC ZONE”**
Add the interface contained in the zone.	vyatta@R1# **set zone-policy zone public interface eth3**
Commit the configuration.	vyatta@R1# **commit**

Show the configuration.	vyatta@R1# **show zone-policy**
	zone dmz {
	description "DMZ ZONE"
	interface eth2
	}
	zone private {
	description "PRIVATE ZONE"
	interface eth0
	interface eth1
	}
	zone public {
	description "PUBLIC ZONE"
	interface eth3
	}

At this point, no traffic flows between these zones. All traffic flowing from one zone to another will be dropped. Note that because eth0 and eth1 lie in the same zone, traffic between these interfaces will flow freely. We now create firewall rule-sets to allow traffic between zones. First we create the rule set for traffic to the Public Zone.

Example 2-14 Creating the firewall rule set for traffic to the Public Zone

Step	Command
Create the configuration node for the to_public rule set and give a description for the rule set.	vyatta@R1# **set firewall name to_public description "allow all traffic to PUBLIC zone"**
Create a rule to accept all traffic sent to the Public Zone.	vyatta@R1# **set firewall name to_public rule 1 action accept**

Example 2-14 Creating the firewall rule set for traffic to the Public Zone

Commit the configuration.	vyatta@R1# **commit**

Show the firewall configuration.	vyatta@R1# **show firewall name to_public**
	description "allow all traffic to PUBLIC zone"
	rule 1 {
	action accept
	}

Then we create the rule sets for traffic to the DMZ Zone

Example 2-15 Creating the firewall rule sets for traffic to the DMZ Zone

Step	**Command**
Create the configuration node for the private_to_dmz rule set and give a description for the rule set.	vyatta@R1# **set firewall name private_to_dmz description "filter traffic from PRIVATE zone to DMZ zone"**
Create a rule to allow traffic sent from the Private Zone to specific ports in the DMZ Zone.	vyatta@R1# **set firewall name private_to_dmz rule 1 action accept** vyatta@R1# **set firewall name private_to_dmz rule 1 destination port http,https,ftp,ssh,telnet** vyatta@R1# **set firewall name private_to_dmz rule 1 protocol tcp**
Create a rule to allow all icmp traffic sent from the Private Zone to the DMZ Zone.	vyatta@R1# **set firewall name** private_**to_dmz rule 2 action accept** vyatta@R1# **set firewall name** private_**to_dmz rule 2 icmp type-name any** vyatta@R1# **set firewall name** private_**to_dmz rule 2 protocol icmp**
Commit the configuration.	vyatta@R1# **commit**

Example 2-15 Creating the firewall rule sets for traffic to the DMZ Zone

Show the firewall configuration.	vyatta@R1# **show firewall name private_to_dmz**
	description "filter traffic from PRIVATE zone to DMZ zone"
	rule 1 {
	action accept
	destination {
	port http,https,ftp,ssh,telnet
	}
	protocol tcp
	}
	rule 2 {
	action accept
	icmp {
	type-name any
	}
	protocol icmp
	}

Create the configuration node for the public_to_dmz rule set and give a description for the rule set.	vyatta@R1# **set firewall name public_to_dmz description "filter traffic from PUBLIC zone to DMZ zone"**
Create a rule to allow traffic sent from the Public Zone to specific ports in the DMZ Zone.	vyatta@R1# **set firewall name public_to_dmz rule 1 action accept** vyatta@R1# **set firewall name public_to_dmz rule 1 destination port http,https** vyatta@R1# **set firewall name public_to_dmz rule 1 protocol tcp**
Create a rule to allow all icmp traffic sent from the Public Zone to the DMZZone.	vyatta@R1# **set firewall name public_to_dmz rule 2 action accept** vyatta@R1# **set firewall name public_to_dmz rule 2 icmp type-name any** vyatta@R1# **set firewall name public_to_dmz rule 2 protocol icmp**
Commit the configuration.	vyatta@R1# **commit**

Example 2-15 Creating the firewall rule sets for traffic to the DMZ Zone

Show the firewall configuration.	vyatta@R1# **show firewall name public_to_dmz**
	description "filter traffic from PUBLIC zone to DMZ zone"
	rule 1 {
	action accept
	destination {
	port http,https
	}
	protocol tcp
	}
	rule 2 {
	action accept
	icmp {
	type-name any
	}
	protocol icmp
	}

Then we create the rule set for traffic to the Private Zone.

Example 2-16 Creating the firewall rule set for traffic to the Private Zone

Step	Command
Create the configuration node for the to_private rule set and give a description for the rule set.	vyatta@R1# **set firewall name to_private description "filter traffic to PRIVATE zone"**
Create a rule to only allow traffic to the Private Zone that was initiated from that zone (i.e. previously established and related sessions).	vyatta@R1# **set firewall name to_private rule 1 action accept** vyatta@R1# **set firewall name to_private rule 1 state established enable** vyatta@R1# **set firewall name to_private rule 1 state related enable** vyatta@R1# **set firewall name to_private rule 1 protocol all**
Commit the configuration.	vyatta@R1# **commit**

Example 2-16 Creating the firewall rule set for traffic to the Private Zone

Show the firewall configuration.	vyatta@R1# **show firewall name to_private**
	description "filter traffic to PRIVATE zone"
	rule 1 {
	action accept
	protocol all
	state {
	established enable
	related enable
	}
	}

We then apply these rule sets to filter traffic between zones. First the DMZ Zone

Example 2-17 Applying rule sets to the DMZ Zone.

Step	Command
Apply the private_to_dmz rule set to traffic from the Private Zone to the DMZ Zone.	vyatta@R1# **set zone-policy zone dmz from private firewall name private_to_dmz**
Apply the public_to_dmz rule set to traffic from the Public Zone to the DMZZone.	vyatta@R1# **set zone-policy zone dmz from public firewall name public_to_dmz**
Commit the configuration.	vyatta@R1# **commit**

Show the DMZ Zone policy configuration.	vyatta@R1# **show zone-policy zone dmz**
	description "DMZ ZONE"
	from private {
	firewall {
	name private_to_dmz
	}
	}
	from public {
	firewall {
	name public_to_dmz
	}
	}
	interface eth2

Then the Private Zone.

Example 2-18 Applying rule sets to the Private Zone.

Step	Command
Apply the to_private rule set to traffic from the DMZ Zone to the Private Zone.	vyatta@R1# **set zone-policy zone private from dmz firewall name to_private**
Apply the to_private rule set to traffic from the Public Zone to the Private Zone.	vyatta@R1# **set zone-policy zone private from public firewall name to_private**
Commit the configuration.	vyatta@R1# **commit**

Show the Private Zone policy configuration.	vyatta@R1# **show zone-policy zone private**
	description "PRIVATE ZONE"
	from dmz {
	  firewall {
	  name to_private
	  }
	}
	from public {
	  firewall {
	  name to_private
	  }
	}
	interface eth0
	interface eth1

Finally, the Public Zone.

Example 2-19 Applying rule sets to the Public Zone.

Step	Command
Apply the to_public rule set to traffic from the DMZ Zone to the Public Zone.	vyatta@R1# **set zone-policy zone public from dmz firewall name to_public**
Apply the to_pubic rule set to traffic from the Private Zone to the Public Zone.	vyatta@R1# **set zone-policy zone public from private firewall name to_public**
Commit the configuration.	vyatta@R1# **commit**

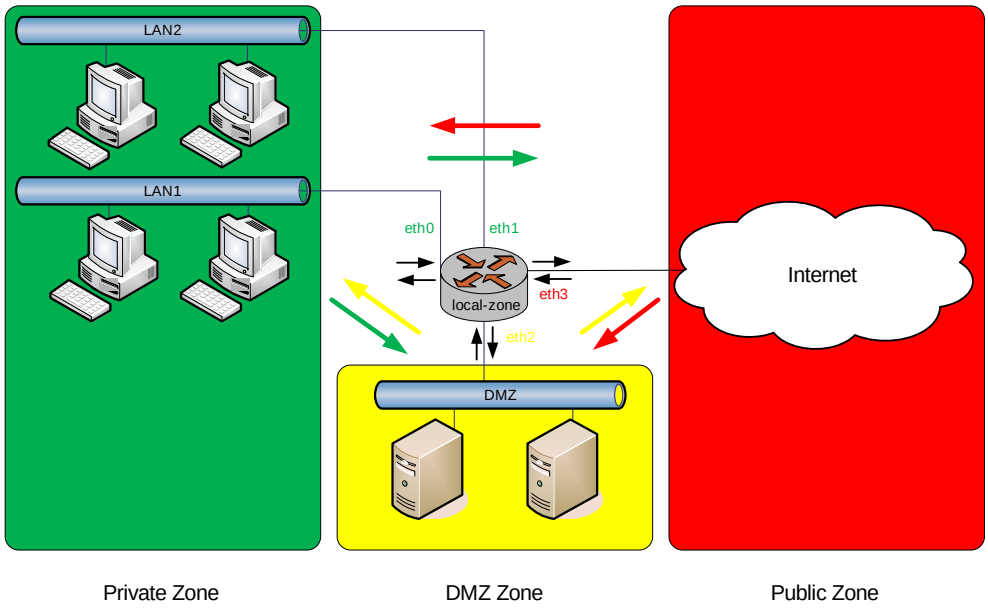
Example 2-19 Applying rule sets to the Public Zone.

Show the public zone policy configuration.	vyatta@R1# **show zone-policy zone public**
	description "PUBLIC ZONE"
	from dmz {
	firewall {
	name to_public
	}
	}
	from private {
	firewall {
	name to_public
	}
	}
	interface eth3

Filtering traffic to/from the Local Zone

The Local Zone is a special zone which refers to the Vyatta system itself. By default, all traffic destined for the system and originating from the system is allowed. In Figure 2-4 we see arrows depicting traffic flows to and from the transit zones (Private, DMZ, and Public) as well as to and from the Local Zone.

Figure 2-4 Default traffic to/from the Local Zone



To create a configuration that restricts access to the Vyatta system to hosts located within the Private Zone, perform the following steps in configuration mode:

Example 2-20 Restricting Vyatta system access to hosts located in the Private Zone.

Step	Command
Create the configuration node for the private_to_vyatta rule set and give a description for the rule set.	vyatta@R1# **set firewall name private_to_vyatta description "filter traffic from PRIVATE zone to local-zone"**
Allow all traffic.	vyatta@R1# **set firewall name private_to_vyatta rule 1 action accept**
Commit the configuration.	vyatta@R1# **commit**

Show the private_to_vyatta firewall configuration.	vyatta@R1# **show firewall name private_to_vyatta**
	description "filter traffic from PRIVATE zone to local-zone"
	rule 1{
	action accept
	}

Apply the private_to_vyatta rule set to traffic from the Private Zone to the Local Zone.	vyatta@R1# **set zone-policy zone vyatta from private firewall name private_to_vyatta**
Set the Local Zone.	vyatta@R1# **set zone-policy zone vyatta local-zone**
Commit the configuration.	vyatta@R1# **commit**

Show the Local Zone policy configuration.	vyatta@R1# **show zone-policy zone vyatta**
	from private {
	firewall {
	name private_to_vyatta
	}
	}
	local-zone

At this point, only traffic from the Private Zone destined for the Vyatta system is allowed. Traffic from all other zones is dropped. However, all traffic originating from the Vyatta system is still allowed to all zones.

NOTE *Care should be taken when defining the local-zone. If you are configuring the system via a remote connection (e.g. via ssh) and restrict access from the zone you are in your session will be dropped. You must make sure that traffic from the zone you are in to to the Vyatta system is allowed.*

Be aware that there are services (e.g. DNS forwarding and Web Proxy) that terminate connections to them within the Vyatta system and then initiate connections to another host. In the case of DNS forwarding, packets destined to the router for lookup of a non-cached DNS entry result in the DNS forwarder initiating a connection to the external name-server to retrieve the DNS entry and then pass it

back to the originating client. In the example configuration above where packets to the router are allowed only from the PRIVATE zone, DNS lookups coming back to the router from an external name-server in the PUBLIC zone would be dropped. Thus, to allow packets destined for the router from the PUBLIC zone, we define a rule-set and apply it in the local-zone as follows:

Example 2-21 Filtering traffic from the Public Zone to the Vyatta system.

Step	Command
Create the configuration node for the public_to_vyatta rule set and give a description for the rule set.	vyatta@R1# **set firewall name public_to_vyatta description "filter traffic from PUBLIC zone to local-zone"**
Allow the specified traffic.	vyatta@R1# **set firewall name public_to_vyatta rule 1 action accept** vyatta@R1# **set firewall name public_to_vyatta rule 1 protocol all** vyatta@R1# **set firewall name public_to_vyatta rule 1 state established enable** vyatta@R1# **set firewall name public_to_vyatta rule 1 state related enable**
Commit the configuration.	vyatta@R1# **commit**

Show the public_to_vyatta firewall configuration.	vyatta@R1# **show firewall name public_to_vyatta**
	description "filter traffic from PUBLIC zone to local-zone"
	rule 1{
	action accept
	protocol all
	state {
	established enable
	related enable
	}
	}

Apply the public_to_vyatta rule set to traffic from the Public Zone to the Local Zone.	vyatta@R1# **set zone-policy zone vyatta from public firewall name public_to_vyatta**
Commit the configuration.	vyatta@R1# **commit**

Example 2-21 Filtering traffic from the Public Zone to the Vyatta system.

Show the new Local Zone policy configuration.	vyatta@R1# **show zone-policy zone vyatta**
	from private {
	  firewall {
	  name private_to_vyatta
	  }
	}
	from public {
	  firewall {
	  name public_to_vyatta
	  }
	}
	local-zone

By default all traffic originating from the Local Zone is permitted. If you wish to restrict this you must define the local-zone as a "from zone" within the definition of a transit zone. Once the local-zone is used as a "from zone" all traffic from the Vyatta system to all other zones is blocked unless explicitly allowed through the use of a rule set that allows traffic into a specific zone.

For example, to allow traffic from the Vyatta system only to the Private Zone we would do the following:

Example 2-22 Allow traffic from the Vyatta system to the Private Zone.

Step	Command
Create the configuration node for the from_vyatta rule set and give a description for the rule set.	vyatta@R1# **set firewall name from_vyatta description "allow all traffic from local-zone"**
Allow the specified traffic.	vyatta@R1# **set firewall name from_vyatta rule 1 action accept** vyatta@R1# **set firewall name from_vyatta rule 1 protocol all**
Commit the configuration.	vyatta@R1# **commit**

Show the from_vyatta firewall configuration.	vyatta@R1# **show firewall name from_vyatta**
	description "allow all traffic from local-zone"
	rule 1{
	  action accept
	  protocol all
	}

Apply the from_vyatta rule set to traffic from the Local Zone to the Private Zone.	vyatta@R1# **set zone-policy zone private from vyatta firewall name from_vyatta**

Example 2-22 Allow traffic from the Vyatta system to the Private Zone.

Commit the configuration.	`vyatta@R1# commit`

Show the new Private Zone policy configuration.	`vyatta@R1# show zone-policy zone private`
	` description "PRIVATE ZONE"`
	` from dmz {`
	`  firewall {`
	`  name to_private`
	`  }`
	` }`
	` from public {`
	`  firewall {`
	`  name to_private`
	`  }`
	` }`
	` from vyatta {`
	`  firewall {`
	`  name from_vyatta`
	`  }`
	` }`
	` interface eth0`
	` interface eth1`

Remember that the services that require traffic to originate from the Vyatta system require appropriate filtering to those zones from the local-zone. For example, for DNS forwarding to work traffic would have to be permitted from the Vyatta system to the Public Zone.

Considerations for Remote Access VPN

We extend our example by adding a separate zone to handle Remote Access VPN users. We treat these users like users in the Private zone (though it is not necessary to do so). To this end, a separate “vpn” zone is created and policies are applied just like for Private zone users. One difference is that all Remote Access VPN users that access the Vyatta system present as separate L2TP or PPTP interfaces so the **interface** is defined as “l2tp+” or “pptp+”, meaning any L2TP or PPTP interface. In this example we also assume that no interaction is required between the VPN zone and the Private zone. The following configuration shows each of the zones now that the VPN zone is aded.

Example 2-23 Zone policy with VPN zone added.

Step	Command

Show the VPN Zone policy configuration. The “interface l2tp+” means any L2TP connection. The “interface pptp+” means any PPTP connection.	vyatta@R1# **show zone-policy zone vpn**
	default-action drop
	description "REMOTE ACCESS VPN ZONE"
	from dmz {
	  firewall {
	  name to_private
	  }
	}
	from public {
	  firewall {
	  name to_private
	  }
	}
	from vyatta {
	  firewall {
	  name from_vyatta
	  }
	}
	interface l2tp+
	interface pptp+

Show the DMZ Zone policy configuration (the “from vpn” section has been added).	vyatta@R1# **show zone-policy zone dmz**
	description "DMZ ZONE"
	from private {
	  firewall {
	  name private_to_dmz
	  }
	}
	from public {
	  firewall {
	  name public_to_dmz
	  }
	}
	from vpn {
	  firewall {
	  name private_to_dmz
	  }
	}
	interface eth2

Example 2-23 Zone policy with VPN zone added.

Show the Private Zone policy configuration (no changes to the Private zone as there is no traffic between Private and VPN zones).

```
vyatta@R1# show zone-policy zone private
 description "PRIVATE ZONE"
 from dmz {
    firewall {
        name to_private
    }
 }
 from public {
    firewall {
        name to_private
    }
 }
 from vyatta {
    firewall {
        name from_vyatta
    }
 }
 interface eth0
 interface eth1
```

Show the Public zone policy configuration (the “from vpn” section has been added).

```
vyatta@R1# show zone-policy zone public
 description "PUBLIC ZONE"
 from dmz {
    firewall {
        name to_public
    }
 }
 from private {
    firewall {
        name to_public
    }
 }
 from vpn {
    firewall {
        name to_public
    }
 }
 interface eth3
```

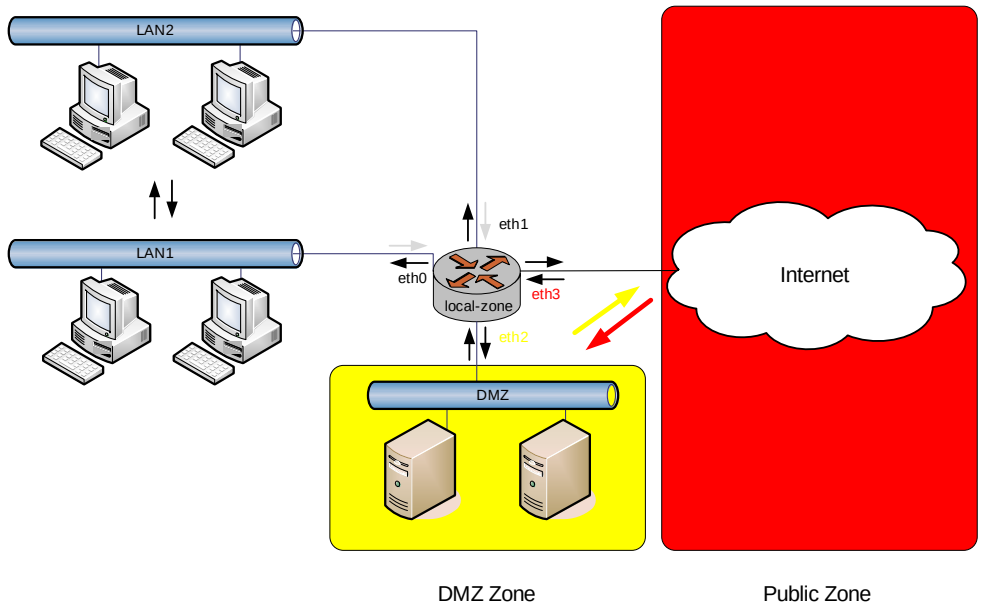
Example 2-23 Zone policy with VPN zone added.

