JUNIPER NETWORKS | Engineering Simplicity

Junos® OS

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JUNOS

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YEAR 2000 NOTICE

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

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Two-Rate Three-Color Policer □□ | 2020

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- QFX3500 □□□□□ □□ □□□□ □□□ □□□ □ □□ □□□□ □□□ □ □□□□ | 2111
- QFX3500 □□□□□ □□□ □□ □□□□ □□□ □□□ □ □□ □□□□ □□□ □ □□□□ | 2112
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per-logical-interface-firewall | 2120

gtp-□□ | 2123

GTP-□□□ | 2125

Junos CLI □□ □□ | 2126

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Junos® ?? ??(Junos OS)? ??? ?? ? ??? ??? ??? ? ?? Junos OS ?? ??? *??? ??????* ?????.

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- ?? BGP ?? ?? ?? ?? ???? ?????? ????.
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- CoS(*Class of Service)*? ??????? ????.

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- ??? ?????? ??? ??? ?, ??? ????? ??? ??? ?? ??? ?? ??????. ??? ??? ? ????? ??????. *???/???* ????? ?? ??? ? ??? ??????? ??? ??? ?? ??????. ? ??? ??? ????? ?????, ?? ??? ?????? ?? ????? ??? ??????. ??? ??? ??? ? ? ??? ??? ??? ? ?????.

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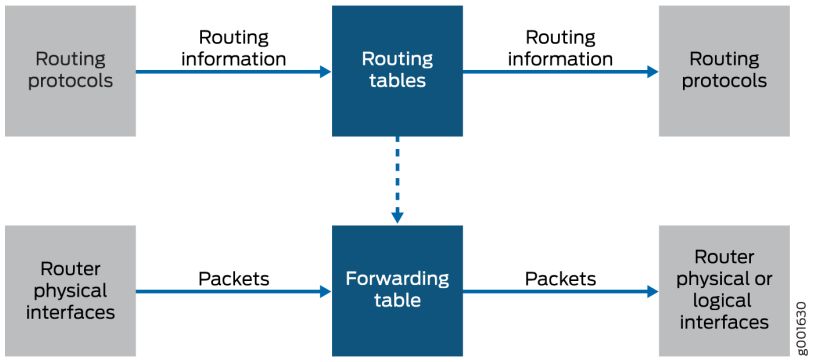

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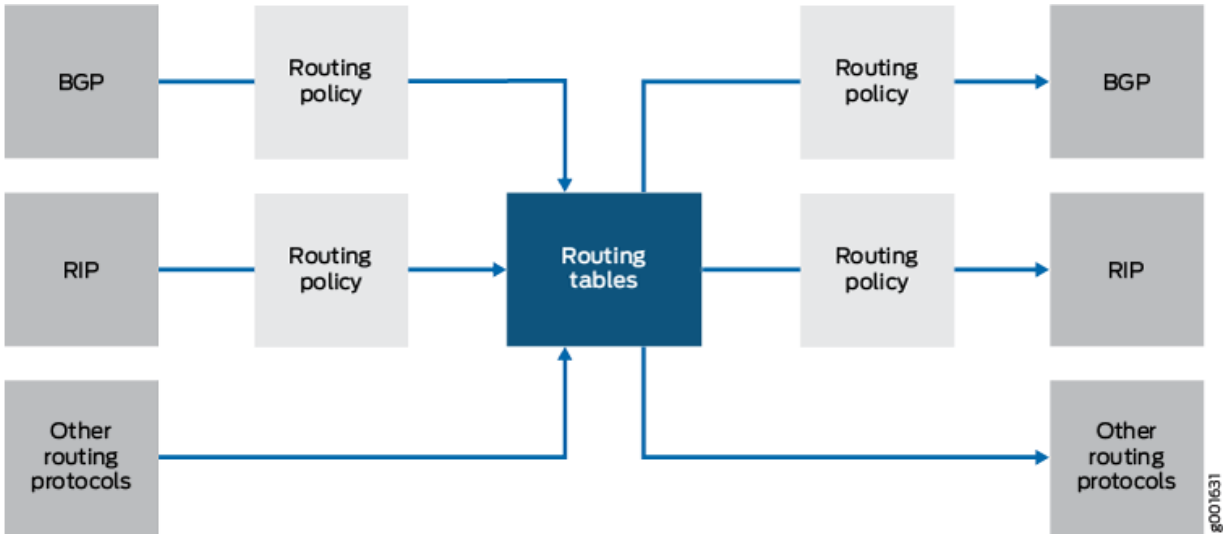

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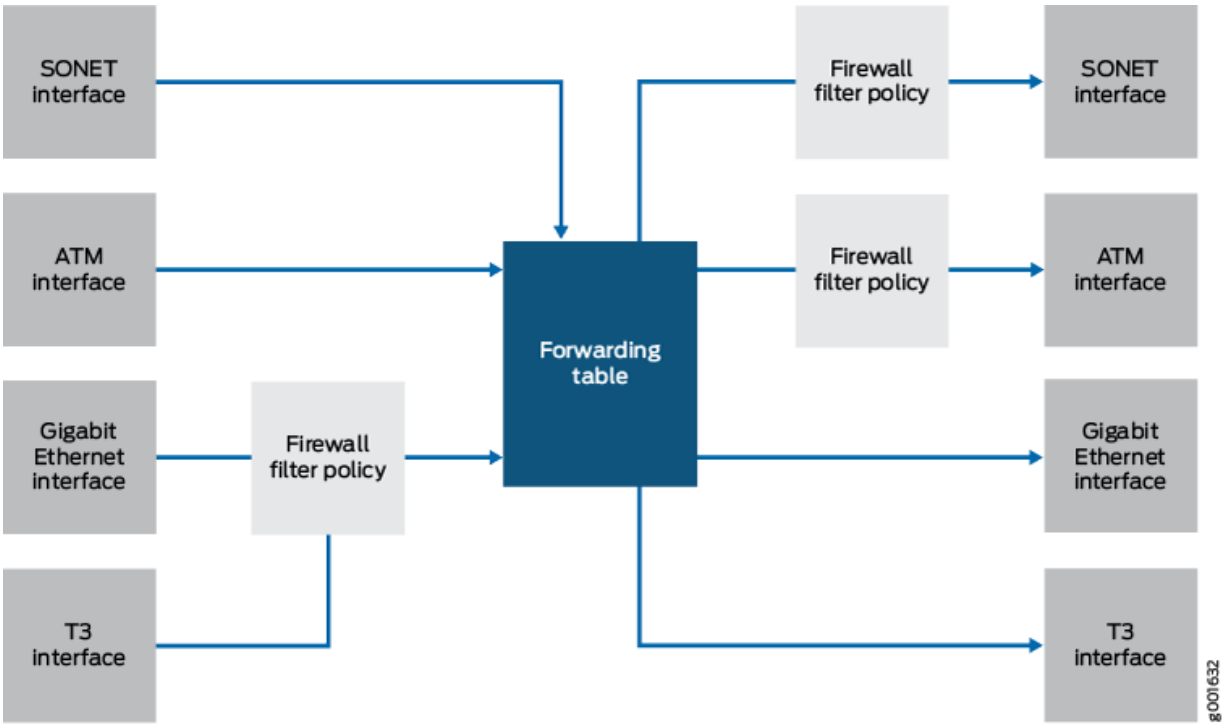
SONET interface
ATM interface
Gigabit Ethernet interface
T3 interface
Firewall filter policy
Forwarding table
Firewall filter policy
Firewall filter policy
SONET interface
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T3 interface
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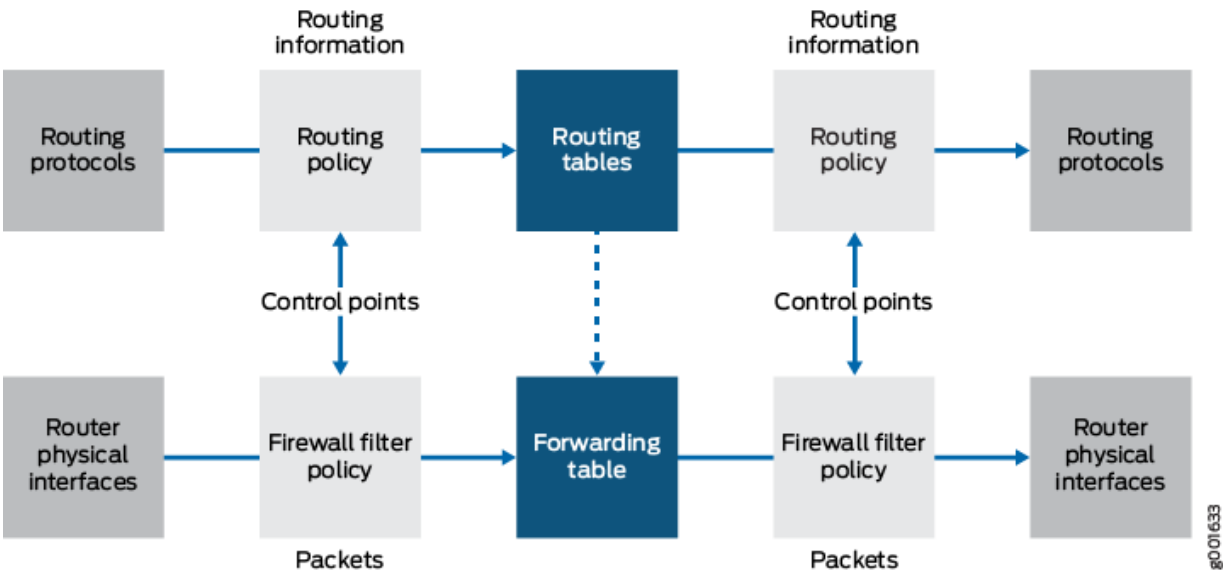

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- *??(Actions)* - ?? ??? ????? ??? ???? ?? ??? ??? ??? ? ?????.
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□□ □□	□□□ □□□□ □□ 0□ □□□ □□□ □□□□□. □□□ □□□, □□ □□ □□□ □□ □□□ □□□ □ □□□□. □ □□ □□□ □□□ □□□ □□ □□ □□□ □□□ □□ □□□□. • AS(Autonomous System) □□ □□□ - AS □□□ □ □□ □□□□ □□□□□. • □□□□ - □□ □□□ □□□□ □□ □□□□□. • □□□ □□ - □□□ □□□ □□□□□. • □□ □□ - □□ □□□ □□□□□. • □□□□ - □□ □□□ □□□□ □□□□□ □□□□ □□□ □□□□□.	□□□ □□□□ □□ 0□ □□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□□ □□□. □□□ □□ □□□ □□□□□□. • □□ □ □□□□ □□□ □□ □□ □□□□. • IP □□ □ □□ □□□□ □□ □□□ □. • Bit-field values(□□ □□ □) - IP □□, TCP(Transmission Control Protocol) □□□ □ IP □□□ □□□ □□ □□□ □□ □□□ □□□□□□ □□□□□. Boolean □□ □□□□ □□□□ □□□ □□□ □ □□□□.

□ 2: □□□ □□□ □□□ □□□ □□ □□□ *(Continued)*

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Metro Ethernet Forum(MEF) □□□ □□□(CE) 2.0 □□ □□□□ UNI(User-to-Network Interface)□□□ □□□ □□□□ □□□ □□ □□□ □□ □□□ □□□□. MEF CE 2.0 □□ □□□ □□ □□□ □□□□ UNI □□ □□ □□ □□□□ 2%□ □□□ □□□□□. □, □□□□ □□□ □□□ □ □□□□ UNI □□□□□□ □□□ □□□ □□□□ □□□ □□□□□ □□□□(□: S-VLAN) □□□ □□□ □ □□ □□ □□ □□□□□ □□□□ □□□.

□□□ □□□□ policer-overhead □ □□ MEF CE 2.0□ □□□ □□ □□□ □□□□ □□ IFL □□ □□ □□□□ □□ □□□ □□□□□. □□□ policer-overhead -16□□□□□ +16□□□ □□□□ □□ IFF(Logical Interface Family) □□ □□□□ □□□□ □□□ IFL □□ □□□□ □□□ 1/□□□ 2(L1/L2) □□ □□□ □□□□ □□ □□□□ □□□□□.

policer-overhead□ □□□□□ □□□ □□□□□.

1. □□ □□□ [edit interfaces] □□ □□□□ □□ □□ □□ □□□□ □□□ □□□□□ □□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@host# edit interfaces interface name
```

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```
[edit interfaces interface name]
user@host# edit xe-0/1/6
```

2. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces unit]
[edit interfaces interface name unit unit-number]
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces unit]
user@host# edit xe-0/1/6 unit 0
```

3. [illegible] [illegible] [illegible] policer-overhead[illegible] [illegible].

```
[edit interfaces interface name unit unit-number ]
user@host# set policer-overhead ingress value in bytes (-16..+16 bytes)
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit xe-0/1/6 unit 0]
user@host# set policer-overhead ingress 10;
```

4. [illegible] [illegible] [illegible] policer-overhead [illegible] [illegible].

```
user@host# set policer-overhead egress value in bytes (-16..+16 bytes)
```

```
[edit xe-0/1/6 unit 0]
user@host# set policer-overhead egress 10;
```

5. [illegible] [illegible].

```
[edit interfaces]
user@host# show interfaces xe-0/1/6
xe-0/1/6 {
        unit 0 {
            policer-overhead {
                ingress 10;
                egress 10;
            }
```

```
        }
    }
user@host>show interfaces xe-0/1/6
Physical interface: xe-0/1/6, Enabled, Physical link is Up
  Interface index: 161, SNMP ifIndex: 544
  Link-level type: Ethernet, MTU: 1514, MRU: 1522, LAN-PHY mode, Speed: 10Gbps, BPDU Error:
None, MAC-REWRITE Error: None,
  Loopback: None, Source filtering: Disabled, Flow control: Enabled
  Pad to minimum frame size: Disabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Current address: 00:23:9c:fc:a8:58, Hardware address: 00:23:9c:fc:a8:58
  Last flapped   : 2015-09-13 20:12:36 PDT (14:21:57 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  PCS statistics                      Seconds
    Bit errors                             0
    Errored blocks                         0
  Link Degrade :
    Link Monitoring                  :  Disable
  Interface transmit statistics: Disabled

  Logical interface xe-0/1/6.0 (Index 339) (SNMP ifIndex 571)
    Flags: Up SNMP-Traps 0x4004000 Encapsulation: ENET2
    Policer overhead :
     Ingress policer overhead  :                    10 bytes
     Egress policer overhead   :                    10 bytes
    Input packets : 0
    Output packets: 0
    Protocol multiservice, MTU: Unlimited
      Flags: Is-Primary



user@host> show interfaces xe-0/1/6.0
  Logical interface xe-0/1/6.0 (Index 339) (SNMP ifIndex 571)
    Flags: Up SNMP-Traps 0x4004000 Encapsulation: ENET2
    Policer overhead :
```

```
 Ingress policer overhead  :                    10 bytes
 Egress policer overhead   :                    10 bytes
Input packets : 0
Output packets: 0
Protocol multiservice, MTU: Unlimited
  Flags: Is-Primary
```

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policer-overhead-adjustment

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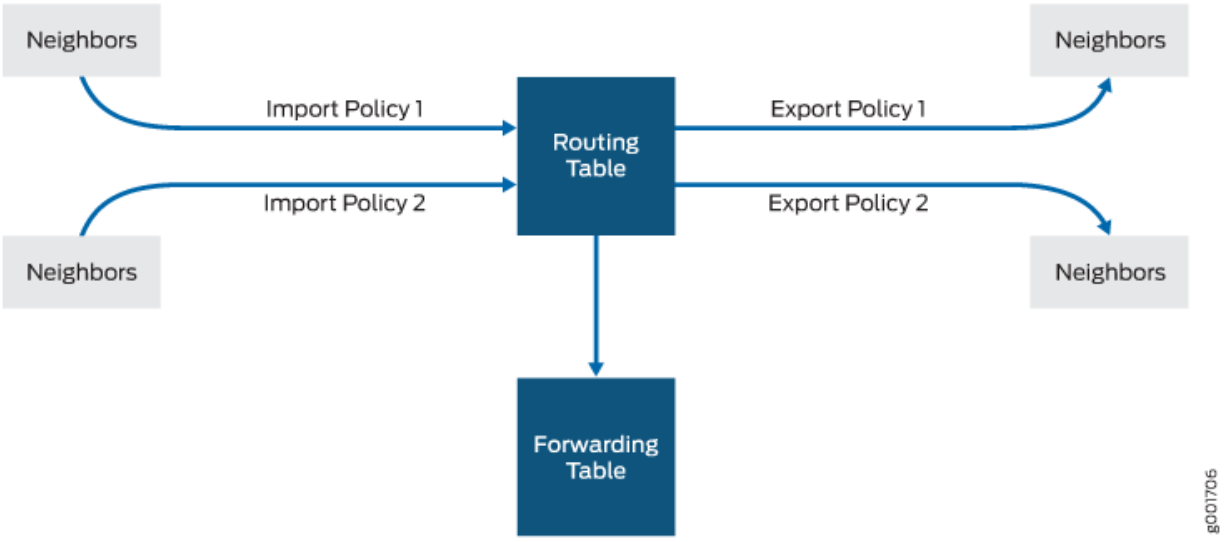
Neighbors
Neighbors
Import Policy 1
Routing Table
Export Policy 1
Import Policy 2
Export Policy 2
Neighbors
Neighbors
Forwarding Table
g001706

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Junos OS ??? 9.5 ?????? ?? ?? ?????????? ????? ?? ???? ???? ???? ?? ?? ????????? ???? ?? ? ?? ???? ?? ???? ?? ? ? ?????. ???? ???? ???? ?? ? ?? ???? ????? ????? ???? ? ????, ???? ?? ?? ????? ????? ???? ? ?????. BGP? ?? ????????? ? ?? ???? ????? ???? ???? ???? ? ?? ???? ????????. ?? ????????? ????? ?? ???? ???? ?? ????? ????? ???? ???? ?? ????? ????? ?? ???? ????? ?? ???? ???? ???? ???? ? ?????. Junos OS? ?? ????????? ?? ?? ???? ????? ?? ???? ? ???? ???? ? ? ????? ?? ?? ?? ?? ???? ?????? ????? ???.

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BGP	□	□	□□: □□□, □□, □□ □□: □□□, □□, □□
DVMRP	□	□	□□□
IS-IS	□	□	□□: □□□
LDP	□	□	□□□
MPLS	□□□	□□□	–
□□ □□ □□(OSPF)	□	□	□□: □□□ □□: □□ □□□
PIM □□□ □□	□	□	□□□
PIM Sparse □□	□	□	□□□
□□ □□□□(Pseudoprotocol) - □□□ □□□□ □□□□ □ □□□ □□: • □□ □□ • □□□ □□	□	□□□	□□: □□□
RIP □ RIPng	□	□	□□: □□□, □□ □□: group

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BGP? ??, ??? ?? ??? ??? ? ????:

- BGP ??? import ? export ?—[edit protocols bgp] ?? ??? ??? ??? ??????(??? ?????? ??, [edit routing-instances *routing-instance-name* protocols bgp] ?? ??? ??? ??? ??).
- ?? import ? export ?—[edit protocols bgp group *group-name*]·?? ??? ??? ??? ??????(??? ?????? ??, [edit routing-instances *routing-instance-name* protocols bgp group *group-name*] ?? ??? ??? ??? ??).
- ?? import ? export ?—[edit protocols bgp group *group-name* neighbor *address*] ?? ??? ??? ??? ??????(??? ??? ?? ??, [edit routing-instances *routing-instance-name* protocols bgp group *group-name* neighbor *address*] ?? ??? ??? ??? ??).
- ??? import ? export ?—[edit protocols bgp family *nlri*] ?? ??? ??? ??? ??????(??? ?????? ??, [edit routing-instances *routing-instance-name* protocols bgp family *nlri*] ?? ??? ??? ??? ??).

peer-level·import □□ export □□ □□ import □□ export □□□ □□□□□. group-level import □□ export □□ □□□ BGP import □□ export □□□ □□□□□.

□ □□□□ send-direct□□ □□□ □□□ □□□ □□□□, send-192.168.0.1□□ □ □□ □□□ □□ □□□ □□□□, send-192.168.20.1□□ □ □□ □ □□ neighbor □□□□ □□□□□.

```
user@host# show protocols
bgp {
    local-address 172.16.1.1;
    export send-direct;
    group internal-peers {
        type internal;
        export send-192.168.0.1;
        neighbor 172.16.2.2 {
            export send-192.168.20.1;
        }
        neighbor 172.16.3.3;
    }
    group other-group {
        type internal;
        neighbor 172.16.4.4;
    }
}
```

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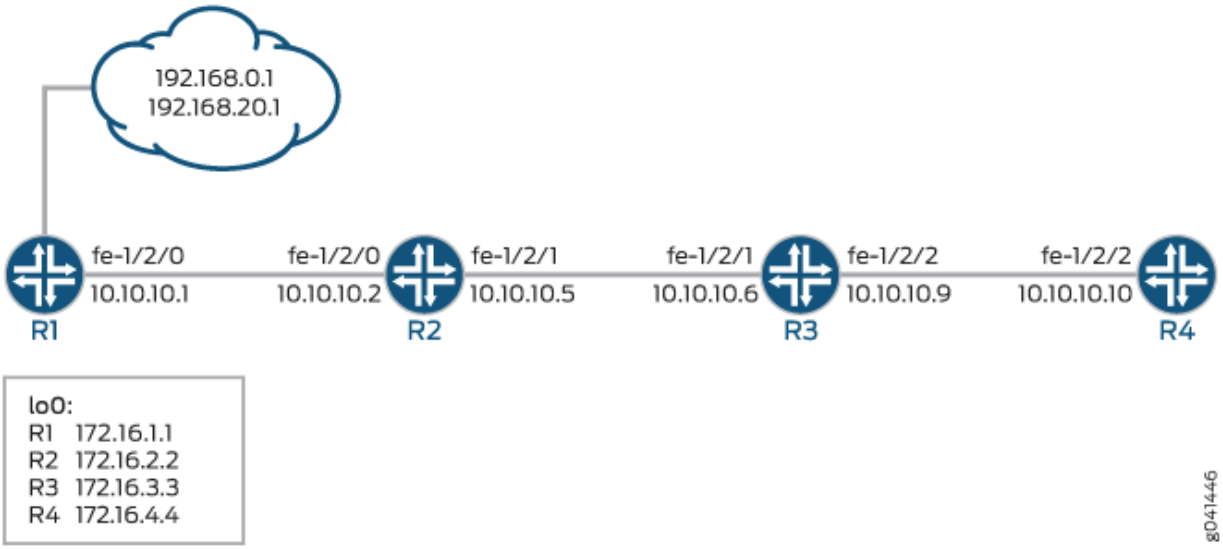
neighbor 172.16.2.2□ send-192.168.20.1 □□□ □□□ □□□□. □ □□□□ □□ □□ neighbor 172.16.3.3□ send-192.168.0.1 □□□ □□□ □□□□. □□, □□ other-group□ neighbor 172.16.4.4□ □□ □□ □□ □□ □□□ □□□□ send-direct □□□ □□□□□.

neighbor 172.16.2.2□ □ □□ □□□ □□□ □□□□ □□ □□, □□ □ □□ □□□ □□□□ □□□ neighbor □□ □□□ □□□□ □□□□□ □□ □ □ □ □□□ □□ □□□□ neighbor 172.16.2.2□ □□□ □ □□□□.

□□□□

□□ 6 □□□ 24□ □□ □□□□□ □□□□□.

□□ 6: BGP□ □□□ □□ □□



"CLI □□ □□" □□□ 24□(□) □□ 6 □□□ 24 □ □□ □□□□□ □□□ □□□□□.

□□ "No Link Title" □□□ 27□ □□□□ R1□ □□□ □□□□□.

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CLI □□ □□

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□□□□ R1

```
set interfaces fe-1/2/0 unit 0 description to-R2
set interfaces fe-1/2/0 unit 0 family inet address 10.10.10.1/30
set interfaces lo0 unit 0 family inet address 172.16.1.1/32
set protocols bgp local-address 172.16.1.1
```

```
set protocols bgp export send-direct
set protocols bgp group internal-peers type internal
set protocols bgp group internal-peers export send-static-192.168.0
set protocols bgp group internal-peers neighbor 172.16.2.2 export send-static-192.168.20
set protocols bgp group internal-peers neighbor 172.16.3.3
set protocols bgp group other-group type internal
set protocols bgp group other-group neighbor 172.16.4.4
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set policy-options policy-statement send-static-192.168.0 term 1 from protocol static
set policy-options policy-statement send-static-192.168.0 term 1 from route-filter
192.168.0.0/24 orlonger
set policy-options policy-statement send-static-192.168.0 term 1 then accept
set policy-options policy-statement send-static-192.168.20 term 1 from protocol static
set policy-options policy-statement send-static-192.168.20 term 1 from route-filter
192.168.20.0/24 orlonger
set policy-options policy-statement send-static-192.168.20 term 1 then accept
set routing-options static route 192.168.0.1/32 discard
set routing-options static route 192.168.20.1/32 discard
set routing-options router-id 172.16.1.1
set routing-options autonomous-system 17
```

???? R2

```
set interfaces fe-1/2/0 unit 0 description to-R1
set interfaces fe-1/2/0 unit 0 family inet address 10.10.10.2/30
set interfaces fe-1/2/1 unit 0 description to-R3
set interfaces fe-1/2/1 unit 0 family inet address 10.10.10.5/30
set interfaces lo0 unit 0 family inet address 172.16.2.2/32
set protocols bgp group internal-peers type internal
set protocols bgp group internal-peers local-address 172.16.2.2
set protocols bgp group internal-peers neighbor 172.16.3.3
set protocols bgp group internal-peers neighbor 172.16.1.1
set protocols bgp group internal-peers neighbor 172.16.4.4
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set routing-options router-id 172.16.2.2
set routing-options autonomous-system 17
```

□□□□ R3

```
set interfaces fe-1/2/1 unit 0 description to-R2
set interfaces fe-1/2/1 unit 0 family inet address 10.10.10.6/30
set interfaces fe-1/2/2 unit 0 description to-R4
set interfaces fe-1/2/2 unit 0 family inet address 10.10.10.9/30
set interfaces lo0 unit 0 family inet address 172.16.3.3/32
set protocols bgp group internal-peers type internal
set protocols bgp group internal-peers local-address 172.16.3.3
set protocols bgp group internal-peers neighbor 172.16.2.2
set protocols bgp group internal-peers neighbor 172.16.1.1
set protocols bgp group internal-peers neighbor 172.16.4.4
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set routing-options router-id 172.16.3.3
set routing-options autonomous-system 17
```

□□□□ R4

```
set interfaces fe-1/2/2 unit 0 description to-R3
set interfaces fe-1/2/2 unit 0 family inet address 10.10.10.10/30
set interfaces lo0 unit 0 family inet address 172.16.4.4/32
set protocols bgp group internal-peers type internal
set protocols bgp group internal-peers local-address 172.16.4.4
set protocols bgp group internal-peers neighbor 172.16.2.2
set protocols bgp group internal-peers neighbor 172.16.1.1
set protocols bgp group internal-peers neighbor 172.16.3.3
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set routing-options router-id 172.16.4.4
set routing-options autonomous-system 17
```

□□

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IS-IS □□ □□ □□ □□:

1. [illegible] [illegible] [illegible].

```
[edit interfaces]
user@R1# set fe-1/2/0 unit 0 description to-R2
user@R1# set fe-1/2/0 unit 0 family inet address 10.10.10.1/30
user@R1# set lo0 unit 0 family inet address 172.16.1.1/32
```

2. [illegible] OSPF [illegible] [illegible] [illegible] [illegible] [illegible](IGP)[illegible] [illegible].

```
[edit protocols OSPF area 0.0.0.0]
user@R1# set interface lo0.0 passive
user@R1# set interface fe-1/2/0.0
```

3. [illegible] [illegible] [illegible].

```
[edit routing-options]
user@R1# set static route 192.168.0.1/32 discard
user@R1# set static route 192.168.20.1/32 discard
```

4. [illegible] [illegible] [illegible].

```
[edit protocols policy-options]
user@R1# set policy-statement send-direct term 1 from protocol direct
user@R1# set policy-statement send-direct term 1 then accept
user@R1# set policy-statement send-static-192.168.0 term 1 from protocol static
user@R1# set policy-statement send-static-192.168.0 term 1 from route-filter 192.168.0.0/24
orlonger
user@R1# set policy-statement send-static-192.168.0 term 1 then accept
user@R1# set policy-statement send-static-192.168.20 term 1 from protocol static
user@R1# set policy-statement send-static-192.168.20 term 1 from route-filter 192.168.20.0/24
orlonger
user@R1# set policy-statement send-static-192.168.20 term 1 then accept
```

5. BGP[illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols bgp]
user@R1# set local-address 172.16.1.1
user@R1# set protocols bgp export send-direct
```

```
user@R1# set group internal-peers type internal
user@R1# set group internal-peers export send-static-192.168.0
user@R1# set group internal-peers neighbor 172.16.2.2 export send-static-192.168.20
user@R1# set group internal-peers neighbor 172.16.3.3
user@R1# set group other-group type internal
user@R1# set group other-group neighbor 172.16.4.4
```

6. □□□ ID □ AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R1# set router-id 172.16.1.1
user@R1# set autonomous-system 17
```

7. □□□□ □□□ □□□□ □□ □□□ □□□□□.

```
[edit]
user@R1# commit
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R1# show interfaces
fe-1/2/0 {
    unit 0 {
        description to-R2;
        family inet {
            address 10.10.10.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 172.16.1.1/32;
        }
```

```
    }
}
```

```
user@R1# show protocols
bgp {
    local-address 172.16.1.1;
    export send-direct;
    group internal-peers {
        type internal;
        export send-static-192.168.0;
        neighbor 172.16.2.2 {
            export send-static-192.168.20;
        }
        neighbor 172.16.3.3;
    }
    group other-group {
        type internal;
        neighbor 172.16.4.4;
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.0 {
            passive;
        }
        interface fe-1/2/0.0;
    }
}
```

```
user@R1# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
policy-statement send-static-192.168.0 {
    term 1 {
        from {
            protocol static;
```

```
            route-filter 192.168.0.0/24 orlonger;
        }
        then accept;
    }
}
policy-statement send-static-192.168.20 {
    term 1 {
        from {
            protocol static;
            route-filter 192.168.20.0/24 orlonger;
        }
        then accept;
    }
}
```

```
user@R1# show routing-options
static {
    route 192.168.0.1/32 discard;
    route 192.168.20.1/32 discard;
}
router-id 172.16.1.1;
autonomous-system 17;
```

??

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??? ???? ???? ??? ??????.

BGP ?? ?? ??

??

??? ??? ??? ?? BGP ???? ??? ???? ????? ??????.

??

```
user@R1> show route protocol direct

inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.1.1/32         *[Direct/0] 1d 22:19:47
                       > via lo0.0
10.10.10.0/30      *[Direct/0] 1d 22:19:47
                       > via fe-1/2/0.0
```

```
user@R1> show route protocol static

inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.0.1/32     *[Static/5] 02:20:03
                      Discard
192.168.20.1/32    *[Static/5] 02:20:03
                      Discard
```

```
user@R2> show route protocol bgp
inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.20.1/32    *[BGP/170] 02:02:40, localpref 100, from 172.16.1.1
                      AS path: I, validation-state: unverified
                       > to 10.10.10.1 via fe-1/2/0.0
```

```
user@R3> show route protocol bgp
inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.0.1/32     *[BGP/170] 02:02:51, localpref 100, from 172.16.1.1
```

```
                      AS path: I, validation-state: unverified
                    > to 10.10.10.5 via fe-1/2/1.0
```

```
user@R4> show route protocol bgp
inet.0: 9 destinations, 11 routes (9 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.1.1/32          [BGP/170] 1d 20:38:54, localpref 100, from 172.16.1.1
                      AS path: I, validation-state: unverified
                    > to 10.10.10.9 via fe-1/2/2.0
10.10.10.0/30       [BGP/170] 1d 20:38:54, localpref 100, from 172.16.1.1
                      AS path: I, validation-state: unverified
                    > to 10.10.10.9 via fe-1/2/2.0
```

??

???? R1?? show route protocol direct ??? ? ?? ?? ?? (172.16.1.1/32 ? 10.10.10.0/30)? ??????. show route protocol static ??? ? ?? ?? ?? (192.168.0.1/32 ? 192.168.20.1/32)? ??????.

???? R2?? show route protocol bgp ??? ???? R2? BGP? ?? ??? ??? ??? 192.168.20.1/32 ???? ??????.

???? R3?? show route protocol bgp ??? ???? R3? BGP? ?? ??? ??? ??? 192.168.0.1/32 ???? ??????.

???? R4?? show route protocol bgp ??? ???? R4? BGP? ?? ??? ??? ??? 172.16.1.1/32 ? 10.10.10.0/30 ?? ?? ??????.

BGP ?? ?? ??

??

???? R1?? ??? BGP ??? ???? BGP ???? ??? ???? ????? ??????.

??

```
user@R2> show route receive-protocol bgp 172.16.1.1

inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
```

```
  Prefix                  Nexthop              MED     Lclpref    AS path
* 192.168.20.1/32         172.16.1.1                      100        I
```

```
user@R3> show route receive-protocol bgp 172.16.1.1

inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 192.168.0.1/32          172.16.1.1                      100        I
```

```
user@R4> show route receive-protocol bgp 172.16.1.1

inet.0: 9 destinations, 11 routes (9 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  172.16.1.1/32              172.16.1.1                      100        I
  10.10.10.0/30           172.16.1.1                      100        I
```

??

???? R2?? `route receive-protocol bgp 172.16.1.1` ??? ???? R2? ???? R1?? ? ??? BGP ??? 192.168.20.1/32 ? ??? ?? ??????.

???? R3?? `route receive-protocol bgp 172.16.1.1` ??? ???? R3? ???? R1?? ? ??? BGP ??? 192.168.0.1/32? ??? ?? ??????.

???? R4?? `route receive-protocol bgp 172.16.1.1` ??? ???? R4? ???? R1?? ? ?? BGP ??? 172.16.1.1/32 ? 10.10.10.0/30? ??? ?? ??????.

??????, BGP?? ?? CLI ??? ?? ??? ?????, ?? ????? ????????? ????? ?? ? ????? ?? ????????? ??????. ? ??? ????? ? ?? ????? ???? ?? ? ?? ?? ??, neighbor ?? ???? ???? ?? ?? ?? ???? ?????? ?? ?? ?? ?? ???? ????? ?????? ?????.

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?: PTX ??? ?? ?? ?????? ?? BGP ??? ??? ?? Junos OS ??? ?????? ??? ?????. ?? ?? ??? (PTX ???)? ?? BGP ??? ?? ??????????????.

? 4: ?????? ?? ?? ????? ? ????? ??

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BGP	??? ?? ????? ??? ??? ?? BGP IPv4 ??? ? ??? inet.0 ??? ???? ??????. ??? ?? ???? ??? ?? ?? BGP IPv6 ??? ???? inet6.0 ? ?? ???? ??????.	?? ?????? ????? ?? ? ? IBGP ???? ?? IBGP ??????? ??? ??? ?? ???? ?? ???? ?????? ??? ????? ?? BGP ????? ?? ?? BGP ??? ?? ??????.
DVMRP	?? DVMRP ??? ???? inet.1 ??? ???? ?? ???.	?? DVMRP ??? ???? ??????.
IGMP	??: ?? ??? ??????(??????? ????? ??? ???? ????). IGMP??? ??? ?????? IGMP? "??? ?"? ????.	
IS-IS	?? IS-IS ??? ???? inet.0 ? inet6.0 ??? ? ??? ??????. ??? ??? ???? ??? ? ?????. import (???? IS-IS)	?? ?? ???????. (? ?????? ????? ????? ?? ?? ? ??? ??? ?????.)

□ 4: □□□□□ □□ □□ □□□□ □ □□□□ □□ ***(Continued)***

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LDP	□□ LDP □□□ □□□□ inet.3 □□□ □□□□ □□□□ □.	□□ □□ □□□□□□.
MPLS	□□ MPLS □□□ □□□□ inet.3 □□□ □□□□ □□□□ □.	□□ MPLS □□□ □□□□ □□□□□.
□□ □□ □□(OSPF)	□□ OSPF □□□ □□□□ inet.0 □□□ □□□□ □□□□ □. (□ □□ □□□ □□□□□□ □□□ □ □□□□.)	□□ □□ □□□□□□. (□ □□□□□ □□□□ □□□□ □□ □□ □ □□□ □□□ □□□□.)
PIM □□□ □□	□□ PIM □□□ □□ □□□ □□□□ inet.1 □□□ □□□□ □□□□□.	□□ PIM □□□ □□ □□□ □□□□□.
PIM Sparse □□	□□ PIM □□□ □□ □□□ □□□□ inet.1 □□□ □□□□ □□□□□.	□□ PIM □□□ □□ □□□ □□□□ □□□□□.

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	□□□□□ □□ □□□ □□ □□□ □□□□ inet.0 □□□ □□ □□ □□□□□.	□□ □□□□□ □□□ □□□□□ □□□ □□□ □□□ □□□□□ □□□ □□□ □ □□□□. □□□ □□□□□ □□□ □□□□□ □□□ □□ □□ □□ □□□ □□□ □ □□□□.

RIP	□□□ □□ □□□□□ □□□ □□ RIP □□□ □□□□ inet.0 □□□ □□□□ □□□□□.	□□ □□ □□□□□□. RIP □□□ □□□□□ RIP□ □□ □□ □□ □□□ □□□□ □□□.
RIPng	□□□ □□ □□□□□ □□□ □□ RIPng □□□ □□□□ inet6.0 □□□ □□□□ □□□□□.	□□ □□ □□□□□□. RIPng □□□ □□□□□ RIPng□ □□ □□□□ □□□ □□□□ □□□.
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OSPF ? IS-IS ???? ??

OSPF? ??, ???? ??? ?? ???? ??????. ?? ??? OSPF AS(Autonomous System) ??? ?? ??????. ?? ??(OSPF?? ??? ??)? ?? OSPF? ?? ?? ???? ??? ??? ? ????. ?? ?? ?????? IS-IS(Intermediate System) ? OSPF? AS(Autonomous System) ?? ??? ?? ??? ??????. AS ?? ?? ???? ???? ??? ?? ?? ????????? ???? ??, ???? ?? ??? ???? ?? ??? ???? ??? ???? ??????. ???? ??? ???? IS-IS ?? OSPF? ???? ??, ?? ??? ?? ?? ???? ??? ?? ? ??? ?? ???? ???? ??? ?? ?? ????????? ?????? ? ????.

IS-IS ? OSPF ?????? ?? ???? ??? ?? ?? ???? ????. ??? ?????? ?????? ??? ??(?????? ???? ????????? ?? ??? ??)? ??? ???? ????. IS-IS(Intermediate System to Intermediate System)? OSPF ?????? ?? ???(flooding)?? ? ??? ???? ?? ??? ??????? ??? ?? ??? ????. ??? ??? ???? ??? ??? ?? ??????? ??? ?? ????. ?????? ?? ??? ?? ??? ??? ?? ??? ? ??? ???? ??? ?? ?? ????.

?? ????

??? 3 VPN? ??, ?? ???? ??? ???? ?? ??? ?? ??? ???? ?? VPN ??? ? ???(VRF) ??? ???? ?? ??? ???? ??? ? ????.

??? 3 VPN?? ?? CE ???? PE ???? ?? VRF ??? ?????? ?? ? ????. PE ?????? ?? VRF ??? ?????? ?? ? ????. ??? ?? ?? ???? ?????? ?? ? ?? PE ???? ?? VRF ??? ???? ??? ???? ? ? ????. ?? ???? PE ???? ??? ? VRF ??? ???? ?? ?? ??? ???? ???. ??? ?? ?? ??? BGP ?? ???? ??? ???? ?? ? ??? ?????? ???? ??? ?? `vrf-export` ? `vrf-import` ???? ??????. ?? ???? ?? ??? ??? ??? ??? ?????? ???.

?? ???? ??? ??? PE ????? ??? ??? VRF ??? ???? ?? ???? ??????. ?? ???? ??? ?? ???? `auto-export` ??? ? ????.

?? ?????? ? VRF? ???? ??? ???? ?? ?? ??? ??? ??? ? ??? ???? ?? ??? ??? ???? ??? ?? ?? PE ???? ????? ?. ?? VRF ???? ? ???? ??? ??? ?? PE ??? ???? ??? ????.

?? ??????? `vrf-export` ??? ??? ??? `then accept` ??? ?? ?? ?? ?????? ?????? ??? ?????? ?? ?? ??? ?? ??? ???? ????.

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? ??? OSPF ?? 0?? 3?? ??? ????? ???? ????. ???? R3?? ??? ??? ?????(ISP)? ?? ?? ???? BGP ??? ???
?.

?? ??? BGP? ???? ?? ? ?? ??? ??? ? ?? ????? `discard` . ISP? BGP? ?? ?? ??? ???? ?? ????? ?? ????? ??
? ? ?? ?? ?? ??? ?????. ?? ???? ?? ?? ?? ????. ?, ??? ?? ???? ??? ???? ??? ??? ???? ? ??? ?? ?? ??? ?
?? ???? ????? ICMP(Internet Control Message Protocol) ?? ?? ???? ???? ????. ?? ?? ???? ?? ??? ????
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???? R3? ?? ??? OSPF? ?????. ???? R3? ?? ??? ??????? ISP? ?? ??? ??? ?? ??? ????? ? ?? ?? ??? ???
??? ?? ??? OSPF? ? ?? ???? ????. ? ??? ??? ?? ?? ???? ???? ?? ?????(null ?? ????????? ?).

? ?? ?? ?????? ?? ??? ???? R3? ??? ??? ?????.

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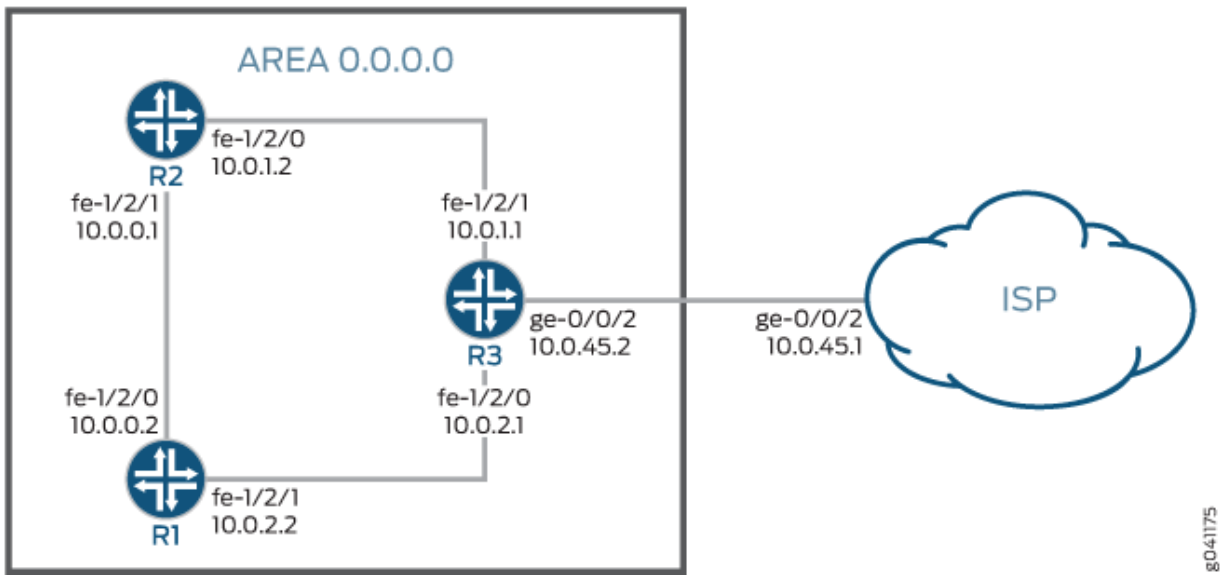
?? 7 ??? 38? ?? ????? ?????.

?? 7: ISP? ?? ??? ?? ??? ?? OSPF



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CLI ?? ??

? ?? ??? ?????, ?? ??? ???? ??? ??? ?? ?? ?? ?? ???????? ????, ???? ??? ???? ? ??? ?? ??? ??? [edit] ? ? ????? ??? CLI? ??? ?? ????.

???? R1

```
set interfaces fe-1/2/0 unit 0 description R1->R3
set interfaces fe-1/2/0 unit 0 family inet address 10.0.1.2/30
set interfaces fe-1/2/1 unit 2 description R1->R2
set interfaces fe-1/2/1 unit 2 family inet address 10.0.0.1/30
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.2
```

□□□□ R2

```
set interfaces fe-1/2/0 unit 1 description R2->R1
set interfaces fe-1/2/0 unit 1 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 4 description R2->R3
set interfaces fe-1/2/1 unit 4 family inet address 10.0.2.2/30
set protocols ospf area 0.0.0.0 interface fe-1/2/0.1
set protocols ospf area 0.0.0.0 interface fe-1/2/1.4
```

□□□□ R3

```
set interfaces fe-1/2/0 unit 3 description R3->R2
set interfaces fe-1/2/0 unit 3 family inet address 10.0.2.1/30
set interfaces fe-1/2/1 unit 5 description R3->R1
set interfaces fe-1/2/1 unit 5 family inet address 10.0.1.1/30
set interfaces ge-0/0/2 unit 0 description R3->ISP
set interfaces ge-0/0/2 unit 0 family inet address 10.0.45.2/30
set protocols bgp group ext type external
set protocols bgp group ext peer-as 64500
set protocols bgp group ext neighbor 10.0.45.1
set protocols ospf export gendefault
set protocols ospf area 0.0.0.0 interface fe-1/2/1.4
set protocols ospf area 0.0.0.0 interface fe-1/2/0.3
set policy-options policy-statement gendefault term upstreamroutes from protocol bgp
set policy-options policy-statement gendefault term upstreamroutes from as-path upstream
set policy-options policy-statement gendefault term upstreamroutes from route-filter 0.0.0.0/0
upto /16
set policy-options policy-statement gendefault term upstreamroutes then next-hop 10.0.45.1
set policy-options policy-statement gendefault term upstreamroutes then accept
set policy-options policy-statement gendefault term end then reject
set policy-options as-path upstream "^64500 "
set routing-options autonomous-system 64501
```

□□□□ ISP

```
set interfaces ge-0/0/2 unit 0 family inet address 10.0.45.1/30
set protocols bgp group ext type external
set protocols bgp group ext export advertise-default
set protocols bgp group ext peer-as 64501
set protocols bgp group ext neighbor 10.0.45.2
set policy-options policy-statement advertise-default term 1 from route-filter 0.0.0.0/0 exact
```

```
set policy-options policy-statement advertise-default term 1 then accept
set routing-options static route 0.0.0.0/0 discard
set routing-options autonomous-system 64500
```

□□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□*□ □□□□□□.

□□□□ R3 □□:

1. □□□□□□ □□□□□.

```
[edit interfaces]
user@R3# set fe-1/2/0 unit 3 description R3->R2
user@R3# set fe-1/2/0 unit 3 family inet address 10.0.2.1/30
user@R3# set fe-1/2/1 unit 5 description R3->R1
user@R3# set fe-1/2/1 unit 5 family inet address 10.0.1.1/30
user@R3# set ge-0/0/2 unit 0 description R3->ISP
user@R3# set ge-0/0/2 unit 0 family inet address 10.0.45.2/30
```

2. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R3# set autonomous-system 64501
```

3. ISP □□□□□ BGP □□□ □□□□□.

```
[edit protocols bgp group ext]
user@R3# set type external
user@R3# set peer-as 64500
user@R3# set neighbor 10.0.45.1
```

4. OSPF□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R3# set interface fe-1/2/1.4
user@R3# set interface fe-1/2/0.3
```

5. □□□ □□ □□

```
[edit policy-options policy-statement gendefault]
user@R3# set term upstreamroutes from protocol bgp
user@R3# set term upstreamroutes from as-path upstream
user@R3# set term upstreamroutes from route-filter 0.0.0.0/0 upto /16
user@R3# set term upstreamroutes then next-hop 10.0.45.1
user@R3# set term upstreamroutes then accept
user@R3# set term end then reject
[edit policy-options]
user@R3# set as-path upstream "^64500 "
```

6. OSPF□ □□□□ □□□ □□□□□.

```
[edit protocols ospf]
user@R3# set export gendefault
```

7. □□□□ □□□ □□□□ □□ □□□ □□□□□.

```
[edit]
user@R3# commit
```

□□

□□□ □□□□ show □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R3# show
interfaces {
    fe-1/2/0 {
        unit 3 {
            description R3->R2;
            family inet {
```

```
                address 10.0.2.1/30;
            }
        }
    }
    fe-1/2/1 {
        unit 5 {
            description R3->R1;
            family inet {
                address 10.0.1.1/30;
            }
        }
    }
    ge-1/2/0 {
        unit 0 {
            description R3->ISP;
            family inet {
                address 10.0.45.2/30;
            }
        }
    }
}
protocols {
    bgp {
        group ext {
            type external;
            peer-as 64500;
            neighbor 10.0.45.1;
        }
    }
    ospf {
        export gendefault;
        area 0.0.0.0 {
            interface fe-1/2/1.4;
            interface fe-1/2/0.3;
        }
    }
}
policy-options {
    policy-statement gendefault {
        term upstreamroutes {
            from {
                protocol bgp;
                as-path upstream;
```

```
                route-filter 0.0.0.0/0 upto /16;
            }
            then {
                next-hop 10.0.45.1;
                accept;
            }
        }
        term end {
            then reject;
        }
    }
    as-path upstream "^64500 ";
}
routing-options {
    autonomous-system 64501;
}
```

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ISP? ?? ??? ?????? ??

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```
user@R3> ping 10.0.45.1
PING 10.0.45.1 (10.0.45.1): 56 data bytes
```

```
64 bytes from 10.0.45.1: icmp_seq=0 ttl=64 time=1.185 ms
64 bytes from 10.0.45.1: icmp_seq=1 ttl=64 time=1.199 ms
64 bytes from 10.0.45.1: icmp_seq=2 ttl=64 time=1.186 ms
```

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BGP ??? ?? ??? ???? R3? ??? ???? ??????? ??????. ?? OSPF ??? ?? ??? ???? R1 ? ???? R2? ??? ???? ? ?????? ??????.

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```
user@R3> show route protocol bgp

inet.0: 9 destinations, 10 routes (9 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 00:00:25, localpref 100
                      AS path: 64500 I
                    > to 10.0.45.1 via ge-0/0/2.6
```

```
user@R1> show route protocol ospf

inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[OSPF/150] 00:03:58, metric 0, tag 0
                    > to 10.0.1.1 via fe-1/2/0.0
10.0.2.0/30        *[OSPF/10] 03:37:45, metric 2
                      to 10.0.1.1 via fe-1/2/0.0
                    > to 10.0.0.2 via fe-1/2/1.2
```

```
172.16.233.5/32       *[OSPF/10] 03:38:41, metric 1
                      MultiRecv
```

```
user@R2> show route protocol ospf
inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[OSPF/150] 00:04:04, metric 0, tag 0
                    > to 10.0.2.1 via fe-1/2/1.4
10.0.1.0/30        *[OSPF/10] 03:37:46, metric 2
                      to 10.0.0.1 via fe-1/2/0.1
                    > to 10.0.2.1 via fe-1/2/1.4
172.16.233.5/32       *[OSPF/10] 03:38:47, metric 1
                      MultiRecv
```

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□□□ □□□□□ □□ 0.0.0.0/0 □□□ □□□□□. □□□□ R1 □ □□□□ R2□ □□□ □□□□ □□□□ □□ □□□□□ □□□ □□□ □□□□ □□, □□□ □ □□ □□ □□□ □□ □□□□ R3□□ □□□□□. □□□□ R3□ □□□ □□□□ □□□□ □□ □□□□□ □□□ □□□ □□□ □□, □□□ □□□ □□ □□□ □□ ISP□ □□□□□.

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```
user@R3> deactivate interfaces ge-0/0/2 unit 0 family inet address 10.0.45.2/30
user@R3> commit
```

```
user@R1> show route protocol ospf

inet.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.2.0/30        *[OSPF/10] 03:41:48, metric 2
```

```
                      to 10.0.1.1 via fe-1/2/0.0
                    > to 10.0.0.2 via fe-1/2/1.2
172.16.233.5/32       *[OSPF/10] 03:42:44, metric 1
                      MultiRecv

user@R2> show route protocol ospf
inet.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.1.0/30         *[OSPF/10] 03:42:10, metric 2
                      to 10.0.0.1 via fe-1/2/0.1
                    > to 10.0.2.1 via fe-1/2/1.4
172.16.233.5/32       *[OSPF/10] 03:43:11, metric 1
                      MultiRecv
```

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□□□□ R1 □ □□□□ R2□ □□□ □□□□□ □□ 0.0.0.0/0 □□□ □□□□ □□ □□□□. □□□ □□ □□ □□□ OSPF □□□□ □ □□ □□□□ □□□ □. ge-0/0/2.6 □□□□□□ □□□□□□□ □□ □□ □□□ □□□□□ activate interfaces ge-0/0/2 unit 0 family inet address 10.0.45.2/30 .

chapter label in part2

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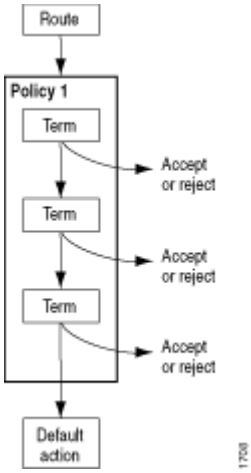

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- □□□□ to □□□ □□□□ □□ *outgoing* □□□ □□□□□. □□ □□□ □□ □□□ □□□ □ □□□□. □ □□□ □□□□ □□ □□□ □□□□□ □□ □□□ □□□ □□□□ □□□.

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```
from {
    family family-name;
    match-conditions;
    policy subroutine-policy-name;
    prefix-list name;
    route-filter destination-prefix match-type <actions>;
    source-address-filter source-prefix match-type <actions>;
}
to {
    match-conditions;
    policy subroutine-policy-name;
}
```

from □□□ □□ □□□ □□□□ □□ □□□ □□□□□. □□ □□□ □□ □□□ □□□ □ □□□□. □ □□□ □□□□ □□ □□□ □□□□□ □□ □□□ □□□□ □□□.

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aggregate-contributor	□□□ □□□□□□□ □□□□ □□□ □□□□□. □ □□ □□□ □□ □□□□ □□□□ □□□□ □ □□□ □ □□□□.
area *area-id*	OSPF □□□ □□ □□□□□ □□□□ □□ □□□ OSPF □□□□ □□□ □□□ □□□□□.
as-path *name*	AS(Autonomous System)□ □□ □□ □□□ □□□ □□□□□. AS □□□ □□□□ □□□□ BGP □□□ □□□ □□.
color *preference*	□□ □□ □□□□□. □□ □□□ □□□ *preference* □□□ □ □□□□ □□ □□ □□□ □ □□□□. color □□ 0□□ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□. □□□ □□□□ □□□□ □□□ □□□□□.
community	□□ □□□ □□□□ □□□ □□□□□. □ □□□ □□□ □□□□ □□ □□□ □□□□□ □□□ □□□ □□□□ □□□. (□□□ □□ □ □□□ OR □□□□□.)
external [type *metric-type*]	□ □□□□ □□ □□□□ □□□ □□□ □□□□ □□ OSPF □□□ □□□□□. □ □□ □□□□ □(□) type □□□ □□□□ □□. □□ metric-type 1 □□ 2□ □ □□□□. □ □□□□ type□□□ □ □□□ □□ □□ □□□ □□□□□.
interface *interface-name*	□□ □□□ □□□ □□□□□□ □□ □□ IP □□□ □□□□□. □□□□□□ □□□□□ □ □□□ □□□□□. □□ □□ □□ BGP(IBGP)□□ □ □□□ □□□□ □□□□. □□□ □□□□ □□□ □□ □ □□ □□□ □□□ □□□□□□□ □□□□□ □□□ □□□□□□ □□ □□□ □□□ □□□□□.
internal	□□□□ □□ □ □□ □□□ □□ □□□ □□□ □□ □□□□ □□□□□□.
level *level*	IS-IS □□□ □□□□□. □□□ □□□□ □□□ □□□ □□□□ □□□□ □□ □□□ □□□□□.

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local-preference *value*	BGP □□ □□ □□ □□□ □□□□□. □□ □□ □□ 0□□ 4,294,967,295(2^{32} – 1)□□□ □ □□□□.
metric *metric* metric2 *metric*	□□□ □□ □□□□□. □ □□ MED(Multiple Exit Discriminator)□ □□□□metric2, BGP □□ □□ metric □□ □□□ □□ □□ □□□□ □□ IGP □□□□ □□□□□.
neighbor *address*	□□ □□□ □□(□□)□ □□□ □□□□□. BGP □□□□ □□□ □□ □□□ □□ □□□□□ □□□□□ □□□ □□□ □□□ □ □□□□. □□ □□ □□□□□ □□, □□□ □□□ □□□□ □□ □□□□ □□ □□□□□.
next-hop *address*	□□ □□□ □□ □□□ □□□ □□□ □□ □ □□□ □□□□□. BGP □□□ □□ □ □□□□ □□ □□ □□ □□□ □□□□□.
origin *value*	AS □□ □□□ □□□ BGP □□ □□□ □□□□□. □□ □□ □ □□□ □ □□□□. • egp- □□ AS□□ □□□ □□ □□□□□. • igp- □□ AS □□□ □□□ □□ □□□□□. • incomplete- □□ □□□ □□ □□□□ □□□□□□□.
preference *preference* preference2 *preference*	□□ □□ □□ □□□□□. □□ □□ □(preference)□ □□ □□ □(preference2)□ □□□ □ □□□□. □□ □□ □□ 0□□ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□. □□□ □□□□ □□□□ □□□ □□□□□. □: BGP route-policy□ □□ □□□□ preference2 □□□□.
protocol *protocol*	□□□ □□□□□□ □□□ □□□□ □□□□□ □□□ □□□□□. □□ □ □□□□□. aggregate, bgp, directlocalospfisisdvmrppim-sparserippim-denseripng□□ .static
route-type *value*	□□ □□□ □□□□□. □□ □□ internal□ □ □□□□external.

□ to □□ □□ □□□ from □□□□ □□□ □□□□□. □ □ 7 □□□ 53 □□□ □□ □□□ □□□ □□ AND □□□□□. □□□ □□□ □□ □□□ □□□ □□ □ □□□□□. □□□ □□□ OR □□□□□. □□ □□, □□□ □□ □ □□ □□ □□□ □□ □□□ □□□□ □□□ □□□□ □□ □□□ OR □□ □□ □□ □□ □□ □ □□ □□ □□□□□.

□ 7 □□□ 53 □(□) □□ □□ □□ □□□ □□□□□ □ □□□ □ □□ □□ □□□ □□□□□. □ □□ □ to □ □□□□ from □□ □□□ □□□ □ □□□ □□□ □ □□ □□ □□□ □ □□ □□□ □□□□ □□□□□ □□ □□□ □□□□□□ □□□□□. □□ □□□ □□ to □□□ from □□□ □□□□□ □ □□□ □□□ □□□ □ □□ □ □□ □□, □ □□□ □□ □□ □□□ □□□ □□□□. □□□ □□□ □ □□ □□□ □□□□ □□□ □□□ □□□□□.

□ 7 □□□ 53 □□ □□ □□□ □□□□ □□□□□ □□□□□. □□□□□ □□□ □□ □□□□ □□□ □□(AS[Autonomous System] □□ □□ □□□, □□□□ □ □□□ □□)□ □□□ □□□ □□□ □□□□ □□ □□ □□□□ □ □□□□□. □□□ □□ □□□ □□ □□□ □□□ □□□□□. □□ □□ □□□□ □□□ □□ □□ □□□ □□□ □□□□ □□□ □□ □□□□ □ □□□□□.

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aggregate-contributor	□□	□□□ □□□□□□□ □□□□ □□□ □□□□□□. □ □□ □□□ □□ □□□□ □□□□ □□□□ □ □□□ □ □□□□.
area *area-id*	□□	(OSPF[Open Shortest Path First]□ □□) □□ □□□□□□. from □□□ □□ export □□□□ □□□ OSPF □□□ □□ □□□□□ □□□ □ □□□ OSPF □□□□ □□□ □□ □ □□□□□□.
as-path *name*	□□	(BGP[Border Gateway Protocol]□ □□) AS □□ □□ □□□□ □□□□□. □□□ □□□ "□□□ □□ □ □ □□□□ □□□□ □□ AS □□ □□ □□□ □□□" □□□ 397 □□□□□□.
as-path-group *group-name*	□□	(BGP□ □□) AS □□ □□ □□ □□□□ □□□□□. □□□ □□□ "□□□ □□ □□ □□□□ □□□□ □□ AS □□ □□ □□□ □□□" □□□ 397 □□□□□□.
bridge-domain-id *bridge-domain-number*	□□	□□□ □□□ ID, VLAN ID □□ (VXLAN □□□□ □□□□) VXLAN □□ □□□□ □□□(VNI).
color *preference* color2 *preference*	□□	□□ □. □ preference2 □□ □□□ □□□ □□□ □ □□□□ □□ □□ □(color □ color2)□ preference □ □□ □ □□□□. □□ □□ 0□□ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□. □□□ □□□□ □□□□ □ □□ □□□□□.

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community-count *value* (equal | orhigher | orlower)	□□	(BGP□ □□) □□□ □□□□□ □ □□□ □□□□ □□ □□□□. □□ □□ 0□□ 1,024 □□□ □□□ □ □□□□. □□ □□ □ □□□ □□□□□□: • equal- □□□□ □□□ □□□□□ □□□□ □□ □ □□ □□□ □□□. • orhigher - □□□□ □□□ □□□□□ □□□□ □□ □ □□□ □□□ □□□ □□□. • orlower- □□□□ □□□ □□□□□ □□□□ □□ □ □□□ □□□ □□□ □□□. □: □□ community-count □□ □□□□ □□ □□□ □□□ □□□□ AND □□□□□. □: □ community-count □□□ □□ □□□□□□□ □□□□□. □□□ □□□□□□□ □□□□ □□□□. □ □□ □□□ To □□ □□ □□□ □ □□□□.
community [*names*]	□□	□□ □□□ □□□□ □□□□□. □ □□□ □□□ □□□□ □□ □□□ □□□□□ □□□ □□□ □□□□ □□□(□□□ □□□ □ □□ OR □□□). □□□ □□□ *BGP □□□□, □□ □□□□ □ □□□ □□□□□ □□□ □□ □□ □□□□ □□*□□□ □□ □□□□. BGP EVPN □□□□ BGP □□□□ □□□ □□ □□□□ □□□□ □□ □□□□ □□□ □□□, □□□ BGP EVPN □□□ □□□□□ □□ □□ □□□□□ □□□ □ □□□□. □□ □□□ □□□□ □□□ □□, mac-mobility □ □, EVPN split-horizon □□□ □□, ESI □□ □ etree □□ □□□□ □□□□□. □□ □□□ □□□□ BGP EVPN □□ □□□□□ □□□□□. • community (type, in decimal format) *val1*:*val2* *val1* □ *val2* □ [2 + 4] □□ □□ [4 + 2] □□□□ □□□ □ □□□□.
external [type *metric-type*]	□□	(OSPF □ IS-IS□ □□) IGP □□ □□□ □□□□□□□. IS-IS □□□ □□, □ external □□□ □ IS-IS □□□ □ □□ IS-IS □□□□ □□□ □□□□ □□□□□. □□□□ type □□ □□□□ OSPF □□ □□□□ □□□□□. □ external □□□□ type□□□ □□□ □□ IGP □□(OSPF □ IS-IS) □□□ □□□□□. □ external □□□ type□ □□□ □□□ OSPF □□□ □□□ □□ OSPF □□ □□□□ □□□□□. □□ □□□ 1 □□ 2□ □ □□□□. BGP □□ □□□ □□□□□□ □□ □□□ □□□□□ route-type .
evpn-esi	□□	□□□□ ESI □□□ □□□□ □□□ □□□ □□ □□ 1, 2, 4, 7, 8□ □□ ESI(Ethernet Segment Identifiers) □□□ □□□□ BGP EVPN □□□ □□□□ □ □□□□. (ESI □□ 10□□□ □□□ □□□□□ □□ □ □□□□□ □□□□ □ □□□□□.)

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evpn-etag	□□	EVPN □□□ □□□□□ □□□ □ □□ EVPN □□ □□□ □□□□ BGP EVPN □□□ □□□□ □ □□□□. □□ CLI □□□□ EVPN□ □□□□ □□□. • filter policy-options policy-statement *name* term *name* family
evpn-mac-route	□□	IP □□□ □□□ □□□ □□ BGP EVPN type-2 □□□ □□□□□□. EVPN type-2 MAC □□□ MAC □□□ □□ □□□□ IP □□□ □□ □ □□□□. MAC-IP □□□ □□□□ IP □□□ IPv4 □□ IPv6 □□□ □ □□□□. mac □□ □□ mac+ipv4 □□ □□ mac+ipv6 □□□ □□ □ □□□ type-2 □□□ □□□□ □ □□□□.
interface *interface-name*	□□	□□ □□□ □□□ □□□□ □□□□□□ □□ □□ IP □□□□□. IBGP□ □□ □□□□□□ □□□□ □□ □□□□□□ □ □ □□□ □□□□ □□□□. □□□ □□□□□ □ □□□□ □□□□□ □□□ □□□ □□□□□□.
level *level*	□□	(IS-IS[Intermediate System-to-Intermediate System]□ □□) IS-IS □□. □□□ □□□□ □□□□□□ □□□ □□□ □□□□□□.
local-preference *value*	□□	(BGP□ □□) BGP □□ □□ □□(LOCAL_PREFlocal-preference (add | subtract) *number*) □□□□□. □□ □□ □□ 0□□ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□.
mac-filter-list	□□	(BGP□ □□) □□□ mac □□ □□. EVPN type-2 □□□□ □□□□ □□□ MAC □□□ □□□, □□ □□□□ MAC □□ □□□ □□□ □ □□□□.

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□□ □□	□□ □□ □□	□ □□
multicast-scoping (*scoping-name* | *number*) < (orhigher | orlower) >	□□	IPv4 □□ IPv6 □□□□□ □□ □□□ □□□□□ □□ □□□□. □□□□□ □□ □□ □□□ IPv4 □□□□ □□□□□. □□ □□□□□ □□ □□ □□□ □□ □□□ □□□□ □□□□ □ □□□□. □□□ □□□□□ □ □□ □□□□ □□□□□□ orlower, □□□ □□□□□ □ □□ □□□□ □□□□□□ □□□□□orhigher. □□□ □□□ Junos OS □□□□□ □□□□ □□□ □□□□ □□□□□□. □□ □□□□ □□ [edit routing-options] □□□□ scope-policy □ □□ □□ □□□ □□□ □□□□ □□□ □ □□□□. □□ *number* 0□□ F □□□ 16□□□ □ □□□□. multicast-scope □□ 0□□ 15 □□□ □□ □□ □□□ □ □□ □□ □□ □□□ □ □□□□□. • node-local (value=1) - □□ □□□□ □□□□ • link-local (value=2) - □□ □□□ 224.0.0.0/24 • site-local (value=5) - □□ □□□□ □□□□ • global (value=14) - □□ □□□ 224.0.1.0 - 238.255.255.255 • organization-local (value=8) - □□ □□□ 239.192.0.0/14
neighbor *address*	□□	□□ □□□ □□(□□)□ □□□□□. BGP□ □□ □□□ □□ □□□□□ □□□□□ □□□ □□□ □ □□□□. BGP *□□□□* □□□ □□, □ □□□□ to neighbor □ □□□□ from neighbor□□ □□□ □□□ □□□□□. BGP *□□□□* □□□ □□, □□ □□□ □□ neighbor □□ □□□ □□□ □□□ □□□□□. □□ □□ □□□□□ □□, □□□ □□□ □□□□ □□□□, □□□□ □□ to □□□ □□□□ □□□ □□□□□. □: neighbor *address* □□ □□□ RIP(Routing Information Protocol)□ □□□□ □□□□.
next-hop [*addresses*]	□□	□□ □□□ □□ □□□ □□□ □□□ □□ □□□ □□ □ □□. □□ □ □□□ □□□□□ □□□ □ □□□□. BGP □□□ □□ □ □□□□ □□ □□ □□ □□□ □□□□□.
next-hop-type merged	□□	LDP□ □□□ □□□ □□□ □□□□ □□ □□□ RSVP □ IP □□ □□ □□□□ □□ □□ □□□□□. □ □□ □□□ To □□ □□ □□□ □ □□□□.

