

Chapter 4

Configure Applications

You can define application protocols for the stateful firewall and Network Address Translation (NAT) services to use in match condition rules. An application protocol defines application parameters using information from network Layer 3 and above. Examples of such applications are FTP and H.323.

To configure applications that are used with services, you include statements at the [edit applications] hierarchy level of the configuration:

```
[edit applications]
application application-name {
  application-protocol protocol-name;
  destination-port port-number;
  icmp-code value;
  icmp-type value;
  inactivity-timeout value;
  protocol type;
  rpc-program-number number;
  snmp-command command;
  source-port port-number;
  ttl-threshold value;
  uuid hex-value;
}
}
application-set application-set-name {
  [ application application-names ];
}
```

This chapter includes the following sections:

Configure Application Protocol Properties on page 40

Configure Application Sets on page 47

Examples: Configure Applications on page 47

Configure Application Protocol Properties

To configure application properties, include the application statement at the [edit applications] hierarchy level:

```
[edit applications]
application application-name {
  application-protocol protocol-name;
  destination-port port-number;
  icmp-code value;
  icmp-type value;
  inactivity-timeout value;
  protocol type;
  rpc-program-number number;
  snmp-command command;
  source-port port-number;
  ttl-threshold value;
  uuid hex-value;
}
```

You can group application objects by configuring the application-set statement; for more information, see “Configure Application Sets” on page 47.

This section includes the following tasks for configuring applications:

- Configure an Application Protocol on page 40
- Configure the Network Protocol on page 42
- Configure the ICMP Code and Type on page 42
- Configure Source and Destination Ports on page 44
- Configure the Inactivity Timeout Period on page 46
- Configure an SNMP Command on page 46
- Configure an RPC Program Number on page 46
- Configure the TTL Threshold on page 47
- Configure a Universal Unique Identifier on page 47

Configure an Application Protocol

The application-protocol statement allows you to specify which of the supported application protocols to configure and include in an application set for service processing. To configure, include the application-protocol statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
application-protocol protocol-name;
```

Table 3 shows the list of supported protocols:

Table 3: Application Protocols Supported by Services Interfaces

Protocol Name	CLI value	Comments
BOOTP	bootp	Supports BOOTP and DHCP.
DCE RPC	dce-rpc	Requires the protocol statement to have the value <code>udp</code> or <code>tcp</code> . Requires a <code>uuid</code> value. You cannot specify <code>destination-port</code> or <code>source-port</code> values.
DCE RPC portmap	dce-rpc-portmap	Requires the protocol statement to have the value <code>udp</code> or <code>tcp</code> . Requires a <code>destination-port</code> value.
DNS	dns	Requires the protocol statement to have the value <code>udp</code> . This application protocol closes the DNS flow as soon as the DNS response is received.
Exec	exec	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
FTP	ftp	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
H.323	h323	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
ICMP	icmp	Requires the protocol statement to have the value <code>icmp</code> or to be unspecified.
IIOP TCP	iiop	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
NetBIOS	netbios	Requires the protocol statement to have the value <code>udp</code> or to be unspecified. Requires a <code>destination-port</code> value.
NetShow	netshow	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
RealAudio	realaudio	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
RPC UDP or TCP	rpc	Requires the protocol statement to have the value <code>udp</code> or <code>tcp</code> . Requires a <code>rpc-program-number</code> value. You cannot specify <code>destination-port</code> or <code>source-port</code> values.
RPC portmap	rpc-portmap	Requires the protocol statement to have the value <code>udp</code> or <code>tcp</code> . Requires a <code>destination-port</code> value.
RTSP	rtsp	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
Shell	shell	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.
SNMP	snmp	Requires the protocol statement to have the value <code>udp</code> or to be unspecified. Requires a <code>destination-port</code> value.
SQLNet	sqlnet	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> or <code>source-port</code> value.
TFTP	tftp	Requires the protocol statement to have the value <code>udp</code> or to be unspecified. Requires a <code>destination-port</code> value.
Trace route	traceroute	Requires the protocol statement to have the value <code>udp</code> or to be unspecified. Requires a <code>destination-port</code> value.
WinFrame	winframe	Requires the protocol statement to have the value <code>tcp</code> or to be unspecified. Requires a <code>destination-port</code> value.

Configure the Network Protocol

The protocol statement allows you to specify which of the supported network protocols to match in an application definition. To configure, include the protocol statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
  protocol type;
```