Show the Local Zone policy configuration (the “from vpn” section has been added).	vyatta@R1# **show zone-policy zone vyatta**
	from private {
	  firewall {
	  name private_to_vyatta
	  }
	}
	from public {
	  firewall {
	  name public_to_vyatta
	  }
	}
	from vpn {
	  firewall {
	  name private_to_vyatta
	  }
	}
	local-zone

Using per interface firewall rule-sets simultaneously with Zone-Based firewall

On the creation of a zone, transit or local, traffic to that zone is only allowed from another zone by using firewall rule-sets to filter traffic from that zone. Thus, interfaces that are not included as part of any zone will not be able to send traffic to any zone. However, traffic between interfaces that are not part of any zone flows freely and can be filtered using per interface firewall rule-sets. Consider the example below:

Figure 2-5 Default traffic to/from the Local Zone



There are three zones defined in this topology - DMZ, Public, local-zone. A sample zone-policy configuration for this topology may look something like this:

Example 2-24 Zone policy for topology with three zones (DMZ, Public, and local-zone).

Step	Command

Show the zone policy configuration.	vyatta@R1# **show zone-policy**
	zone dmz {
	default-action drop
	description "DMZ ZONE"
	from public {
	firewall {
	name public_to_dmz
	}
	}
	interface eth2
	}
	zone public {
	default-action drop
	description "PUBLIC ZONE"
	from dmz {
	firewall {
	name to_public
	}
	}
	interface eth3
	}
	zone vyatta {
	default-action drop
	from dmz {
	firewall {
	name dmz_to_vyatta
	}
	}
	from public {
	firewall {
	name public_to_vyatta
	}
	}
	local-zone
	}

eth0 and eth1 are not part of any zone. Thus, traffic to any of the three zones from these interfaces will be dropped. Traffic flowing between LAN1 and LAN2 will flow freely and unfiltered. Also, traffic going out eth0 and eth1 from any of the zones (DMZ, Public, and local-zone) will flow unfiltered. Now, suppose that we want to

reject all traffic from any of the zones going out eth0 and eth1 and also, want to allow just ICMP packets between LAN1 and LAN2. We would configure the system as follows:

Example 2-25 Reject traffic from zones and allow only ICMP between LANs.

Step	Command

Show the allow_ping_only firewall configuration.
NOTE: “not_allowed_nets” is a network group containing subnets of the DMZ and Public zones.
	vyatta@R1# **show firewall name allow_ping_only**
	description "allow nothing from zones. allow icmp packets between LANs"
	rule 1 {
	action reject
	protocol all
	source {
	group {
	network-group not_allowed_nets
	}
	}
	}
	rule 2 {
	action accept
	icmp {
	type-name any
	}
	protocol icmp
	}

Show the firewall configuration of eth0 and eth1.	vyatta@R1# **show interfaces ethernet eth0 firewall**
	out {
	name allow_ping_only
	}
	vyatta@R1# **show interfaces ethernet eth1 firewall**
	out {
	name allow_ping_only
	}

This does not filter traffic originating from the Vyatta system going out interfaces eth0 and eth1. There are no commands to filter traffic originating from the system on a per interface basis. If the zone-policy configuration in this example had the local-zone (zone vyatta) being used as a from zone under DMZ and/or Public then traffic originating from the system would only go out those zones and nothing else.

Viewing Firewall Information

This section presents the following topics:

This section includes the following examples:

Showing Firewall Instance Information

You can see how firewall instances are set up by using the **show firewall** command in operational mode and specifying the name of the instance. If no instance is specified then all defined instances are displayed.

Example 2-26 shows the information you configured for firewall instance FWTEST-1 and FWTEST-3.

Example 2-26 Showing firewall instances

```
vyatta@R1:~$ show firewall FWTEST-1

Active on (eth0, IN)

State Codes: E - Established, I - Invalid, N - New, R - Related

rule  action  source              destination         proto  state
----  ------  ------              -----------         -----  -----
1     REJECT  172.16.0.26         0.0.0.0/0           all    any
1025  DROP    0.0.0.0/0           0.0.0.0/0           all    any


vyatta@R1:~$ show firewall FWTEST-3

Active on (eth1, LOCAL)

State Codes: E - Established, I - Invalid, N - New, R - Related

rule  action  source              destination         proto  state
----  ------  ------              -----------         -----  -----
```

```
1     ACCEPT  10.10.30.46         0.0.0.0/0           tcp    any
                                  dst ports: telnet
1025  DROP    0.0.0.0/0           0.0.0.0/0           all    any


vyatta@R1:~$
```

Showing Firewall Configuration on Interfaces

Example 2-27 shows how firewall instance FWTEST-1 is applied to interface eth0.

Example 2-27 Showing firewall configuration on an interface

```
vyatta@R1# show interfaces ethernet eth0 firewall
    in {
        name FWTEST-1
    }
vyatta@R1#
```

Showing Firewall Configuration

You can always view the information in configuration nodes by using the **show** command in configuration mode. In this case you can view firewall configuration by using the **show firewall** command in configuration mode, as shown in Example 2-28.

Example 2-28 Displaying the “firewall” configuration node

```
vyatta@R1# show firewall
    name FWTEST-1 {
        rule 1 {
            action reject
            source {
                address 172.16.0.26
            }
        }
    }
    name FWTEST-2 {
        rule 1 {
            action accept
            destination {
                address 10.10.40.101
            }
```

```
            source {
                address 10.10.30.46
            }
        }
    }
    name FWTEST-3 {
        rule 1 {
            action accept
            destination {
                port telnet
            }
            protocol tcp
            source {
                address 10.10.30.46
            }
        }
    }
    name FWTEST-4 {
        rule 1 {
            action accept
            destination {
                address 172.16.0.0/24
            }
            source {
                address 10.10.40.0/24
            }
        }
    }
    name FWTEST-5 {
        rule 1 {
            action accept
            source {
                mac-addr 00:13:ce:29:be:e7
            }
        }
    }
vyatta@R1#
```

Chapter 3: Global Firewall Commands

This chapter describes Vyatta system firewall commands that apply to both IPv4 and IPv6 firewalls.

Global Firewall Commands

This chapter contains the following commands.

Configuration Commands	
Global Configuration Commands	
firewall	Enables firewall on the Vyatta system.
firewall conntrack-expect-table-size <size>	Sets the maximum size of the connection tracking expect table.
firewall conntrack-hash-size <size>	Sets the size of the hash table associated with the connection tracking table.
firewall conntrack-options sip	Sets options associated with connection tracking SIP traffic.
firewall conntrack-table-size <size>	Sets the maximum size of the connection tracking table.
firewall conntrack-tcp-loose <state>	Specifies whether previously-established connections are to be tracked for stateful traffic filtering.
Operational Commands	
Global Operational Commands	
show firewall	Displays information about configured firewall instances.

firewall

Enables firewall on the Vyatta system.

Syntax

set firewall

delete firewall

show firewall

Command Mode

Configuration mode.

Configuration Statement

```
firewall {}
```

Parameters

None.

Default

None.

Usage Guidelines

Use this command to define firewall configuration settings and rule sets, using other **firewall** commands.

Once the firewall rule sets have been defined, they must be applied to interfaces as packet filters using firewall-related **interface** commands. Until a firewall rule set has been applied to an interface, it has no effect on traffic destined for or traversing the system.

Note that after the final user-defined rule in a rule set is executed, an implicit rule of **reject all** takes effect.

Use the **set** form of this command to create firewall configuration.

Use the **delete** form of this command to remove firewall configuration.

Use the **show** form of this command to view firewall configuration.

firewall conntrack-expect-table-size <size>

Sets the maximum size of the connection tracking expect table.

Syntax

set firewall conntrack-expect-table-size *size*

delete firewall conntrack-expect-table-size

show firewall conntrack-expect-table-size

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   conntrack-expect-table-size size
}
```

Parameters

size	The maximum number of entries allowed in the Netfilter connection tracking expect table. For memory usage estimating purposes, each entry, including overhead, uses approximately 300 bytes of kernel memory. The range is 1 to 50000000.

Default

When the firewall is not enabled, the connection tracking expect table is set to track a maximum of 2048 entries; when the firewall is enabled, the connection tracking expect table is set to track a maximum of 4096 entries. Since, each connection tracking expect table entry is about 300 bytes in size, the maximum amount of kernel memory used for connection tracking expect table entries could reach approximately 600 Kbytes [(2048 * 300)/(1024 * 1024)] when firewall is not enabled. Similarly, the maximum amount of kernel memory used for connection tracking expect table entries could reach a maximum of 1.2 Mbytes [(4096 * 300)/(1024 * 1024)] when the firewall is enabled.

Usage Guidelines

Use this command to specify the maximum size of the Netfilter connection tracking expect table. The connection tracking expect table is a table of connection tracking expectations. These are the mechanism by which connections related to existing connections are “expected”. They are generally used by "connection tracking helpers" (or “application level gateways”) for protocols such as FTP, SIP, and H.323.

If you intend to increase this value, then attention should be payed to the amount of memory available with the system and the approximate amount of memory that might get used by increasing this value.

Note that since memory for connection tracking expect table entries is dynamically allocated, memory usage will increase as the number of expected connections tracked by the system increases. Also, if the maximum number of entries is reached in the connection tracking table then the kernel may begin to drop existing connection tracking expect table entries to accommodate new entries or if it is unable to remove entries from the table then incoming packets may begin to be dropped.

Use the **set** form of this command to modify the maximum size of the connection tracking expect table.

Use the **delete** form of this command to restore the default connection tracking expect table size.

Use the **show** form of this command to view connection tracking expect table size configuration.

firewall conntrack-hash-size <size>

Sets the size of the hash table associated with the connection tracking table.

Syntax

set firewall conntrack-hash-size *size*

delete firewall conntrack-hash-size

show firewall conntrack-hash-size

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   conntrack-hash-size size
}
```

Parameters

size	The number of buckets in the Netfilter connection tracking hash table. For memory usage estimating purposes, each entry, uses 8 bytes of kernel memory. The range is 1 to 50000000.

Default

The connection tracking hash table contains 4,096 buckets (32 Kbytes).

Usage Guidelines

Use this command to specify the size of the Netfilter connection tracking hash table. The connection tracking table hash table is the data structure used to provide quick seaching of the connection tracking table. The hash table is typically 1/8th the size of the connection tracking table. If the connection tracking table size is increased then the hash table should be increased as well in the same ratio. Making the hash table larger than that uses more memory but also increases the speed of accessing a connection entry. Making it smaller decreases the memory usage but slows down lookup time. Memory for connection tracking hash table entries is allocated statically.

Use the **set** form of this command to modify the size of the connection tracking hash table.

Use the **delete** form of this command to restore the default connection tracking hash table size.

Use the **show** form of this command to view connection tracking hash table size configuration.

firewall conntrack-options sip

Sets options associated with connection tracking SIP traffic.

Syntax

set firewall conntrack-options sip [**enable-indirect-media** | **enable-indirect-signalling** | **port** *port*]

delete firewall conntrack-options sip [**enable-indirect-media** | **enable-indirect-signalling** | **port**]

show firewall conntrack-options sip

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    conntrack-options {
        sip {
            enable-indirect-media
            enable-indirect-signalling
            port port
        }
    }
}
```

Parameters

enable-indirect-media	Media streams can originate from, or be delivered to, addresses other than those used during the signalling (SIP) phase of the connection. By default, the connection tracking system only expects media streams using the same source/destination address pair as the SIP signalling stream.
enable-indirect-signalling	Incoming calls can come from an address other than the one a phone is registered with (typically the address of the PBX the phone registers with on boot). By default, the connection tracking system will only expect incoming calls to a phone from its registrar.

port	Multinode. The port number that SIP traffic is carried on. Up to eight ports can be specified by creating additional **port** configuration nodes. The default is 5060. ***NOTE*** *If this parameter is set then only the port numbers specified will be tracked. If you wish to track port 5060 in addition to other ports then it must be specified explicitly along with the others you wish to track.*

Default

SIP traffic is carried on port 5060.

Usage Guidelines

Use this command to specify options associated with connection tracking SIP traffic.

Use the **set** form of this command to set options associated with connection tracking SIP traffic.

Use the **delete** form of this command to restore the default configuration.

Use the **show** form of this command to view the configuration.

firewall conntrack-table-size <size>

Sets the maximum size of the connection tracking table.

Syntax

set firewall conntrack-table-size *size*

delete firewall conntrack-table-size

show firewall conntrack-table-size

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   conntrack-table-size size
}
```

Parameters

size	The maximum number of entries allowed in the Netfilter connection tracking table. For memory usage estimating purposes, each entry, including overhead, uses approximately 300 bytes of kernel memory. The range is 1 to 50000000.

Default

When the firewall is not enabled, the connection tracking table is set to track a maximum of 16,384 entries; when the firewall is enabled, the connection tracking table is set to track a maximum of 32,768 entries. Since, each connection tracking entry is about 300 bytes in size, the maximum amount of kernel memory used for connection tracking entries could reach approximately 4.5 Mbytes [(16384 * 300)/(1024 * 1024)] when firewall is not enabled. Similarly, the maximum amount of kernel memory used for connection tracking entries could reach a maximum of 9 Mbytes [(32768 * 300)/(1024 * 1024)] when the firewall is enabled.

Usage Guidelines

Use this command to specify the maximum size of the Netfilter connection tracking table. The connection tracking table tracks the state of network connections and traffic streams, allowing the system to relate them to provide stateful traffic filtering.

If you intend to increase this value, then attention should be payed to the amount of memory available with the system and the approximate amount of memory that might get used by increasing this value.

Note that since memory for connection tracking entries is dynamically allocated, memory usage will increase as the number of connections tracked by the system increases. Also, if the maximum number of entries is reached in the connection tracking table then the kernel may begin to drop existing connection tracking entries to accommodate new entries or if it is unable to remove connection entries from the table then incoming packets may begin to be dropped.

NOTE *In most environments, if the connection tracking table size is modified, the connection tracking hash table size (**conntrack-hash-size**) should also be modified so that it remains 1/8th the size of the connection tracking table.*

Use the **set** form of this command to modify the maximum size of the connection tracking table.

Use the **delete** form of this command to restore the default connection tracking table size.

Use the **show** form of this command to view connection tracking table size configuration.

firewall conntrack-tcp-loose <state>

Specifies whether previously-established connections are to be tracked for stateful traffic filtering.

Syntax

set firewall conntrack-tcp-loose {**enable** | **disable**}

delete firewall conntrack-tcp-loose

show firewall conntrack-tcp-loose

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    conntrack-tcp-loose [enable|disable]
}
```

Parameters

enable	The system allows the processing of previously-established connections.
disable	The system does not allow the processing of previously-established connections.

Default

Previously-established connections are allowed.

Usage Guidelines

Use this command to specify whether loose TCP tracking is to be applied; that is, whether previously established connections should be allowed in stateful traffic filtering.

In stateful traffic filtering, the system retains state new data flows authorized from the trusted network. When loose TCP connection tracking is enabled, the system permits traffic flows that were established previously to tracking; when disabled, the system rejects these flows.

Use the **set** form of this command to specify whether previously established connections area allowed or rejected.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view loose TCP tracking configuration.

show firewall

Displays information about configured firewall instances.

Syntax

show firewall [**name** *name* | **detail** | **statistics**]

Command Mode

Operational mode.

Parameters

name *name*	Displays information about the specified rule set, showing to which interfaces or zones it is currently applied.
detail	Displays detailed information about all firewall rule sets.
statistics	Displays statistics for all firewall rule sets.

Default

When no option is specified, summary information is displayed for all firewall rule sets.

Usage Guidelines

Use this command to display information about configured firewall rule sets (instances). Information is displayed for all IPv4 and IPv6 rule sets.

Note that only information about rule sets (instances) is displayed; information about interfaces to which firewall instances have been applied is not shown. To see information about which firewall instances have been applied to an interface, use the **show interfaces** command for the interface.

Examples

Example 3-1 shows the zones to which the firewall rule set “allow_all” has been applied as a packet filter.

Example 3-1 Seeing where firewall rule sets are being used

```
vyatta@R1:~$# show firewall name allow_all
IPv4 Firewall "allow_all":

 Active on (eth1,IN)

 Active on traffic to -
  zone [private] from zones [dmz, public]

(State Codes: E - Established, I - Invalid, N - New, R - Related)

rule  action  source              destination         proto  state
----  ------  ------              -----------         -----  -----
1     ACCEPT  0.0.0.0/0           0.0.0.0/0           all    any
1025  DROP    0.0.0.0/0           0.0.0.0/0           all    any
```

Example 3-2 shows a summary of the rule sets configured on R1. In this example, only one rule set (TEST) has been defined.

Example 3-2 Displaying firewall information

```
vyatta@R1:~$ show firewall
------------------------------------------------------------
IPv4 Firewall "TEST": Active on (eth0,IN)
(State Codes: E - Established, I - Invalid, N - New, R - Related)

rule  action  source              destination         proto  state
----  ------  ------              -----------         -----  -----
10    ACCEPT  192.168.0.0/24      0.0.0.0/0           all    any
20    DROP    192.168.74.0/24     0.0.0.0/0           icmp   any
30    ACCEPT  0.0.0.0/0           0.0.0.0/0           tcp    E,N
1025  DROP    0.0.0.0/0           0.0.0.0/0           all    any

vyatta@R1:~$
```

Example 3-3 shows detail for all firewall rule s on R1. In this example, only one rule set (TEST) has been defined.

Example 3-3 Displaying detailed firewall rule set information

```
vyatta@R1:~$ show firewall detail
------------------------------------------------------------
IPv4 Firewall "TEST": Active on (eth0,IN)

rule  action   proto  packets  bytes
```

```
----  ------   -----  -------  -----
10    accept   all    0        0
  condition - saddr 192.168.0.0/24