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nlri-route-type	□□	NLRI 1□□ NLRI 10□□□ □□ □□□□□. □□ □□□□ □□ □□ □□□ □□□ □ □□□□. EVPN□ □□ NLRI □□ □□□ □□□ 1□□ 8□□□□□(BGP □□□□ □□□□□ □□ □□□□ □ □□ □□□ EVPN □□ □□□). EVPN NLRI □□ □□□ □□□□□ □ □□□ □□ □□ 2 □ 5□ EVPN □□ □□□□ □□□ IP □□ □□ MAC □□(mac-ip)□ □□□□ □□ □□□□. □□□ □□□ □□□ □□ route-filter □ □□□□□prefix-list . □□□□ □□□ □□ 2 mac-ip □□□□ type-5 □□□ □□□□, type-2 □□ □□□□ □□□ □□□□□ □□□ type-5 □□□ □□□□□. □□□□ □□ □□□ donot-advertise-community □□ □□ □□□ □ □□□□ protocols evpn ip-prefix-routes .
origin *value*	□□	(BGP□ □□) AS □□ □□□ □□□ BGP □□ □□□□□. □□ □□ □ □□□ □ □□□□. • egp- □□ AS□□ □□□ □□ □□□□□. • igp- □□ AS □□□ □□□ □□ □□□□□. • incomplete- □□ □□□ □□ □□□□ □□□□□□□.
policy [*policy-name*]	□□	□□□□□□□ □□□ □□□ □□□□□. □ □□ □□ □□□ □□ □□□ "□□□ □□ □□ □□□ □□ □□□□ □□" □□□ 258□□□ □□□□□□□.
preference *preference* preference2 *preference*	□□	□□ □□ □□□□. □□ □□ □(preference)□ □□ □□ □(preference2)□ □□□ □ □□□□. □□ □□ □□ 0□ □ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□. □□□ □□□□ □□□□ □□□ □□□□□. □ □□□□ □□ □□ □□ □□□□□ □ □□ color □ color2 □□ □□□ □□□□□□.
prefix-list *prefix-list-name ip-addresses*	□□	IP □□□ □□□ □□□□□. □□ □□□ □□□ □□□□□ □□□ □ □□□□. □ □□□ □□ □□□ □□ □□□ □□□ "□□□ □□ □□ □□□□ □□□□ □□ □□□ □□ □□" □□□ 358□□□ □□□ □□□. □ □□ □□□ To □□ □□ □□□ □ □□□□. □ □□ □□□ To □□ □□ □□□ □ □□□□.

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prefix-list-filter *prefix-list-name match-type*	□□	□□□ □□□ □□□□□. □□□ □□□ □□□ □□□ □□ □□□ □□ □□□□ □□□ □ □□□□. EVPN NRLI □□ □□ 2 □ 5□ □□ □□□ □□ □□□ □□□□□. • from prefix-list-filter [exact | longer | orlonger] □ □□□ □□ □□□ □□ □□□ □□□ "□□□ □□ □□ □□□□ □□□□ □□ □□□ □□ □□" □□□ 358□□ □□□ □□□. □ □□ □□□ To □□ □□ □□□ □ □□□□.
protocol *protocol*	□□	□□□ □□□□□□ □□□ □□□□ □□□□□ □□□□□. □□ □ □□□□□. accessldpevpndvmrpbgp-staticdirectbgpanchorl2-learned-host-routingl-isislocall2circuitisisfrresismsdpl2vpnbgp-ls-epearpospfmplsaggregateisis(access-internalOSPFv2 □ OSPFv3 □□□ □□), (OSPFv2 □□□ □□), ospf2 (OSPFv2 □□□ □□), ospf3 (OSPFv3 □□□ □□), , staticriftripngvplsriproute-targetrsvpspring-tepim
rib *routing-table*	□□	□□□ □□□□ □□□□□. □ *routing-table* □□ □□ □ □□□ □ □□□□. • inet.0—□□□□□ IPv4 □□ • *instance-name* inet.0—□□ □□□ □□□□□ □□ □□□□□ IPv4 □□ • inet.1—□□□□□ IPv4 □□ • inet.2—□□□□□ RPF(Reverse Path Forwarding) □□□ □□ □□□□□ IPv4 □□ • inet.3—MPLS □□ • mpls.0—LSP(label-switched path) □□ □□ □□ MPLS □□ • inet6.0—□□□□□ IPv6 □□
route-distinguisher	□□	RD(route-distinguisher)□ □□□□□. RD□ BGP EVPN □□ □□□□ □□□□□. RD □□□ EVPN □□□ □□□□ □□□□□.

□ 7: □□□ □□ □□ □□□ □□ □□ *(Continued)*

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route-filter route-filter-list	□□	□□□ □□ □□ □□ □□ □□ □□□□□. □□ □□ □□□ □□ □□□ □□ □□□ □□ □□□□ □□□ □ □□□□. EVPN NRLI □□ □□ 2 □ 5□ □□ □□□ □□ □□□ □□□□□. • from route-filter [address-mask | exact | longer | orlonger | prefix-length-range | through | upto] □ □□ □□□ To □□ □□ □□□ □ □□□□.
rtf-prefix-list *name route-targets*	□□	(BGP□ □□) BGP □□ □□ □□□ □ □□□ BGP □□ □□ □□□□ □□ □□ □□ □□□□ □□□ □□□□□. □ □□□ □□ □□□ □□ □□□ □□□ *□: VPN□ □□ BGP □□ □□ □□□□ □□□□ □□ □□.* □ □□ □□□ To □□ □□ □□□ □ □□□□.
source-address-filter *destination-prefix match-type <actions>*	□□	□□□□ □□ □□ □□□□. □□ □□□ □□□ □ □□ □□□ □□□ □□□□□ □□□□□ □□ □□□ □□□ □ □□□ □ □□ □□□ □ □□□□. □□ □□□ □□□□ □□□ □□□□ □□□ □□□□ □□□ □□□ □□□ □ □□□□. □□□ □□□ "□ □□ □□ □□ □□□□ □□□□ □□ □□ □□ □□□" □□□ 276 □□□□□□. □ □□ □□□ To □□ □□ □□□ □ □□□□.
state (active | inactive)	□□	(BGP □□□□□ □□) □□ □□□ □□ □□□□ □□□□□□. • active- □□ BGP □□ • inactive- □□□ □□□ □□ □□□ □□□□ □□ BGP □□□ □□□ □□ □□□ □□□□ □□ • inactive- □□□ □□□□ □□ □□□ □□□□ □□ □□□□ BGP□□ □□□ □□□ □□□□ □□

표 7: □□□ □□ □□ □□□ □□ □□ *(Continued)*

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tag *string* tag2 *string*	□□	□□ □□□□. □ □□ □□ □□□□ □□□ □ □□□□. tag (□ □□ □□□□ □□) □ tag2. □□□ □□ □□□□ □□□□ □□□ □□□□ □□ □□□□ □□□ □□□ □□□□ □□□ □ □□□□. □□□□ □□ □□ □□ □□□ □□□□ □□□ □□ □□□□ □□ □□□ □□□ □ □□□□. □ □□ □□ □□ □□□ □□□□. `from tag [ tag1 tag2 tag3 ];` OSPF □□tag □ □□ □□□ OSPF □□ LSA(Link-State Advertisement) □□□ 32□□ □□ □□ □ □□□□□. IS-IS □□□ □□, tag □□□ IS-IS IP □□□ □□ □□ □□ 32□□ □□□□ □□□□□. (TLV)□□□. OSPF□ □□ □□□ OSPF □□ ID□tag2 □□□ □□□□□. □□□ □□ □□□ □□ OSPF□ □□□ □□ □□ tag2□□□□ □□□□. □□ □□□ □□□□ □□ □□ □□□ tag2 □ □□□□. □□□ □□ tag2 □□ □□ □□(□: tag2□ □□ ID□ □□□□ OSPF □□) □□ tag2 □□ □ □□□ □□□□□. □□□ "from area" □□ □□□ □□□□ □□ □□, OSPF □□ ID□ □□□□ □(□ tag2) □□□ □□ OSPF □□□ □□ □□□ □□□□ □□□ □□ ID□ □□ tag2 □□□. □□□ □□□□ □□ □□ OSPF □□□ tag2 □□ □□ □□□ □□□□□.
validation-database	□□	BGP □□ □□□ □□□□ □□ □□ □□□□□□□□ □□□ □□□□□ □□ □□□□ □□□□, □□□□ □□□ □□ □ □ □□ □ □□□□□. □□ □□ □□□□□□□□ □□ □□□□ □□ AS(Originating Autonomous System)□ □□ □□ ROA(Route Origin Authorization) □□□□ □□□□ □□□□. □□□ □□ □□□ □□□ □□□ □□□ □ □□ □□□ □ □□□□. BGP□ □□ □□□ □□ □□□ □□□□□□□.

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□ 8: □□ □□ □□ □□

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address-mask *netmask-value*	□□ □□□ □□ □□□□□. • *netmask-value* □□ □ □□ IPv4 □□ IPv6 □□ □□□ □□ □□ AND□ *netmask-value* □□ □ *destination-prefix* □□□ □□ □□ AND□ □□□□ □. *netmask-value* □□□ □□□ □□□ □□□□ □□□ □□□□. • *prefix-length*□□ IPv4 □□ IPv6 □□ □□□ □□ □□□ *destination-prefix*□□□ □□ *prefix-length*□□□ □□□□□. □: address-mask □□□ □□ □□ □□□ □□ IPv4(family inet) □□ IPv6(family inet6) □□ □□□ route-filter □□ □□□ □□ □□ □□□ □□□ □ □□□□ □□□□ □□□□□. address-mask □□□ □□ □□ □□□ □□□□ □□□ □□ □□ □□□□ □□ □ □□□ □□□ □□ □□ □□□ □□ IPv4 □□ IPv6 □□ □□□ □□□□ □ □□□□. □□ □□□ □□□ □□□ □□ □ □ □□□□ □□□ □□□ □□□□ □□□. address-mask □□ □□□ □□□ □□ □□□ □□ □□□ □□ □□□ □□□□ □□ □□□□□. □□ □□□□ longest-match □□□ □□□□, □□□ □□ □□□ □□ □□ □□□ □□□ address-mask □□ □□□ □□□□□. □□ □ □□ □□ □□□□ □□□ □□□□ □□, □□ □□□□ □□ □□□ □□ □□ □□ □□ □□□□□.
exact	□□□ □□□ MSB(□)□ □□□□(□ □□□□ *prefix-length*□□ *prefix-length*) □□ □ □□□ □□□ □□□□□.
longer	□□□ □□□ □□□ □□(□ □□ *prefix-length*)□ □□□□ *prefix-length* □□□ □□□ □□□□ □□□.
orlonger	□□□ □□□ □□□ □□(□ □□ *prefix-length*)□ □□□□ *prefix-length* □□□ □□□ □□□ □□□ □□□.
prefix-length-range *prefix-length2-prefix-length3*	□□□ □□□ □□□ □□(□ □□*prefix-length*□)□ □□□□, □□□ □□□ □□□ □*prefix-length3*(□□) □□□ *prefix-length2* □□□□.

□ 8: □□ □□ □□ □□ *(Continued)*

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through *destination-prefix*	□□ □□□ □□ □□□□□. • □□□ □ □□ □□ □□□□ □□□ □□□ □□(□ □□ *prefix-length*□)□ □□□□□. • □□□ □□□ □□□ □□ □□ □□ □ □□ □□ □□□□ □□□ □□□ □□(□ □□ *prefix-length*□)□ □□□□□. • □□□ □□□ □□□ □□ □□ □□ □ □□ □□□□ □□ □□□ □□□ □□□□. □□□□ □□□ □□ □□□□□ through □□ □□□ □□□□ □□□□.
upto *prefix-length2*	□□□ □□□ □□□ □□(□ □□□ *prefix-length*)□ □□□□ □□□ □□□ □□□ □(□) □□□ *prefix-lengthprefix-length2*□□□□.

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□□□ □□ □□ □□ | 76
□: □□□ □□□ □□ □□ | 118
□: □□ □ □□ □□□□ □□□ □□□□ □□□ | 625

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in this section

- □□□ □□ □□ □□ | 64
- □□ □□□ □□□□ □□ □□ | 64
- □□□ □□□□ □□ □□ □□ | 73
- □□□ □□□□ □□ □□ □□ | 75
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then {
    actions;
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- [edit policy-options policy-statement *policy-name* term *term-name*]
- [edit logical-systems *logical-system-name* policy-options policy-statement *policy-name* term *term-name*]

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next policy	?? ???? ????? ????? ??????. ?? then ???? ?? ?? ?? ?? ???? ??????. ?? ???? ????? ?? ?? ??? then ???? ?? ???. next policy ? ?? ?? ??????. ???? ????? ???? ?? ???? ????? ?? ?? ???? ???? ?? ???? ?????.
sr-te-template	PCE ?? LSP? ??? SR-TE(Segment Routing-Traffic Engineered) ???????.

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표 10: □□ □□□ □□□□ □□

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add-path send-count *path-count*	(BGP□ □□) □□□ □□□□ add-path □□ □□□ □□ □□□□ □□ 20□□ BGP □□□ □□ □ □□□□.
as-path-prepend *as-path*	(BGP□ □□) AS □□□ □□ □□□ □□ □□□ AS □□□ □□□□. AS □□□ □ □ □□ □□□□ □□ □□□ □□□(" ")□ □□□□. AS □□□ □□ AS □□□ □□□ □□□ □□ □□□□□. □ □□□ AS □□□□□ AS □□□ □□□□ AS □□□□ □ □□□ □□□□. □□ AS □□□ □□□□□□ □□□ □□ □□□ □□□□ □□ □□□ AS □□□ □□□□□□ □□□ □□ □□□□□. □□□ □□□ □□□ AS □□□ □□□ □□□ □□ □□□□□. □□□ □□□ "BGP AS □□□ □□ □□□ AS □□ □□ □□□ □□□□□□" □□□ 420. Junos OS □□□ 9.1 □□, RFC 4893 4□□ *□□ AS □□ □□□ □□ BGP □□* □□□ 4□□□ AS □□□ □□ □ □□ □□□, Junos OS□ □□ □□□□□ □□□□ 2□□□ AS □□□ □□□ □ □□□□.
as-path-expand last-as count *n*	(BGP□ □□) □□ AS □□□□ □□□ AS □□□ □□□□ □□ AS □□□ AS □□ *n* □□□ □□ □□□ □□□□. □□□ □ (□ *n*) 1□□ 32□□□ □□□□□. □□ AS □□□ □□□ □□□□ □□ AS □□□ □□□□□. □ □□□ AS □□□□□ AS □□□ □□□□ AS □□□□ □□□□ □□□□. □□ AS □□□ □□□□□□ □□□ □□ □□□ □□□□ □□ □□□ AS □□□ □□□□□□ □□□ □□ □□□□□. □□□ □□□ □□□ AS □□□ □□□ □□□ □□ □□□□□. □ □□□ □□□□□ □ IBGP □□□□ □□□ □□□□□. □: Junos OS □□□ 17.3□□ □□□ □□ □□ null □□□ □□□ □ □□□, □ □□ Junos□ null□ 0 □□□□ □□ 1 □□□□ □□□□□ □□□ □□□□ □□□□. as-path-expand □□□ 1□ □□ □□□ *as-path*□ □ □□□□□ □□□□□ □□□□. □□□ as-path-expand □□□□□ □□□□□ □□□□ □□ □□□ □□□□ □□□ □□ □□□ □□□□ □□ □□□□.
assisted-replication replicator-ip *replicator-ip* (strict | fallback-replicator-ip *fallback-replicator-ip*)	(□□□□ □□□□□ □□□□□[OISM]□ □□□□ AR[□□ □□]□ □□) OISM□ □□□□ EVPN □□□□□□ AR □□ □□□□□ □□□□□ □□□□□ □□□□ □□ AR □□□ □□□□□ □□□□□□ □□□□□. □□□□□ □□□□ □□□ □□□□ □□ □ AR □□□□□ □□□□ □□□□ □□□ □□□□□ strict. □□ □□ AR □□□□ □□□ □□ □□□ □□ AR □□□ □□□ □□□ □ □□□□. □□□ □□□ *assisted-replication (Deterministic AR Replicator Policy Actions)*□(□) □□□□□□.
bgp-output-queue-priority	(BGP□ □□) □ □□□ □□□□ □□ □□ □□ □□□□ □□□□□. □□ □□□ □□□ □□ □□□□ 17□□□□. □□ □□□ □□ □□ □□ □□□ □ 1□ □□ □□ □□ □□□□ 16□ □□ □□ □□□ □□□ □□□ 16□.
class *class-name*	(□□□ □□□[CoS]□ □□) □□□ □□□ □□ □□ □□□ □□□ □□□□ □□□ □□□ □□□□□. □□□ □□□ □□□ □□□□ Junos OS □□□ □□ □□ □□□□ □□□□□□.

□ 10: □□ □□□ □□□□ □□ ***(Continued)***

□□	□□
color *preference* color2 *preference*	□□ □□ □□ □□□ □□□ □□□□□. color □ color2 □□ □□ □□ □ preference2 □□□ □□□ □□□ □□ □ □□ □□□ preference □□□□. □□ □□ 0□□ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□. □□□ □□□□ □ □□□ □□□ □□□□□. □□□□ □□ □□□ color □□□□ □□, □ □□ Junos OS □□□□□ □□□□□ □□□□.
color (add | subtract) *number* color2 (add | subtract) *number*	□□ □□ □□ □□ □□□ □□□ □□□□□. □□□ □□ □□ □□ 4,294,967,295(2^{32} – 1)□□ □ □□ □□ 2^{32} – 1 □ □□□□□. □□ □□□ □□□ 0□□ □□ □□ □□ 0□□ □□□□□. □□□ □□ □□ □□ □ □□ □□ □□ □□□□ □□ □□, □□ □□ □□□ □□ □□□□ □□□□ 0 □□□ □□□□□. □□ 0□ □□□ □□□□ □□□□ □□□ □□□ □□ □□ □□ □□□.
community (+ | add) [*names*]	(BGP□ □□) □□□ □□□□ □□□ □□□ □□□□□ □□□□□. □□□ □□□ *BGP □□□□, □□ □□□□ □ □□□ □□□□ □ □□□ □□ □□ □□□□ □□*□□□ □□□□□□.
community (- | delete) [*names*]	(BGP□ □□) □□□ □□□□ □□□□ □□□ □□□□□ □□□□□. □□□ □□□ *BGP □□□□, □□ □□□□ □ □□□ □□□ □□ □□□ □□ □□ □□□□ □□*□□□ □□□□□□.
community (= | set) [*names*]	(BGP□ □□) □□□ □□ □□ □□□□□ □□□ □□□□□ □□□□. □□□ □□□ *BGP □□□□, □□ □□□□ □ □□□ □□□ □□ □□□ □□ □□ □□□□ □□*□□□ □□□□□□.
cos-next-hop-map *map-name*	□□□ □□□□□ CoS □□ □□ □ □□ □□□□□.
damping *name*	(BGP□ □□) □□□ □□ □□ □□ □□□ □□□ □□□□□. □□□ □□□□□ □□ □□ □□□□□ □□□□□. □ □□□ □□ □ □ □□□ □□□ □□□□ □□ □□□ □□□ □□□ □□□ □□□□ □□□□□ □□□□□. □□ □□ □□□ □□□□□ □□□ □□□□□ Junos OS □□□ □□□□ □□□□□□ □□□ □□ BGP □□ □□□ □□□□□ □□, "□□□ □□□ □□□□ BGP □□ □□□ □□" □□□ 555□ □□□ □□ □□□ □□ □□ □□□ □□□□ □□□.

표 10: ?? ??? ???? ?? *(Continued)*

??	??
destination-class *destination-class-name*	??? ?? ??? ???? ????? ???? ??? ?? ?? ?? ?????. ??? ??? ? ????. • ??? ??? ???? ?? ?? ???? ?????. • ?? ??? ??? ?? ?? ???? ?? ??? ???? ?????. • ?? ???? ?? ???? ?? ??? ???????? ?? ???? destination-class-usage[edit interfaces *interface-name* unit *logical-unit-number* family inet accounting] ?? ????(??? ??? ?? Junos OS ??? ?? ?? ??? ??). • ?? ?? ? ??? ???? ??? ???. show interfaces destination-class (all | *destination-class-name logical-interface-name*), show interfaces *interface-name* extensive?? show interfaces *interface-name* statistics (CLI ??? ??). • ?? ??? ???? ?? ?? ????? ? ?? source-class ??? ?? ?????.
external type *metric*	OSPF?? ??? ??? ?? ?? ??? ??? ?????. ??? type? ???? ???.
forwarding-class *forwarding-class-name*	??? ?? ??? ?? ??? ???? ??? ???? ??? ???? ?????. ??? ??? ? ????. • ??? ??? ???? ?? ???? ?????. • ?? ??? ???? ?? ??? ???? ?? ??? ??? ?????. • ? ?? ??? ?? source-class ??? ??? ??? ???? ?? ??? ???????? ?? ???? destination-class ??????.
install-nexthop <strict> lsp *lsp-name*	??? LSP ?? ? ?? ? ??? ???? ???? ?? ?? ?????. ??? ???? ?? ???? ??? ???? ??? ??? ??? LSP ?? ?? ?????. strict ??? ??? LSP ?? ?? ?? ??? ???? ?? ??? ????? ??? ??? ??. ??? LSP ?? ? ? ?? ?? ???? ??? ??? ?? ?? ?? ?????.
install-to-fib	PTX ??? ???? ???? ?? BGP ??? ??? ???????. ??? ??? ?: PTX ??? ?? ?? ???? ?? BGP ??? ??? ???????.
load-balance consistent-hash	(BGP? ??) MPC(Modular Port Concentrator)? ?? MX ??? ???? QFX10000 ??? ??? ?? ?? ??? IP ??? ?? ??? ?? ???? ?????. ? ??? ?? ??? ?? ? ??? ??? ? ECMP(Equal-Cost Multipath) ??? ??? ?? ??? ???? ?????. ??? ??? ??? ????????. ?? ??? ???? ?? ? ??? ???? ?????.

□ 10: □□ □□□ □□□□ □□ ***(Continued)***

□□	□□
load-balance *symmetric-consistent-hash*	(MX □□□ □□□ - AFT □□) □□ □□□ □□□ □□□□□ □□□□ □□ □□□□ □□□ □□□ □□□□ □□□ □ □□□□ □ □ □□□ □□ □□ IP □ □□ IP □□ □□□ □□ □□ □□□□ □□ □□ □□□□ □□□□□. □ □□□ □□□□ □ □□□□□ □□□ ECMP □□ □□□ □□ □□ □□□ □□ □□□ □□□□ □□ □□□□ □□□□ □□□□□ IP□ □□□ □□□ □□□□ □□□□□□ □□□□□. □□□ □□ □□□□ □□□ ECMP □□□ □□□□ □□□ □ □□□□ □□ □ □□ □□□ □□□□ □□ □□-IP□ □□□□ □□□□□ □□ □□□ □□□ □□□□ □□ destination-IP□ □□□□□.
load-balance destination-ip-only	□□ IP □□□□ □□□□ □□ □□ □□□ □□□□□. □□ □□ □□□ □□□□□□ □□□□ □□ □□□□ □□ □□□ □□□ □□□□ □□ □ □□□□.
load-balance per-packet	(□□□ □□□□ □□□□□□ □□) □□□ □□□□ □□ □□ □ □□□ □□□□ □□□ □□□□ □□□ □□ □□□□ □□□□□ □□□. □ □□ □□□ □□□□ □□ □□□□ VPLS □□□ □□□ □□□□ □ □□□□. □□□ □□□ *□□□ □□ □□□ □□□* □□□□□ □.
load-balance per-prefix	PTX □□□ □□□□ □□□□ BGP□ □□ □□ □□□ □□ □□□ □□□ □□□ □□□□□□. □□□ □□□ □: PTX □□□ □ □ □□ □□□□ □□ BGP □□□ □□□ □□□□□□.
load-balance source-ip-only	□□ IP □□□□ □□□□ □□ □□ □□□ □□□□□. □□ □□ □□□ □□□□□□ □□□□ □□ □□□□ □□ □□□ □□□ □□□□ □□ □ □□□□.
local-preference *value*	(BGP□ □□) BGP □□ □□ □□(LOCAL_PREF) □□□ □□□□□. □□ □□ □□ 0□□ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□.
local-preference (add | subtract) *number*	□□ □□ □□ □□ □□□ □□□ □□□□□. □□□ □□ □□ □□ 4,294,967,295(2^{32} – 1)□□ □ □□ □□ 2^{32} – 1 □ □□□□□. □□ □□□ □□□ 0□□ □□ □□ □□ 0□□ □□□□□. □□□ □□ □□ □□ □ □□ □□ □□ □□□□ □□ □□, □□ □□ □□□ □□ □□□□ □□□□□ 0 □□□ □□□□□. □□ 0□ □□□ □□□□ □□□□ □□□ □□□ □□ □□ □□ □□□. BGP□ □□, □□ □□ □ □ □□ □□ □□□ □□□ □□□□ □□ 100□□ □□□□□□.

□ 10: □□ □□□ □□□□ □□ ***(Continued)***

□□	□□
map-to-interface (*interface-name* | self)	map-to-interface □□ □□ □□ □□ □□□ □□□ □□ □□□□□. □ map-to-interface □□□ □□□□□ □□ □ □□□ □□□□ □□□. • □□□ □□□□□(□: ge-0/0/0.0). □□□ □□□□□□ VLAN □ □□ □□□ □□□□□□ □□□□ □□□□□□ □□ □□□□ □□ □□□□□□ □ □ □□□□. □: □□□ □□□□□ map-to-interface (□: ge-0/0/0)□ □ □□□□ □□, □□□ □□□□□□ □□□□ □□ □□□ □□□□□□ .0 □□ □□□□□. • □□□ self. □□□□ self □□□□□ □□□ □□□ □□ □□□ □□□ □□□□□□□ □□□□ □□□ □□□□ □□□ □□□ □□. □□□□ □□□ □□□ □□□□□ □□□ □□□ □□□□ □□□□.
metric *metric* metric2 *metric* metric3 *metric* metric4 *metric*	□□□□ □□□□□. (□ □□ □□ □□ □□)□ metric □□□□ , metric3, □ □ metric2□□□□ □□ 4□□ □□ □□ □□ □ □ □□□□metric4. (BGP□ □□) metric □□ □□□ MED□ □□□□ metric2 , BGP □□ □□ □□ □□□□ □□ □□□□ □□ IGP □ □□□ □□□□□.
metric (add | subtract) *number* metric2 (add | subtract) *number* metric3 (add | subtract) *number* metric4 (add | subtract) *number*	□□□ □□□ □□□ □□ □□□□□. □□□ □□ □□ □□ 4,294,967,295(2^{32} – 1)□□ □ □□ □□ 2^{32} – 1□ □□ □□□. □□ □□□ □□□ 0□□ □□ □□ □□ 0□□ □□□□□. □□□ □□ □□ □□ □ □□ □□ □□ □□□□ □□ □□, □□ □ □ □□□ □□ □□□□ □□□□□ 0 □□□ □□□□□. □□ 0□ □□□ □□□□ □□□□ □□□ □□□ □□ □□ □□ □□□.
metric expression (metric multiplier *x* offset *a* | metric2 multiplier *y* offset *b*)	□ metric2□ □□ □□ □□□□ □□□ metric □□□□□. □ □□ □□□ □□ □□□ □□ □□ □□□□ □□□ □□□□□□ ((x * □□□) + a) + ((y * □□□2) + b) □□□ metric □ metric2 □ □□ □□ □□□□. □□□ □□ □□□ □□ □□□ 8□□□ □□□□□.
metric (igp | minimum-igp) *site-offset*	(BGP□ □□) □□□ □□ □□ □□ □□□□□ □□□(MED) □□ □□□□□. □ □□□ □□ BGP(EBGP) □□□□ □□□ □□ □□□□□.

□ 10: □□ □□□ □□□□ □□ ***(Continued)***

□□	□□

next-hop (*address* | discard | next-table *table-name* | peer-address | reject | self)	□□ □ □□□ □□□□□. □□ □□□□□ BGP□ □□, □□ □□ □□ □□□ □ □□ □□□□ □□ □□ □□□ □ □□□□. □, IBGP □□ EBGP □□□ □□□□ □□□□□.
	
	□ □□□ self□□, □□ □ □□□ □□ □□□ □□□□□ □□ □ □□□ □□□□□. □□ □□□□□ □□□ □□□ □□□□□. □□ □ □□□□ BGP□ □□ □ □□□ BGP □□□□ □□□□ □□ IP □□□ □□□□□. □□□ □□□□□ □□□ □□ □□□ □□□□ □□□ □□□ □ □□□□.
	
	□ □□□□ peer-address□□ □ □□□ □□□ IP □□□ □□□□□. □ □□□ □□□□ □□□□□ □□□□□. □□□ □□□ □ □□ IP □□□ □□□□□ □□□□ □□ BGP□□ □□ □□□□ □ □□□ □□ □□ □□ □□□ □□□□ □□ □□ □□□ □□ □□ □ □□□□□ □□□□ □□□ □□□□.
	
	□ □□□□ discard□□ □ □□□ □□□ □□ □□□ □□□□□.
	
	□ □□□ next-table□□, □□□ □□□□□ □□□ □□□□□ □□□ □□□ □□□□□.
	
	□□□ □□□□ next-table □□ □□□ □□□ □□□ next-table □□ □□ □□□□ □□□□ □□ □□□□ □□□□□ □□ □. □, □□□□ □□ □□□□ from □□□□ □□□□ next-table □□□□ □□□. □□ □□□ □ □□ □□□ □□□□ □□□□ □ □□□□□ rib vrf-customer2.inet.0 . □ □□□ □□ □□□ □□□ vrf-customer1.inet.0□□ □□ □□ □□□□□. □ □□ □□□ in □□ □□□ vrf-customer2.inet.0 In the next-table action□ □□□□ rib vrf-customer1.inet.0 □□ □□□ □□□□□.
	
	`term 1 {`
	`  from {`
	`  protocol bgp;`
	`  rib vrf-customer2.inet.0;`
	`  community customer;`
	`  }`
	`  then {`
	`  next-hop next-table vrf-customer1.inet.0;`
	`  }`
	`}`
	`term 2 {`
	`  from {`
	`  protocol bgp;`
	`  rib vrf-customer1.inet.0;`
	`  community customer;`
	`  }`
	`  then {`
	`  next-hop next-table vrf-customer2.inet.0;`
	`  }`
	`}`

□ 10: □□ □□□ □□□□ □□ ***(Continued)***

□□	□□
	□ □□□□ reject□□ □ □□□ □□□ □□ □□□ □□□□□.
origin *value*	(BGP□ □□) BGP □□ □□□ □□ □ □ □□□ □□□□□. • igp- □□ AS □□□ □□□ □□ □□□□□. • egp- □□ AS□□ □□□ □□ □□□□□. • incomplete- □□ □□□□ □□□ □□ □□□□□.
p2mp-lsp-root	□□□□□ LDP(M-LDP) □□ □□□ □ □□□□□ LSP(label-switched path)□ □□ □□ □□ □□□ □□□□□. □□□ □□□ □: Point-to-Multipoint LSP□ □□ □□□□□ LDP □□ □ □□□□ □□.
preference *preference* preference2 *preference*	□□ □□ □□ □□□□□. □□ □□ □(preference)□ □□ □□ □(preference2)□ □□□ □ □□□□. □□ □□ □□ 0□ □ 4,294,967,295(2^{32} – 1) □□□ □□□ □ □□□□. □□□ □□□□ □□□□ □□□ □□□□□. □□□□ □□□ □□□ □ □ preference2 □□ □□□□ □□ □□ □□ 4,294,967,295□ □□□□ Junos OS□ □ □□ -1□ □□□□□ □. (2^{31} – 1)□□ □ □□□ □□□□ preference2 □□ □□□ □□□□□□. □ □□□□ □□ □□ □□ □□□□□ □ □□ color □ color2 □□□ □□□□□□. □□□□ □□ □□□ preference □□□□ □ □□ □□□ □□□ □□□ □□□ □□□□□. □□□ □□ □□□ Junos OS □□ □ □□□ □□□□□ □□□□.
preference (add | subtract) *number* preference2 (add | subtract) *number*	□□ □□ □□ □□□ □□□ □□□□□. □□□ □□ □□ □□ 4,294,967,295(2^{32} – 1)□□ □ □□ □□ 2^{32} – 1□ □ □□□□. □□ □□□ □□□ 0□□ □□ □□ □□ 0□□ □□□□□. □□□ □□ □□ □□ □ □□ □□ □□ □□□□ □□ □□, □□ □□ □□□ □□ □□□□ □□□□□ 0 □□□ □□□□□. □□ 0□ □□□ □□□□ □□□□ □□□ □□□ □□ □□ □□ □□□.
priority (low | medium | high)	(OSPF □□□□□ □□) OSPF □□□□ □□□ □□□ □□□□ □□ □□□ □□□□□. OSPF□ □□ □□□ □□□□ □□□□ □□□ □□ □□□ □□ □□□ □□□□ □□□□□. □ high □□ □□□□ □□□ □□□□ □□ □□□□, □ low □□ □□□□ □□□ □ □□□ □□□□ □□□□□. □: OSPF □□□□ □□□ □□ □□□ □□□□□ OSPF □□ □□□ □□□□□ □□ □□□ □ □□□□. OSPF □□□□ □□□ □□□□ reject □□□ □□□ □□ □□ □□□ □□□□ □□ □□ reject □□□ □□□□ □□□ □□□□□.

□ 10: □□ □□□ □□□□ □□ ***(Continued)***

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source-class *source-class-name*	□□ □□□ □□□□ □□□□□ □□□□ □□□ □□ □□ □□ □□□□□. □□□ □□□ □ □□□□. • □□□ □□□ □□□□ □□ □□ □□□□ □□□□□. • □□ □□□ □□□ □□ □□ □□□□ □□ □□□ □□□□ □□□□□. • □□ □□□□ □□ □□□□ source-class-usage *interface-name* □□ □□□ □□□□□□□ □□ □□□□ [edit interfaces *logical-unit-number* unit family inet accounting] □□□□□□. □□ □□□□ source-class-usage □□ inputoutput □□□ □□ □□ □□□ □□(SCU)□ □□ □□□□□□ □□□ □ □□□□ □□□□ □□□□ □ □□□□□ □□□□□□ □□□□□(□□ □ □□ □□ □□□ □□□□□□ □□). □□ □□□ [edit interfaces *interface-name* unit family inet accounting source-class-usage (input | output | input output) *unit-number*]□□□. • □□ □□ □ □□□ □□□□ □□□ □□□. show interfaces *interface-name* source-class *source-class-name*, show interfaces *interface-name* extensive□□ show interfaces *interface-name* statistics (CLI □□□ □□). • □□ □□□ □□□□ □□ □□ □□□□□ □ □□ destination-class □□□ □□ □□□□□. • □□□ □□ □□□ □□ □□ □□□ □:" □□ □ □□ □□□□ □□□ □□□" □□□ 625□ □□□. □: □□ □□ □□ □□□ □ □□□□ □ □□□ □□ □ □□□ □□ □□□□ □□□ □ □□□□. □, □□□ □□□ □ □ □□□ □□ □□□□ □□□ □ □□□□.	
ssm-source [*addresses*];	SSM(Source-Specific Multicast) □□□ □□ □□ □□□ IPv4 □□ IPv6 □□ □□□ □□□□□
ssm-source [*addresses*];	SSM(Source-Specific Multicast) □□□ □□ □□ □□□ IPv4 □□ IPv6 □□ □□□ □□□□□.
tag *tag* tag2 *tag*	□□ □□ □□□□□. □ □□ □□ □□□□ □□□ □ □□□□. tag (□ □□ □□□□ □□) □ tag2 (□ □□ □□□)□□□. □□□ □□ □□□□ □□□□□. • OSPF □□□ □□, tag □□□ OSPF □□ LSA(Link-State Advertisement) □□□□ 32□□ □□ □ □□ □□□□□. • IS-IS □□□ □□, tag □ □□□ IS-IS IP □□□ □□ □□ □(TLV)□ 32□□ □□□□ □□□□□. • RIPv2 □□ tag □ □□ □ □□□ route-tag □□□□□ □□□□□. □ tag2 □□□ □□□□ □□□□.

표 10: □□ □□□ □□□□ □□ ***(Continued)***

□□	□□
tag (add | subtract) *number* tag2 (add | subtract) *number*	□□□ □□□ □□ □□ □□□□□. □□□ □□ □□ □□ 4,294,967,295(2^{32} – 1)□□ □ □□ □□ 2^{32} – 1□ □□□ □□. □□ □□□ □□□ 0□□ □□ □□ □□ 0□□ □□□□□. □□□ □□ □□ □□ □ □□ □□ □□ □□□□ □□ □□, □□ □□ □□□ □□ □□□□ □□□□□ 0 □□□ □□□□□. □□ 0□ □□□ □□□□ □□□□ □□□ □□□ □□ □□ □□ □□□.
validation-state	BGP □□ □□□ □□□ □□ □□ □□□□ □□ □□□ □□, □□ □□ □ □ □□□□ □□□□□. □□ □□ □□□□□□□□ □□ □□□□ □□ AS(Originating Autonomous System)□ □□□□ ROA(Route Origin Authorization) □□□□ □□□□ □□□□. □□□ □□ □□□ □□□ □□□ □□□□ □□ □□ □ □ □□□□. BGP□ □□ □□□ □□ □□□ □□□□□□.

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□□□□ default-action □□□□□ □□□ □□ □□□□ □□□□□. □□ □ □□□ □□□□ □□□□ □□□ □□□□ □□ □□□ □□ □□□ □□□ □ □□□□. □□ □ □□ □□ □□(□□ acceptreject)□ □□□ □ □□□□.

```
[edit]
policy-options {
    policy-statement policy-name {
        term term-name {
            from {
                family family-name;
                match-conditions;
                policy subroutine-policy-name;
                prefix-list name;
                route-filter destination-prefix match-type <actions>;
                source-address-filter source-prefix match-type <actions>;
            }
            to {
                match-conditions;
                policy subroutine-policy-name;
            }
            then {
                actions;
                default-action (accept | reject);
            }
```

```
        }
    }
}
```

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```
[edit]
policy-options {
    policy-statement test {
        term set-default {
            then default-action reject;
        }
        term hub {
            from interface ge-2/1/0.5;
            then {
                community add test-01-hub;
                default-action accept;
            }
        }
        term spoke {
            from interface [ ge-2/1/0.1 ge-2/1/0.2 ];
            then {
                community add test-01-spoke;
                default-action accept;
            }
        }
        term management {
            from protocol direct;
            then {
                community add management;
                default-action accept;
            }
        }
    }
}
```

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```
[edit]
policy-options {
    policy-statement policy-name {
        term term-name {
            from {
                family family-name;
                match-conditions;
                policy subroutine-policy-name;
                prefix-list name;
                route-filter destination-prefix match-type <actions>;
                source-address-filter source-prefix match-type <actions>;
            }
            to {
                match-conditions;
                policy subroutine-policy-name;
            }
            then {
                actions;
            }
        }
        then action;
    }
}
```

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- ?? ?? ??
- policy ? ? flag ??

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```
[edit]
routing-options {
    traceoptions {
```

```
        file “policy-log";
        flag policy;
    }
}
```

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accept	??? ???? ??????. ??? ??? ??? ??? ??? ?? ??? ?? ??? ??? ???? ????.
reject	??? ???? ???? ????. ??? ??? ??? ??? ??? ?? ??? ?? ??? ??? ???? ????.
next term	??? ??? ???? ?? ??? ???? ??????. ?? then ??? ?? acceptreject ??? ??????. ?? ??? ???? ?? then ??? ?? ??? ??? ??????.
next policy	?? ??? ???? ???? ??????. ?? then ??? ?? acceptreject ??? ??????. ?? ??? ???? ?? then ??? ?? ??? ??? ??????.
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□ 11: □□ □□□ □□ □□ □□ *(Continued)*

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as-path-prepend *as-path*	AS □□□ □□ □□□ □□ □□□ AS □□□ □□□□□. □ □□□ AS □□□ □□□□ □□, □□□ □□ □□□ □□□□□□. AS □□□ □□ AS □□□ □□□ □□□ □□ □□□□□. □ □□□ AS □□□□□ AS □□□ □□□□ AS □□□□ □□□□ □□□□. □□ AS □□□ □□□□□□ □□□ □□ □□□ □□□□ □□, □□□ AS □□□ □□□□□□ □□□ □□ □□□□□. □□□ □□□ □□□ AS □□□ □□□ □□□□ □□ □□□□□.
as-path-expand last-as count *n*	□□ AS □□□□ □□□ AS □□□ □□□□ □□ AS □□□ AS □□ *n* □□□ □□ □□□ □□□□□. □ □□ □□□ 32□ □ 1 □ □□□□*n*. AS □□□ □□ AS □□□ □□□ □□□ □□ □□□□□. □ □□□ AS □□□□□ AS □□□ □□□□ AS □□□□ □□□□ □□□□. □□ AS □□□ □□□□□□ □□□ □□ □□□ □□□□ □□, □□□ AS □□□ □□□□□□ □□□ □□ □□□□□. □□□ □□□ □□□ AS □□□ □□□ □□□□ □□ □□□□□.
class *class-name*	□□□ CoS(class-of-service) □□ □□□ □□□ □□□□ □□□ □□□ □□□□□.
color *preference* color2 *preference*	□□ □□ □□ □□□ □□□ □□□□□. color □ color2 □□ □□ (2^{32} - 1)□□ 0 □□□ 4,294,967,295 □□□ □ □□□□. □□□ □□□□ □□□□ □□□ □□□□□.
damping *name*	□□□ □□ □□ □□ □□□ □□□ □□□□□. □□□ □□□□□ BGP□ □□ □□ □□□□□ □□□□□□. □ □□□ □□□□ □□□□□ □□□□□.
local-preference *value*	BGP □□ □□ □□ □□□ □□□□□. □□ □□□ (2^{32} - 1)□□ 0 □□□ 4,294,967,295 □□□ □ □□□□.
metric *metric* metric2 *metric* metric3 *metric* metric4 *metric*	□□□□ □□□□□. (□ □□ □□ □□ □□)□ metric □□□□ , metric3, □ □ metric2□□□□ □□ 4□□ □□ □□ □□□ □ □□□□metric4. BGP □□□ □□, metric MED□ □□□□ metric2 , BGP □□ □□ □□ □□□□ □□ □□□□ □□ IGP □□ □□ □□□□□.
next-hop *address*	□□ □□ □□□□□. □ self□ □□□□ *address* □□ □ □□□ □□ □□□□ □□ □ □□□ □□□□□. □□ □□□□□ □□□ □□□ □□□□□.

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`advertise-external` □□ BGP □□□□ □□□ □□□□ □□ □□ □□□ □□ □□□ □□□□ IBGP □□□ □□ □□ □□□ □□□□□.

> □: `advertise-external` □□ □□ □ neighbor □□□□ □□ □□□□□. neighbor □□□□ □□ □□□□ □□ □ □□ neighbor□ □□□ □□□□ □□□. □□□ □□□ □□□ □□□□ □□ □□□□ □□□□□.

`conditional` □□□ `advertise-external` □□□ □□□ □□□□, □□ □□ □□□□□ MED(Multiple Exit Discriminator) □□□□ □□□□ □□□□ □□□ □□ □□ □□□ □□□□□. □□□, □□ □□ AS □□□ □□ □□□□ □□ (□) □□ □□ □□□ □□□□ □□□□. `conditional` □□□ □□□ □□ □□□ □□ □□□ □□ □□ □□□□□ MED □□□□ □□□ □□, □□ □□ □□□ □□□□□. □□□ □□ □□□ □□□□ □ □□□□ □□□ `conditional` □□□ □□ □□□ □□□□ □□□□□.

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```
policy-options {
    policy-statement name{
        from state (active|inactive);
    }
}
```

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□□ □□ □□ □□□ □□ □□□□ BGP □□□□ □□□□ □□□□, □□□ □□ community□□ advertise-external □□□□ □□□ □□□ □□□□□. □□ community□ □□□ □□ □□□□ □□□□ □□□ □□□□□ □□□ □□□ □□□□ □ □□□□. □□ □□ □□□□□ □□□□ □□□□ □□□□ □□ □□ □□ □ □□□ □□□ □□□ □□ □□□ □□□ □□□□ □ □□□ □ □□□□.

```
user@host# show policy-options
policy-statement mark-inactive {
    term inactive {
        from state inactive;
        then {
            community set comm-inactive;
        }
    }
    term default {
        from protocol bgp;
        then accept;
    }
    then reject;
}
community comm-inactive members 65536:65284;
```

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□□□□ R1□ 172.16.6.0/24□ □□□□□. □□□□ R2□ □□□□ R1□ □□□ □□ □□□□ □□□□ local □□□ □□□□ □□□□, 172.16.6.0/24□ 100□ □□ local □□□ □□□□.

□□□□ R3□ 200□ local □□□ 172.16.6.0/24□ □□□□□.

advertise-external □□ □□□□ R2□□ □□□□ □□□, □□□□ R2□ □□□□ R3□□ 172.16.6.0/24□ □□□□ □□□□.

advertise-external □□ □□□□ R3□ □□ □□□□ □□□□ R2□ □□□□, □□□□ R2□ □□□□ R3□□ 172.16.6.0/24□ □□□□□.

advertise-external conditional□ □□□□ R3□ □□ □□□□ □□□□ R2□ □□□□, □□□□ R2□ □□□□ R3□□ 172.16.6.0/24□ □□ □□□. □□□□ R3□□ then local-preference 200 □□□ □□□□ □□□□ R2□ path-selection as-path-ignore □□□ □□□□(□□□ □□ □ □ □□□ □□ □□ □□□□□ MED □□□□ □□), □□□□ R2□ □□□□ R3□□ 172.16.6.0/24□ □□□□□.

□: □□ □□□□□□□ advertise-external □□ □□□□□, no-client-reflect □□□ □□□□ □□ □□□□□ □□□□□□□ □□, □ □□□□ □□□□□ □□□ □□□□ □□ □□ □□ □□□ □□□ □□□.

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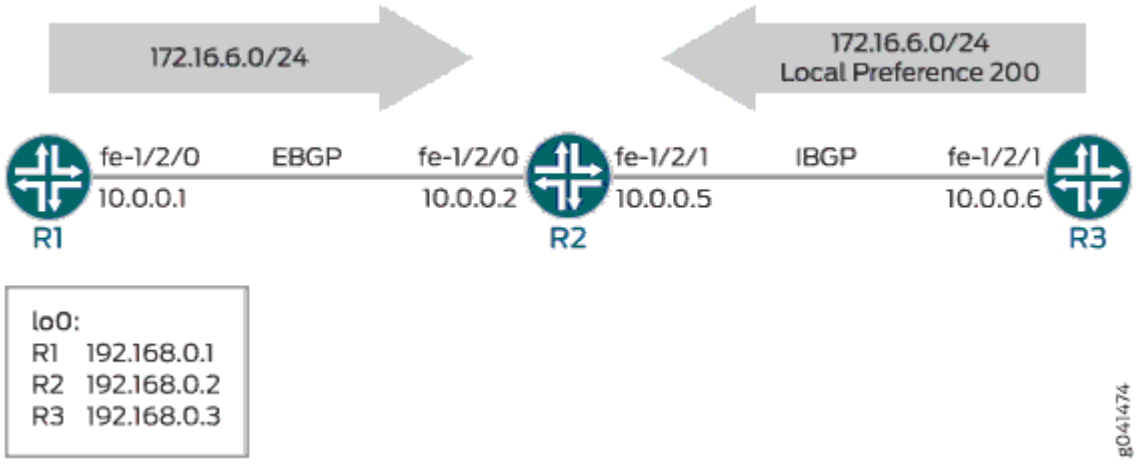
□□ 9: advertise-external□ □□ BGP □□□□



"CLI □□ □□" □□□ 82□(□) □□ 9 □□□ 81 □ □□ □□□□□ □□□ □□□□□.

□□ "No Link Title" □□□ 83□ □□□□ R2□ □□□ □□□□□.

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???? R1

```
set interfaces fe-1/2/0 unit 0 description to-R2
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 from route-filter 172.16.6.0/24 exact
set policy-options policy-statement send-static term 1 then accept
set policy-options policy-statement send-static term 2 then reject
set routing-options static route 172.16.6.0/24 reject
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 100
```

???? R2

```
set interfaces fe-1/2/0 unit 0 description to-R1
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 description to-R3
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.5/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 100
```

```
set protocols bgp group ext neighbor 10.0.0.1
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.2
set protocols bgp group int advertise-external
set protocols bgp group int neighbor 192.168.0.3
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 200
```

□□□□ R3

```
set interfaces fe-1/2/0 unit 6 family inet address 10.0.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.3
set protocols bgp group int export send-static
set protocols bgp group int neighbor 192.168.0.2
set protocols ospf area 0.0.0.0 interface fe-1/2/0.6
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then local-preference 200
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 172.16.6.0/24 reject
set routing-options static route 0.0.0.0/0 next-hop 10.0.0.5
set routing-options autonomous-system 200
```

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□□□□ R2 □□:

1. □□□□ □□□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set fe-1/2/0 unit 0 description to-R1
user@R2# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
user@R2# set fe-1/2/1 unit 0 description to-R3
```

```
user@R2# set fe-1/2/1 unit 0 family inet address 10.0.0.5/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. OSPF □□ □ □□ □□ □□□□□ □□□□(IGP)□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R2# set interface fe-1/2/1.0
user@R2# set interface lo0.0 passive
```

3. □□□□ R1□ EBGP □□□ □□□□□.

```
[edit protocols bgp group ext]
user@R2# set type external
user@R2# set peer-as 100
user@R2# set neighbor 10.0.0.1
```

4. □□□□ R3□ IBGP □□□ □□□□□.

```
[edit protocols bgp group int]
user@R2# set type internal
user@R2# set local-address 192.168.0.2
user@R2# set neighbor 192.168.0.3
```

5. IBGP □□ □□□ □□□ advertise-external □□ □□□□□.

```
[edit protocols bgp group int]
user@R2# set advertise-external
```

6. AS(Autonomous System) □□□ □□□ ID□ □□□□□.

```
[edit routing-options ]
user@R2# set router-id 192.168.0.2
user@R2# set autonomous-system 200
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ??? ??? ????? ????? ???? ? ?? ???? ????? ???? ????????.

```
user@R2# show interfaces
fe-1/2/0 {
    unit 0{
        description to-R1;
        family inet {
            address 10.0.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        description to-R3;
        family inet {
            address 10.0.0.5/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group ext {
        type external;
        peer-as 100;
        neighbor 10.0.0.1;
    }
    group int {
        type internal;
        local-address 192.168.0.2;
        advertise-external;
```

```
        neighbor 192.168.0.3;
    }
}
ospf {
    area 0.0.0.0 {
        interface fe-1/2/1.0;
        interface lo0.0 {
            passive;
        }
    }
}
```

```
user@R2# show routing-options
router-id 192.168.0.2;
autonomous-system 200;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

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BGP □□ □□ □□

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□□□□ R2□□ 172.16.6.0/24 □□□□ □□□ □□□□ □□ □□□□ □□ □□□ □□□□□ □□□□□.

??

```
user@R2> show route 172.16.6

inet.0: 8 destinations, 9 routes (8 active, 1 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.6.0/24      *[BGP/170] 00:00:07, localpref 200, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/1.0
                    [BGP/170] 03:23:03, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
```

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???? R2? ???? R1? ???? R3?? ?? 172.16.6.0/24 ??? ??????. ???? R3? ??? ??(*)? ??? ?? ??????. ?? ??? ? ? ?? local ??? ??????. ? ??? local ??? ??????? ???? R3? ??? ?? ?? AS ??? ?????? ?? ??? ??????.

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???? R2?? 172.16.6.0/24 ??? ???? R3?? ?????? ??????.

??

```
user@R2> show route advertising-protocol bgp 192.168.0.3

inet.0: 8 destinations, 9 routes (8 active, 1 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  172.16.6.0/24           10.0.0.1                     100        100 I
```

??

???? R2? ???? R3?? 172.16.6.0/24 ??? ??????.

□□□□ R3□□ □□ □□

□□

172.16.6.0/24 □□□□ □□□□ R3□ □□□ □□□□ □□□ □□□□□.

□□

```
user@R3> show route 172.16.6.0/24

inet.0: 7 destinations, 8 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.6.0/24      *[Static/5] 03:34:14
                      Reject
                    [BGP/170] 06:34:43, localpref 100, from 192.168.0.2
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.5 via fe-1/2/0.6
```

□□

□□□□ R3□ □□ □□□ 172.16.6.0/24□ □□ BGP □□□ □□□□□.

□□□ □□□ □ □□□ □□ □□ □□ □□□□ □□ BGP □□□ □□□□ R3□ □□□□□. □ □□ □□□ □□□□ □□, □ □□ □□□□ R3(static route 0.0.0.0/0 next-hop 10.0.0.5)□ □□ □□ □□□ □□□□□.

□□□ □□ □□

□□

conditional □□□ BGP □□ □□ □□□□□ □□□□ □□□ □□□□□ □□□□□.

□□

1. □□□□ R2□□ conditional □□□ □□□□□.

```
[edit  protocols bgp group int]
user@R2# set advertise-external conditional
user@R2# commit
```

2. □□□□ R2□□ 172.16.6.0/24 □□□ □□□□ R3□□ □□□□□ □□□□□.

```
user@R2> show route advertising-protocol bgp 192.168.0.3
```

□□□□ □□□ □ □□ □□□□ □□□□. □ □□□ □□□ □ □ □□□□ □ □□ □□□□.

3. □□□□ R3□□ then local-preference □□ □□□ □□□□□□□□.

```
[edit policy-options policy-statement send-static term 1]
user@R3# deactivate logical-systems R3 then local-preference
user@R3# commit
```

4. □□□□ R2□□ □ □□□ local □□□ □□□□ □□□□□.

```
user@R2> show route 172.16.6.0/24

inet.0: 8 destinations, 9 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.6.0/24      *[BGP/170] 08:02:59, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
                    [BGP/170] 00:07:51, localpref 100, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/1.0
```

5. □□□□ R2□□ as-path-ignore □□ □□□□□.

```
[edit protocols bgp]
user@R2# set path-selection as-path-ignore
user@R2# commit
```

6. □□□□ R2□□ 172.16.6.0/24 □□□ □□□□ R3□□ □□□□□ □□□□□.

```
user@R2> show route advertising-protocol bgp 192.168.0.3

inet.0: 8 destinations, 9 routes (8 active, 0 holddown, 0 hidden)
```

```
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.6.0/24           10.0.0.1                     100        100 I
```

□□□□ AS □□ □□□ □□□□ local □□□ □□□□□ □□ □□□ □□□□□.

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□: □□□ □□□ □□□□ BGP □□

BGP □□ □□ □□

□: □□□ □□□ □□□□ BGP □□

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□□□□□ BGP□ □□ □□□ □□□□□□□. Junos OS□ □□ □□□ □□□□ □□□□□ BGP□ □□□ □□□ □□□ BGP□ □□□□□ advertise-inactive □□ □□□□□□□.

```
advertise-inactive;
```

Junos OS□□ BGP□ BGP □□ □□ □□□ □□ □□ □ □□□ □□□ □□□□□ □□□□ BGP □□□ □□□□□. □□□□ advertise-inactive □□ □ BGP □□□ □□ □□□ □□□□□ □□□□□.

□: □□□ □□□□ □□□ □□ □□□□ □□ □□□ □□□ □□□ □ □□ BGP □□□ □□ □□, □□ advertise-inactive □□□ BGP □□□□ □□□□ □□□□. □ □□ □□ □□ BGP □□□ □□ □□ □□□ BGP □□□ □□□□ □□□□. □□□ □□ □□□ □□ □ □□ □□ □□ advertise-inactive □□□ BGP □□□ □□□□□.

□: □□□□ advertise-inactive □□□□ □□ □□□□□ □□□ □□ VRF□□ □□□ □□□ □□□□ □ □□□ □□ □□□□.

Junos OS□ □□ □□□ □□ □□□ □□□□ BGP □□□□ □□ □□□ □□□□□. □□□ □□ □□ □□ □□□ □□□ □□□□ □ □□□□:

```
policy-options {
    policy-statement name{
        from state (active|inactive);
    }
}
```

□ □□□□ □□□□ □□□ □□□□□□□ □□□ □□ □□□□□. □□□ □□(□: BGP)□ □□□ □ □□ □□□□□ □□ □□□ □□□□ □□, state inactive (□□ advertise-external) □□ □□□ □□□ □□□ advertise-inactive □□□□□.

□□ □□, □□ □□□ BGP □□□□ □□□□ □□□□ □□□ □□ □□□□□ □□□□ □□ advertise-inactive □□□ □□□ □□□ □ □□□□. □□ community□ □□□ □□ □□□□ □□□□ □□□ □□□□□ □□□ □□□ □□□□ □ □□□□. □□ □□ □□□□□ □□□□ □□□□ □□□□ □□ □□ □□□ □ □□ □□□ □□□ □□ □□□ □□□ □□□□ □ □□□ □ □□□□.

```
user@host# show policy-options
policy-statement mark-inactive {
    term inactive {
        from state inactive;
        then {
            community set comm-inactive;
        }
    }
    term default {
        from protocol bgp;
        then accept;
    }
    then reject;
}
community comm-inactive members 65536:65284;
```

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? ??? ???? R2?? ???? R1? ???? R3??? ? ?? ?? BGP(EBGP) ??? ????.

???? R1?? 172.16.5/24? ?? ?? ??? ????. ????? ???? R2?? 172.16.5/24? ?? ?? ??? ????. ???? R1? BGP? ?? ?? ??? ?? ??? ???? R2? ?????. ?? ???? R2? ? ?? ??, ? ?? ?? ??? ???? R1?? ??? BGP ?? ??? 172.16.5/24? ?? ??? ????. ?? ??? BGP ?? ???? ????? BGP ??? ???? R2?? ????????. ????? ???? R2? BGP ?? ??? ???? R3? ?????, ???? R2? BGP ??? ??? ???? ??? ? ??? ???? ????. ??? ???? R3? ???? R2? ? ??? ??? advertise-inactive ?? ?? ? 172.16.5/24? ?? ??? ???, ?? ?? ???? R2? BGP ??? ???? R3?? ???? ?.

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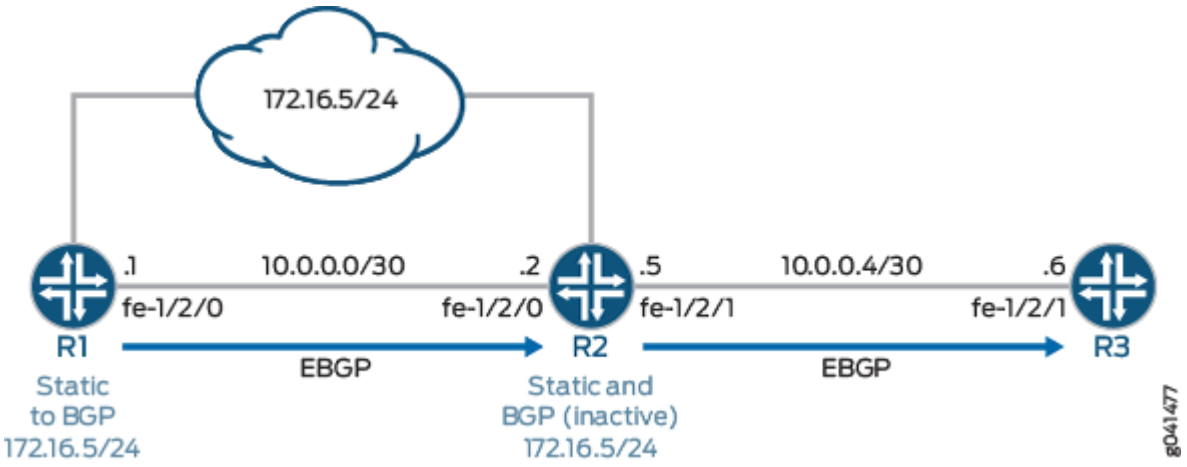
?? 10 ??? 92? ?? ????? ??????.

?? 10: advertise-inactive? ?? BGP ????



"CLI ?? ??" ??? 93?(?) ?? 10 ??? 92 ? ?? ????? ??? ?????.

?? "No Link Title" ??? 94? ???? R2? ??? ?????.

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CLI ?? ??

? ?? ??? ??????, ?? ??? ????? ??? ??? ?? ?? ?? ?? ????????? ?????, ????? ??? ????? ? ??? ?? ??? ??? [edit] ? ? ????? ??? CLI? ??? ?? ?????.

???? R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group to_R2 type external
set protocols bgp group to_R2 export send-static
set protocols bgp group to_R2 neighbor 10.0.0.2 peer-as 200
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 172.16.5.0/24 discard
set routing-options static route 172.16.5.0/24 install
set routing-options autonomous-system 100
```

???? R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.5/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group to_R1 type external
set protocols bgp group to_R1 neighbor 10.0.0.1 peer-as 100
set protocols bgp group to_R3 type external
set protocols bgp group to_R3 advertise-inactive
set protocols bgp group to_R3 neighbor 10.0.0.6 peer-as 300
set routing-options static route 172.16.5.0/24 discard
set routing-options static route 172.16.5.0/24 install
set routing-options autonomous-system 200
```

□□□□ R3

```
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.6/30
set interfaces fe-1/2/0 unit 9 family inet address 10.0.0.9/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.5
set routing-options autonomous-system 300
```

□□

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□□□□ R2 □□:

1. □□□□ □□□□□□ □□□□□.

   ```
   [edit interfaces]
   user@R2# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
   user@R2# set fe-1/2/1 unit 0 family inet address 10.0.0.5/30
   user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
   ```

2. □□□□ R1□ EBGP □□□ □□□□□.

   ```
   [edit protocols bgp group to_R1]
   user@R2# set type external
   user@R2# set neighbor 10.0.0.1 peer-as 100
   ```

3. □□□□ R3□ EBGP □□□ □□□□□.

   ```
   [edit protocols bgp group to_R3]
   user@R2# set type external
   user@R2# set neighbor 10.0.0.6 peer-as 300
   ```

4. advertise-inactive □□□□ R3□□ EBGP □□ □□□ □□□ □□ □□□□□.

```
[edit protocols bgp group to_R3]
user@R2# set advertise-inactive
```

5. 172.16.5.0/24 □□□□□ □□ □□ □□□ □□□□□.

```
[edit routing-options static]
user@R2# set route 172.16.5.0/24 discard
user@R2# set route 172.16.5.0/24 install
```

6. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R2# set autonomous-system 200
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R2# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        family inet {
            address 10.0.0.5/30;
        }
    }
}
lo0 {
    unit 0 {
```

```
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group to_R1 {
        type external;
        neighbor 10.0.0.1 {
            peer-as 100;
        }
    }
    group to_R3 {
        type external;
        advertise-inactive;
        neighbor 10.0.0.6 {
            peer-as 300;
        }
    }
}
```

```
user@R2# show routing-options
static {
    route 172.16.5.0/24 {
        discard;
        install;
    }
}
autonomous-system 200;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

??

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??? ????? ????? ??? ??????.

BGP ?? ?? ??

??

????? R2?? 172.16.5.0/24 ????? ???? ????? ?? ????? ?? ???? ???? ???? ??????.

??

```
user@R2> show route 172.16.5

inet.0: 7 destinations, 8 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.5.0/24      *[Static/5] 21:24:38
                      Discard
                    [BGP/170] 21:21:41, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
```

??

???? R2? ???? R1? ????? ???? ?? ?? ????? 172.16.5.0/24 ???? ??????. ?? ???? ??(*)? ???? ?? ??????. ?? ?? ??? BGP ?? ??(170)? ?? ?? ?? ???? ?? ????(5). ???? ?? ???? ???????.

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□□□□ R2□□ 172.16.5.0/24 □□□ □□□□ R3□□ □□□□□ □□□□□.

□□

```
user@R2> show route advertising-protocol bgp 10.0.0.6


inet.0: 6 destinations, 7 routes (6 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  172.16.5.0/24           Self                                    100 I
```

□□

□□□□ R2□ □□□□ R3□□ 172.16.5.0/24 □□□ □□□□ □□□□

□□□□ **R3□□ □□ □□**

□□

172.16.6.0/24 □□□□ □□□□ R3□ □□□ □□□□ □□□ □□□□□.

□□

```
user@R3> show route 172.16.5.0/24

inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.5.0/24      *[BGP/170] 00:01:19, localpref 100
                      AS path: 200 100 I, validation-state: unverified
                    > to 10.0.0.5 via fe-1/2/1.0
```

□□

□□□□ R3□□ 172.16.5.0/24□ □□ BGP □□ □□□ □□□□.

advertise-inactive □ □□

□□

□□□□ R2□ advertise-inactive BGP □□□□ □□ □□□□ □□□ □□□ □□□□□.

□□

1. □□□□ R2□□ □□ □□□□□□□□ advertise-inactive .

```
[edit  protocols bgp group to_R3]
user@R2# deactivate advertise-inactive
user@R2# commit
```

2. □□□□ R2□□ 172.16.5.0/24 □□□ □□□□ R3□□ □□□□□ □□□□□.

```
user@R2> show route advertising-protocol bgp 10.0.0.6
```

□□□□ □□□ □ □□ □□□□ □□□□.

3. □□□□ R3□□ 172.16.5/24 □□□ □□□ □□□□ □□□ □□□□□.