You specify the protocol type as a numeric value; for the more commonly used protocols, text names are also supported in the CLI. Table 4 shows the list of the supported protocols:

Table 4: Network Protocols Supported by Services Interfaces

Network Protocol Type	CLI Value	Comments
IPSec AH	ah	
EGP	egp	
IPSec ESP	esp	
GRE	gre	
ICMP	icmp	Requires an application-protocol value of icmp.
IGMP	igmp	
IP in IP	ipip	
IPv6 in IP	ipv6	
OSPF	ospf	
PIM	pim	
RSVP	rsvp	
TCP	tcp	Requires a destination-port or source-port value unless you specify application-protocol rcp or dce-rcp.
UDP	udp	Requires a destination-port or source-port value unless you specify application-protocol rcp or dce-rcp.
VRRP	vrrp	

For a complete list of possible numeric values, see RFC 1700, *Assigned Number s* (for the Internet Protocol Suite).

Configure the ICMP Code and Type

The ICMP code and type provide additional specification, in conjunction with the network protocol, for packet matching in an application definition. To configure, include the icmp-code and icmp-type statements at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
  icmp-code value;
  icmp-type value;
```

You can include only one ICMP code and type value. The application-protocol statement must have the value icmp. Table 5 shows the list of supported ICMP values:

Table 5: ICMP Codes and Types Supported by Services Interfaces

CLI Statement	Description
icmp-code	<p>This value or keyword provides more specific information than icmp-type. Because the value's meaning depends upon the associated icmp-type value, you must specify icmp-type along with icmp-code. For more information, see the <i>JUNOS Internet Software Policy Framework Configuration Guide</i>.</p> <p>In place of the numeric value, you can specify one of the following text synonyms (the field values are also listed). The keywords are grouped by the ICMP type with which they are associated:</p> <p>parameter-problem: ip-header-bad (0), required-option-missing (1)</p> <p>redirect: redirect-for-host (1), redirect-for-network (0), redirect-for-tos-and-host (3), redirect-for-tos-and-net (2)</p> <p>time-exceeded: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0)</p> <p>unreachable: communication-prohibited-by-filtering (13), destination-host-prohibited (10), destination-host-unknown (7), destination-network-prohibited (9), destination-network-unknown (6), fragmentation-needed (4), host-precedence-violation (14), host-unreachable (1), host-unreachable-for-TOS (12), network-unreachable (0), network-unreachable-for-TOS (11), port-unreachable (3), precedence-cutoff-in-effect (15), protocol-unreachable (2), source-host-isolated (8), source-route-failed (5)</p>
icmp-type	<p>Normally, you specify this match in conjunction with the protocol match statement to determine which protocol is being used on the port. For more information, see the <i>JUNOS Internet Software Policy Framework Configuration Guide</i>.</p> <p>In place of the numeric value, you can specify one of the following text synonyms (the field values are also listed): echo-reply (0), echo-request (8), info-reply (16), info-request (15), mask-request (17), mask-reply (18), parameter-problem (12), redirect (5), router-advertisement (9), router-solicit (10), source-quench (4), time-exceeded (11), timestamp (13), timestamp-reply (14), or unreachable (3).</p>



NOTE: If you configure an interface with an input firewall filter that includes a reject action and with a service set that includes stateful firewall rules, the router executes the input firewall filter before the stateful firewall rules are run on the packet. As a result, when the Packet Forwarding Engine sends an ICMP error message out through the interface, the stateful firewall rules might drop the packet because it was not seen in the input direction.

Possible workarounds are to include a forwarding-table filter to perform the reject action, because this type of filter is executed after the stateful firewall in the input direction, or to include an output service filter to prevent the locally generated ICMP packets from going to the stateful firewall service.

Configure Source and Destination Ports

The TCP or UDP source and destination port provide additional specification, in conjunction with the network protocol, for packet matching in an application definition. To configure, include the destination-port and source-port statements at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
destination-port value;
source-port value;
```

You must define one source or destination port. Normally, you specify this match in conjunction with the protocol match statement to determine which protocol is being used on the port; for constraints, see Table 3 on page 41.