20    drop     icmp   0        0
  condition - saddr 192.168.74.0/24

30    accept   tcp    0        0
  condition - state NEW,ESTABLISHED

1025  drop     all    0        0

vyatta@R1:~$
```

Example 3-4 shows statistics for all firewall rules on R1.

Example 3-4 “show firewall statistics ”: Displaying rule statistics

```
vyatta@R1:~$ show firewall statistics
------------------------------------------------------------
IPv4 Firewall "TEST": Active on (eth0,IN)

rule  packets   bytes     action  source              destination
----  -------   -----     ------  ------              -----------
10    0         0         ACCEPT  192.168.0.0/24      0.0.0.0/0
20    0         0         DROP    192.168.74.0/24     0.0.0.0/0
30    0         0         ACCEPT  0.0.0.0/0           0.0.0.0/0
1025  0         0         DROP    0.0.0.0/0           0.0.0.0/0

vyatta@R1:~$
```

Chapter 4: IPv4 Firewall Commands

This chapter describes commands for defining IPv4 firewall packet filters on the Vyatta system.

This chapter presents the following topics:

IPv4 Firewall Commands

This chapter contains the following commands.

Configuration Commands	
Interface Commands	
interfaces <interface> firewall <direction> name <fw-name>	Applies an IPv4 firewall instance to the defined interface.
General Detection	
firewall all-ping <state>	Enables or disables response to all IPv4 ICMP Echo Request (ping) messages.
firewall broadcast-ping <state>	Enables or disables response to broadcast IPv4 ICMP Echo Request and Timestamp Request messages.
firewall ip-src-route <state>	Specifies whether to process packets with the Loose Source Route or Strict Source Route IP options.
firewall log-martians <state>	Specifies whether to log packets with invalid addresses.
firewall receive-redirects <state>	Specifies whether to process IPv4 ICMP redirect messages.
firewall send-redirects <state>	Specifies whether to allow sending of IPv4 ICMP redirect messages.
firewall source-validation <state>	Specifies whether to allow sending of IPv4 ICMP redirect messages.
firewall syn-cookies <state>	Specifies a policy for source validation by reversed path, as defined in RFC 3704.
Firewall Groups	
firewall group	Defines a group of objects for referencing in firewall rules.
firewall group address-group <group-name>	Defines a group of IP addresses for referencing in firewall rules.
firewall group network-group <group-name>	Defines a group of networks for referencing in firewall rules.
firewall group port-group <group-name>	Defines a a group of ports for referencing in firewall rules.

Rules and Rule Sets	
firewall name <name>	Defines an IPv4 firewall rule set.
firewall name <name> default-action <action>	Sets the default action for an IPv4 rule set.
firewall name <name> description <desc>	Specifies a brief description for an IPv4 firewall rule set.
firewall name <name> enable-default-log	Logs packets that reach the default action.
firewall name <name> rule <rule-num>	Defines a rule within an IPv4 firewall rule set.
firewall name <name> rule <rule-num> action <action>	Specifies the action to perform on matched packets.
firewall name <name> rule <rule-num> description <desc>	Specifies a brief description for an IPv4 firewall rule.
firewall name <name> rule <rule-num> destination	Specifies the destination address and, optionally, port to match in an IPv4 firewall rule.
firewall name <name> rule <rule-num> destination group	Specifies a group or addresses, ports, or networks for packet destination address matching in an IPv4 firewall rule.
firewall name <name> rule <rule-num> disable	Disables a firewall rule.
firewall name <name> rule <rule-num> fragment	Specifies matching for fragmented packets.
firewall name <name> rule <rule-num> icmp	Specifies ICMP code and type settings for a firewall rule.
firewall name <name> rule <rule-num> ipsec	Specifies IPSEC packet matching.
firewall name <name> rule <rule-num> limit	Specifies traffic rate limiting parameters for a firewall rule.
firewall name <name> rule <rule-num> log <state>	Enables or disables logging of firewall rule actions.
firewall name <name> rule <rule-num> p2p <app_name>	Specifies a P2P application to which a firewall rule applies.
firewall name <name> rule <rule-num> protocol <protocol>	Specifies the protocol to which a firewall rule applies.
firewall name <name> rule <rule-num> recent	Specifies the parameters to match recently seen sources.
firewall name <name> rule <rule-num> source	Specifies the source address and port to match in a firewall rule.
firewall name <name> rule <rule-num> source group	Specifies a group or addresses, ports, or networks for packet source address matching in an IPv4 firewall rule.

firewall name <name> rule <rule-num> state	Specifies the kinds of packets to which this rule is applied.
firewall name <name> rule <rule-num> tcp flags	Specifies the TCP flags to match in a firewall rule.
firewall name <name> rule <rule-num> time	Specifies the times at which this rule is applied.
Operational Commands	
clear firewall name <name> counters	Clears statistics associated with an IPv4 firewall rule set.
show firewall	Displays statistics information for firewall instances.
show firewall group	Displays firewall group information.

clear firewall name <name> counters

Clears statistics associated with an IPv4 firewall rule set.

Syntax

clear firewall name *name* [**rule** *rule-num*] **counters**

Command Mode

Operational mode.

Parameters

name	The name of the firewall rule set for which statistics are to be cleared.
rule *rule-num*	Clears statistics for a specific rule within the specified firewall rule set.

Default

When no rule is specified, statistics are cleared for all rules in the rule set.

Usage Guidelines

Use this command to clear the statistics associated with an IPv4 firewall rule set or, optionally, a rule within an IPv4 firewall rule set.

firewall all-ping <state>

Enables or disables response to all IPv4 ICMP Echo Request (ping) messages.

Syntax

set firewall all-ping {**enable** | **disable**}

delete firewall all-ping

show firewall all-ping

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   all-ping state
}
```

Parameters

enable	The system responds to IPv4 ICMP Echo Request messages.
disable	The system does not respond to IPv4 ICMP Echo Request messages.

Default

The system responds to IPv4 ICMP Echo Request messages.

Usage Guidelines

Use this command to specify whether the system responds to IPv4 ICMP Echo Request messages (pings). This includes all ping messages: unicast, broadcast, or multicast.

Pings are a network tool used to establish the reachability of a device from the local system. Pings are often disallowed as a potential means of Denial of Service (DoS) attacks.

Use the **set** form of this command to enable or disable responses to pings.

Use the **delete** form of this command to restore the default behavior for responses to pings.

Use the **show** form of this command to view ping processing configuration.

firewall broadcast-ping <state>

Enables or disables response to broadcast IPv4 ICMP Echo Request and Timestamp Request messages.

Syntax

set firewall broadcast-ping {**enable** | **disable**}

delete firewall broadcast-ping

show firewall broadcast-ping

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    broadcast-ping state
}
```

Parameters

enable	The system responds to broadcast IPv4 ICMP Echo and Timestamp Request messages.
disable	The system does not respond to broadcast IPv4 ICMP Echo and Timestamp Request messages.

Default

IPv4 ICMP Echo and Timestamp Request messages are not processed.

Usage Guidelines

Use this command to specify whether the system processes broadcast IPv4 ICMP Echo Request and broadcast IPv4 ICMP Timestamp Request messages.

Pings are a network tool used to establish the reachability of a device from the local system. Pings, and particularly broadcast pings are often disallowed because of the potential of a Denial of Service (DoS) attack. Timestamp requests are used by to

query another device for the current date and time. Broadcast timestamp requests are also often disallowed, both because of the potential for a DoS attack and because the query allows an attacker to learn the date set on the queried machine.

Use the **set** form of this command to specify whether the system responds to broadcast ICMP IPv4 ICMP Echo and Timestamp Request messages.

Use the **delete** form of this command to restore the default behavior for responding to these messages.

Use the **show** form of this command to view configured behavior for responding to these messages.

firewall group

Defines a group of objects for referencing in firewall rules.

Syntax

set firewall group

delete firewall group

show firewall group

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   group {}
}
```

Parameters

None.

Default

None.

Usage Guidelines

Use this command to define a group of objects that can be firewall group configuration. A firewall group is a mechanism for grouping various network objects and matching any of the elements in the group rather than having to specify them individually. You can create groups of addresses, networks, or interfaces.

The **firewall group** configuration node is a multi-node: you can define multiple groups by creating multiple **firewall group** configuration nodes.

Use the **set** form of this command to create the firewall group configuration.

Use the **delete** form of this command to remove a firewall group.

Use the **show** form of this command to view firewall group configuration.

firewall group address-group <group-name>

Defines a group of IP addresses for referencing in firewall rules.

Syntax

set firewall group address-group *group-name* {**address** *address* | **description** *desc*}

delete firewall group address-group *group-name* {**address** *address* | **description**}

show firewall group address-group *group-name* {**address** *address* | **description**}

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    group {
        address-group group-name {
            address address
            description desc
        }
    }
}
```

Parameters

group-name	Mandatory. The name of the firewall address group.
address *address*	Mandatory. Adds the specified IPv4 address or range of IPv4 addresses to the specified address group. IPv4 address ranges are specified by separating two contiguous IPv4 addresses with a hyphen; for example, 10.0.0.1-10.0.0.50.
description *desc*	Allows you to specify a brief description for the address group.

Default

None.

Usage Guidelines

Use this command to specify an address group. An address group is a collection of host IP addresses and address ranges which, once defined, can be collectively referenced within a firewall command.

An address group is considered matched if the packet address matches any address or address range within the group.

Use the **set** form of this command to specify the address group.

Use the **delete** form of this command to remove the address group or its members.

Use the **show** form of this command to view the address group configuration.

firewall group network-group <group-name>

Defines a group of networks for referencing in firewall rules.

Syntax

set firewall group network-group *group-name* {**network** *ipv4net* | **description** *desc*}

delete firewall group network-group *group-name* {**network** *ipv4net* | **description** *desc*}

show firewall group network-group *group-name* {**network** *ipv4net* | **description**}

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    group {
        network-group group-name {
            description desc
            network ipv4net
        }
    }
}
```

Parameters

group-name	Mandatory. The name of the firewall network group.
network *ipv4net*	Mandatory. Adds an IPv4 network to the specified network group. The format is *ip-address/prefix*.
description *desc*	Allows you to specify a brief description for the network group.

Default

None.

Usage Guidelines

Use this command to define a network group. A network group is a collection of network addresses which, once defined, can be collectively referenced within a firewall command.

A network group is considered matched if the packet address matches any network address or address range within the group.

Use the **set** form of this command to define a network group.

Use the **delete** form of this command to remove the network group or its members.

Use the **show** form of this command to view network group configuration.

firewall group port-group <group-name>

Defines a a group of ports for referencing in firewall rules.

Syntax

set firewall group port-group *group-name* {**port** *port* | **description** *desc*}

delete firewall group port-group *group-name* {**port** *port* | **description**}

show firewall group port-group *group-name* {**port** *port* | **description**}

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    group {
        port-group group-name {
            description desc
            port port
        }
    }
}
```

Parameters

group-name	Mandatory. The name of the firewall port group.
port *port*	Mandatory. Adds a port number to the specified port group. Supported formats include a port name (any name in **/etc/services**), a port number, or a hyphen-separated range of port numbers; for example, 1001-1050.
description *desc*	Allows you to specify a brief description for the port group.

Default

None.

Usage Guidelines

Use this command to specify a port group. A port group is a collection of port names, port numbers, and port number ranges which, once defined, can be collectively referenced within a firewall command.

A port group is considered matched if the packet port matches any port name or number within the group.

Use the **set** form of this command to specify a port group.

Use the **delete** form of this command to remove the port group or its members.

Use the **show** form of this command to view port group configuration.

firewall ip-src-route <state>

Specifies whether to process packets with the Loose Source Route or Strict Source Route IP options.

Syntax

set firewall ip-src-route {**enable** | **disable**}

delete firewall ip-src-route

show firewall ip-src-route

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ip-src-route state
}
```

Parameters

enable	Processes packets with source routing IP options set.
disable	Does not process packets with source routing IP options set.

Default

The default is **disable**.

Usage Guidelines

Use this command to specify whether to permit or deny packets with the Loose Source Route or Strict Source Route IP options.

Source routing allows applications to override the routing tables and specify one or more intermediate destinations for outgoing datagrams. This capability is sometimes used for troubleshooting, but renders the network vulnerable to attacks where network traffic is transparently directed to a centralized collection point for packet capture.

Use the **set** form of this command to specify whether or not to process source route IP options.

Use the **delete** form of this command to restore the default behavior for source route IP options.

Use the **show** form of this command to view source route IP option configuration.

firewall log-martians <state>

Specifies whether to log packets with invalid addresses.

Syntax

set firewall log-martians *state*

delete firewall log-martians

show firewall log-martians

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   log-martians state
}
```

Parameters

state	Specifies whether or not to record packets with invalid addresses in the log. Supported values are as follows: **enable:** Logs packets with invalid addresses. **disable:** Does not log packets with invalid addresses.

Default

Packets with invalid addresses are logged.

Usage Guidelines

Use this command to specify whether to log packets with invalid addresses.

Use the **set** form of this command to set the logging behavior for packets with invalid addresses.

Use the **delete** form of this command to restore the default behavior for packets with invalid addresses.

Use the **show** form of this command to view configuration information for packets with invalid addresses.

firewall name <name>

Defines an IPv4 firewall rule set.

Syntax

set firewall name *name*

delete firewall name [*name*]

show firewall name [*name*]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {}
}
```

Parameters

name	Multinode. The name of the firewall rule set. The name must not contain a space or any other of the following special characters: “|”, “;”, “&”, “$”, “<“, or “>”. The name can be up to 28 characters long. You can define multiple IPv4 firewall rule sets by creating more than one **name** configuration node.

Default

None.

Usage Guidelines

Use this command to define an IPv4 firewall rule set.

A firewall rule set is a named collection of up to 9999 packet-filtering rules . Following the configurable rules is an implicit rule, rule 10000, which denies all traffic.

NOTE *The "deny all" rule stays in effect until every reference to the rule set is removed; that is, until every packet filter referencing the rule set has been removed from all interfaces.*

Use the **set** form of this command to create or modify an IPv4 firewall rule set.

Use the **delete** form of this command to remove an IPv4 firewall rule set.

Use the **show** form of this command to view firewall rule set configuration.

firewall name <name> default-action <action>

Sets the default action for an IPv4 rule set.

Syntax

set firewall name *name* **default-action** *action*

delete firewall name *name* **default-action**

show firewall name *name* **default-action**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        default-action action
    }
}
```

Parameters

name	The name of the firewall rule set.
action	The default action to take if no matches are found within a rule set. Supported values are as follows: **accept**: Accept the packet. **drop**: Drop the packet silently. **reject**: Drop the packet with an ICMP Destination Unreachable message.

Default

If an action is not specified, packets not matching any rules in the rule set are silently dropped.

Usage Guidelines

Use this command to specify a default action to take for packets not matching any rule in an IPv4 rule set.

Packets not matching any rules within a rule set “fall through” to the default policy. By default, the action taken is to silently drop unmatched packets.

Use the **set** form of this command to set the default action for an IPv4 rule set rule set.

Use the **delete** form of this command to restore the default behavior for unmatched packets.

Use the **show** form of this command to view default policy configuration.

firewall name <name> description <desc>

Specifies a brief description for an IPv4 firewall rule set.

Syntax

set firewall name *name* **description** *desc*

delete firewall name *name* **description**

show firewall name *name* **description**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        description desc
    }
}
```

Parameters

name	The name of the firewall rule set.
desc	A description for the rule set. If the description contains spaces, it must be enclosed in double quotes.

Default

None.

Usage Guidelines

Use this command to specify a description for an IPv4 firewall rule set.

Use the **set** form of this command to add or modify the description.

Use the **delete** form of this command to remove the description.

Use the **show** form of this command to view description configuration.

firewall name <name> enable-default-log

Logs packets that reach the default action.