```
user@R3> show route 172.16.5/24
```

□□

□□□□ R1□ □□□□ R2□ □□ 172.16.5/24□ □□□□□, □□□□ R2□ □ □□□□ □□ □□□□ □□□ □□ □□□ □□□ □□□□. □□ □□□ BGP □□□□ □□□□□, □□□□ R2□ BGP □□□ □□□ □□□ □□□□□. BGP □□□ □□□□□ □□□ □□□ □□□□ R2□ BGP □□□ □□□□ R3□□ □ □ □□□□ □□□□. □□ Junos OS□ □□ □□□□□. □□□□ R2□ BGP □□□ □□□□ □□□□ advertise-inactive □□, □□□□ R2□ □□□ □ □□ □□ □□□□□.

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> *□: □□ □□□ □□□ □□ □□□ □□□□ □□□ □□ □□*
>
> *BGP □□ □□ □□*

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? ????? ???? ???? ????? BGP?? ???? ???? ?? ?? ???? ????? ???? ?? ????. ???? ???? ?? ????? ???? ? ?????. ?? ????? ? ?? ????? ???? ?? ?? ???? ?? ?? ? ????? ?? ?? ?????. ?? ???? ?? ???? ?? ???? ?? ???? ???? BGP ?? OSPF? ?? ???? ??????? ???? ????? ??????. ?? ????????? ? ???? *?/? ?/?* ?? ????.

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???? ???? ?? ??, BGP ?? IGP(Interior Gateway Protocol) ?? ?? ?? ????? ???? ? ?????. Junos OS? ???? ?? ???? ?? ???? ???? ?, ?? ?? ????? ?? ???? ?? ???? ????? ? ???? ???? ????? ??????. ?????? ???? ??????? BGP?? ???? ???? ? ? ?? 170? ??????. ?? ???? ????? ???? BGP? ?? ?? ?? ?? ????, ?? BGP?? ???? ???? ?? ???? ? ????? ?? ???? ?? ?? ????.

?? ???? ?? BGP(EBGP)? ?? 20, ?? BGP(IGBP)? ?? 200? ???(??)? ???? ?????. Junos OS? EBGP? IBGP ???? ? ?? ?(170)? ??????. ???? Junos OS? ?? IBGP ????? EBGP ???? ????? ???? ?? ?? ???? ???? ???? ???? ???? ?????.

?????? ?? ? ?? ???? BGP ???? ???? IGP ??????. ?? ??, ?? ???? OSPF ???? 110? ???? ??????. ?? EBGP ?? 20?? ????, ???? OSPF ???? ?? EBGP ???? ????? ????. ???? ??????? Junos OS? ?? OSPF ???? ?? ?? ?? 10? ?? OSPF ? ?? ?? ?? ?? 150 ???? OSPF ???? ?????, ?? ?? ?? BGP ???? ???? ?? ???? 170?? ?????.

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□□ □□□□□□□ □□□□ R1 □ □□□□ R3□ □□□□ R2□ EBGP □□□ □□□□.

□□□□ R2□□ □□□□ □□□ □□ □□□ □□□□□.

- □□ □ 10.0.0.1(□□□□ R1)□□ BGP□ □□ □□□ □□□ □□ □□ □□ □□□ 10□□ □□□□□.
- □□ □ 10.1.0.2(□□□□ R3)□□ BGP□ □□ □□□ □□□ □□ □□ □□ □□□ 15□ □□□□□.

□□ 11 □□□ 101□ □□ □□□□□ □□□□□.

□□ 11: BGP □□ □ □□□□

"CLI □□ □□" □□□ 101□(□) □□ 11 □□□ 101 □ □□ □□□□□ □□□ □□□□□.

□□ "No Link Title" □□□ 103□ □□□□ R2□ □□□ □□□□□.

□□

in this section

- CLI □□ □□ | **101**
- □□ | **103**

CLI □□ □□

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□□□□ R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 100
```

□□□□ R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext import set-preference
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols bgp group ext neighbor 10.1.0.2 peer-as 300
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set policy-options policy-statement set-preference term term1 from protocol bgp
set policy-options policy-statement set-preference term term1 from next-hop 10.0.0.1
set policy-options policy-statement set-preference term term1 then preference 10
set policy-options policy-statement set-preference term term2 from protocol bgp
set policy-options policy-statement set-preference term term2 from next-hop 10.1.0.2
set policy-options policy-statement set-preference term term2 then preference 15
set routing-options autonomous-system 200
```

□□□□ R3

```
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.1.0.1
set policy-options policy-statement send-direct term 1 from protocol direct
```

```
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 300
```

□□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□* □□□□□□.

□□□ R2 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
user@R2# set fe-1/2/1 unit 0 family inet address 10.1.0.1/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. □□ AS(Autonomous System)□ □□□□□.

```
[edit routing-options]
user@R2# set autonomous-system 200
```

3. □□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R2# set from protocol direct
user@R2# set then accept
```

4. □□□ □□□ □□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement set-preference]
user@R2# set term term1 from protocol bgp
user@R2# set term term1 from next-hop 10.0.0.1
user@R2# set term term1 then preference 10
user@R2# set term term2 from protocol bgp
user@R2# set term term2 from next-hop 10.1.0.2
user@R2# set term term2 then preference 15
```

5. [illegible] R2[illegible] [illegible] [illegible] [illegible].

```
[edit protocols bgp group ext]
user@R2# set type external
user@R2# set export send-direct
user@R2# set neighbor 10.0.0.1 peer-as 100
user@R2# set neighbor 10.1.0.2 peer-as 300
```

6. set-preference [illegible] [illegible] [illegible] [illegible].

   [illegible] [illegible] R2[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] R1 [illegible] [illegible] R3[illegible] [illegible] [illegible] [illegible].

```
[edit protocols bgp group ext]
user@R2# set import set-preference
```

[illegible]

[illegible] [illegible] show interfaces, show protocols, show policy-options [illegible] show routing-options [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R2# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        family inet {
            address 10.1.0.1/30;
        }
    }
}
lo0 {
    unit 0{
        family inet {
            address 192.168.0.2/32;
        }
```

```
    }
}
```

```
user@R2# show protocols
bgp {
    group ext {
        type external;
        import set-preference;
        export send-direct;
        neighbor 10.0.0.1 {
            peer-as 100;
        }
        neighbor 10.1.0.2 {
            peer-as 300;
        }
    }
}
```

```
user@R2# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
policy-statement set-preference {
    term term1 {
        from {
            protocol bgp;
            next-hop 10.0.0.1;
        }
        then {
            preference 10;
        }
    }
    term term2 {
        from {
            protocol bgp;
            next-hop 10.1.0.2;
        }
```

```
        then {
            preference 15;
        }
    }
}
```

```
user@R2# show routing-options
autonomous-system 200;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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□□

□□□□ R1 □ □□□□ R2□ □□□ □□□□ □□□□ R1□ □□□ EBGP □□ □□ 8□ □□□□ □□□□ R2□ □□ EBGP □□ □□ 170□ □□□□□ □□□ □□□□□ □□□□□.

□□

□□ □□□□ show route protocols bgp □□□ □□□□□.

```
user@R2> show route protocols bgp
inet.0: 7 destinations, 9 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.0/30         [BGP/10] 04:42:23, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
```

```
10.1.0.0/30         [BGP/15] 04:42:23, localpref 100
                      AS path: 300 I, validation-state: unverified
                    > to 10.1.0.2 via fe-1/2/1.0
192.168.0.1/32     *[BGP/10] 04:42:23, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
192.168.0.3/32     *[BGP/15] 04:42:23, localpref 100
                      AS path: 300 I, validation-state: unverified
                    > to 10.1.0.2 via fe-1/2/1.0
```

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□□ □□, □□□□ R2□□ □□□□ R3□□ □□□ □□□ □□ □□ □□ 15□ □□□□□, □□□□ R1□□ □□□ □□□ □□ □□ □□ 10□□ □□□□□□ □□□ □□.

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> □□ □□ □□ □□
>
> □□ BGP □□□ □□ □□

□: BGP □□ □□ □□□

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Junos OS□ □ EBGP □□□□ □□□ □□□ □□□ □□ BGP(EBGP) □□□ □□ □□□ □□□□. □□ □□□□□□ □□□ □□□□□ □□□□ □□ □□□ □□□ AS(Autonomous System)□ □□ EBGP □□□ □□□ □□□ □□ □□□ □□□□. □□□ `advertise-peer-as` □□ □□□□ □ □□□ □□ □ □ □□□□.

□□□ `advertise-peer-as` □□ □□□□, BGP□ □ □□□ □□□□ □□□ □□□□□.

□□ □□□ □□□□□ □□□ no-advertise-peer-as □□ □□□□□.

```
no-advertise-peer-as;
```

□□□ as-override □□ □□□ □□ □□ □□ □□ □□□ □□□□□□□. □□□ as-override □□ no-advertise-peer-as □□ □□ □□□□ no-advertise-peer-as □□ □□□□□.

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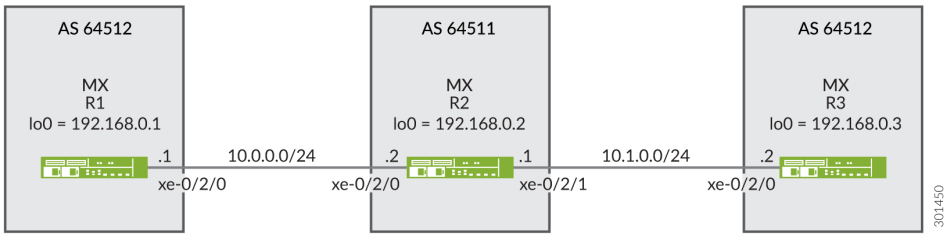
□ □□ □□ BGP(EBGP) □□□ □□ 3□□ □□□ □□□□□ □□□□□. □□□□ R2□ □□□□ R1□ □□ EBGP □□□ □□□□ R3□ □□ □ □□ EBGP □□□ □□□ □□□□. AS 64511□ □□ □□□□ R2□ □□ □□□□□, □□□□ R1□ □□□□ R3□ □□□ AS(AS 64512)□ □□□□. □□ □□ R1 □ □□□□ R3□ □□ □□□ □□□□□ □□□ BGP □□ □□□ □□□□□.

□□□□ R2□ □□□ □□□ □□□□□ □□□ □□□□, □□□□ advertise peer-as □□□□ R2□ □□ □□□□□ □□□□□. □□□□□ □□□□ R1□ □□□ □ R2□ 192.168.0.1 □□□ □□□□, □□□□ R2□ □□□ □□□ □□□□ □□□□ R2□ advertise peer-as □□□□ R3□ 192.168.0.1 □ □□ □□□ □ □□□□. □□□□□, □□□□ R3□ 192.168.0.3 □□□ □□□□ R2□ □□□□ advertise peer-as , □□□□ R2□ □□□ □□□□ R1 □ □□□ □ □□□ □□□.

□□□□ R1 □ □□□□ R3□ AS □□□ loops 2 □□ AS □□□ □□□ □□□ □□□□□ □□□ □□□□ R1 □ □□□□ R3□ □□ □□□□□.

□□□□

□□ 12: advertise-peer-as□ □□ BGP □□□□



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CLI □□ □□

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□□□ R1

```
set interfaces xe-0/2/0 description R1-to-R2
set interfaces xe-0/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp family inet unicast loops 2
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.0.0.2
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 64512
```

□□□□ R2

```
set interfaces xe-0/2/0 description R2-to-R1
set interfaces xe-0/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces xe-0/2/1 description R2-to-R3
set interfaces xe-0/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext advertise-peer-as
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 64512
set protocols bgp group ext neighbor 10.1.0.2 peer-as 64512
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 64511
```

□□□□ R3

```
set interfaces xe-0/2/0 description R3-to-R2
set interfaces xe-0/2/0 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp family inet unicast loops 2
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.1.0.1
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 64512
```

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□□□□ R1 □□

1. [illegible] [illegible] [illegible].

```
[edit interfaces]
user@R1# set xe-0/2/0 description R1-to-R2
user@R1# set xe-0/2/0 unit 0 family inet address 10.0.0.1/30
user@R1# set lo0 unit 0 family inet address 192.168.0.1/32
```

2. BGP[illegible] [illegible].

```
[edit protocols bgp group ext]
user@R1# set type external
user@R1# set peer-as 64511
user@R1# set neighbor 10.0.0.2
```

3. [illegible] [illegible] [illegible] R3[illegible] [illegible] [illegible] R1[illegible] [illegible] [illegible] [illegible] loops 2 .

[illegible] loops 2 [illegible] [illegible] [illegible] AS [illegible] [illegible] [illegible] [illegible] AS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] AS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols bgp family inet unicast]
user@R1# set loops 2
```

4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit policy-options policy-statement send-direct term 1]
user@R1# set from protocol direct
user@R1# set then accept
```

5. [illegible] R2[illegible] BGP [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols bgp group ext]
user@R1# set export send-direct
```

6. AS(Autonomous System) [illegible] [illegible].

```
[edit routing-options ]
user@R1# set autonomous-system 64512
```

□□□ □□

□□□□ R2 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set xe-0/2/0 description R2-to-R1
user@R2# set xe-0/2/0 unit 0 family inet address 10.0.0.2/30
user@R2# set xe-0/2/1 description R2-to-R3
user@R2# set xe-0/2/1 unit 0 family inet address 10.1.0.1/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. BGP□ □□□□□.

```
[edit  protocols bgp group ext]
user@R2# set type external
user@R2# set neighbor 10.0.0.1 peer-as 64512
user@R2# set neighbor 10.1.0.2 peer-as 64512
```

3. □□□ EBGP □□□□ □□□ □□□ □□□ AS□ □□ EBGP □□□ □□□□□ □□□□ R2□ □□□□□.

   □, □□□□ R1□ □□□□ R3□ □□□ AS□ □□□□ □□□□ R3□□ □□□ □□□□ R1 □□□ □□□□□(□□ □ □□).

```
[edit  protocols bgp group ext]
user@R2# set advertise-peer-as
```

4. □□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R2# set from protocol direct
user@R2# set then accept
```

5. □□□□ □□□ □□□□□.

```
[edit protocols bgp group ext]
user@R2# set export send-direct
```

6. AS ??? ?????.

```
[edit routing-options]
user@R2# set autonomous-system 64511
```

??

?? ???? show interfaces, show protocols, show policy-options ? show routing-options ??? ???? ??? ?????. ?? ??? ??? ???? ???? ??? ? ?? ??? ???? ??? ???????.

???? R1

```
user@R1# show interfaces
xe-0/2/0 {
    description R1-to-R2;
    unit 0 {
        family inet {
            address 10.0.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
    }
}
```

```
user@R1# show protocols
bgp {
    family inet {
        unicast {
            loops 2;
        }
    }
    group ext {
        type external;
        export send-direct;
        peer-as 64511;
```

```
        neighbor 10.0.0.2;
    }
}
```

```
user@R1# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
```

```
user@R1# show routing-options
autonomous-system 64512;
```

???? R2

```
user@R2# show interfaces
xe-0/2/0 {
    description R2-to-R1;
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
xe-0/2/1 {
    description R2-to-R3;
    unit 0 {
        family inet {
            address 10.1.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
```

```
    }
}
```

```
user@R2# show protocols
bgp {
    group ext {
        type external;
        advertise-peer-as;
        export send-direct;
        neighbor 10.0.0.1 {
            peer-as 64512;
        }
        neighbor 10.1.0.2 {
            peer-as 64512;
        }
    }
}
```

```
user@R2# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
```

```
user@R2# show routing-options
autonomous-system 64511;
```

□□□□ □□□ □□□□ □□□□□□□ commit□(□) □□□□□.

□□

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- BGP □□ □□ | **116**

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BGP □□ □□

□□

□□□□ R1 □ □□□□ R3□ □□□ □□□□ □□ □□□ □□□□ □□□ □□□□□.

□□

1. □□□□ R2□□ BGP □□□ □□ □□□□ advertise-peer-as □□□.

```
[edit  protocols bgp group ext]
user@R2# deactivate advertise-peer-as
user@R2# commit
```

2. □□□□ R3□□ BGP □□□ □□ □□□□ loops □□□.

```
[edit  protocols bgp family inet unicast ]
user@R3# deactivate unicast loops
user@R3# commit
```

3. □□□□ R1□□ □□□□ R2□ □□□□ □□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.0.0.2
inet.0: 5 destinations, 6 routes (5 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.0/30             Self                                    I
* 192.168.0.1/32          Self                                    I
```

4. □□□□ R2□□ □□□□ R1□□ □□□□ □□□ □□□□□.

```
user@R2> show route receive-protocol bgp 10.0.0.1
inet.0: 7 destinations, 9 routes (7 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  10.0.0.0/30             10.0.0.1                                64512 I
* 192.168.0.1/32          10.0.0.1                                64512 I
```

5. □□□□ R2□□ □□□□ R3□ □□□□ □□□ □□□□□.

```
user@R2> show route advertising-protocol bgp 10.1.0.2
inet.0: 7 destinations, 9 routes (7 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.0/30             Self                                    I
* 10.1.0.0/30             Self                                    I
* 192.168.0.2/32          Self                                    I
```

6. □□□□ R2□ BGP □□□□ □□ □□□□□□□ advertise-peer-as .

```
[edit  protocols bgp group ext]
user@R2# activate advertise-peer-as
user@R2# commit
```

7. □□□□ R2□□ □□□□ R3□ □□□ □□□ □□ □□□□□.

```
user@R2> show route advertising-protocol bgp 10.1.0.2
inet.0: 7 destinations, 9 routes (7 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.0/30             Self                                    I
* 10.1.0.0/30             Self                                    I
* 192.168.0.1/32          Self             64512 I
* 192.168.0.2/32          Self                                    I
* 192.168.0.3/32          10.1.0.2         64512 I
```

8. □□□□ R3□□, □□□□ R2□□ □□□ □□□ □□□□□.

```
user@R3> show route receive-protocol bgp 10.1.0.1
inet.0: 5 destinations, 6 routes (5 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.0/30             10.1.0.1                                64511 I
  10.1.0.0/30             10.1.0.1                                64511 I
* 192.168.0.2/32          10.1.0.1                                64511 I
```

9. [illegible] R3[illegible] BGP [illegible] [illegible] [illegible] loops .

```
[edit  protocols bgp family inet unicast ]
user@R3# activate unicast loops
user@R3# commit
```

10. [illegible] R3[illegible], [illegible] R2[illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R3> show route receive-protocol bgp 10.1.0.1
inet.0: 6 destinations, 8 routes (6 active, 0 holddown, 1 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.0/30             10.1.0.1                                64511 I
  10.1.0.0/30             10.1.0.1                                64511 I
* 192.168.0.1/32          10.1.0.1                                64511 64512 I
* 192.168.0.2/32          10.1.0.1                                64511 I
```

[illegible]

advertise-peer-as [illegible] [illegible] loops [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] R1[illegible] [illegible] R1[illegible] [illegible] [illegible] [illegible] 192.168.0.1/32[illegible] [illegible] [illegible] [illegible] R2[illegible] [illegible]. [illegible] R2[illegible] [illegible] [illegible] R3[illegible] [illegible] [illegible]. [illegible] [illegible] advertise-peer-as [illegible] [illegible] [illegible] R2[illegible] [illegible] R3[illegible] 192.168.0.1/32 [illegible] [illegible]. [illegible] R3[illegible] [illegible] [illegible] [illegible] loops [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

> *[illegible]: [illegible] [illegible] [illegible] AS [illegible] [illegible] 3 VPN [illegible]*

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- [illegible] | 119
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```
set policy-options policy-statement rejectpolicy1 term rejectterm1 from route-filter 0.0.0.0/0
upto /7 accept
set policy-options policy-statement rejectpolicy1 term rejectterm1 from route-filter 0.0.0.0/8
orlonger reject
set policy-options policy-statement test term 1 from protocol direct
```

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1. ??? ???? ?????.

```
[edit]
user@host# edit policy-options policy-statement rejectpolicy1
```

2. ?? ??? ??????.

```
[edit policy-options policy-statement rejectpolicy1]
user@host# edit term rejectterm1
```

3. ??? ???? ????? ????? ??????.

```
[edit policy-options policy-statement rejectpolicy1 term rejectterm1]
user@host# set from route-filter 0/0 upto /7 accept
```

4. ??? ???? ????? ????? ?????.

```
[edit policy-options policy-statement rejectpolicy1 term rejectterm1]
user@host# set from route-filter 0/8 orlonger reject
```

??

?? ????? show policy-options ??? ????? ??? ??????. ???? ???? ???? ????? ???, ? ?? ?? ??? ????? ??????.

```
user@host# show policy-options
policy-statement rejectpolicy1 {
    term rejectterm1 {
        from {
            route-filter 0.0.0.0/0 upto /7 accept;
            route-filter 0.0.0.0/8 orlonger reject;
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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□□ □□□□ show policy-options □□□ □□□□□.

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- [illegible] ISP-3 [illegible] | 147
- [illegible] Exchange-2 [illegible] | 154
- [illegible] Private-Peer-2 [illegible] | 163
- [illegible] | 163

[illegible] [illegible] ISP([illegible] [illegible] [illegible]) [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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[illegible]

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[illegible] [illegible] ISP[illegible] AS [illegible] 64510[illegible]. ISP[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible](AS 64514 [illegible] AS 64515)[illegible] [illegible]. [illegible] ISP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible](AS 64513 [illegible] AS 64516)[illegible] [illegible]. ISP[illegible] [illegible] [illegible] [illegible](AS 64511 [illegible] AS 64512)[illegible] [illegible] [illegible].

ISP [illegible] [illegible] [illegible] [illegible]. [illegible], [illegible] [illegible] ISP[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. ISP[illegible] AS 64510 [illegible] [illegible] [illegible] 172.16.32.0/21[illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].
2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible], ISP[illegible] [illegible] BGP [illegible] [illegible] [illegible](AS [illegible] [illegible] [illegible] [illegible])[illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ISP[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].
3. ISP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible], ISP[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] ISP[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].
4. [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible]. Customer-1[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible]-2[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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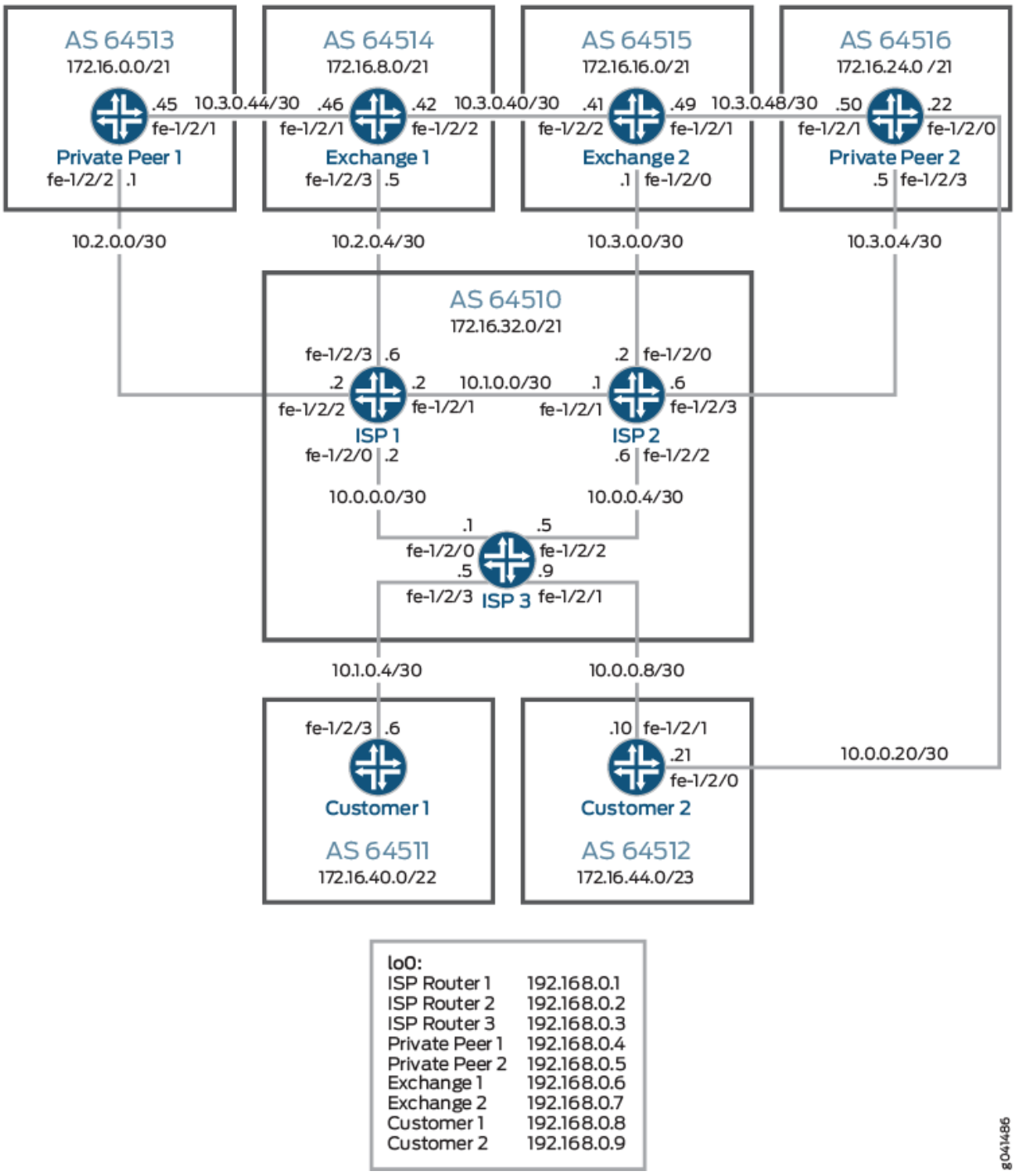
?? 13: ISP ???? ??


AS 64513
172.16.0.0/21
.45
fe-1/2/1
Private Peer 1
fe-1/2/2 .1
10.3.0.44/30
AS 64514
172.16.8.0/21
.46
fe-1/2/1
.42
fe-1/2/2
Exchange 1
fe-1/2/3 .5
10.3.0.40/30
AS 64515
172.16.16.0/21
.41
fe-1/2/2
.49
fe-1/2/1
Exchange 2
.1 fe-1/2/0
10.3.0.48/30
AS 64516
172.16.24.0 /21
.50
fe-1/2/1
.22
fe-1/2/0
Private Peer 2
.5 fe-1/2/3
10.2.0.0/30
10.2.0.4/30
10.3.0.0/30
10.3.0.4/30
AS 64510
172.16.32.0/21
fe-1/2/3 .6
.2 fe-1/2/0
.2
fe-1/2/2
fe-1/2/1
10.1.0.0/30
.1
fe-1/2/1
.6
fe-1/2/3
ISP 1
ISP 2
fe-1/2/0 .2
.6 fe-1/2/2
10.0.0.0/30
10.0.0.4/30
.1
.5
fe-1/2/0
fe-1/2/2
.5
.9
fe-1/2/3
ISP 3
fe-1/2/1
10.1.0.4/30
10.0.0.8/30
fe-1/2/3 .6
Customer 1
AS 64511
172.16.40.0/22
.10 fe-1/2/1
.21
fe-1/2/0
Customer 2
AS 64512
172.16.44.0/23
10.0.0.20/30
lo0:
ISP Router 1 192.168.0.1
ISP Router 2 192.168.0.2
ISP Router 3 192.168.0.3
Private Peer 1 192.168.0.4
Private Peer 2 192.168.0.5
Exchange 1 192.168.0.6
Exchange 2 192.168.0.7
Customer 1 192.168.0.8
Customer 2 192.168.0.9
g041486

[illegible]

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[illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [edit] [illegible] [illegible] CLI[illegible] [illegible] [illegible].

[illegible]-1

```
set interfaces fe-1/2/3 unit 0 description to_ISP-3
set interfaces fe-1/2/3 unit 0 family inet address 10.1.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.8/32
set protocols bgp group ext type external
set protocols bgp group ext export send-statics
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.1.0.5
set policy-options policy-statement send-statics term static-routes from protocol static
set policy-options policy-statement send-statics term static-routes then accept
set routing-options static route 172.16.40.0/25 reject
set routing-options static route 172.16.40.128/25 reject
set routing-options static route 172.16.41.0/25 reject
set routing-options static route 172.16.41.128/25 reject
set routing-options autonomous-system 64511
```

[illegible]-2

```
set interfaces fe-1/2/1 unit 0 description to_ISP-3
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.10/30
set interfaces fe-1/2/0 unit 0 description to-Private-Peer-2
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.21/30
set interfaces lo0 unit 0 family inet address 192.168.0.9/32
set protocols bgp group ext type external
set protocols bgp group ext import inbound-routes
set protocols bgp group ext export outbound-routes
set protocols bgp group ext neighbor 10.0.0.9 peer-as 64510
```

```
set protocols bgp group ext neighbor 10.0.0.22 peer-as 64516
set policy-options policy-statement inbound-routes term AS64510-primary from protocol bgp
set policy-options policy-statement inbound-routes term AS64510-primary from as-path AS64510-
routes
set policy-options policy-statement inbound-routes term AS64510-primary then local-preference 200
set policy-options policy-statement inbound-routes term AS64510-primary then accept
set policy-options policy-statement inbound-routes term AS64516-backup from protocol bgp
set policy-options policy-statement inbound-routes term AS64516-backup from as-path AS64516-
routes
set policy-options policy-statement inbound-routes term AS64516-backup then local-preference 50
set policy-options policy-statement inbound-routes term AS64516-backup then accept
set policy-options policy-statement outbound-routes term statics from protocol static
set policy-options policy-statement outbound-routes term statics then accept
set policy-options policy-statement outbound-routes term internal-bgp-routes from protocol bgp
set policy-options policy-statement outbound-routes term internal-bgp-routes from as-path my-own-
routes
set policy-options policy-statement outbound-routes term internal-bgp-routes then accept
set policy-options policy-statement outbound-routes term no-transit then reject
set policy-options as-path my-own-routes "()"
set policy-options as-path AS64510-routes "64510 .*"
set policy-options as-path AS64516-routes "64516 .*"
set routing-options static route 172.16.44.0/26 reject
set routing-options static route 172.16.44.64/26 reject
set routing-options static route 172.16.44.128/26 reject
set routing-options static route 172.16.44.192/26 reject
set routing-options autonomous-system 64512
```

□□□□ ISP-1

```
set interfaces fe-1/2/0 unit 0 description to_ISP-3
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 description to_ISP-2
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces fe-1/2/2 unit 0 description to_Private-Peer-1
set interfaces fe-1/2/2 unit 0 family inet address 10.2.0.2/30
set interfaces fe-1/2/3 unit 0 description to_Exchange-1
set interfaces fe-1/2/3 unit 0 family inet address 10.2.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.1
set protocols bgp group int export internal-peers
set protocols bgp group int neighbor 192.168.0.2
```

```
set protocols bgp group int neighbor 192.168.0.3
set protocols bgp group to_64513 type external
set protocols bgp group to_64513 export private-peer
set protocols bgp group to_64513 peer-as 64513
set protocols bgp group to_64513 neighbor 10.2.0.1
set protocols bgp group to_64514 type external
set protocols bgp group to_64514 export exchange-peer
set protocols bgp group to_64514 peer-as 64514
set protocols bgp group to_64514 neighbor 10.2.0.5
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement exchange-peer term AS64510-Aggregate from protocol aggregate
set policy-options policy-statement exchange-peer term AS64510-Aggregate from route-filter
172.16.32.0/21 exact
set policy-options policy-statement exchange-peer term AS64510-Aggregate then accept
set policy-options policy-statement exchange-peer term Customer-2-Aggregate from protocol
aggregate
set policy-options policy-statement exchange-peer term Customer-2-Aggregate from route-filter
172.16.40.0/22 exact
set policy-options policy-statement exchange-peer term Customer-2-Aggregate then accept
set policy-options policy-statement exchange-peer term reject-all-other-routes then reject
set policy-options policy-statement internal-peers term statics from protocol static
set policy-options policy-statement internal-peers term statics then accept
set policy-options policy-statement internal-peers term next-hop-self then next-hop self
set policy-options policy-statement private-peer term statics from protocol static
set policy-options policy-statement private-peer term statics then accept
set policy-options policy-statement private-peer term isp-and-customer-routes from protocol bgp
set policy-options policy-statement private-peer term isp-and-customer-routes from route-filter
172.16.32.0/21 orlonger
set policy-options policy-statement private-peer term isp-and-customer-routes then accept
set policy-options policy-statement private-peer term reject-all then reject
set routing-options static route 172.16.32.0/24 reject
set routing-options static route 172.16.33.0/24 reject
set routing-options aggregate route 172.16.32.0/21
set routing-options aggregate route 172.16.40.0/22
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
```

□□□□ ISP-2

```
set interfaces fe-1/2/1 unit 0 description to_ISP-1
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces fe-1/2/2 unit 0 description to_ISP-3
set interfaces fe-1/2/2 unit 0 family inet address 10.0.0.6/30
set interfaces fe-1/2/3 unit 0 description to_Private-Peer-2
set interfaces fe-1/2/3 unit 0 family inet address 10.3.0.6/30
set interfaces fe-1/2/0 unit 0 description to_Exchange-2
set interfaces fe-1/2/0 unit 0 family inet address 10.3.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.2
set protocols bgp group int export internal-peers
set protocols bgp group int neighbor 192.168.0.1
set protocols bgp group int neighbor 192.168.0.3
set protocols bgp group AS-64516 type external
set protocols bgp group AS-64516 export private-peer
set protocols bgp group AS-64516 peer-as 64516
set protocols bgp group AS-64516 neighbor 10.3.0.5
set protocols bgp group AS-64515 type external
set protocols bgp group AS-64515 export exchange-peer
set protocols bgp group AS-64515 peer-as 64515
set protocols bgp group AS-64515 neighbor 10.3.0.1
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement exchange-peer term AS64510-Aggregate from protocol aggregate
set policy-options policy-statement exchange-peer term AS64510-Aggregate from route-filter
172.16.32.0/21 exact
set policy-options policy-statement exchange-peer term AS64510-Aggregate then accept
set policy-options policy-statement exchange-peer term Customer-2-Aggregate from protocol
aggregate
set policy-options policy-statement exchange-peer term Customer-2-Aggregate from route-filter
172.16.44.0/23 exact
set policy-options policy-statement exchange-peer term Customer-2-Aggregate then accept
set policy-options policy-statement exchange-peer term reject-all-other-routes then reject
set policy-options policy-statement internal-peers term statics from protocol static
set policy-options policy-statement internal-peers term statics then accept
set policy-options policy-statement internal-peers term next-hop-self then next-hop self
set policy-options policy-statement private-peer term statics from protocol static
set policy-options policy-statement private-peer term statics then accept
```

```
set policy-options policy-statement private-peer term isp-and-customer-routes from protocol bgp
set policy-options policy-statement private-peer term isp-and-customer-routes from route-filter
172.16.32.0/21 orlonger
set policy-options policy-statement private-peer term isp-and-customer-routes then accept
set policy-options policy-statement private-peer term reject-all then reject
set routing-options static route 172.16.34.0/24 reject
set routing-options static route 172.16.35.0/24 reject
set routing-options aggregate route 172.16.44.0/23
set routing-options aggregate route 172.16.32.0/21
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 64510
```

???? ISP-3

```
set interfaces fe-1/2/0 unit 0 description to_ISP-1
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/2 unit 0 description to_ISP-2
set interfaces fe-1/2/2 unit 0 family inet address 10.0.0.5/30
set interfaces fe-1/2/3 unit 0 description to_Customer-1
set interfaces fe-1/2/3 unit 0 family inet address 10.1.0.5/30
set interfaces fe-1/2/1 unit 0 description to_Customer-2
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.9/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.3
set protocols bgp group int export internal-peers
set protocols bgp group int neighbor 192.168.0.1
set protocols bgp group int neighbor 192.168.0.2
set protocols bgp group to_64511 type external
set protocols bgp group to_64511 export customer-1-peer
set protocols bgp group to_64511 neighbor 10.1.0.6 peer-as 64511
set protocols bgp group to_64512 type external
set protocols bgp group to_64512 export customer-2-peer
set protocols bgp group to_64512 neighbor 10.0.0.10 peer-as 64512
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement customer-1-peer term defaut-route from route-filter
0.0.0.0/0 exact
set policy-options policy-statement customer-1-peer term defaut-route then accept
set policy-options policy-statement customer-1-peer term reject-all-other-routes then reject
set policy-options policy-statement customer-2-peer term statics from protocol static
```

```
set policy-options policy-statement customer-2-peer term statics then accept
set policy-options policy-statement customer-2-peer term isp-and-customer-routes from protocol
bgp
set policy-options policy-statement customer-2-peer term isp-and-customer-routes from route-
filter 172.16.32.0/21 orlonger
set policy-options policy-statement customer-2-peer term isp-and-customer-routes then accept
set policy-options policy-statement customer-2-peer term default-route from route-filter
0.0.0.0/0 exact
set policy-options policy-statement customer-2-peer term default-route then accept
set policy-options policy-statement customer-2-peer term reject-all-other-routes then reject
set policy-options policy-statement if-upstream-routes-exist term only-certain-contributing-
routes from route-filter 172.16.8.0/21 exact
set policy-options policy-statement if-upstream-routes-exist term only-certain-contributing-
routes then accept
set policy-options policy-statement if-upstream-routes-exist term reject-all-other-routes then
reject
set policy-options policy-statement internal-peers term statics from protocol static
set policy-options policy-statement internal-peers term statics then accept
set policy-options policy-statement internal-peers term next then next-hop self
set routing-options static route 172.16.36.0/24 reject
set routing-options static route 172.16.37.0/24 reject
set routing-options static route 172.16.38.0/24 reject
set routing-options static route 172.16.39.0/24 reject
set routing-options generate route 0.0.0.0/0 policy if-upstream-routes-exist
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 64510
```

□□ □□-1

```
set interfaces fe-1/2/3 unit 0 description to_ISP-1
set interfaces fe-1/2/3 unit 0 family inet address 10.2.0.5/30
set interfaces fe-1/2/2 unit 0 description to_Exchange-2
set interfaces fe-1/2/2 unit 0 family inet address 10.3.0.42/30
set interfaces fe-1/2/1 unit 0 description to_Private-Peer-1
set interfaces fe-1/2/1 unit 0 family inet address 10.3.0.45/30
set interfaces lo0 unit 0 family inet address 192.168.0.6/32
set protocols bgp group ext type external
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.2.0.6
set protocols bgp group ext neighbor 10.3.0.41 peer-as 64515
set policy-options policy-statement send-static from protocol static
```

```
set policy-options policy-statement send-static then accept
set routing-options static route 172.16.8.0/21 reject
set routing-options autonomous-system 64514
```

□□□□ □□-2

```
set interfaces fe-1/2/0 unit 0 description to_ISP-2
set interfaces fe-1/2/0 unit 0 family inet address 10.3.0.1/30
set interfaces fe-1/2/2 unit 0 description to_Exchange-1
set interfaces fe-1/2/2 unit 0 family inet address 10.3.0.41/30
set interfaces fe-1/2/1 unit 0 description to_Private-Peer-2
set interfaces fe-1/2/1 unit 0 family inet address 10.3.0.49/30
set interfaces lo0 unit 0 family inet address 192.168.0.7/32
set protocols bgp group ext type external
set protocols bgp group ext export outbound-routes
set protocols bgp group ext neighbor 10.3.0.2 peer-as 64510
set protocols bgp group ext neighbor 10.3.0.50 peer-as 64516
set protocols bgp group ext neighbor 10.3.0.42 peer-as 64514
set policy-options policy-statement outbound-routes term statics from protocol static
set policy-options policy-statement outbound-routes term statics then accept
set routing-options autonomous-system 64515
set routing-options static route 172.16.16.0/21 reject
```

□□□□ Private-Peer-1

```
set interfaces fe-1/2/2 unit 0 description to_ISP-1
set interfaces fe-1/2/2 unit 0 family inet address 10.2.0.1/30
set interfaces fe-1/2/1 unit 0 description to_Exchange-1
set interfaces fe-1/2/1 unit 0 family inet address 10.3.0.46/30
set interfaces lo0 unit 0 family inet address 192.168.0.4/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.2.0.2
set routing-options autonomous-system 64513
```

□□□□ Private-Peer-2

```
set interfaces fe-1/2/3 unit 0 description to_ISP-2
set interfaces fe-1/2/3 unit 0 family inet address 10.3.0.5/30
set interfaces fe-1/2/0 unit 0 description to_Customer-1
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.22/30
```

```
set interfaces fe-1/2/1 unit 0 description to_Exchange-2
set interfaces fe-1/2/1 unit 0 family inet address 10.3.0.50/30
set interfaces lo0 unit 0 family inet address 192.168.0.5/32
set protocols bgp group ext type external
set protocols bgp group ext export outbound-routes
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.3.0.6
set protocols bgp group to-64512 type external
set protocols bgp group to-64512 peer-as 64512
set protocols bgp group to-64512 neighbor 10.0.0.21
set protocols bgp group to-64512 export internal-routes
set protocols bgp group to-64515 type external
set protocols bgp group to-64515 export outbound-routes
set protocols bgp group to-64515 peer-as 64515
set protocols bgp group to-64515 neighbor 10.3.0.49
set policy-options policy-statement if-upstream-routes-exist term as-64515-routes from route-
filter 172.16.16.0/21 exact
set policy-options policy-statement if-upstream-routes-exist term as-64515-routes then accept
set policy-options policy-statement if-upstream-routes-exist term reject-all-other-routes then
reject
set policy-options policy-statement internal-routes term statics from protocol static
set policy-options policy-statement internal-routes term statics then accept
set policy-options policy-statement internal-routes term default-route from route-filter
0.0.0.0/0 exact
set policy-options policy-statement internal-routes term default-route then accept
set policy-options policy-statement internal-routes term reject-all-other-routes then reject
set policy-options policy-statement outbound-routes term statics from protocol static
set policy-options policy-statement outbound-routes term statics then accept
set policy-options policy-statement outbound-routes term allowed-bgp-routes from as-path my-own-
routes
set policy-options policy-statement outbound-routes term allowed-bgp-routes from as-path AS64512-
routes
set policy-options policy-statement outbound-routes term allowed-bgp-routes then accept
set policy-options policy-statement outbound-routes term no-transit then reject
set policy-options as-path my-own-routes "()"
set policy-options as-path AS64512-routes 64512
set routing-options static route 172.16.24.0/25 reject
set routing-options static route 172.16.24.128/25 reject
set routing-options static route 172.16.25.0/26 reject
set routing-options static route 172.16.25.64/26 reject
set routing-options generate route 0.0.0.0/0 policy if-upstream-routes-exist
set routing-options autonomous-system 64516
```

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???? Customer-1?? ?? ??? ????????? ??? ?? ?? ??? ????. ??? ??? ISP? ??????.

???? Customer-1 ??:

1. ???? ??????? ??????.

```
[edit interfaces]
user@Customer-1# set fe-1/2/3 unit 0 description to_ISP-3
user@Customer-1# set fe-1/2/3 unit 0 family inet address 10.1.0.6/30
user@Customer-1# set lo0 unit 0 family inet address 192.168.0.8/32
```

2. ?? ??? ??????.

```
[edit routing-options static]
user@Customer-1# set route 172.16.40.0/25 reject
user@Customer-1# set route 172.16.40.128/25 reject
user@Customer-1# set route 172.16.41.0/25 reject
user@Customer-1# set route 172.16.41.128/25 reject
```

3. ?? ??? ?????? ??? ??????.

```
[edit policy-options policy-statement send-statics term static-routes]
user@Customer-1# set from protocol static
user@Customer-1# set then accept
```

4. ISP□ □□ □□ BGP(EBGP) □□□ □□□□□.

```
[edit protocols bgp group ext]
user@Customer-1# set type external
user@Customer-1# set export send-statics
user@Customer-1# set peer-as 64510
user@Customer-1# set neighbor 10.1.0.5
```

5. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@Customer-1# set autonomous-system 64511
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@Customer-1# show interfaces
fe-1/2/1 {
    unit 0 {
        description to_ISP-3;
        family inet {
            address 10.1.0.6/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.8/32;
        }
    }
}
```

```
user@Customer-1# show protocols
bgp {
    group ext {
```

```
        type external;
        export send-statics;
        peer-as 64510;
        neighbor 10.1.0.5;
    }
}
```

```
user@Customer-1# show policy-options
policy-statement send-statics {
    term static-routes {
        from protocol static;
        then accept;
    }
}
```

```
user@Customer-1# show routing-options
static {
    route 172.16.40.0/25 reject;
    route 172.16.40.128/25 reject;
    route 172.16.41.0/25 reject;
    route 172.16.41.128/25 reject;
}
autonomous-system 64511;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□□□ □□ □□-2

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□□□□ Customer-2□□ □□ □□□ □□□□□□□□ □□□ □ □□ □□ □□□ □□□□. □□□ □□□ ISP□ □□□□□. □□-2□□ ISP□ □□ □□□ AS 8000□ □□ □□□ □□□□. □ □□□ ISP □ AS 64516□□ □□ □□ □□□ □□□□□□□. □□-2□ □□□ □□ □□□□ ISP□ □□□□□ □□ ISP□ □ □ □□□ □□□□□□□.

□□□□ Customer-2 □□:

1. □□□□ □□□□□□□ □□□□□.

```
[edit interfaces]
user@Customer-2# set fe-1/2/1 unit 0 description to_ISP-3
user@Customer-2# set fe-1/2/1 unit 0 family inet address 10.0.0.10/30
user@Customer-2# set fe-1/2/0 unit 0 description to-Private-Peer-2
user@Customer-2# set fe-1/2/0 unit 0 family inet address 10.0.0.21/30
user@Customer-2# set lo0 unit 0 family inet address 192.168.0.9/32
```

2. □□ □□□ □□□□□.

```
[edit routing-options static]
user@Customer-2# set route 172.16.44.0/26 reject
user@Customer-2# set route 172.16.44.64/26 reject
user@Customer-2# set route 172.16.44.128/26 reject
user@Customer-2# set route 172.16.44.192/26 reject
```

3. □□□□ □□□ □□□ □□□□□.

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```
[edit policy-options policy-statement inbound-routes]
user@Customer-2# set term AS64510-primary from protocol bgp
user@Customer-2# set term AS64510-primary from as-path AS64510-routes
user@Customer-2# set term AS64510-primary then local-preference 200
user@Customer-2# set term AS64510-primary then accept
[edit policy-options policy-statement inbound-routes]
user@Customer-2# set term AS64516-backup from protocol bgp
```

```
user@Customer-2# set term AS64516-backup from as-path AS64516-routes
user@Customer-2# set term AS64516-backup then local-preference 50
user@Customer-2# set term AS64516-backup then accept
[edit policy-options]
user@Customer-2# set as-path AS64510-routes "64510 .*"
user@Customer-2# set as-path AS64516-routes "64516 .*"
```

4. [illegible]

```
[edit policy-options policy-statement outbound-routes]
user@Customer-2# set term statics from protocol static
user@Customer-2# set term statics then accept
user@Customer-2# set term internal-bgp-routes from protocol bgp
user@Customer-2# set term internal-bgp-routes from as-path my-own-routes
user@Customer-2# set term internal-bgp-routes then accept
user@Customer-2# set term no-transit then reject
[edit policy-options]
user@Customer-2# set as-path my-own-routes "()"
```

5. ISP [illegible] Private-Peer-2[illegible] BGP(EBGP) [illegible]

```
[edit protocols bgp group ext]
user@Customer-2# set type external
user@Customer-2# set import inbound-routes
user@Customer-2# set export outbound-routes
user@Customer-2# set neighbor 10.0.0.9 peer-as 64510
user@Customer-2# set neighbor 10.0.0.22 peer-as 64516
```

6. AS(Autonomous System) [illegible]

```
[edit routing-options]
user@Customer-2# set autonomous-system 64512
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@Customer-2# show interfaces
fe-1/2/1 {
    unit 0 {
        description to_ISP-3;
        family inet {
            address 10.0.0.10/30;
        }
    }
}
fe-1/2/0 {
    unit 0 {
        description to-Private-Peer-2;
        family inet {
            address 10.0.0.21/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.9/32;
        }
    }
}
```

```
user@Customer-2# show protocols
bgp {
    group ext {
        type external;
        import inbound-routes;
        export outbound-routes;
        neighbor 10.0.0.9 {
            peer-as 64510;
        }
        neighbor 10.0.0.22 {
            peer-as 64516;
```

```
        }
    }
}
```

```
user@Customer-2# show policy-options
policy-statement inbound-routes {
    term AS64510-primary {
        from {
            protocol bgp;
            as-path AS64510-routes;
        }
        then {
            local-preference 200;
            accept;
        }
    }
    term AS64516-backup {
        from {
            protocol bgp;
            as-path AS64516-routes;
        }
        then {
            local-preference 50;
            accept;
        }
    }
}
policy-statement outbound-routes {
    term statics {
        from protocol static;
        then accept;
    }
    term internal-bgp-routes {
        from {
            protocol bgp;
            as-path my-own-routes;
        }
        then accept;
    }
    term no-transit {
        then reject;
```

```
    }
}
as-path my-own-routes "()";
as-path AS64510-routes "64510 .*";
as-path AS64516-routes "64516 .*";
```

```
user@Customer-2# show routing-options
static {
    route 172.16.44.0/26 reject;
    route 172.16.44.64/26 reject;
    route 172.16.44.128/26 reject;
    route 172.16.44.192/26 reject;
}
autonomous-system 64512;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□□ ISP-1 □ ISP-2 □□

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□□□□ ISP-1 □ □□□□ ISP-2□□ □□ □ □□ □□□ □□□□ □□□□. private-peer □□ □ exchange-peer □□. □□□ □□□□ □□□ □ □□□□ □□□□ ISP-2□ □□ □□□ □□□ □□□□□.

□□□□ ISP-2□□ □□□□ □□ □□□ ISP □□ □□□ □□□□ □□□□-□□-2□ □□□□. □ □□□ □□ □□ □□ □□(□□ □□□□ ISP-2 □□)□ 172.16.32.0/21 □□(□□ ISP □□□□□ □□)□ □□ BGP □□□ □□□□□. □ □ □□ □□□ ISP □□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □ □□ □□ □□□ □□□ □□□□ □□□□ □□ □□ □□□ □□□□□. □□ □ □□ □□□ □□□ □□□ □□□□ □□□□-□□-2□ □□□ □□□ □□□□.

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- □□□□ □□□ □□ □□□ □□□□. □□□ private-peer □ □□□ □□□□□. □ exchange-peer □□□ Device Exchange-2□ □□□ □□□□.

□ □□□□ Device Exchange-2□ □ □□ □□□ □□□□ □□□.

- 172.16.32.0/21□ AS 64510 □□□ □□□ □□□□ □□ □□□□□. □ □□□ □□□□ □□ □□□ □□□□ □□□ □□ exchange-peer □□□□ □.
- Customer-2, 172.16.44.0/23□ □□□ □□ □□□□□. □□□ AS 64516 □□(Device Private-Peer-2)□□ □□□□ □□□□ □ □ □□ □□ □□□ Device Exchange-2□ □□□ □□□.

□ □ □□□ □□□□ Exchange-2□ □□□ □□□□ □□ □□□□□ ISP □□ □□□□ □□□ □□ □□□□ □□□ □ □□□□. ISP□ /21 □□□ □□ □□□ □ □□ □□□□ □□□ /23 □□□□□ □□□□ □□ □□□ □□□□ □□ □□ □□□□ AS 64516□□□ □□□□□. □□□ ISP□ □□□ □□□ □□□ □□□□ ISP-2□ 172.16.44.0/23 □□□ □□□□. □ □ □□ □□□ □□□□□ 172.16.44.0/23 □□□ □□□ □□□□ exchange-peer □□□ □□ □□□□□. □ □□□ □□□ □□□ ISP□ □□ □□ □□□□, □□□□ □□□□-□□-1□ □□ □□, □□□□ □□□□-□□-2□ □□ □□, □□□□ Exchange-1 □ □□□ □□□□ □□□ □□ □□□ □□□□□. □□□□□, □ □□□ □□□ ISP□ □□□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□.

□□□□ ISP-2 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@ISP-2# set fe-1/2/1 unit 0 description to_ISP-1
user@ISP-2# set fe-1/2/1 unit 0 family inet address 10.1.0.1/30
user@ISP-2# set fe-1/2/2 unit 0 description to_ISP-3
user@ISP-2# set fe-1/2/2 unit 0 family inet address 10.0.0.6/30
user@ISP-2# set fe-1/2/3 unit 0 description to_Private-Peer-2
user@ISP-2# set fe-1/2/3 unit 0 family inet address 10.3.0.6/30
user@ISP-2# set fe-1/2/0 unit 0 description to_Exchange-2
user@ISP-2# set fe-1/2/0 unit 0 family inet address 10.3.0.2/30
user@ISP-2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. IGP(Interior Gateway Protocol)□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@ISP-2# set interface fe-1/2/2.0
user@ISP-2# set interface fe-1/2/1.0
user@ISP-2# set interface lo0.0 passive
```

3. □□ □ □□ □□□ □□□□□.

```
[edit routing-options static]
user@ISP-2# set route 172.16.34.0/24 reject
user@ISP-2# set route 172.16.35.0/24 reject
[edit routing-options aggregate]
```

```
user@ISP-2# set route 172.16.44.0/23
user@ISP-2# set route 172.16.32.0/21
```

4. Exchange □□□ □□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement exchange-peer]
user@ISP-2# set term AS64510-Aggregate from protocol aggregate
user@ISP-2# set term AS64510-Aggregate from route-filter 172.16.32.0/21 exact
user@ISP-2# set term AS64510-Aggregate then accept
user@ISP-2# set term Customer-2-Aggregate from protocol aggregate
user@ISP-2# set term Customer-2-Aggregate from route-filter 172.16.44.0/23 exact
user@ISP-2# set term Customer-2-Aggregate then accept
user@ISP-2# set term reject-all-other-routes then reject
```

5. □□ □□□ □□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement internal-peers]
user@ISP-2# set term statics from protocol static
user@ISP-2# set term statics then accept
user@ISP-2# set term next-hop-self then next-hop self
```

6. □□□□ □□□ □□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement private-peer]
user@ISP-2# set term statics from protocol static
user@ISP-2# set term statics then accept
user@ISP-2# set term isp-and-customer-routes from protocol bgp
user@ISP-2# set term isp-and-customer-routes from route-filter 172.16.32.0/21 orlonger
user@ISP-2# set term isp-and-customer-routes then accept
user@ISP-2# set term reject-all then reject
```

7. □□ ISP □□□□□ □□ □□ BGP(IBGP) □□□ □□□□□.

```
[edit protocols bgp group int]
user@ISP-2# set type internal
user@ISP-2# set local-address 192.168.0.2
user@ISP-2# set export internal-peers
```

```
user@ISP-2# set neighbor 192.168.0.1
user@ISP-2# set neighbor 192.168.0.3
```

8. □□ □□ □ □□□□ □□□ □□ EBGP □□□ □□□□□.

```
[edit protocols bgp group AS-64516]
user@ISP-2# set type external
user@ISP-2# set export private-peer
user@ISP-2# set peer-as 64516
user@ISP-2# set neighbor 10.3.0.5
[edit protocols bgp group AS-64515]
user@ISP-2# set type external
user@ISP-2# set export exchange-peer
user@ISP-2# set peer-as 64515
user@ISP-2# set neighbor 10.3.0.1
```

9. AS(Autonomous System) □□□ □□□ ID□ □□□□□.

```
[edit routing-options]
user@ISP-2# set router-id 192.168.0.2
user@ISP-2# set autonomous-system 64510
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@ISP-2# show interfaces
fe-1/2/0 {
    unit 0{
        description to_Exchange-2;
        family inet {
            address 10.3.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0{
        description to_ISP-1;
```

```
        family inet {
            address 10.1.0.1/30;
        }
    }
}
fe-1/2/2 {
    unit 0 {
        description to_ISP-3;
        family inet {
            address 10.0.0.6/30;
        }
    }
}
fe-1/2/3 {
    unit 0 {
        description to_Private-Peer-2;
        family inet {
            address 10.3.0.6/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@ISP-2# show protocols
bgp {
    group int {
        type internal;
        local-address 192.168.0.2;
        export internal-peers;
        neighbor 192.168.0.1;
        neighbor 192.168.0.3;
    }
    group AS-64516 {
        type external;
        export private-peer;
```

```
        peer-as 64516;
        neighbor 10.3.0.5;
    }
    group AS-64515 {
        type external;
        export exchange-peer;
        peer-as 64515;
        neighbor 10.3.0.1;
    }
}
ospf {
    area 0.0.0.0 {
        interface fe-1/2/2.0;
        interface fe-1/2/1.0;
        interface lo0.0 {
            passive;
        }
    }
}
```

```
user@ISP-2# show policy-options
policy-statement exchange-peer {
    term AS64510-Aggregate {
        from {
            protocol aggregate;
            route-filter 172.16.32.0/21 exact;
        }
        then accept;
    }
    term Customer-2-Aggregate {
        from {
            protocol aggregate;
            route-filter 172.16.44.0/23 exact;
        }
        then accept;
    }
    term reject-all-other-routes {
        then reject;
    }
}
policy-statement internal-peers {
```

```
    term statics {
        from protocol static;
        then accept;
    }
    term next-hop-self {
        then {
            next-hop self;
        }
    }
}
policy-statement private-peer {
    term statics {
        from protocol static;
        then accept;
    }
    term isp-and-customer-routes {
        from {
            protocol bgp;
            route-filter 172.16.32.0/21 orlonger;
        }
        then accept;
    }
    term reject-all {
        then reject;
    }
}
```

```
user@ISP-2# show routing-options
static {
    route 172.16.34.0/24 reject;
    route 172.16.35.0/24 reject;
}
aggregate {
    route 172.16.44.0/23;
    route 172.16.32.0/21;
}
router-id 192.168.0.2;
autonomous-system 64510;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

???? ISP-3 ??

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?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? Junos OS CLI ??? ???? "?? ???? CLI ??? ??" ??? 1787? (?) ????????.

???? ISP-3??? ? ??? ?? ??? ??? ??????. Customer-1? ?? ??? ??? ?? customer-1-peer ??????. ? ??? inet.0?? 0.0.0.0/0 ?? ??? ?? ??????. ?? ? ??? ?? ?? ??? ????? ISP ???? ?? BGP ??? ???? ????. ? customer-2-peer ? ?? Customer-2? ?? ??? ?? ??? ????? ?? ?? BGP ??? ????? ?? ??? ?? ??? ??????. ???? ?? ??? customer-2-peer ISP ?? ??? ??-2? ????. ????? ISP-3?? ?? ??? ????? ?? ?? ??? ?? ??? ??? ??? ?? ISP ????? ?? ?? ????? ??? ?? ?? ?? ??? ?? ??????.

???? Exchange-1(172.16.8.0/21)? ????? ??? ?? ?? ????? ISP-3? ?? ??? ??????.

???? ISP-3 ??:

1. ????? ???????? ??????.

```
[edit interfaces]
user@ISP-3# set fe-1/2/0 unit 0 description to_ISP-1
user@ISP-3# set fe-1/2/0 unit 0 family inet address 10.0.0.1/30
user@ISP-3# set fe-1/2/2 unit 0 description to_ISP-2
user@ISP-3# set fe-1/2/2 unit 0 family inet address 10.0.0.5/30
user@ISP-3# set fe-1/2/3 unit 0 description to_Customer-1
user@ISP-3# set fe-1/2/3 unit 0 family inet address 10.1.0.5/30
user@ISP-3# set fe-1/2/1 unit 0 description to_Customer-2
user@ISP-3# set fe-1/2/1 unit 0 family inet address 10.0.0.9/30
user@ISP-3# set lo0 unit 0 family inet address 192.168.0.3/32
```

2. IGP(Interior Gateway Protocol)□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@ISP-3# set interface fe-1/2/0.0
user@ISP-3# set interface fe-1/2/2.0
user@ISP-3# set interface lo0.0 passive
```

3. □□ □□□ □□□□□.

```
[edit routing-options static]
user@ISP-3# set route 172.16.36.0/24 reject
user@ISP-3# set route 172.16.37.0/24 reject
user@ISP-3# set route 172.16.38.0/24 reject
user@ISP-3# set route 172.16.39.0/24 reject
```

4. □□ □□□□ □□□ □□□□ □□□□ □□ □□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement if-upstream-routes-exist term only-certain-
contributing-routes]
user@ISP-3# set from route-filter 172.16.8.0/21 exact
user@ISP-3# set then accept
[edit policy-options policy-statement if-upstream-routes-exist]
user@ISP-3# set term reject-all-other-routes then reject
[edit routing-options generate route 0.0.0.0/0]
user@ISP-3# set policy if-upstream-routes-exist
```

5. Customer-1□ □□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement customer-1-peer]
user@ISP-3# set term defaut-route from route-filter 0.0.0.0/0 exact
user@ISP-3# set term defaut-route then accept
user@ISP-3# set term reject-all-other-routes then reject
```

6. Customer-2□ □□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement customer-2-peer]
user@ISP-3# set term statics from protocol static
user@ISP-3# set term statics then accept
```

```
user@ISP-3# set term isp-and-customer-routes from protocol bgp
user@ISP-3# set term isp-and-customer-routes from route-filter 172.16.32.0/21 orlonger
user@ISP-3# set term isp-and-customer-routes then accept
user@ISP-3# set term default-route from route-filter 0.0.0.0/0 exact
user@ISP-3# set term default-route then accept
user@ISP-3# set term reject-all-other-routes then reject
```

7. [illegible]

```
[edit policy-options policy-statement internal-peers]
user@ISP-3# set term statics from protocol static
user@ISP-3# set term statics then accept
user@ISP-3# set term next then next-hop self
```

8. [illegible] ISP [illegible] [illegible] [illegible] BGP(IBGP) [illegible] [illegible].

```
[edit protocols bgp group int]
user@ISP-3# set type internal
user@ISP-3# set local-address 192.168.0.3
user@ISP-3# set export internal-peers
user@ISP-3# set neighbor 192.168.0.1
user@ISP-3# set neighbor 192.168.0.2
```

9. [illegible] [illegible] [illegible] EBGP [illegible] [illegible].

```
[edit protocols bgp group to_64511]
user@ISP-3# set type external
user@ISP-3# set export customer-1-peer
user@ISP-3# set neighbor 10.1.0.6 peer-as 64511
[edit protocols bgp group to_64512]
user@ISP-3# set type external
user@ISP-3# set export customer-2-peer
user@ISP-3# set neighbor 10.0.0.10 peer-as 64512
```

10. AS(Autonomous System) ??? ??? ID? ??????.

```
[edit routing-options]
user@ISP-3# set router-id 192.168.0.3
user@ISP-3# set autonomous-system 64510
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ??? ??? ????? ????? ??? ? ?? ??? ????? ??? ???????.

```
user@ISP-3# show interfaces
fe-1/2/0 {
    unit 0 {
        description to_ISP-1;
        family inet {
            address 10.0.0.1/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        description to_Customer-2;
        family inet {
            address 10.0.0.9/30;
        }
    }
}
fe-1/2/2 {
    unit 0 {
        description to_ISP-2;
        family inet {
            address 10.0.0.5/30;
        }
    }
}
fe-1/2/3 {
    unit 0 {
        description to_Customer-1;
        family inet {
            address 10.1.0.5/30;
```

```
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.3/32;
        }
    }
}
```

```
user@ISP-3# show protocols
bgp {
    group int {
        type internal;
        local-address 192.168.0.3;
        export internal-peers;
        neighbor 192.168.0.1;
        neighbor 192.168.0.2;
    }
    group to_64511 {
        type external;
        export customer-1-peer;
        neighbor 10.1.0.6 {
            peer-as 64511;
        }
    }
    group to_64512 {
        type external;
        export customer-2-peer;
        neighbor 10.0.0.10 {
            peer-as 64512;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface fe-1/2/0.0;
        interface fe-1/2/2.0;
        interface lo0.0 {
            passive;
```

```
        }
    }
}
```

```
user@ISP-3# show policy-options
policy-statement customer-1-peer {
    term defaut-route {
        from {
            route-filter 0.0.0.0/0 exact;
        }
        then accept;
    }
    term reject-all-other-routes {
        then reject;
    }
}
policy-statement customer-2-peer {
    term statics {
        from protocol static;
        then accept;
    }
    term isp-and-customer-routes {
        from {
            protocol bgp;
            route-filter 172.16.32.0/21 orlonger;
        }
        then accept;
    }
    term default-route {
        from {
            route-filter 0.0.0.0/0 exact;
        }
        then accept;
    }
    term reject-all-other-routes {
        then reject;
    }
}
policy-statement if-upstream-routes-exist {
    term only-certain-contributing-routes {
        from {
```

```
            route-filter 172.16.8.0/21 exact;
        }
        then accept;
    }
    term reject-all-other-routes {
        then reject;
    }
}
policy-statement internal-peers {
    term statics {
        from protocol static;
        then accept;
    }
    term next {
        then {
            next-hop self;
        }
    }
}
```

```
user@ISP-3# show routing-options
static {
    route 172.16.36.0/24 reject;
    route 172.16.37.0/24 reject;
    route 172.16.38.0/24 reject;
    route 172.16.39.0/24 reject;
}
generate {
    route 0.0.0.0/0 policy if-upstream-routes-exist;
}
router-id 192.168.0.3;
autonomous-system 64510;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

???? Exchange-2 ??

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?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? Junos OS CLI ??? ???? "?? ???? CLI ??? ??" ??? 1787? (?) ????????.

???? Exchange-2? ?? BGP ??? ?? BGP ??? ??????. Device Exchange-2? ?? outbound-routes ??? BGP? ? ??? ??? ??? ?? ??? ??????. ??? `then reject` ??? ???? ?? BGP ??? ?? ?? BGP ??? ???? ?? BGP ???? ??? ? ????.

Device Exchange-2? ?????? ??? ??????.

1. ???? ??????? ??????.

```
[edit interfaces]
user@Exchange-2# set fe-1/2/0 unit 0 description to_ISP-2
user@Exchange-2# set fe-1/2/0 unit 0 family inet address 10.3.0.1/30
user@Exchange-2# set fe-1/2/2 unit 0 description to_Exchange-1
user@Exchange-2# set fe-1/2/2 unit 0 family inet address 10.3.0.41/30
user@Exchange-2# set fe-1/2/1 unit 0 description to_Private-Peer-2
user@Exchange-2# set fe-1/2/1 unit 0 family inet address 10.3.0.49/30
user@Exchange-2# set lo0 unit 0 family inet address 192.168.0.7/32
```

2. ?? ??? ??????.

```
[edit routing-options static]
set route 172.16.16.0/21 reject
```

3. □□ □□ □□□ □□□□ □□□□ □□ □□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement outbound-routes term statics]
user@Exchange-2# set from protocol static
user@Exchange-2# set then accept
```

4. □□ □□□ □□ EBGP □□□ □□□□□.

```
[edit protocols bgp group ext]
user@Exchange-2# set type external
user@Exchange-2# set export outbound-routes
user@Exchange-2# set neighbor 10.3.0.2 peer-as 64510
user@Exchange-2# set neighbor 10.3.0.50 peer-as 64516
user@Exchange-2# set neighbor 10.3.0.42 peer-as 64514
```

5. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@Exchange-2# set autonomous-system 64515
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@Exchange-2 show interfaces
fe-1/2/0 {
    unit 0 {
        description to_ISP-2;
        family inet {
            address 10.3.0.1/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        description to_Private-Peer-2;
        family inet {
            address 10.3.0.49/30;
```

```
        }
    }
}
fe-1/2/2 {
    unit 0 {
        description to_Exchange-1;
        family inet {
            address 10.3.0.41/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.7/32;
        }
    }
}
```

```
user@Exchange-2# show protocols
bgp {
    group ext {
        type external;
        export outbound-routes;
        neighbor 10.3.0.2 {
            peer-as 64510;
        }
        neighbor 10.3.0.50 {
            peer-as 64516;
        }
        neighbor 10.3.0.42 {
            peer-as 64514;
        }
    }
}
```

```
user@Exchange-2# show policy-options
policy-statement outbound-routes {
    term statics {
        from protocol static;
```

```
        then accept;
    }
}
```

```
user@Exchange-2# show routing-options
static {
    route 172.16.16.0/21 reject;
}
autonomous-system 64515;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□□□ Private-Peer-2 □□

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□□□□ Private-Peer-2□ □ □□ □□ □□□ □□□□□.

- AS 64516□ □□ □□ □□□ □□ □□□ ISP □□□ □□□ □□□□□. □ outbound-routes □□□ □□□□ □□ □□ □□(□, □□)□ □□□□, AS 64516 □□ AS 64512□□ □□□ BGP□□ □□□ □□ □□□ □□□□□. □□□ □□□□ AS 64512 □□ □□ □□ AS 64516 □□ □□□ □□□□□. AS □□□ □□□ AS □□ □□□ □□ □□□ □□ □□□□□.
- AS 64512 □□ □□□□ 0.0.0.0/0 □□ □□□ □□□□□. □□ □□ □□□□ □□□ □□□□ □□□ 0.0.0.0/0□ □□ □□□ □□□ □□□□□. □ □□□ □□□□ □□ □□□ □□□ □□□ □□□ □ □□□ □□□□ □□ □□□ if-upstream-routes-exist□□□ □□□□ □□□ □□□□□ □□ □□□ □□ □□. □□□ □□□□□ BGP □ □□□ □□□ □□□□ AS 64512 □□□□ □□□ □ □□□□. □ if-upstream-routes-exist □□□ Device Exchange-2□□ 172.16.32.0/21 □□□ □□□□ □□ □□ □□□ □□□□□. 172.16.32.0/21 □□□ □□ □□□ □□ □□□□ □□□□ □□□ 0.0.0.0/0 □□ □□□ □□ AS 64512 □□ □□□□□ □□ □□□ □□□□□.

□□□□ Private-Peer-2 □□:

1. [illegible] [illegible] [illegible].