You can specify either a numeric value or one of the text synonyms listed in Table 6:

Table 6: Port Names Supported by Services Interfaces

Port Name	Corresponding Port Number
afs	1483
bgp	179
biff	512
bootpc	68
bootps	67
cmd	514
cvspserver	2401
dhcp	67
domain	53
eklogin	2105
ekshell	2106
exec	512
finger	79
ftp	21

Port Name	Corresponding Port Number
ftp-data	20
http	80
https	443
ident	113
imap	143
kerberos-sec	88
klogin	543
kpasswd	761
krb-prop	754
krbupdate	760
kshell	544
ldap	389
login	513
mobileip-agent	434
mobileip-mn	435
msdp	639
netbios-dgm	138
netbios-ns	137
netbios-ssn	139
nfsd	2049
nntp	119
ntalk	518
ntp	123
pop3	110
pptp	1723
printer	515
radacct	1813
radius	1812
rip	520
rkinit	2108
smtp	25
snmp	161
snmptrap	162
snpp	444
socks	1080
ssh	22
sunrpc	111
syslog	514
tacacs-ds	65
talk	517

Port Name	Corresponding Port Number
telnet	23
tftp	69
timed	525
who	513
xdmcp	177
zephyr-clt	2103
zephyr-hm	2104

For more information on matching criteria, see the *JUNOS Internet Software Policy Framework Configuration Guide*.

Configure the Inactivity Timeout Period

You can specify a timeout period for application inactivity. If the software has not detected any activity during the duration, the flow becomes invalid when the timer expires. To configure, include the `inactivity-timeout` statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
inactivity-timeout seconds;
```

The default value is 30 seconds. The value you configure for an application overrides any global value configured at the [edit interfaces *interface-name* service-options] hierarchy level; for more information, see “Configure Default Timeout Settings” on page 214.

Configure an SNMP Command

You can specify a SNMP command setting for packet matching. To configure, include the `snmp-command` statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
snmp-command value;
```

The supported values are `get`, `get-next`, `set`, and `trap`. You can configure one only value for matching. The `application-protocol` statement must have the value `snmp`.

Configure an RPC Program Number

You can specify an RPC program number for packet matching. To configure, include the `rpc-program-number` statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
rpc-program-number number;
```

The range of values used for DCE or RPC is 100,000 through 400,000. The `application-protocol` statement must have the value `rpc`.

Configure the TTL Threshold

You can specify a trace route time-to-live (TTL) threshold value, which controls the acceptable level of network penetration for trace routing. To configure, include the `ttl-threshold` statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
ttl-threshold value;
```

The `application-protocol` statement must have the value `traceroute`.

Configure a Universal Unique Identifier

You can specify a Universal Unique Identifier (UUID) for DCE RPC objects. To configure, include the `uuid` statement at the [edit applications application *application-name*] hierarchy level:

```
[edit applications application application-name]
uuid hex-value;
```

The `uuid` value is in hexadecimal notation. The `application-protocol` statement must have the value `dce-rpc`. For more information on UUID numbers, see <http://www.opengroup.org/onlinepubs/9629399/apdx.htm>.

Configure Application Sets

You can group the applications you have defined into a named object by including the `application-set` statement at the [edit applications] hierarchy level:

```
[edit applications]
application-set application-set-name {
  application application1;
  application application2;
}
```

For an example of a typical application set, see “Examples: Configure Applications” on page 47.

Examples: Configure Applications

The following example shows an application protocol definition describing a special FTP application running on port 78:

```
[edit applications]
application my-ftp-app {
  application-protocol ftp;
  protocol tcp;
  destination-port 78;
  timeout 100; # inactivity timeout for ftp service
}
```

The following example shows a special ICMP protocol (application-protocol icmp) of type 8 (ICMP echo):

```
[edit applications]
application icmp-app {
  application-protocol icmp;
  protocol icmp;
  icmp-type icmp-echo;
}
```

The following example shows a possible application set:

```
[edit applications]
application-set basic {
  http;
  ftp;
  telnet;
  nfs;
  icmp;
}
```

The software includes a predefined set of well-known application protocols. The set includes applications for which the TCP and UDP destination ports are already recognized by stateless firewall filters.