Syntax

set firewall name *name* **enable-default-log**

delete firewall name *name* **enable-default-log**

show firewall name *name*

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        enable-default-log
    }
}
```

Parameters

name	The name of the firewall rule set.

Default

Packets reaching the default action are not logged.

Usage Guidelines

Use this command to log packets that reach the default action.

Use the **set** form of this command to log packets that reach the default action.

Use the **delete** form of this command to restore the default behavior for packets that reach the default action.

Use the **show** form of this command to view the configuration.

firewall name <name> rule <rule-num>

Defines a rule within an IPv4 firewall rule set.

Syntax

set firewall name *name* **rule** *rule-num*

delete firewall name *name* **rule** [*rule-num*]

show firewall name *name* **rule** [*rule-num*]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {}
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	Multinode. The numeric identifier of the rule. Rule numbers determine the order in which rules are executed. Each rule must have a unique rule number. The range is 1 to 9999. You can define multiple rules by creating more than one **rule** configuration node.

Default

None.

Usage Guidelines

Use this command to define a rule within an IPv4 firewall rule set.

A firewall rule set consists of up to 9999 configurable rules. Following the last configured rule, a system rule (rule 10000) with an action of “deny all” is applied.

Firewall rules are executed in numeric sequence, from lowest to highest. You cannot directly change a rule number, because it is the identifier of a configuration node; however, you can renumber rules using the **rename** command.

To avoid having to renumber firewall rules, a good practice is to number rules in increments of 10. This allows room for the insertion of new rules within the rule set.

Use the **set** form of this command to create or modify a firewall rule within an IPv4 firewall rule set.

Use the **delete** form of this command to remove a rule from an IPv4 firewall rule set.

Use the **show** form of this command to view firewall rule configuration.

firewall name <name> rule <rule-num> action <action>

Specifies the action to perform on matched packets.

Syntax

set firewall name *name* **rule** *rule-num* **action** *action*

delete firewall name *name* **rule** *rule-num* **action**

show firewall name *name* **rule** *rule-num* **action**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            action action
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
action	The action to be taken when a packet satisfies the criteria specified in the rule. Supported values are as follows: **accept**: Accepts and forwards matched packets. **drop**: Silently drops matched packets. **inspect**: Forwards matched packets to the intrusion protection system (IPS). Packets forwarded to the IPS are processed by the **content-inspection traffic-filter** command. **reject**: Drops matched packets with a TCP reset.

Default

Packets are silently dropped.

Usage Guidelines

Use this command to specify the action to perform on packets matching the criteria specified in this firewall rule. Only one action can be defined per rule.

Use the **set** form of this command to specify the action to perform on matched packets.

Use the **delete** form of this command to restore the default action for matched packets.

Use the **show** form of this command to view firewall rule action configuration.

firewall name <name> rule <rule-num> description <desc>

Specifies a brief description for an IPv4 firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **description** *desc*

delete firewall name *name* **rule** *rule-num* **description**

show firewall name *name* **rule** *rule-num* **description**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            description desc
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
desc	A brief description for this rule. If the description contains spaces, it must be enclosed in double quotes.

Default

None.

Usage Guidelines

Use this command to specify a brief description for a firewall rule.

Use the **set** form of this command to set the description.

Use the **delete** form of this command to remove the description.

Use the **show** form of this command to view description configuration.

firewall name <name> rule <rule-num> destination

Specifies the destination address and, optionally, port to match in an IPv4 firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **destination** [**address** *address* | **port** *port*]

delete firewall name *name* **rule** *rule-num* **destination** [**address** | **port**]

show firewall name *name* **rule** *rule-num* **destination** [**address** | **port**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            destination {
                address address
                port port
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

address	The destination address to match. Supported formats are as follows: *ip-address*: An IPv4 address. *ip-address/prefix*: A network address, where 0.0.0.0/0 matches any network. *ip-address–ip-address*: A range of contiguous IP addresses; for example, 192.168.1.1–192.168.1.150. **!***ip-address*: Matches all IP addresses except the one specified. **!***ip-address/prefix*: Matches all network addresses except the one specified. **!***ip-address–ip-address*: Matches all IP addresses except those in the specified range.
port	Applicable only when the protocol is TCP or UDP. The destination port to match. Supported formats are as follows: *port-name*: Matches the name of an IP service; for example, **http**. You can specify any service name in the file **/etc/services**. *port-num*: Matches a port number. The range is 1 to 65535. start–end: Matches the specified range of ports; for example, 1001–1005. You can use a combination of these formats in a comma-separated list. You can also negate the entire list by prepending it with an exclamation mark (“!”); for example,**!22,telnet,http,123,1001-1005**.

Default

None.

Usage Guidelines

Use this command to specify the destination in an IPv4 firewall rule.

If both address and port are specified, the packet is considered a match only if both the address and the port match.

Use the **set** form of this command to specify or modify a firewall destination.

Use the **delete** form of this command to remove a firewall destination.

Use the **show** form of this command to view firewall destination configuration.

firewall name <name> rule <rule-num> destination group

Specifies a group or addresses, ports, or networks for packet destination address matching in an IPv4 firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **destination group** [**address-group** *addr-group-name* | **network-group** *net-group-name* | **port-group** *port-group-name*]

delete firewall name *name* **rule** *rule-num* **destination group** [**address-group** *addr-group-name* | **network-group** *net-group-name* | **port-group** *port-group-name*]

show firewall name *name* **rule** *rule-num* **destination group** [**address-group** | **network-group** | **port-group**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            destination {
                group {
                    address-group addr-group-name
                    network-group net-group-name
                    port-group port-group-name
                }
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

address-group *addr-group-name*	Matches the destination host IP address in packets against the specified address group. Only one address group may be specified. The address group must already be defined.
network group *net-group-name*	Matches the destination network address in packets against the specified network group. The packet is considered a match if it matches any address specified in the group. Only one network group may be specified. The network group must already be defined.
port-group *port-group-name*	Matches the destination port packets against the specified port group. The packet is considered a match if it matches any port name or number specified in the group. Only one port group may be specified. The port group must already be defined.

Default

None.

Usage Guidelines

Use this command to use a defined firewall group as a destination.

A packet is considered a match for an address, a network, or a port group if it matches any host IP address, network address, or port name or number, respectively, in the group. However, if more than one group is specified, the packet must be a match for both groups in order to be considered a match. For example, if an address group and a port group are both specified, the packet's destination must match at least one item in the address group and at least one item in the port group.

An address group may be specified together with a port group, and a network group may be specified together with a port group. You cannot specify both an address and a network group

Use the **set** form of this command to specify a firewall destination group to match.

Use the **delete** form of this command to remove a firewall destination group.

Use the **show** form of this command to view firewall destination group configuration.

firewall name <name> rule <rule-num> disable

Disables a firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **disable**

delete firewall name *name* **rule** *rule-num* **disable**

show firewall name *name* **rule** *rule-num*

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            disable
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
disable	Disables the specified firewall rule.

Default

The rule is enabled.

Usage Guidelines

Use this command to disable a firewall rule. This is a useful way to test how the firewall performs without a specific rule without having to delete and then re-enter the rule.

Use the **set** form of this command to disable a firewall rule.

Use the **delete** form of this command to remove the configuration.

Use the **show** form of this command to view the configuration.

firewall name <name> rule <rule-num> fragment

Specifies matching for fragmented packets.

Syntax

set firewall name *name* **rule** *rule-num* **fragment** {**match-frag**|**match-non-frag**}

delete firewall name *name* **rule** *rule-num* **fragment** [**match-frag**|**match-non-frag**]

show firewall name *name* **rule** *rule-num* **fragment**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            fragment {
                match-frag
                match-non-frag
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
match-frag	Match the second and later fragments of a fragmented packet.
match-non-frag	Match only the first fragment of a fragmented packet or unfragmented packets.

Default

None.

Usage Guidelines

Use this command to specify how to match fragmented packets.

Use the **set** form of this command to specify how to match fragmented packets.

Use the **delete** form of this command to remove the configuration.

Use the **show** form of this command to view the configuration.

firewall name <name> rule <rule-num> icmp

Specifies ICMP code and type settings for a firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **icmp** {**type** *type* | **code** *code* | **type-name** *type-name*}

delete firewall name *name* **rule** *rule-num* **icmp** [**type** | **code** | **type-name**]

show firewall name *name* **rule** *rule-num* **icmp** [**type** | **code** | **type-name**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            icmp {
                type type
                code code
                type-name type-name
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
type	A valid ICMP type code from 0 to 255; for example, 8 (Echo Request), or 0 (Echo Reply). For a list of ICMP codes and types, see "Appendix A: ICMP Types."

code	The ICMP type code associated with this ICMP type. The range is 0 to 255. For a list of ICMP codes and types, see "Appendix A: ICMP Types."
type-name	An ICMP type name. The default is **any**. For a list of ICMP codes and types, see "Appendix A: ICMP Types."

Default

None.

Usage Guidelines

Use this command to define the ICMP types this rule applies to—for example Echo Request or Echo Reply. Packets having this ICMP type will "match" the rule.

Use the **set** form of this command to specify the ICMP code and type for the specified rule

Use the **delete** form of this command to remove the ICMP code or type value for the specified rule.

Use the **show** form of this command to view the ICMP code or type value for the specified rule.

firewall name <name> rule <rule-num> ipsec

Specifies IPSEC packet matching.

Syntax

set firewall name *name* **rule** *rule-num* **ipsec** {**match-ipsec**|**match-none**}

delete firewall name *name* **rule** *rule-num* **ipsec** [**match-ipsec**|**match-none**]

show firewall name *name* **rule** *rule-num* **ipsec**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            ipsec {
                match-ipsec
                match-none
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
match-ipsec	Match inbound IPsec packets.
match-none	Match inbound non-IPsec packets.

Default

None.

Usage Guidelines

Use this command to specify whether to match IPsec or non-IPsec packets.

Use the **set** form of this command to specify which type of packets to match.

Use the **delete** form of this command to remove the configuration.

Use the **show** form of this command to view the configuration.

firewall name <name> rule <rule-num> limit

Specifies traffic rate limiting parameters for a firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **limit** {**burst** *size* | **rate** *rate*}

delete firewall name *name* **rule** *rule-num* **limit** [**burst** | **rate**]

show firewall name *name* **rule** *rule-num* **limit** [**burst** | **rate**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            limit {
                burst size
                rate rate
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
size	The size of the burst buffer. This is the maximum number of packets that can be sent as a burst in excess of the specified token rate given available tokens in the buffer. The default is 1, which provides no bursting above the specified rate.
rate	The maximum average rate of data traffic for packets matching the rule. Supported time units are: second, minute, hour, and day. The rate is specified in the format “X/<time unit>”. For example “2/second” limits the packets matching the rule to two per second.

Default

No imposed limit.

Usage Guidelines

Use this command to limit the traffic rate of packets matching the rule. The limit option employs the Token Bucket Filter (TBF) queuing mechanism within firewall to limit the rate of incoming packets to an administatively set rate but with the possibility of allowing short bursts in excess of this rate.

The TBF implementation consists of a buffer (bucket), constantly filled by some virtual pieces of information called tokens, at a specific rate (token rate). The most important parameter of the bucket is its size, that is the number of tokens it can store. Each arriving token collects one incoming data packet from the data queue and is then deleted from the bucket. Associating this algorithm with the two flows -- token and data, gives us three possible scenarios:

1) The data arrives in the TBF at a rate that's equal to the rate of incoming tokens. In this case each incoming packet has its matching token and passes the queue without delay.

2) The data arrives in the TBF at a lower rate than the token rate. Only a part of the tokens are deleted at output of each data packet that's sent out the queue, so the tokens accumulate, up to the bucket size. The unused tokens can then be used to send data at a speed that's exceeding the standard token rate, in case short data bursts occur.

3) The data arrives in the TBF at a greater rate than the token rate. This means that the bucket will soon be devoid of tokens, which causes the TBF to throttle itself for a while. This is called an 'overlimit situation'. If packets keep coming in, packets will start to get dropped.

The limit option "rate" relates to the "token rate" as described in the above algorithm while the limit option "burst" relates to the "bucket size". The implementation of these values is explained below :

rate - If set, this rule will match packets at the specified maximum average rate. Any of the following time units can be used to specify rate : second, minute, hour, day.

For example, a value of 1/second implies that the rule be matched at an average of once per second.

burst - If set, this rule will match packets specified by this value in excess of rate. By default, this value is set to 1. so if you don't want to bother with short bursts of packets and want to simply rate limit at the specified rate then you do not have to worry about this option.

Use the **set** form of this command to specify the traffic limit for the specified rule

Use the **delete** form of this command to remove the traffic limit for the specified rule.

Use the **show** form of this command to view the traffic limit for the specified rule.

firewall name <name> rule <rule-num> log <state>

Enables or disables logging of firewall rule actions.

Syntax

set firewall name *name* **rule** *rule-num* **log** *state*

delete firewall name *name* **rule** *rule-num* **log**

show firewall name *name* **rule** *rule-num* **log**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            log state
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
state	Enables or disables logging of firewall actions. Supported values are as follows: **enable**: Log when action is taken. **disable**: Do not log when action is taken.

Default

Actions are not logged.

Usage Guidelines

Use this command to enable or disable logging for the specified rule. When enabled, any actions taken will be logged.

Use the **set** form of this command to specify logging for the specified rule

Use the **delete** form of this command to remove the logging value for the specified rule.

Use the **show** form of this command to view the logging value for the specified rule.

firewall name <name> rule <rule-num> p2p <app_name>

Specifies a P2P application to which a firewall rule applies.

Syntax

set firewall name *name* **rule** *rule-num* **p2p** *app_name*

delete firewall name *name* **rule** *rule-num* **p2p** *app_name*

show firewall name *name* **rule** *rule-num* **p2p**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            p2p appname
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
app_name	Mandatory. Match P2P application packets. Supported values are as follows: **all**: Match packets sent by any of the applications listed below. **applejuice**: Match packets sent by AppleJuice applications. **bittorrent**: Match packets sent by BitTorrent applications. **directconnect**: Match packets sent by Direct Connect applications. **edonkey**: Match packets sent by eDonkey/eMule applications. **gnutella**: Match packets sent by Gnutella applications. **kazaa**: Match packets sent by KaZaA applications.

Default

None.

Usage Guidelines

Use this command to define to which P2P application a firewall rule applies. Packets to or from this application will "match" the rule. Multiple P2P options can be specified in a rule to match multiple P2P applications.

Use the **set** form of this command to specify the P2P application to match for the specified rule

Use the **delete** form of this command to remove the P2P application value for the specified rule.

Use the **show** form of this command to view the P2P application value for the specified rule.

firewall name <name> rule <rule-num> protocol <protocol>

Specifies the protocol to which a firewall rule applies.

Syntax

set firewall name *name* **rule** *rule-num* **protocol** *protocol*

delete firewall name *name* **rule** *rule-num* **protocol**

show firewall name *name* **rule** *rule-num* **protocol**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            protocol protocol
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
protocol	Mandatory. Any protocol literals or numbers listed in the file **/etc/protocols** can be used. The keywords **tcp_udp** (for both TCP and UDP) and **all** (for all protocols) are also supported. Prefixing the protocol name with the exclamation mark character (“**!**”) matches every protocol except the specified protocol. For example, **!tcp** matches all protocols except TCP.

Default

The default is **all**.

Usage Guidelines

Use this command to define to which protocol a firewall rule applies. Packets using this protocol will “match” the rule.

Note that you should take care in using more than one “exclusion” rule (that is, a rule using the negation operation (“!”) in combination. Firewall rules are evaluated sequentially, and a sequence of exclusion rules could result in unexpected behavior.

Use the **set** form of this command to specify the protocol to match for the specified rule

Use the **delete** form of this command to remove the protocol value for the specified rule.

Use the **show** form of this command to view the protocol value for the specified rule.

firewall name <name> rule <rule-num> recent

Specifies the parameters to match recently seen sources.

Syntax

set firewall name *name* **rule** *rule-num* **recent** [**count** *count* | **time** *seconds*]

delete firewall name *name* **rule** *rule-num* **recent** [**count** | **time**]

show firewall name *name* **rule** *rule-num* **recent** [**count** | **time**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            recent {
                count count
                time seconds
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
count	Mandatory. The number of times the same source IP address is seen within the specified time period. The range is 0 to 255.
seconds	Mandatory. The amount of time, in seconds, to look for "count" connection attempts from the same source.

Default

None.

Usage Guidelines

Use this command to match recently seen sources. The most common use for this is to help prevent “brute force” attacks where an external device is opening a continuous flow of connections (e.g. to SSH) in an attempt to break into the system. Because the external host will be an unknown source, the “recent” list allows the firewall to match packets based on the external host’s behavior without initially knowing it’s address.

Use the **set** form of this command to specify the “recent” configuration.

Use the **delete** form of this command to remove the “recent” configuration.

Use the **show** form of this command to view firewall “recent” configuration.

firewall name <name> rule <rule-num> source

Specifies the source address and port to match in a firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **source** [**address** *address* | **mac-address** *mac-addr* | **port** *port*]

delete firewall name *name* **rule** *rule-num* **source** [**address** | **mac-address** | **port**]

show firewall name *name* **rule** *rule-num* **source** [**address** | **mac-address** | **port**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            source {
                address address
                mac-address mac-addr
                port port
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

address	The source address to match. The following formats are valid: *ip-address*: Matches the specified IP address. *ip-address/prefix*: A network address, where 0.0.0.0/0 matches any network. *ip-address–ip-address*: Matches a range of contiguous IP addresses; for example, 192.168.1.1–192.168.1.150. **!***ip-address*: Matches all IP addresses except the one specified. **!***ip-address/prefix*: Matches all network addresses except the one specified. **!***ip-address–ip-address*: Matches all IP addresses except those in the specified range.
mac-addr	The media access control (MAC) address to match. The format is 6 colon-separated 8-bit numbers in hexadecimal; for example, 00:0a:59:9a:f2:ba.
port	The source port to match. The following formats are valid: *port-name*: Matches the name of an IP service; for example, **http**. You can specify any service name in the file **etc/services**. *port-num*: Matches a port number. The range is 1 to 65535. start–end: Matches the specified range of ports; for example, 1001–1005. You can use a combination of these formats in a comma-separated list. You can also negate the entire list by prepending it with an exclamation mark (“**!**”); for example, **!22,telnet,http,123,1001-1005**.

Default

None.

Usage Guidelines

Use this command to specify the source to match in a firewall rule.

Note that you should take care in using more than one “exclusion” rule (that is, a rule using the negation operation (“**!**”) in combination. NAT rules are evaluated sequentially, and a sequence of exclusion rules could result in unexpected behavior.

Use the **set** form of this command to create a firewall source.

Use the **delete** form of this command to remove a firewall source.

Use the **show** form of this command to view firewall source configuration.

firewall name <name> rule <rule-num> source group

Specifies a group or addresses, ports, or networks for packet source address matching in an IPv4 firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **source group** [**address-group** *addr-group-name* | **network-group** *net-group-name* | **port-group** *port-group-name*]

delete firewall name *name* **rule** *rule-num* **source group** [**address-group** *addr-group-name* | **network-group** *net-group-name* | **port-group** *port-group-name*]

show firewall name *name* **rule** *rule-num* **source group** [**address-group** | **network-group** | **port-group**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            source {
                group {
                    address-group addr-group-name
                    network-group net-group-name
                    port-group port-group-name
                }
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

address-group *addr-group-name*	Multinode. Matches the source IP address in packets against the specified address group. Only one address group may be specified. The address group must already be defined.
network group *net-group-name*	Multinode. Matches the source network address in packets against the specified network group. Only one network group may be specified. The network group must already be defined.
port-group *port-group-name*	Matches the source port packets against the specified port group. Only one port group may be specified. The port group must already be defined.

Default

None.

Usage Guidelines

Use this command to specify the source group to match in a firewall rule.

Note that you should take care in using more than one “exclusion” rule (that is, a rule using the negation operation (“!”) in combination. Firewall rules are evaluated sequentially, and a sequence of exclusion rules could result in unexpected behavior.

Use the **set** form of this command to specify a firewall source group to match.

Use the **delete** form of this command to remove a firewall source group.

Use the **show** form of this command to view firewall source group configuration.

firewall name <name> rule <rule-num> state

Specifies the kinds of packets to which this rule is applied.

Syntax

set firewall name *name* **rule** *rule-num* **state** {**established** *state* | **invalid** *state* | **new** *state* | **related** *state*}

delete firewall name *name* **rule** *rule-num* **state**

show firewall name *name* **rule** *rule-num* **state**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            state {
                    established state
                    invalid state
                    new state
                    related state
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
established *state*	Specifies whether or not the rule will be applied to established packets. Supported values are as follows: **enable**: Applies the rule to established packets. **disable**: Does not apply the rule to established packets.

invalid *state*	Specifies whether or not the rule will be applied to invalid packets. Supported values are as follows: **enable**: Applies the rule to invalid packets. **disable**: Does not apply the rule to invalid packets.
new *state*	Specifies whether or not the rule will be applied to new packets. Supported values are as follows: **enable**: Applies the rule to new packets. **disable**: Does not apply the rule to new packets.
related *state*	Specifies whether or not the rule will be applied to related packets. Supported values are as follows: **enable**: Applies the rule to related packets. **disable**: Does not apply the rule to related packets.

Default

The rule is applied to all packets, regardless of state.

Usage Guidelines

Use this command to specify the kind of packets this rule will be applied to.

- *Established* packets are packets that are part of a connection that has seen packets in both directions; for example, a reply packet, or an outgoing packet on a connection that has been replied to.
- *Invalid* packets are packets that could not be identified for some reason. These might include the system running out of resource, or ICMP errors that do not correspond to any known connection. Generally these packets should be dropped.
- *New* packets are packets creating new connections. For TCP, this will be packets with the SYN flag set.
- *Related* packets are packets related to existing connections.

Use the **set** form of this command to specify the kind of packets a firewall rule will be applied to.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view state configuration for a firewall rule.

firewall name <name> rule <rule-num> tcp flags

Specifies the TCP flags to match in a firewall rule.

Syntax

set firewall name *name* **rule** *rule-num* **tcp flags** *flags*

delete firewall name *name* **rule** *rule-num* **tcp flags**

show firewall name *name* **rule** *rule-num* **tcp flags**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            tcp {
                flags flags
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
flags	Specifies which TCP flags to match. Supported values are SYN, ACK, FIN, RST, URG, PSH, and ALL. When specifying more than one flag, they should be comma-separated. For example, “SYN, !ACK, !FIN, !RST” will only match packets with the SYN flag set and the ACK, FIN, and RST flags unset. ALL can be used to check if all flags are set and !ALL can be used to check for no flags set. Prefixing the flag name with “!” matches an unset value of the flag.

Default

None.

Usage Guidelines

Use this command to match TCP flags in a firewall rule.

Use the **set** form of this command to specify the TCP flags to match.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view the TCP flags configuration for a firewall rule.

firewall name <name> rule <rule-num> time

Specifies the times at which this rule is applied.

Syntax

set firewall name *name* **rule** *rule-num* **time** {**monthdays** *days-of-month* | **startdate** *date* | **starttime** *time* | **stopdate** *date* | **stoptime** *time* | *utc* | **weekdays** *days-of-week*}

delete firewall name *name* **rule** *rule-num* **time**

show firewall name *name* **rule** *rule-num* **time**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    name name {
        rule rule-num {
            time {
                monthdays days-of-month
                startdate date
                starttime time
                stopdate date
                stoptime time
                utc
                weekdays days-of-week
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

monthdays *days-of-month*	Specifies which days in the month the rule will be applied. Supported values are days of the month (1 to 31) within a comma-separated list (e.g. 2,12,21). The "!" character can be used to negate a list of values (e.g. !2,12,21). This indicates that the firewall rule is to be applied on all but the specified days.
startdate *date*	Specifies the start of a period of time in which the firewall rule will be applied. Set the date, and optionally the time, using one of the following formats: **yyyy-mm-dd** (e.g. 2009-03-12) **yyyy-mm-ddThh:mm:ss** (e.g. 2009-03-12T17:30:00) The default is 1970-01-01. Note that if the time is specified that it is 24 hour format (valid values are from 00:00:00 to 23:59:59). If the time is not specified the default is the start of the day on the specified date (i.e. 00:00:00). Use **stopdate** to end the activation period.
starttime *time*	Specifies the start of a period of time in the day to which the firewall rule will be applied. Set the start time using the following format: **hh:mm:ss** (e.g. 17:30:00) Note that the time is specified in 24 hour format (valid values are from 00:00:00 to 23:59:59). Use **stoptime** to end the activation period.
stopdate *date*	Specifies the end of a period of time in which the firewall rule will be applied. Set the date, and optionally the time, using one of the following formats: **yyyy-mm-dd** (e.g. 2009-03-12) **yyyy-mm-ddThh:mm:ss** (e.g. 2009-03-12T17:30:00) The default is 2038-01-19. Note that if the time is specified that it is 24 hour format (valid values are from 00:00:00 to 23:59:59). If the time is not specified the default is the start of the day on the specified date (i.e. 00:00:00). Use **startdate** to begin the activation period.

stoptime *time*	Specifies the end of a period of time in the day to which the firewall rule will be applied. Set the stop time using the following format: **hh:mm:ss** (e.g. 17:30:00) Note that the time is specified in 24 hour format (valid values are from 00:00:00 to 23:59:59). Use **starttime** to begin the activation period.
utc	Specifies that times given using **startdate**, **stopdate**, **starttime**, and **stoptime**, should be interpreted as UTC time rather than local time.
weekdays *days-of-week*	Specifies which days in the week the rule will be applied. Supported values are days of the week (Mon, Tue, Wed, Thu, Fri, Sat, and Sun) within a comma-separated list (e.g. Mon,Wed,Fri). The "**!**" character can be used to negate a list of values (e.g. !Mon,Wed,Fri). This indicates that the firewall rule is to be applied on all but the specified days of the week.

Default

The rule is applied at all times.

Usage Guidelines

Use this command to restrict the times during which the rule will be applied. All values are optional and are ANDed when specified.

Use the **set** form of this command to specify the times at which a firewall rule will be applied.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view time configuration for a firewall rule.

firewall receive-redirects <state>

Specifies whether to process IPv4 ICMP redirect messages.

Syntax

set firewall receive-redirects {**enable** | **disable**}

delete firewall receive-redirects

show firewall receive-redirects

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   receive-redirects state
}
```