```
[edit interfaces]
user@Private-Peer-2# set fe-1/2/3 unit 0 description to_ISP-2
user@Private-Peer-2# set fe-1/2/3 unit 0 family inet address 10.3.0.5/30
user@Private-Peer-2# set fe-1/2/0 unit 0 description to_Customer-1
user@Private-Peer-2# set fe-1/2/0 unit 0 family inet address 10.0.0.22/30
user@Private-Peer-2# set fe-1/2/1 unit 0 description to_Exchange-2
user@Private-Peer-2# set fe-1/2/1 unit 0 family inet address 10.3.0.50/30
user@Private-Peer-2# set lo0 unit 0 family inet address 192.168.0.5/32
```

2. [illegible] [illegible] [illegible].

```
[edit routing-options static]
user@Private-Peer-2# set route 172.16.24.0/25 reject
user@Private-Peer-2# set route 172.16.24.128/25 reject
user@Private-Peer-2# set route 172.16.25.0/26 reject
user@Private-Peer-2# set route 172.16.25.64/26 reject
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit policy-options policy-statement if-upstream-routes-exist]
user@Private-Peer-2# set term as-64515-routes from route-filter 172.16.16.0/21 exact
user@Private-Peer-2# set term as-64515-routes then accept
user@Private-Peer-2# set term reject-all-other-routes then reject
[edit routing-options generate route 0.0.0.0/0]
user@Private-Peer-2# set policy if-upstream-routes-exist
```

4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit policy-options policy-statement internal-routes]
user@Private-Peer-2# set term statics from protocol static
user@Private-Peer-2# set term statics then accept
user@Private-Peer-2# set term default-route from route-filter 0.0.0.0/0 exact
user@Private-Peer-2# set term default-route then accept
user@Private-Peer-2# set term reject-all-other-routes then reject
```

5. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit policy-options policy-statement outbound-routes]
user@Private-Peer-2# set term statics from protocol static
user@Private-Peer-2# set term statics then accept
user@Private-Peer-2# set term allowed-bgp-routes from as-path my-own-routes
user@Private-Peer-2# set term allowed-bgp-routes from as-path AS64512-routes
user@Private-Peer-2# set term allowed-bgp-routes then accept
user@Private-Peer-2# set term no-transit then reject
[edit policy-options]
user@Private-Peer-2# set as-path my-own-routes "()"
user@Private-Peer-2# set as-path AS64512-routes 64512
```

6. Customer-2[illegible] [illegible] EBGP [illegible] [illegible].

```
[edit protocols bgp group to-64512]
user@Private-Peer-2# set type external
user@Private-Peer-2# set export internal-routes
user@Private-Peer-2# set peer-as 64512
user@Private-Peer-2# set neighbor 10.0.0.21
```

7. [illegible] Exchange-2[illegible] [illegible] EBGP [illegible] [illegible].

```
[edit protocols bgp group to-64515]
user@Private-Peer-2# set type external
user@Private-Peer-2# set export outbound-routes
user@Private-Peer-2# set peer-as 64515
user@Private-Peer-2# set neighbor 10.3.0.49
```

8. ISP[illegible] [illegible] EBGP [illegible] [illegible].

```
[edit protocols bgp group ext]
user@Private-Peer-2# set type external
user@Private-Peer-2# set export outbound-routes
user@Private-Peer-2# set peer-as 64510
user@Private-Peer-2# set neighbor 10.3.0.6
```

9. AS(Autonomous System) ??? ?????.

```
[edit routing-options]
user@Private-Peer-2# set autonomous-system 64516
```

??

?? ???? show interfaces, show protocols, show policy-options ? show routing-options ??? ???? ??? ??????. ?? ??? ??? ???? ???? ??? ? ?? ??? ???? ??? ????????.

```
user@Private-Peer-2# show interfaces
fe-1/2/0 {
    unit 0 {
        description to_Customer-1;
        family inet {
            address 10.0.0.22/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        description to_Exchange-2;
        family inet {
            address 10.3.0.50/30;
        }
    }
}
fe-1/2/3 {
    unit 0 {
        description to_ISP-2;
        family inet {
            address 10.3.0.5/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.5/32;
        }
```

```
    }
}
```

```
user@Private-Peer-2# show protocols
bgp {
    group ext {
        type external;
        export outbound-routes;
        peer-as 64510;
        neighbor 10.3.0.6;
    }
    group to-64512 {
        type external;
        export internal-routes;
        peer-as 64512;
        neighbor 10.0.0.21;
    }
    group to-64515 {
        type external;
        export outbound-routes;
        peer-as 64515;
        neighbor 10.3.0.49;
    }
}
```

```
user@Private-Peer-2# show policy-options
policy-statement if-upstream-routes-exist {
    term as-64515-routes {
        from {
            route-filter 172.16.16.0/21 exact;
        }
        then accept;
    }
    term reject-all-other-routes {
        then reject;
    }
}
policy-statement internal-routes {
    term statics {
        from protocol static;
```

```
        then accept;
    }
    term default-route {
        from {
            route-filter 0.0.0.0/0 exact;
        }
        then accept;
    }
    term reject-all-other-routes {
        then reject;
    }
}
policy-statement outbound-routes {
    term statics {
        from protocol static;
        then accept;
    }
    term allowed-bgp-routes {
        from as-path [ my-own-routes AS64512-routes ];
        then accept;
    }
    term no-transit {
        then reject;
    }
}
as-path my-own-routes "()";
as-path AS64512-routes 64512;
```

```
user@Private-Peer-2# show routing-options
static {
    route 172.16.24.0/25 reject;
    route 172.16.24.128/25 reject;
    route 172.16.25.0/26 reject;
    route 172.16.25.64/26 reject;
}
generate {
    route 0.0.0.0/0 policy if-upstream-routes-exist;
}
autonomous-system 64516;
```

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??

in this section

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??? ????? ????? ??? ??????.

???? Customer-1?? ?? ??

??

????? Customer-1?? ???? ????? ???? ??????.

??

```
user@Customer-1> show route

inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 00:09:25, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.1.0.5 via fe-1/2/3.0
10.1.0.4/30        *[Direct/0] 23:50:20
                    > via fe-1/2/3.0
10.1.0.6/32        *[Local/0] 5d 21:56:47
                      Local via fe-1/2/3.0
```

```
172.16.40.0/25     *[Static/5] 22:59:04
                      Reject
172.16.40.128/25   *[Static/5] 22:59:04
                      Reject
172.16.41.0/25     *[Static/5] 22:59:04
                      Reject
172.16.41.128/25   *[Static/5] 22:59:04
                      Reject
192.168.0.8/32     *[Direct/0] 5d 21:25:45
                    > via lo0.0
```

??

???? Customer-1?? 4?? ?? ???? ??? BGP? ?? ?? ???? ??????.

???? ??-2?? ?? ??

??

???? Customer-2?? ???? ???? ???? ?????.

??

```
user@Customer-2> show route
inet.0: 22 destinations, 23 routes (22 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 00:10:35, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
                    [BGP/170] 04:58:09, localpref 50
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.22 via fe-1/2/0.0
10.0.0.8/30        *[Direct/0] 23:51:29
                    > via fe-1/2/0.10
10.0.0.10/32       *[Local/0] 23:52:49
                      Local via fe-1/2/0.10
10.0.0.20/30       *[Direct/0] 23:52:49
                    > via fe-1/2/0.0
10.0.0.21/32       *[Local/0] 23:52:49
                      Local via fe-1/2/0.0
```

```
172.16.24.0/25     *[BGP/170] 04:58:09, localpref 50
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.22 via fe-1/2/0.0
172.16.24.128/25   *[BGP/170] 04:58:09, localpref 50
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.22 via fe-1/2/0.0
172.16.25.0/26     *[BGP/170] 04:58:09, localpref 50
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.22 via fe-1/2/0.0
172.16.25.64/26    *[BGP/170] 04:58:09, localpref 50
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.22 via fe-1/2/0.0
172.16.32.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.33.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.34.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.35.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.36.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.37.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.38.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.39.0/24     *[BGP/170] 22:38:47, localpref 200
                      AS path: 64510 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/0.10
172.16.44.0/26     *[Static/5] 22:57:28
                      Reject
172.16.44.64/26    *[Static/5] 22:57:28
                      Reject
172.16.44.128/26   *[Static/5] 22:57:28
                      Reject
172.16.44.192/26   *[Static/5] 22:57:28
```

```
                      Reject
192.168.0.9/32     *[Direct/0] 23:52:49
                    > via lo0.0
```

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□□□□ □□-2□ ISP□□ □□ □ □□□□ □□□□ □□□ □□ □□ □□□ □□□□□□. ISP□□ □□□ □□□ □□ □□□ □ □□ □□□ □□□□□.

□□□ **ISP-1□□ □□ □□**

□□

□□□ ISP-1□□ □□□ □□□□ □□□ □□□□□.

□□

```
user@ISP-1> show route
inet.0: 42 destinations, 53 routes (42 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 22:44:26, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
10.0.0.0/30        *[Direct/0] 23:52:01
                    > via fe-1/2/0.0
10.0.0.2/32        *[Local/0] 23:52:01
                      Local via fe-1/2/0.0
10.0.0.4/30        *[OSPF/10] 23:51:06, metric 2
                      to 10.1.0.1 via fe-1/2/1.0
                    > to 10.0.0.1 via fe-1/2/0.0
10.0.0.20/30       *[BGP/170] 23:50:55, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
                    [BGP/170] 23:51:28, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
10.1.0.0/30        *[Direct/0] 23:52:01
                    > via fe-1/2/1.0
10.1.0.2/32        *[Local/0] 23:52:01
                      Local via fe-1/2/1.0
10.2.0.0/30        *[Direct/0] 23:52:01
```

```
                    > via fe-1/2/2.0
10.2.0.2/32         *[Local/0] 23:52:01
                      Local via fe-1/2/2.0
10.2.0.4/30         *[Direct/0] 23:52:00
                    > via fe-1/2/3.0
10.2.0.6/32         *[Local/0] 23:52:00
                      Local via fe-1/2/3.0
10.3.0.4/30         *[BGP/170] 23:51:28, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
10.3.0.48/30        *[BGP/170] 23:50:55, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
172.16.8.0/21       *[BGP/170] 00:11:08, localpref 100
                      AS path: 64514 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.16.0/21      *[BGP/170] 02:02:10, localpref 100, from 192.168.0.2
                      AS path: 64515 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
                    [BGP/170] 02:02:10, localpref 100
                      AS path: 64514 64515 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.24.0/25      *[BGP/170] 23:06:33, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
                    [BGP/170] 23:06:33, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.24.128/25    *[BGP/170] 23:06:33, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
                    [BGP/170] 23:06:33, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.25.0/26      *[BGP/170] 23:06:33, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
                    [BGP/170] 23:06:33, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.25.64/26     *[BGP/170] 23:06:33, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
```

```
                    [BGP/170] 23:06:33, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.32.0/21      *[Aggregate/130] 22:44:27
                      Reject
172.16.32.0/24      *[Static/5] 22:44:27
                      Reject
172.16.33.0/24      *[Static/5] 22:44:27
                      Reject
172.16.34.0/24      *[BGP/170] 22:39:20, localpref 100, from 192.168.0.2
                      AS path: I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
172.16.35.0/24      *[BGP/170] 22:39:20, localpref 100, from 192.168.0.2
                      AS path: I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
172.16.36.0/24      *[BGP/170] 22:39:20, localpref 100, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.37.0/24      *[BGP/170] 22:39:20, localpref 100, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.38.0/24      *[BGP/170] 22:39:20, localpref 100, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.39.0/24      *[BGP/170] 22:39:20, localpref 100, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.40.0/22      *[Aggregate/130] 22:44:27
                      Reject
172.16.40.0/25      *[BGP/170] 23:00:47, localpref 100, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.40.128/25    *[BGP/170] 23:00:47, localpref 100, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.41.0/25      *[BGP/170] 23:00:47, localpref 100, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.41.128/25    *[BGP/170] 23:00:47, localpref 100, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.44.0/26      *[BGP/170] 22:58:01, localpref 100, from 192.168.0.3
                      AS path: 64512 I, validation-state: unverified
```

```
                    > to 10.0.0.1 via fe-1/2/0.0
                    [BGP/170] 22:58:01, localpref 100
                      AS path: 64514 64515 64516 64512 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.44.64/26    *[BGP/170] 22:58:01, localpref 100, from 192.168.0.3
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
                    [BGP/170] 22:58:01, localpref 100
                      AS path: 64514 64515 64516 64512 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.44.128/26   *[BGP/170] 22:58:01, localpref 100, from 192.168.0.3
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
                    [BGP/170] 22:58:01, localpref 100
                      AS path: 64514 64515 64516 64512 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.44.192/26   *[BGP/170] 22:58:01, localpref 100, from 192.168.0.3
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
                    [BGP/170] 22:58:01, localpref 100
                      AS path: 64514 64515 64516 64512 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
192.168.0.1/32     *[Direct/0] 23:52:01
                    > via lo0.0
192.168.0.2/32     *[OSPF/10] 23:51:06, metric 1
                    > to 10.1.0.1 via fe-1/2/1.0
192.168.0.3/32     *[OSPF/10] 23:51:06, metric 1
                    > to 10.0.0.1 via fe-1/2/0.0
192.168.0.5/32     *[BGP/170] 23:50:55, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.1.0.1 via fe-1/2/1.0
                    [BGP/170] 23:51:28, localpref 100
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.2.0.5 via fe-1/2/3.0
172.16.233.5/32      *[OSPF/10] 23:52:07, metric 1
                      MultiRecv
```

□□□□ ISP-2□□ □□ □□

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□□□□ ISP-2□□ □□□ □□□□ □□□ □□□□□.

??

```
user@ISP-2> show route
inet.0: 41 destinations, 59 routes (41 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[BGP/170] 22:45:44, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
10.0.0.0/30        *[OSPF/10] 23:52:25, metric 2
                      to 10.0.0.5 via fe-1/2/2.0
                    > to 10.1.0.2 via fe-1/2/1.0
10.0.0.4/30        *[Direct/0] 23:53:21
                    > via fe-1/2/2.0
10.0.0.6/32        *[Local/0] 23:53:23
                      Local via fe-1/2/2.0
10.0.0.20/30       *[BGP/170] 23:53:11, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
                    [BGP/170] 23:53:09, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.1 via fe-1/2/0.0
10.1.0.0/30        *[Direct/0] 23:53:19
                    > via fe-1/2/1.0
10.1.0.1/32        *[Local/0] 23:53:23
                      Local via fe-1/2/1.0
10.3.0.0/30        *[Direct/0] 23:53:22
                    > via fe-1/2/0.0
10.3.0.2/32        *[Local/0] 23:53:23
                      Local via fe-1/2/0.0
10.3.0.4/30        *[Direct/0] 23:53:23
                    > via fe-1/2/3.0
                    [BGP/170] 23:53:11, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
                    [BGP/170] 23:53:09, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.1 via fe-1/2/0.0
                    [BGP/170] 23:52:13, localpref 100, from 192.168.0.1
                      AS path: 64514 64515 64516 I, validation-state: unverified
                    > to 10.1.0.2 via fe-1/2/1.0
10.3.0.6/32        *[Local/0] 23:53:23
```

```
                    Local via fe-1/2/3.0
10.3.0.48/30       *[BGP/170] 23:53:11, localpref 100
                      AS path: 64516 I, validation-state: unverified
                     > to 10.3.0.5 via fe-1/2/3.0
172.16.8.0/21      *[BGP/170] 00:12:26, localpref 100, from 192.168.0.1
                      AS path: 64514 I, validation-state: unverified
                     > to 10.1.0.2 via fe-1/2/1.0
                     [BGP/170] 00:12:26, localpref 100
                      AS path: 64515 64514 I, validation-state: unverified
                     > to 10.3.0.1 via fe-1/2/0.0
172.16.16.0/21     *[BGP/170] 02:03:28, localpref 100
                      AS path: 64515 I, validation-state: unverified
                     > to 10.3.0.1 via fe-1/2/0.0
172.16.24.0/25     *[BGP/170] 23:07:51, localpref 100
                      AS path: 64516 I, validation-state: unverified
                     > to 10.3.0.5 via fe-1/2/3.0
                     [BGP/170] 23:07:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                     > to 10.3.0.1 via fe-1/2/0.0
172.16.24.128/25   *[BGP/170] 23:07:51, localpref 100
                      AS path: 64516 I, validation-state: unverified
                     > to 10.3.0.5 via fe-1/2/3.0
                     [BGP/170] 23:07:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                     > to 10.3.0.1 via fe-1/2/0.0
172.16.25.0/26     *[BGP/170] 23:07:51, localpref 100
                      AS path: 64516 I, validation-state: unverified
                     > to 10.3.0.5 via fe-1/2/3.0
                     [BGP/170] 23:07:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                     > to 10.3.0.1 via fe-1/2/0.0
172.16.25.64/26    *[BGP/170] 23:07:51, localpref 100
                      AS path: 64516 I, validation-state: unverified
                     > to 10.3.0.5 via fe-1/2/3.0
                     [BGP/170] 23:07:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                     > to 10.3.0.1 via fe-1/2/0.0
172.16.32.0/21     *[Aggregate/130] 22:40:38
                      Reject
172.16.32.0/24     *[BGP/170] 22:45:44, localpref 100, from 192.168.0.1
                      AS path: I, validation-state: unverified
                     > to 10.1.0.2 via fe-1/2/1.0
172.16.33.0/24     *[BGP/170] 22:45:44, localpref 100, from 192.168.0.1
```

```
                    AS path: I, validation-state: unverified
                  > to 10.1.0.2 via fe-1/2/1.0
172.16.34.0/24     *[Static/5] 22:40:38
                    Reject
172.16.35.0/24     *[Static/5] 22:40:38
                    Reject
172.16.36.0/24     *[BGP/170] 22:40:38, localpref 100, from 192.168.0.3
                    AS path: I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.37.0/24     *[BGP/170] 22:40:38, localpref 100, from 192.168.0.3
                    AS path: I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.38.0/24     *[BGP/170] 22:40:38, localpref 100, from 192.168.0.3
                    AS path: I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.39.0/24     *[BGP/170] 22:40:38, localpref 100, from 192.168.0.3
                    AS path: I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.40.0/25     *[BGP/170] 23:02:05, localpref 100, from 192.168.0.3
                    AS path: 64511 I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.40.128/25   *[BGP/170] 23:02:05, localpref 100, from 192.168.0.3
                    AS path: 64511 I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.41.0/25     *[BGP/170] 23:02:05, localpref 100, from 192.168.0.3
                    AS path: 64511 I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.41.128/25   *[BGP/170] 23:02:05, localpref 100, from 192.168.0.3
                    AS path: 64511 I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
172.16.44.0/23     *[Aggregate/130] 22:40:38
                    Reject
172.16.44.0/26     *[BGP/170] 22:59:19, localpref 100, from 192.168.0.3
                    AS path: 64512 I, validation-state: unverified
                  > to 10.0.0.5 via fe-1/2/2.0
                   [BGP/170] 22:59:19, localpref 100
                    AS path: 64516 64512 I, validation-state: unverified
                  > to 10.3.0.5 via fe-1/2/3.0
                   [BGP/170] 22:59:19, localpref 100
                    AS path: 64515 64516 64512 I, validation-state: unverified
                  > to 10.3.0.1 via fe-1/2/0.0
172.16.44.64/26    *[BGP/170] 22:59:19, localpref 100, from 192.168.0.3
                    AS path: 64512 I, validation-state: unverified
```

```
                    > to 10.0.0.5 via fe-1/2/2.0
                    [BGP/170] 22:59:19, localpref 100
                      AS path: 64516 64512 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
                    [BGP/170] 22:59:19, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.1 via fe-1/2/0.0
172.16.44.128/26   *[BGP/170] 22:59:19, localpref 100, from 192.168.0.3
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.5 via fe-1/2/2.0
                    [BGP/170] 22:59:19, localpref 100
                      AS path: 64516 64512 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
                    [BGP/170] 22:59:19, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.1 via fe-1/2/0.0
172.16.44.192/26   *[BGP/170] 22:59:19, localpref 100, from 192.168.0.3
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.5 via fe-1/2/2.0
                    [BGP/170] 22:59:19, localpref 100
                      AS path: 64516 64512 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
                    [BGP/170] 22:59:19, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.1 via fe-1/2/0.0
192.168.0.1/32     *[OSPF/10] 23:52:25, metric 1
                    > to 10.1.0.2 via fe-1/2/1.0
192.168.0.2/32     *[Direct/0] 23:53:23
                    > via lo0.0
192.168.0.3/32     *[OSPF/10] 23:52:30, metric 1
                    > to 10.0.0.5 via fe-1/2/2.0
192.168.0.5/32     *[BGP/170] 23:53:11, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.5 via fe-1/2/3.0
                    [BGP/170] 23:53:09, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.1 via fe-1/2/0.0
172.16.233.5/32      *[OSPF/10] 23:53:25, metric 1
                      MultiRecv
```

□□□□ ISP-3□□ □□ □□

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□□□□ ISP-3□□ □□□ □□□□ □□□ □□□□□.

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```
user@ISP-3> show route

inet.0: 40 destinations, 41 routes (40 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[Aggregate/130] 23:53:57, metric2 1
                    > to 10.0.0.2 via fe-1/2/0.0
                    [BGP/170] 22:46:17, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
10.0.0.0/30        *[Direct/0] 23:53:52
                    > via fe-1/2/0.0
10.0.0.1/32        *[Local/0] 23:53:53
                      Local via fe-1/2/0.0
10.0.0.4/30        *[Direct/0] 23:53:54
                    > via fe-1/2/2.0
10.0.0.5/32        *[Local/0] 23:53:54
                      Local via fe-1/2/2.0
10.0.0.8/30        *[Direct/0] 23:53:53
                    > via fe-1/2/1.0
10.0.0.9/32        *[Local/0] 23:53:53
                      Local via fe-1/2/1.0
10.0.0.20/30       *[BGP/170] 23:53:02, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
10.1.0.0/30        *[OSPF/10] 23:53:03, metric 2
                    > to 10.0.0.6 via fe-1/2/2.0
                      to 10.0.0.2 via fe-1/2/0.0
10.1.0.4/30        *[Direct/0] 23:53:54
                    > via fe-1/2/3.0
10.1.0.5/32        *[Local/0] 23:53:54
                      Local via fe-1/2/3.0
10.3.0.4/30        *[BGP/170] 23:52:46, localpref 100, from 192.168.0.1
                      AS path: 64514 64515 64516 I, validation-state: unverified
```

```
                    > to 10.0.0.2 via fe-1/2/0.0
10.3.0.48/30        *[BGP/170] 23:53:02, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.8.0/21       *[BGP/170] 00:12:59, localpref 100, from 192.168.0.1
                      AS path: 64514 I, validation-state: unverified
                    > to 10.0.0.2 via fe-1/2/0.0
172.16.16.0/21      *[BGP/170] 02:04:01, localpref 100, from 192.168.0.2
                      AS path: 64515 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.24.0/25      *[BGP/170] 23:08:24, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.24.128/25    *[BGP/170] 23:08:24, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.25.0/26      *[BGP/170] 23:08:24, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.25.64/26     *[BGP/170] 23:08:24, localpref 100, from 192.168.0.2
                      AS path: 64516 I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.32.0/24      *[BGP/170] 22:46:17, localpref 100, from 192.168.0.1
                      AS path: I, validation-state: unverified
                    > to 10.0.0.2 via fe-1/2/0.0
172.16.33.0/24      *[BGP/170] 22:46:17, localpref 100, from 192.168.0.1
                      AS path: I, validation-state: unverified
                    > to 10.0.0.2 via fe-1/2/0.0
172.16.34.0/24      *[BGP/170] 22:41:11, localpref 100, from 192.168.0.2
                      AS path: I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.35.0/24      *[BGP/170] 22:41:11, localpref 100, from 192.168.0.2
                      AS path: I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
172.16.36.0/24      *[Static/5] 22:41:11
                      Reject
172.16.37.0/24      *[Static/5] 22:41:11
                      Reject
172.16.38.0/24      *[Static/5] 22:41:11
                      Reject
172.16.39.0/24      *[Static/5] 22:41:11
                      Reject
172.16.40.0/25      *[BGP/170] 23:02:38, localpref 100
```

```
                    AS path: 64511 I, validation-state: unverified
                  > to 10.1.0.6 via fe-1/2/3.0
172.16.40.128/25  *[BGP/170] 23:02:38, localpref 100
                    AS path: 64511 I, validation-state: unverified
                  > to 10.1.0.6 via fe-1/2/3.0
172.16.41.0/25    *[BGP/170] 23:02:38, localpref 100
                    AS path: 64511 I, validation-state: unverified
                  > to 10.1.0.6 via fe-1/2/3.0
172.16.41.128/25  *[BGP/170] 23:02:38, localpref 100
                    AS path: 64511 I, validation-state: unverified
                  > to 10.1.0.6 via fe-1/2/3.0
172.16.44.0/26    *[BGP/170] 22:59:52, localpref 100
                    AS path: 64512 I, validation-state: unverified
                  > to 10.0.0.10 via fe-1/2/1.0
172.16.44.64/26   *[BGP/170] 22:59:52, localpref 100
                    AS path: 64512 I, validation-state: unverified
                  > to 10.0.0.10 via fe-1/2/1.0
172.16.44.128/26  *[BGP/170] 22:59:52, localpref 100
                    AS path: 64512 I, validation-state: unverified
                  > to 10.0.0.10 via fe-1/2/1.0
172.16.44.192/26  *[BGP/170] 22:59:52, localpref 100
                    AS path: 64512 I, validation-state: unverified
                  > to 10.0.0.10 via fe-1/2/1.0
192.168.0.1/32    *[OSPF/10] 23:53:03, metric 1
                  > to 10.0.0.2 via fe-1/2/0.0
192.168.0.2/32    *[OSPF/10] 23:53:03, metric 1
                  > to 10.0.0.6 via fe-1/2/2.0
192.168.0.3/32    *[Direct/0] 23:53:54
                  > via lo0.0
192.168.0.5/32    *[BGP/170] 23:53:02, localpref 100, from 192.168.0.2
                    AS path: 64516 I, validation-state: unverified
                  > to 10.0.0.6 via fe-1/2/2.0
172.16.233.5/32     *[OSPF/10] 23:53:58, metric 1
                    MultiRecv
```

□□□□ Exchange-1□□ □□ □□

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Device Exchange-1□□ □□□ □□□□ □□□ □□□□□.

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```
user@Exchange-1> show route

inet.0: 23 destinations, 24 routes (23 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.20/30       *[BGP/170] 23:53:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
10.2.0.4/30        *[Direct/0] 23:54:23
                    > via fe-1/2/3.0
10.2.0.5/32        *[Local/0] 23:54:29
                      Local via fe-1/2/3.0
10.3.0.4/30        *[BGP/170] 23:53:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
10.3.0.40/30       *[Direct/0] 23:54:27
                    > via fe-1/2/2.0
10.3.0.42/32       *[Local/0] 23:54:29
                      Local via fe-1/2/2.0
10.3.0.44/30       *[Direct/0] 23:54:29
                    > via fe-1/2/1.0
10.3.0.45/32       *[Local/0] 23:54:29
                      Local via fe-1/2/1.0
172.16.8.0/21      *[Static/5] 00:13:31
                      Reject
172.16.16.0/21     *[BGP/170] 02:04:33, localpref 100
                      AS path: 64515 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.24.0/25     *[BGP/170] 23:08:56, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.24.128/25   *[BGP/170] 23:08:56, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.25.0/26     *[BGP/170] 23:08:56, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.25.64/26    *[BGP/170] 23:08:56, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
```

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172.16.32.0/21     *[BGP/170] 22:46:49, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.6 via fe-1/2/3.0
                    [BGP/170] 22:41:43, localpref 100
                      AS path: 64515 64510 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.40.0/22     *[BGP/170] 22:46:49, localpref 100
                      AS path: 64510 64511 I, validation-state: unverified
                    > to 10.2.0.6 via fe-1/2/3.0
172.16.44.0/23     *[BGP/170] 22:41:43, localpref 100
                      AS path: 64515 64510 64512 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.44.0/26     *[BGP/170] 23:00:24, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.44.64/26    *[BGP/170] 23:00:24, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.44.128/26   *[BGP/170] 23:00:24, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
172.16.44.192/26   *[BGP/170] 23:00:24, localpref 100
                      AS path: 64515 64516 64512 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
192.168.0.5/32     *[BGP/170] 23:53:51, localpref 100
                      AS path: 64515 64516 I, validation-state: unverified
                    > to 10.3.0.41 via fe-1/2/2.0
192.168.0.6/32     *[Direct/0] 23:54:29
                    > via lo0.0
```

□□□□ Exchange-2□□ □□ □□

□□

Device Exchange-2□□ □□□□ □□□□ □□□□ □□□□□□.

□□

```
user@Exchange-2> show route
inet.0: 24 destinations, 26 routes (23 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
10.0.0.20/30       *[BGP/170] 23:54:44, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
10.3.0.0/30        *[Direct/0] 23:54:57
                    > via fe-1/2/0.0
10.3.0.1/32        *[Local/0] 23:54:57
                      Local via fe-1/2/0.0
10.3.0.4/30        *[BGP/170] 23:54:44, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
10.3.0.40/30       *[Direct/0] 23:54:57
                    > via fe-1/2/2.0
10.3.0.41/32       *[Local/0] 23:54:57
                      Local via fe-1/2/2.0
10.3.0.48/30       *[Direct/0] 23:54:57
                    > via fe-1/2/1.0
                    [BGP/170] 23:54:44, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
10.3.0.49/32       *[Local/0] 23:54:57
                      Local via fe-1/2/1.0
172.16.8.0/21      *[BGP/170] 00:14:01, localpref 100
                      AS path: 64514 I, validation-state: unverified
                    > to 10.3.0.42 via fe-1/2/2.0
172.16.16.0/21     *[Static/5] 02:05:03
                      Reject
172.16.24.0/25     *[BGP/170] 23:09:26, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
172.16.24.128/25   *[BGP/170] 23:09:26, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
172.16.25.0/26     *[BGP/170] 23:09:26, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
172.16.25.64/26    *[BGP/170] 23:09:26, localpref 100
                      AS path: 64516 I, validation-state: unverified
                    > to 10.3.0.50 via fe-1/2/1.0
172.16.32.0/21     *[BGP/170] 22:42:13, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.2 via fe-1/2/0.0
                    [BGP/170] 22:47:19, localpref 100
```

```
                    AS path: 64514 64510 I, validation-state: unverified
                  > to 10.3.0.42 via fe-1/2/2.0
172.16.40.0/22    *[BGP/170] 22:47:19, localpref 100
                    AS path: 64514 64510 64511 I, validation-state: unverified
                  > to 10.3.0.42 via fe-1/2/2.0
172.16.44.0/23    *[BGP/170] 22:42:13, localpref 100
                    AS path: 64510 64512 I, validation-state: unverified
                  > to 10.3.0.2 via fe-1/2/0.0
172.16.44.0/26    *[BGP/170] 23:00:54, localpref 100
                    AS path: 64516 64512 I, validation-state: unverified
                  > to 10.3.0.50 via fe-1/2/1.0
172.16.44.64/26   *[BGP/170] 23:00:54, localpref 100
                    AS path: 64516 64512 I, validation-state: unverified
                  > to 10.3.0.50 via fe-1/2/1.0
172.16.44.128/26  *[BGP/170] 23:00:54, localpref 100
                    AS path: 64516 64512 I, validation-state: unverified
                  > to 10.3.0.50 via fe-1/2/1.0
172.16.44.192/26  *[BGP/170] 23:00:54, localpref 100
                    AS path: 64516 64512 I, validation-state: unverified
                  > to 10.3.0.50 via fe-1/2/1.0
192.168.0.5/32    *[BGP/170] 23:54:44, localpref 100
                    AS path: 64516 I, validation-state: unverified
                  > to 10.3.0.50 via fe-1/2/1.0
192.168.0.7/32    *[Direct/0] 23:54:57
                  > via lo0.0
```

??

Device Exchange-2?? ??? ?? ?? ??? ??? Device Private-Peer-2? ?? ?? ???????? ??? ?? ?? 0/0? ?????. ? ?? ??? ?? ??? ??? ?????.

???? private-peer-1?? ?? ??

??

???? Private-Peer-1?? ??? ???? ??? ??????.

??

```
user@Private-Peer-1> show route
```

```
inet.0: 13 destinations, 13 routes (13 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.2.0.0/30        *[Direct/0] 23:58:57
                    > via fe-1/2/2.0
10.2.0.1/32        *[Local/0] 5d 21:34:22
                      Local via fe-1/2/2.0
10.3.0.44/30       *[Direct/0] 23:59:02
                    > via fe-1/2/1.0
10.3.0.46/32       *[Local/0] 1d 03:19:52
                      Local via fe-1/2/1.0
172.16.32.0/24     *[BGP/170] 22:51:22, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.33.0/24     *[BGP/170] 22:51:22, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.34.0/24     *[BGP/170] 22:46:16, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.35.0/24     *[BGP/170] 22:46:16, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.36.0/24     *[BGP/170] 22:46:16, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.37.0/24     *[BGP/170] 22:46:16, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.38.0/24     *[BGP/170] 22:46:16, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
172.16.39.0/24     *[BGP/170] 22:46:16, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.2.0.2 via fe-1/2/2.0
192.168.0.4/32     *[Direct/0] 5d 21:34:22
                    > via lo0.0
```

□□□□ private-peer-2□□ □□ □□

□□

□□□□ Private-Peer-2□□ □□□ □□□□ □□□ □□□□□.

□□

```
user@Private-Peer-2> show route


inet.0: 29 destinations, 29 routes (29 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[Aggregate/130] 1d 02:13:28
                    > to 10.3.0.49 via fe-1/2/1.0
10.0.0.20/30       *[Direct/0] 1d 00:00:53
                    > via fe-1/2/0.0
10.0.0.22/32       *[Local/0] 4d 23:51:14
                      Local via fe-1/2/0.0
10.3.0.4/30        *[Direct/0] 23:59:36
                    > via fe-1/2/3.0
10.3.0.5/32        *[Local/0] 5d 21:34:57
                      Local via fe-1/2/3.0
10.3.0.48/30       *[Direct/0] 23:59:35
                    > via fe-1/2/1.0
10.3.0.50/32       *[Local/0] 1d 03:20:27
                      Local via fe-1/2/1.0
172.16.8.0/21      *[BGP/170] 00:18:39, localpref 100
                      AS path: 64515 64514 I, validation-state: unverified
                    > to 10.3.0.49 via fe-1/2/1.0
172.16.16.0/21     *[BGP/170] 02:09:41, localpref 100
                      AS path: 64515 I, validation-state: unverified
                    > to 10.3.0.49 via fe-1/2/1.0
172.16.24.0/25     *[Static/5] 23:14:04
                      Reject
172.16.24.128/25   *[Static/5] 23:14:04
                      Reject
172.16.25.0/26     *[Static/5] 23:14:04
                      Reject
172.16.25.64/26    *[Static/5] 23:14:04
                      Reject
```

```
172.16.32.0/21     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64515 64510 I, validation-state: unverified
                    > to 10.3.0.49 via fe-1/2/1.0
172.16.32.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.33.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.34.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.35.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.36.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.37.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.38.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.39.0/24     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64510 I, validation-state: unverified
                    > to 10.3.0.6 via fe-1/2/3.0
172.16.40.0/22     *[BGP/170] 22:51:57, localpref 100
                      AS path: 64515 64514 64510 64511 I, validation-state: unverified
                    > to 10.3.0.49 via fe-1/2/1.0
172.16.44.0/23     *[BGP/170] 22:46:51, localpref 100
                      AS path: 64515 64510 64512 I, validation-state: unverified
                    > to 10.3.0.49 via fe-1/2/1.0
172.16.44.0/26     *[BGP/170] 23:05:32, localpref 100
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.21 via fe-1/2/0.0
172.16.44.64/26    *[BGP/170] 23:05:32, localpref 100
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.21 via fe-1/2/0.0
172.16.44.128/26   *[BGP/170] 23:05:32, localpref 100
                      AS path: 64512 I, validation-state: unverified
                    > to 10.0.0.21 via fe-1/2/0.0
172.16.44.192/26   *[BGP/170] 23:05:32, localpref 100
```

```
                    AS path: 64512 I, validation-state: unverified
                  > to 10.0.0.21 via fe-1/2/0.0
192.168.0.5/32    *[Direct/0] 5d 21:34:57
                  > via lo0.0
```

??? ???

? ??? ??? ? ??? ??? ??? | 233

? ???? ??? ???? ??? ??? | 362

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in this section

- ??? ???? ??? | 186
- ??? ??? ??? | 187
- ??? ???? ??? | 187

??? ????? ??? ?????? ??????? ???? ???? ????? ??? ???? ??????. *???? ?????* ???? ??? ??? ??? ????? ??????. ??? ????? ???? ??? ??? ???? ??????.

??? ?????? ???? ???? ????? ??? ??, ??? ??? ??? ???? ??? ???? TRUE ?? FALSE ???? ??????. ??? ??? ? ??? ???? ??? ????? ??? ???? TRUE ?? FALSE? ???? ??????. ??? ??? ???? ??, ??? ??? ??? ???? ??? ??? ????? ??? ??????. ??? ????? ???? ??? ???? ? ???? ???? ??????. ???? ?? ??? ????? ???? ?????? ??? ???? ??????.

? 12 ???? 185 ???? ??? ???? ?? TRUE ? FALSE ?, ??? ??? ??? ??? ??????. ? 13 ???? 185 ???? ??? ????? ??????. ??? ??? ? ???? ??? ???? ???? ? ???????? "??? ??? ???" ???? 187.

??? ????? ???? ???? ????. ??? ????? ??? ??? `import` ??? ??? ???? ???? ? ?????`from policy.export`

□ 12: □□ □□ □□ □

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□ 13: □□ □□□ □□ □□□

□□ □□□	□□ □□□ □□	□□ □□□□ □□ □□□ □□□ □□□ □□
&& (□□ AND)	□□ AND□ □□□□□ □□ □□ TRUE□□ TRUE□ □□□ □□□ □ □□□□. □□□ □□ □□ TRUE□□ TRUE□□ TRUE□ □ □□□□. TRUE □ FALSE □□ FALSE□ □□□ □□□□□. FALSE□ FALSE□ □□ FALSE□ □ □□ □□□□□.	□ □□ □□□ □□□ TRUE □□ □□□□ □□ □□□ □□□□□. □ □□ □□□ FALSE □□ □□□□ □□ □□□ □□□□ □□ □□ □□□ □□□□ □□□□.
|| (□□□ OR)	□□□ OR□ □□□□□ TRUE □□□ □□□□ □□ □ □ □□□ □□ TRUE□□ □□□. □□□ □□ □□ TRUE□□ FALSE□□ TRUE□ □□□□□. TRUE □ TRUE □□ TRUE□ □□□ □□□□□. FALSE□ FALSE□ □□ FALSE□ □ □□ □□□□□.	□ □□ □□□ □□□ TRUE □□ □□□□ □□ □□□ □□□□ □□ □□ □□□ □□□ □ □□□□. □ □□ □□□ FALSE □□ □□□□ □□ □□□ □□□□□.
! (□□□ NOT)	□□ NOT□ TRUE□ □□ FALSE□, FALSE□ □□ TRUE□ □□□□. □□ □□ □ □□ □□□ □□□□ □□□ □□□□ □□□ □□□ □□□.	□□ AND □□□□ □□ □□□ □□ □ □□ □□□ □□ □ FALSE□ TRUE□ □ □□□ □□ □□□ □□□□□. TRUE □□ FALSE□ □□□ □□ □□□ □□□□ □□ □□ □□□ □□□□ □□□□. □□ OR □□□□ □□ □□□ □ □ □□ □□□ □□ □ FALSE□ TRUE□ □□□ □ □□□□ □□□ □□□□ □□□□ □□ □□□ □□□□ □□□□. TRUE □□ FALSE□ □□□ □□ □□□ □□□□□. □□□ □□ □□□□ □□□ □□ □□□ □□ □□ □□ □□□ □□, □□□ □□□ □□□ □ □□□□. □□ □□ □□□ □□□□ □ □□□ □□□□ □□□□□□.

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?? ??? ??

?? ?????? ?? ???? ???? ?? ???? ??? ??? ?? ???.

- ??? AND - ?? ???? ?(?) policy1 ?? ??????. after policy1 ? ???? TRUE ?? ???? policy2 ??????. FALSE ?? ? ? policy2 ?? ???? ????.

```
export (policy1 && policy2)
```

- ??? OR - ?? ???? ?(?) policy1 ?? ??????. after policy1 ? ???? TRUE ?? ???? policy2 ???? ????. FALSE ? ? ?? policy2 ?? ??????.

```
export (policy1 || policy2)
```

- ?? OR ? ?? AND - ?? ???? ?(?) policy1 ?? ??????. after policy1 ? ???? TRUE ?? ?? policy2 ?? ???? policy3 ??????. after policy1 ? ???? FALSE ?? ???? policy2 ??????. TRUE ?? ???? policy2policy3 ??????. FALSE ?? ???? policy2policy3 ???? ????.

```
export [(policy1 || policy2) && policy3]
```

- ??? NOT - ?? ???? ?(?) policy1 ?? ??????. after policy1 ? ???? TRUE ?? ???? ?? FALSE? ???? policy2 ? ??? ????. FALSE ?? ???? ?? TRUE? ???? policy2 ??????.

```
export (!policy1 && policy2)
```

??? ??? [policy1 policy2 policy3] ?? ??? (policy1 && policy2 && policy3)? ???? ????.

??? ??? ??? ??? ???? ??? ???? ??????. ?? ?? ???? ??? accept ?? reject? policy3policy2 ?? policy1 ???? ??? ?. ? policy1 (?) ???? ??? ?(?) policy2 ??? ???? ??? accept ?? ? reject? ??? ??????.

?? ???? TRUE ?? FALSE ??? ???? ??? ??? ??? ??? ?? ???? ??? ???? ??????. (?? ??? ??? ?? ??? ??? ? ? ?????? "?? ?? ??" ??? 187.) ?? ?? if policy1 ? FALSE policy2 ?? ???? policy3 ???? ????. TRUE ?? ???? policy1policy2 ??????. FALSE ?? ???? policy2policy3 ???? ????. TRUE ?? ???? policy2policy3 ??????.

?? ???? ??? ??? ??? ?? ?????. ?? ?????? FALSE policy2 ?? ???? ?? policy1 ? ??????. TRUE ?? ???? ??? policy3 ????? next policy ?? policy2 ? ??????. TRUE ?? ?????? ??? policy3 ??? ??? ????? next policy ?? ??

policy2 ??? ??????(??? ????? ??? ?? ?? ?? ?? ??? ?? ????? ??). ?? TRUE? ????? ??? policy3 ????? accept ?? policy2 ????? ?????.

```
export [(policy1 || policy2) policy3]
```

?? ?? ??

?? ?? ?? ?????? ??????? ?? ??? TRUE ?? FALSE ??? ????, ?? ????? ????? ??? ?? ??? ????? ??????. ???? ??? ??? ?? ?? ????? ??? ??? ??? ?? ??? ?? ??? ??? ????? ????.

?? ?????? ??????? ??? ?? ?? ????? ??????.

1. ??????? ?? ????? ? ?? ??? ??? ?? ??? ????? ??? ????? ?? ??? TRUE ?? FALSE ??? ??????. (?? ?? ?? ?? ? ? ??? ??? ? ??????? 12 ??? 185.)
2. ??????? TRUE ?? FALSE ?? ?? ????? ??? ?? ????? ?? ??????(? 13 ??? 185??). ??????? ??? ?? ????? ?? ? ? ??(?? ??)? ????? ??? ??????.

   ?? ?????? ??????? ?? ?? ?? ??? ??????. ?? ?? ??? ?? ?? ????? ?? ?? ????? ??, ??????? ????? ?? ??? ????? ????. ?? ??, ?? ????? ?? AND ????? ????? ?? ??? FALSE ?? ????? ??, ????? ?? ??? ?? ????? ????? ?? ?? FALSE? ?????? ??????? ????? ?? ??? ????? ????.
3. ??????? ?? ????? ? ?? ??? ??? ?? 1??? 2??? ??????(????? ?? ?? ????? ?).
4. ??? ??? ??? ??? ? ??? ?? ??????? ? ??? ?? ????? ?? TRUE ?? FALSE ?? ??????. ???? ?? ????? ?? TRUE ? ? FALSE? ??? ??????.
5. ??????? TRUE ?? FALSE? ??? ?? ????? ??????. (?? ?? ?? ?? ?? ??? ??? ? ??????? 12 ??? 185.) ??? ?? ???.

   ????? ? ??? TRUE ?? ??? ?? ??????? TRUE? ???? ???? ???? ???? ?? ?? ????? ?? ??????. ?? ??, ?? ??? (policy1 && policy2) ? ????? policy1 ?? accept ? policy2 ? next termnext term ??? ?? ??? ??????.

   ?? ? ??? ??? ??? ?? ??? ????? ?? ?? ?????? ??????? ??? ??? ????? ?? ? ?? ??? ??????. ?? ?? ?? ????? ? ?? ??? ??? ??? ??? ????? 500?? ????? ?? ? ???? ?? ???? ??? ?? metric 500 ? ??????. ???? ?? ????? ?? ?? ?? ??? ???? ?? ?? ?? ???? ???? ??, ????? ???? ?? ???? ????? ?? ?? ???? ???? ????? ?? ? ?????.

?? ??? ??

?? ?? ??? ?????? ? ?? ?? ????? ??????.

```
[edit]
policy-options {
```

```
    policy-statement policy-A {
        from {
            route-filter 10.10.0.0/16 orlonger;
        }
        then reject;
    }
}
policy-options {
    policy-statement policy-B {
        from {
            route-filter 10.20.0.0/16 orlonger;
        }
        then accept;
    }
}
protocols {
    bgp {
        neighbor 192.168.1.1 {
            export (policy-A && policy-B);
        }
        neighbor 192.168.2.1 {
            export (policy-A || policy-B);
        }
        neighbor 192.168.3.1 {
            export (!policy-A);
        }
    }
}
```

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- (policy-A & & policy-B) - 10.10.1.0/24□ □ □□ policy-A□□□□□. 10.10.1.0/24□ □ □□□ policy-A□□ □□□ □□□□□ □ reject □□□ □□□ □□□□□. reject □ FALSE □□□ □□□□, FALSE□ □□□ □□ AND□ □□ □□□□□. FALSE□ □□□ □□ □□□ policy-B □□□□ □□□□ □□□(□□ □□□ □□□□ □□ □□□ FALSE □□ FALSE□ □□□ □□□) policy-B □□□□ □□ FALSE□ □□□ □ □□□□. FALSE □□□ □ □□ reject□□ 10.10.1.0/24□ □□□□□.

- (policy-A || policy-B) - 10.10.1.0/24□ □ □□ policy-A□□□□□. 10.10.1.0/24□ □ □□□ policy-A□□ □□□ □□□□□ □ reject □□□ □□□ □□□□□. reject □ FALSE □□□ □□□□ □□□ □□ OR□ □□ FALSE□ □□□□□. □□ OR□ TRUE □□□ □□□□ □□ □□ □□□ TRUE □□ □□□□□ 10.10.1.0/24□ □ □□ policy-B□□□□□. 10.10.1.0/24□ □ □□□□ policy-B□□□□ □ next-policy □□ □□□ □□□□□. □ next-policy (□) TRUE □□□ □□□ □□ FALSE(□□□ policy-A) □ TRUE(□□□ policy-B) □□ □□□ □□ OR□ □□ □□□□□. □□ □ □□□□ FALSE □□ TRUE□ TRUE□ □□□ □□□□□. TRUE□ □□□ □ □□ next-policy□ □□. (TRUE□ □□ □□□□□ □□□□□□□ □□□□□ □□□ □□□□ □□□ next-policy □ next-policy □□□□□.) policy-B □ □□ □□□□ □□□ □□□ □□□□□ BGP□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.

- (!policy-A) - 10.10.1.0/24 □ □□ policy-A□□□□□. 10.10.1.0/24 □ □□□ policy-A□□ □□□ □□□□□ □ reject □□□ □□□ □□□□□. reject □ FALSE □□□ □□□□ FALSE□ □□□ □□ NOT□ □□ □□□□□. FALSE□ □□ □□ NOT□ □□□ □□ TRUE□ □□□□ □□□□□. TRUE□ □□□ □ □□ accept□□ □□ 10.10.1.0/24□ □□□□□.

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OSPF LFA(loop-free alternate) □□□ □□ □□□ □□□□□ OSPF□ □□ IP fast-reroute □□□ □□□□□. Junos OS□ □□ OSPF □□□ □□ □□ □□ □□ □□ □□ □□□ □□ □□□□□. □□□ □□ □□□ □□ □□ □□□ □□ □□□□ □□ □□□ □□□□ □□ □□□ □□ □□ □□ □ □ □□□ □ □□ □□□ □ □□ □ □□ □□□ □□□□□. LFA□ □□□ □□□ □□□□ □□□□ □□ □□□□ LFA□ □□□□ □□□□ □□□□□. □□□□ □□ □□ □□□ □□□ □ □□ □□□ □□ □□□ □□□□ □□ □□□□. □□□ LFA□ □□□□ □□ Junos OS□ □□□□ □ □□(IPv4 □ IPv6)□ □□ □□ □ □□□ □□□ □□ □□□□ □□ □□ □□ □□□ □□□ □ □□□□. □□□ □□□ admin-group, srlg, □□□, □□ □□, □□□ □ □□ □□□ □□□□ □□□□□.

□□ □□ □□ □□(SPF) □□ □□ □□ □□□ □ □□ □ □□ □□□ IGP□ □□ □□□□ □□□□□ □□ □□(□□□)□ □□□□□. □□□ □□ □□□□ □□ □□ □ □□ □□□□□ □□ □□ □□□ □□□□□. □□□□□ □□ □□ □□ □□□ □□□ □□ □□□□ □□□□□.

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- admin-group– □□ □□ □□ □□□ □□□□□□ □□ □□ □□□ □□□ '□□'□ □□□□ □□□□ □□□ □□□□, □□□ □□□ □□□ □□□□□ □□□ □□□□ □□□□. □□□ □□□ □□ □□□ □□□□ MPLS□ □□ □□□□□. □□ □□□ □□□□ exclude, include-all, include-any □□ preference□ □□□□ □□□ □□ □□ □□□ □□□ □ □□□□.
- srlg— SRLG(Shared Risk Link Group)□ □□ □□□□ □□□□ □□ □□□, □□ □□□□ □□□ □□ □□□ □□ □□□ □□□ □□□□. □□□ □□□ □□□ □□ □□□ □□□□□ □□□ SRLG□ □□□ □□□ □□□□□. □□ □□, □□ □□□□ □□□□ □□□ □□□ SRLG□ □□□ □□□. □□□ □ □□□ □□ □□□ □□ □□□ □□□ □ □□ □□□□□. SRLG□ IGP(OSPF) □□□ □□□ □□□ 32□□ □□□ □□□□□. □□□ □□ SRLG□ □□ □ □□□□. □□ □□□ □□ □□ □□ □□ SRLG□ □□□□□ □□□□ □□ □□□ □□□ □ □□□□. □□□ □□ SRLG□ □□□ □□ □□ □ □ □□ SPF□ □□ SRLG□ □□ □□□ □□□□ □□ □□□□□.

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- bandwidth - □□□□ □□ □□□ □□ □□ □□ □□□ □□ □□□ □□□□□. □□ □□ □ □□□ □□ □□ □ □□□□□□ □□□□ □□ □□ □□ □□□□ □ □□□ □□ □□□□ □□□ □ □□□□.
- protection-type— protection-type□ □□ □□□ □□ □□ □□ □□ □□□ □□ □□□□□ □□□ □□□□□. □□□ □□□□ □□ □□, □□ □ □ □□ □□□ □□□ □ □□□□. □□ □□□ □□□ □□ □□ □□ LFA□ □□ □□ LFA□□ □□□□□.
- node- □□□ □□ □□□□□. □□□ □□□ □□ □□□ □□□, RSVP □□ LSP □□□□□ □□ □□ □□□ □□ □□ SPF □□□ □□ □□□□ □ □□□ □. □□□ LSP□ □□□ □□ □□□□ route-id□ □□ □□□□□. □□□ □□□□ □□ □□□□ □□□□□ □□□ □ □□□□.
- metric— □□□□ LFA□ □□ □□□ □□□□□. □□ □□ □□□□ □□ □□□□ □□ □□□□ □ □□ □□□ □□□□□□. root-metric□ □□ □ □□ □□ RSVP □□ LSP □□□□ □□□□ □□ □□ □□□□ □□ □□□□ □□□□□. □□ □□□□ RSVP □□ LSP □□ □□ □□□□ □□ □□ □ □□ □ □ □□ □□□□□ □□ □□□□□ □□□□ □□□□□. □□□ □□□ □□□□ □□ □□□□□□ □□□□□. □□□□□ □ □□ □□□ □□ □□□ □□ □□ □□ □□ □ □□□ □□ □□ □□□□ □□ □□ □□ □□□ □□□□□.

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□: TE □□□ OSPFv3□□ □□□□ □□□ IPv6 □□□□ □□ □□ □□ □□ □□□ □□□ □ □□□□.

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backup-selection(□□□□ IS-IS)

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OSPF LFA(loop-free alternate) □□□ □□ □□□ □□□□□ OSPF□ □□ IP fast-reroute □□□ □□□□□. Junos OS□ □□ OSPF □□□ □□ □□ □□ □□ □□ □□ □□□ □□ □□□□□. □□□ □□ □□□ □□ □□ □□□ □□ □□□□ □□ □□□ □□□□ □□ □□□ □□ □□ □□ □ □ □□□ □ □□ □□□ □ □□ □ □□ □□□ □□□□□. LFA□ □□□ □□□ □□□□ □□□□ □□ □□□□ LFA□ □□□□ □□□□ □□□□□. □□□□ □□ □□ □□□ □□□ □ □□ □□□ □□ □□□ □□□□ □□ □□□□. □□□ LFA□ □□□□ □□ Junos OS□ □□□ □ □□(IPv4 □ IPv6)□ □□ □□ □ □□□ □□□ □□ □□□□ □□ □□ □□ □□□ □□□ □ □□□□. □□□ □□□ admin-group, srlg, □□□, □□ □□, □□□ □ □□ □□□ □□□□ □□□□□.

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- □□ □□□□□ □□□□ □□ □□ □□□□ □□□□□. *□□□ □□□□□ Junos OS □□□ □□□□ □□□□□□ □□□□□□.*

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1. [illegible] [illegible] [illegible].

```
[edit policy-options]
 user@host# set policy-statement ecmp term 1 then load-balance per-packet
```

2. [illegible] [illegible] RSVP [illegible].

```
[edit protocols]
user@host# set rsvp interface all
```

3. [illegible] [illegible].

```
[edit protocols mpls]
user@host# set admin-groups group-name
```

4. srlg [illegible].

```
[edit routing-options]
user@host# set srlg srlg-name srlg-value srlg-value
```

5. [illegible] [illegible] MPLS [illegible].

```
[edit protocols mpls]
user@host# set interface all
```

6. [illegible] [illegible] [illegible] [illegible] MPLS [illegible].

```
[edit protocols mpls]
user@host# set interface interface-name admin-group group-name
```

7. [illegible] ID [illegible].

```
[edit routing-options]
user@host# set router-id router-id
```

8. [illegible]

```
[edit routing-options]
user@host# set forwarding-table export ecmp
```

9. [illegible]

```
[edit protocols ospf]
user@host# set area area-id interface interface-name link-protection
user@host# set area area-id interface interface-name metric metric
```

10. IP [illegible]

[illegible]

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name admin-group
```

- [illegible]

```
[edit routing-options backup-selection destination ip-address interface interface-name
admin-group]
user@host# set exclude group-name
```

[illegible] LFA(loop-free alternate) [illegible]

[illegible] c1[illegible]

```
[edit routing-options backup-selection destination 0.0.0.0/0 interface all admin-group]
user@host# set exclude c1
```

- [illegible]

```
[edit routing-options backup-selection destination ip-address interface interface-name
admin-group]
user@host# set include-all group-name
```

[illegible]

```
[edit routing-options backup-selection destination 0.0.0.0/0 interface all admin-group]
user@host# set include-all c2
```

- [illegible]

```
[edit routing-options backup-selection destination ip-address interface interface-name
admin-group]
user@host# set include-any group-name
```

[illegible]

```
[edit routing-options backup-selection destination 0.0.0.0/0 interface all admin-group]
user@host# set include-any c3
```

- [illegible]

  [illegible]

```
[edit routing-options backup-selection destination ip-address interface interface-name
admin-group]
user@host#  set preference group-name
```

[illegible]

```
[edit routing-options backup-selection destination 0.0.0.0/0 interface all admin-group]
user@host#  set preference c4
```

11. [illegible]

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name bandwidth-
greater-equal-primary
```

12. [illegible] RSVP [illegible] LSP(label-switched-path) [illegible]

    [illegible]

- ?? ????? ?? ?? ?? ??? ??????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name dest-
metric highest
```

- ?? ????? ?? ?? ?? ??? ??????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name dest-
metric lowest
```

13. ??? ?? ?????? ??? ?? ??? ??????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name downstream-
paths-only
```

14. ?? ?? ?? ?? ??? ?? ????? ?? ?? ??? ??????.

?? ?? ??? ??? ?? ? ?????.

- [root dest] — ?? ?? ?? ?? ?? ??? ?? ?? ??? ??? ????? ???. ?? ?? ????? ??? ??? ?? ?? ?? ?? ??? ?? ????? ????? ???.
- [dest root] — ?? ?? ?? ?? ?? ??? ?? ?? ??? ??? ????? ???. ?? ?? ????? ??? ??? ?? ??? ?? ????? ?? ?? ???.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name metric-
order dest
user@host# set backup-selection destination ip-address interface interface-name metric-
order root
```

15. ?? ??? ????? ?? ?? ????? ?????? ??? ?? ??? ??? IP ?? ??? ??????.

??? ??(?? ???) ??, ?? ?? ?? ?? ??? ?? ?? ????? ? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name node
```

- ??? ?? ??? ?????.

```
[edit routing-options backup-selection destination ip-address interface interface-name
node]
user@host# set exclude node-address
```

???? ???? ?? ?? ??? ?? ?? ?? ?? ?? ?? ??? ???? ?????.

- ????? ??? ?? ??? ?????.

```
[edit routing-options backup-selection destination ip-address interface interface-name
node]
user@host# set preference node-address
```

?? ??? ?? ??? ?? ?? ??? ?????.

16. ?? ??? ???? ??, ?? ?? ?? ??? ? ?? ??? ?? ?? ??? ?????.

- ?? ??? ???? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name
protection-type link
```

- ?? ??? ???? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name
protection-type node
```

- ?? ?? LFA? ?? ?? LFA?? ???? ?? ?? ?? ?? LFA? ???? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface interface-name
protection-type node-link
```

17. ?? ? ?? ?? RSVP ?? LSP(label-switched-path) ?? ?? ???? ?? ?? ???? ???? ?????.

- ?? ???? ?? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface all root-metric highest
```

- ?? ???? ?? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface all root-metric lowest
```

18. ?? ??? ?? ??? ? ?? ?? ?? SRLG(Shared Risk Link Group)? ????? ????? ?? ?? ??? ?????.

- ?? ??? ?? ??? ? ?? ?? ?? srlgs? ????? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface all srlg loose
```

srlg ?? ?? ?? ?? ??? ?????.

- ?? ?? ? ??? ?? ??? ? ?? ??? ??? srlgs? ?? ?? ??? ????? ?? ??? ?????.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface all srlg strict
```

19. ?? ??, srlg, ???, ?? ??, ?? ? ???? ???? ?? ??? ???? ??? ??? ????? ?? ??? ?????.

?? ?? ??? admin-group, srlg, bandwidth, protection-type, node ? metric???.

```
[edit routing-options]
user@host# set backup-selection destination ip-address interface all evaluation-order admin-
group
user@host# set backup-selection destination ip-address interface all evaluation-order srlg
user@host# set backup-selection destination ip-address interface all evaluation-order
bandwidth
```

?? ??

backup-selection(???? IS-IS)

IS-IS ⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰

in this section

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IS-IS ⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰

IS-IS LFA(loop-free alternate) ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰ IS-IS⍰ ⍰⍰ IP fast-reroute ⍰⍰⍰ ⍰⍰⍰⍰⍰. Junos OS⍰ ⍰⍰ IS-IS ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰ ⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰. LFA⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰ LFA⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰. ⍰⍰⍰ LFA⍰ ⍰⍰⍰⍰ ⍰⍰ Junos OS⍰ ⍰⍰⍰⍰ ⍰ ⍰⍰(IPv4 ⍰ IPv6)⍰ ⍰⍰ ⍰⍰ ⍰ ⍰⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰⍰ admin-group, srlg, ⍰⍰⍰, ⍰⍰ ⍰⍰, ⍰⍰⍰ ⍰ neighbor ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰.

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LFA ⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰.

- admin-group– ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ '⍰⍰'⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰, ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ MPLS⍰ ⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ exclude, include-all, include-any ⍰⍰ preference⍰ ⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰⍰⍰.
- backup-neighbor— ⍰⍰ ⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰ neighbor ID⍰⍰⍰.
- node— ⍰⍰ ⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ IP ⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰(⍰⍰ ⍰⍰⍰) ⍰⍰, ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰ ⍰ ⍰⍰⍰. ⍰⍰⍰ LSP⍰ ⍰⍰⍰ ⍰⍰⍰⍰ TE-router-ID TLV⍰ ⍰⍰ ⍰⍰⍰⍰⍰.
- node-tag— ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰ PE ⍰⍰⍰ ⍰⍰⍰ neighbor ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰ IS-IS admin-tags⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰⍰⍰ ⍰⍰⍰ router-id⍰ ⍰⍰⍰⍰ ⍰⍰⍰ lo0 ⍰⍰ ⍰⍰⍰⍰ ⍰⍰ admin-tag ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ TE ⍰⍰⍰ _ID ⍰⍰ ⍰⍰ ID⍰ ⍰⍰⍰⍰ /32 ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ IP ⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰.
- srlg— SRLG(Shared Risk Link Group)⍰ ⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰, ⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰ SRLG⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰ ⍰⍰, ⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ SRLG⍰ ⍰⍰⍰ ⍰⍰⍰. ⍰⍰⍰ ⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰ ⍰⍰⍰⍰⍰. SRLG⍰ IGP(IS-IS) ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ 32⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰. ⍰⍰⍰ ⍰⍰ SRLG⍰ ⍰⍰ ⍰ ⍰⍰⍰⍰. ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ SRLG⍰ ⍰⍰⍰⍰⍰ ⍰⍰⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰⍰⍰.

- bandwidth - [illegible].
- protection-type— protection-type[illegible], [illegible]. [illegible] LFA[illegible] LFA[illegible].
- metric— [illegible] LFA[illegible]. root-metric[illegible] RSVP [illegible] LSP [illegible]. [illegible] RSVP [illegible] LSP [illegible].

[illegible]. LFA[illegible] [admin-group srlg bandwidth protection-type neighbor neighbor-tag metric] [illegible].

SEE ALSO

[illegible]: IS-IS [illegible]

backup-selection([illegible] IS-IS)

[illegible]: OSPF [illegible] OSPF3 [illegible]

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- [illegible] | 200
- [illegible] | 225

[illegible] LFA(loop-free alternate)[illegible] OSPF [illegible] OSPF3 [illegible].

[illegible] Junos OS[illegible] LFA[illegible]. [illegible] admin-group, srlg, bandwidth, protection-type, metric, node[illegible].

[illegible]

[illegible].

- M ??? ?????? ?? ???, MX ??? 5G ???? ??? ???, PTX ??? ?? ?? ???, T ??? ?? ???? ??? ? ?? ??? 8?
- ?? ??????? Junos OS ??? 15.1 ?? ??

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1. ???? ??????? ?????.
2. OSPF? ?????.

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Junos OS??? ?? LFA(loop-free alternative) ?? ???? ?? ??? LFA ???? ???? ? ????. ??? ??? ? ??(IPv4 ? IPv6)? ?? ?? ? ??????? ?? ??????. ??? ?? ??? ?? ??? admin-group, srlg, ???, protection-type, metric, node ??? ?? LFA? ?????. ?? ?? ?? ??(SPF) ?? ?? ?? ?? ??? ??? ?? ??? ? ??(?? ? ?? ??)? IGP? ?? ??????. IGP? ?? ?????? ??? ??? ??, ?? ?? ??? ?? ??? ? ??(IPv4 ? IPv6) ? ?? ?? ? ??????? ?? ??? ??? ?? ??????. ? ?? ?? ??? ?? ??? ???? ??? ???? ?? ?? ??? ??????. ?? ?? ??? ?????? ?? ???? ?? ?? `[edit routing-options]` ?????? `backup-selection`. ??? `show backup-selection` ??? ?????? ? ??? ?? ??? ??? ??????. ??????? ?? ??, ???, ?????? ?? ??? ???? ?? ???? ? ????.

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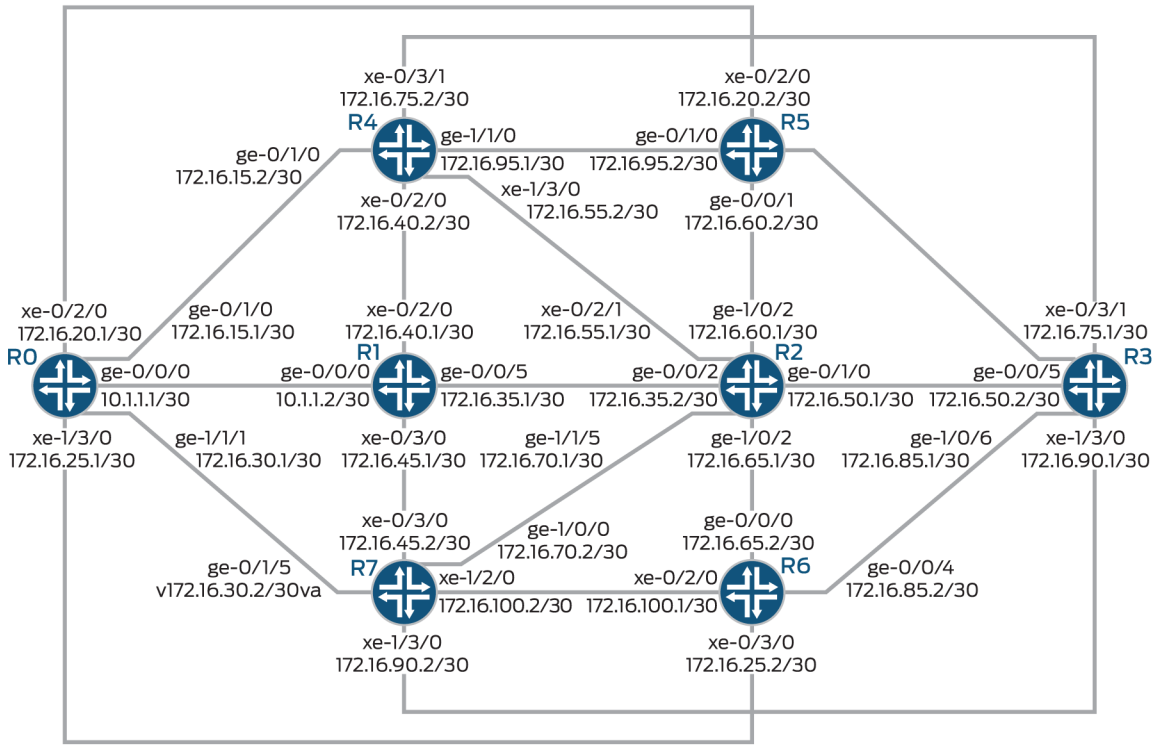
? ?? 14 ??? 200??? ? ????????? ?? ?? ??? ???? R3? ??????.

?? 14: OSPF ?? OPSF3? ?? ?? ?? ??? ?



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R0

```
set interfaces ge-0/0/0 unit 0 family inet address 10.1.1.1/30
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:10:1:1::1/64
set interfaces ge-0/0/0 unit 0 family mpls
set interfaces ge-0/1/0 unit 0 family inet address 172.16.15.1/30
set interfaces ge-0/1/0 unit 0 family inet6 address 2001:db8:15:1:1::1/64
set interfaces ge-0/1/0 unit 0 family mpls
set interfaces xe-0/2/0 unit 0 family inet address 172.16.20.1/30
set interfaces xe-0/2/0 unit 0 family inet6 address 2001:db8:20:1:1::1/64
set interfaces xe-0/2/0 unit 0 family mpls
set interfaces ge-1/0/5 unit 0 family inet address 172.16.150.1/24
set interfaces ge-1/0/5 unit 0 family inet6 address 2001:db8:150:1:1::1/64
set interfaces ge-1/0/5 unit 0 family mpls
set interfaces ge-1/1/1 unit 0 family inet address 172.16.30.1/30
set interfaces ge-1/1/1 unit 0 family inet6 address 2001:db8:30:1:1::1/64
set interfaces ge-1/1/1 unit 0 family mpls
set interfaces xe-1/3/0 unit 0 family inet address 172.16.25.1/30
set interfaces xe-1/3/0 unit 0 family inet6 address 2001:db8:25:1:1::1/64
set interfaces xe-1/3/0 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 10.10.10.10/32 primary
set interfaces lo0 unit 0 family inet6 address 2001:db8::10:10:10:10/128 primary
set interfaces lo0 unit 0 family mpls
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 10.10.10.10
set protocols rsvp interface all
```

```
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-0/1/0.0 metric 18
set protocols ospf area 0.0.0.0 interface xe-0/2/0.0 metric 51
set protocols ospf area 0.0.0.0 interface ge-1/1/1.0 metric 23
set protocols ospf area 0.0.0.0 interface xe-1/3/0.0 metric 52
set protocols ospf area 0.0.0.0 interface ge-1/0/5.0
set protocols ospf3 area 0.0.0.0 interface ge-0/0/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/1/0.0 metric 18
set protocols ospf3 area 0.0.0.0 interface xe-0/2/0.0 metric 51
set protocols ospf3 area 0.0.0.0 interface ge-1/1/1.0 metric 23
```

```
set protocols ospf3 area 0.0.0.0 interface xe-1/3/0.0 metric 52
set protocols ospf3 area 0.0.0.0 interface ge-1/0/5.0
```

R1

```
set interfaces ge-0/0/0 unit 0 family inet address 10.1.1.2/30
set interfaces ge-0/0/0 unit 0 family inet6 address 2001:db8:10:1:1::2/64
set interfaces ge-0/0/0 unit 0 family mpls
set interfaces ge-0/0/5 unit 0 family inet address 172.16.35.1/30
set interfaces ge-0/0/5 unit 0 family inet6 address 2001:db8:35:1:1::1/64
set interfaces ge-0/0/5 unit 0 family mpls
set interfaces xe-0/2/0 unit 0 family inet address 172.16.40.1/30
set interfaces xe-0/2/0 unit 0 family inet6 address 2001:db8:40:1:1::1/64
set interfaces xe-0/2/0 unit 0 family mpls
set interfaces xe-0/3/0 unit 0 family inet address 172.16.45.1/30
set interfaces xe-0/3/0 unit 0 family inet6 address 2001:db8:45:1:1::1/64
set interfaces xe-0/3/0 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 172.16.1.1/32 primary
set interfaces lo0 unit 0 family inet6 address 2001:db8::1:1:1:1/128 primary
set interfaces lo0 unit 0 family mpls
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 172.16.1.1
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
```

```
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols mpls interface ge-0/0/0.0 srlg srlg9
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-0/0/5.0 metric 10
set protocols ospf area 0.0.0.0 interface xe-0/2/0.0 metric 10
set protocols ospf area 0.0.0.0 interface xe-0/3/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/0/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/0/5.0 metric 10
set protocols ospf3 area 0.0.0.0 interface xe-0/2/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface xe-0/3/0.0 metric 10
```

R2

```
set interfaces ge-0/0/2 unit 0 family inet address 172.16.35.2/30
set interfaces ge-0/0/2 unit 0 family inet6 address 2001:db8:35:1:1::2/64
set interfaces ge-0/0/2 unit 0 family mpls
set interfaces ge-0/1/0 unit 0 family inet address 172.16.50.1/30
set interfaces ge-0/1/0 unit 0 family inet6 address 2001:db8:50:1:1::1/64
```

```
set interfaces ge-0/1/0 unit 0 family mpls
set interfaces xe-0/2/1 unit 0 family inet address 172.16.55.1/30
set interfaces xe-0/2/1 unit 0 family inet6 address 2001:db8:55:1:1::1/64
set interfaces xe-0/2/1 unit 0 family mpls
set interfaces ge-1/0/2 unit 0 family inet address 172.16.60.1/30
set interfaces ge-1/0/2 unit 0 family inet6 address 2001:db8:60:1:1::1/64
set interfaces ge-1/0/2 unit 0 family mpls
set interfaces ge-1/0/9 unit 0 family inet address 172.16.65.1/30
set interfaces ge-1/0/9 unit 0 family inet6 address 2001:db8:65:1:1::1/64
set interfaces ge-1/0/9 unit 0 family mpls
set interfaces ge-1/1/5 unit 0 family inet address 172.16.70.1/30
set interfaces ge-1/1/5 unit 0 family inet6 address 2001:db8:70:1:1::1/64
set interfaces ge-1/1/5 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 172.16.2.2/32 primary
set interfaces lo0 unit 0 family inet6 address 2001:db8::2:2:2:2/128 primary
set interfaces lo0 unit 0 family mpls
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 172.16.2.2
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
```

```
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols mpls interface ge-0/1/0.0 srlg srlg1
set protocols mpls interface ge-1/0/9.0 srlg srlg1
set protocols mpls interface ge-1/1/5.0 srlg srlg7
set protocols ospf area 0.0.0.0 interface ge-0/0/2.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-0/1/0.0 link-protection
set protocols ospf area 0.0.0.0 interface xe-0/2/1.0 metric 12
set protocols ospf area 0.0.0.0 interface ge-1/0/2.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-1/0/9.0 metric 12
set protocols ospf area 0.0.0.0 interface ge-1/1/5.0 metric 13
set protocols ospf3 area 0.0.0.0 interface ge-0/0/2.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/1/0.0 link-protection
set protocols ospf3 area 0.0.0.0 interface xe-0/2/1.0 metric 12
set protocols ospf3 area 0.0.0.0 interface ge-1/0/2.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-1/0/9.0 metric 12
set protocols ospf3 area 0.0.0.0 interface ge-1/1/5.0 metric 13
```

R3

```
set interfaces ge-0/0/5 unit 0 family inet address 172.16.50.2/30
set interfaces ge-0/0/5 unit 0 family inet6 address 2001:db8:50:1:1::2/64
set interfaces ge-0/0/5 unit 0 family mpls
set interfaces xe-0/3/1 unit 0 family inet address 172.16.75.1/30
```

```
set interfaces xe-0/3/1 unit 0 family inet6 address 2001:db8:75:1:1::1/64
set interfaces xe-0/3/1 unit 0 family mpls
set interfaces ge-1/0/0 unit 0 family inet address 172.16.80.1/30
set interfaces ge-1/0/0 unit 0 family inet6 address 2001:db8:80:1:1::1/64
set interfaces ge-1/0/0 unit 0 family mpls
set interfaces ge-1/0/5 unit 0 family inet address 172.16.200.1/24
set interfaces ge-1/0/5 unit 0 family inet6 address 2001:db8:200:1:1::1/64
set interfaces ge-1/0/6 unit 0 family inet address 172.16.85.1/30
set interfaces ge-1/0/6 unit 0 family inet6 address 2001:db8:85:1:1::1/64
set interfaces ge-1/0/6 unit 0 family mpls
set interfaces xe-1/3/0 unit 0 family inet address 172.16.90.1/30
set interfaces xe-1/3/0 unit 0 family inet6 address 2001:db8:90:1:1::1/64
set interfaces xe-1/3/0 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 172.16.3.3/32 primary
set interfaces lo0 unit 0 family inet6 address 2001:db8::3:3:3:3/128 primary
set interfaces lo0 unit 0 family mpls
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 172.16.3.3
set routing-options forwarding-table export ecmp
set routing-options backup-selection destination 10.1.1.0/30 interface xe-1/3/0.0 admin-group
include-all c2
set routing-options backup-selection destination 10.1.1.0/30 interface all admin-group exclude c3
set routing-options backup-selection destination 10.1.1.0/30 interface all srlg strict
set routing-options backup-selection destination 10.1.1.0/30 interface all protection-type node
set routing-options backup-selection destination 10.1.1.0/30 interface all bandwidth-greater-
equal-primary
set routing-options backup-selection destination 10.1.1.0/30 interface all neighbor preference
172.16.7.7
set routing-options backup-selection destination 10.1.1.0/30 interface all root-metric lowest
set routing-options backup-selection destination 10.1.1.0/30 interface all metric-order root
set routing-options backup-selection destination 172.16.30.0/30 interface all admin-group
exclude c5
```

```
set routing-options backup-selection destination 172.16.30.0/30 interface all srlg strict
set routing-options backup-selection destination 172.16.30.0/30 interface all protection-type
node
set routing-options backup-selection destination 172.16.30.0/30 interface all bandwidth-greater-
equal-primary
set routing-options backup-selection destination 172.16.30.0/30 interface all neighbor
preference 172.16.7.7
set routing-options backup-selection destination 172.16.30.0/30 interface all root-metric lowest
set routing-options backup-selection destination 172.16.30.0/30 interface all metric-order root
set routing-options backup-selection destination 172.16.45.0/30 interface all admin-group
exclude c5
set routing-options backup-selection destination 172.16.45.0/30 interface all srlg strict
set routing-options backup-selection destination 172.16.45.0/30 interface all protection-type
node
set routing-options backup-selection destination 172.16.45.0/30 interface all bandwidth-greater-
equal-primary
set routing-options backup-selection destination 172.16.45.0/30 interface all neighbor
preference 172.16.7.7
set routing-options backup-selection destination 172.16.45.0/30 interface all root-metric lowest
set routing-options backup-selection destination 172.16.45.1/30 interface all metric-order root
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
```

```
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols mpls interface ge-0/0/5.0 admin-group c0
set protocols ospf area 0.0.0.0 interface ge-0/0/5.0 link-protection
set protocols ospf area 0.0.0.0 interface ge-0/0/5.0 metric 10
set protocols ospf area 0.0.0.0 interface xe-0/3/1.0 metric 21
set protocols ospf area 0.0.0.0 interface ge-1/0/0.0 metric 13
set protocols ospf area 0.0.0.0 interface ge-1/0/6.0 metric 15
set protocols ospf area 0.0.0.0 interface xe-1/3/0.0 link-protection
set protocols ospf area 0.0.0.0 interface xe-1/3/0.0 metric 22
set protocols ospf3 area 0.0.0.0 interface ge-0/0/5.0 link-protection
set protocols ospf3 area 0.0.0.0 interface ge-0/0/5.0 metric 10
set protocols ospf3 area 0.0.0.0 interface xe-0/3/1.0 metric 21
set protocols ospf3 area 0.0.0.0 interface ge-1/0/0.0 metric 13
set protocols ospf3 area 0.0.0.0 interface ge-1/0/6.0 metric 15
set protocols ospf3 area 0.0.0.0 interface xe-1/3/0.0 link-protection
set protocols ospf3 area 0.0.0.0 interface xe-1/3/0.0 metric 22
set policy-options policy-statement ecmp term 1 then load-balance per-packet
```

R4

```
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
```

```
set routing-options router-id 172.16.4.4
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols ospf area 0.0.0.0 interface ge-0/1/0.0 metric 18
set protocols ospf area 0.0.0.0 interface xe-0/2/0.0 metric 10
set protocols ospf area 0.0.0.0 interface xe-1/3/0.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-1/1/0.0 metric 10
set protocols ospf area 0.0.0.0 interface xe-0/3/1.0 metric 21
set protocols ospf3 area 0.0.0.0 interface ge-0/1/0.0 metric 18
set protocols ospf3 area 0.0.0.0 interface xe-0/2/0.0 metric 10
```

```
set protocols ospf3 area 0.0.0.0 interface xe-1/3/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/0/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-1/1/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface xe-0/3/1.0 metric 21
```

R5

```
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 172.16.5.5
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
```

```
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols ospf area 0.0.0.0 interface xe-0/2/0.0 metric 51
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-0/0/5.0 metric 13
set protocols ospf area 0.0.0.0 interface ge-0/1/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface xe-0/2/0.0 metric 51
set protocols ospf3 area 0.0.0.0 interface ge-0/0/1.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/0/5.0 metric 13
set protocols ospf3 area 0.0.0.0 interface ge-0/1/0.0 metric 10
```

R6

```
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 172.16.6.6
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
```

```
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 25
set protocols mpls admin-groups c26 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
set protocols ospf area 0.0.0.0 interface xe-0/3/0.0 metric 52
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0 metric 12
set protocols ospf area 0.0.0.0 interface ge-0/0/4.0 metric 15
set protocols ospf area 0.0.0.0 interface xe-0/2/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface xe-0/3/0.0 metric 52
set protocols ospf3 area 0.0.0.0 interface ge-0/0/0.0 metric 12
set protocols ospf3 area 0.0.0.0 interface ge-0/0/4.0 metric 15
set protocols ospf3 area 0.0.0.0 interface xe-0/2/0.0 metric 10
```

R7

```
set routing-options srlg srlg1 srlg-value 1001
set routing-options srlg srlg2 srlg-value 1002
set routing-options srlg srlg3 srlg-value 1003
```

```
set routing-options srlg srlg4 srlg-value 1004
set routing-options srlg srlg5 srlg-value 1005
set routing-options srlg srlg6 srlg-value 1006
set routing-options srlg srlg7 srlg-value 1007
set routing-options srlg srlg8 srlg-value 1008
set routing-options srlg srlg9 srlg-value 1009
set routing-options srlg srlg10 srlg-value 10010
set routing-options srlg srlg11 srlg-value 10011
set routing-options srlg srlg12 srlg-value 10012
set routing-options router-id 172.16.7.7
set protocols rsvp interface all
set protocols mpls admin-groups c0 0
set protocols mpls admin-groups c1 1
set protocols mpls admin-groups c2 2
set protocols mpls admin-groups c3 3
set protocols mpls admin-groups c4 4
set protocols mpls admin-groups c5 5
set protocols mpls admin-groups c6 6
set protocols mpls admin-groups c7 7
set protocols mpls admin-groups c8 8
set protocols mpls admin-groups c9 9
set protocols mpls admin-groups c10 10
set protocols mpls admin-groups c11 11
set protocols mpls admin-groups c12 12
set protocols mpls admin-groups c13 13
set protocols mpls admin-groups c14 14
set protocols mpls admin-groups c15 15
set protocols mpls admin-groups c16 16
set protocols mpls admin-groups c17 17
set protocols mpls admin-groups c18 18
set protocols mpls admin-groups c19 19
set protocols mpls admin-groups c20 20
set protocols mpls admin-groups c21 21
set protocols mpls admin-groups c22 22
set protocols mpls admin-groups c23 23
set protocols mpls admin-groups c24 24
set protocols mpls admin-groups c25 26
set protocols mpls admin-groups c27 27
set protocols mpls admin-groups c28 28
set protocols mpls admin-groups c29 29
set protocols mpls admin-groups c30 30
set protocols mpls admin-groups c31 31
set protocols mpls interface all
```

```
set protocols mpls interface xe-0/3/0.0 srlg srlg8
set protocols ospf area 0.0.0.0 interface ge-0/1/5.0 metric 23
set protocols ospf area 0.0.0.0 interface xe-0/3/0.0 metric 10
set protocols ospf area 0.0.0.0 interface ge-1/0/0.0 metric 13
set protocols ospf area 0.0.0.0 interface xe-1/3/0.0 metric 22
set protocols ospf area 0.0.0.0 interface xe-1/2/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-0/1/5.0 metric 23
set protocols ospf3 area 0.0.0.0 interface xe-0/3/0.0 metric 10
set protocols ospf3 area 0.0.0.0 interface ge-1/0/0.0 metric 13
set protocols ospf3 area 0.0.0.0 interface xe-1/3/0.0 metric 22
set protocols ospf3 area 0.0.0.0 interface xe-1/2/0.0 metric 10
```

????? R3 ??

??? ??

?? ?? ?? ????? ???? ???? ???? ??????. CLI ???? ?? ???? *CLI ???? ????*?? ?? ????? CLI ???? ???? ???? ??????.

????? R3 ??:

1. ??????? ??????.

```
[edit interfaces]
user@R3# set ge-0/0/5 unit 0 family inet address 172.16.50.2/30
user@R3# set ge-0/0/5 unit 0 family inet6 address 2001:db8:50:1:1::2/64
user@R3# set ge-0/0/5 unit 0 family mpls
user@R3# set xe-0/3/1 unit 0 family inet address 172.16.75.1/30
user@R3# set xe-0/3/1 unit 0 family inet6 address 2001:db8:75:1:1::1/64
user@R3# set xe-0/3/1 unit 0 family mpls
user@R3# set ge-1/0/0 unit 0 family inet address 172.16.80.1/30
user@R3# set ge-1/0/0 unit 0 family inet6 address 2001:db8:80:1:1::1/64
user@R3# set ge-1/0/0 unit 0 family mpls
user@R3# set ge-1/0/5 unit 0 family inet address 172.16.200.1/24
user@R3# set ge-1/0/5 unit 0 family inet6 address 2001:db8:200:1:1::1/64
user@R3# set ge-1/0/6 unit 0 family inet address 172.16.85.1/30
user@R3# set ge-1/0/6 unit 0 family inet6 address 2001:db8:85:1:1::1/64
user@R3# set ge-1/0/6 unit 0 family mpls
user@R3# set xe-1/3/0 unit 0 family inet address 172.16.90.1/30
user@R3# set xe-1/3/0 unit 0 family inet6 address 2001:db8:90:1:1::1/64
user@R3# set xe-1/3/0 unit 0 family mpls
user@R3# set lo0 unit 0 family inet address 172.16.3.3/32 primary
```

```
user@R3# set lo0 unit 0 family inet6 address 2001:db8::3:3:3:3/128 primary
user@R3# set lo0 unit 0 family mpls
```

2. srlg ?? ?????.

```
[edit routing-options]
user@R3# set srlg srlg1 srlg-value 1001
user@R3# set srlg srlg2 srlg-value 1002
user@R3# set srlg srlg3 srlg-value 1003
user@R3# set srlg srlg4 srlg-value 1004
user@R3# set srlg srlg5 srlg-value 1005
user@R3# set srlg srlg6 srlg-value 1006
user@R3# set srlg srlg7 srlg-value 1007
user@R3# set srlg srlg8 srlg-value 1008
user@R3# set srlg srlg9 srlg-value 1009
user@R3# set srlg srlg10 srlg-value 10010
user@R3# set srlg srlg11 srlg-value 10011
user@R3# set srlg srlg12 srlg-value 10012
```

3. ???? ID? ??????.

```
[edit routing-options]
user@R3# set router-id 172.16.3.3
```

4. ??? ?????? ??? ????? ??? ?? ?? ?? ?? ??? ??? ??? ??????.

```
[edit routing-options]
user@R3# set forwarding-table export ecmp
```

5. ?? ?? ??? ??? ??????.

```
[edit routing-options backup-selection]
user@R3# set destination 10.1.1.0/30 interface xe-1/3/0.0 admin-group include-all c2
user@R3# set destination 10.1.1.0/30 interface all admin-group exclude c3
user@R3# set destination 10.1.1.0/30 interface all srlg strict
user@R3# set destination 10.1.1.0/30 interface all protection-type node
user@R3# set destination 10.1.1.0/30 interface all bandwidth-greater-equal-primary
user@R3# set destination 10.1.1.0/30 interface all neighbor preference 172.16.7.7
user@R3# set destination 10.1.1.0/30 interface all root-metric lowest
```

```
user@R3# set destination 10.1.1.0/30 interface all metric-order root
user@R3# set destination 172.16.30.0/30 interface all admin-group exclude c5
user@R3# set destination 172.16.30.0/30 interface all srlg strict
user@R3# set destination 172.16.30.0/30 interface all protection-type node
user@R3# set destination 172.16.30.0/30 interface all bandwidth-greater-equal-primary
user@R3# set destination 172.16.30.0/30 interface all neighbor preference 172.16.7.7
user@R3# set destination 172.16.30.0/30 interface all root-metric lowest
user@R3# set destination 172.16.30.0/30 interface all metric-order root
user@R3# set destination 192.168.45.0/30 interface all admin-group exclude c5
user@R3# set destination 192.168.45.0/30 interface all srlg strict
user@R3# set destination 192.168.45.0/30 interface all protection-type node
user@R3# set destination 192.168.45.0/30 interface all bandwidth-greater-equal-primary
user@R3# set destination 192.168.45.0/30 interface all neighbor preference 172.16.7.7
user@R3# set destination 192.168.45.0/30 interface all root-metric lowest
user@R3# set destination 192.168.45.0/30 interface all metric-order root
```

6. □□ □□□□□□□□ RSVP□ □□□□□□□.

```
[edit protocols]
user@R3# set rsvp interface all
```

7. □□ □□□ □□□□□.

```
[edit protocols mpls]
user@R3# set admin-groups c0 0
user@R3# set admin-groups c1 1
user@R3# set admin-groups c2 2
user@R3# set admin-groups c3 3
user@R3# set admin-groups c4 4
user@R3# set admin-groups c5 5
user@R3# set admin-groups c6 6
user@R3# set admin-groups c7 7
user@R3# set admin-groups c8 8
user@R3# set admin-groups c9 9
user@R3# set admin-groups c10 10
user@R3# set admin-groups c11 11
user@R3# set admin-groups c12 12
user@R3# set admin-groups c13 13
user@R3# set admin-groups c14 14
user@R3# set admin-groups c15 15
user@R3# set admin-groups c16 16
```

```
user@R3# set admin-groups c17 17
user@R3# set admin-groups c18 18
user@R3# set admin-groups c19 19
user@R3# set admin-groups c20 20
user@R3# set admin-groups c21 21
user@R3# set admin-groups c22 22
user@R3# set admin-groups c23 23
user@R3# set admin-groups c24 24
user@R3# set admin-groups c25 25
user@R3# set admin-groups c26 26
user@R3# set admin-groups c27 27
user@R3# set admin-groups c28 28
user@R3# set admin-groups c29 29
user@R3# set admin-groups c30 30
user@R3# set admin-groups c31 31
```

8. [illegible] MPLS[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols mpls]
user@R3# set interface all
user@R3# set interface ge-0/0/5.0 admin-group c0
```

9. [illegible] [illegible] [illegible] OSPF [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols ospf]
user@R3# set area 0.0.0.0 interface ge-0/0/5.0 link-protection
user@R3# set area 0.0.0.0 interface ge-0/0/5.0 metric 10
user@R3# set area 0.0.0.0 interface xe-0/3/1.0 metric 21
user@R3# set area 0.0.0.0 interface ge-1/0/0.0 metric 13
user@R3# set area 0.0.0.0 interface ge-1/0/6.0 metric 15
user@R3# set area 0.0.0.0 interface xe-1/3/0.0 link-protection
user@R3# set area 0.0.0.0 interface xe-1/3/0.0 metric 22
```

10. [illegible] [illegible] [illegible] OSPF3 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols ospf3]
user@R3# set area 0.0.0.0 interface ge-0/0/5.0 link-protection
user@R3# set area 0.0.0.0 interface ge-0/0/5.0 metric 10
user@R3# set area 0.0.0.0 interface xe-0/3/1.0 metric 21
user@R3# set area 0.0.0.0 interface ge-1/0/0.0 metric 13
```

```
user@R3# set area 0.0.0.0 interface ge-1/0/6.0 metric 15
user@R3# set area 0.0.0.0 interface xe-1/3/0.0 link-protection
user@R3# set area 0.0.0.0 interface xe-1/3/0.0 metric 22
```

11. □□□ □□ □□

```
[edit policy-options]
user@R3# set policy-statement ecmp term 1 then load-balance per-packet
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R3# show interfaces
ge-0/0/5 {
    unit 0 {
        family inet {
            address 192.168.50.2/30;
        }
        family inet6 {
            address 2001:db8:50:1:1::2/64;
        }
        family mpls;
    }
}
xe-0/3/1 {
    unit 0 {
        family inet {
            address 192.168.75.1/30;
        }
        family inet6 {
            address 2001:db8:75:1:1::1/64;
        }
        family mpls;
    }
}
ge-1/0/0 {
    unit 0 {
        family inet {
```

```
            address 192.168.80.1/30;
        }
        family inet6 {
            address 2001:db8:80:1:1::1/64;
        }
        family mpls;
    }
}
ge-1/0/5 {
    unit 0 {
        family inet {
            address 172.16.200.1/24;
        }
        family inet6 {
            address 2001:db8:200:1:1::1/64;
        }
    }
}
ge-1/0/6 {
    unit 0 {
        family inet {
            address 192.168.85.1/30;
        }
        family inet6 {
            address 2001:db8:85:1:1::1/64;
        }
        family mpls;
    }
}
xe-1/3/0 {
    unit 0 {
        family inet {
            address 192.168.90.1/30;
        }
        family inet6 {
            address 2001:db8:90:1:1::1/64;
        }
        family mpls;
    }
}
lo0 {
    unit 0 {
        family inet {
```

```
            address 172.16.3.3/32 {
                primary;
            }
        }
        family inet6 {
            address 2001:db8:3:3:3:3/128 {
                primary;
            }
        }
        family mpls;
    }
}
```

```
user@R3# show protocols
rsvp {
    interface all;
}
mpls {
    admin-groups {
        c0 0;
        c1 1;
        c2 2;
        c3 3;
        c4 4;
        c5 5;
        c6 6;
        c7 7;
        c8 8;
        c9 9;
        c10 10;
        c11 11;
        c12 12;
        c13 13;
        c14 14;
        c15 15;
        c16 16;
        c17 17;
        c18 18;
        c19 19;
        c20 20;
        c21 21;
```

```
        c22 22;
        c23 23;
        c24 24;
        c25 25;
        c26 26;
        c27 27;
        c28 28;
        c29 29;
        c30 30;
        c31 31;
    }
    interface all;
    interface ge-0/0/5.0 {
        admin-group c0;
    }
}
ospf {
    area 0.0.0.0 {
        interface ge-0/0/5.0 {
            link-protection;
            metric 10;
        }
        interface xe-0/3/1.0 {
            metric 21;
        }
        interface ge-1/0/0.0 {
            metric 13;
        }
        interface ge-1/0/6.0 {
            metric 15;
        }
        interface xe-1/3/0.0 {
            link-protection;
            metric 22;
        }
    }
}
ospf3 {
    area 0.0.0.0 {
        interface ge-0/0/5.0 {
            link-protection;
            metric 10;
        }
```

```
        interface xe-0/3/1.0 {
            metric 21;
        }
        interface ge-1/0/0.0 {
            metric 13;
        }
        interface ge-1/0/6.0 {
            metric 15;
        }
        interface xe-1/3/0.0 {
            link-protection;
            metric 22;
        }
    }
}
```

```
user@R3# show routing-options
srlg {
    srlg1 srlg-value 1001;
    srlg2 srlg-value 1002;
    srlg3 srlg-value 1003;
    srlg4 srlg-value 1004;
    srlg5 srlg-value 1005;
    srlg6 srlg-value 1006;
    srlg7 srlg-value 1007;
    srlg8 srlg-value 1008;
    srlg9 srlg-value 1009;
    srlg10 srlg-value 10010;
    srlg11 srlg-value 10011;
    srlg12 srlg-value 10012;
}
router-id 172.16.3.3;
forwarding-table {
    export ecmp;
}
backup-selection {
    destination 10.1.1.0/30 {
        interface xe-1/3/0.0 {
            admin-group {
                include-all c2;
            }
```

```
        }
        interface all {
            admin-group {
                exclude c3;
            }
            srlg strict;
            protection-type node;
            bandwidth-greater-equal-primary;
            node {
                preference 172.16.7.7;
            }
            root-metric lowest;
            metric-order root;
        }
    }
    destination 172.16.30.0/30 {
        interface all {
            admin-group {
                exclude c5;
            }
            srlg strict;
            protection-type node;
            bandwidth-greater-equal-primary;
            node {
                preference 172.16.7.7;
            }
            root-metric lowest;
            metric-order root;
        }
    }
    destination 192.168.45.0/30 {
        interface all {
            admin-group {
                exclude c5;
            }
            srlg strict;
            protection-type node;
            bandwidth-greater-equal-primary;
            node {
                preference 172.16.7.7;
            }
            root-metric lowest;
            metric-order root;
```

```
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

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□□ □□□□ □□□ □□□□ □□ □□□ □□□□□ show route .

```
user@R3> show route
inet.0: 48 destinations, 48 routes (48 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.3.3/32         *[Direct/0] 02:22:27
                       > via lo0.0
10.4.0.0/16          *[Static/5] 02:22:57
                       > to 10.92.31.254 via fxp0.0
10.5.0.0/16          *[Static/5] 02:22:57
                       > to 10.92.31.254 via fxp0.0
10.6.128.0/17        *[Static/5] 02:22:57
```

```
                    > to 10.92.31.254 via fxp0.0
10.9.0.0/16         *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.10.0.0/16        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.13.4.0/23        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.13.10.0/23       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.82.0.0/15        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.84.0.0/16        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.85.12.0/22       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.92.0.0/16        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.92.16.0/20       *[Direct/0] 02:22:57
                    > via fxp0.0
10.92.24.195/32     *[Local/0] 02:22:57
                      Local via fxp0.0
10.94.0.0/16        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.99.0.0/16        *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.102.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.150.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.155.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.157.64.0/19      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.160.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.204.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.205.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.206.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.207.0.0/16       *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
```

```
10.209.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.212.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.213.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.214.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.215.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.216.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.218.13.0/24     *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.218.14.0/24     *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.218.16.0/20     *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.218.32.0/20     *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
10.227.0.0/16      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
172.16.50.0/30       *[Direct/0] 02:19:55
                    > via ge-0/0/5.0
172.16.50.2/32       *[Local/0] 02:19:58
                      Local via ge-0/0/5.0
172.16.75.0/30       *[Direct/0] 02:19:55
                    > via xe-0/3/1.0
172.16.75.1/32       *[Local/0] 02:19:57
                      Local via xe-0/3/1.0
172.16.24.195/32   *[Direct/0] 02:22:57
                    > via lo0.0
172.16.0.0/12      *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
192.168.0.0/16     *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
192.168.102.0/23   *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
192.168.136.0/24    *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
192.168.136.192/32  *[Static/5] 02:22:57
                    > to 10.92.31.254 via fxp0.0
192.168.137.0/24    *[Static/5] 02:22:57
```

```
                    > to 10.92.31.254 via fxp0.0
192.168.233.5/32       *[OSPF/10] 00:16:55, metric 1
                       MultiRecv

iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

47.0005.80ff.f800.0000.0108.0001.1280.9202.4195/152
                   *[Direct/0] 02:22:57
                    > via lo0.0

mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                  *[MPLS/0] 00:16:55, metric 1
                      Receive
1                  *[MPLS/0] 00:16:55, metric 1
                      Receive
2                  *[MPLS/0] 00:16:55, metric 1
                      Receive
13                 *[MPLS/0] 00:16:55, metric 1
                      Receive

inet6.0: 10 destinations, 11 routes (10 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

2001:db8:50:1:1::/64   *[Direct/0] 02:19:44
                    > via ge-0/0/5.0
2001:db8:50:1:1::2/128 *[Local/0] 02:19:58
                       Local via ge-0/0/5.0
2001:db8:75:1:1::/64   *[Direct/0] 02:19:44
                    > via xe-0/3/1.0
2001:db8:75:1:1::1/128 *[Local/0] 02:19:57
                       Local via xe-0/3/1.0
2001:db8::3:3:3:3/128  *[Direct/0] 02:22:27
                    > via lo0.0
2001:db8::128:92:24:195/128
                   *[Direct/0] 02:22:57
                    > via lo0.0
fe80::/64          *[Direct/0] 02:19:44
                    > via ge-0/0/5.0
                    [Direct/0] 02:19:43
                    > via xe-0/3/1.0
```

```
fe80::205:86ff:fe00:ed05/128
                   *[Local/0] 02:19:58
                      Local via ge-0/0/5.0
fe80::205:86ff:fe00:ed3d/128
                   *[Local/0] 02:19:57
                      Local via xe-0/3/1.0
fe80::5668:a50f:fcc1:3ca2/128
                   *[Direct/0] 02:22:57
                    > via lo0.0
```

??

????? ?? ????? R3 ??? ??????.

OSPF ?? ??

??

OSPF? ??? ????? ??????.

??

?? ????? ????? R3? `show ospf route detail` ?? ??? ??????.

```
user@R3> show ospf route detail
Topology default Route Table:

Prefix             Path  Route      NH       Metric NextHop       Nexthop
                   Type  Type       Type             Interface     Address/LSP
172.16.50.0/30        Intra Network    IP           10 ge-0/0/5.0
  area 0.0.0.0, origin 172.16.3.3, priority low
172.16.75.0/30        Intra Network    IP           21 xe-0/3/1.0
  area 0.0.0.0, origin 172.16.3.3, priority low
```

??

????? OSPF ????? ??? ????? ??????.

OSPF3 □□ □□

□□

OSPF3□ □□□ □□□□ □□□□□.

□□

□□ □□□□ □□□□ R3□ show ospf3 route detail □□ □□□ □□□□□.

```
user@R3> show ospf3 route detail

Prefix                                     Path  Route      NH   Metric
                                           Type  Type       Type
2001:db8:50:1:1::/64                           Intra Network    IP   10
  NH-interface ge-0/0/5.0
  Area 0.0.0.0, Origin 172.16.3.3, Priority low
2001:db8:75:1:1::/64                           Intra Network    IP   21
  NH-interface xe-0/3/1.0
  Area 0.0.0.0, Origin 172.16.3.3, Priority low
```

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□□□□ OSPF3 □□□□ □□□ □□□□ □□□□□.

□□□□ R3□ □□ □□ □□ □□ □□

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□□□□ R3□ □□ □□ □□ □□□ □□□□□.

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□□ □□□□ □□□□ R3□ show backup-selection □□ □□□ □□□□□.

```
user@R3> show backup-selection
Prefix: 10.1.1.0/30
  Interface: all
    Admin-group exclude: c3
    Neighbor preference: 172.16.7.7
```

```
    Protection Type: Node, Downstream Paths Only: Disabled, SRLG: Strict, B/w >= Primary:
Enabled, Root-metric: lowest, Dest-metric: lowest
    Metric Evaluation Order: Root-metric, Dest-metric
    Policy Evaluation Order: Admin-group, SRLG, Bandwidth, Protection, node, Metric
  Interface: xe-1/3/0.0
    Admin-group include-all: c2
    Protection Type: Link, Downstream Paths Only: Disabled, SRLG: Loose, B/w >= Primary:
Disabled, Root-metric: lowest, Dest-metric: lowest
    Metric Evaluation Order: Dest-metric, Root-metric
    Policy Evaluation Order: Admin-group, SRLG, Bandwidth, Protection, node, Metric Prefix:
172.16.30.0/30
  Interface: all
    Admin-group exclude: c5
    Neighbor preference: 172.16.7.7
    Protection Type: Node, Downstream Paths Only: Disabled, SRLG: Strict, B/w >= Primary:
Enabled, Root-metric: lowest, Dest-metric: lowest
    Metric Evaluation Order: Root-metric, Dest-metric
    Policy Evaluation Order: Admin-group, SRLG, Bandwidth, Protection, node, Metric
Prefix: 172.16.45.0/30
  Interface: all
    Admin-group exclude: c5
    Neighbor preference: 172.16.7.7
    Protection Type: Node, Downstream Paths Only: Disabled, SRLG: Strict, B/w >= Primary:
Enabled, Root-metric: lowest, Dest-metric: lowest
    Metric Evaluation Order: Root-metric, Dest-metric
    Policy Evaluation Order: Admin-group, SRLG, Bandwidth, Protection, node, Metric
```

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backup-selection(???? IS-IS)

chapter label in part3

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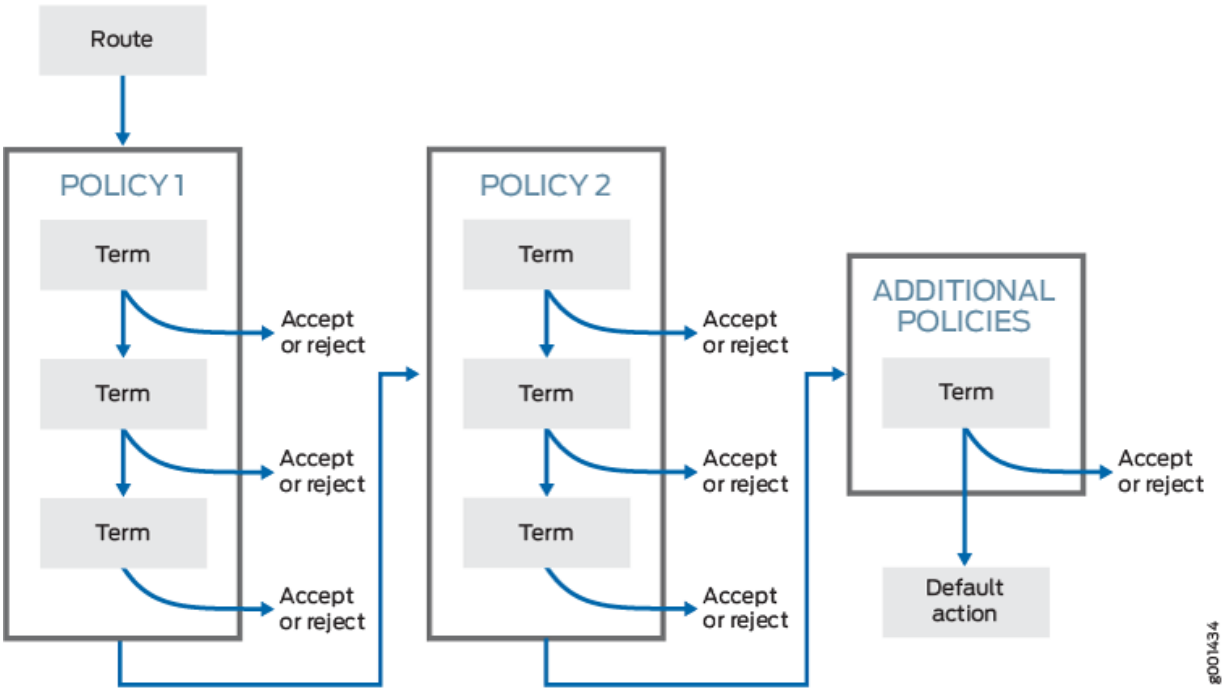

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BGP? ????? ?? ???? ?? ???? ????.

```
user@R1# show protocols bgp
group int {
    type internal;
    local-address 192.168.0.1;
    export [ adv-statics adv-large-aggregates adv-small-aggregates ];
    neighbor 192.168.0.2;
    neighbor 192.168.0.3;
}
```

adv-statics, adv-large-aggregates, ? adv-small-aggregates ???? ?? BGP ???? ???? ????? R1? BGP ???? ????? ?? ???? ??????. ?? ? 2?? ?? ?? ?? ???? ?? ?? ???? ??????. ?? ???? ?? ?? ???? ?????? ?? ???? ????? ?????.

```
user@R1# show policy-options
policy-statement adv-large-aggregates {
    term between-16-and-18 {
        from {
            protocol aggregate;
            route-filter 172.16.0.0/16 upto /18;
        }
        then accept;
    }
}
policy-statement adv-small-aggregates {
    term between-19-and-24 {
        from {
```

```
            protocol aggregate;
            route-filter 172.16.0.0/16 prefix-length-range /19-/24;
        }
        then accept;
    }
}
policy-statement adv-statics {
    term statics {
        from protocol static;
        then accept;
    }
}
```

□□□□□ □ □□ □□□ □□ BGP(IBGP) □□□ □□ □□ □□ □□ □□□□ □□□ □ □□□□. □□□ □□ □□ □□□ □□ □ □□□ □□□ □□ □□□ □□□□ □ □□ □□□ □□ □□□.

□□ 16 □□□ 236 □(□) IBGP □□, □□□□ R2 □ □□□□ R3□ □□ AS 64510□ □□□□ R1□ □□□□□. □□□□ R1□ □□ AS 64511 □ □□□□ R4 □ AS 64512□ □□□□ R5□ □□ □□ BGP(EBGP) □□□ □□□ □□□□. AS 64510 □□ □□ □□ □□□ □□ □□ □□□ □□ IBGP □□□□ □□□□ □□□□. □□ □□□□ □□□□ □□ EBGP □□□ □□□ □□□ 18□□□□ □□ □□ □□□ □□□□□. □□□ □□□□ □□□□ □□ EBGP □□□ □□□ □□□ 19□□□□ □ □□ □□ □□□ □□ □□□ □□□□□. □□□ □□ □□□ □ □□□ □□ □□ □□□ □□□ □□□ □□□□ [edit policy-opitons] □□□□□. □□□ □□□ AS 64510□ □□□□□ □□□ □□□ □□□□ □□ □□ □□ □□□ □□□□□.

□□□□ R4□ AS 64510□ □□ □□□□ □□□□, □□ □□ AS□ □□□ □□□ □□□ □□□□ □□□ □ □□□□. □□, □□□□ R5□□ □□□□ □□□ □□ □□ □□ AS 64510□ □□ □□ □□□ □□ AS(Autonomous System) □□ □□□□ □□ □□□□ □ □□□□.

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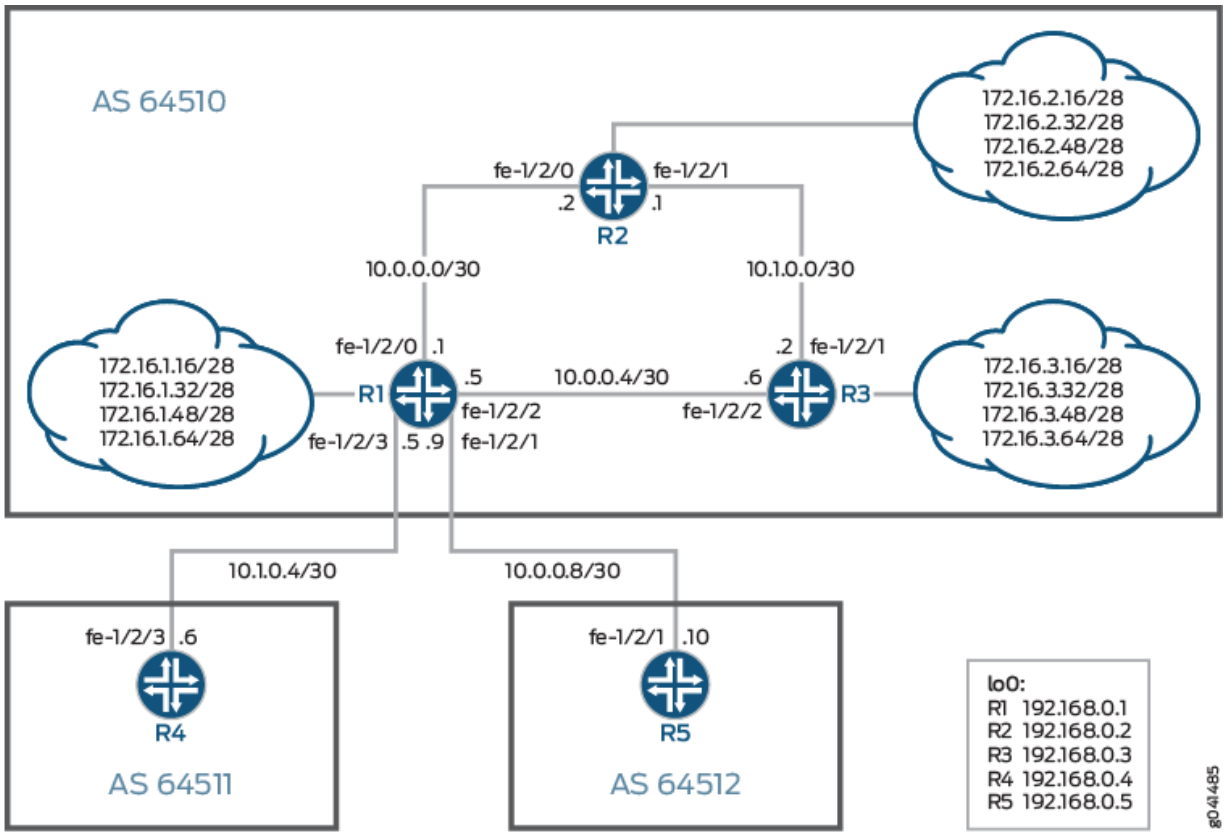
□□ 16 □□□ 236□ □□ □□□□□ □□□□□.

□□ 16: □□ □□□ □□ BGP □□□□



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"□□" □□□ 240 □□□□□ □□□□ R1□ □□□ □□□□□.

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????? R1

```
set interfaces fe-1/2/0 unit 0 description to_R2
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/2 unit 0 description to_R3
set interfaces fe-1/2/2 unit 0 family inet address 10.0.0.5/30
set interfaces fe-1/2/3 unit 0 description to_R4
set interfaces fe-1/2/3 unit 0 family inet address 10.1.0.5/30
set interfaces fe-1/2/1 unit 0 description to_R5
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.10/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.1
set protocols bgp group int export adv-statics
set protocols bgp group int export adv-large-aggregates
set protocols bgp group int export adv-small-aggregates
set protocols bgp group int neighbor 192.168.0.2
set protocols bgp group int neighbor 192.168.0.3
set protocols bgp group to_64511 type external
set protocols bgp group to_64511 export adv-large-aggregates
set protocols bgp group to_64511 neighbor 10.1.0.6 peer-as 64511
set protocols bgp group to_64512 type external
set protocols bgp group to_64512 export adv-small-aggregates
set protocols bgp group to_64512 export adv-statics
set protocols bgp group to_64512 neighbor 10.0.0.9 peer-as 64512
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement adv-large-aggregates term between-16-and-18 from protocol
aggregate
set policy-options policy-statement adv-large-aggregates term between-16-and-18 from route-
filter 172.16.0.0/16 upto /18
set policy-options policy-statement adv-large-aggregates term between-16-and-18 then accept
set policy-options policy-statement adv-small-aggregates term between-19-and-24 from protocol
aggregate
set policy-options policy-statement adv-small-aggregates term between-19-and-24 from route-
filter 172.16.0.0/16 prefix-length-range /19-/24
set policy-options policy-statement adv-small-aggregates term between-19-and-24 then accept
set policy-options policy-statement adv-statics term statics from protocol static
set policy-options policy-statement adv-statics term statics then accept
set routing-options static route 172.16.1.16/28 discard
set routing-options static route 172.16.1.32/28 discard
```

```
set routing-options static route 172.16.1.48/28 discard
set routing-options static route 172.16.1.64/28 discard
set routing-options aggregate route 172.16.0.0/16
set routing-options aggregate route 172.16.1.0/24
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
```

□□□□ R2

```
set interfaces fe-1/2/0 unit 0 description to_R1
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 description to_R3
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.2
set protocols bgp group int neighbor 192.168.0.1 export send-static-aggregate
set protocols bgp group int neighbor 192.168.0.3
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-static-aggregate term 1 from protocol static
set policy-options policy-statement send-static-aggregate term 1 from protocol aggregate
set policy-options policy-statement send-static-aggregate term 1 then accept
set routing-options static route 172.16.2.16/28 discard
set routing-options static route 172.16.2.32/28 discard
set routing-options static route 172.16.2.48/28 discard
set routing-options static route 172.16.2.64/28 discard
set routing-options aggregate route 172.16.2.0/24
set routing-options aggregate route 172.16.0.0/16
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 64510
```

□□□□ R3

```
set interfaces fe-1/2/1 unit 0 description to_R2
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces fe-1/2/2 unit 0 description to_R1
set interfaces fe-1/2/2 unit 0 family inet address 10.0.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group int type internal
```

```
set protocols bgp group int local-address 192.168.0.3
set protocols bgp group int neighbor 192.168.0.1 export send-static-aggregate
set protocols bgp group int neighbor 192.168.0.2
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-static-aggregate from protocol static
set policy-options policy-statement send-static-aggregate from protocol aggregate
set policy-options policy-statement send-static-aggregate then accept
set routing-options static route 172.16.3.16/28 discard
set routing-options static route 172.16.3.32/28 discard
set routing-options static route 172.16.3.48/28 discard
set routing-options static route 172.16.3.64/28 discard
set routing-options aggregate route 172.16.0.0/16
set routing-options aggregate route 172.16.3.0/24
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 64510
```

???? R4

```
set interfaces fe-1/2/3 unit 0 description to_R1
set interfaces fe-1/2/3 unit 0 family inet address 10.1.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.4/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.1.0.5
set routing-options autonomous-system 64511
```

???? R5

```
set interfaces fe-1/2/1 unit 0 description to_R1
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.9/30
set interfaces lo0 unit 0 family inet address 192.168.0.5/32
set protocols bgp group ext type external
set protocols bgp group ext neighbor 10.0.0.10 peer-as 64510
set routing-options autonomous-system 64512
```

□□

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□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□□ □□ □□□ Junos OS CLI □□□ □□□□ "□□ □□□□ CLI □□□ □□" □□□ 1787□ (□) □□□□□□□.

□□□□ R1 □□

1. □□□□ □□□□□□□ □□□□□.

```
[edit interfaces]
user@R1# set fe-1/2/0 unit 0 description to_R2
user@R1# set fe-1/2/0 unit 0 family inet address 10.0.0.1/30
user@R1# set fe-1/2/2 unit 0 description to_R3
user@R1# set fe-1/2/2 unit 0 family inet address 10.0.0.5/30
user@R1# set fe-1/2/3 unit 0 description to_R4
user@R1# set fe-1/2/3 unit 0 family inet address 10.1.0.5/30
user@R1# set fe-1/2/1 unit 0 description to_R5
user@R1# set fe-1/2/1 unit 0 family inet address 10.0.0.10/30
user@R1# set lo0 unit 0 family inet address 192.168.0.1/32
```

2. □□□□ R2 □ □□□□ R3□ □□ IBGP □□□ □□□□□.

```
[edit protocols bgp group int]
user@R1# set type internal
user@R1# set local-address 192.168.0.1
user@R1# set neighbor 192.168.0.2
user@R1# set neighbor 192.168.0.3
```

3. □□ □□□ □□ □□□□ □□□ □□□□□.

```
[edit protocols bgp group int]
user@R1# set export adv-statics
user@R1# set export adv-large-aggregates
user@R1# set export adv-small-aggregates
```

4. □□□□ R4□ EBGP □□□ □□□□□.

```
[edit protocols bgp group to_64511]
user@R1# set type external
user@R1# set neighbor 10.1.0.6 peer-as 64511
```

5. □□□□ R4□ □□ □□□□ □□□ □□□□□.

```
[edit protocols bgp group to_64511]
user@R1# set export adv-large-aggregates
```

6. □□□□ R5□ EBGP □□□ □□□□□.

```
[edit protocols bgp group to_64512]
user@R1# set type external
user@R1# set neighbor 10.0.0.9 peer-as 64512
```

7. □□□□ R5□ □□ □□□□ □□□ □□□□□.

```
[edit protocols bgp group to_64512]
user@R1# set export adv-small-aggregates
user@R1# set export adv-statics
```

8. □□□□ R2 □ □□□□ R3□ □□ OSPF □□□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R1# set interface fe-1/2/0.0
user@R1# set interface fe-1/2/2.0
user@R1# set interface lo0.0 passive
```

9. □□□ □□□ □□□□□.

```
[edit policy-options policy-statement adv-large-aggregates term between-16-and-18]
user@R1# set from protocol aggregate
user@R1# set from route-filter 172.16.0.0/16 upto /18
user@R1# set then accept
[edit policy-options policy-statement adv-small-aggregates term between-19-and-24]
```

```
user@R1# set from protocol aggregate
user@R1# set from route-filter 172.16.0.0/16 prefix-length-range /19-/24
user@R1# set then accept
[edit policy-options policy-statement adv-statics term statics]
user@R1# set from protocol static
user@R1# set then accept
```

10. [illegible]

```
[edit routing-options static]
user@R1# set route 172.16.1.16/28 discard
user@R1# set route 172.16.1.32/28 discard
user@R1# set route 172.16.1.48/28 discard
user@R1# set route 172.16.1.64/28 discard
[edit routing-options aggregate]
user@R1# set route 172.16.0.0/16
user@R1# set route 172.16.1.0/24
```

11. [illegible](AS) [illegible] ID[illegible].

```
[edit routing-options]
user@R1# set router-id 192.168.0.1
user@R1# set autonomous-system 64510
```

[illegible]

[illegible] show interfaces, show protocols, show policy-options [illegible] show routing-options [illegible].

```
user@R1# show interfaces
fe-1/2/0 {
    unit 0 {
        description to_R2;
        family inet {
            address 10.0.0.1/30;
        }
    }
}
fe-1/2/2 {
```

```
    unit 0 {
        description to_R3;
        family inet {
            address 10.0.0.5/30;
        }
    }
}
fe-1/2/3 {
    unit 0 {
        description to_R4;
        family inet {
            address 10.1.0.5/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        description to_R5;
        family inet {
            address 10.0.0.10/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
    }
}
```

```
user@R1# show protocols
bgp {
    group int {
        type internal;
        local-address 192.168.0.1;
        export [ adv-statics adv-large-aggregates adv-small-aggregates ];
        neighbor 192.168.0.2;
        neighbor 192.168.0.3;
    }
    group to_64511 {
```

```
        type external;
        export adv-large-aggregates;
        neighbor 10.1.0.6 {
            peer-as 64511;
        }
    }
    group to_64512 {
        type external;
        export [ adv-small-aggregates adv-statics ];
        neighbor 10.0.0.9 {
            peer-as 64512;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface fe-1/2/0.0;
        interface fe-1/2/2.0;
        interface lo0.0 {
            passive;
        }
    }
}
```

```
user@R1# show policy-options
policy-statement adv-large-aggregates {
    term between-16-and-18 {
        from {
            protocol aggregate;
            route-filter 172.16.0.0/16 upto /18;
        }
        then accept;
    }
}
policy-statement adv-small-aggregates {
    term between-19-and-24 {
        from {
            protocol aggregate;
            route-filter 172.16.0.0/16 prefix-length-range /19-/24;
        }
        then accept;
```

```
    }
}
policy-statement adv-statics {
    term statics {
        from protocol static;
        then accept;
    }
}
```

```
user@R1# show routing-options
static {
    route 172.16.1.16/28 discard;
    route 172.16.1.32/28 discard;
    route 172.16.1.48/28 discard;
    route 172.16.1.64/28 discard;
}
aggregate {
    route 172.16.0.0/16;
    route 172.16.1.0/24;
}
router-id 192.168.0.1;
autonomous-system 64510;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

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□□□□ R1□□ □□ □□□ □□□□ R4□ □□□□□□□ □□□□□.

□□

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 29 destinations, 31 routes (29 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.0.0/16           Self                                    I
* 172.16.2.0/24           Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
* 172.16.3.0/24           Self                                    I
* 172.16.3.16/28          Self                                    I
* 172.16.3.32/28          Self                                    I
* 172.16.3.48/28          Self                                    I
* 172.16.3.64/28          Self                                    I
```

□□

□ adv-large-aggregates □□□ □□□□ R4□□ □□□ □□□ □□□□ □□□ □□□ □□□ 16□□□□ 18□□ □□□ □□ □□□ □□□□□.
172.16.0.0/16 □□ □□□ □□ □□□ □□□ □□ □□□□□, □ □ □□□ □□□□ □□ □□ □□ □□□ □□□□ R4□ □□□□ □□□□.

□ □ □□□ □□□ □□

□□

□□□□ R1□□ □□ □□□ □□□ □□□□.

□□

```
user@R1> show route 172.16.3.16/28

inet.0: 29 destinations, 31 routes (29 active, 0 holddown, 0 hidden)
```

```
+ = Active Route, - = Last Active, * = Both

172.16.3.16/28     *[BGP/170] 20:16:00, localpref 100, from 192.168.0.3
                      AS path: I, validation-state: unverified
                    > to 10.0.0.6 via fe-1/2/2.0
```

??

????? R1? ????? R3?? BGP ???? ?? ? ???? ???????. ?? BGP ????? ???? BGP ?? ???? ?? ????? ??????. ?? ???? ?? ?? ?? ???? ?? ??????. ???? ?? ?? ????? ???? ????? ???? ????? ??????.

?? ????? ?? ??

??

??? ???? ???? 19?? ???? 172.16.0.0/16 ?? ?? ?? ?? ???? ????? ?? ???? not-larger-than-18 ?????. ???? ?? ????? 16????? 18?? ???? ?? ???? ????? ?? ???? ???? ???? ? ?????.

??

1. ????? R1?? not-larger-than-18 ???? ??????.

```
[edit policy-options policy-statement not-larger-than-18 term reject-greater-than-18-bits]
user@R1# set from route-filter 172.16.0.0/16 prefix-length-range /19-/32
user@R1# set then reject
```

2. ????? R1?? ????? R4?? ???? ???? ???? ??????.

```
[edit  protocols bgp group to_64511]
user@R1# set export not-larger-than-18
user@R1# commit
```

3. ????? R1?? ????? R4? ????? ???? ??????.

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 29 destinations, 31 routes (29 active, 0 holddown, 0 hidden)
```

```
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.0.0/16           Self                                    I
```

??

?? ???? ????? ????? ?????. 172.16.0.0/16 ??? ????? R4? ??????.

????? R5? ?? ?? ?? ??

??

????? R1?? ?? ???? ????? R5? ??????? ??????.

????? R5? AS 64512?? ????? R1? EBGP ??????. ?? ???? ???? ? ???? ???? 18????? ? ?? ???? ?? ?? ???? ??????. ? ???? R4? ???? ???? ???? ???? ???? ????? ???? ???? 16????? 18?? ???? ?? ???? ????? ?? ???? `not-smaller- than-18` ???? ? ?????.

??

1. ????? R2?? 172.16.128.0/17? ?? ?? ???? ??????.

```
[edit routing-options aggregate]
user@R2# set route 172.16.128.0/17 discard
user@R2# commit
```

2. ????? R1?? ????? R5? ????? ???? ??????.

```
user@R1> show route advertising-protocol bgp 10.0.0.9


inet.0: 30 destinations, 32 routes (30 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.0/24           Self                                    I
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
* 172.16.2.0/24           Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
```

```
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
* 172.16.3.0/24           Self                                    I
* 172.16.3.16/28          Self                                    I
* 172.16.3.32/28          Self                                    I
* 172.16.3.48/28          Self                                    I
* 172.16.3.64/28          Self                                    I
* 172.16.128.0/17         Self                                    I
```

□ □□ 172.16.128.0/17□ □□ □□□ □□□□ □□□□□□□□

3. □□□□ R1□□ not-smaller-than-18 □□□ □□□□□.

```
[edit policy-options policy-statement not-smaller-than-18 term reject-less-than-18-bits]
user@R1# set from protocol aggregate
user@R1# set from route-filter 172.16.0.0/16 upto /18
user@R1# set then reject
```

4. □□□□ R1□□ □□□□ R5□□ □□□ □□□ □□□ □□□□□.

```
[edit  protocols bgp group to_64512]
user@R1# set export not-smaller-than-18
user@R1# commit
```

5. □□□□ R1□□ □□□□ R5□ □□□□ □□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.0.0.9

inet.0: 29 destinations, 31 routes (29 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.0/24           Self                                    I
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
* 172.16.2.0/24           Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
```

```
* 172.16.3.0/24          Self                                I
* 172.16.3.16/28         Self                                I
* 172.16.3.32/28         Self                                I
* 172.16.3.48/28         Self                                I
* 172.16.3.64/28         Self                                I
```

??

?? ??? ???? ???? ????. ??? 18???? ? ?? ??? ?? ?? ??? ???? R5? ?????.

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? ???? ??? ?? ??? ???? ??? ?? ???. ??? ?? filter1, filter2 ? filter3? ? ?? ?? ???? `input-chain` ????? ge-0/1/1.0? `output-chain` ?????.

?? ??

???? ??:

- MPC? ?? Junos ??? 18.4R1 ??? ???? MX ??? ???? ??? ???.

□ □□□□ □□ PTX10001-36MR, PTX10004, PTX10008 □□ PTX10016 □□□□ □□□□ □□ Junos OS Evolved □□ □ 21.4R1□ □□□□□.

- □□□□ IP □□ 4(IPv4) □□□□(family inet)□ □□ □□□□□ □□ □□□□□ □□□ □□□□ □□□ □□□□□□ □□□□ □□□. □□ □□ □□ □□□ □□□ □□□□□ □□, □□□□ □□ □□ IPv4 □□□ □□□□□ □□□.
- □□□□ □□□□ □□□ □□ □□□ □□□□□ □□□□ □□□ □□□□ □□□ □□□□ □□□ □ □□□□.

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□□ □□□ □□□□(□□ □□ □□□ □□) □□ □□□ □□□□ □□ □□(□: QoS)□ □□□ □□ □□ □□□(□: □□) □ □□ □□ □□□ □□ □□□ □□□□ □□ □ □ □□ □□□ □□□□ □□□□ □□□ □□□□.

input-list□ □□ □□ □□ □ □□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□ □□, □□□ □□ □□□□ □□ □□ □□ □□□ □□ □□□ □□□ □□□ □□ □□□ □□□ □□ □□□ □□ □□□ □□(□□ □□)□ □□□ □□□□□.

Junos OS Evolved □□□ 21.4R1□□ PTX10001-36MR, PTX10004, PTX10008 □ PTX10016 □□□□□ □□□ □□ □ □□ □□□ □ □□□□.

□□□ □□ □□ □□□ □□□ □ □□□□.

```
set interfaces interface-name unit unit family inet filter input-chain [filter1 filter2 filter3];
```

```
set interfaces interface-name unit unit family inet filter output-chain [filter1 filter2 filter3];
```

PTX Evo □□□□□ □ □□□ □□□ □□ □□ □□□ □□□□.

- □□ □□□ □ □□ □□□ □□□□□□□ □□□ □ □□□□. MX □□□ □□□□□□ □□ □□□ □□ □□□ □□□□□□□ □□□ □ □□□□.
- □□□ □□□□□□ □□□ □□□□□ □□ CLI □□ □ □□ □□□ □□□ □□□ □□□ □□□ □ □□□□. □□□ □□□□□□ □□□ □□□□□ □□ CLI □□□ □□ □□□□ □□□□□ □ □□□ □□□□ □□□ □□□□ □□□ □□□□□.
- □□□ □□□ □□□□□ "family ANY" □ □□□□□ □□□□ □□ □□ □□□ □□□ □ □□□□.
- □□□ □□□□□□□□ □□ □□ □□□ □□□□ □□□□.
- □□□ □□□□□□□□ □□ CLI □□ □□□ □□ □□□ □□ □□□ □ □□□□.

- IRB ??????? ??, ?? CLI ??????? ???? ?? ???? ?? ???? ? ?????.
- ??? 2 SP ???? ???? ?? ?? CLI ??????? ???? ?? ???? ?? ???? ? ?????.
- ? fast-lookup-filter ?? ??? CLI ?? ???? ??? ????? ????.
- CLI ?? ??? Urpf-fail-filters? ?? ????? ?????.
- MPLS ????? ?? ?? ???? ?? ?? fast-lookup-filter ?? ?? ??? fast-lookup-filters? ????? ????? ??? MPLS ?? ? ? ???? ????? ?? ?? ?? ???? ??????.

?????

? ????? ?? ???? ???? ???? ?? ???? ??????? ????? ????? ??????. ? ????? ?? ? ?? ?? ??? ?? IP ?? 172.16.1.1/30?? ??? ?? ?????? ge-0/1/1.0 . ???? ?? ???? ???? ????? ???? ???? ??????.

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?? ?? ?? ????? ???? ???? ???? ??????. CLI ???? ?? ???? ???? ? ???????? "?? ????? CLI ???? ??" ??? 1787.

CLI ?? ??

? ?? ???? ?????? ?? ???? ???? ???? ????? ? ???? ???? ?? ???? ?? ??? CLI? ??????? [edit] . ???? ????? ?? ??? , ??? **filter1**, ?? ??? **t1_f1** (term1, filter1 ??) ?????.

```
set firewall family inet filter filter1 term t1_f1 from protocol tcp
set firewall family inet filter filter1 term t1_f1 then count f1_t1_cnt
set firewall family inet filter filter1 term t2_f1 from precedence 7
set firewall family inet filter filter1 term t2_f1 then count f1_t2_cnt
set firewall family inet filter filter1 term t2_f1 then accept
set firewall family inet filter filter2 term t1_f2 from dscp 0
set firewall family inet filter filter2 term t1_f2 then count f2_t1_cnt
```

```
set firewall family inet filter filter2 term t2_f2 from source-port 1020
set firewall family inet filter filter2 term t2_f2 then count f2_t2_cnt
set firewall family inet filter filter2 term t2_f2 then accept
set firewall family inet filter filter3 term t1_f3 from destination-address 172.30.1.1/32
set firewall family inet filter filter3 term t1_f3 then count f3_t1_cnt
set firewall family inet filter filter3 term t2_f3 from destination-port 5454
set firewall family inet filter filter3 term t2_f3 then count f3_t2_cnt
set firewall family inet filter filter3 term t2_f3 then accept
set interfaces ge-0/1/1 unit 0 family inet address 172.16.1.1/30
set interfaces ge-0/1/1 unit 0 family inet filter input-chain [ filter1 filter2 filter3 ]
set interfaces ge-0/1/1 unit 0 family inet filter output-chain [ filter1 filter2 filter3 ]
```

IPv4 □□□ □□ □□

□□□□ □□□ □□□ □□□□□. □□□ □□ □□ □□ □□□ □□□ □□□ □□□ □□□□. □□ □ □□□ □□□□ □□ □□□ **count**□□ □□ □□□ □□□, □□ □ □□□ □□□ □□□ □□ □□□ □□□□□ □□ □□□□, □ □□ □□□ **□□** □□□ □□□□. □□□ □□□ □□□□ □□ □□□ □□□□□.

□□□ □□

□□□ □□ □□ □□:

1. CLI□□ IPv4 □□□ □□□ □□□□ □□ □□□□ □□□□□.

```
[edit]
user@host# edit firewall family inet
```

2. □□□ □□ □□□ □□□□ □□ TCP □□ □□ □□ □□□ 7□ □□□ □□□□□□ □ □□ □□□ □□□ □□□□□.

```
[edit firewall family inet]
user@host# set filter filter1 term t1_f1 from protocol tcp
user@host# set filter filter1 term t1_f1 then count f1_t1_cnt
user@host# set filter filter1 term t2_f1 from precedence 7
user@host# set filter filter1 term t2_f1 then count f1_t2_cnt
user@host# set filter filter1 term t2_f1 then accept
```

3. □□□ □□ □□□ □□□ □□ DSCP □□ □□ □□ □□□ 1020□ □□□ □□□□□□ □ □□ □□□ □□□ □□□□□.