Parameters

state	Permits or denies receiving IPv4 ICMP redirect messages. Supported values are as follows: **enable**: Permits IPv4 ICMP redirects to be received. **disable**: Denies IPv4 ICMP redirects from being received.

Default

The default is **disable**.

Usage Guidelines

Use this command to specify whether to accept IPv4 ICMP redirects. ICMP redirects can allow an arbitrary sender to forge packets and alter the system's routing table. This can leave the system open to a man-in-the-middle attack.

Use the **set** form of this command to specify whether to accept IPv4 ICMP redirects.

Use the **delete** form of this command to remove the specified value.

Use the **show** form of this command to view the specified value.

firewall send-redirects <state>

Specifies whether to allow sending of IPv4 ICMP redirect messages.

Syntax

set firewall send-redirects {**enable** | **disable**}

delete firewall send-redirects

show firewall send-redirects

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   send-redirects state
}
```

Parameters

state	Permits or denies transmitting packets IPv4 ICMP redirect messages. Supported values are as follows: **enable**: Permits IPv4 ICMP redirects to be sent. **disable**: Denies IPv4 ICMP redirects from being sent.

Default

The default is **enable**.

Usage Guidelines

Use this command to specify whether to allow sending of IPv4 ICMP redirect messages. Sending a redirect will potentially alter the routing table of the host or router to which the redirect is sent.

Use the **set** form of this command to specify whether to permit or deny the sending IPv4 ICMP redirects.

Use the **delete** form of this command to remove the specified value.

Use the **show** form of this command to view the specified value.

firewall source-validation <state>

Specifies a policy for source validation by reversed path, as defined in RFC 3704.

Syntax

set firewall source-validation {**disable** | **loose** | **strict**}

delete firewall source-validation

show firewall source-validation

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    source-validation state
}
```

Parameters

state	Specifies policy for source validation by reversed path, as specified in RFC3704. Supported values are as follows: **disable**: No source validation is performed. **loose**: Enable Loose Reverse Path Forwarding as defined in RFC3704. **strict**: Enable Strict Reverse Path Forwarding as defined in RFC3704.

Default

The default is **disable**.

Usage Guidelines

Use this command to specify policy for source validation by reversed path, as specified in RFC3704.

Use the **set** form of this command to specify policy for source validation by reversed path, as specified in RFC3704.

Use the **delete** form of this command to remove the specified value.

Use the **show** form of this command to view the specified value.

firewall syn-cookies <state>

Specifies policy for using TCP SYN cookies with IPv4.

Syntax

set firewall syn-cookies {**enable** | **disable**}

delete firewall syn-cookies

show firewall syn-cookies

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   syn-cookies state
}
```

Parameters

state	Enables or disables TCP SYN cookies option. Supported values are as follows: **enable**: Enables TCP SYN cookies with IPv4. **disable**: Disables TCP SYN cookies with IPv4.

Default

The default is **enable**.

Usage Guidelines

Use this command to specify whether to use TCP SYN cookies with IPv4. Enabling this option can help protect the system from a TCP SYN Flood Denial of Service (DoS) attack. To start a TCP connection, a source sends a SYN (synchronize/start) packet. The destination sends back a SYN ACK (synchronize acknowledge). Then the source sends an ACK (acknowledge), and the connection is established. This is referred to as the "TCP three-way handshake."

After a destination server sends a SYN ACK, it uses a connection queue to keep track of the connections waiting to be completed. An attacker can fill up the connection queue by generating phony TCP SYN packets from random IP addresses at a rapid rate. When the connection queue is full, all subsequent TCP services are denied.

When this option is enabled, the system creates a hash entry when it receives a SYN packet, and returns a SYN ACK cookie only, without retaining all the SYN information. When it receives the ACK from the client, it validates it against the hash and, if it is valid, rebuilds the SYN packet information and accepts the packet.

Use the **set** form of this command to specify whether to enable or disable the TCP SYN cookies option.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view TCP SYN cookies option configuration.

interfaces <interface> firewall <direction> name <fw-name>

Applies an IPv4 firewall instance to the defined interface.

Syntax

set interfaces *interface* **firewall** {**in name** *fw-name* | **local name** *fw-name* | **out name** *fw-name*}

delete interfaces *interface* **firewall** [**in name** | **local name** | **out name**]

show interfaces *interface* **firewall** [**in name** | **local name** | **out name**]

Command Mode

Configuration mode.

Configuration Statement

```
interfaces interface {
    firewall {
        in {
            name fw-name
        }
        local {
            name fw-name
        }
        out {
            name fw-name
        }
    }
}
```

Parameters

interface	Mandatory. The type of interface. For detailed keywords and arguments that can be specified as interface types, see the table in the Usage Guidelines below.
in name *fw-name*	Applies the specified IPv4 firewall instance to inbound traffic on the specified interface.

local name *fw-name*	Applies the specified IPv4 firewall instance to traffic arriving on the specified interface and bound for the local system.
out name *fw-name*	Applies the specified IPv4 firewall instance to outbound traffic on the specified interface.

Default

None.

Usage Guidelines

Use this command to apply an IPv4 firewall instance, or rule set, to an interface.

A firewall has no effect on traffic traversing the system or destined to the system until a firewall rule set has been applied to an interface or a vif using this command.

To use the firewall feature, you define a firewall rule set as a named firewall instance, using firewall command. You then apply the firewall instance to interfaces and/or vifs using a statement like this one. Once applied, the instance acts as a packet filter.

The firewall instance will filter packets in one of the following ways, depending on what you specify when you apply it:

- **in.** If you apply the rule set as **in**, the firewall will filter packets entering the interface.
- **out.** If you apply the rule set as **out**, the firewall will filter packets leaving the interface.
- **local.** If you apply the rule set as **local**, the firewall will filter packets destined for the system itself.

For each interface, you can apply up to three firewall instances: one firewall **in** instance, one firewall **out** instance, and one firewall **local** instance.

Make sure the firewall instance you apply to an interface is already defined, or you may experience unintended results. If you apply a firewall instance that does not exist to an interface, the implicit firewall rule of **allow all** will be applied.

The following table shows the syntax and parameters for supported interface types.

Interface Type	Syntax	Parameters
ADSL Bridged Ethernet	adsl *adslx* pvc *pvc-id* bridged-ethernet	*adslx* The name of a Bridged Ethernet- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically.
ADSL Classical IPOA	adsl *adslx* pvc *pvc-id* classical-ipoa	*adslx* The name of a Classical IPoA- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically.
ADSL PPPoA	adsl *adslx* pvc *pvc-id* pppoa *num*	*adslx* The name of a Classical IPoA- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically. *num* The PPPoA unit number. This number must be unique across all PPPoA interfaces. In addition, only one PPPoA instance can be configured on a PVC. PPPoA units range from 0 to 15 and the resulting interfaces are named pppoa0 to pppoa15.
ADSL PPPoE	adsl *adslx* pvc *pvc-id* pppoe *num*	*adslx* The name of a Classical IPoA- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically. *num* The name of a defined PPPoE unit. The range is 0 to 15.
Bonding	bonding *bondx*	*bondx* The identifier for the bonding interface. Supported values are **bond0** through **bond99**.
Bonding Vif	bonding *bondx* vif *vlan-id*	*bondx* The identifier for the bonding interface. Supported values are **bond0** through **bond99**. *vlan-id* The VLAN ID for the vif. The range is 0 to 4094.

Interface Type	Syntax	Parameters
Bridge	bridge *brx*	*brx* The name of a Bridge group. The range is **br0** through **br999**.
Ethernet	ethernet *ethx*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system.
Ethernet PPPoE	ethernet *ethx* pppoe *num*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system. *num* The name of a defined PPPoE unit. The range is 0 to 15.
Ethernet Vif	ethernet *ethx* vif *vlan-id*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system. *vlan-id* The VLAN ID for the vif. The range is 0 to 4094.
Ethernet Vif PPPoE	ethernet *ethx* vif *vlan-id* pppoe *num*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system. *vlan-id* The VLAN ID for the vif. The range is 0 to 4094. *num* The name of a defined PPPoE unit. The range is 0 to 15.
Loopback	loopback *lo*	*lo* The name of the loopback interface.
Multilink	multilink *mlx* vif *1*	*mlx* The identifier of the multilink bundle. You can create up to two multilink bundles. Supported values are **ml0** (“em ell zero”) through **ml23** (“em ell twenty-three”). *1* The identifier of the virtual interface. Currently, only one vif is supported for multilink interfaces, and the identifier must be 1. The vif must already have been defined.
OpenVPN	openvpn *vtunx*	*vtunx* The identifier for the OpenVPN interface. This may be **vtun0** to **vtun*x***, where ***x*** is a non-negative integer.
Pseudo-Ethernet	pseudo-ethernet *pethx*	*pethx* The name of a pseudo-Ethernet interface. The range is **peth0** through **peth999**.
Serial Cisco HDLC	serial *wanx* cisco-hdlc vif *1*	*wanx* The serial interface you are configuring: one of **wan0** through **wan23**. The interface must already have been defined. *1* The identifier of the virtual interface. Currently, only one vif is supported for Cisco HDLC interfaces, and the identifier must be 1. The vif must already have been defined.

Interface Type	Syntax	Parameters
Serial Frame Relay	serial *wanx* frame-relay vif *dlci*	*wanx* The serial interface you are configuring: one of **wan0** through **wan23**. The interface must already have been defined. *dlci* The identifier of the virtual interface. For Frame Relay interfaces, this is the DLCI number for the interface. the range is 16 to 991. The vif must already have been defined.
Serial PPP	serial *wanx* ppp vif *1*	*wanx* The serial interface you are configuring: one of **wan0** through **wan23**. The interface must already have been defined. *1* The identifier of the virtual interface. Currently, only one vif is supported for point-to-point interfaces, and the identifier must be 1. The vif must already have been defined.
Tunnel	tunnel *tunx*	*tunx* An identifier for the tunnel interface you are defining. The range is **tun0** to **tun23**.
Wireless	wireless *wlanx*	*wlanx* The identifier for the wireless interface you are using. This may be **wlan0** to **wlan999**.
Wireless Modem	wirelessmodem *wlmx*	*wlmx* The identifier for the wireless modem interface you are using. This may be **wlm0** to **wlm999**.

Use the **set** form of this command to apply an IPv4 firewall instance to an interface.

Use the **delete** form of this command to remove an IPv4 firewall instance from an interface.

Use the **show** form of this command to view an IPv4 firewall configuration for an interface.

show firewall

Displays statistics information for firewall instances.

Syntax

show firewall [**name** *name* [**rule** *rule-num* | **statistics**] | **statistics**]

Command Mode

Operational mode.

Parameters

name *name*	Optional. Displays detailed statistics information about the specified firewall instance.
name *name* **rule** *rule-num*	Optional. Displays detailed statistics information about the specified firewall rule configured under the specified firewall instance.
name *name* **statistics**	Optional. Displays summary statistics information about the specified firewall instance.
statistics	Optional. Displays summary statistics information about all firewall instances.

Default

By default, detailed statisitics information about all firewall instances is displayed.

Usage Guidelines

Use this command to display statistics information about configured firewall instances.

Examples

Example 4-1 shows detailed statisitcs information for all firewall instances.

Example 4-1 "show firewall": Displaying firewall statistics information.

```
vyatta@R1:~$ show firewall
```

```
--------------------------------------------------------------------------
--------
IPv4 Firewall "test":

 Active on (eth1,IN) (eth1,LOCAL)

rule  action   proto     packets  bytes
----  ------   -----     -------  -----
20    accept   all       0        0
  condition - match-SRC-NTWRK-GROUP trusted-nets match-DST-ADDR-GROUP
local

10000 drop     all       1556     256635

vyatta@R1:~$
```

Example 4-2 shows summary statistics of all firewall instances.

Example 4-2 "show firewall statistics": Displaying summary statistics for all firewall instances.

```
vyatta@R1:~$ show firewall statistics
--------------------------------------------------------------------------
--------
IPv4 Firewall "test":

 Active on (eth1,IN) (eth1,LOCAL)

rule  packets   bytes     action  source              destination
----  -------   -----     ------  ------              -----------
20    0         0         ACCEPT  0.0.0.0/0           0.0.0.0/0
10000 1.60K     263.76K   DROP    0.0.0.0/0           0.0.0.0/0

vyatta@R1:~$
```

show firewall group

Displays firewall group information.

Syntax

show firewall group [*group-name*]

Command Mode

Operational mode.

Parameters

group-name	The name of a specific firewall group.

Default

All groups are displayed.

Usage Guidelines

Use this command to display firewall group information. Supported group types include address groups, network groups, and port groups.

Examples

Example 4-3 shows all firewall groups on R1.

Example 4-3 "show firewall group": Displaying information on all defined firewall groups.

```
vyatta@R1:~$ show firewall group
Name       : SERVERS
Type       : address
Description: My set of blocked servers
References : FW1-25-destination
Members    :
             1.1.1.1
             1.1.1.2
             1.1.1.3
             1.1.1.5
             1.1.1.7
             3.3.3.3
```

```
Name       : BAD-NETS
Type       : network
Description: my bad nets
References : none
Members    :
             2.2.0.0/16
             8.8.8.0/24
             9.0.0.0/24
vyatta@R1:~$
```

Chapter 5: IPv6 Firewall Commands

This chapter describes commands for defining IPv6 firewall packet filters on the Vyatta system.

This chapter presents the following topics:

IPv6 Firewall Commands

This chapter contains the following commands.

Configuration Commands	
Interface Commands	
interfaces <interface> firewall <direction> ipv6-name <fw-name>	Applies an IPv6 firewall instance to the defined interface.
General Detection	
firewall ipv6-receive-redirects <state>	Specifies whether to process received ICMPv6 redirect messages.
firewall ipv6-src-route <state>	Specifies whether to process IPv6 packets with routing extension header.
Rules and Rule Sets	
firewall ipv6-name <name>	Defines an IPv6 firewall rule set.
firewall ipv6-name <name> default-action <action>	Sets the default action for an IPv6 rule set.
firewall ipv6-name <name> description <desc>	Specifies a brief description for an IPv6 firewall rule set.
firewall ipv6-name <name> enable-default-log	Logs packets that reach the default action.
firewall ipv6-name <name> rule <rule-num>	Defines a rule within an IPv6 firewall rule set.
firewall ipv6-name <name> rule <rule-num> action <action>	Specifies the action to perform on matched packets.
firewall ipv6-name <name> rule <rule-num> description <desc>	Specifies a brief description for an IPv6 firewall rule.
firewall ipv6-name <name> rule <rule-num> destination	Specifies the destination address and port to match in an IPv6 firewall rule.
firewall ipv6-name <name> rule <rule-num> disable	Disables the IPv6 firewall rule..
firewall ipv6-name <name> rule <rule-num> icmpv6 type	Specifies ICMPv6 code and type settings for an IPv6 firewall rule.
firewall ipv6-name <name> rule <rule-num> ipsec	Specifies IPSEC packet matching.
firewall ipv6-name <name> rule <rule-num> limit	Specifies traffic rate limiting parameters for an IPv6 firewall rule.
firewall ipv6-name <name> rule <rule-num> log <state>	Enables or disables logging of IPv6 firewall rule actions.

firewall ipv6-name <name> rule <rule-num> p2p <app_name>	Specifies a P2P application to which an IPv6 firewall rule applies.
firewall ipv6-name <name> rule <rule-num> protocol <protocol>	Specifies the protocol to which an IPv6 firewall rule applies.
firewall ipv6-name <name> rule <rule-num> recent	Specifies the parameters to match recently seen sources.
firewall ipv6-name <name> rule <rule-num> source	Specifies the source address and port to match in an IPv6 firewall rule.
firewall ipv6-name <name> rule <rule-num> state	Specifies the kinds of packets to which this rule is applied.
firewall ipv6-name <name> rule <rule-num> tcp flags	Specifies the TCP flags to match in an IPv6 firewall rule.
firewall ipv6-name <name> rule <rule-num> time	Specifies the times at which this rule is applied.
Operational Commands	
clear firewall ipv6-name <name> counters	Clears statistics associated with an IPv6 firewall rule set.
show firewall ipv6-name	Displays statistics information for IPv6 firewall instances.

clear firewall ipv6-name <name> counters

Clears statistics associated with an IPv6 firewall rule set.

Syntax

clear firewall ipv6-name *name* [**rule** *rule-num*] **counters**

Command Mode

Operational mode.

Parameters

name	The name of the IPv6 firewall rule set for which statistics are to be cleared.
rule *rule-num*	Clears statistics for a specific rule within the specified IPv6 firewall rule set.

Default

When no rule is specified, statistics are cleared for all rules in the rule set.

Usage Guidelines

Use this command to clear the statistics associated with an IPv6 firewall rule set or, optionally, a rule within an IPv6 firewall rule set.

firewall ipv6-name <name>

Defines an IPv6 firewall rule set.

Syntax

set firewall ipv6-name *name*

delete firewall ipv6-name [*name*]

show firewall ipv6-name [*name*]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {}
}
```

Parameters

name	Multinode. The name of the firewall rule set. The name must not contain a space or any other of the following special characters: “|”, “;”, “&”, “$”, “<“, or “>”. The name can be up to 28 characters long. You can define multiple IPv6 firewall rule sets by creating more than one **name** configuration node.

Default

None.

Usage Guidelines

Use this command to define an IPv64 firewall rule set.

A firewall rule set is a named collection of up to 9999 packet-filtering rules . Following the configurable rules is an implicit rule, rule 10000, which denies all traffic.

NOTE *The "deny all" rule stays in effect until every reference to the rule set is removed; that is, until every packet filter referencing the rule set has been removed from all interfaces.*

Use the **set** form of this command to create or modify an IPv6 firewall rule set.

Use the **delete** form of this command to remove an IPv6 firewall rule set.

Use the **show** form of this command to view firewall rule set configuration.

firewall ipv6-name <name> default-action <action>

Sets the default action for an IPv6 rule set.

Syntax

set firewall ipv6-name *name* **default-action** *action*

delete firewall ipv6-name *name* **default-action**

show firewall ipv6-name *name* **default-action**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        default-action action
    }
}
```

Parameters

name	The name of the firewall rule set.
action	The default action to take if no matches are found within a rule set. Supported values are as follows: **accept**: Accept the packet. **drop**: Drop the packet silently. **reject**: Drop the packet with an ICMP Destination Unreachable message.

Default

If an action is not specified, packets not matching any rules in the rule set are silently dropped.

Usage Guidelines

Use this command to specify a default action to take for packets not matching any rule in an IPv6 rule set.

Packets not matching any rules within a rule set “fall through” to the default policy. By default, the action taken is to silently drop unmatched packets.

Use the **set** form of this command to set the default action for an IPv6 rule set rule set.

Use the **delete** form of this command to restore the default behavior for unmatched packets.

Use the **show** form of this command to view default policy configuration.

firewall ipv6-name <name> description <desc>

Specifies a brief description for an IPv6 firewall rule set.

Syntax

set firewall ipv6-name *name* **description** *desc*

delete firewall ipv6-name *name* **description**

show firewall ipv6-name *name* **description**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        description desc
    }
}
```

Parameters

name	The name of the firewall rule set.
desc	A description of the rule set. If the description contains spaces, it must be enclosed in double quotes.

Default

None.

Usage Guidelines

Use this command to specify a description for an IPv6 firewall rule set.

Use the **set** form of this command to add or modify the description.

Use the **delete** form of this command to remove the description.

Use the **show** form of this command to view description configuration.

firewall ipv6-name <name> enable-default-log

Logs packets that reach the default action.

Syntax

set firewall ipv6-name *name* **enable-default-log**

delete firewall ipv6-name *name* **enable-default-log**

show firewall ipv6-name *name*

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        enable-default-log
    }
}
```

Parameters

name	The name of the IPv6 firewall rule set.

Default

Packets reaching the default action are not logged.

Usage Guidelines

Use this command to log packets that reach the default action.

Use the **set** form of this command to log packets that reach the default action.

Use the **delete** form of this command to restore the default behavior for packets that reach the default action.

Use the **show** form of this command to view the configuration.

firewall ipv6-name <name> rule <rule-num>

Defines a rule within an IPv6 firewall rule set.

Syntax

set firewall ipv6-name *name* **rule** *rule-num*

delete firewall ipv6-name *name* **rule** [*rule-num*]

show firewall ipv6-name *name* **rule** [*rule-num*]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {}
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	Multinode. The numeric identifier of the rule. Rule numbers determine the order in which rules are executed. Each rule must have a unique rule number. The range is 1 to 9999. You can define multiple rules by creating more than one **rule** configuration node.

Default

None.

Usage Guidelines

Use this command to define a rule within an IPv6 firewall rule set.

A firewall rule set consists of up to 9999 configurable rules. Following the last configured rule, a system rule (rule 10000) with an action of “deny all” is applied.

Firewall rules are executed in numeric sequence, from lowest to highest. You cannot directly change a rule number, because it is the identifier of a configuration node; however, you can renumber rules using the **rename** command.

To avoid having to renumber firewall rules, a good practice is to number rules in increments of 10. This allows room for the insertion of new rules within the rule set.

Use the **set** form of this command to create or modify a firewall rule within an IPv6 firewall rule set.

Use the **delete** form of this command to remove a rule from an IPv6 firewall rule set.

Use the **show** form of this command to view firewall rule configuration.

firewall ipv6-name <name> rule <rule-num> action <action>

Specifies the action to perform on matched packets.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **action** *action*

delete firewall ipv6-name *name* **rule** *rule-num* **action**

show firewall ipv6-name *name* **rule** *rule-num* **action**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            action action
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
action	The action to be taken when a packet satisfies the criteria specified in the rule. Supported values are as follows: **accept:** Accepts and forwards matched packets. **drop:** Silently drops matched packets. **inspect:** Forwards matched packets to the intrusion protection system (IPS). Packets forwarded to the IPS are processed by the **content-inspection traffic-filter** command. **reject:** Drops matched packets with a TCP reset.

Default

Packets are silently dropped.

Usage Guidelines

Use this command to specify the action to perform on packets matching the criteria specified in this firewall rule. Only one action can be defined per rule.

Use the **set** form of this command to specify the action to perform on matched packets.

Use the **delete** form of this command to restore the default action for matched packets.

Use the **show** form of this command to view firewall rule action configuration.

firewall ipv6-name <name> rule <rule-num> description <desc>

Specifies a brief description for an IPv6 firewall rule.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **description** *desc*

delete firewall ipv6-name *name* **rule** *rule-num* **description**

show firewall ipv6-name *name* **rule** *rule-num* **description**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            description desc
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
desc	A brief description for this rule. If the description contains spaces, it must be enclosed in double quotes.

Default

None.

Usage Guidelines

Use this command to specify a brief description for an IPv6 firewall rule.

Use the **set** form of this command to set the description.

Use the **delete** form of this command to remove the description.

Use the **show** form of this command to view description configuration.

firewall ipv6-name <name> rule <rule-num> destination

Specifies the destination address and port to match in an IPv6 firewall rule.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **destination** [**address** *address* | **port** *port*]

delete firewall ipv6-name *name* **rule** *rule-num* **destination** [**address** | **port**]

show firewall ipv6-name *name* **rule** *rule-num* **destination** [**address** | **port**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            destination {
                address address
                port port
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

address	The destination address to match. The following formats are valid: *ipv6-address*: Matches the specified IPv6 address; for example, fe80::20c:29fe:fe47:f89. *ipv6-address/prefix*: A network address, where ::/0 matches any network; for example, fe80::20c:29fe:fe47:f88/64 *ipv6-address–ipv6-address*: Matches a range of contiguous IP addresses; for example, fe80::20c:29fe:fe47:f00–fe80::20c:29fe:fe47:f89. **!***ipv6-address*: Matches all IP addresses except the one specified. **!***ipv6-address/prefix*: Matches all network addresses except the one specified. **!***ipv6-address–ipv6-address*: Matches all IP addresses except those in the specified range.
port	Applicable only when the protocol is TCP or UDP. The destination port to match. Supported formats are as follows: *port-name*: Matches the name of an IP service; for example, **http**. You can specify any service name in the file **/etc/services**. *port-num*: Matches a port number. The range is 1 to 65535. start–end: Matches the specified range of ports; for example, 1001–1005. You can use a combination of these formats in a comma-separated list. You can also negate the entire list by prepending it with an exclamation mark (“!”); for example,**!22,telnet,http,123,1001-1005**.

Default

None.

Usage Guidelines

Use this command to specify the destination in an IPv6 firewall rule.

If both address and port are specified, the packet is considered a match only if both the address and the port match.

Use the **set** form of this command to specify or modify a firewall destination.

Use the **delete** form of this command to remove a firewall destination.

Use the **show** form of this command to view firewall destination configuration.

firewall ipv6-name <name> rule <rule-num> disable

Disables the IPv6 firewall rule..

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **disable**

delete firewall ipv6-name *name* **rule** *rule-num* **disable**

show firewall ipv6-name *name* **rule** *rule-num*

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            disable
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

Default

The firewall rule is enabled.

Usage Guidelines

Use this command to disable an IPv6 firewall rule.

Use the **set** form of this command to disable the specified rule

Use the **delete** form of this command to enable the specified rule.

Use the **show** form of this command to view the configuration for the specified rule.

firewall ipv6-name <name> rule <rule-num> icmpv6 type

Specifies ICMPv6 code and type settings for an IPv6 firewall rule.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **icmpv6 type** *type*

delete firewall ipv6-name *name* **rule** *rule-num* **icmpv6 type**

show firewall ipv6-name *name* **rule** *rule-num* **icmpv6 type**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            icmpv6 {
                type type
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
type	A valid ICMPv6 type code from 0 to 255; for example, **128** (Echo Request), or a type/code pair (each from 0 to 255); for example, **1/4** (Port unreachable). Alternatively, you can specify an ICMPv6 type code literal; for example, **echo-request** (Echo Request). For a list of ICMPv6 codes and types, see "Appendix B: ICMPv6 Types."

Default

None.

Usage Guidelines

Use this command to define the ICMPv6 types this rule applies to—for example Echo Request or Echo Reply. Packets having this ICMPv6 type will "match" the rule. Note that this command requres that "protocol" be set to "icmpv6".

Use the **set** form of this command to specify the ICMPv6 code and type for the specified rule

Use the **delete** form of this command to remove the ICMPv6 code or type value for the specified rule.

Use the **show** form of this command to view the ICMPv6 code or type value for the specified rule.

firewall ipv6-name <name> rule <rule-num> ipsec

Specifies IPSEC packet matching.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **ipsec** {**match-ipsec**|**match-none**}

delete firewall ipv6-name *name* **rule** *rule-num* **ipsec** [**match-ipsec**|**match-none**]

show firewall ipv6-name *name* **rule** *rule-num* **ipsec**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            ipsec {
                match-ipsec
                match-none
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
match-ipsec	Match inbound IPsec packets.
match-none	Match inbound non-IPsec packets.

Default

None.

Usage Guidelines

Use this command to specify whether to match IPsec or non-IPsec packets.

Use the **set** form of this command to specify which type of packets to match.

Use the **delete** form of this command to remove the configuration.

Use the **show** form of this command to view the configuration.

firewall ipv6-name <name> rule <rule-num> limit

Specifies traffic rate limiting parameters for an IPv6 firewall rule.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **limit** {**burst** *size* | **rate** *rate*}

delete firewall ipv6-name *name* **rule** *rule-num* **limit** [**burst** | **rate**]

show firewall ipv6-name *name* **rule** *rule-num* **limit** [**burst** | **rate**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            limit {
                burst size
                rate rate
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
size	The size of the burst buffer. This is the maximum number of packets that can be sent as a burst in excess of the specified token rate given available tokens in the buffer. The default is 1, which provides no bursting above the specified rate.
rate	The maximum average rate of data traffic for packets matching the rule. Supported time units are: second, minute, hour, and day. The rate is specified in the format “X/<time unit>”. For example “2/second” limits the packets matching the rule to two per second.

Default

No imposed limit.

Usage Guidelines

Use this command to limit the traffic rate of packets matching the rule. The limit option employs the Token Bucket Filter (TBF) queuing mechanism within firewall to limit the rate of incoming packets to an administatively set rate but with the possibility of allowing short bursts in excess of this rate.

The TBF implementation consists of a buffer (bucket), constantly filled by some virtual pieces of information called tokens, at a specific rate (token rate). The most important parameter of the bucket is its size, that is the number of tokens it can store. Each arriving token collects one incoming data packet from the data queue and is then deleted from the bucket. Associating this algorithm with the two flows -- token and data, gives us three possible scenarios:

1) The data arrives in the TBF at a rate that's equal to the rate of incoming tokens. In this case each incoming packet has its matching token and passes the queue without delay.

2) The data arrives in the TBF at a lower rate than the token rate. Only a part of the tokens are deleted at output of each data packet that's sent out the queue, so the tokens accumulate, up to the bucket size. The unused tokens can then be used to send data at a speed that's exceeding the standard token rate, in case short data bursts occur.

3) The data arrives in the TBF at a greater rate than the token rate. This means that the bucket will soon be devoid of tokens, which causes the TBF to throttle itself for a while. This is called an 'overlimit situation'. If packets keep coming in, packets will start to get dropped.

The limit option "rate" relates to the "token rate" as described in the above algorithm while the limit option "burst" relates to the "bucket size". The implementation of these values is explained below :

rate - If set, this rule will match packets at the specified maximum average rate. Any of the following time units can be used to specify rate : second, minute, hour, day.

For example, a value of 1/second implies that the rule be matched at an average of once per second.

burst - If set, this rule will match packets specified by this value in excess of rate. By default, this value is set to 1. so if you don't want to bother with short bursts of packets and want to simply rate limit at the specified rate then you do not have to worry about this option.

Use the **set** form of this command to specify the traffic limit for the specified rule

Use the **delete** form of this command to remove the traffic limit for the specified rule.

Use the **show** form of this command to view the traffic limit for the specified rule.

firewall ipv6-name <name> rule <rule-num> log <state>

Enables or disables logging of IPv6 firewall rule actions.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **log** *state*

delete firewall ipv6-name *name* **rule** *rule-num* **log**

show firewall ipv6-name *name* **rule** *rule-num* **log**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            log state
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
state	Enables or disables logging of firewall actions. Supported values are as follows: **enable**: Log when action is taken. **disable**: Do not log when action is taken.

Default

Actions are not logged.

Usage Guidelines

Use this command to enable or disable logging for the specified rule. When enabled, any actions taken will be logged.

Use the **set** form of this command to specify logging for the specified rule

Use the **delete** form of this command to remove the logging value for the specified rule.

Use the **show** form of this command to view the logging value for the specified rule.

firewall ipv6-name <name> rule <rule-num> p2p <app_name>

Specifies a P2P application to which an IPv6 firewall rule applies.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **p2p** *app_name*

delete firewall ipv6-name *name* **rule** *rule-num* **p2p** *app_name*

show firewall ipv6-name *name* **rule** *rule-num* **p2p**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            p2p app_name
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

app_name	Mandatory. Match P2P application packets. Supported values are as follows: **all**: Match packets sent by any of the applications listed below. **applejuice**: Match packets sent by AppleJuice applications. **bittorrent**: Match packets sent by BitTorrent applications. **directconnect**: Match packets sent by Direct Connect applications. **edonkey**: Match packets sent by eDonkey/eMule applications. **gnutella**: Match packets sent by Gnutella applications. **kazaa**: Match packets sent by KaZaA applications.

Default

None.

Usage Guidelines

Use this command to define to which P2P application a firewall rule applies. Packets to or from this application will "match" the rule. Multiple P2P options can be specified in a rule to match multiple P2P applications.

Use the **set** form of this command to specify the P2P application to match for the specified rule

Use the **delete** form of this command to remove the P2P application value for the specified rule.

Use the **show** form of this command to view the P2P application value for the specified rule.

firewall ipv6-name <name> rule <rule-num> protocol <protocol>

Specifies the protocol to which an IPv6 firewall rule applies.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **protocol** *protocol*

delete firewall ipv6-name *name* **rule** *rule-num* **protocol**

show firewall ipv6-name *name* **rule** *rule-num* **protocol**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            protocol protocol
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
protocol	Mandatory. Any protocol literals or numbers listed in the file **/etc/protocols** can be used. The keywords **icmpv6** and **all** are also supported. Prefixing the protocol name with the exclamation mark character (“**!**”) matches every protocol except the specified protocol. For example, **!tcp** matches all protocols except TCP.

Default

The default is **all**.

Usage Guidelines

Use this command to define to which protocol an IPv6 firewall rule applies. Packets using this protocol will “match” the rule.

Note that you should take care in using more than one “exclusion” rule (that is, a rule using the negation operation (“!”) in combination.

Also note that this parameter works slightly different than its IPv4 counterpart. In IPv4, this field strictly matches the "protocol ID" field in the IPv4 header. In IPv6, this parameter matches the "last" next-header field in the IPv6 header chain. This means that if the IPv6 packet has no extension headers, it will match the next-header field in the main IPv6 header. If the packet does have extension headers, the parameter will match the next-header field of the last extension header in the chain. In other words, the parameter will always match the ID of the transport-layer packet that is being carried.

Use the **set** form of this command to specify the protocol to match for the specified rule

Use the **delete** form of this command to remove the protocol value for the specified rule.

Use the **show** form of this command to view the protocol value for the specified rule.

firewall ipv6-name <name> rule <rule-num> recent

Specifies the parameters to match recently seen sources.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **recent** [**count** *count* | **time** *seconds*]

delete firewall ipv6-name *name* **rule** *rule-num* **recent** [**count** | **time**]

show firewall ipv6-name *name* **rule** *rule-num* **recent** [**count** | **time**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            recent {
                count count
                time seconds
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
count	Mandatory. The number of times the same source IP address is seen within the specified time period. The range is 0 to 255.
seconds	Mandatory. The amount of time, in seconds, to look for “count” connection attempts from the same source.

Default

None.

Usage Guidelines

Use this command to match recently seen sources. The most common use for this is to help prevent “brute force” attacks where an external device is opening a continuous flow of connections (e.g. to SSH) in an attempt to break into the system. Because the external host will be an unknown source, the “recent” list allows the firewall to match packets based on the external host’s behavior without initially knowing it’s address.

Use the **set** form of this command to specify the “recent” configuration.

Use the **delete** form of this command to remove the “recent” configuration.

Use the **show** form of this command to view firewall “recent” configuration.

firewall ipv6-name <name> rule <rule-num> source

Specifies the source address and port to match in an IPv6 firewall rule.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **source** [**address** *address* | **mac-address** *mac-addr* | **port** *port*]

delete firewall ipv6-name *name* **rule** *rule-num* **source** [**address** | **mac-address** | **port**]

show firewall ipv6-name *name* **rule** *rule-num* **source** [**address** | **mac-address** | **port**]

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            source {
                address address
                mac-address mac-addr
                port port
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

address	The source address to match. The following formats are valid: *ipv6-address*: Matches the specified IPv6 address; for example, fe80::20c:29fe:fe47:f89. *ipv6-address/prefix*: A network address, where ::/0 matches any network; for example, fe80::20c:29fe:fe47:f88/64 *ipv6-address–ipv6-address*: Matches a range of contiguous IP addresses; for example, fe80::20c:29fe:fe47:f00–fe80::20c:29fe:fe47:f89. **!***ipv6-address*: Matches all IP addresses except the one specified. **!***ipv6-address/prefix*: Matches all network addresses except the one specified. **!***ipv6-address*–ipv6-address: Matches all IP addresses except those in the specified range.
mac-addr	The media access control (MAC) address to match. The format is 6 colon-separated 8-bit numbers in hexadecimal; for example, 00:0a:59:9a:f2:ba.
port	The source port to match. The following formats are valid: *port-name*: Matches the name of an IP service; for example, **http**. You can specify any service name in the file **etc/services**. *port-num*: Matches a port number. The range is 1 to 65535. start–end: Matches the specified range of ports; for example, 1001–1005. You can use a combination of these formats in a comma-separated list. You can also negate the entire list by prepending it with an exclamation mark (“**!**”); for example, **!22,telnet,http,123,1001-1005**.

Default

None.

Usage Guidelines

Use this command to specify the source to match in an IPv6 firewall rule.

Note that you should take care in using more than one “exclusion” rule (that is, a rule using the negation operation (“**!**”) in combination.

Use the **set** form of this command to create a firewall source.

Use the **delete** form of this command to remove a firewall source.

Use the **show** form of this command to view firewall source configuration.

firewall ipv6-name <name> rule <rule-num> state

Specifies the kinds of packets to which this rule is applied.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **state** {**established** *state* | **invalid** *state* | **new** *state* | **related** *state*}

delete firewall ipv6-name *name* **rule** *rule-num* **state**

show firewall ipv6-name *name* **rule** *rule-num* **state**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            state {
                established state
                invalid state
                new state
                related state
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.
established *state*	Specifies whether or not the rule will be applied to established packets. Supported values are as follows: **enable**: Applies the rule to established packets. **disable**: Does not apply the rule to established packets.

invalid *state*	Specifies whether or not the rule will be applied to invalid packets. Supported values are as follows: **enable**: Applies the rule to invalid packets. **disable**: Does not apply the rule to invalid packets.
new *state*	Specifies whether or not the rule will be applied to new packets. Supported values are as follows: **enable**: Applies the rule to new packets. **disable**: Does not apply the rule to new packets.
related *state*	Specifies whether or not the rule will be applied to related packets. Supported values are as follows: **enable**: Applies the rule to related packets. **disable**: Does not apply the rule to related packets.

Default

The rule is applied to all packets, regardless of state.

Usage Guidelines

Use this command to specify the kind of packets this rule will be applied to.

- *Established* packets are packets that are part of a connection that has seen packets in both directions; for example, a reply packet, or an outgoing packet on a connection that has been replied to.
- *Invalid* packets are packets that could not be identified for some reason. These might include the system running out of resource, or ICMP errors that do not correspond to any known connection. Generally these packets should be dropped.
- *New* packets are packets creating new connections. For TCP, this will be packets with the SYN flag set.
- *Related* packets are packets related to existing connections.

Use the **set** form of this command to specify the kind of packets an IPv6 firewall rule will be applied to.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view state configuration for a firewall rule.

firewall ipv6-name <name> rule <rule-num> tcp flags

Specifies the TCP flags to match in an IPv6 firewall rule.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **tcp flags** *flags*

delete firewall ipv6-name *name* **rule** *rule-num* **tcp flags**

show firewall ipv6-name *name* **rule** *rule-num* **tcp flags**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            tcp {
                flags flags
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

Default

None.

Usage Guidelines

Use this command to match TCP flags in an IPv6 firewall rule.

Use the **set** form of this command to specify the TCP flags to match.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view the TCP flags configuration for a firewall rule.

firewall ipv6-name <name> rule <rule-num> time

Specifies the times at which this rule is applied.

Syntax

set firewall ipv6-name *name* **rule** *rule-num* **time** {**monthdays** *days-of-month* | **startdate** *date* | **starttime** *time* | **stopdate** *date* | **stoptime** *time* | *utc* | **weekdays** *days-of-week*}

delete firewall ipv6-name *name* **rule** *rule-num* **time**

show firewall ipv6-name *name* **rule** *rule-num* **time**

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
    ipv6-name name {
        rule rule-num {
            time {
                monthdays days-of-month
                startdate date
                starttime time
                stopdate date
                stoptime time
                utc
                weekdays days-of-week
            }
        }
    }
}
```