```
[edit firewall family inet]
user@host# set filter filter2 term t1_f2 from dscp 0
user@host# set filter filter2 term t1_f2 then count f2_t1_cnt
```

```
user@host# set filter filter2 term t2_f2 from source-port 1020
user@host# set filter filter2 term t2_f2 then count f2_t2_cnt
user@host# set filter filter2 term t2_f2 then accept
```

4. [illegible] 172.30.1.1/32 [illegible] 5454[illegible]

```
[edit firewall family inet]
user@host# set filter filter3 term t1_f3 from destination-address 172.30.1.1/32
user@host# set filter filter3 term t1_f3 then count f3_t1_cnt
user@host# set filter filter3 term t2_f3 from destination-port 5454
user@host# set filter filter3 term t2_f3 then count f3_t2_cnt
user@host# set filter filter3 term t2_f3 then accept
```

[illegible]

[illegible]

[illegible]

[illegible] IP [illegible]

1. [illegible] ge-0/1/1.0[illegible]

```
[edit]
user@host# edit interfaces ge-0/1/1 unit 0 family inet
```

2. [illegible] IPv4 [illegible]

```
[edit interfaces ge-0/1/1 unit 0 family inet]
user@host# set address 172.16.1.1/30
```

3. [illegible]

```
[edit interfaces ge-0/1/1 unit 0 family inet]
user@host# set filter input-chain [ filter1 filter2 filter3 ]
user@host# set filter out-chain [ filter1 filter2 filter3 ]
```

?? ?? ?? ? ??

??? ??

?? ???? ???? ? ?????? ???? ??????.

1. ?? ?? ???? ????? ???? ???? show firewall ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ???? ????? ???? ???? ????.

```
[edit firewall]
user@host# show
    family inet {
        }
        filter filter1 {
            term t1_f1 {
                from {
                    protocol tcp;
                }
                then count f1_t1_cnt;
                accept;
            }
            term t2_f1 {
                from {
                    precedence 7;
                }
                then count f1_t2_cnt;
                accept;
            }
        }
        filter filter2 {
            term t1_f2 {
                from {
                    dscp 0;
                }
                then count f2_t1_cnt;
            }
            term t2_f2 {
                from {
                    source-port 1020;
                }
                then count f2_t2_cnt;
            }
```

```
        }
        filter filter3 {
            term t1_f3 {
                from {
                    destination-address {
                        172.30.1.1/32;
                    }
                }
                then {
                    count f3_t1_cnt;
                }
            }
            term t2_f3 {
                from {
                    destination-port 5454;
                }
                then {
                    count f3_t2_cnt;
                    accept;
                }
            }
        }
    }
}
```

2. [illegible] show interfaces [illegible].

```
[edit]
user@host# show interfaces
ge-0/1/1 {
    unit 0 {
        family inet {
            filter {
                input-chain [ filter1 filter2 filter3 ];
            }
            address 172.16.1.1/30;
        }
    }
}
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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

[illegible]

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[illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] filter1, filter2 [illegible] filter3[illegible] [illegible] [illegible] [illegible] [illegible](count [illegible] accept)[illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible] [illegible] filter1, filter2 [illegible] filter3[illegible] [illegible] [illegible] [illegible],

1. [illegible] [illegible] `ge-0/1/1.0`[illegible] [illegible] [illegible] 7[illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] filter2[illegible] [illegible] [illegible].
2. [illegible] [illegible] `ge-0/1/1.0`[illegible] [illegible] DSCP [illegible] 0[illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] filter3[illegible] [illegible] [illegible].
3. [illegible] [illegible] `ge-0/1/1.0`[illegible] [illegible] [illegible] [illegible] 172.30.1.1/32[illegible] [illegible] [illegible] [illegible] 5454[illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible].
4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] `show firewall filter` *`filter-name`* [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible]

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?? ??? Junos OS ?? ??????? ?????? ???? ??????. ??? ?????? ??? ?? ?????? ???? ??? ??????. ?????? ?????? ?? ??? ?????? ???? ?? ??????. ?? ?????? ??? ???? ?????? ?? ??? ?? ??? ?? ???? ??????. ??? ?????? ?? ?????? ??? ?? ?? ??? ??????. ?????? ??? true ?? false ?? ??? ?? ??? ??????. ?????? ?? ???? ???? ??? true ??? ?? ??? ?? ??? ?? ??? ?? ??? ??? ? ??? ??????. ??? ?????? ??? ??? ?? ??? ?? ??? ??? ??????.

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> ?: ??? ?? ??? ???? ????. ? ?? ??? ??? ???? ???? ????.

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?? ?? ?? A?? ???? ???? ISP(??? ??? ???)? ???? ?????? ??? ??????. ?? A? ??? ???? ???? ?? ???? ??? ?? ?? ??? ??? ???????. ?? A? ?? ??? ??? ???? ??? ???? ?? ??? ?? ?? ??? ?????? ???? ??? ??? ??? ???? ??? ?? ???????.

```
[edit]
policy-options {
    policy-statement customer-a-subroutine {
        from {
```

```
            route-filter 10.1/16 exact;
            route-filter 10.5/16 exact;
            route-filter 192.168.10/24 exact;
        }
        then accept;
    }
}
policy-options {
    policy-statement send-customer-a-default {
        from {
            policy customer-a-subroutine;
        }
        then {
            set metric 500;
            accept;
        }
    }
}
policy-options {
    policy-statement send-customer-a-primary {
        from {
            policy customer-a-subroutine;
        }
        then {
            set metric 100;
            accept;
        }
    }
}
policy-options {
    policy-statement send-customer-a-secondary {
        from {
            policy customer-a-subroutine;
        }
        then {
            set metric 200;
            accept;
        }
    }
}
protocols {
    bgp {
        group customer-a {
```

```
            export send-customer-a-default;
            neighbor 10.1.1.1;
            neighbor 10.1.2.1;
            neighbor 10.1.3.1 {
                export send-customer-a-primary;
            }
            neighbor 10.1.4.1 {
                export send-customer-a-secondary;
            }
        }
    }
}
```

□ □□□□ □□□ □□ □□□ □□□□□.

- group-level export □□ □□□□ □□ □□□ □□□□ □□□□ □□□ neighbor 10.1.1.1 □ 10.1.2.1□ □□ BGP □□□ □□□ □ □□□ □ 500□□ □□□□□□□.
- neighbor-level export □□ □□□□ □□ □□□ □□□□ BGP □□□□ □□□ □□ BGP □□□ neighbor 10.1.3.1 □ 10.1.4.1□ □ □ □□□ □ □□□□ 100 □ 200□□ □□□□□□.

□□□ □□□ □□ □□□ □□□□ □□□ □□ □□□ □□□□ □□ □□□ □□ □□ □□□ □□□□ □□ □□ BGP □□□ □□□□ □□ BGP □□□□ □□□ □□□ □ □□□ □□□□□.

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```
[edit]
policy-options {
    policy-statement customer-a-subroutine {
        term accept-exact {
            from {
                route-filter 10.1/16 exact;
                route-filter 10.5/16 exact;
                route-filter 192.168.10/24 exact;
            }
            then accept;
        }
        term reject-others {
            then reject;
        }
```

```
    }
}
```

[illegible].

- [illegible].
- [illegible].
- [illegible].

[illegible].

[illegible]

[illegible] | 261

[illegible]: [illegible] | 263

[illegible]

[illegible] 17 [illegible] 262 [illegible].

1. [illegible]([illegible] "2" [illegible] 261[illegible]). [illegible].

   a. [illegible] TRUE[illegible]. [illegible] FALSE[illegible].

      [illegible] rejectnext-policy [illegible] accept[illegible], [illegible] reject [illegible] accept [illegible], TRUE [illegible] FALSE[illegible].

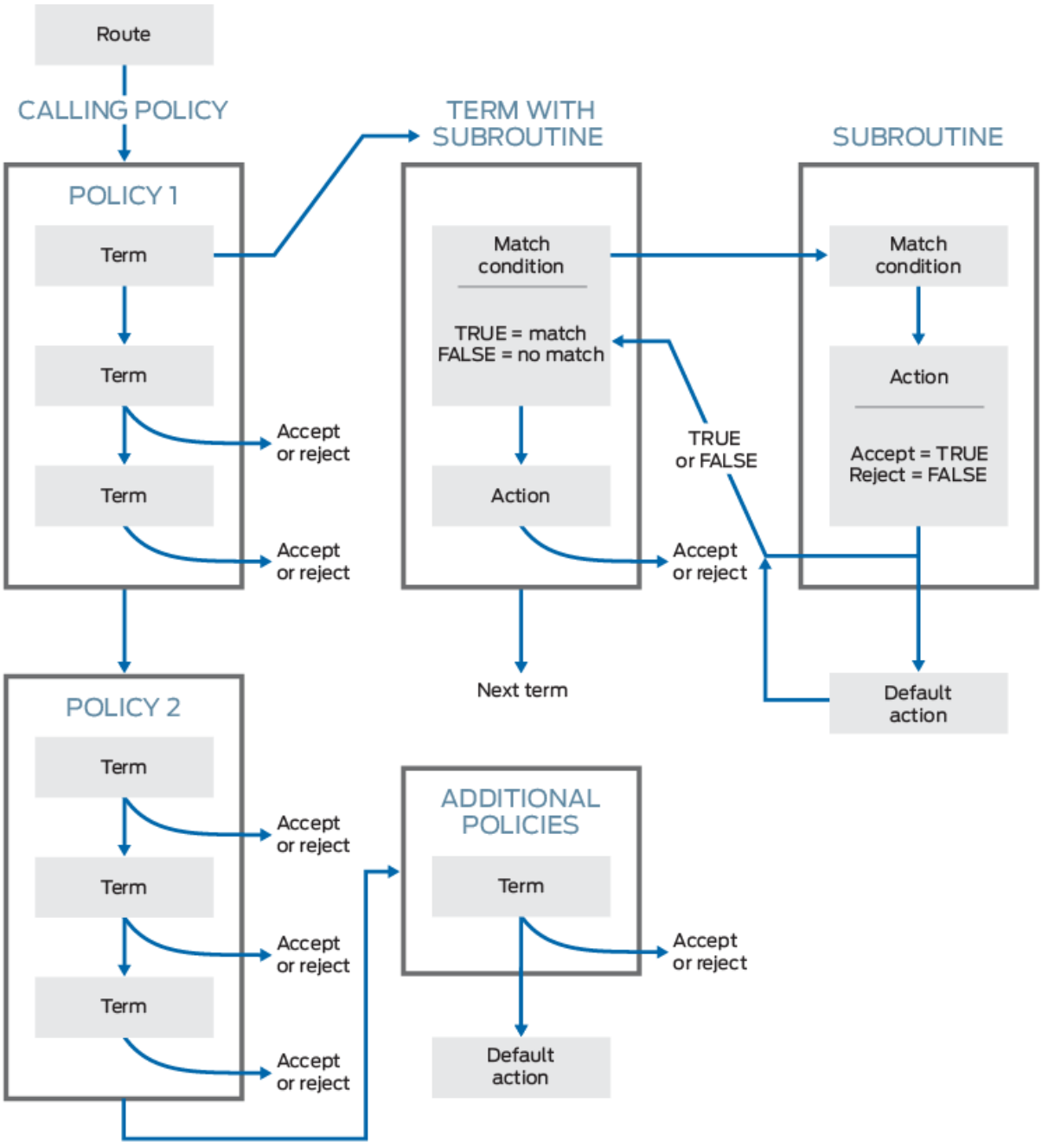
   b. [illegible] TRUE[illegible] FALSE[illegible]. [illegible] TRUE[illegible]. [illegible] FALSE[illegible].

2. [illegible].

[illegible].

[illegible], [illegible].

?? 17: ??? ?? ???? ??


Route
CALLING POLICY
POLICY 1
Term
Term
Term
Accept or reject
Accept or reject
TERM WITH SUBROUTINE
Match condition
TRUE = match
FALSE = no match
Action
Accept or reject
Next term
SUBROUTINE
Match condition
Action
Accept = TRUE
Reject = FALSE
TRUE or FALSE
Default action
POLICY 2
Term
Term
Term
Accept or reject
Accept or reject
Accept or reject
ADDITIONAL POLICIES
Term
Accept or reject
Default action
g007009

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???? R1?? ?? main ??? ?????.

```
user@R1# show policy-options
policy-statement main {
    term subroutine-as-a-match {
        from policy subroutine;
        then accept;
    }
    term nothing-else {
        then reject;
```

```
    }
}
```

□ □□ □□□ □□ □□□□ subroutine□ □□□□□.

```
user@R1# show policy-options
policy-statement subroutine {
    term get-routes {
        from protocol static;
        then accept;
    }
    term nothing-else {
        then reject;
    }
}
```

□□□□ □□□ □□□□ □ main □□□ □□□□□. □ □□ □□ from policy subroutine □ □□□ □□□□□ □□□□□ □□ □ □□□ □□□. □□□□□ □□ □□□ □□ □□ □□ □□□ □□ □□□□ □□□□□. □ □□□ □□□ □□□□ □□ □□ □□□ □□□□□ □□□□□. □□□ □□ □□ □□ □□ □□□ true □□□ □ □□□ □□□□□ □□□□ □□□ □□□□□ □□□□. □□ □□□ □□□ □□□□ □□□ □□□□□. □□□ □□□□ □□ □□ □□□ □□□□□ □□□□ □□□ □□ □□ □ □□□ □□□ □□□□□. □□□□□ □ □ □□ □□ main □ □□□□ □□□ □□□□□.

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AS 64510□ □□□□ R1□□ □□ □□ □□□ □□□, □ □ □□□ □□□ □□□ □□ □□□□, □□□ □□ BGP(IBGP)□ □□ □□□□ R2 □ □□□□ R3□□ □□□□□. AS 64510□ AS 64511□ □□□□ R4□ □□□□□. □ □□□ main □□□□ R4□□ □□□□ R1□ BGP □□□ □□□□ □□□ □ □□□□ □□□□□. □□ □□ □□□□ R1□ □□ □□ □□□ □□□□ R4□ □□□□□. □□ main□□□ □□□□ R1□ □□ □□□ □□□□ R2 □ □□□□ R3□□ □□□ □□□ □□□□ □□□□.

□□ □□□□□ □□ □□□ □, □□ EBGP □□□□ □□□ □□□ □□ BGP □□□ □□ EBGP □□□ □□□□ □□□ □□□□ □□□. □ □□ □□□ □□ □□□ □□□□□□ □□□□□. □□□ □ □□ □□□ □□□ □□ EBGP □□□□ □□□ □□□□ □□□□ □□ □□□ □□ □□□□ □□□□ □□ □□□ □□ □□□ □□□□ then reject □□□. □ □□ □□ □□ □□ □□ □□□□□□ □□ then reject □□□ □□□ □□ □□□□ □□□ □□□□□.

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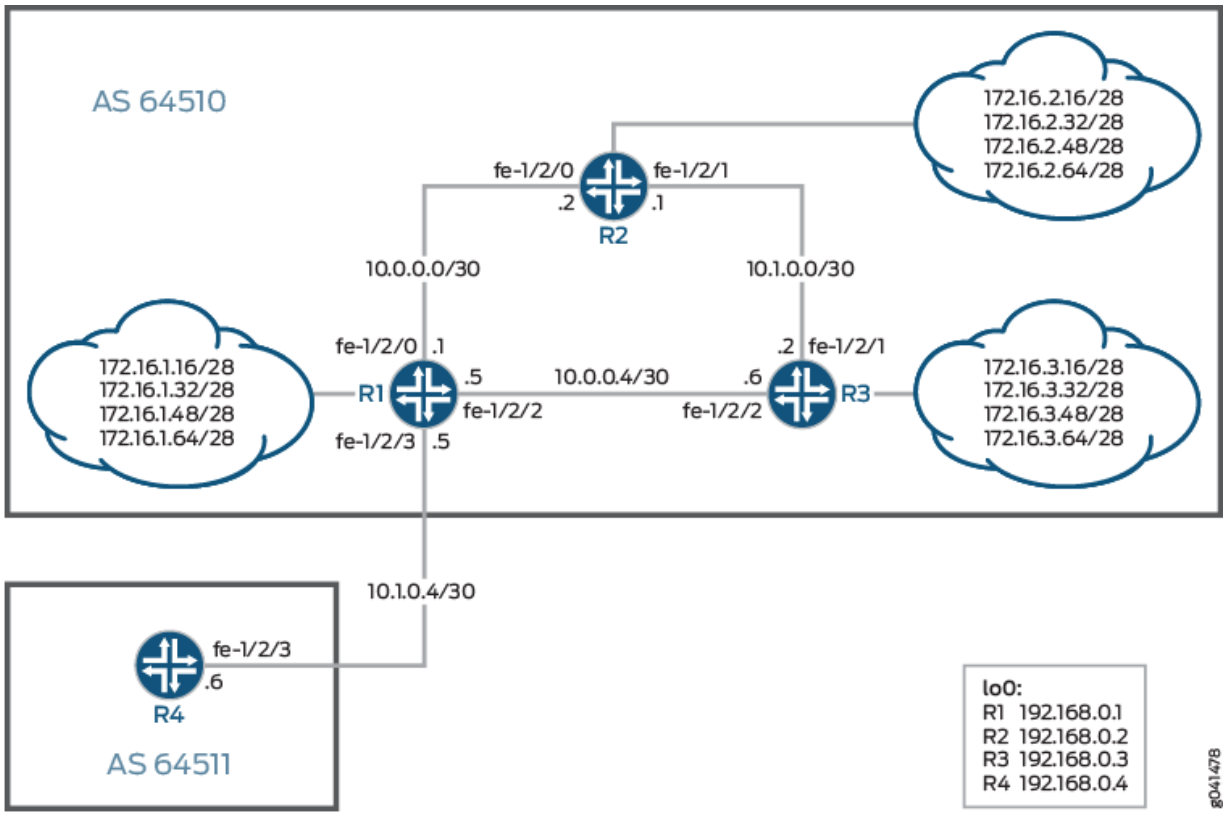
□□ 18 □□□ 265□ □□ □□□□□ □□□□□.

?? 18: ?? ?????? ?? BGP ????



"CLI ?? ??" ??? 265?(?) ?? 18 ??? 265 ? ?? ?????? ??? ??????.

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CLI ?? ??

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????? R1

```
set interfaces fe-1/2/0 unit 0 description to_R2
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/2 unit 0 description to_R3
set interfaces fe-1/2/2 unit 0 family inet address 10.0.0.5/30
set interfaces fe-1/2/3 unit 0 description to_R4
set interfaces fe-1/2/3 unit 0 family inet address 10.1.0.5/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.1
set protocols bgp group int neighbor 192.168.0.2
set protocols bgp group int neighbor 192.168.0.3
set protocols bgp group to_64511 type external
set protocols bgp group to_64511 export main
set protocols bgp group to_64511 neighbor 10.1.0.6 peer-as 64511
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/2.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement main term subroutine-as-a-match from policy subroutine
set policy-options policy-statement main term subroutine-as-a-match then accept
set policy-options policy-statement main term nothing-else then reject
set policy-options policy-statement subroutine term get-routes from protocol static
set policy-options policy-statement subroutine term get-routes then accept
set policy-options policy-statement subroutine term nothing-else then reject
set routing-options static route 172.16.1.16/28 discard
set routing-options static route 172.16.1.32/28 discard
set routing-options static route 172.16.1.48/28 discard
set routing-options static route 172.16.1.64/28 discard
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
```

????? R2

```
set interfaces fe-1/2/0 unit 0 description to_R1
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 description to_R3
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.2
```

```
set protocols bgp group int neighbor 192.168.0.1 export send-static
set protocols bgp group int neighbor 192.168.0.3
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface fe-1/2/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 172.16.2.16/28 discard
set routing-options static route 172.16.2.32/28 discard
set routing-options static route 172.16.2.48/28 discard
set routing-options static route 172.16.2.64/28 discard
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 64510
```

□□□□ R3

```
set interfaces fe-1/2/1 unit 0 description to_R2
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces fe-1/2/2 unit 0 description to_R1
set interfaces fe-1/2/2 unit 0 family inet address 10.0.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.3
set protocols bgp group int neighbor 192.168.0.1 export send-static
set protocols bgp group int neighbor 192.168.0.2
set protocols ospf area 0.0.0.0 interface fe-1/2/2.6
set protocols ospf area 0.0.0.0 interface fe-1/2/0.4
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-static from protocol static
set policy-options policy-statement send-static then accept
set routing-options static route 172.16.3.16/28 discard
set routing-options static route 172.16.3.32/28 discard
set routing-options static route 172.16.3.48/28 discard
set routing-options static route 172.16.3.64/28 discard
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 64510
```

□□□□ R4

```
set interfaces fe-1/2/3 unit 0 description to_R1
set interfaces fe-1/2/3 unit 0 family inet address 10.1.0.6/30
```

```
set interfaces lo0 unit 0 family inet address 192.168.0.4/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.1.0.5
set routing-options autonomous-system 64511
```

□□

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□□□□ R1 □□

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R1# set fe-1/2/0 unit 0 description to_R2
user@R1# set fe-1/2/0 unit 0 family inet address 10.0.0.1/30
user@R1# set fe-1/2/2 unit 0 description to_R3
user@R1# set fe-1/2/2 unit 0 family inet address 10.0.0.5/30
user@R1# set fe-1/2/3 unit 0 description to_R4
user@R1# set fe-1/2/3 unit 0 family inet address 10.1.0.5/30
user@R1# set lo0 unit 0 family inet address 192.168.0.1/32
```

2. □□□□ R2 □ □□□□ R3□ □□ □□ BGP(IBGP) □□□ □□□□□.

```
[edit protocols bgp group int]
user@R1# set type internal
user@R1# set local-address 192.168.0.1
user@R1# set neighbor 192.168.0.2
user@R1# set neighbor 192.168.0.3
```

3. □□□□ R4□ EBGP □□□ □□□□□.

```
[edit protocols bgp group to_64511]
user@R1# set type external
```

```
user@R1# set export main
user@R1# set neighbor 10.1.0.6 peer-as 64511
```

4. □□□□ R2 □ □□□□ R3□ □□ OSPF □□□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R1# set interface fe-1/2/0.0
user@R1# set interface fe-1/2/2.0
user@R1# set interface lo0.0 passive
```

5. □□ main□(□) □□□□□.

```
[edit policy-options policy-statement main term subroutine-as-a-match]
user@R1# set from policy subroutine
user@R1# set then accept
[edit policy-options policy-statement main term nothing-else]
user@R1# set then reject
```

6. □□ subroutine□(□) □□□□□.

```
[edit policy-options policy-statement subroutine term get-routes]
user@R1# set from protocol static
user@R1# set then accept
[edit policy-options policy-statement subroutine term nothing-else]
user@R1# set then reject
```

7. 172.16.5.0/24 □□□□□ □□ □□ □□□ □□□□□.

```
[edit routing-options static]
user@R1# set route 172.16.1.16/28 discard
user@R1# set route 172.16.1.32/28 discard
user@R1# set route 172.16.1.48/28 discard
user@R1# set route 172.16.1.64/28 discard
```

8. □□ □□□(AS) □□ □ □□□ ID□ □□□□□.

```
[edit routing-options]
user@R1# set router-id 192.168.0.1
user@R1# set autonomous-system 64510
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R1# show interfaces
fe-1/2/0 {
    unit 0 {
        description to_R2;
        family inet {
            address 10.0.0.1/30;
        }
    }
}
fe-1/2/2 {
    unit 0 {
        description to_R3;
        family inet {
            address 10.0.0.5/30;
        }
    }
}
fe-1/2/3 {
    unit 0 {
        description to_R4;
        family inet {
            address 10.1.0.5/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
```

```
    }
}
```

```
user@R1# show protocols
bgp {
    group int {
        type internal;
        local-address 192.168.0.1;
        neighbor 192.168.0.2;
        neighbor 192.168.0.3;
    }
    group to_64511 {
        type external;
        export main;
        neighbor 10.1.0.6 {
            peer-as 64511;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface fe-1/2/0.0;
        interface fe-1/2/2.0;
        interface lo0.0 {
            passive;
        }
    }
}
```

```
user@R1# show policy-options
policy-statement main {
    term subroutine-as-a-match {
        from policy subroutine;
        then accept;
    }
    term nothing-else {
        then reject;
    }
}
policy-statement subroutine {
```

```
    term get-routes {
        from protocol static;
        then accept;
    }
    term nothing-else {
        then reject;
    }
}
```

```
user@R1# show routing-options
static {
    route 172.6.1.16/28 discard;
    route 172.6.1.32/28 discard;
    route 172.6.1.48/28 discard;
    route 172.6.1.64/28 discard;
}
router-id 192.168.0.1;
autonomous-system 64510;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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- □□ BGP □□□□ □□ □□ | 274

□□□ □□□□ □□□□ □□□ □□□□□.

□□□□ R1□□ □□ □□

□□

□□□□ R1□□ □□□ □□□□ □□ □□□ □□□□□.

□□

```
user@R1> show route protocol static

inet.0: 23 destinations, 23 routes (23 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.1.16/28     *[Static/5] 1d 02:02:13
                      Discard
172.16.1.32/28     *[Static/5] 1d 02:02:13
                      Discard
172.16.1.48/28     *[Static/5] 1d 02:02:13
                      Discard
172.16.1.64/28     *[Static/5] 1d 02:02:13
                      Discard
```

□□

□□□□ R1□□ 4□□ □□ □□□ □□□□.

□□□□ **R4□ □□ □□ □□ □□**

□□

□□□□ R1□□ □□ □□□ □□□□ R4□ □□□□□□□ □□□□□.

□□

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 23 destinations, 23 routes (23 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
```

□□

□□□□ □□□□ R1□ □□ □□□ □□□□ R4□ □□□□□.

□□ BGP □□□□ □□ □□

□□

□□ main □□ □□subroutine□□ □□ then reject □□□ □□□□ □□□ □□□ □□□□□.

□□

1. □□□□ R1□□ □□□ main□□□ □□□ □□□□□□□□.

```
[edit  policy-options policy-statement main]
user@R1# deactivate term nothing-else
user@R1# commit
```

2. □□□□ R1□□ □□□□ R4□ □□□□ □□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 23 destinations, 23 routes (23 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
* 172.16.3.16/28          Self                                    I
* 172.16.3.32/28          Self                                    I
* 172.16.3.48/28          Self                                    I
* 172.16.3.64/28          Self                                    I
```

□□ □□□□ R1□ □□ BGP □□□ □□□□ R4□ □□□□□. □□ □□□ □□ main□□ □□□ □ □□ BGP □□□□ □□□ □□□□ □□□□□.

3. ???? R1?? ??? main?? ??? ?? ????? ??? subroutine?? ??? ????????.

```
[edit  policy-options policy-statement main]
user@R1# activate term nothing-else

[edit  policy-options policy-statement subroutine]
user@R1# deactivate term nothing-else
user@R1# commit
```

4. ???? R1?? ???? R4? ???? ??? ??????.

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 23 destinations, 23 routes (23 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
* 172.16.3.16/28          Self                                    I
* 172.16.3.32/28          Self                                    I
* 172.16.3.48/28          Self                                    I
* 172.16.3.64/28          Self                                    I
```

?? ???? R1? ?? BGP ??? ???? R4? ??????. ?? ??? ?? main?? ???? ?? ?? BGP ???? ??? ??? subroutine? ??? ??????.

??

?? BGP ???? ??? ???? ??? ??? ?? ?? ? ??? ?? ?????? ?? then reject ??? ???? ???.

?? ??

??? ?? ?? ?????? ?? ???? ?? | 258

??? ?? ???? ?? ?? | 261

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- ?? ?? ?? IP? ???? ?? ??? ?? | 298
- ?? ??? ?? ??? ?? | 299
- ?? ??? ??? ?? ?? ??? ??? ?? | 303
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- ?: ?? ??? ??? ?? ????? ?? ??? ?? ??? ?? | 314
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□: □□ □□ □□□□ □□□ □ □□□ □□ □□□ □□□□□, □□□ □□□□ □□ □□□□□ □□□ IP □□ □□□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□(□□: "□□□ □□ □□ □□□□ □□ □□□ □□□□ □□" □□□ 286).

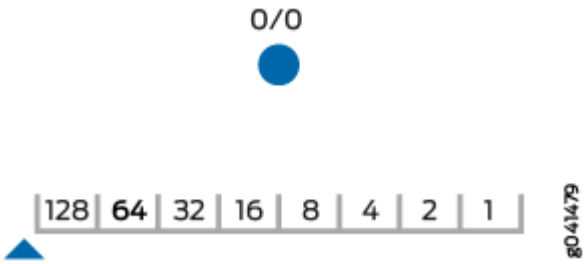
□ □□□ □□ □□□ □□ □□□□□.

□□ □□(Radix Tree)

□□ □□□ □□□ □□□□□ □□ □□(patricia trie □□ radix trie□□□ □)□□ □□ □□□ □□□ □□□□ □□□□□ □□□□□ □□□. □□ □□□ IP □□ (□□)□ □□□□ □□ □□ □□□ □□□□□. IP□□□ □□□ □□ □□□ □ □□□ □□□ □□□ 10□□ □□□□ □□□□ 32□□ □□□□□. □□□ 8□□ □□□□ □□ 0□ 225 □□□ □□ □□□ □ □□□□. □□ □□□ □□□ □□□□ □□□ □□□ □ □□□□.

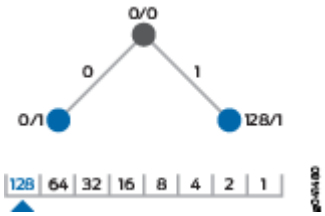
□□ 19 □□□ 277□□ □□ □□□ □□□ □□ □□ □□□□ □□□□(0□□ □□) □□ IP □□□ □□ □□□ □□□□. □□□ 0/0□□ □□□□, □□ □□ □□□ □ □□□.

□□ 19: □□ □□□ □□ □□



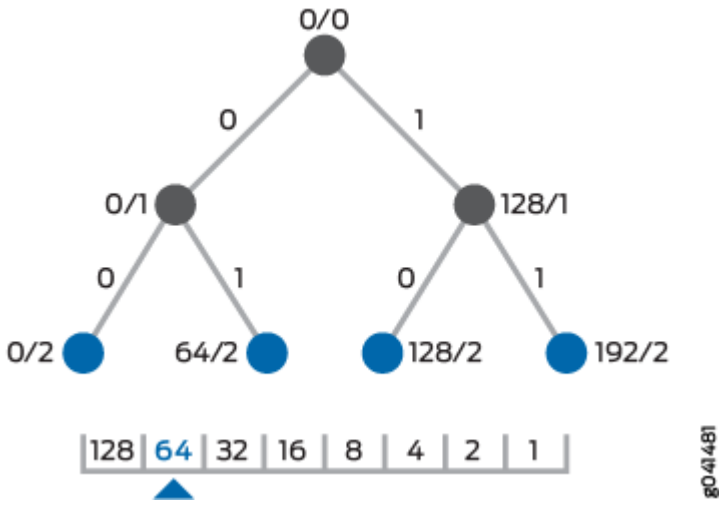
□□□ □□□□□□, □ □□□ □□□ □ □□ □(0 □□ 1) □ □□□ □□ □ □□□□. □□ □□□□ □□□□ 0, □□□□□ □□□□ 1□ □□ □□□□□. □ □□ □□□ □□ 20 □□□ 278□ □□□□. □ □□ □□□□ IP □□□ □ □□ 8□□□ 00000000 □□ 10000000(□□ 0 □□ 128) □□ □□□□. □□□ □□ 20 □□□ 278□□ 0/1 □ 128/1 □□□ □□□□□.

?? 20: ?? ??? ? ??



? ?? ???? ?? 21 ??? 278? ??????. ???? ? ? ?? ????? ? ?? 8???? ?? ???? 4?? ?? ? 00000000, 01000000, 10000000, 11000000? ?????. ???? 10?? ? 0, 64, 128, 192? ?? ????? 0/2, 64/2, 128/2, 192/2? IP ??? ??? ??.

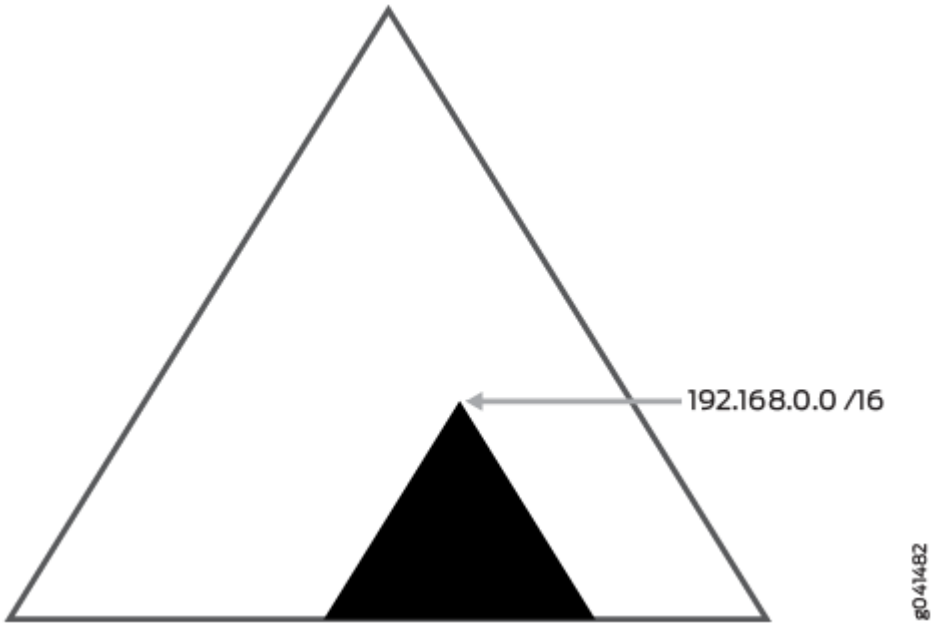
?? 21: ?? ??? ? ?? ??



? ??? ?????? ??? ?? IP ??? ????? ?? ? 33?? ????? ??????.

?? ?? ???? ??? MSB(??? ??)? ?? ????? ?? ???? ?? ? ??????. ?? 22 ??? 279?192.168.0.0/16 ?????? ????? ?? ???? ??? ??????. 192.168.0.0/16?? ? ????? ?? ???? ???? ???? ??????.

□□ 22: □□ □□ □□



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□: '□□ □□ □□' □□□□ □□ Junos OS □□□ □□ □□□□□. □ □□□□ □□□ □□ walkup □□□ □□□□ □□□ □□ □□ □ □□ □ □□ □□ □□□ □□□ □ □□□ □□ □ □□□□ □□□ □□ □□□ □□□□□. □□□ □□□ "□□ □□□ □□ □□□ □□" □□□ 299□(□) □□□□□□.

□□ □□□ □□□□□ □□ □□□ route-filter □□ source-address-filter □□ □□□□□.

```
[edit policy-options policy-statement policy-name term term-name from]
route-filter destination-prefix match-type {
    actions;
}
```

route-filter □□□ □□□□□ □□ □□ □□□ □□□□□ □□ □□□ □□□ □□ □□□ □□ □□ □□□□ □□□□□ □ □□□□□.

destination-prefix □□□ *prefix*/*prefix-length*□□ □□□ IP □□ 4(IPv4) □□ IP □□ 6(IPv6) □□ □□□□□□. IPv4 □□□□ □□ *prefix-length*□(□) □□□□ □□□□ /32□□□. IPv6 □□□□ □□ *prefix-length*□(□) □□□□ □□□□ /128□□□. from □□ □□□ □□□□ □ □ IPv4 □□ □□ IPv6 □□□□ □□□.

source-address-filter □□□ □□□□□ □□□□□□ BGP(MBGP) □ MSDP(Multicast Source Discovery Protocol) □□□□ □□ □□ □□□ □□□□□ □□ □□□ □□□□□ □ □□□□□.

```
source-address-filter source-prefix match-type {
    actions;
}
```

source-prefix □□□ *prefix*/*prefix-length*□□ □□□ IPv4 □□ IPv6 □□□□□. IPv4 □□□□ □□ *prefix-length*□(□) □□□□ □□□ □ /32*prefix-length*□□□. IPv6 □□□□ □□ *prefix-length*□(□) □□□□ □□□□ /128□□□. from □□ □□□ □□□□ □□ IPv4 □□ □□ IPv6 □□□□ □□□.

match-type□ □□ □□ □□ □□□□ □□□ □□ □□□□, □ 14 □□□ 281□ □□□ □□ □□ □ □□□ □ □□□□. □□ □□ □ □□□ □□□ □□ □□□ □ □ □□ □□ □ 15 □□□ 285□ □□□□□□.

actions□ □□ □□□ □□ □□ □□□(route-filter □□□ □□□ □□) □□ □□ □□ □□□(destination-address-filter □□□ □□□ □□)□ □□ □□□ □□□ □□□ □□ □□□□ □□□□□. □ □□□ "□□□ □□ □□□ □□" □□□ 62□ □□□ □□ □□□ □□□□ □□□ □ □□□□.

□□ □□□□ □□□ □□ □ □□ □□□□ □□□ □□□ □ □□□□.

- route-filter □□ source-address-filter □□□□—□□□ □□□ □□□ □□□ □□ □□□□, then □□ □□□□ □□□□.
- then □□□—□□□ □□□ □□□ □□□ □□ □□□□□, route-filter □□ source-address-filter □□□ □□□□ □□□ □□□□ □□□□.

upto □ prefix-length-range □□ □□□ □□ MSB(□□□ □□)□ □□□□ □□□ □ □□ □□□ □□ □□□ □□□□□ □□□ □□□□□. □□□□ upto□ (□) □□□□ □□□ □□ □□□ □□□□ □□□ □□□ □ □□ □□, prefix-length-range□(□) □□□□ □□□ □□□ □□ □□□ □ □□□ □□□□.

□□□ □□ □□ □□ □□□ □□ □□□ □□□ "□□ □□ □□" □□□ 289□(□) □□□□□□.

□ 14: □□□ □□□ □□ □□ □□ □□ □□

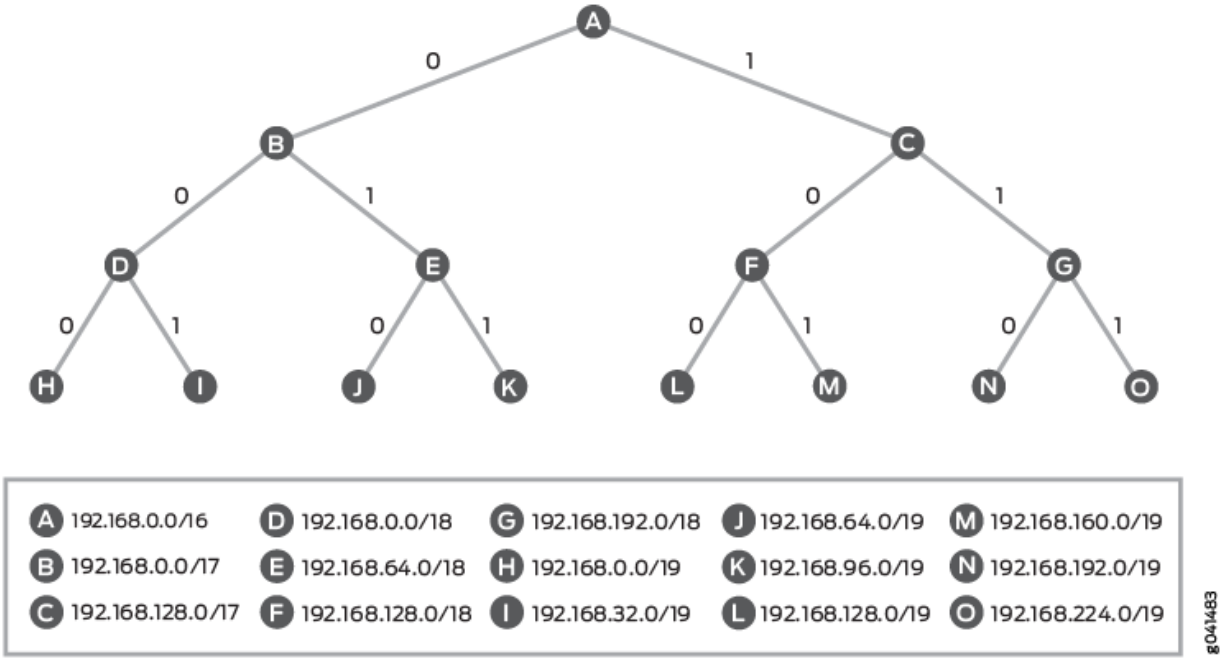
□□ □□	□□ □□
address-mask *netmask-value*	□□ □□□ □□ □□□□□. • *netmask-value* □□ □ □□ IPv4 □□ IPv6 □□ □□□ □□ □□ AND□ *netmask-value* □□ □ *destination-prefix* □□□ □□ □□ AND□ □□□□□. *netmask-value* □□□ □□□ □□□ □□□□ □□□ □□□□. • *prefix-length*□□ IPv4 □□ IPv6 □□ □□□ □□ □□□ *destination-prefix*□□□ □□ *prefix-length*□□□ □□ □□□. □: address-mask □□□ □□ □□ □□□ □□ IPv4(family inet) □□ IPv6(family inet6) □□ □□□ route-filter □□ □□□ □□ □□ □□□ □□□ □□□□□ □□□□ □□□□□. address-mask □□□ □□ □□ □□□ □□□□ □□□ □□ □□ □□□□ □□ □ □□□ □□□ □□□□ □□□ □□ IPv4 □□ IPv6 □□ □□ □ □□□□ □ □□□□. □□ □□□ □□□ □□□ □□ □□ □□□□ □□□ □□□ □□□□ □□□. address-mask □□ □□□ □□□ □□ □□□ □□ □□□ □□ □□□ □□□□ □□ □□□□□. □□ □□□□ longest-match □□□ □□□□, □□□ □□ □□□ □□ □□ □□□ □□□ address-mask □□ □□□ □□□□□. □□ □ □ □ □□ □□□□ □□□ □□□□ □□, □□ □□□□ □□ □□□ □□ □□ □□ □□ □□□□□. □□□ □□ □□ □□ □□□ □□ □□□ □□□ "□□ □□□ □□ □□□ □□□□ □□" □□□ 288□(□) □□□□□□. address-mask □□ □□□ □□□ □□ □□□ □□□□ □□ □□□ □□ □□□ □□□□□□. • "□□ □□ □ □□ □□ □□□□ □□ □□□□ □□□□ □□ IPv4 □□ □□" □□□ 294. • "□□□ □□□□□ □□□ □□□ □□ □□ IPv4 □□ □□" □□□ 295. • "Longest-Match □□□ □□ □□□ □□ □□ □□" □□□ 296.
exact	□□ □□□ □□ □□□□□. • □□ □□□ □□ □□□(*destination-prefix* □□ *source-prefix*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □□ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□ □□□□ *prefix-length* □□ □□□ □□□ □□□ □□□ □□□□□.
longer	□□ □□□ □□ □□□□□. • □□ □□□ □□ □□□(*destination-prefix* □□ *source-prefix*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □□ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□□ □□□ □□□ □□ □□□□ *prefix-length* □□ □□□□ □□□.

□ 14: □□□ □□□ □□ □□ □□ □□ □□ *(Continued)*

□□ □□	□□ □□
orlonger	□□ □□□ □□ □□□□□. • □□ □□□ □□ □□□(*destination-prefix* □□ *source-prefix*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □□ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□□ □□□ □□□ □□□ □□ □□□□ *prefix-length* □□ □□□ □□□ □□□.
prefix-length-range *prefix-length2-prefix-length3*	□□ □□□ □□ □□□□□. • □□ □□□ □□ □□□(*destination-prefix* □□ *source-prefix*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □□ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□□ □□□ □□□ *prefix-length2*□ *prefix-length3* □□□ □□□□.
through {*destination-prefix2* | *source-prefix2*}	□□ □□□ □□ □□□□□. • □□ □□□ □ □□ □□ □□□(*destination-prefix* □□ *source-prefix*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □□ □□ □ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□ □□□ □ □□ □□ □□□(*destination-prefix2* □□ *source-prefix2*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □ □ □□ □ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□□ □□□ □□□ □ □□ □□ □□□□ *prefix-length* □□ □□□□ □□□ □□□□□. □□□□ □□□ □□ □□□□□ through □□ □□□ □□□□ □□□□. □□ □□, "□□ □□□□ □□ □□" □□□ 290□(□) □□□□□□.
upto *prefix-length2*	□□ □□□ □□ □□□□□. • □□ □□□ □□ □□□(*destination-prefix* □□ *source-prefix*)□ □□□ MSB(□□□ □□)□ □□□□□. □□ □□ □□ □□ □□□□ *prefix-length* □□ □□□ □□□□□. • □□□ □□□ □□□ □ □□ □□ □□□□ *prefix-length* □□ □□□ *prefix-length2* □□□ □□□□.

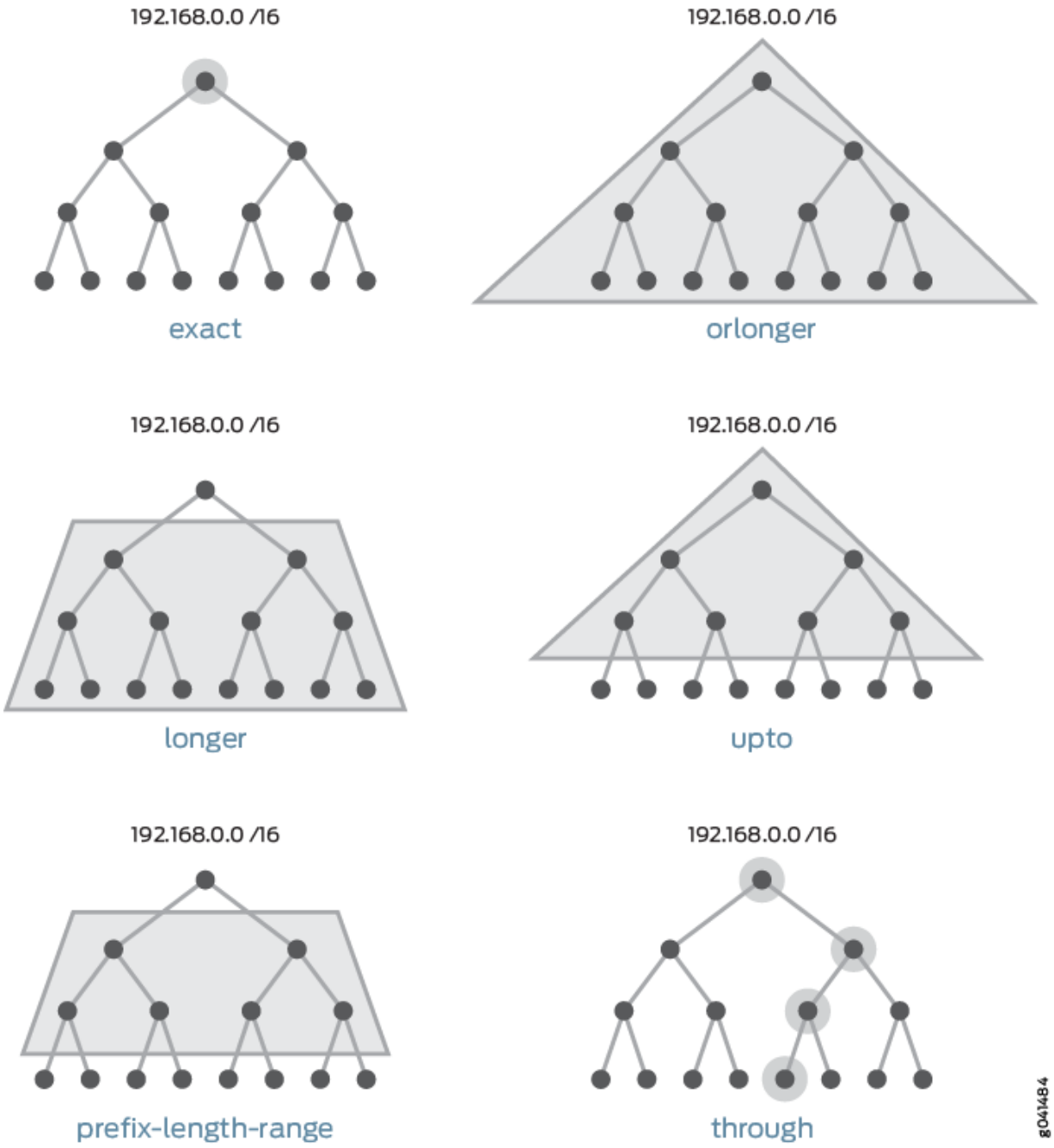
□□ 23 □□□ 283□ □□ 192.168.0.0/16□ □□ □□□ □□ □□□ □□□□□.

□□ 23: □□ □□ □□



□□ 24 □□□ 284□ □ 15 □□□ 285□ □□□ □□ □□ □□ □□□ □□□ □□□□□.

?? 24: ?? ?? ?? ??


192.168.0.0 /16
exact
192.168.0.0 /16
orlonger
192.168.0.0 /16
longer
192.168.0.0 /16
upto
192.168.0.0 /16
prefix-length-range
192.168.0.0 /16
through
g041484

□ 15: □□ □□ □□

□□□	192.168/16 exact	192.168/16 longer	192.168/16 orlonger	192.168/16 upto /24	192.168/16 prefix-length-range/18 – /20	192.168/16 through192.168.16/20	192.168/19 address-mask255.255.0.0
10.0.0.0/8	–	–	–	–	–	–	–
192.168.0.0/16	□□	–	□□	□□	–	□□	–
192.168.0.0/17	–	□□	□□	□□	–	□□	–
192.168.0.0/18	–	□□	□□	□□	□□	□□	–
192.168.0.0/19	–	□□	□□	□□	□□	□□	□□
192.168.4.0/24	–	□□	□□	□□	–	–	–
192.168.5.4/30	–	□□	□□	–	–	–	–
192.168.12.4/30	–	□□	□□	–	–	–	–
192.168.12.128/32	–	□□	□□	–	–	–	–
192.168.16.0/20	–	□□	□□	□□	□□	□□	–
192.168.192.0/18	–	□□	□□	□□	□□	–	–

□ 15: □□ □□ □□ *(Continued)*

□□□	192.168/16 exact	192.168/16 longer	192.168/16 orlonger	192.168/16 upto /24	192.168/16 prefix-length-range/18 – /20	192.168/16 through192.168.16/20	192.168/19 address-mask255.255.0.0
192.168.224.0/19	–	□□	□□	□□	□□	–	□□
10.169.1.0/24	–	–	–	–	–	–	–
10.170.0.0/16	–	–	–	–	–	–	–

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1. □□ □□□□□ □□□□□□ *longest-match* □□ □□□□□. □, □□□□□□ □□□□ □□ □ □□□□ □□□□□.

   longest-match □□□ □□□ □□ □□□□ *prefix* □ *prefix-length* □□ □□□ □□□□ *match-type* □□ □□□ □□□□ □□□□. □□ □□ □ □ □□□ □ □□□ □□□□□.

   ```
   from {
       route-filter 192.168.0.0/14 upto /24 reject;
       route-filter 192.168.0.0/15 exact;
   }
   then accept;
   ```

   □□ □□ 192.168.1.0/24□ □□ □□ □ □□□ □□□□ □□□ □□□ □□□□ □□ □ □□ □□ □□□ 192.168.0.0/15□□□.

2. □□ □□□ □□□□ □□□ □(□□ □ □□□ □□) □□ □□□ □□□□□.

   a. □□ □□□ □□□□ □□□□ □□ □□□ □□ □□□ □□□ □□□□□.

   b. □□□□□□ □□ □□□□ □□□ □□ □□□ □□□ □□□□□.

□: □□ □□ □□□ address-mask □□ □□□ □□□□ □□ □□□ □□ □□□□, □ □□ □□□ □□□ □□□□ □□ □□□□□. □□□ □□ □ "□□ □□□ □□ □□□ □□□□ □□" □□□ 288□ □□□□□□.

1□□□□ □□ 192.168.1.0/24□ □□□□ □□□□ □□□□. 192.168.0.0/15□ □□ □ □□□□ □□□□□ exact□ □□□□ □□□□. □□ □□□ □□□□ □□□□ □□□ □□□□□, □□ □□□ □□□□□□ □ □□□ □□□ □□□□□.

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□: □□ □□□ □□ □□ □□□□ □□□□ □□, □□□ □□□□□ □□□ □□□□ □□□□ □□□. □□ □□ □□□ □□□□ □□ OR □□□□ □.

□□□ □□□□ □□ □□, □□□□□□ □□ □□□ □□□ □□□ □□□□□(□□ □□), □□ □□□ □□□ accept □□ reject □□□ □□□□□.

□□ □□, □□□ 192.168.254.0/24□ □□ □□ □□□ □□□□□.

```
route-filter 192.168.0.0/16 orlonger;
route-filter 192.168.254.0/23 exact;
```

□□□ 192.168.254.0/23□ □□ □ □□□□ □□□□□. □□□□□□ 192.168.254.0/24□ □□ □ □□□□ □□ □□□□ □□□ □□□□□ (192.168.254.0/24□ 192.168.254.0/23□ □□ □□□). 192.168.254.0/24□ □□ □ □□□□□ □□□□□ □□□ □□□□□. □□□ □□□□□□ □□ □□□ □□□ □, 192.168.254.0/24□ 192.168.254.0/23 exact □□□□ □□□ □□□□ □□□□. □□□□□□ □□□ □□□ □ □□□□ □□□ □□□ □□ □□□ □□□ □□□□ □□□□□(□□ □□), □□ □□□ □□□ accept □□ reject □□□ □□□□□.

□: walkup □□□ □□ □□ □□ □□□ □□ □□□ □□ □□□□□ '□□□'□□ □□ □ □□ □ □□□ □ □□□□ □□□ □□□□ □ □□□ □. □, □□□□ □□□□□ □□ □□□ "□□□ □□□□ □□□ □□□"□□ "□□□ □□□□ □□□ □□□"□□ □□□□□. *walkup* □□□ □□ □□□ □□□ "□□ □□□ □□ □□□ □□" □□□ 299□(□) □□□□□□.

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□: walkup □□□ □□ □□ □□ □□□ □□ □□□ □□ □□□□□ '□□□'□□ □□ □ □□ □ □□□ □ □□□□ □□□ □□□□ □ □□□ □. □, □□□□ □□□□□ □□ □□□ "□□□ □□□□ □□□ □□□"□□ "□□□ □□□□ □□□ □□□"□□ □□□□□. *walkup* □□□ □□ □□□ □□□ "□□ □□□ □□ □□□ □□" □□□ 299□(□) □□□□□□.

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```
route-filter 0.0.0.0/0 upto /7 reject;
route-filter 0.0.0.0/0 upto /24 next-hop self;
route-filter 0.0.0.0/0 orlonger reject;
```

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address-mask □□□ □□ □□ □□□ □□□□ □□□ □□ □□ □□□□ □□ □ □□□ □□□ □□□□ □□□ □□ IPv4 □□ IPv6 □□ □□□ □□□□ □ □□ □□. □□ □□ □□ □□ address-mask □□ □□□ □□□ □□□□ □□ □□□□ □□ □□□ □□ □□ □□□ □□□ □□□□□.

- longest-match □□□ address-mask □□□ □□ □□ □□□ □□□ □ □□□ □□ □□□□ *prefix-length* □□ □□□ □□□□ □□□□. □□ □□ □ □□□□ □□ □□□ □□ □□ □□ □□ □□□□□.
- □□ IPv4 □□ IPv6 □□ □□□ address-mask □□□ □□ □□ □□□ □□□□ □□ □□ □□ □□□ □□ □□□ □, □□ □□ □□□□ □□□ □□□□□.
  - □□□ □□□□ □□ □□ IPv4 □□ IPv6 □□ □□□ □□ □□ AND
  - □□□ □□□□ □□ □□□ □□ □□ □□□□ □□ □□ AND

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Longest-Match □□□ □□□□ □□ □□

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```
route-filter 192.168.0.0/16 orlonger;
route-filter 192.168.254.0/23 exact;
```

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```
[edit]
policy-options {
    policy-statement policy-statement from-hall2 {
        term 1 {
            from {
                route-filter 0.0.0.0/0 upto /8 reject;
            }
        }
        then accept;
    }
}
```

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□□□□ /8 □□(□, /8, /9, /10 □)□□ □□ 8□□□ 0□□ □□□ □□□ □□□□ □□□ 8□□ □□□ □□□ □□□□□.

```
[edit]
policy-options {
    policy-statement from-hall3 {
```

```
        term term1 {
            from {
                route-filter 0/0 upto /7 accept;
                route-filter 0/8 orlonger;
            }
            then reject;
        }
    }
}
```

[illegible] [illegible] 26~29 [illegible] [illegible] [illegible]

[illegible] [illegible] 192.168.10/24[illegible] [illegible] /26~/29 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
policy-options {
    policy-statement from-customer-a {
        term term1 {
            from {
                route-filter 192.168.10/24 prefix-length-range /26-/29 reject;
            }
            then accept;
        }
    }
}
```

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
policy-options {
    policy-statement hosts-only {
        from {
            route-filter 10.125.0.0/16 upto /31 reject;
            route-filter 0/0;
        }
        then accept;
```

```
    }
}
```

□□□□ □□□ □□ □□□□□ through □□ □□□ □□□□ □□□□. through□ exact □□□ □□□ □□□ □□□□□ □□□ □□□□ □□□. □□ □□, □□□ □□ 4□□ exact □□□ □□□□ □□:

```
from route-filter 0.0.0.0/1 exact
from route-filter 0.0.0.0/2 exact
from route-filter 0.0.0.0/3 exact
from route-filter 0.0.0.0/4 exact
```

□□ □□ □□□ □□□ □ □□□□.

```
from route-filter 0.0.0.0/1 through 0.0.0.0/4
```

□□□ □□□ □□□ □□ □□ □□

□□□ □□□ □□(□ □□ □□)□ □□□□□ □□□□ □□ □□ □□□(□ □□ □□)□ □□□□□.

```
policy-options {
policy-statement internet-in {
    term 1 {
        from {
            route-filter 192.168.231.0/24 exact accept;
            route-filter 192.168.244.0/24 exact accept;
            route-filter 192.168.198.0/24 exact accept;
            route-filter 192.168.160.0/24 exact accept;
            route-filter 192.168.59.0/24 exact accept;
        }
    }
    term 2 {
        then {
            reject;
        }
    }
}
```

??? ??? ??? ?? ?? ??

???? ? ?? ??? ???? ??? ???? ??????.

```
[edit policy-options]
policy-statement drop-routes {
    term 1{
        from { # first, reject a number of prefixes:
            route-filter default exact reject; # reject 0.0.0.0/0 exact
            route-filter 0.0.0.0/8 orlonger reject; # reject prefix 0, mask /8 or longer
            route-filter 10.0.0.0/8 orlonger reject; # reject loopback addresses
            }
            route-filter 10.105.0.0/16 exact { # accept 10.105.0.0/16
                as-path-prepend “1 2 3”;
                accept;
            }
            route-filter 192.0.2.0/24 orlonger reject; # reject test network packets
            route-filter 172.16.233.0/3 orlonger reject; # reject multicast and higher
            route-filter 0.0.0.0/0 upto /24 accept; # accept everything up to /24
            route-filter 0.0.0.0/0 orlonger accept; # accept everything else
            }
        }
    }
}
```

???? 24???? ? ?? ??

24???? ? ?? ???? ??????. export ??? ??? ??? ??? ? ??? ??? ??????. ? ???? ? ?? ??? ??? ??? ?? 24??? ?? ? ?? ??????. ??? ???? ?? ? ?? ??? ?? ?? ??? ??????.

```
[edit policy-options]
policy-statement 24bit-filter {
    term acl20 {
        from {
            route-filter 0.0.0.0/0 upto /24;
        }
        then next policy;
    }
    then reject;
}
```

□ □□□□ route-filter 0.0.0.0/0 upto /24 accept□(□) □□□□, □□□□ □□□□ □□ □□□□ export □□ □□ □□□ □□□ □□□□ □□□□.

□□ □ then reject□□ □□□ □□, 24□□□□ □ acl20□□□□ □□□□ □□□□. □□□ □□□ □ □□ □□□□□ □□□□□□ then reject□□ □□□□ □□ □□ □ □□□ □□□□ □□□□□.

PIM □□□□□ □□□ Join □□

□□□ □□ □□ □□□□ □□ PIM(Protocol Independent Multicast) □□□□□ □□□ join□ □□□□ □□ □□□ □□□ □□□□□.

```
[edit]
policy-options {
    policy-statement join-filter {
        from {
            neighbor 10.14.12.20;
            source-address-filter 10.83.0.0/16 orlonger;
        }
        then reject;
    }
}
```

PIM □□□ □□

□□□□□□ □□ □□ □□□□ □□ PIM □□□□ □□□□ □□ □□□ □□□ □□□□□.

```
[edit]
policy-options {
    policy-statement join-filter {
        from {
            interface so-1/0/0.0;
            source-address-filter 10.83.0.0/16 orlonger;
        }
        then reject;
    }
}
```

□□□ □□ □□□ □□ □□□□ PIM□ □□□□□.

- interface—join□ □□□ □□□□□
- neighbor—join□ □□□ □□
- route-filter—□□ □□

- source-address-filter—join□ □□□□ □□ □□

PIM □□□□ □□□□ PIM join □□ □□□□□ □□ □□□ □□□ Junos OS □□□□□ □□□□ □□□ □□□□ □□□□□□.

□□ □□ □ □□ □□ □□□□ □□ □□□□ □□□□ □□ IPv4 □□ □□

□□ □□□□ 10.1.0.0/24□□ □ □□ □□□□ 0~14 □□□ □□□ □□ IPv4 □□□ □□□□□.

```
[edit]
policy-options {
    policy-statement from_customer_a {
        term term_1 {
            from {
                route-filter 10.1.0.0/24 address-mask 255.255.241.0;
            }
            then {
                ...
                reject;
            }
        }
    }
}
```

□□□ □□ □□ term_1□ □□ □□□ □□□ □□ □□ IPv4 □□ □□□ □□□□□.

- 10.1.0.0/24
- 10.1.2.0/24
- 10.1.4.0/24
- 10.1.6.0/24
- 10.1.8.0/24
- 10.1.10.0/24
- 10.1.12.0/24
- 10.1.14.0/24

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- □□□□ □□ □□ □ □□□□ □□□ 1111 1111 1111 1111□□□. □, □□ □ □□□□ 10.1□ □□ □□ □□ □□ □□□ □□□ □□□□□.

- [illegible] 1111 0001[illegible]. [illegible], [illegible] 15([illegible])[illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible].
- [illegible] 24([illegible])[illegible]. [illegible], [illegible] 24[illegible] [illegible] [illegible] [illegible] [illegible].

[illegible], [illegible] 10.1.8.0/24([illegible] 0000 1010 0000 0001 0000 1000)[illegible] [illegible].

- [illegible] [illegible], [illegible] [illegible] 0000 1010 0000 0001 0000 0000[illegible].
- [illegible] [illegible] 0000 1010 0000 0001 0000 0000[illegible].
- AND [illegible] [illegible] [illegible].
- [illegible] 24[illegible]), [illegible].

[illegible], [illegible] 10.1.3.0/24 (binary 0000 1010 0000 0001 0000 0011)[illegible] [illegible].

- [illegible] [illegible] 0000 1010 0000 0001 0000 0001[illegible].
- [illegible] 0000 1010 0000 0001 0000 0000[illegible].
- AND [illegible]([illegible]), [illegible].

[illegible] IPv4 [illegible]

10.*.1/24 [illegible] 10.*.1. */32 [illegible] IPv4 [illegible].

```
[edit]
policy-options {
    policy-statement from_customer_b {
        term term_2 {
            from {
                route-filter 10.0.1.0/24 address-mask 255.0.255.0;
                route-filter 10.0.1.0/32 address-mask 255.0.255.0;
            }
            then {
                ...
                reject;
            }
        }
    }
}
```

[illegible] `10.0.1.0/24 address-mask 255.0.255.0`[illegible] 10.*.1/24 [illegible] IPv4 [illegible]. [illegible] [illegible] 24[illegible], [illegible].

□□ □□ □□ □□ 10.0.1.0/32 address-mask 255.0.255.0□ 10.*.1. */32 □□□ □□ IPv4 □□ □□□ □□□□□. □□□ □□□ □□□ □□□ 32□□□□ □□, □ □□□ □ □□ □□□□□ □□ □□ □□□ □ □□□□.

Longest-Match □□□ □□ □□□ □□ □□ □□

□ □□□ longest-match □□□ 2□□ address-mask □□ □□□ □□□□ □□ □□□ □□□ □□□□□ □□□□□. □□□□ □□□ □□ □□ term_3□ □ □□ □□ □□□ □□□□□□□.

```
[edit]
policy-options {
    policy-statement from_customer_c {
        term term_3 {
            from {
                route-filter 10.0.1.0/24 address-mask 255.0.255.0;
                route-filter 10.0.2.0/24 address-mask 255.240.255.0;
            }
            then {
                ...
            }
        }
    }
}
```

□□ IPv4 □□ □□ □□ 10.1.1.0/24□ □□ □□ term_3□ □□□ □□ □□□ □□ □□□□□□□ □□□□□□.

1. □□□ □□ □□ term_3□ □□ longest-match □□ □□□□ 2□□ □□ □□□, □ 10.0.1.0/24 address-mask 255.0.255.0□ □□ □□□ 1 □□ 10.0.2.0/24 address-mask 255.240.255.0□ □□ □□□ 1□□ □□□□□. □□□ □□ □□ □ □□□ □□□ □□ □□□ □□□ □ longest-prefix □□□ □□□ □□ *netmask-value*□□ □□□ □□ □□ □□ □□ □□ *destination-prefix*□□□□□.

   - □ □□ □□ □□ □□ □□□ □□, □□□□ □□ 8□□ □□ □□ □□□ □□□□ □□ □□□ longest-match □□ □□□ 10.0.0.0/8□□□.
   - □ □□ □□ □□ □□ □□□ □□, □□□□ □□ 12□□ □□ □□ □□□ □□□□ □□ □□□ longest-match □□ □□□ 10.0.0.0/12□□□.

   □□ □□ □□ 10.1.1.0/24□ □□, longest-match □□□ □□ □□ □□ □□ 10.0.2.0/24 address-mask 255.240.255.0□ □□□□ □ □ □□ 10.0.0.0/12□ □□□□□.

2. □□ □□ □□ □□□ □□ term_3□□ longest-match □□□□ □□□□□□□, □□ □□ □□□ □□ □□ □□ □□ 10.0.2.0/24 address-mask 255.240.255.0□ □□ □□□□□.

   a. □□ IPv4 □□ □□ 10.1.1.0/24□ □□□□□ □□ □□□□ □ 255.240.255.0□ 10.1.1.0/24□ □□□□□. □□□ 10.0.1.0□□ □.

   b. □□□ □□ □□□ □□ 10.0.2.0/24□ □□□□□ □□ □□□□ □ 255.240.255.0□ 10.0.2.0/24□ □□□□□. □□□ 10.0.2.0□□ □.

c. ??? ????, ?? ?? ??? ??????. ?? ????? ?????, then ??? ????? ?? ??? ??? ????? ?????. ?? IPv4 ?? ??? ?? ?? ?? ??? ?? ????? ?????.

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?: OSPF? ?? ??? ????? ?? ??? ?????? ?? ?? ?? ?? | 329

?: ?? ??? ????? MED ?? | 335

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?? ?? ???? route-filter-list ???? ???? ?? ?? ?? ? ?? ?? ???? ????? ? ?? ????? ? source-address-filter-list ?? ?? ? ? ?????. ???? ?? ???? ?? ?? ????? ???? ?? ? ?? ???? ?? ???? ????? ? source-address-filter ?? ?? ??? route-filter ??????.

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?? ?? ?? ? ?? ?? ?? ???? ?????? MBGP(Multiprotocol BGP) ? MSDP(Multicast Source Discovery Protocol) ????? ?? ?? ???? ?????? ?? ???? ?????? ? ??????.

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route-filter-list

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?? ?? ?? IP? ????? ?? ??? ??

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□: □ □□□ IP □□ □□□□□□ □□□□□. L3VPN □□□□ □□, □□ □□□ □□ □□□ □□□ □ PE □□□□□ MPLS □□□ □ □□□□. L3VPN□□ □□ □□ □□ □□ □□ □□□□ □□□□□ □□□ □□□□□□ vt- □□□□□□ □□ vrf-table-label □□□ □□□ □ □□□□.

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□□ □□ □□ IP□ □□□□ □□ □□□ □□ | 298

vrf-table-label

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□□□ □□□□□ □□□□ □□□□ □□□ □□□ □□□□□ □□ □□□□ □□ □□ □□ □□(ECMP) □□ □□□□, □□□ □□□ □□□□ □□ □□□□ □□□□ □□ □□□ □□□□ □□ □□□ □□ □□□ □□□□ □□□ □□□□ □□□□ □□. □ □□□ □□□ □□□□□ □□□□□ □□□□ □□□□ □□ □□□□ □□□□ □□ □□□ □□□ □□□□ □□□□□ □□□ □□□□ □□ □□□□ □□□□ □□ □□□ □□□ □□□□ □□□□□.

□□ □ □□ □□ □□ □□□□ □□□□□ □□□ □□□□□ □□□□□ ECMP □□ AE(Aggregated Ethernet) □□□□ □□□□□. □□□□□ □□ PE □□□□ □□□□□. IPv4() □ IPv6(inetinet6) □□□□ □□□□ □□□□□.

□ □□□ □□□□ □□ □□□ □□□ □□□□ □□□□.

□: □ □□□ IP □□ □□□□□□ □□□□□. L3VPN □□□□ □□, □□ □□□ □□ □□□ □□□ □ PE □□□□□ MPLS □□□ □ □□□□. L3VPN□□ □□ □□ □□ □□ □□ □□□□ □□□□□ □□□ □□□□□□ vt- □□□□□□ □□ vrf-table-label □□□ □□□ □ □□□□.

□□ □□ □□ IP□ □□□□ □□ □□□□ □□□□□ □□ □□ □□ □□□ □ □□□ □□□ □□□ □□□ □□ □□ □□□ □□□□□. □□ □□ □□ □□□ □□□ □□ load-balance destination-ip-only □□ □□□ □□ □□ □□□ load-balance source-ip-only □□□□□.

1. □□ □ □□ IP □□ □□ □□□□ □□□ □ □□□ □□□ □□ □□□ □□□ □□□□□ [edit forwarding-options enhanced-hash-key] □□ □□□ □□ □□ □□ source-destination-only-load-balancing □□ □□□ □□□ □□□□□.

```
[edit forwarding-options enhanced-hash-key]
source-destination-only-load-balancing {
    family inet {
```

```
        prefix-length prefix-length;
    }
    family inet6 {
        prefix-length prefix-length;
    }
}
```

2. ?? ?? ?? IP?? ???? ?? ???? ????? ??? ??? ????? [edit policy-options policy-statement *policy-name*] ?? ?? ? ?? ? ?? ?? destination-ip-only ? ?? ??? ?????source-ip-only.

```
[edit policy-options policy-statement policy-name]
term term-name {
    from {
        route-filter filter-spec'
    }
    then {
        load-balance (source-ip-only | destination-ip-only);
    }
}
```

?: source-ip-only ? destination-ip-only ?? ??? ??? ???? ?? ??? ? ????. ?? ?? ??? ?? ???? ?? ? ?????. ??? ?? ???? ? ?? ??? ????? ?? ??? ???? ???? ?? ?? ??? ???? ? ?? ?? ??? ???? ?. ?? ?? ???? ???? destination-ip-only ????? ???? ?(?) ??????source-ip-only.

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> *MX ??? 5G ???? ??? ????? VPLS ?? ??? ??*
>
> ?? ?? ?? IP? ???? ?? ??? ?? | 297
>
> *?????? ??? ??????? ????? ?? ??? ??*

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```
[edit policy-options]
policy-statement RouteFilter-A {
    term RouteFilter-1 {
        from {
            route-filter 10.0.0.0/16 prefix-length-range /22-/24;
            route-filter 10.0.0.0/8 orlonger;
        }
        then accept;
    }
    term default {
        then reject;
    }
}
```

□□□ 10.0.0.0/8 orlonger □□□□ □□□ □□□□□ 10.0.0.0/16 prefix-length-range /22-/24 . □, □□□□ 8□□ □□□ □□□ 10.0.0.0 □□□□ 22□□□□ 24□□ □□□ □□□ □□ □□□□.

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10.0.0.0/18 □□ □□□ □□□ □□□□□RouteFilter-1. □(□) □□ 10.0.0.0/810.0.0.0/18 □□ □□□ 10.0.0.0/16 □□□ □ □□ □□□□ □□ □□□□ □□□□□. □□□□, □□□ □□□ □□□□ □□ □□□ 10.0.0.0/18 □□□ prefix-length-range /22-/24 □□□□□. □□□ □□□□ RouteFilter-1 □□ □□□ □□□□ □□□ □□ □□□ □□ □□□ □□□□□. □□□ 10.0.0.0/18 □□ □□□ □□ □□□□□.

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```
[edit policy-options]
policy-statement RouteFilter-A {
    term RouteFilter-1 {
        from {
            route-filter 10.0.0.0/16 prefix-length-range /22-/24;
        }
        then accept;
    }
    term RouteFilter-2 {
        from {
            route-filter 10.0.0.0/8 orlonger;
        }
        then accept;
    }
    term default {
        then reject;
    }
}
```

10.0.0.0/18 □□ □□□ □□□ □□ □□□ □□ RouteFilter-1 □□□□ □ RouteFilter-2 □□□ □□□□ □□□ □□□ □□□□□(10.0.0.0/8□ □□ □ □□ □□□□ orlonger □□□ true□). □ □□ □□□ □□□□ □□ □□ □□ □□□ □□□□ □□□ □□ □□□ □□□ □□□□ □ □ □□ □□□ □□□□ □□□ □. □ □□□ □□ □□ □□□ □ □□□□ □□□□.

one-term-per-route-filters □□ □□□ □□□ □□□ □ □ □□□□ □□□□□. □□□□ □□ □□ □□□ □□ □□□ □□□□□ □□ □□□□ □□□□□.

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```
[edit policy-options]
policy-statement RouteFilter-A {
    defaults {
        route-filter walkup;
    }
    term RouteFilter-1 {
        from {
            route-filter 10.0.0.0/16 prefix-length-range /22-/24;
            route-filter 10.0.0.0/8 orlonger;
        }
        then accept;
    }
    term default {
        then reject;
    }
}
```

□□ □□ □□□ 10.0.0.0/18 □ □□ □ RouteFilter-A□ □□ □□□ □ □□□□□.

□□ □□□ □□□ □□□ □□ □□□□□. □□□ □□□□□ □(10.0.0.0/18□) □□ 10.0.0.0/8□□ □□□ □ □□ □□□□ □□ □□□□ □□□□□ 10.0.0.0/16. □□□ □□□□□ □□□ □□□ □□□□ □□□□ □ □□□ 10.0.0.0/18prefix-length-range /22-/24 □□□□□. □□□ □□□□ □□□ □□ "□□ □"□□ □□□□ □ □□□□ 10.0.0.0/8 □□ □□□ □□□□□. □ orlonger □□ □□□ □ □□□ □□□□□ □□□ □□□ RouteFilter-1 □□ □ □□□□.

□□ □□□□ (BGP □□□ □□) □□□ □ □□□□ **show route protocol bgp 10.0.0.0/18** . □□□□ □□□ □□□ □□ □□□□.

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?: [edit policy-options default route-filter] ?? ????? ??? ??? ???walkup, ?????? ?? ??? "no walkup"?? ??????. ???? ?? ??? ?? ?? ? [edit policy-options policy-statement default route-filter] ? ????? ?? no-walkup ?? ?? ??? walkup ? ?????. ???? ????? ?? ????? ?? ?? ????? ????(?? ??? ?? walkup) ?? ????? ????? ???(?? ??? ?? no-walkup)? ??? ? ?????. ???? ?? ????? ??? ??? ? ?? ? walkup ?????

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user@host> set policy-options defaults route-filter walkup

□□ □□□ □□□□□ □□□ □□□□□□ walkup □□□ □□□□□□ □□□□□□.

user@host> set logical-systems *logical-system-name* policy-options defaults route-filter walkup

□□□ □□□□□ □□ □□□ walkup □□ no-walkup □□□ □□□ □□□□□□.

user@host> set policy-options policy-statement *policy-statement-name* defaults route-filter [no-walkup | walkup]

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user@host> set logical-systems *logical-system-name* policy-options policy-statement policy-statement-name defaults route-filter [no-walkup | walkup]

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2	(□□)	walkup	□□□□□ □ □□□ □□ □□□□□ □□□□□.
3	(□□)	no-walkup	□□□□□ □□(□□ □□)□ □□ □□□□□ □□□□□ □□ □□.
4	walkup	(□□)	□□□□□ □□ □□□ □□ □□□□□ □□□□□.
5	walkup	walkup	□□□□□ □□ □□□ □□ □□□□□ □□□□□.
6	walkup	no-walkup	□□□□□ □ □□□ □□□□□ □□□□□ □□□□□ □□□□□.

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- □□ #1: □□ □□ □□□□ □□□□ □□ □□□ □□□□□. □□□□□□□ □□□□ □□ □□ □□□□ □□□□□ □□□□. □□□ □□□ □□□□ □□ □□□ □□□ □□. □□ □□□□□ □□ □□ □□□□ □□□□ □□□□.

- ?? #2: ?? ?? ????? ?????? ?????? ???, ?? RouteFilter-Case2?? ??? ?? ??? ???????. ?? ?? ????? ? ????? ??? ??.

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  1. ? ?? ??? ?? ????? ??? ??? ???????.

     ```
     [edit policy-options]
     user@host# set policy-statement RouteFilter-Case2 defaults route-filter walkup
     ```

  2. ?? ??? ??? ??????(????? ? ??? ?? ??? ???).

     ```
     [edit policy-options]
     user@host# set policy-statement RouteFilter-Case2 term ...
     ```

  3. ??? ?????? ?? ?? ??????.

- ?? #3: ?? ??? walkup ?????? ?????? ??? no-walkup , ?? RouteFilter-Case3?? ??? ?? ??? ???????. (? ??? ???? ? ?? ????? ????? ????? ?? ??? ??? ??? ?? ??? ??? ????? ?????? ????????? ?? ??? ?????? ?????.)

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  1. ? ?? ??? no-walkup ?? ??? ??? ???????.

     ```
     [edit policy-options]
     user@host# set policy-statement RouteFilter-Case3 defaults route-filter no-walkup
     ```

  2. ?? ??? ??? ??????(no-walkup ? ??? ???).

     ```
     [edit policy-options]
     user@host# set policy-statement RouteFilter-Case3 term ...
     ```

  3. ??? ?????? ?? ?? ??????.

- ?? #4: ?? ??? walkup ?????? ???????, ?? RouteFilter-Case4?? ??? ????? ????? ?????? ?????. ??? ????????? ? ? ? ????? ?? ??? walkup ??????.

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1. □ □□□ □□ □□□□□ □□□ □□□ □□□□□□□.

```
[edit policy-options]
user@host# set defaults route-filter walkup
```

□: □□ □□□ □□□ □□□ □□ □□ walkup □□ □□walkup□ □□ [edit logical-systems *logical-system-name* policy-options defaults] □□ □□□□ □□ [edit policy-options defaults] □□ □□ □□□ □□□□□.no-walkup

2. □□ □□ RouteFilter-Case4 □ □□□ □□□ □□□□□(□□□ □ □□□ □□□).

```
[edit policy-options]
user@host# set policy-statement RouteFilter-Case4 term ...
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3. □□□ □□□□□ □□ □□ □□□□□.

- □□ #5: □□ □□□ walkup □□□□□ □□□□□, □□ RouteFilter-Case5□□ □□□ □□ □□□ □□□□□□. □ □□□ □□□□ □□□ □□ □ □□□ (□□□□ □□□□□□ □□□□ □□□□), □□□ □□ □□ □□ □□□□ □□□ □□□□ □□□□□□ □ □□□□ □□ □□ □□□□ □□□□□.

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1. □ □□□ □□ □□□□□ walkup □□□ □□□□□□.

```
[edit policy-options]
user@host# set defaults route-filter walkup
```

□: □□□ □□□□ □□ [edit logical-systems *logical-system-name* policy-options defaults] □□ □□□□ □□ [edit policy-options defaults] □□ □□ □□□ □□□□□.

2. □□ □□ RouteFilter-Case5 □□□□ □□□ □□□□□□ walkup (walkup □ □□□ □□□).

```
[edit policy-options]
user@host# set policy-statement Route-Filter-Case5 defaults route-filter walkup
```

3. ?? ?? RouteFilter-Case5 ? ??? ??? ??????(????? ? ??? ???).

```
[edit policy-options]
user@host# set policy-statement RouteFilter-Case5 term ...
```

4. ??? ?????? ?? ?? ??????.

- ?? #6: ?? ??? walkup ?????? ???????, ?? RouteFilter-Case6?? ??? ?? ??? no-walkup ???????. ?? ????? ?? ? ?? ??? ?? ?? ????? ????? ?????. ? ??? ?? ??? ?? ????? ?????? ?? ??? ?????? ????? ? ??????.

  ?????? ?? ?????? ?? ?? ????? ????? ?? ??? ?? ????? no-walkup ??? ??????:

1. ? ??? ?? ?????? ??? ??? ????????.

```
[edit policy-options]
user@host# set defaults route-filter walkup
```

> ?: ??? ????? ?? [edit logical-systems *logical-system-name* policy-options defaults] ?? ????? ?? [edit policy-options defaults] ?? ?? ??? ??????.

2. ?? ?? RouteFilter-Case6 ????? ?? ????? ????? ????? ????????? no-walkup (? ?????? ????? ????? ??).

```
[edit policy-options]
user@host# set policy-statement Route-Filter-Case6 defaults route-filter walkup
```

3. ?? ?? RouteFilter-Case6 ? ??? ??? ??????.

```
[edit policy-options]
user@host# set policy-statement RouteFilter-Case6 term ...
```

4. ??? ?????? ?? ?? ??????.

> ?: ?? ?? ??? ????? ??? ?? ????? ?? ????? ????? ??? ??? ?? ??? ????? ?????. BGP? ?? ???, ?? ?? neighbor ????? ? ??? ??? ? ?????.

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- □□ □□ □□□□ □□□ □□□□ Junos OS □□□ 15.2 □□□ □□□□ □□□.

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?? route-filter-list ?? ???? ??? ??? ??? ?? ??? ?? ?? ??? ?? ? ????. ?? ???? ??? [edit policy-options] ?? ???. ?? ?? ??? ?? ?? ??? ?? ??? ?? ? ???? ?? ?? from ?? ????? [edit policy-options policy-statement *policy-statement-name* term *term-name* from].

? ??? ?? ?? ???? BGP ?? ??? 192.0.2.1?? ?? ??? ???? ????. ?? ?? ??? ??? show route receive-protocol bgp 192.0.2.1 ?????.

```
user@router> show route receive-protocol bgp 192.0.2.1
inet.0: 17 destinations, 18 routes (16 active, 0 holddown, 1 hidden)
  Prefix                                  Nexthop           MED     Lclpref         AS path
* 198.151.100.0/29          192.0.2.1                      103 I
* 198.151.100.8/29          192.0.2.1                      103 I
* 203.0.113.0/29            192.0.2.1                      103 I
* 203.0.113.8/29            192.0.2.1                      103 I
* 203.0.113.16/29           192.0.2.1                      103 I
```

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```
set policy-options route-filter-list rf-list-1 203.0.113.0/29 exact
set policy-options route-filter-list rf-list-1 203.0.113.8/29 exact
set policy-options route-filter-list rf-list-1 203.0.113.16/29 orlonger accept
set policy-options policy-statement rf-test-policy term term2 from route-filter 198.51.100.0/29
upto 198.51.100.0/30
set policy-options policy-statement rf-test-policy term term2 from route-filter 198.51.100.8/29
upto 198.51.100.8/30 accept
```

```
set policy-options policy-statement rf-test-policy term term2 from route-filter-list rf-list-1
set policy-options policy-statement rf-test-policy then reject
set protocols bgp group test-group import rf-test-policy
```

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- □□ rf-list-1 □□ □□ □□□ □□□□ □□□ □□ □□□□ □□□ □ □□□ □□□ □□□□.
- □□ □□ □ □□□ □□ □□ □□□ □□□□ □□□ □□ □□ rf-test-policy □□□□□.
- □□□□ □□□ □□□ rf-test-policy BGP□ □□□□□.

1. □□ □□□□ □□□ □□□ □ □□□ □□□ rf-list-1 □□ □□ □□□ □□□□□.

   ```
   [edit policy-options]
   user@router# set route-filter-list rf-list-1
   ```

2. □□□ rf-list-1□□□□ .

   □□□ □ □ □□□ □□□ □□□ □□□□. □ □□□ □□□ □□ □□□□ □□□□ □□ □□□□□.

   ```
   [edit policy-options]
   user@router# set route-filter-list rf-list-1 203.0.113.0/29 exact
   user@router# set  route-filter-list rf-list-1 203.0.113.8/29 exact
   user@router# set route-filter-list rf-list-1 203.0.113.16/29 orlonger accept
   ```

3. □□ □□ □ □□□ □□ □□ □□□ □□□□ □□□ □□ □□ rf-test-policy □□□□□.

   □ □□□ □□ □□ □□□: reject. □□ □□ □□ □ □□□ □□□ accept□□ □□ □□ □□ □□□ □□□□. □□ □□ □□ □□ □□ □□ □□□ □□□ □□□ □□□ □□□ □□ □□□□ □□□□ □□ □□□□□.

   ```
   [edit policy-options]
   user@router# set policy-statement rf-test-policy term term2 from route-filter 198.51.100.0/29
   upto 198.51.100.0/30
   user@router# set policy-statement rf-test-policy term term2 from route-filter 198.51.100.8/29
   ```

```
upto 198.51.100.8/30 accept
user@router# set policy-statement rf-test-policy term term2 from route-filter-list rf-list-1
user@router# set policy-statement rf-test-policy then reject
```

4. [illegible] BGP [illegible].

```
[edit protocols bgp group test-group]
user@router# set import rf-test-policy
```

[illegible]

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[illegible]

[illegible]

[illegible] [edit] [illegible]show policy-options route-filter-list *route-filter-list-name*.

[illegible]

```
[edit]
user@routershow policy-options route-filter-list rf-list-1
203.0.113.0/29 exact;
203.0.113.8/29 exact;
203.0.113.16/29 orlonger accept;
```

??

??? ??? ??? ?????? ?? ??????.

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?? ???? ????? ??????? ?????? ?? ????? ??? [edit] ??????show policy-options policy-statement *policy-statement-name*.

??

```
[edit]
user@router# show policy-options policy-statement rf-test-policy
from {
    route-filter 198.51.100.0/29 upto 198.51.100.0/30;
    route-filter 198.51.100.8/29 upto 198.51.100.8/30 accept;
     route-filter-list rf-list-1;
}
then reject;
```

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??? ?? ?? BGP ??????? ????? ????? ??????? ?????? ?? ????? ??? [edit] ??????show protocols bgp import.

??

```
[edit]
user@router# show protocols bgp import
import rf-test-policy;
```

??

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?? ????? ?? ?? ?? ????? ???? [edit] ????? commit ???? ??????? ? ? ?????.

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?? ???? ?? ? ????????, ?? ???? ????? show route receive-protocol bgp 192.0.2.1 ?? ?? ???? ???? ??????.

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```
user@router> show route receive-protocol bgp 192.0.2.1
inet.0: 14 destinations, 15 routes (13 active, 0 holddown, 1 hidden)
  Prefix                                        Nexthop           MED     Lclpref    AS path
* 198.151.100.8/29          192.0.2.1                            103 I
* 203.0.113.16/29           192.0.2.1                            103 I
```

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??? ???? ???? 5?? BGP ?? ? 3?? ?? ? rf-test-policy? ?? ??????? ??????. ?? ????? ?? ?? ???? ???? ?? ???? ???? ? ?? ???? ?? accept ? ??????. ?? ???? ? ???? policy-statement?? ?????????.

?? ??

> *route-filter-list*
>
> ???? ?? ?? ????? ????? ?? ?? ?? ? ?? ?? ?? ?? ?? | 297

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- ??? ???? ???
- Junos ?? ?? 13.3 ??

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- ???? ??? ??? ?? ?? ??? ?? ??
- ?? ?? ?? ??? ? ?? ?? ??? ?? ??? ???? ? ???

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[illegible]

[illegible] BGP[illegible]

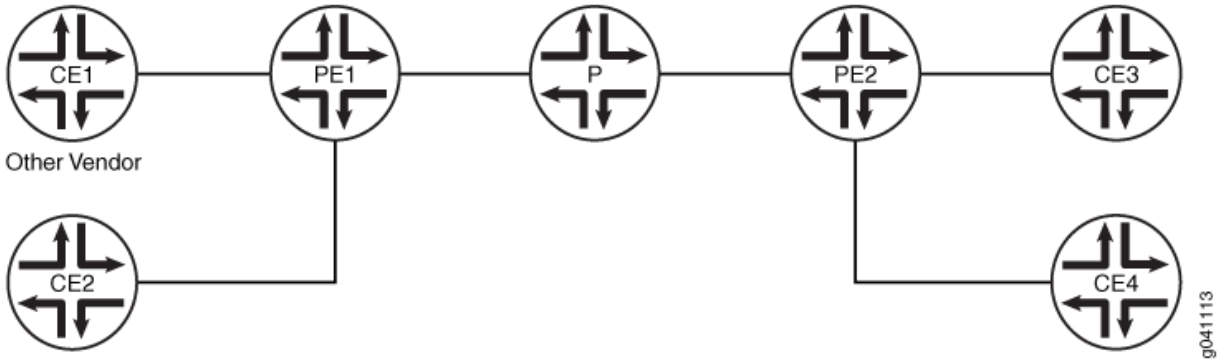
[illegible] walkup [illegible] "[illegible]"[illegible]

[illegible] no-walkup [illegible]

[illegible]

[illegible] 25 [illegible] 315[illegible] CE1[illegible]

[illegible] 25: [illegible]



[illegible]

- 10.0.0.0/16
- 10.0.0.0/8

> [illegible]: 10.0.0.0/8 [illegible] RFC 1918 10.0.0.0/8 [illegible]

[illegible]

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CLI [illegible]

[illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] CLI [edit] [illegible] [illegible] [illegible].

[illegible] PE1

```
set policy-options defaults route-filter walkup
set policy-options policy-statement routeset1-import term prefixes1 from route-filter
10.0.0.0/16 prefix-length-range /22-/24
set policy-options policy-statement routeset1-import term prefixes1 from route-filter 10.0.0.0/8
orlonger
set policy-options policy-statement routeset1-import term prefixes1 then accept
set policy-options policy-statement routeset1-import term reject-the-rest then reject
set policy-options policy-statement import-route-filter-a term import-routes from protocol bgp
set policy-options policy-statement import-route-filter-a term import-routes from policy
routeset1-import
set policy-options policy-statement import-route-filter-a term import-routes then next policy
set policy-options policy-statement import-route-filter-a term all-others then reject
set policy-options policy-statement route-filter-a-export term all then reject
set protocols bgp group routeset1 type external
set protocols bgp group routeset1 neighbor 10.0.10.13 import import-route-filter-a
set protocols bgp group routeset1 neighbor 10.0.10.13 family inet unicast
set protocols bgp group routeset1 neighbor 10.0.10.13 export route-filter-a-export
set protocols bgp group routeset1 neighbor 10.0.10.13 peer-as 64506
```

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□□□ PE1□ □□□□ □□□□□ □□□□ □□□□ □□ □□ □□□ □ □□□ □□□□□ □□□ □□□□□.

1. □□□ □□□ □□□□ □□□□□.

```
[edit policy-options defaults]
user@PE1# set route-filter walkup
```

2. □□ routeset1-import□□□□ □□□ □□ □□ □□ □□□□□.

```
[edit policy-options]
user@PE1# set policy-statement routeset1-import term prefixes1 from route-filter 10.0.0.0/16
prefix-length-range /22-/24
user@PE1# set policy-statement routeset1-import term prefixes1 from route-filter 10.0.0.0/8
orlonger
user@PE1# set policy-statement routeset1-import term prefixes1 then accept
user@PE1# set policy-statement routeset1-import term reject-the-rest then reject
```

3. □□□□ □ □□□□ □□ □□ □□ □□ □□□ □□□□□.

```
[edit policy-options]
user@PE1# set policy-statement import-route-filter-a term import-routes from protocol bgp
user@PE1# set policy-statement import-route-filter-a term import-routes from policy routeset1-
import
user@PE1# set policy-statement import-route-filter-a term import-routes then next policy
user@PE1# set policy-statement route-filter-a-export term all-others then reject
```

4. BGP □□ □□□□ □□□□ □ □□□□ □□□ □□□□□.

```
[edit protocols bgp]
user@PE1# set group routeset1 type external
user@PE1# set group routeset1 neighbor 10.0.10.13 import import-route-filter-a
user@PE1# set group routeset1 neighbor 10.0.10.13 family inet unicast
```

```
user@PE1# set group routeset1 neighbor 10.0.10.13 export route-filter-a-export
user@PE1# set group routeset1 neighbor 10.0.10.13 peer-as 64506
```

□□

□□ □□□□ show protocols □ show policy-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□□.

```
user@PE1# show policy-options
    defaults {
        route-filter walkup;
    }

    policy-statement routeset1-import  {
    term prefixes1 {
        from {
            route-filter 10.0.0.0/16 prefix-length-range /22-/24;
            route-filter 10.0.0.0/8 orlonger;
        }
        then accept;
    }
    term reject-the-rest {
        then reject;
    }
}

policy-statement import-route-filter-a {
    term import-routes {
        from {
            protocol bgp;
            policy routeset1-import;
        }
        then next policy;
    }
    term all-others {
        then reject;
    }
}
policy-statement route-filter-a-export {
    term all {
        then reject;
```

```
    }
}
```

```
user@PE!# show protocols bgp
group routeset1 {
    type external;
    neighbor 10.0.10.13 {
        import import-route-filter-a;
        family inet {
            unicast;
        }
        export router-filter-a-export;
        peer-as 64506;
    }
}
```

□□□□ □□□□ □□□□□ □□ □□□□□ commit□(□) □□□□□□.

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□□□ 10.0.0.0/8 orlonger □□□ □□□ □□□□ 10.0.0.0/16 prefix-length-range /22-/24 □□□□. □, □□□□ 8□□ □□□ □□□ 10.0.0.0 □□□□ 22□□□□ 24□□ □□□ □□□ □□ □□□□. walkup □□□ □□□□□ □□□ □ 10.0.0.0/16 □□ □□□ □□□□ □□□ □□□ □□ □. □□□ □□□ □□□□ □□□□ □□□□ □□□ □ □□ □□□ □□ 10.0.0.0/16 □□□ □□□□.

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?? ???? *show route protocol* bgp 10.0.0.0/16 ??? ??????. ??? ??? ??? 10.0.0.0/16 ??????.

```
user@PE1>show route protocol bgp 10.0.0.0/16
inet.0: 520762 destinations, 520764 routes (520760 active, 0 holddown, 2 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.0/16       *[BGP/170] 01:07:37, localpref 100
                        AS path: 64506, I, validation-state:  unverified
                    > to 10.0.100.13 via xe-0/2/0.0
```

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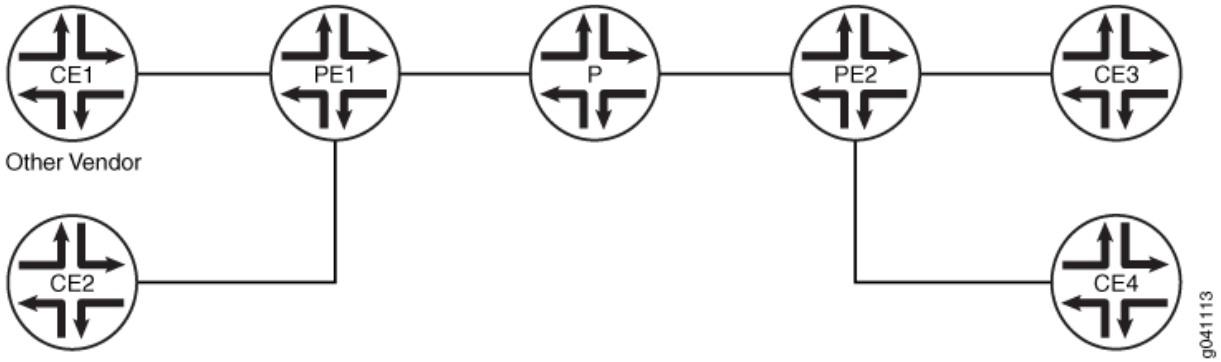

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- 10.0.0.0/16
- 10.0.0.0/8

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□□□□ PE1

```
set policy-options policy-statement routeset1-import defaults route-filter walkup
set policy-options policy-statement routeset1-import term prefixes1 from route-filter
10.0.0.0/16 prefix-length-range /22-/24
set policy-options policy-statement routeset1-import term prefixes1 from route-filter 10.0.0.0/8
orlonger
set policy-options policy-statement routeset1-import term prefixes1 then accept
set policy-options policy-statement routeset1-import term reject-the-rest then reject
set policy-options policy-statement import-route-filter-a term import-routes from protocol bgp
set policy-options policy-statement import-route-filter-a term import-routes from policy
routeset1-import
set policy-options policy-statement import-route-filter-a term import-routes then next policy
set policy-options policy-statement import-route-filter-a term all-others then reject
set policy-options policy-statement route-filter-a-export term all then reject
set protocols bgp group routeset1 type external
set protocols bgp group routeset1 neighbor 10.0.10.13 import import-route-filter-a
set protocols bgp group routeset1 neighbor 10.0.10.13 family inet unicast
set protocols bgp group routeset1 neighbor 10.0.10.13 export route-filter-a-export
set protocols bgp group routeset1 neighbor 10.0.10.13 peer-as 64506
```

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1. □□ routeset1-import□□□□ □□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement routeset1-import defaults]
user@PE1# set route-filter walkup
```

2. □□ routeset1-import□□□□ □□□ □□ □□ □□ □□□□□.

```
[edit policy-options ]
user@PE1# set policy-statement routeset1-import term prefixes1 from route-filter 10.0.0.0/16
prefix-length-range /22-/24
user@PE1# set policy-statement routeset1-import term prefixes1 from route-filter 10.0.0.0/8
orlonger
user@PE1# set policy-statement routeset1-import term prefixes1 then accept
user@PE1# set policy-statement routeset1-import term reject-the-rest then reject
```

3. □□□□ □ □□□□ □□ □□ □□ □□ □□□ □□□□□.

```
[edit policy-options]
user@PE1# set policy-statement import-route-filter-a term import-routes from protocol bgp
user@PE1# set policy-statement import-route-filter-a term import-routes from policy routeset1-
import
user@PE1# set policy-statement import-route-filter-a term import-routes then next policy
user@PE1# set policy-statement route-filter-a-export term all-others then reject
```

4. BGP □□ □□□□ □□□□ □ □□□□ □□□ □□□□□.

```
[edit protocols bgp]
user@PE1# set group routeset1 type external
user@PE1# set group routeset1 neighbor 10.0.10.13 import import-route-filter-a
user@PE1# set group routeset1 neighbor 10.0.10.13 family inet unicast
user@PE1# set group routeset1 neighbor 10.0.10.13 export route-filter-a-export
user@PE1# set group routeset1 neighbor 10.0.10.13 peer-as 64506
```

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□□ □□□□ show protocols □ show policy-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□□.

```
user@PE1# show policy-options
policy-statement routeset1-import  {
    defaults {
        route-filter walkup;
    }
    term prefixes1 {
```

```
        from {
            route-filter 10.0.0.0/16 prefix-length-range /22-/24;
            route-filter 10.0.0.0/8 orlonger;
        }
        then accept;
    }
    term reject-the-rest {
        then reject;
    }
}

policy-statement import-route-filter-a {
    term import-routes {
        from {
            protocol bgp;
            policy routeset1-import;
        }
        then next policy;
    }
    term all-others {
        then reject;
    }
}
policy-statement route-filter-a-export {
    term all {
        then reject;
    }
}
```

```
user@PE!# show protocols bgp
group routeset1 {
    type external;
    neighbor 10.0.10.13 {
        import import-route-filter-a;
        family inet {
            unicast;
        }
        export router-filter-a-export;
        peer-as 64506;
```

```
    }
}
```

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□□□ 10.0.0.0/8 orlonger □□□ □□□ □□□□ 10.0.0.0/16 prefix-length-range /22-/24 □□□□. □, □□□□ 8□□ □□□ □□□ 10.0.0.0 □□□□ 22□□□□ 24□□ □□□ □□□ □□ □□□□. □□□ □□ □□□ walkup □□□ □□□□□ □□□ □ 10.0.0.0/16 □□ □□□ □□□□ □□□ □□□ □□□. □□□ □□□ □□□□ □□□□ □□□□ □□□ □ □□ □□□ □□ 10.0.0.0/16 □□□ □□□□.

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□□ □□□□ *show route protocol* bgp 10.0.0.0/16 □□□ □□□□□. □□□ □□□ □□□ 10.0.0.0/16 □□□□□.

```
user@PE1>show route protocol bgp 10.0.0.0/16
inet.0: 520762 destinations, 520764 routes (520760 active, 0 holddown, 2 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.0/16       *[BGP/170] 01:07:37, localpref 100
                        AS path: 64506, I, validation-state:  unverified
                    > to 10.0.100.13 via xe-0/2/0.0
```

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OSPF ??? ?? ???????? ????? ????? ??? ?? ??? ??????? ??? ????? ?? ??? ? ?????. Junos OS ??? 9.3 ?????? OSPF ????? ??? ??? ????? ?? ??, ?? ?? ???? ?? ???? ??? ? ?????. OSPF ?????? ????? ?? ??? ?????? ?? ???? ?? ????? ?? ??????? ? ???? ?? ?? ???? ?? ?? ?? ????? ????????.

OSPF ????? ??? ?? ??? ?????? OSPF ?? ??? ?????? ?? ???? ? ?????. OSPF ????? ??? ????? `reject` ??? ??? ?? ?? ??? ????? ?? ?? `reject` ??? ????? ??? ??????. ?????? ??? ??? ?? ?? ?? ??? ??? ????? ??????. ? ??? OSPF ??? ??? ??? ????? ????? ??? ???, ? ????? ????? ????? ??????.

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? ??? ??? ?????? ?????? ? `fe-1/1/0` ?? ?????? ????? ?? 0.0.0.0 `fe-0/1/0` ? ?????. ospf-import?? ????? ??? ??? ????? OSPF? ?? ??? ????? ?? ???? ??????. ??? ????? ??? ??? ????? ??? ?? ?? ????? ??? ????? ??????. ????? ?? ? `192.0.2.0/24 orlonger` ?? ??? high??? ?? ??????. ????? ??? `198.51.100.0/24 orlonger` ?? ??? medium??? ??? ??? ??. ????? `203.0.113.0/24 orlonger` ??? ?? ??? ??? ????? low??????. ?? ?? ????? ??? OSPF? ??????.

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```
[edit]
set interfaces fe-0/1/0 unit 0 family inet address 192.168.8.4/30
set interfaces fe-0/1/0 unit 0 family inet address 192.168.8.5/30
set policy-options policy-statement ospf-import term t1 from route-filter 203.0.113.0/24 orlonger
set policy-options policy-statement ospf-import term t1 then priority low
set policy-options policy-statement ospf-import term t1 then accept
set policy-options policy-statement ospf-import term t2 from route-filter 198.51.100.0/24
orlonger
set policy-options policy-statement ospf-import term t2 then priority medium
set policy-options policy-statement ospf-import term t2 then accept
set policy-options policy-statement ospf-import term t3 from route-filter 192.0.2.0/24 orlonger
set policy-options policy-statement ospf-import term t3 then priority high
set policy-options policy-statement ospf-import term t3 then accept
set protocols ospf import ospf-import
set protocols ospf area 0.0.0.0 interface fe-0/1/0
set protocols ospf area 0.0.0.0 interface fe-1/1/0
```

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1. ??????? ??????.

```
[edit]
user@host# set interfaces fe-0/1/0 unit 0 family inet address 192.168.8.4/30
user@host# set interfaces fe-0/2/0 unit 0 family inet address 192.168.8.5/30
```

2. ???????? OSPF? ????????.

?: OSPFv3? [edit protocols] ?? ?? ???? ?? ??????ospf3.

```
[edit]
user@host# set protocols ospf area 0.0.0.0 interface fe-0/1/0
user@host# set protocols ospf area 0.0.0.0 interface fe-0/2/0
```

3. OSPF? ?? ???? ????? ?? ???? ?????? ???? ??????.

```
[edit ]
user@host# set policy-options policy-statement ospf-import term t1 from route-filter
203.0.113.0/24 orlonger
user@host# set policy-options policy-statement ospf-import term t1 then priority low
user@host# set policy-options policy-statement ospf-import term t1 then accept
user@host# set policy-options policy-statement ospf-import term t2 from route-filter
198.51.100.0/24 orlonger
user@host# set policy-options policy-statement ospf-import term t2 then priority medium
user@host# set policy-options policy-statement ospf-import term t2 then accept
user@host# set policy-options policy-statement ospf-import term t3 from route-filter
192.0.2.0/24 orlonger
user@host# set policy-options policy-statement ospf-import term t3 then priority high
user@host# set policy-options policy-statement ospf-import term t3 then accept
```

4. OSPF? ???? ??????.

```
[edit]
user@host# set protocols ospf import ospf-import
```

5. [illegible].

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

[illegible]

, show policy-options[illegible] show protocols ospf [illegible] show interfaces[illegible]. [illegible].

```
user@host# show interfaces
fe-0/1/0 {
    unit 0 {
        family inet {
            address 192.168.8.4/30;
        }
    }
}
    fe-0/2/0 {
        unit 0 {
            family inet {
                address 192.168.8.5/30;
            }
        }
    }
```

```
user@host# show protocols ospf
import ospf-import;
area 0.0.0.0 {
    interface fe-0/1/0.0;
    interface fe-0/2/0.0;
}
```

```
user@host# show policy-options
policy-statement ospf-import {
    term t1 {
        from {
            route-filter 203.0.113.0/24 orlonger;
```

```
        }
        then {
            priority low;
            accept;
        }
    }
    term t2 {
        from {
            route-filter 198.51.100.0/24 orlonger;
        }
        then {
            priority medium;
            accept;
        }
    }
    term t3 {
        from {
            route-filter 192.0.2.0/24 orlonger;
        }
        then {
            priority high;
            accept;
        }
    }
}
```

```
user@host# show protocols ospf
import ospf-import;
area 0.0.0.0 {
    interface fe-0/1/0.0;
    interface fe-0/2/0.0;
}
```

OSPFv3 □□□ □□□□□ , show policy-options□ show protocols ospf3 □□□ □□□□□show interfaces.

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OSPF ??? ?????? ??? ?? ?? ??

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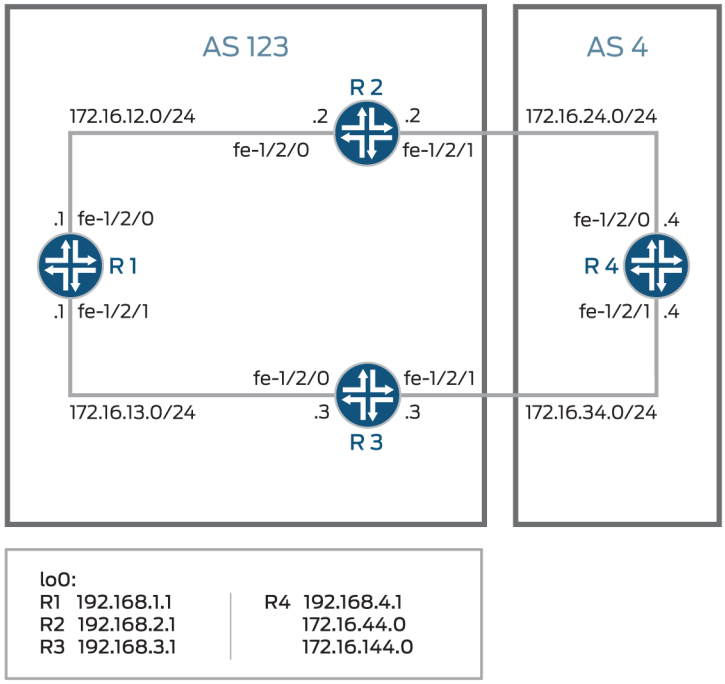
BGP ???? ?????? ??? MED ???? ???? route-filter ??? ?????? ?? ??? ?? ?????? `metric` .

?? 27 ??? 336 ?? ?? ?? ??? ?? AS(Autonomous System)? ?? ?? ???? ?? ???? ????? ?? ????.

?? 27: IBGP ?? ? ?? ?? ??? ?? ???? ????



???? R4?? ??? ???? ????????? ??? ?? ??? ??????? ????. ?? ???? ?????? ??? 172.16.44.0/32 ? 172.16.144.0/32???. ? ?? 172.16.144.0? ??? ?? ??? ?? ???? R3? MED ? 30? ???? ???? R4? ???? ??? ?????. 172.16.144.0? ?? MED ? 10? ???? 3? ??????. MED ? 20? ?? ???? ???? ???? R2? ??????.

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CLI □□ □□

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□□□□ R1

```
set interfaces fe-1/2/0 unit 1 family inet address 172.16.12.1/24
set interfaces fe-1/2/1 unit 2 family inet address 172.16.13.1/24
set interfaces lo0 unit 1 family inet address 192.168.1.1/32
set protocols bgp group internal type internal
set protocols bgp group internal local-address 192.168.1.1
set protocols bgp group internal export send-direct
set protocols bgp group internal neighbor 192.168.2.1
set protocols bgp group internal neighbor 192.168.3.1
set protocols ospf area 0.0.0.0 interface lo0.1 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.1
set protocols ospf area 0.0.0.0 interface fe-1/2/1.2
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 123
set routing-options router-id 192.168.1.1
```

□□□□ R2

```
set interfaces fe-1/2/0 unit 3 family inet address 172.16.12.2/24
set interfaces fe-1/2/1 unit 4 family inet address 172.16.24.2/24
set interfaces lo0 unit 2 family inet address 192.168.2.1/32
set protocols bgp group internal type internal
set protocols bgp group internal local-address 192.168.2.1
set protocols bgp group internal export send-direct
set protocols bgp group internal neighbor 192.168.1.1
set protocols bgp group internal neighbor 192.168.3.1
set protocols bgp group external type external
set protocols bgp group external export send-direct
set protocols bgp group external peer-as 4
set protocols bgp group external neighbor 172.16.24.4
set protocols ospf area 0.0.0.0 interface lo0.2 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.3
set protocols ospf area 0.0.0.0 interface fe-1/2/1.4
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
```

```
set routing-options autonomous-system 123
set routing-options router-id 192.168.2.1
```

???? R3

```
set interfaces fe-1/2/0 unit 5 family inet address 172.16.13.3/24
set interfaces fe-1/2/1 unit 6 family inet address 172.16.34.3/24
set interfaces lo0 unit 3 family inet address 192.168.3.1/32
set protocols bgp group internal type internal
set protocols bgp group internal local-address 192.168.3.1
set protocols bgp group internal export send-direct
set protocols bgp group internal neighbor 192.168.1.1
set protocols bgp group internal neighbor 192.168.2.1
set protocols bgp group external type external
set protocols bgp group external export send-direct
set protocols bgp group external peer-as 4
set protocols bgp group external neighbor 172.16.34.4
set protocols ospf area 0.0.0.0 interface lo0.3 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.5
set protocols ospf area 0.0.0.0 interface fe-1/2/1.6
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 123
set routing-options router-id 192.168.3.1
```

???? R4

```
set interfaces fe-1/2/0 unit 7 family inet address 172.16.24.4/24
set interfaces fe-1/2/1 unit 8 family inet address 172.16.34.4/24
set interfaces lo0 unit 4 family inet address 192.168.4.1/32
set interfaces lo0 unit 4 family inet address 172.16.44.0/32
set interfaces lo0 unit 4 family inet address 172.16.144.0/32
set protocols bgp group external type external
set protocols bgp group external export send-direct
set protocols bgp group external peer-as 123
set protocols bgp group external neighbor 172.16.34.3 export med-10
set protocols bgp group external neighbor 172.16.34.3 export med-30
set protocols bgp group external neighbor 172.16.24.2 metric-out 20
set policy-options policy-statement med-10 from route-filter 172.16.144.0/32 exact
set policy-options policy-statement med-10 then metric 10
set policy-options policy-statement med-10 then accept
```

```
set policy-options policy-statement med-30 from route-filter 0.0.0.0/0 longer
set policy-options policy-statement med-30 then metric 30
set policy-options policy-statement med-30 then accept
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 4
set routing-options router-id 192.168.4.1
```

□□□□ R1 □□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□*□ □□□□□□.

□□□□ R1 □□

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces fe-1/2/0 unit 1]
user@R1# set family inet address 172.16.12.1/24
[edit interfaces fe-1/2/1 unit 2]
user@R1# set family inet address 172.16.13.1/24
[edit interfaces lo0 unit 1]
user@R1# set family inet address 192.168.1.1/32
```

2. BGP□ □□□□□.

```
[edit protocols bgp group internal]
user@R1# set type internal
user@R1# set local-address 192.168.1.1
user@R1# set export send-direct
user@R1# set neighbor 192.168.2.1
user@R1# set neighbor 192.168.3.1
```

3. OSPF□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R1# set interface lo0.1 passive
```

```
user@R1# set interface fe-1/2/0.1
user@R1# set interface fe-1/2/1.2
```

4. ?? ??? ???? ??? ?????.

   ? ?????? ?? ??? ??? OSPF ?? ?? ??? ?? ??? ??? ???? ?? ? ????.

```
[edit policy-options policy-statement send-direct term 1]
user@R1# set from protocol direct
user@R1# set then accept
```

5. ??? ID ? AS(Autonomous System) ??? ?????.

```
[edit routing-options]
user@R1# set autonomous-system 123
user@R1# set router-id 192.168.1.1
```

??

?? ???? show interfaces, show protocols, show policy-options ? show routing-options ??? ???? ??? ?????. ?? ??? ??? ???? ???? ??? ? ?? ??? ???? ??? ???????.

```
user@R1# show interfaces
fe-1/2/0 {
    unit 1 {
        family inet {
            address 172.16.12.1/24;
        }
    }
}
fe-1/2/1 {
    unit 2 {
        family inet {
            address 172.16.13.1/24;
        }
    }
}
lo0 {
    unit 1 {
        family inet {
```

```
            address 192.168.1.1/32;
        }
    }
}
```

```
user@R1# show protocols
bgp {
    group internal {
        type internal;
        local-address 192.168.1.1;
        export send-direct;
        neighbor 192.168.2.1;
        neighbor 192.168.3.1;
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.1 {
            passive;
        }
        interface fe-1/2/0.1;
        interface fe-1/2/1.2;
    }
}
```

```
user@R1# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
```

```
user@R1# show routing-options
autonomous-system 123;
router-id 192.168.1.1;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□□□ R2 □□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□*□ □□□□□□.

□□□□ R2 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces fe-1/2/0 unit 3]
user@R2# set family inet address 172.16.12.21/24
[edit interfaces fe-1/2/1 unit 4]
user@R2# set family inet address 172.16.24.2/24
[edit interfaces lo0 unit 2]
user@R2# set family inet address 192.168.2.1/32
```

2. BGP□ □□□□□.

```
[edit protocols bgp group internal]
user@R2# set type internal
user@R2# set local-address 192.168.2.1
user@R2# set export send-direct
user@R2# set neighbor 192.168.1.1
user@R2# set neighbor 192.168.3.1
[edit protocols bgp group external]
user@R2# set type external
user@R2# set export send-direct
user@R2# set peer-as 4
user@R2# set neighbor 172.16.24.4
```

3. OSPF□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R2# set interface lo0.2 passive
user@R2# set interface fe-1/2/0.3
user@R2# set interface fe-1/2/1.4
```

4. □□ □□□ □□□□ □□□ □□□□□.

□ □□□□□□ □□ □□□□ □□□□ OSPF □□ □□ □□□□ □□ □□□□ □□□□ □□□□□ □□ □ □□□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R2# set from protocol direct
user@R2# set then accept
```

5. □□□ ID □ AS(Autonomous System) □□□□ □□□□□□.

```
[edit routing-options]
user@R2# set autonomous-system 123
user@R2# set router-id 192.168.2.1
```

□□

□□ □□□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□□ □□□□□ □□□□ □□□□□□. □□ □□□□ □□□□ □□□□□ □□□□□ □□□□ □ □□ □□□□ □□□□□ □□□□ □□□□□□□.

```
user@R2# show interfaces
fe-1/2/0 {
    unit 3 {
        family inet {
            address 172.16.12.2/24;
        }
    }
}
fe-1/2/1 {
    unit 4 {
        family inet {
            address 172.16.24.2/24;
        }
    }
}
lo0 {
    unit 2 {
        family inet {
            address 192.168.2.1/32;
        }
```

```
    }
}
```

```
user@R2# show protocols
bgp {
    group internal {
        type internal;
        local-address 192.168.2.1;
        export send-direct;
        neighbor 192.168.1.1;
        neighbor 192.168.3.1;
    }
    group external {
        type external;
        export send-direct;
        peer-as 4;
        neighbor 172.16.24.4;
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.2 {
            passive;
        }
        interface fe-1/2/0.3;
        interface fe-1/2/1.4;
    }
}
```

```
user@R2# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
```

```
    }
}
```

```
user@R2# show routing-options
autonomous-system 123;
router-id 192.168.2.1;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□□ R3 □□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□*□ □□□□□□.

□□□ R3 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces fe-1/2/0 unit 5]
user@R3# set family inet address 172.16.13.3/24
[edit interfaces fe-1/2/1 unit 6]
user@R3# set family inet address 172.16.34.3/24
[edit interfaces lo0 unit 3]
user@R3# set family inet address 192.168.3.1/32
```

2. BGP□ □□□□□.

```
[edit protocols bgp group internal]
user@R3# set type internal
user@R3# set local-address 192.168.3.1
user@R3# set export send-direct
user@R3# set neighbor 192.168.1.1
user@R3# set neighbor 192.168.2.1
[edit protocols bgp group external]
user@R3# set type external
user@R3# set export send-direct
user@R3# set peer-as 4
user@R3# set neighbor 172.16.34.4
```

3. OSPF□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R3# set interface lo0.3 passive
user@R3# set interface fe-1/2/0.5
user@R3# set interface fe-1/2/1.6
```

4. □□ □□□ □□□□ □□□ □□□□□.

□ □□□□□ □□ □□□ □□□ OSPF □□ □□ □□□ □□ □□□ □□□ □□□□ □□ □ □□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R3# set from protocol direct
user@R3# set then accept
```

5. □□□ ID □ AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R3# set autonomous-system 123
user@R3# set router-id 192.168.3.1
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R3# show interfaces
fe-1/2/0 {
    unit 5 {
        family inet {
            address 172.16.13.3/24;
        }
    }
}
fe-1/2/1 {
    unit 6 {
        family inet {
            address 172.16.34.3/24;
        }
```

```
    }
}
lo0 {
    unit 3 {
        family inet {
            address 192.168.3.1/32;
        }
    }
}
```

```
user@R3# show protocols
bgp {
    group internal {
        type internal;
        local-address 192.168.3.1;
        export send-direct;
        neighbor 192.168.1.1;
        neighbor 192.168.2.1;
    }
    group external {
        type external;
        export send-direct;
        peer-as 4;
        neighbor 172.16.34.4;
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.3 {
            passive;
        }
        interface fe-1/2/0.5;
        interface fe-1/2/1.6;
    }
}
```

```
user@R3# show policy-options
policy-statement send-direct {
    term 1 {
        from protocol direct;
```

```
        then accept;
    }
}
```

```
user@R3# show routing-options
autonomous-system 123;
router-id 192.168.3.1;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□□ R4 □□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□* □□□□□□.

□□□ R4 □□:

1. □□□ □□□□□□ □□□□□.

   ```
   [edit interfaces fe-1/2/0 unit 7]
   user@R4# set family inet address 172.16.24.4/24
   [edit interfaces fe-1/2/1 unit 8]
   user@R4# set family inet address 172.16.34.4/24
   [edit interfaces lo0 unit 4]
   user@R4# set family inet address 192.168.4.1/32
   user@R4# set family inet address 172.16.44.0/32
   user@R4# set family inet address 172.16.144.0/32
   ```

   □□□ R4□□ □□□ □□□ □□□□□□□ □□ □□ □□□ □□□□□ □□□ □□□.

2. □□ □□□ □□□ □□□ □□□□.

   □ □□□□□ □□ □□□ □□□ OSPF □□ □□ □□□ □□ □□□ □□□ □□□ □□ □ □□□.

   ```
   [edit policy-options policy-statement send-direct term 1]
   user@R4# set from protocol direct
   user@R4# set then accept
   ```

3. BGP□ □□□□□.

```
[edit protocols bgp group external]
user@R4# set type external
user@R4# set export send-direct
user@R4# set peer-as 123
```

4. □ □□ MED □□□ □□□□□.

```
[edit policy-options]
set policy-statement med-10 from route-filter 172.16.144.0/32 exact
set policy-statement med-10 then metric 10
set policy-statement med-10 then accept
set policy-statement med-30 from route-filter 0.0.0.0/0 longer
set policy-statement med-30 then metric 30
set policy-statement med-30 then accept
```

5. □ □□ EBGP □□ □□□□ □□□□, □ □□ MED □□□ □□□□ R3□ □□□□, MED □ 20□ □□□□ R2□ □□□□□.

```
[edit protocols bgp group external]
user@R4# set neighbor 172.16.34.3 export med-10
user@R4# set neighbor 172.16.34.3 export med-30
user@R4# set neighbor 172.16.24.2 metric-out 20
```

6. □□□ ID □ AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R4# set autonomous-system 4
user@R4# set router-id 192.168.4.1
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R4# show interfaces
fe-1/2/0 {
    unit 7 {
```

```
        family inet {
            address 172.16.24.4/24;
        }
    }
}
fe-1/2/1 {
    unit 8 {
        family inet {
            address 172.16.34.4/24;
        }
    }
}
lo0 {
    unit 4 {
        family inet {
            address 192.168.4.1/32;
            address 172.16.44.0/32;
            address 172.16.144.0/32;
        }
    }
}
```

```
user@R4# show protocols
bgp {
    group external {
        type external;
        export send-direct;
        peer-as 123;
        neighbor 172.16.24.2 {
            metric-out 20;
        }
        neighbor 172.16.34.3 {
            export [ med-10 med-30 ];
        }
    }
}
```

```
user@R4# show policy-options
policy-statement med-10 {
    from {
```

```
        route-filter 172.16.144.0/32 exact;
    }
    then {
        metric 10;
        accept;
    }
}
policy-statement med-30 {
    from {
        route-filter 0.0.0.0/0 longer;
    }
    then {
        metric 30;
        accept;
    }
}
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
```

```
user@R4# show routing-options
autonomous-system 4;
router-id 192.168.4.1;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

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- □□□□ R4□ □□□ □□□□ □□□□ □□□ □□ | 353

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□□□□ R1□□ □□□□ R4□□ □□ □□ □□

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□□ □□□ □□□□ R2□ □□□□□ □□□□□.

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□□ □□□□ show route protocol bgp □□□ □□□□□.

```
user@R1> show route protocol bgp
inet.0: 13 destinations, 19 routes (13 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.12.0/24       [BGP/170] 4d 01:13:32, localpref 100, from 192.168.2.1
                      AS path: I
                    > to 172.16.12.2 via fe-1/2/0.1
172.16.13.0/24       [BGP/170] 3d 05:36:10, localpref 100, from 192.168.3.1
                      AS path: I
                    > to 172.16.13.3 via fe-1/2/1.2
172.16.24.0/24       [BGP/170] 4d 01:13:32, localpref 100, from 192.168.2.1
                      AS path: I
                    > to 172.16.12.2 via fe-1/2/0.1
172.16.34.0/24       [BGP/170] 3d 05:36:10, localpref 100, from 192.168.3.1
                      AS path: I
                    > to 172.16.13.3 via fe-1/2/1.2
172.16.44.0/32     *[BGP/170] 00:06:03, MED 20, localpref 100, from 192.168.2.1
                      AS path: 4 I
                    > to 172.16.12.2 via fe-1/2/0.1
172.16.144.0/32 *[BGP/170] 00:06:03, MED 10, localpref 100, from 192.168.3.1
                      AS path: 4 I
                    > to 172.16.13.3 via fe-1/2/1.2
192.168.2.1/32       [BGP/170] 4d 01:13:32, localpref 100, from 192.168.2.1
                      AS path: I
                    > to 172.16.12.2 via fe-1/2/0.1
192.168.3.1/32       [BGP/170] 3d 05:36:10, localpref 100, from 192.168.3.1
                      AS path: I
                    > to 172.16.13.3 via fe-1/2/1.2
192.168.4.1/32     *[BGP/170] 00:06:03, MED 20, localpref 100, from 192.168.2.1
                      AS path: 4 I
                    > to 172.16.12.2 via fe-1/2/0.1
```

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□□ □□, □□□□ R4□ □□□□ □□□ □□ □□□ 172.16.144.0/32□ □□□ □□ □□□ □□ □□□□ R2□ □□□□ □□□□.
172.16.144.0/32□ □□ □□ □□□ □□□□ R3□ □□□□ □□□□.

□□□□ R4□ □□□ □□□□ □□□□ □□□ □□

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□□□□ R4□ □□□□ R2□ 20 □, □□□□ R3□ 30 □□ □□ □□□□ □□□□ □□□□ □□□ □□□□□.

□□

□□ □□□□ show route advertising-protocol bgp □□□ □□□□□.

```
user@R4> show route advertising-protocol bgp 172.16.24.2
inet.0: 11 destinations, 13 routes (11 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.24.0/24           Self                 20                 I
* 172.16.34.0/24           Self                 20                 I
* 172.16.44.0/32          Self                 20                 I
* 172.16.144.0/32      Self                 20                 I
* 192.168.4.1/32          Self                 20                 I
```

```
user@R4> show route advertising-protocol bgp 172.16.34.3
inet.0: 11 destinations, 13 routes (11 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.24.0/24           Self                 30                 I
* 172.16.34.0/24           Self                 30                 I
* 172.16.44.0/32          Self                 30                 I
* 172.16.144.0/32      Self                 10                 I
* 192.168.4.1/32          Self                 30                 I
```

□□

MED □□ □□□□ R4□ □ □□ EBGP □□ □□□□ □□□ MED □□ □□□□ □□□ □□□□□.

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?: MED ?? ??? IGP ???? ???? MED ???? ??

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BGP ?? ?? ??

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? ?? BGP ???? ??? ?? ??? ???? ???? BGP ???? ??? ??? ???? ??? ??????. ??? ???? , `inet6`, `inet-vpn`?? `inet6-vpn`??? ??? `inet`?????.

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```
route-filter ipv4-address/mask;
```

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```
route-filter ipv6-address/mask;
```

BGP ??? ??? inet ??? ??? inet-vpn ?? ??? ?? ?????? ? BGP ??? ?? ????? ??? ??? ??? ??? ?????. ?, ??? inet ? ??? inet-vpn ?? ?? ??? ? ??? ????? ??? ??????. ?? ??? ??? ?? ? ?????.

```
from {
    route-filter 0.0.0.0/0 exact;
}
then {
    next-hop self;
    accept;
}
```

? ?? ?? ??? inet 0.0.0.0? ?? ? inet-vpn IPv4 ?? ??? 0.0.0.0? ??? ??????. ??? inet-vpn 8??? ?? ??? ??? ?? ? ? ????? ????? ?????. ?? Junos OS ??? 10.0?? ??? Junos OS ??? ?? ??????.

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inet □□

```
set policy-options policy-statement specific-family from family inet
set policy-options policy-statement specific-family from route-filter 0.0.0.0/0 exact
set policy-options policy-statement specific-family then next-hop self
set policy-options policy-statement specific-family then accept
set protocols bgp import specific-family
```

Inet-vpn □

```
set policy-options policy-statement specific-family from family inet-vpn
set policy-options policy-statement specific-family from route-filter 0.0.0.0/0 exact
set policy-options policy-statement specific-family then next-hop self
set policy-options policy-statement specific-family then accept
set protocols bgp import specific-family
```

inet6 □□

```
set policy-options policy-statement specific-family from family inet6
set policy-options policy-statement specific-family from route-filter 0::0/0 exact
set policy-options policy-statement specific-family then next-hop self
set policy-options policy-statement specific-family then accept
set protocols bgp import specific-family
```

Inet6-vpn □

```
set policy-options policy-statement specific-family from family inet6-vpn
set policy-options policy-statement specific-family from route-filter 0::0/0 exact
set policy-options policy-statement specific-family then next-hop self
set policy-options policy-statement specific-family then accept
set protocols bgp import specific-family
```

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??? ? ?? ??:

1. ??? ????? ??????.

```
[edit policy-options]
user@host# set policy-statement specific-family from family inet
```

2. ?? ??? ??????.

```
[edit policy-options]
user@host# set policy-statement specific-family from route-filter 0.0.0.0/0 exact
```

3. ?? ??? ??????.

```
[edit policy-options]
user@host# set policy-statement specific-family then next-hop self
user@host# set policy-statement specific-family then accept
```

4. ??? ??????.

```
[edit protocols bgp]
user@host# set import specific-family
```

??

?? ????? ? show policy-options ???? ????? show protocols ???? ??????. ?? ??? ??? ????? ????? ??? ? ?? ??? ????? ??? ???????.

```
user@host# show protocols
bgp {
    import specific-family;
}
user@host# show policy-options
policy-statement specific-family {
```

```
    from {
        family inet;
        route-filter 0.0.0.0/0 exact;
    }
    then {
        next-hop self;
        accept;
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ **commit**□(□) □□□□□.

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- show route advertising-protocol bgp *neighbor* detail
- show route instance *instance-name* detail

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```
prefix-list bgp179 {
    apply-path "protocols bgp group <*> neighbor <*>";
}
```

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IPv4 □ IPv6 □□□ □□ □□□ □□□ □□ □□□ □□ □□ □□ □□□□ □□ □□ □□□ □□ □□□ □□□ □□□ □ □□□□.

```
prefix-list IPV4-BGP-NEIGHBORS {
    apply-path "protocols bgp group <*> neighbor <*.*.*.*>";
}
prefix-list IPV6-BGP-NEIGHBORS {
    apply-path "protocols bgp group <*> neighbor <*:*:*>";
}
```

□□□ □□□ □□□ IPv4 □□□ □□□□□. □□ □□□ IPv6 □□□ □□□□□. □□□ □□□□ show configuration policy-options prefix-list prefix-list name | display inheritance □□□ □□□ □ □□□□.

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□□	□□□□□□ action□ then □□□ □ □□□□. □□□ □□, □□□ □□□□ □□ □□□□ □□□ □□□□□.	□□ □□ □□□□ □□ □□□ route-filter □ □□□□□ □□ □□□□ □□□ □□ □□□□ □□□□ □□□ □□□ □ □□□□ then.from

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□□□ □□□ □□□□□ □□ □□□□□.prefix-list

```
[edit policy-options]
    prefix-list prefix-list-name {
    apply-path path;
    ip-addresses;
}
```

□□ □□□□ apply-path □□□ □□□ □□□□ □□ □□□(□ □□ □□□□ □□□)□ □□□□□, □□ □□□ □□□ □□□□□, □□ □ □□ □□□ □ □□□□.

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```
[edit policy-options policy-statement policy-name term term-name]
from {
    prefix-list prefix-list-name;
}
then actions;
```

name □□□□ □□□□ □□□□□□. □□, □□ □ □□□□(-)□ □□□□ □ □□□□ □□ □□□□ 127□□□□□□□. □□□□ □□□□ □□□□□□, □□ □□□□ □□□□(" ")□ □□□□ □□ □.

ip-addresses □ □ □□□ IPv4 □□ IP □□ 6(IPv6) □□□□□□□ *prefix*/*prefix-length*. IPv4 □□□□□ □□ *prefix-length*□(□) □□□□□ □ □□□□ /32*prefix-length*□□□. IPv6 □□□□□ □□ *prefix-length*□(□) □□□□□ □□□□□ /128□□□. from □□ □□□□ □□□□□ □□ IPv4 □□ □ □ IPv6 □□□□□ □□□□. □□□□ □□ □□□□□□ □□□□ □□□□ □ □□□□□.

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apply-path □□□□□ □□□□□ □□□□ □□□□ □□□□□ □□ IP □□□□□ □□□□ □□□□ □□□□ □□□□□□. □□□□ □□ □□ □□□□ □□□□ □□□□□ □ □□□□ □□□□□ □□ □ □□□□ □ □□□□□.

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??? ?? ??? ????? ?? ???? ???? [edit policy-options policy-statement *policy-name* from] ?????prefix-list-filter.

```
[edit policy-options policy-statement policy-name]
from {
    prefix-list-filter prefix-list-name match-type actions;
}
```

prefix-list-name ??? ??? ??? ??? ??? ??????. ??? ??? ??? ??? ? ????.

match-type ??? ??? ??? ???? ??? ?? ??????. ? 18 ??? 361? ??? ?? ?? ? ??? ? ????.

actions ??? ??? ??? ???? ?? ??? ??????. "?? ?? ?? ??" ??? 64 ? "?? ??? ???? ?? ???" ??? 64 ??? ?? ? ?? ??? ? ? ????.

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exact	??? ??? MSB(?)? ????(? ???? *prefix-length*?? *prefix-length*) ??? ??? ??? ??????.
longer	??? ??? ??? ??(? ?? *prefix-length*)? ???? *prefix-length* ??? ??? ???? ???.
orlonger	??? ??? ??? ??(? ?? *prefix-length*)? ???? *prefix-length* ??? ??? ??? ??? ???.

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Junos OS?? ??? ??? ?? ??? ???? ??? ??????. Junos OS? ?? ??? ?? ??? ??? ???? ?? ??? ??????. ??? ??? ??? ???? ?? ???? ???? ?? ??? ???? IP ???? ??????. ??? ??? ?? ???(AS)?? ?? ?? ??? ???? ? ??? ? ?????. ? ?? ???? ??? ????, [edit policy-options] ?? ?? ??? ??????.

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Junos OS ??? 22.1R1? ????? ??????? ???????.

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?? ????? ??? ??? ? ??? ?? ?? ?? ????? ????? ????? ??????. ?? ??, BGP ????? ??, ????? ??, RPF ????, ??? ??? ?, ??? ?????, ?????? ?? ?? ??? ??? ??? ??? ? ?????.

??? ??? ??? ??, ?? ??? ?? ??? ??? ????? ??, ??? ??? ????????, ????? ?? ?? ?? ? ?? ??? ? ?????. ??? ?? ??? ?? ?? ??, ?? ??? ?? ????? ?? ?? ????? ??????.

??? ??? ?? ?? ?????? ????? ????? ??? ???. ??? ? ????? ??? ?? ? ??? ????? ?? IP ?? ? ?? ??? ??? ??? ? ??? ?. ? ?? ??? ??? ??? ? ??? ????? ??, ?????? ? ????? ??? ??? ????????.

□□ 28 □□□ 365□□ □ □ □□□, AS 65000□ □ □□□□□ □□ □□□ □□□□. □□□□ R1□ 172.16.1.0/24 □□□ □□□ □□ □□□ □□□ □□. □□□□ R2 □ □□□□ R3□ □□ 172.16.2.0/24 □ 172.16.3.0/24 □□□ □□ □□□ □□□□□. □□□□ R1□ □□ □□ □□ □□□ □□ □□ □□ AS 65000□□ □□ □□□□ □□□□□□□. □□□□ R1□□ customers(□)□□ □□□ □□□ □□□ □□□, □□□ □□□□.