Parameters

name	The name of the firewall rule set.
rule-num	The numeric identifier of the rule. The range is 1 to 9999.

monthdays *days-of-month*	Specifies which days in the month the rule will be applied. Supported values are days of the month (1 to 31) within a comma-separated list (e.g. 2,12,21). The "!" character can be used to negate a list of values (e.g. !2,12,21). This indicates that the firewall rule is to be applied on all but the specified days.
startdate *date*	Specifies the start of a period of time in which the firewall rule will be applied. Set the date, and optionally the time, using one of the following formats: **yyyy-mm-dd** (e.g. 2009-03-12) **yyyy-mm-ddThh:mm:ss** (e.g. 2009-03-12T17:30:00) The default is 1970-01-01. Note that if the time is specified that it is 24 hour format (valid values are from 00:00:00 to 23:59:59). If the time is not specified the default is the start of the day on the specified date (i.e. 00:00:00). Use **stopdate** to end the activation period.
starttime *time*	Specifies the start of a period of time in the day to which the firewall rule will be applied. Set the start time using the following format: **hh:mm:ss** (e.g. 17:30:00) Note that the time is specified in 24 hour format (valid values are from 00:00:00 to 23:59:59). Use **stoptime** to end the activation period.
stopdate *date*	Specifies the end of a period of time in which the firewall rule will be applied. Set the date, and optionally the time, using one of the following formats: **yyyy-mm-dd** (e.g. 2009-03-12) **yyyy-mm-ddThh:mm:ss** (e.g. 2009-03-12T17:30:00) The default is 2038-01-19. Note that if the time is specified that it is 24 hour format (valid values are from 00:00:00 to 23:59:59). If the time is not specified the default is the start of the day on the specified date (i.e. 00:00:00). Use **startdate** to begin the activation period.

stoptime *time*	Specifies the end of a period of time in the day to which the firewall rule will be applied. Set the stop time using the following format: **hh:mm:ss** (e.g. 17:30:00) Note that the time is specified in 24 hour format (valid values are from 00:00:00 to 23:59:59). Use **starttime** to begin the activation period.
utc	Specifies that times given using **startdate**, **stopdate**, **starttime**, and **stoptime**, should be interpreted as UTC time rather than local time.
weekdays *days-of-week*	Specifies which days in the week the rule will be applied. Supported values are days of the week (Mon, Tue, Wed, Thu, Fri, Sat, and Sun) within a comma-separated list (e.g. Mon,Wed,Fri). The "**!**" character can be used to negate a list of values (e.g. !Mon,Wed,Fri). This indicates that the firewall rule is to be applied on all but the specified days of the week.

Default

The rule is applied at all times.

Usage Guidelines

Use this command to restrict the times during which the rule will be applied. All values are optional and are ANDed when specified.

Use the **set** form of this command to specify the times at which an IPv6 firewall rule will be applied.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view time configuration for a firewall rule.

firewall ipv6-receive-redirects <state>

Specifies whether to process received ICMPv6 redirect messages.

Syntax

set firewall ipv6-receive-redirects {**enable** | **disable**}

delete firewall ipv6-receive-redirects

show firewall ipv6-receive-redirects

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   ipv6-receive-redirects state
}
```

Parameters

enable	Process received ICMPv6 redirect messages.
disable	Does not process received ICMPv6 redirect messages.

Default

The default is **disable**.

Usage Guidelines

Use this command to specify whether to process received ICMPv6 redirect messages.

Use the **set** form of this command to specify whether to process received ICMPv6 redirect messages.

Use the **delete** form of this command to remove the specified value.

Use the **show** form of this command to view the specified value.

firewall ipv6-src-route <state>

Specifies whether to process IPv6 packets with routing extension header.

Syntax

set firewall ipv6-src-route {**enable** | **disable**}

delete firewall ipv6-src-route

show firewall ipv6-src-route

Command Mode

Configuration mode.

Configuration Statement

```
firewall {
   ipv6-src-route state
}
```

Parameters

enable	Process IPv6 packets with routing header type 2.
disable	Does not process IPv6 packets with routing header.

Default

The default is **disable**.

Usage Guidelines

Source routing allows applications to override the routing tables and specify one or more intermediate destinations for outgoing datagrams. This capability is sometimes used for troubleshooting, but renders the network vulnerable to attacks where network traffic is transparently directed to a centralized collection point for packet capture.

Use this command to specify whether to process IPv6 packets with routing extension header.

Use the **set** form of this command to specify whether to process IPv6 packets with routing extension header.

Use the **delete** form of this command to remove the specified value.

Use the **show** form of this command to view the specified value.

interfaces <interface> firewall <direction> ipv6-name <fw-name>

Applies an IPv6 firewall instance to the defined interface.

Syntax

set interfaces *interface* **firewall** {**in ipv6-name** *fw-name* | **local ipv6-name** *fw-name* | **out ipv6-name** *fw-name*}

delete interfaces *interface* **firewall** [**in ipv6-name** | **local ipv6-name** | **out ipv6-name**]

show interfaces *interface* **firewall** [**in ipv6-name** | **local ipv6-name** | **out ipv6-name**]

Command Mode

Configuration mode.

Configuration Statement

```
interfaces interface {
    firewall {
        in {
            ipv6-name fw-name
        }
        local {
            ipv6-name fw-name
        }
        out {
            ipv6-name fw-name
        }
    }
}
```

Parameters

interface	Mandatory. The type of interface. For detailed keywords and arguments that can be specified as interface types, see the table in the Usage Guidelines below.
in ipv6-name *fw-name*	Applies the specified IPv6 firewall instance to inbound traffic on the specified interface.

local ipv6-name *fw-name*	Applies the specified IPv6 firewall instance to traffic arriving on the specified interface and bound for the local system.
out ipv6-name *fw-name*	Applies the specified IPv6 firewall instance to outbound traffic on the specified interface.

Default

None.

Usage Guidelines

Use this command to apply an IPv6 firewall instance, or rule set, to an interface.

A firewall has no effect on traffic traversing the system or destined to the system until a firewall rule set has been applied to an interface or a vif using this command.

To use the firewall feature, you define a firewall rule set as a named firewall instance, using firewall command. You then apply the firewall instance to interfaces and/or vifs using a statement like this one. Once applied, the instance acts as a packet filter.

The firewall instance will filter packets in one of the following ways, depending on what you specify when you apply it:

- **in.** If you apply the rule set as **in**, the firewall will filter packets entering the interface.
- **out.** If you apply the rule set as **out**, the firewall will filter packets leaving the interface.
- **local.** If you apply the rule set as **local**, the firewall will filter packets destined for the system itself.

For each interface, you can apply up to three firewall instances: one firewall **in** instance, one firewall **out** instance, and one firewall **local** instance.

Make sure the firewall instance you apply to an interface is already defined, or you may experience unintended results. If you apply a firewall instance that does not exist to an interface, the implicit firewall rule of **allow all** will be applied.

The following table shows the syntax and parameters for supported interface types.

Interface Type	Syntax	Parameters
ADSL Bridged Ethernet	adsl *adslx* pvc *pvc-id* bridged-ethernet	*adslx* The name of a Bridged Ethernet- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically.
ADSL Classical IPOA	adsl *adslx* pvc *pvc-id* classical-ipoa	*adslx* The name of a Classical IPoA- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically.
ADSL PPPoA	adsl *adslx* pvc *pvc-id* pppoa *num*	*adslx* The name of a Classical IPoA- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically. *num* The PPPoA unit number. This number must be unique across all PPPoA interfaces. In addition, only one PPPoA instance can be configured on a PVC. PPPoA units range from 0 to 15 and the resulting interfaces are named pppoa0 to pppoa15.
ADSL PPPoE	adsl *adslx* pvc *pvc-id* pppoe *num*	*adslx* The name of a Classical IPoA- encapsulated DSL interface. *pvc-id* The identifier for the PVC. It can either be the *vpi*/*vci* pair or the keyword **auto**, where *vpi* is a Virtual Path Index from 0 to 255, *vci* is a Virtual Circuit Index from from 0 to 65535, and **auto** directs the system to detect the Virtual Path Index and Virtual Circuit Index automatically. *num* The name of a defined PPPoE unit. The range is 0 to 15.
Bonding	bonding *bondx*	*bondx* The identifier for the bonding interface. Supported values are **bond0** through **bond99**.
Bonding Vif	bonding *bondx* vif *vlan-id*	*bondx* The identifier for the bonding interface. Supported values are **bond0** through **bond99**. *vlan-id* The VLAN ID for the vif. The range is 0 to 4094.

Interface Type	Syntax	Parameters
Bridge	bridge *brx*	*brx* The name of a Bridge group. The range is **br0** through **br999**.
Ethernet	ethernet *ethx*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system.
Ethernet PPPoE	ethernet *ethx* pppoe *num*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system. *num* The name of a defined PPPoE unit. The range is 0 to 15.
Ethernet Vif	ethernet *ethx* vif *vlan-id*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system. *vlan-id* The VLAN ID for the vif. The range is 0 to 4094.
Ethernet Vif PPPoE	ethernet *ethx* vif *vlan-id* pppoe *num*	*ethx* The name of an Ethernet interface. The range is **eth0** through **eth23**, depending on the physical interfaces available on your system. *vlan-id* The VLAN ID for the vif. The range is 0 to 4094. *num* The name of a defined PPPoE unit. The range is 0 to 15.
Loopback	loopback *lo*	*lo* The name of the loopback interface.
Multilink	multilink *mlx* vif *1*	*mlx* The identifier of the multilink bundle. You can create up to two multilink bundles. Supported values are **ml0** (“em ell zero”) through **ml23** (“em ell twenty-three”). *1* The identifier of the virtual interface. Currently, only one vif is supported for multilink interfaces, and the identifier must be 1. The vif must already have been defined.
OpenVPN	openvpn *vtunx*	*vtunx* The identifier for the OpenVPN interface. This may be **vtun0** to **vtun*x***, where ***x*** is a non-negative integer.
Pseudo-Ethernet	pseudo-ethernet *pethx*	*pethx* The name of a pseudo-Ethernet interface. The range is **peth0** through **peth999**.
Serial Cisco HDLC	serial *wanx* cisco-hdlc vif *1*	*wanx* The serial interface you are configuring: one of **wan0** through **wan23**. The interface must already have been defined. *1* The identifier of the virtual interface. Currently, only one vif is supported for Cisco HDLC interfaces, and the identifier must be 1. The vif must already have been defined.

Interface Type	Syntax	Parameters
Serial Frame Relay	serial *wanx* frame-relay vif *dlci*	*wanx* The serial interface you are configuring: one of **wan0** through **wan23**. The interface must already have been defined. *dlci* The identifier of the virtual interface. For Frame Relay interfaces, this is the DLCI number for the interface. the range is 16 to 991. The vif must already have been defined.
Serial PPP	serial *wanx* ppp vif *1*	*wanx* The serial interface you are configuring: one of **wan0** through **wan23**. The interface must already have been defined. *1* The identifier of the virtual interface. Currently, only one vif is supported for point-to-point interfaces, and the identifier must be 1. The vif must already have been defined.
Tunnel	tunnel *tunx*	*tunx* An identifier for the tunnel interface you are defining. The range is **tun0** to **tun23**.
Wireless	wireless *wlanx*	*wlanx* The identifier for the wireless interface you are using. This may be **wlan0** to **wlan999**.
Wireless Modem	wirelessmodem *wlmx*	*wlmx* The identifier for the wireless modem interface you are using. This may be **wlm0** to **wlm999**.

Use the **set** form of this command to apply an IPv6 firewall instance to an interface.

Use the **delete** form of this command to remove an IPv6 firewall instance from an interface.

Use the **show** form of this command to view an IPv6 firewall configuration for an interface.

show firewall ipv6-name

Displays statistics information for IPv6 firewall instances.

Syntax

show firewall ipv6-name [*name* [**rule** *rule-num* | **statistics**]]

Command Mode

Operational mode.

Parameters

name	Optional. Displays detailed statistics information about the specified IPv6 firewall instance.
rule *rule-num*	Optional. Displays detailed statistics information about the specified firewall rule configured under the specified IPv6 firewall instance.
statistics	Optional. Displays summary statistics information about the specified IPv6 firewall instance.

Default

By default, detailed statisitics information about all IPv6 firewall instances is displayed.

Usage Guidelines

Use this command to display statistics information about configured IPv6 firewall instances.

Examples

Example 5-1 shows summary statistics of a specified IPv6 firewall instance.

Example 5-1 "show firewall ipv6-name TEST2 statistics": Displaying summary statistics for a specified IPv6 firewall instance.

```
vyatta@R1:~$ show firewall ipv6-name TEST2 statistics
------------------------------------------------------------------------
--------
```

```
IPv6 Firewall "TEST2": Active on (eth0,IN)

rule  packets   bytes     action  source              destination
----  -------   -----     ------  ------              -----------
10    0         0         ACCEPT  ::/0                ::/0
10000 3         168       DROP    ::/0                ::/0

vyatta@R1:~$
```

Chapter 6: Zone-Based Firewall

Commands

This chapter describes commands for implementing zone-based firewall on the Vyatta system.

Zone-Based Firewall Commands

Configuration Commands	
zone-policy zone <to-zone>	Defines a security zone.
zone-policy zone <to-zone> default-action <action>	Defines the default action for traffic arriving at a security zone.
zone-policy zone <to-zone> description <desc>	Specifies a description for a security zone.
zone-policy zone <to-zone> from <from-zone>	Names the traffic source zone to which this policy applies.
zone-policy zone <to-zone> from <from-zone> firewall ipv6-name <name>	Applies packet filtering as defined in an IPv6 firewall rule set to traffic arriving from the specified “from” zone.
zone-policy zone <to-zone> from <from-zone> firewall name <name>	Applies packet filtering as defined in an IPv4 firewall rule set to traffic arriving from the specified “from” zone.
zone-policy zone <to-zone> interface <if-name>	Adds an interface to a security zone.
zone-policy zone <to-zone> local-zone	Designates this zone as the “local” zone.
Operational Commands	
See operational commands in “Chapter 3: Global Firewall Commands.”	

zone-policy zone <to-zone>

Defines a security zone.

Syntax

set zone-policy zone *zone*

delete zone-policy zone *zone*

show zone-policy *zone*

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone zone {}
```

Parameters

zone	Multimode. The name of the security zone. The name can be up to 18 characters long. You can define multiple security zones by creating more than one **zone-policy zone** configuration node.

Default

None.

Usage Guidelines

Use this command to define a security zone.

In the Vyatta system, a zone is defined as a group of interfaces with the same security level. Once the zone is defined, a filtering policy can be applied to traffic flowing between zones.

By default, traffic to a zone is dropped unless a policy has been defined for the zone sending the traffic. Traffic flowing within a zone is not filtered.

When defining zones, keep the following in mind:

- An interface can be a member of only one zone.

- An interface that is a member of a zone cannot have a firewall rule set directly applied to it.
- For interfaces not assigned to a zone, traffic is unfiltered by default. These interfaces can have rule sets directly applied to them.

Use the **set** form of this command to define a security zone.

Use the **delete** form of this command to remove a security zone.

Use the **show** form of this command to view security zone configuration.

zone-policy zone <to-zone> default-action <action>

Defines the default action for traffic arriving at a security zone.

Syntax

set zone-policy zone *to-zone* **default-action** *action*

delete zone-policy zone *to-zone* **default-action**

show zone-policy zone *to-zone* **default-action**

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   default-action action
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.
action	The action to be taken for traffic arriving at a security zone. Supported values are as follows: **drop**: Traffic is silently dropped. **reject**: Traffic is dropped with an ICMP unreachable message.

Default

Traffic is silently dropped.

Usage Guidelines

Use this command to specify the default action to take for traffic arriving at a security zone.

This is the action that will be taken for all traffic arriving from zones for which a policy has not been defined. That is, in order for traffic from a given zone to be allowed, a policy must be explicitly defined allowing traffic from that zone.

Use the **set** form of this command to set the default action.

Use the **delete** form of this command to restore the default behavior.

Use the **show** form of this command to view default action configuration.

zone-policy zone <to-zone> description <desc>

Specifies a description for a security zone.

Syntax

set zone-policy zone *to-zone* **description** *desc*

delete zone-policy zone *to-zone* **description**

show zone-policy zone *to-zone* **description**

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   description desc
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.
descr	A string providing a brief description for the security zone. If the string contains spaces, it must be enclosed in double quotes.

Default

None.

Usage Guidelines

Use this command to record a brief description for security zone.

Use the **set** form of this command to specify the description.

Use the **delete** form of this command to remove the description.

Use the **show** form of this command to view description configuration.

zone-policy zone <to-zone> from <from-zone>

Names the traffic source zone to which this policy applies.

Syntax

set zone-policy zone *to-zone* **from** *from-zone*

delete zone-policy zone *to-zone* **from** *from-zone*

show zone-policy zone *to-zone* **from** *from-zone*

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   from from-zone
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.
from-zone	The name of the security zone from which traffic is originating.

Default

None.

Usage Guidelines

Use this command to specify a zone from which traffic will be arriving (the "from" zone). The packet filtering policy for this "from" zone is applied to all traffic arriving from this zone.

Use the **set** form of this command to specify the description.

Use the **delete** form of this command to remove the description.

Use the **show** form of this command to view description configuration.

zone-policy zone <to-zone> from <from-zone> firewall ipv6-name <name>

Applies packet filtering as defined in an IPv6 firewall rule set to traffic arriving from the specified "from" zone.

Syntax

set zone-policy zone *to-zone* **from** *from-zone* **firewall ipv6-name** *name*

delete zone-policy zone *to-zone* **from** *from-zone* **firewall ipv6-name**

show zone-policy zone *to-zone* **from** *from-zone* **firewall ipv6-name**

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   from from-zone
      firewall {
         ipv6-name name
      }
   }
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.
from-zone	The name of the security zone from which traffic is originating.
name	The name of an IPv6 firewall rule set.

Default

None.

Usage Guidelines

Use this command to apply an IP version 6 (IPv6) rule set as a packet filter to traffic arriving from a “from” zone.

You can apply one IPv6 rule set and one IP version 4 (IPv4) rule set as packet filters for a “from” zone.

Use the **set** form of this command to specify an IPv6 rule set as a packet filter for a “from” zone.

Use the **delete** form of this command to remove IPv6 rule set from the packet filters defined for a “from” zone.

Use the **show** form of this command to see what packet filter, if any, has been applied to a “from” zone.

zone-policy zone <to-zone> from <from-zone> firewall name <name>

Applies packet filtering as defined in an IPv4 firewall rule set to traffic arriving from the specified "from" zone.

Syntax

set zone-policy zone *to-zone* **from** *from-zone* **firewall name** *name*

delete zone-policy zone *to-zone* **from** *from-zone* **firewall name**

show zone-policy zone *to-zone* **from** *from-zone* **firewall name**

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   from from-zone
      firewall {
         name name
      }
   }
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.
from-zone	The name of the security zone from which traffic is originating.
name	The name of an IPv4 firewall rule set.

Default

None.

Usage Guidelines

Use this command to apply an IP version 4 (IPv4) rule set as a packet filter to traffic arriving from a “from” zone.

You can apply one IPv4 rule set and one IP version 6 (IPv6) rule set as packet filters for a “from” zone.

Use the **set** form of this command to specify an IPv4 rule set as a packet filter for a “from” zone.

Use the **delete** form of this command to remove an IPv4 rule set from the packet filters defined for a “from” zone.

Use the **show** form of this command to see what IPv4 packet filter, if any, has been applied to a “from” zone.

zone-policy zone <to-zone> interface <if-name>

Adds an interface to a security zone.

Syntax

set zone-policy zone *to-zone* **interface** *if-name*

delete zone-policy zone *to-zone* **interface** *if-name*

show zone-policy zone *to-zone* **interface** *if-name*

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   interface if-name {}
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.
if-name	Multinode. The name of an interface; for example, **eth0**, **wan1**, or **ppp1**.

Default

None.

Usage Guidelines

Use this command to add an interface to a security zone.

All interfaces in the zone have the same security level; traffic arriving to those interfaces from other zones is all treated in the same way. Traffic flowing between interfaces in the same security zone is not filtered.

Use the **set** form of this command to add an interface to the zone.

Use the **delete** form of this command to remove an interface from the zone.

Use the **show** form of this command to see what interfaces are members of this zone.

zone-policy zone <to-zone> local-zone

Designates this zone as the “local” zone.

Syntax

set zone-policy zone *to-zone* **local-zone**

delete zone-policy zone *to-zone* **local-zone**

show zone-policy zone *to-zone*

Command Mode

Configuration mode.

Configuration Statement

```
zone-policy zone to-zone {
   local-zone
}
```

Parameters

to-zone	The name of the security zone that traffic is destined for.

Default

None.

Usage Guidelines

Use this command to designate security zone as the “local” zone.

The local zone is a special zone which refers to the local Vyatta device itself. If you specify a security zone as local, the firewall policies specified for the zone filter packets destined for the Vyatta system.

By default, all traffic destined for the router and originating from the router is allowed.

Only one zone may be designated as the local zone.

Use the **set** form of this command to designate a security zone as the local zone.

Use the **delete** form of this command to stop a security zone from being the local zone.

Use the **show** form of this command to see security zone configuration.

Appendix A: ICMP Types

This appendix lists the ICMP types defined by the Internet Assigned Numbers Authority (IANA).

The Internet Assigned Numbers Authority (IANA) has developed a standard that maps a set of integers onto ICMP types.Table A-1 lists the ICMP types and codes defined by the IANA and maps them to the strings literal strings available in the Vyatta system.

Table A-1 ICMP types

ICMP Type	Code	Literal	Description
0 - Echo reply	0	echo-reply	Echo reply (pong)
3 - Destination unreachable		destination- unreachable	
	0	network-unreachable	Destination network unreachable
	1	host-unreachable	Destination host unreachable
	2	protocol-unreachable	Destination protocol unreachable
	3	port-unreachable	Destination port unreachable
	4	fragmentation-needed	Fragmentation required
	5	source-route-failed	Source route failed
	6	network-unknown	Destination network unknown
	7	host-unknown	Destination host unknown
	9	network-prohibited	Network administratively prohibited
	10	host-prohibited	Host administratively prohibited
	11	TOS-network-unreachable	Network unreachable for TOS
	12	TOS-host-unreachable	Host unreachable for TOS
	13	communication-prohibited	Communication administratively prohibited
	14	host-precedence-violation	Requested precedence is not permitted.

Table A-1 ICMP types

ICMP Type	Code	Literal	Description
	15	precedence-cutoff	Datagram sent with precedence lower than required minimum.
4 - Source quench	0	source-quench	Source quench (congestion control)
5 - Redirect message		redirect	
	0	network-redirect	Redirect datagrams for the network
	1	host-redirect	Redirect datagrams for the host
	2	TOS-network-redirect	Redirect datagrams for the TOS and network
	3	TOS-host-redirect	Redirect datagrams for the TOS and host
8 - Echo request	0	echo-request	Echo request (ping)
9 - Router advertisement	0	router-advertisement	Router advertisement
10 - Router solicitation	0	router-solicitation	Router solicitation
11 - Time exceeded		time-exceeded	
	0	ttl-zero-during-transit	TTL expired in transit
	1	ttl-zero-during-reassembly	Fragment reassembly time exceeded
12 - Parameter problem: Bad IP header		parameter-problem	
	0	ip-header-bad	Pointer indicates the error
	1	required-option-missing	Missing required option
13 - Timestamp	0	timestamp-request	Timestamp
14 - Timestamp reply	0	timestamp-reply	Timestamp reply
15 - Information request	0		Information request

Table A-1 ICMP types

ICMP Type	Code	Literal	Description
16 - Information reply	0		Information reply
17 - Address mask request	0	address-mask-request	Address mask request
18 - Address mask reply	0	address-mask-reply	Address mask reply

Appendix B: ICMPv6 Types

This appendix lists the ICMPv6 types defined by the Internet Assigned Numbers Authority (IANA).

The Internet Assigned Numbers Authority (IANA) has developed a standard that maps a set of integers onto ICMPv6 types. Table B-2 lists the ICMPv6 types and codes defined by the IANA and maps them to the strings literal strings available in the Vyatta system.

Table B-1 ICMPv6 types

ICMPv6 Type	Code	Literal	Description
1 - Destination unreachable		destination- unreachable	
	0	no-route	No route to destination
	1	communication-prohibited	Communication with destination administratively prohibited
	2		Beyond scope of source address
	3	address-unreachable	Address unreachable
	4	port-unreachable	Port unreachable
	5		Source address failed ingress/egress policy
	6		Reject route to destination
2 - Packet too big	0	packet-too-big	
3 - Time exceeded		time-exceeded	
	0	ttl-zero-during-transit	Hop limit exceeded in transit
	1	ttl-zero-during-reassembly	Fragment reassembly time exceeded
4 - Parameter problem		parameter-problem	
	0	bad-header	Erroneous header field encountered
	1	unknown-header-type	Unrecognized Next Header type encountered
	2	unknown-option	Unrecognized IPv6 option encountered

Table B-1 ICMPv6 types

ICMPv6 Type	Code	Literal	Description
128 - Echo request	0	echo-request (ping)	Echo request
129 - Echo reply	0	echo-reply (pong)	Echo reply
133 - Router solicitation	0	router-solicitation	Router solicitation
134 - Router advertisement	0	router-advertisement	Router advertisement
135 - Neighbor solicitation	0	neighbor-solicitation (neighbour-solicitation)	Neighbor solicitation
136 - Neighbor advertisement	0	neighbor-advertisement (neighbour-advertisement)	Neighbor advertisement

The Internet Assigned Numbers Authority (IANA) has developed a standard that maps a set of integers onto ICMP types.Table B-2 lists the ICMP types and codes defined by the IANA and maps them to the strings literal strings available in the Vyatta system.

Table B-2 ICMP types

ICMP Type	Code	Literal	Description
0 - Echo reply	0	echo-reply	Echo reply (pong)
3 - Destination unreachable		destination- unreachable	
	0	network-unreachable	Destination network unreachable
	1	host-unreachable	Destination host unreachable
	2	protocol-unreachable	Destination protocol unreachable
	3	port-unreachable	Destination port unreachable
	4	fragmentation-needed	Fragmentation required
	5	source-route-failed	Source route failed

Table B-2 ICMP types

ICMP Type	Code	Literal	Description
	6	network-unknown	Destination network unknown
	7	host-unknown	Destination host unknown
	9	network-prohibited	Network administratively prohibited
	10	host-prohibited	Host administratively prohibited
	11	TOS-network-unreachable	Network unreachable for TOS
	12	TOS-host-unreachable	Host unreachable for TOS
	13	communication-prohibited	Communication administratively prohibited
	14	host-precedence-violation	Requested precedence is not permitted.
	15	precedence-cutoff	Datagram sent with precedence lower than required minimum.
4 - Source quench	0	source-quench	Source quench (congestion control)
5 - Redirect message		redirect	
	0	network-redirect	Redirect datagrams for the network
	1	host-redirect	Redirect datagrams for the host
	2	TOS-network-redirect	Redirect datagrams for the TOS and network
	3	TOS-host-redirect	Redirect datagrams for the TOS and host
8 - Echo request	0	echo-request	Echo request (ping)
9 - Router advertisement	0	router-advertisement	Router advertisement

Table B-2 ICMP types

ICMP Type	Code	Literal	Description
10 - Router solicitation	0	router-solicitation	Router solicitation
11 - Time exceeded		time-exceeded	
	0	ttl-zero-during-transit	TTL expired in transit
	1	ttl-zero-during-reassembly	Fragment reassembly time exceeded
12 - Parameter problem: Bad IP header		parameter-problem	
	0	ip-header-bad	Pointer indicates the error
	1	required-option-missing	Missing required option
13 - Timestamp	0	timestamp-request	Timestamp
14 - Timestamp reply	0	timestamp-reply	Timestamp reply
15 - Information request	0		Information request
16 - Information reply	0		Information reply
17 - Address mask request	0	address-mask-request	Address mask request
18 - Address mask reply	0	address-mask-reply	Address mask reply

Glossary of Acronyms

ACL	access control list
ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
AS	autonomous system
ARP	Address Resolution Protocol
BGP	Border Gateway Protocol
BIOS	Basic Input Output System
BPDU	Bridge Protocol Data Unit
CA	certificate authority
CCMP	AES in counter mode with CBC-MAC
CHAP	Challenge Handshake Authentication Protocol
CLI	command-line interface
DDNS	dynamic DNS
DHCP	Dynamic Host Configuration Protocol
DHCPv6	Dynamic Host Configuration Protocol version 6
DLCI	data-link connection identifier
DMI	desktop management interface

DMZ	demilitarized zone
DN	distinguished name
DNS	Domain Name System
DSCP	Differentiated Services Code Point
DSL	Digital Subscriber Line
eBGP	external BGP
EGP	Exterior Gateway Protocol
ECMP	equal-cost multipath
ESP	Encapsulating Security Payload
FIB	Forwarding Information Base
FTP	File Transfer Protocol
GRE	Generic Routing Encapsulation
HDLC	High-Level Data Link Control
I/O	Input/Ouput
ICMP	Internet Control Message Protocol
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
IGP	Interior Gateway Protocol
IPS	Intrusion Protection System
IKE	Internet Key Exchange
IP	Internet Protocol
IPOA	IP over ATM
IPsec	IP security
IPv4	IP Version 4
IPv6	IP Version 6
ISP	Internet Service Provider

L2TP	Layer 2 Tunneling Protocol
LACP	Link Aggregation Control Protocol
LAN	local area network
LDAP	Lightweight Directory Access Protocol
LLDP	Link Layer Discovery Protocol
MAC	medium access control
MIB	Management Information Base
MLPPP	multilink PPP
MRRU	maximum received reconstructed unit
MTU	maximum transmission unit
NAT	Network Address Translation
ND	Neighbor Discovery
NIC	network interface card
NTP	Network Time Protocol
OSPF	Open Shortest Path First
OSPFv2	OSPF Version 2
OSPFv3	OSPF Version 3
PAM	Pluggable Authentication Module
PAP	Password Authentication Protocol
PAT	Port Address Translation
PCI	peripheral component interconnect
PKI	Public Key Infrastructure
PPP	Point-to-Point Protocol
PPPoA	PPP over ATM
PPPoE	PPP over Ethernet
PPTP	Point-to-Point Tunneling Protocol

PVC	permanent virtual circuit
QoS	quality of service
RADIUS	Remote Authentication Dial-In User Service
RIB	Routing Information Base
RIP	Routing Information Protocol
RIPng	RIP next generation
Rx	receive
SLAAC	Stateless Address Auto-Configuration
SNMP	Simple Network Management Protocol
SMTP	Simple Mail Transfer Protocol
SONET	Synchronous Optical Network
SSH	Secure Shell
SSID	Service Set Identifier
STP	Spanning Tree Protocol
TACACS+	Terminal Access Controller Access Control System Plus
TCP	Transmission Control Protocol
TKIP	Temporal Key Integrity Protocol
ToS	Type of Service
Tx	transmit
UDP	User Datagram Protocol
vif	virtual interface
VLAN	virtual LAN
VPN	Virtual Private Network
VRRP	Virtual Router Redundancy Protocol
WAN	wide area network
WAP	wireless access point

WPA	Wired Protected Access