```
user@R1# show policy-options
prefix-list customers {
    172.16.1.16/28;
    172.16.1.32/28;
    172.16.1.48/28;
    172.16.1.64/28;
    172.16.2.16/28;
    172.16.2.32/28;
    172.16.2.48/28;
    172.16.2.64/28;
    172.16.3.16/28;
    172.16.3.32/28;
    172.16.3.48/28;
    172.16.3.64/28;
}
```

□□□□□ □□□ □□□ □ □□□ □□ □□ □□□ □□□□ □□□□(□□ □□□ □□ □ □□ □□□). □□□ □□□ □□□ □□□ □ □□□ □□□□□□. □□□ □□□ □ □□ □ □□□ □□□ □□□□ □□□□ □□□□□. □, □□□ □ □□□ □□□ □□□ □□□ □□ □□□ □□□ □□□□ □□□□ □□□.

□□□ □□ □□ □□□ □□ □□□□ □□□ □□□ □□□□□.

```
user@R1# show policy-options
policy-statement customer-routes {
    term get-routes {
        from {
            prefix-list customers;
        }
        then accept;
    }
    term others {
        then reject;
    }
}
```

□ □□□ customers □□□ □□□ □□ □□□ □□□□ R1□□ □□□ □□□□ □□□□□. □□□□ R2 □ □□□□ R3□ □□□ □□ □□□□ R1 □□ □□□ □ □□□□.

□□ □□□□□, exact, longer □□ orlonger □□ □□□ □□□ prefix-list-filter □□ □□□ □□□ □ □□□□. □□□ □□ □□□ □□□ □□□ □□ □□□-□□ □□□ □□ □ □□ □□□ □□□□. □ □□ □□ □□ □□□ □□□□.

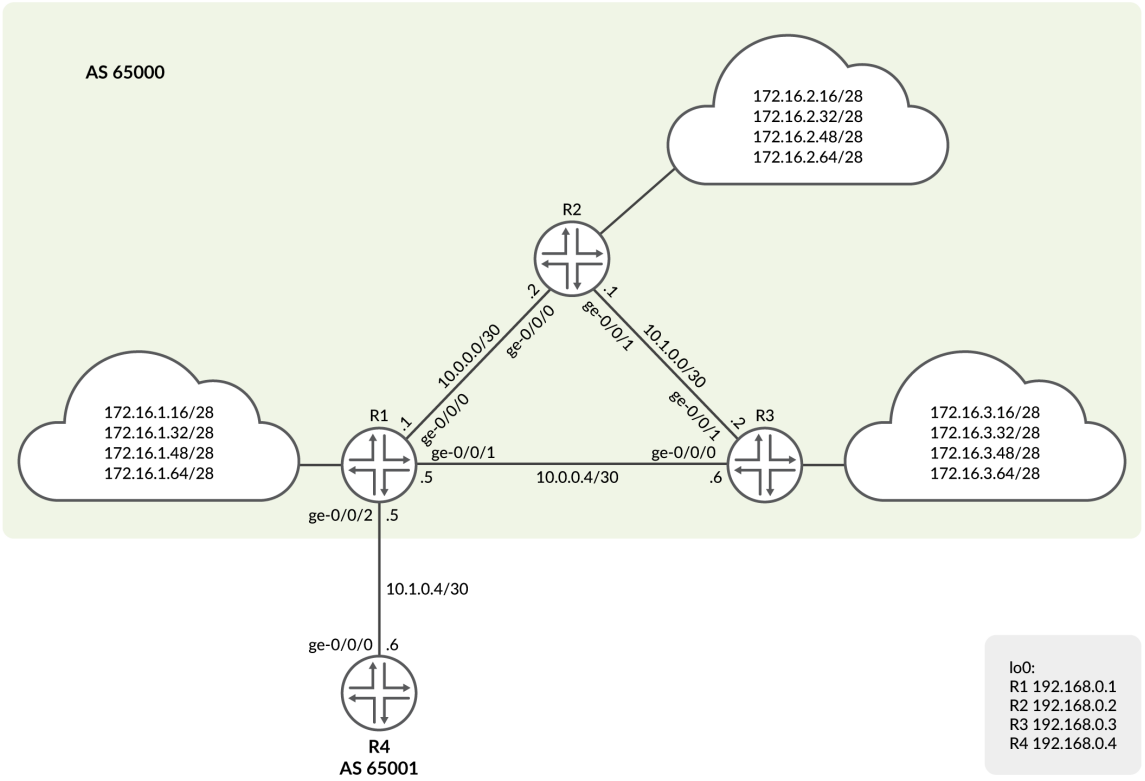
```
user@R1# show policy-options
policy-statement customer-routes {
    term get-routes {
        from {
            prefix-list-filter customers orlonger;
        }
        then accept;
    }
    term others {
        then reject;
    }
}
```

□ □□ prefix-list □□ □□□ prefix-list-filter □□ □□ □□□ □□□ □□□□□.

□□□□

□□ 28 □□□ 365□ □□ □□□□□ □□□□□.

□□ 28: □□ □□□ □□□ □□ BGP □□□□



"CLI □□ □□" □□□ 365□(□) □□ 28 □□□ 365 □ □□ □□□□□ □□□ □□□□□.

□□ "No Link Title" □□□ 368□ □□□□ R1□ □□□ □□□□□.

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CLI □□ □□

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□□□□ R1

```
set interfaces ge-0/0/0 unit 0 description to_R2
set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.1/30
set interfaces ge-0/0/1 unit 0 description to_R3
set interfaces ge-0/0/1 unit 0 family inet address 10.0.0.5/30
set interfaces ge-0/0/2 unit 0 description to_R4
set interfaces ge-0/0/2 unit 0 family inet address 10.1.0.5/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set policy-options prefix-list customers 172.16.1.16/28
set policy-options prefix-list customers 172.16.1.32/28
set policy-options prefix-list customers 172.16.1.48/28
set policy-options prefix-list customers 172.16.1.64/28
set policy-options prefix-list customers 172.16.2.16/28
set policy-options prefix-list customers 172.16.2.32/28
set policy-options prefix-list customers 172.16.2.48/28
set policy-options prefix-list customers 172.16.2.64/28
set policy-options prefix-list customers 172.16.3.16/28
set policy-options prefix-list customers 172.16.3.32/28
set policy-options prefix-list customers 172.16.3.48/28
set policy-options prefix-list customers 172.16.3.64/28
set policy-options policy-statement customer-routes term get-routes from prefix-list customers
set policy-options policy-statement customer-routes term get-routes then accept
set policy-options policy-statement customer-routes term others then reject
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 65000
set routing-options static route 172.16.1.16/28 discard
set routing-options static route 172.16.1.32/28 discard
set routing-options static route 172.16.1.48/28 discard
set routing-options static route 172.16.1.64/28 discard
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.1
set protocols bgp group int neighbor 192.168.0.2
set protocols bgp group int neighbor 192.168.0.3
set protocols bgp group to_65001 type external
set protocols bgp group to_65001 export customer-routes
set protocols bgp group to_65001 neighbor 10.1.0.6 peer-as 65001
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
```

????? R2

```
set interfaces ge-0/0/0 unit 0 description to_R1
set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.2/30
set interfaces ge-0/0/1 unit 0 description to_R3
set interfaces ge-0/0/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 65000
set routing-options static route 172.16.2.16/28 discard
set routing-options static route 172.16.2.32/28 discard
set routing-options static route 172.16.2.48/28 discard
set routing-options static route 172.16.2.64/28 discard
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.2
set protocols bgp group int neighbor 192.168.0.1 export send-static
set protocols bgp group int neighbor 192.168.0.3
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
```

????? R3

```
set interfaces ge-0/0/0 unit 0 description to_R1
set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.6/30
set interfaces ge-0/0/1 unit 0 description to_R2
set interfaces ge-0/0/1 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 65000
set routing-options static route 172.16.3.16/28 discard
set routing-options static route 172.16.3.32/28 discard
set routing-options static route 172.16.3.48/28 discard
set routing-options static route 172.16.3.64/28 discard
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.3
set protocols bgp group int neighbor 192.168.0.1 export send-static
```

```
set protocols bgp group int neighbor 192.168.0.2
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
```

???? R4

```
set interfaces ge-0/0/0 unit 0 description to_R1
set interfaces ge-0/0/0 unit 0 family inet address 10.1.0.6/30
set interfaces lo0 unit 0 family inet address 192.168.0.4/32
set routing-options autonomous-system 65001
set protocols bgp group ext type external
set protocols bgp group ext peer-as 65000
set protocols bgp group ext neighbor 10.1.0.5
```

??

??? ??

R1? ????? ?? ??? ??? ?????? ?????. ?? ????? ??? ??? ?????? ??? ?????. ?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? Junos OS CLI ??? ???? "?? ???? CLI ??? ??" ??? 1787?(?) ???????.

R1? ??????

1. ??????? ??????.

```
[edit]
user@R1# set interfaces ge-0/0/0 unit 0 description to_R2
user@R1# set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.1/30
user@R1# set interfaces ge-0/0/1 unit 0 description to_R3
user@R1# set interfaces ge-0/0/1 unit 0 family inet address 10.0.0.5/30
user@R1# set interfaces ge-0/0/2 unit 0 description to_R4
user@R1# set interfaces ge-0/0/2 unit 0 family inet address 10.1.0.5/30
user@R1# set interfaces lo0 unit 0 family inet address 192.168.0.1/32
```

2. R2 ? R3? ?? ?? BGP(IBGP) ???? ?????.

```
[edit]
user@R1# set protocols bgp group int type internal
user@R1# set protocols bgp group int local-address 192.168.0.1
```

```
user@R1# set protocols bgp group int neighbor 192.168.0.2
user@R1# set protocols bgp group int neighbor 192.168.0.3
```

3. R4□ □□ □□ BGP(EBGP) □□□□ □□□□□. □□□□ □□ □□□ □□□ □□□□□.

```
[edit]
user@R1# set protocols bgp group to_65001 type external
user@R1# set protocols bgp group to_65001 export customer-routes
user@R1# set protocols bgp group to_65001 neighbor 10.1.0.6 peer-as 65001
```

4. R2 □ R3□ □□ □□ □□ □□(OSPF) □□□□ □□□□□.□□ □□ □□(OSPF) □□□□□ IBGP □□□□ □□□□□ □□□□ □ □□□□□ □□□ □ □ □□□ □□□□□.

```
[edit]
user@R1# set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
user@R1# set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
user@R1# set protocols ospf area 0.0.0.0 interface lo0.0 passive
```

5. □□□ □□□ □□□□□.

```
[edit]
user@R1# set policy-options prefix-list customers 172.16.1.16/28
user@R1# set policy-options prefix-list customers 172.16.1.32/28
user@R1# set policy-options prefix-list customers 172.16.1.48/28
user@R1# set policy-options prefix-list customers 172.16.1.64/28
user@R1# set policy-options prefix-list customers 172.16.2.16/28
user@R1# set policy-options prefix-list customers 172.16.2.32/28
user@R1# set policy-options prefix-list customers 172.16.2.48/28
user@R1# set policy-options prefix-list customers 172.16.2.64/28
user@R1# set policy-options prefix-list customers 172.16.3.16/28
user@R1# set policy-options prefix-list customers 172.16.3.32/28
user@R1# set policy-options prefix-list customers 172.16.3.48/28
user@R1# set policy-options prefix-list customers 172.16.3.64/28
```

6. □□□ □□□ □□ □□□□ □□□□ □□□ □□□ □□□□□.

```
[edit]
user@R1# set policy-options policy-statement customer-routes term get-routes from prefix-list
customers
```

```
user@R1# set policy-options policy-statement customer-routes term get-routes then accept
user@R1# set policy-options policy-statement customer-routes term others then reject
```

7. 172.16.1.0/24 [illegible] [illegible] [illegible] [illegible].[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@R1# set routing-options static route 172.16.1.16/28 discard
user@R1# set routing-options static route 172.16.1.32/28 discard
user@R1# set routing-options static route 172.16.1.48/28 discard
user@R1# set routing-options static route 172.16.1.64/28 discard
```

8. [illegible] [illegible](AS) [illegible] [illegible] [illegible] ID[illegible] [illegible].

```
[edit]
user@R1# set routing-options router-id 192.168.0.1
user@R1# set routing-options autonomous-system 65000
```

[illegible]

[illegible] [illegible] show interfaces, show protocols, show policy-options [illegible] show routing-options [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R1# show interfaces
ge-0/0/0 {
    unit 0 {
        description to_R2;
        family inet {
            address 10.0.0.1/30;
        }
    }
}
ge-0/0/1 {
    unit 0 {
        description to_R3;
        family inet {
            address 10.0.0.5/30;
        }
    }
}
```

```
ge-0/0/2 {
    unit 0 {
        description to_R4;
        family inet {
            address 10.1.0.5/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
    }
}
```

```
user@R1# show protocols
bgp {
    group int {
        type internal;
        local-address 192.168.0.1;
        neighbor 192.168.0.2;
        neighbor 192.168.0.3;
    }
    group to_65001 {
        type external;
        export customer-routes;
        neighbor 10.1.0.6 {
            peer-as 65001;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface ge-0/0/0.0;
        interface ge-0/0/1.0;
        interface lo0.0 {
            passive;
        }
```

```
    }
}
```

```
user@R1# show policy-options
prefix-list customers {
    172.16.1.16/28;
    172.16.1.32/28;
    172.16.1.48/28;
    172.16.1.64/28;
    172.16.2.16/28;
    172.16.2.32/28;
    172.16.2.48/28;
    172.16.2.64/28;
    172.16.3.16/28;
    172.16.3.32/28;
    172.16.3.48/28;
    172.16.3.64/28;
}
policy-statement customer-routes {
    term get-routes {
        from {
            prefix-list customers;
        }
        then accept;
    }
    term others {
        then reject;
    }
}
```

```
user@R1# show routing-options
static {
    route 172.16.1.16/28 discard;
    route 172.16.1.32/28 discard;
    route 172.16.1.48/28 discard;
    route 172.16.1.64/28 discard;
}
router-id 192.168.0.1;
autonomous-system 65000;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

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- □□□ □□ □□ □ □□□□ | 375

□□□ □□□□ □□□□ □□□ □□□□□.

R1□□ □□ □□

□□

R1□□ □□□ □□□ □□□ □□□□□.

□□

```
user@R1> show route terse 172.16/16

inet.0: 30 destinations, 30 routes (30 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A V Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* ? 172.16.1.16/28     S   5                        Discard
* ? 172.16.1.32/28     S   5                        Discard
* ? 172.16.1.48/28     S   5                        Discard
* ? 172.16.1.64/28     S   5                        Discard
* ? 172.16.2.16/28     B 170        100                          I
  unverified                                      >10.0.0.2
* ? 172.16.2.32/28     B 170        100                          I
  unverified                                      >10.0.0.2
* ? 172.16.2.48/28     B 170        100                          I
  unverified                                      >10.0.0.2
* ? 172.16.2.64/28     B 170        100                          I
  unverified                                      >10.0.0.2
```

```
* ? 172.16.3.16/28     B 170        100                          I
  unverified                                  >10.0.0.6
* ? 172.16.3.32/28     B 170        100                          I
  unverified                                  >10.0.0.6
* ? 172.16.3.48/28     B 170        100                          I
  unverified                                  >10.0.0.6
* ? 172.16.3.64/28     B 170        100                          I
  unverified                                  >10.0.0.6
```

□□

□□□□ R1□ □□□□ R2 □ R3(B)□□ □□ □□ □□(S) □ BGP(Border Gateway Protocol) □□□ □□□□□□.

R4□ □□ □□ □□ □□

□□

R1□□ □□ □□□ R4□ □□□□□□□ □□□□□.

□□

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 30 destinations, 30 routes (30 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
* 172.16.3.16/28          Self                                    I
* 172.16.3.32/28          Self                                    I
* 172.16.3.48/28          Self                                    I
* 172.16.3.64/28          Self                                    I
```

□□

□□□□ □□ □□□ □□□ □□□ R4□ □□□□□.

□□□ □□ □□ □ □□□□

□□

prefix-list□□ prefix-list-filter□(□) □□□□ □□ □□ □□□ □ □□□ □□□□□.

□□

1. R3□□ □□ □□ □□ □ □□□□ □ □ □□ □□□ □□□□□.

```
[edit routing-options static]
user@R3# set route 172.16.3.65/32 discard
user@R3# commit
```

2. R1□□ □□□ □□□ □□□□□□□ orlonger□□ □□□□ □□□ □□ □□□ □□□□□.

```
[edit policy-options policy-statement customer-routes term get-routes]
user@R1# deactivate from prefix-list customers
user@R1# set from prefix-list-filter customers orlonger
user@R1# commit
```

3. R1□□ □□ □□□ R4□ □□□□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.1.0.6

inet.0: 31 destinations, 31 routes (31 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.16/28          Self                                    I
* 172.16.1.32/28          Self                                    I
* 172.16.1.48/28          Self                                    I
* 172.16.1.64/28          Self                                    I
* 172.16.2.16/28          Self                                    I
* 172.16.2.32/28          Self                                    I
* 172.16.2.48/28          Self                                    I
* 172.16.2.64/28          Self                                    I
```

```
* 172.16.3.16/28          Self                            I
* 172.16.3.32/28          Self                            I
* 172.16.3.48/28          Self                            I
* 172.16.3.64/28          Self                            I
* 172.16.3.65/32          Self                            I
```

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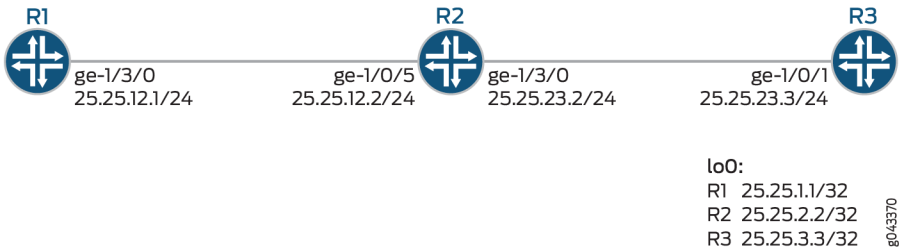

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R1

```
set interfaces ge-1/3/0 unit 0 family inet address 172.16.12.1/24
set interfaces ge-1/3/0 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 172.16.25.1/32
set protocols mpls interface ge-1/3/0.0
set protocols bgp group prio_internal type internal
set protocols bgp group prio_internal local-address 172.16.25.1
set protocols bgp group prio_internal import prio_for_bgp
set protocols bgp group prio_internal neighbor 172.16.25.3 family inet unicast
set protocols bgp group prio_internal neighbor 172.16.25.3 export next-hop-self
sset protocols ospf import ospf_prio
set protocols ospf area 0.0.0.0 interface ge-1/3/0.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ldp interface ge-1/3/0.0
set protocols ldp interface lo0.0
```

```
set policy-options policy-statement next-hop-self term nhself from protocol bgp
set policy-options policy-statement next-hop-self term nhself then next-hop self
set policy-options policy-statement next-hop-self term nhself then accept
set policy-options policy-statement ospf_prio term ospf_ldp from protocol ospf
set policy-options policy-statement ospf_prio term ospf_ldp from route-filter 172.16.25.3/32
exact
set policy-options policy-statement ospf_prio term ospf_ldp then priority high
set policy-options policy-statement ospf_prio term ospf_ldp then accept
set policy-options policy-statement prio_for_bgp term bgp_prio from protocol bgp
set policy-options policy-statement prio_for_bgp term bgp_prio from route-filter 172.16.50.1/32
exact
set policy-options policy-statement prio_for_bgp term bgp_prio then priority high
set routing-options nonstop-routing
set routing-options router-id 172.16.25.1
set routing-options autonomous-system 2525
```

R2

```
set interfaces ge-1/0/5 unit 0 family inet address 172.16.12.2/24
set interfaces ge-1/0/5 unit 0 family mpls
set interfaces ge-1/3/0 unit 0 family inet address 172.16.23.2/24
set interfaces ge-1/3/0 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 172.16.25.2/32
set protocols mpls interface ge-1/0/5.0
set protocols mpls interface ge-1/3/0.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface ge-1/0/5.0
set protocols ospf area 0.0.0.0 interface ge-1/3/0.0
set protocols ldp interface ge-1/0/5.0
set protocols ldp interface ge-1/3/0.0
set protocols ldp interface lo0.0
set routing-options nonstop-routing
set routing-options router-id 172.16.25.2
set routing-options autonomous-system 2525
```

R3

```
set interfaces ge-1/0/1 unit 0 family inet address 172.16.23.3/24
set interfaces ge-1/0/1 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 172.16.25.3/32
set protocols mpls interface ge-1/0/1.0
```

```
set protocols bgp group prio_internal type internal
set protocols bgp group prio_internal local-address 172.16.25.3
set protocols bgp group prio_internal neighbor 172.16.25.1 family inet unicast
set protocols bgp group prio_internal neighbor 172.16.25.1 export next-hop-self
set protocols bgp group prio_internal neighbor 172.16.25.1 export static_to_bgp
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface ge-1/0/1.0
set protocols ldp interface ge-1/0/1.0
set protocols ldp interface lo0.0
set policy-options policy-statement next-hop-self term nhself from protocol bgp
set policy-options policy-statement next-hop-self term nhself then next-hop self
set policy-options policy-statement next-hop-self term nhself then accept
set policy-options policy-statement static_to_bgp term s_to_b from protocol static
set policy-options policy-statement static_to_bgp term s_to_b from route-filter 172.16.50.1/32
exact
set policy-options policy-statement static_to_bgp term s_to_b from route-filter 172.16.50.2/32
exact
set policy-options policy-statement static_to_bgp term s_to_b then accept
set routing-options nonstop-routing
set routing-options static route 172.16.50.1/32 receive
set routing-options static route 172.16.50.2/32 receive
set routing-options router-id 172.16.25.3
set routing-options autonomous-system 2525
```

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```
[edit interfaces]
user@R1# set interfaces ge-1/3/0 unit 0 family inet address 172.16.12.1/24
user@R1# set interfaces ge-1/3/0 unit 0 family mpls
user@R1# set interfaces lo0 unit 0 family inet address 172.16.25.1/32
```

2. [illegible] [illegible] [illegible] [illegible].

```
[edit lo0 unit 0 family]
user@R1# set address 172.16.25.1/32
```

3. MPLS[illegible] [illegible].

```
[edit protocols]
user@R1# set protocols mpls interface ge-1/3/0.0
```

4. [illegible] R1[illegible] [illegible] ID[illegible] AS(Autonomous System)[illegible] [illegible].

```
[edit routing-options]
user@R1# set router-id 172.16.7.7
user@R1# set autonomous-system 100
```

5. [illegible] R1[illegible] [illegible] OSPF[illegible] [illegible].

```
[edit protocols]
user@R1# set protocols ospf import ospf_prio
user@R1# set protocols ospf area 0.0.0.0 interface ge-1/3/0.0
user@R1# set protocols ospf area 0.0.0.0 interface lo0.0 passive
```

6. [illegible] LDP [illegible] [illegible].

```
[edit protocols]
user@R1# set protocols ldp interface ge-1/3/0.0
user@R1# set protocols ldp interface lo0.0
```

7. BGP[illegible] [illegible].

```
[edit protocols]
user@R1# set protocols bgp group prio_internal type internal
user@R1# set protocols bgp group prio_internal local-address 172.16.25.1
user@R1# set protocols bgp group prio_internal import prio_for_bgp
```

```
user@R1# set protocols bgp group prio_internal neighbor 172.16.25.3 family inet unicast
user@R1# set protocols bgp group prio_internal neighbor 172.16.25.3 export next-hop-self
```

8. □□□ □□ □□□ □□□□□ □□ □□□ □□□□□. □□ next-hop-self□ BGP□ □□□ □□□□□. □ □□ □□□□ □□□ □□□ □□□□□. next-hop-self, OSPF-PRIO □ prio_for_bgp. □□□ □□ next-hop-self□ BGP□ □□□ □□□□□. ospf-prio □□□ □□□ □□ 172.16.25.3/32□ □□□□ □□□ □□ □□□ □□ □□□ □□ □□□□□. LDP□ OSPF□□ □□□ □□□□□. prio_for_bgp □□□ □□ 172.16.50.1/32□ □□□□ □□□ □□ □□□ □□ □□□ □□ □□□□□.

```
[edit policy-options policy-statement]
user@R1# set policy-options policy-statement next-hop-self term nhself from protocol bgp
user@R1# set policy-options policy-statement next-hop-self term nhself then next-hop self
user@R1# set policy-options policy-statement next-hop-self term nhself then accept
user@R1# set policy-options policy-statement ospf_prio term ospf_ldp from protocol ospf
user@R1# set policy-options policy-statement ospf_prio term ospf_ldp from route-filter
172.16.25.3/32 exact
 set policy-options policy-statement ospf_prio term ospf_ldp then priority high
 set policy-options policy-statement ospf_prio term ospf_ldp then accept
 set policy-options policy-statement prio_for_bgp term bgp_prio from protocol bgp
 set policy-options policy-statement prio_for_bgp term bgp_prio from route-filter
172.16.50.1/32 exact
 set policy-options policy-statement prio_for_bgp term bgp_prio then priority high
```

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□□ □□□□ **show interfaces**, **show protocols**, **show routing-options** □ **show policy-options** □□□ □□□□ □□□ □□ □□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@R1# show interfaces
ge-1/3/0 {
    unit 0 {
        family inet {
            address 172.16.12.1/24;
        }
        family mpls;
    }
}
lo0 {
```

```
    unit 0 {
        family inet {
            address address 172.16.25.1/32;
        }
    }
}
```

```
[edit]
user@R1# show protocols
mpls {
    interface ge-1/3/0.0;
}
bgp {
    group prio_internal {
        type internal;
        local-address 172.16.25.1;
    import prio_for_bgp
        neighbor 172.16.25.3 {
            family inet {
                unicast;
                }
                export next-hop-self;
                }
                }
            }
        ospf {
            import ospf_prio;
            area 0.0.0.0 {
                interface ge-1/3/0.0;
                interface lo0.0 {
                    passive;
                    }
            }
        }
        ldp {
        interface ge-1/3/0.0;
        interface lo0.0;
```

```
        }
    }
```

```
[edit]
user@R1# show routing-options
nonstop-routing;
router-id 172.16.25.1;
autonomous-system 2525;
```

```
[edit]
user@R1# show policy-options
policy-statement next-hop-self {
    term nhself {
        from protocol bgp;
        then {
            next-hop self;
                accept;
            }
    }
}
policy-statement ospf_prio {
    term ospf_ldp {
        from {
            protocol ospf;
            route-filter 172.16.25.3/32 exact;
            }
        then {
                priority high;
                accept;
                }
            }
    }
policy-statement prio_for_bgp {
    term bgp_prio {
        from {
            protocol bgp;
        route-filter 172.16.50.1/32 exact;
            }
            then priority high;
```

```
    }
}
```

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OSPF □□□ □□ □□ □□

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□□□□ R1□ □□ □□□□ □□□ □□□□□ show ospf route 172.16.25.3/32 extensive . □□ □□ □□□ OSPF □□ 172.16.25.3□ □□ □□□.

```
user@R1> show ospf route 172.16.25.3/32 extensive

Topology default Route Table:

Prefix             Path  Route      NH       Metric NextHop       Nexthop
                   Type  Type       Type            Interface     Address/LSP
172.16.25.3          Intra Router     IP            2 ge-1/3/0.0    172.16.12.2
  area 0.0.0.0, origin 172.16.25.3, optional-capability 0x0
172.16.25.3/32       Intra Network    IP            2 ge-1/3/0.0    172.16.12.2
  area 0.0.0.0, origin 172.16.25.3, priority high
```

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□□□ OSPF □□ 172.16.25.3□ □□ □□□ high □□□□ □□□□□.

LDP □□□ □□ □□ □□

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LDP□ OSPF□□ □□□□□ □□□□□.

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□□ □□□□ □□□ □□□□ show route 172.16.25.3 LDP□ OSPF□□ □□□ □□□□□ □□□□□.

```
user@R1> show route 172.16.25.3

  inet.0: 24 destinations, 24 routes (24 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.25.3/32       *[OSPF/10] 00:10:27, metric 2
                     > to 172.16.25.2 via ge-1/3/0.0

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.25.3/32       *[LDP/9] 00:10:24, metric 1
                     > to 172.16.25.2 via ge-1/3/0.0, Push 299824
```

□□ □□□□ □□□ □□□□ show route 172.16.25.3 extensive LDP□ □□ □□□ □□□□□□ □□□□□.

```
user@R1> show route 172.16.25.3 extensive
inet.0: 24 destinations, 24 routes (24 active, 0 holddown, 0 hidden)
172.16.25.3/32 (1 entry, 1 announced)
        State:<Flashall>
TSI:
KRT in-kernel 172.16.25.3/32 -> {172.16.12.2}
        *OSPF   Preference: 10
                Next hop type: Router, Next hop index: 549
                Address: 0xa463390
                Next-hop reference count: 6
```

```
                Next hop: 172.16.12.2 via ge-1/3/0.0, selected
                Session Id: 0x0
                State:<Active Int HighPriority>
                Local AS:  2525
                Age: 10:43      Metric: 2
                Validation State: unverified
                Area: 0.0.0.0
                Task: OSPF
                Announcement bits (4): 0-KRT 4-LDP 6-Resolve tree 2 7-Resolve_IGP_FRR task
                AS path: I


inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

172.16.25.3/32 (1 entry, 1 announced)
        State:<Flashall>
LDP    Preference: 9
                Next hop type: Router, Next hop index: 582
                Address: 0xa477810
                Next-hop reference count: 12
                Next hop: 172.16.12.2 via ge-1/3/0.0, selected
                Label operation: Push 299824
                Label TTL action: prop-ttl
                Load balance label: Label 299824: None;
                Label element ptr: 0xa17ad00
                Label parent element ptr: 0x0
                Label element references: 1
                Label element child references: 0
                Label element lsp id: 0
                Session Id: 0x0
                State:<Active Int HighPriority>
                Local AS:  2525
                Age: 10:40      Metric: 1
                Validation State: unverified
                Task: LDP
                Announcement bits (3): 2-Resolve tree 1 3-Resolve tree 2 4-Resolve_IGP_FRR task
                AS path: I
```

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BGP □□□ □□ □□ □□

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BGP□□ □□□□ □□□ □□ □□□ □□□□ □□□ □□□□□.

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□□□□ R1□□ □□ □□□□ □□□ □□□□ show route protocol bgp BGP□□ □□□ □□□ □□□□□.

```
user@R1> show route protocol bgp

inet.0: 24 destinations, 24 routes (24 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.50.1/32        *[BGP/170] 00:11:24, localpref 100, from 172.16.25.3
                       AS path: I, validation-state: unverified
                     > to 172.16.12.2 via ge-1/3/0.0, Push 299824
172.16.50.2/32        *[BGP/170] 00:11:24, localpref 100, from 172.16.25.3
                       AS path: I, validation-state: unverified
                     > to 172.16.12.2 via ge-1/3/0.0, Push 299824

inet.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)

mpls.0: 9 destinations, 9 routes (9 active, 0 holddown, 0 hidden)
```

□□□□ R1□ □□ □□□□ □□□ □□□□□ show route 172.16.50.1 extensive . BGP □□ 172.16.50.1□□ □□ □□ □□□ □□□□□.

```
user@R1> show route 172.16.50.1 extensive

inet.0: 24 destinations, 24 routes (24 active, 0 holddown, 0 hidden)
172.16.50.1/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 172.16.50.1/32 -> {indirect(1048574)}
        *BGP    Preference: 170/-101
                Next hop type: Indirect, Next hop index: 0
                Address: 0xa487b10
```

```
                Next-hop reference count: 4
                Source: 172.16.25.3
                Next hop type: Router, Next hop index: 582
                Next hop: 172.16.12.2 via ge-1/3/0.0, selected
                Label operation: Push 299824
                Label TTL action: prop-ttl
                Load balance label: Label 299824: None;
                Label element ptr: 0xa17ad00
                Label parent element ptr: 0x0
                Label element references: 1
                Label element child references: 0
                Label element lsp id: 0
                Session Id: 0x0
                Protocol next hop: 172.16.25.3
                Indirect next hop: 0xa4a9800 1048574 INH Session ID: 0x0
                State: <Active Int Ext HighPriority>
                Local AS:  2525 Peer AS:  2525
                Age: 11:49      Metric2: 1
                Validation State: unverified
                Task: BGP_2525.172.16.25.3
                Announcement bits (2): 0-KRT 6-Resolve tree 2
                AS path: I (Atomic)
                Accepted
                Localpref: 100
                Router ID: 172.16.25.3
                Indirect next hops: 1
                        Protocol next hop: 172.16.25.3 Metric: 1
                        Indirect next hop: 0xa4a9800 1048574 INH Session ID: 0x0
                        Indirect path forwarding next hops: 1
                                Next hop type: Router
                                Next hop: 172.16.12.2 via ge-1/3/0.0
                                Session Id: 0x0
                        172.16.25.3/32 Originating RIB: inet.3
                          Metric: 1                       Node path count: 1
                          Forwarding nexthops: 1
                                Nexthop: 172.16.12.2 via ge-1/3/0.0
```

□□

□□□ BGP □□ 172.16.50.1□ □□ □□□ high □□□□□□□ □□□□□.

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RPD ????? ?? ???? ?? ?? ?? ?? | 390

RPD ????? ?? ???? ?? ?? ?? ??

??? ?? ?? ??? ???? ? ?? ????? ?? ?? ?? ?? ???? ?? ??? ???? ???? ???? ???? ? ??? ???. ?? ?? ?? ????? ?? ???? ????? ???? ?? ??? ??????? ??? ???? ?? ??? ??? ????. ??? ???? Junos OS? ????? ???? ???? ?? ?? ???? ??? ??????? ??? ??????. ??? ?? ??? ?? ??? ?? ????. ??? ?? ?? ??? ???? ??? LDP ?? OSPF?? rpd ?, rpd?? ??? ??????? ??? ??? ? ?? ??? ??????. Junos OS ?? ??? ???? ????? ?? ???? ??? ?? ???? ?? ??? ?? ??(?? ? ??)? ??? ? ??? ????????. ??? ??? ?? ??? ?? ??? ?? ?? ?? ?? ???? ??????. ????? ???? ??, ?? ?? ? ?? ???? ??? ????? ?? ???????? ? ??? ?? ?? ??? ?? ???? ????????. ??? ?? ?? ?? ??? ??? ????? ?? ????? ??. ????? ?? ??? ???? ?? ??? ?? ?? ??? ?????.

OSPF, LDP ? BGP? ?? ????? ?? rpd?? ??? ?? ?? ??? ???? ??:

- ??? ??????? ?????.
- MPLS? ?????.
- OSPF, BGP ? LDP ????? ?????.

OSPF ????? ?? ??? high ????? ??? ?????.

1. ?? ??? ?????.

```
[edit policy-options policy-statement policy-name]
user@host# set term term-name
```

? ?? ?? ?? ??? ????.

```
[edit policy-options policy-statement ospf-prio]
user@host# set term t1
```

2. OSPF? ??? ????? ?? ??? ?????.

```
[edit policy-options policy-statement ospf-prio  term t1]
user@host# set from protocol ospf
```

3. □□ □□□ high□□□ □□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement ospf-prio term t1]
user@host# set from route-filter destination-prefix match-type
```

□ □□ □□ □□ □□□ □□□□.

```
[edit policy-options policy-statement ospf-prio term t1]
user@host# set from route-filter 172.16.25.3/32 exact
```

4. □□ □□□ □□□□ □□ □□□ □□□□ □□□ □□ □□ □□□ high □□□□□ □□□□□.

```
[edit policy-options policy-statement ospf-prio term t1]
user@host# set then priority high
user@host# set then accept
```

5. □□□ □□□□□.

```
[edit]
user@host# show policy-options
policy-statement ospf-prio {
    term t1 {
        from {
            route-filter 172.16.25.3/32 exact;
            }
        then {
                priority high;
                accept;
                }
            }
    }
```

LDP□ OSPF□□ □□□□□.

LDP□ □□ □□ high □□ □□:

1. OSPF□□ □□□□ □□ □□□ □□□□□.

```
[edit policy-options policy-statement policy-name]
user@host# set term term-name
```

□ □□ □□ □□ □□□ □□□□.

```
[edit policy-options policy-statement ospf-import]
user@host# set term ospf_ldp
```

2. OSPF□□ □□ □ □□ □□□ □□□□□ □□□ □□□□□.

```
[edit policy-options policy-statement ospf_import term ospf_ldp]
user@host# set from protocol ospf
user@host# set from route-filter destination-prefix match-type
```

□ □□ □□ □□ □□□ □□□□.

```
[edit policy-options policy-statement ospf_import term ospf_ldp]
user@host# set from protocol ospf
user@host# set from route-filter 172.16.25.3/32 exact
```

3. □□□ □□□□□.

```
[edit]
user@host# show policy-options
policy-statement ospf-import {
    term ospf_ldp {
        from {
            protocol ospf ;
            route-filter 172.16.25.3/32 exact;
            }
        then {
                priority high;
                accept;
                }
            }
    }
```

BGP □□□□□ □□ □□□ high □□□□□ □□□ □□□□□.

1. □□ □□□ □□□□□.

```
[edit policy-options policy-statement policy-name]
user@host# set term term-name
```

□ □□ □□ □□ □□□ □□□□.

```
[edit policy-options policy-statement prio-for-bgp]
user@host# set term bgp_prio
```

2. □□□ □□□ □□ □□□□ □□□□□.

```
[edit policy-options policy-statement prio-for-bgp term bgp_prio]
user@host# set from protocol bgp
user@host# set from route-filter destination-prefix match-type
```

□ □□ □□ □□ □□□ □□□□.

```
[edit policy-options policy-statement prio-for-bgp term bgp_prio]
user@host# set from protocol bgp
user@host# set from route-filter 172.16.50.1/32 exact
```

3. □□□ □□□□□ □□□□ □□ □□□ □□□□ □□ □□□ □□ □□□ high □□□□□.

```
[edit policy-options policy-statement prio-for-bgp term bgp_prio]
user@host# set then priority high
user@host# set then accept
```

4. □□□ □□□□□.

```
policy-statement prio_for_bgp {
    term bgp_prio {
        from {
            protocol bgp;
            route-filter 172.16.50.1/32 exact;
            }
```

```
                then {
                    priority high;
                    accept;
                    }
    }
}
```

?: BGP? ??, L3VPN? ?? RD(Route Distinguisher) ?? ???? ?? ??? ??? ?? ????. ?? ?? route-distinguisher 51.51.51.51:111? ???? BGP? ?? ??? ??? ? ????.

RD(route-distinguisher) ?? ???? BGP? ?? ??? ?????? ??? ??????.

1. ?? ??? ??????.

```
[edit policy-options policy-statement policy-name]
user@host# set term term-name
```

? ?? ?? ?? ??? ????.

```
[edit policy-options policy-statement prio-for-bgp]
user@host# set term bgp_prio
```

2. ??? ??? ?? ???? ??????.

```
[edit policy-options policy-statement prio-for-bgp term bgp_prio]
user@host# set from rib bgp.l3vpn.0
user@host# set from route-filter destination-prefix match-type
user@host# set from route-distinguisher route-distinguisher value
```

? ?? ?? ?? ??? ????.

```
[edit policy-options policy-statement prio-for-bgp term bgp_prio]
user@host# set from rib bgp.l3vpn.0
user@host# set from route-filter 172.16.1.1/32 exact
user@host# set from route-distinguisher RD1
```

3. [illegible] high [illegible].

```
[edit policy-options policy-statement prio-for-bgp term bgp_prio]
user@host# set then priority high
user@host# set then accept
```

4. [illegible].

```
policy-statement prio_for_bgp {
    term bgp_prio {
        from {
            protocol rib bgp.l3vpn.0;
            route-filter 172.16.1.1/32 exact;
            route-distinguisher RD1;
            }
                then {
                    priority high;
                    accept;
                    }
    }
}
```

[illegible] high [illegible] low [illegible].

[illegible] RIB[illegible] FIB[illegible] show output [illegible].

```
user@R1> show route 172.16.25.3 extensive | match state
 State: <FlashAll>
              State:   <Active Int HighPriority>     <=== OSPF
        Validation State: unverified
        State: <FlashAll>
              State:   <Active Int>                  <=== LDP
        Validation State: unverified
```

□□□ FIB□ □□ □□□□ □□□□ LDP□ □□ □□□ □□□□ □□□□ □□□□.

□□□ □□□ □□ □□□□ □□□ □□□□ □□ □□□□ OSPF □ LDP □□□□ □□ □□□□ □□□ □□ □□□ □□□□□.

```
user@R1> restart routing
Routing protocols process signalled but still running, waiting 8 seconds more
Routing protocols process started, pid 4512

user@R1> show route 172.16.25.3 extensive |match state
 State: <FlashAll>
              State:   <Active Int HighPriority>     <=== OSPF
        Validation State: unverified
        State: <FlashAll>
              State:   <Active Int HighPriority>     <=== LDP
        Validation State: unverified
```

□□ □□

□□□ □□ □□ □□ □□ | 11

□: RPD □□□□□ □□ □□□□ □□ □□ □□ □□ | 376

chapter label in part5

AS ??? ?? ????? ??

in this chapter

- ??? ?? ?? ????? ????? ?? AS ?? ?? ??? ?? | 397
- ?: AS ?? ?? ??? ?? | 405
- BGP AS ??? ?? ??? AS ?? ?? | 420
- ?: AS ?? ????? ?? ??? ?? ?? | 421
- BGP AS ??? AS ?? ?? ?? | 431
- ?: BGP?? ?? ?? ?? | 432
- BGP ???? AS ?? ?? ?? ?? | 469

??? ?? ?? ????? ????? ?? AS ?? ?? ??? ??

in this section

- AS ?? ?? ??? ?? | 398
- AS ?? ?? ????? ?? ?? | 403
- ?: AS ?? ?? ??? ?? | 404

BGP *AS ????* ???? ??? ??? ????? ?????? ??????? ?? ????? ???????. AS ??? ?????? ????? ?? ????? ???????. ?? ?? ?, AS ?? 5 4 3 2 1? ??? ????? ??? ????? ??? ?? ?? ??? AS 5? ??????? AS 1? ??? ??? ??????. ? ????? AS 1? ?? ?? ?? ??? AS?, ??? ??? ?????? AS???.

AS ??? ??? ?? ?? ????? ??? ??, ??? ?? ?? ?? ????? ??? ? ?????. ????? AS ??? ?? ?? ??? ????? ?? ??? ?? ??? ??? ??, ??? ?? ?? ??????.

?? ?????? AS ?? ?? ????? ????? ?? ?? ??????.

AS ?? ?? ??? ??

??? AS ?? ?? ???? ??? ??, as-path ?? ??("??? ?? ?? ??" ??? 50?? ??)? ??? ??? ??? ? ????. ??? AS ?? ?? ?????? ?????? as-path ?? ??????.

```
[edit policy-options]
as-path name regular-expression;
```

??? ???? AS ?? ?? ???? ??????, from??? as-path?? ??? ??????.

??, AS ?? ?? ?????? ??? ??? AS ?? ??? ??? ?? as-path-group ?? ??? ??? ??? ??? ? ????. ??? AS ?? ??? ?? ???, as-path-group ?? ??????.

```
[edit policy-options]
    as-path-group group-name  {
    name [ regular-expressions ];
}
```

AS ?? ??? AS ?? ?? ???? ???? ??, from??? as-path-group?? ??? ??????.

?: ??? ?? ??? as-path ? ? as-path-group ?? ?? ??? ?? ????

?: from?? as-path?? ???? ?? AS ?? ?? ???? ??? ??? ? ????. ? ??? ????, ??? ???? ???? ??? AS ?? ?? ???? ???? ???. AS ?? ??? ??? ???? ?? OR ??????.

AS ?? ??? ?? ???? ??????. ??, ?? ? ???(-)? ??? ? ???, ?? 65,536? ??????. ??? ??? ??????, ?? ??? ???(" ")? ??? ???.

?? ???? AS ??? ?? ?? ??? ???? ? ??????. ? ?? ??? ??????, ?? ???? ??????.

```
term <operator>
```

- *term* - AS? ??????. ?? ?? ? ??? ??? ? ????:
  - AS ?? - ?? AS ??? ??? ?? ??????. POSIX 1003.2?? ??? ?? ???? ??? ??? AS ?? ?? ?? ??? ??? ? ??? ?.
  - ?????? ?? - ?? AS ??? ??????. ?????? ??? ???(.)???. ?? ?????? ??? ??? ? ????.

- AS □□ - □□ □□ □□□ □□ AS □□ □□ AS □□ □□. □□□ □□□□ □□ □□□□ □□□□□ □□□□ □□□ □□ □□□ □□□□, □□ □□□□□ □□□□□. □□□□ □□□ □□□ □□□□ □□□ □ □□□□.

  Junos OS □□□ 9.1 □□, RFC 4893 4□□ *□□ AS □□ □□□ □□ BGP □□□* □□□ 4□□□ AS □□□ □□□ □□ □□□, Junos OS□ □□ □□□□□ □□□□ 2□□□ AS □□□ □□□ □ □□□□. 1~4,294,967,295 □□□□ □□ □□□ □ □□□□.

- *operator* - (□□ □□) □□□□ □□ □□ □□□ □□□□□. □□□□ □□□□ □□□ □□□□ □□ □□□ □□ □□ □□ □□□□□(□: □□ □, □□ 0□, □□ 1□). □ 19 □□□ 399□(□) AS □□□ □□□□ □□ □□□□ □□□ □□□ □□□□□. □ □□ □ □□□ □□□□ □□□(|) □ □□(–) □□□□ □□ □□ □□□ □□□ □□ □□ □□ *term*□□ □□ □□□□ □□□□□.

□□ □□ □□□□□ □□ □□□ □ □□□ □□ □□□ □ □□□□.

□ 20 □□□ 400□(□) AS □□□ □□□□ □□ □□□□ □□□□ □□□ □□ □□□□□.

□ 19: AS □□ □□ □□□ □□□

□□□	□□ □□
{*m*,*n*}	□ *m*□□ □ □ □□ □ *nterm*□□. *m*□ *n* □□ □□ □□□□, *m*□(□) *n*□□ □□□ □□□.
{*m*}	□ □□□ □ *m*□□. *term*□(□) □□ □□□□ *m*□□□.
{*m*,}	*m*□ □ □□ *term*□□. □(□) □□ □□□□ *m*□□□.
*	*term*□ 0□ □□□ □□. □□□ {0,}□ □□□□□.
+	*term*□ 1□ □□□ □□. □□□ {1,}□ □□□□□.
?	*term*□ 0 □□ 1□ □□. □□□ {0,1}□ □□□□□.
|	□□□□ □□ □□□□ □ □ □ □□.
-	□□ □ □□ □□ □□, □□.
^	□□□□ □□ □□ □□□□ □□ □□ □□. □ □□□ □□□□□ □□□□□. □□□ □ □□□ □□ □□□□□.
$	□□□□ □□ □□ □□□□ □ □□ □□. □ □□□ □□□□□ □□□□□. □□□ □ □□□ □□ □□□□□.

□ 19: AS □□ □□ □□□ □□□ *(Continued)*

□□□	□□ □□
( )	□ □□□ □□ □□ □□□□□. □□ □ □ □□ □□ □□□ □□□□□. □□ □□□ □□ □□ □□ □□□□ □□□□ □□("()"), null □□□ □□□□□.
[ ]	AS □□ □□. □□□□ □□□ AS □□□ □□□□ □□□. □□ □ □□ □□□ □□□□□, □□□(-)□ □□□□□. □□(^)□ □□ □□ □□ AS □□□ □□□□ □□□ □□ □□□□ □ □□□ □ □□□□. □: [^123]

□ 20: AS □□ □□ □□□□ □

AS □□ □□	□□ □□□	□□ □□
AS □□□ 1234□□□	1234	1234
AS □□ 1234□ 0□ □□ □□	1234*	1234 1234 1234 1234 1234 1234 Null AS □□
AS □□ 1234□ 0□ □□ 1□ □□	1234? □□ 1234{0,1}	1234 Null AS □□
AS □□ 1234□ 1~4□ □□	1234{1,4}	1234 1234 1234 1234 1234 1234 1234 1234 1234 1234
AS □□ 12□ 1~4□ □□, □□□ AS □□ 34□ 1□ □ □	12{1,4} 34	12 34 12 12 34 12 12 12 34 12 12 12 12 34

□ 20: AS □□ □□ □□□□ □ *(Continued)*

AS □□ □□	□□ □□□	□□ □□
□□ AS □□□ □□□□ AS □□ □□	123–125	123 124 125
	[123–125]*	Null AS □□ 123 124 124 125 125 125 123 124 125 123
□ □□ AS □□□ 56 □□ 78□□□ □□ □□	(. 56) | (. 78) □□ . (56 | 78)	1234 56 1234 78 9876 56 3857 78
□ □□ AS □□□ 56 □□ 78□ □□ □□	. (56 | 78)?	1234 56 52 34 56 1234 1234 78 39 794 78 2
□ □□ AS □□□ 123□□ □ □ AS □□□ 56 □□ 78 □ □□	123 (56| 78)	123 56 123 78
□□□□ □□ □□□ □□□□ □□ □□□ □□□□ □ □□ AS □ □□ □□□□ □□ □□ □□□□ □□□□ □ □ □□□□	. .* □□ . .{ 0,}	1234 1234 5678 1234 5 6 7 8
AS □□□ 1 2 3□□□	1 2 3	1 2 3

□ 20: AS □□ □□ □□□□ □ *(Continued)*

AS □□ □□	□□ □□□	□□ □□
AS □□ 1 □ 2□ 1□ □□, □□□ AS □□ 3□ 1□ □□ □□	1 2 3+	1 2 3 1 2 3 3 1 2 3 3 3
AS □□ 1□ 1□ □□ □□, □□□ AS □□ 2□ 1□ □□ □ □, □□□ AS□ 1□ □□ □□ □□ 3	1+ 2+ 3+	1 2 3 1 1 2 3 1 1 2 2 3 1 1 2 2 3 3
AS □□ 4, 5, 6□□ □□□□ □□ □□□ □□	4 5 6 . *	4 5 6 4 5 6 7 8 9
AS □□ 4, 5, 6□□ □□□ □□ □□□ □□	. * 4 5 6	4 5 6 1 2 3 4 5 6 4 9 4 5 6
AS □□ 5, 12 □□ 18	5 | 12 | 18	5 12 18

Null AS □□ □□

AS □□ □□ □□□□ □□□□ AS□□ □□□ □□(□□□)□ □□□□ null AS □□□ □□□□□. □□□ □□□ □□□ □□ □□□□ AS□ □□□□ □□□□. null AS □□□ □□□□□, □□ □□□ □□ □□□□ □□□□ □□ □□□□ □□□□□.

```
[edit policy-options]
as-path null-as “()";
```

□□ □□□, □□□ □□□□ AS 2□ AS 1(10.2.2.6) □ AS 3□ □□□□□. AS 3□ AS2□ □□□ □□□□□, AS 2□ □□□□ AS 3 □□□ AS 1 □ □□□□ □□ □□□□, AS 1□□ AS 2□ □□ AS 3□□ □□□ □□□ □□□□□. □□ □□□□ □□□□ □□ □□□□ □□ □(□) AS 1□ only-my-routes□□□□□. AS 2□□ AS 1□□ □□ □□□ □□□□□, AS 1□□ AS 3□ □□(□□ □□□ □□ AS□ □□) □□□ □□□□□.

```
[edit policy-options]
as-path null-as "()";
policy-statement only-my-routes {
    term just-my-as {
        from {
            protocol bgp;
            as-path null-as;
        }
        then accept;
    }
    term nothing-else {
        then reject;
    }
}
protocol {
    bgp {
        neighbor 10.2.2.6 {
            export only-my-routes;
        }
    }
}
```

AS □□ □□ □□□□ □□ □□

AS □□ □□ □□□□ POSIX 1003.2□□ □□□ □□□(□□) □□ □□□□ □□□□□. □□ □□□ □□ UNIX □□ □□□□ □□□□□.

- AS □□ □□ □□□□ □□ □□ □□□ AS □□□□, □□ □□□ □□□□.
- □□ □□□□ □□□ AS □□□ *regular-expression*□(□) □□□ □□□□ □□□□ □□□ □□□□□. □□□ UNIX □□ □□□□ ^*regular-expression*$□□□. □□ □□, AS □□ □□ □□□ 1234□(□) UNIX □□ □□□ ^1234$□(□) □□□□□.
- □□□□□ □□□□ □□□□ □□ □□□□ □□□ □ □□□□.

□: AS □□ □□ □□□ □□

□□□ AS □□ 1234 56 78 9□ □□□ □□□□ □□□ □□□□□.

```
[edit]
policy-options {
    as-path wellington "1234 56 78 9";
    policy-statement from-wellington {
        term term1 {
            from as-path wellington;
        }
            then {
                preference 200;
                accept;
            }
        term term2 {
            then reject;
        }
    }
}
```

AS□□ □□ □□□ □□□□, □□ □□ □□ □ □□□□□.

```
[edit]
policy-options {
    as-path wellington-alternate “1234{1,6} (56|47)? (78|101|112)* 9+”;
    policy-statement from-wellington {
        from as-path wellington-alternate;
        }
        then {
            preference 200;
            accept;
        }
    }
}
```

123, 124 □□ 125□ AS □□ □□□ □□□□, □□ □□ □□ □ □□□□□.

```
[edit]
policy-options {
```

```
    as-path addison "123-125";
    policy-statement from-addison {
        from as-path addison;
        }
        then {
            preference 200;
            accept;
        }
    }
}
```


□□ □□

□: AS □□ □□ □□□ □□ | 405

□: AS □□ □□□□ □□ □□□ □□ □□ | 421

□: AS □□ □□ □□□ □□

in this section

- □□ □□ | 405
- □□ | 406
- □□ | 408
- □□ | 416

AS(Autonomous System) □□□ BGP□□ □□□□ □□ □□□□□. AS □□□ □□ □□□ □□□ □□□ □□□ □□□□ □ □□ □□□□□. □ □□ □ □ □□□ □□ □□ AS □□ □□□ □□ □□ □□□□ □□□□ □□□ □□□□□.

□□ □□

□ □□ □□□□ □□ □□□□ □□□□ □□□ □□□ □□□ □□□□ □□□□.

??

in this section

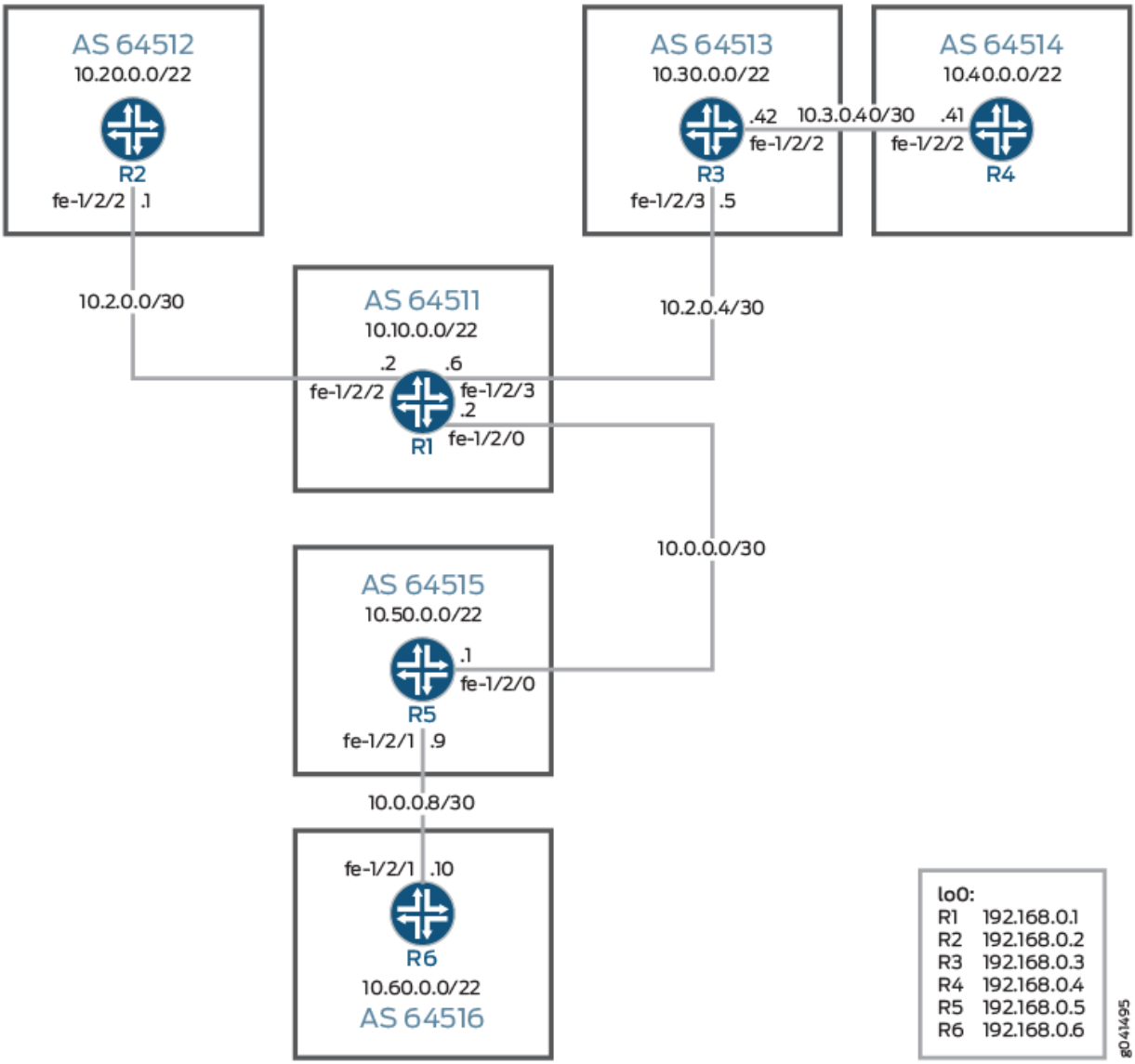
- ???? | 406

?? 30 ??? 407 ? ?? BGP(EBGP) ??? ??? ?? ??? ?? AS? ??????. ? ?????? ??? ?? ?? ??? ?? ??? ??????.

????

?? 30 ??? 407? ?? ?????? ??????.

?? 30: BGP ???? AS ?? ???



AS 64516? ???? AS 64513 ? AS 64514?? ???? ?? ??? ????? ???. ? `orig-in-64514` ?? `orig-in-64513` ?? `reject-some-routes`?? ?? ? ???? ? ?? AS ?? ?? ???? ?????. ?? ?? ??? ??? ???? R6? ???? ???? ?????.

"CLI ?? ??" ??? 408?(?) ?? 30 ??? 407 ? ?? ????? ??? ?????.

? ????? "No Link Title" ??? 411 ???? R2 ? ???? R6? ??? ?????. "??" ??? 416 ??? ???? ???? ??? ?? ?? ? ??? R2?? ??? `show route` ?? ??? ???? `aspath-regex` ??? ?????.

??

in this section

- CLI ?? ?? | 408
- ?? | 411

CLI ?? ??

? ?? ??? ??????, ?? ??? ????? ??? ??? ?? ?? ?? ?? ????????? ?????, ????? ??? ????? ? ??? ?? ??? ??? [edit] ? ? ????? ??? CLI? ??? ?? ?????.

???? R1

```
set interfaces fe-1/2/2 unit 0 description to-R2
set interfaces fe-1/2/2 unit 0 family inet address 10.2.0.2/30
set interfaces fe-1/2/3 unit 0 description to-R3
set interfaces fe-1/2/3 unit 0 family inet address 10.2.0.6/30
set interfaces fe-1/2/0 unit 0 description to-R5
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp export send-static
set protocols bgp group 64512 type external
set protocols bgp group 64512 peer-as 64512
set protocols bgp group 64512 neighbor 10.2.0.1
set protocols bgp group 64513 type external
set protocols bgp group 64513 peer-as 64513
set protocols bgp group 64513 neighbor 10.2.0.5
set protocols bgp group 64515 type external
set protocols bgp group 64515 peer-as 64515
set protocols bgp group 64515 neighbor 10.0.0.1
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.10.1.0/24 reject
set routing-options static route 10.10.2.0/24 reject
set routing-options static route 10.10.3.0/24 reject
set routing-options autonomous-system 64511
```

□□□□ R2

```
set interfaces fe-1/2/2 unit 0 description to-R1
set interfaces fe-1/2/2 unit 0 family inet address 10.2.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp export send-static
set protocols bgp group 64511 type external
set protocols bgp group 64511 peer-as 64511
set protocols bgp group 64511 neighbor 10.2.0.2
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.20.1.0/24 reject
set routing-options static route 10.20.2.0/24 reject
set routing-options static route 10.20.3.0/24 reject
set routing-options autonomous-system 64512
```

□□□□ R3

```
set interfaces fe-1/2/3 unit 0 description to-R1
set interfaces fe-1/2/3 unit 0 family inet address 10.2.0.5/30
set interfaces fe-1/2/2 unit 0 description to-R4
set interfaces fe-1/2/2 unit 0 family inet address 10.3.0.42/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp export send-static
set protocols bgp group 64511 type external
set protocols bgp group 64511 peer-as 64511
set protocols bgp group 64511 neighbor 10.2.0.6
set protocols bgp group 64514 type external
set protocols bgp group 64514 peer-as 64514
set protocols bgp group 64514 neighbor 10.3.0.41
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.30.1.0/24 reject
set routing-options static route 10.30.2.0/24 reject
set routing-options static route 10.30.3.0/24 reject
set routing-options autonomous-system 64513
```

□□□□ R4

```
set interfaces fe-1/2/2 unit 0 description to-R3
set interfaces fe-1/2/2 unit 0 family inet address 10.3.0.41/30
```

```
set interfaces lo0 unit 0 family inet address 192.168.0.4/32
set protocols bgp export send-static
set protocols bgp group 64513 type external
set protocols bgp group 64513 peer-as 64513
set protocols bgp group 64513 neighbor 10.3.0.42
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.40.1.0/24 reject
set routing-options static route 10.40.2.0/24 reject
set routing-options static route 10.40.3.0/24 reject
set routing-options autonomous-system 64514
```

???? R5

```
set interfaces fe-1/2/0 unit 0 description to-R1
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/1 unit 0 description to-R6
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.9/30
set interfaces lo0 unit 0 family inet address 192.168.0.5/32
set protocols bgp export send-static
set protocols bgp group 64511 type external
set protocols bgp group 64511 peer-as 64511
set protocols bgp group 64511 neighbor 10.0.0.2
set protocols bgp group 64516 type external
set protocols bgp group 64516 peer-as 64516
set protocols bgp group 64516 neighbor 10.0.0.10
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.50.1.0/24 reject
set routing-options static route 10.50.2.0/24 reject
set routing-options static route 10.50.3.0/24 reject
set routing-options autonomous-system 64515
```

???? R6

```
set interfaces fe-1/2/1 unit 0 description to-R5
set interfaces fe-1/2/1 unit 0 family inet address 10.0.0.10/30
set interfaces lo0 unit 0 family inet address 192.168.0.6/32
set protocols bgp export send-static
set protocols bgp group 64515 type external
set protocols bgp group 64515 import reject-some-routes
```

```
set protocols bgp group 64515 peer-as 64515
set protocols bgp group 64515 neighbor 10.0.0.9
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set policy-options policy-statement reject-some-routes term find-routes from as-path orig-
in-64513
set policy-options policy-statement reject-some-routes term find-routes from as-path orig-
in-64514
set policy-options policy-statement reject-some-routes term find-routes then reject
set policy-options as-path orig-in-64513 ".* 64513"
set policy-options as-path orig-in-64514 ".* 64514"
set routing-options static route 10.60.1.0/24 reject
set routing-options static route 10.60.2.0/24 reject
set routing-options static route 10.60.3.0/24 reject
set routing-options autonomous-system 64516
```

□□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□□ □□ □□□ Junos OS CLI □□□ □□□□ "□□ □□□□ CLI □□□ □□" □□□ 1787□ (□) □□□□□□□.

□□□□ R2 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set fe-1/2/2 unit 0 description to-R1
user@R2# set fe-1/2/2 unit 0 family inet address 10.2.0.1/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. □□□□ R1□ EBGP □□□ □□□□□.

```
[edit protocols bgp]
user@R2# set export send-static
user@R2# set group 64511 type external
user@R2# set group 64511 peer-as 64511
user@R2# set group 64511 neighbor 10.2.0.2
```

3. □□□ □□ □□

```
[edit policy-options policy-statement send-static term 1]
user@R2# set from protocol static
user@R2# set then accept
```

4. □□ □□□ □□□□□.

```
[edit routing-options static]
user@R2# set route 10.20.1.0/24 reject
user@R2# set route 10.20.2.0/24 reject
user@R2# set route 10.20.3.0/24 reject
```

5. AS □□□ □□□□□.

```
[edit routing-options]
user@R2# set autonomous-system 64512
```

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□□ □□ □□□ Junos OS CLI □□□ □□□□ "□□ □□□□ CLI □□□ □□" □□□ 1787□ (□) □□□□□□□.

□□□□ R6 □□:

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R6# set fe-1/2/1 unit 0 description to-R5
user@R6# set fe-1/2/1 unit 0 family inet address 10.0.0.10/30
user@R6# set lo0 unit 0 family inet address 192.168.0.6/32
```

2. □□□□ R5□ EBGP □□□ □□□□□.

```
[edit protocols bgp]
user@R6# set export send-static
user@R6# set group 64515 type external
user@R6# set group 64515 import reject-some-routes
```

```
user@R6# set group 64515 peer-as 64515
user@R6# set group 64515 neighbor 10.0.0.9
```

3. [illegible]

```
[edit policy-options policy-statement send-static term 1]
user@R6# set  from protocol static
user@R6# set then accept
```

4. [illegible]

```
[edit policy-options policy-statement reject-some-routes term find-routes]
user@R6# set from as-path orig-in-64513
user@R6# set from as-path orig-in-64514
user@R6# set then reject
[edit policy-options]
user@R6# set as-path orig-in-64513 ".* 64513"
user@R6# set as-path orig-in-64514 ".* 64514"
```

5. [illegible]

```
[edit routing-options static]
user@R6# set route 10.60.1.0/24 reject
user@R6# set route 10.60.2.0/24 reject
user@R6# set route 10.60.3.0/24 reject
```

6. AS [illegible]

```
[edit routing-options]
user@R6# set autonomous-system 64516
```

[illegible]

[illegible] show interfaces, show protocols, show policy-options [illegible] show routing-options [illegible]. [illegible]
[illegible] [illegible] [illegible] [illegible].

□□□□ R2

```
user@R2# show interfaces
fe-1/2/0 {
    unit 0 {
        description to-R1;
        family inet {
            address 10.2.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    export send-static;
    group 64511 {
        type external;
        peer-as 64511;
        neighbor 10.2.0.2;
    }
}
```

```
user@R2# show policy-options
policy-statement send-static {
    term 1 {
        from protocol static;
        then accept;
```

```
    }
}
```

```
user@R2# show routing-options
static {
    route 10.20.1.0/24 reject;
    route 10.20.2.0/24 reject;
    route 10.20.3.0/24 reject;
}
autonomous-system 64512;
```

???? R6

```
user@R6# show interfaces
fe-1/2/0 {
    unit 0 {
        description to-R5;
        family inet {
            address 10.0.0.10/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.6/32;
        }
    }
}
```

```
user@R6# show protocols
bgp {
    export send-static;
    group 64515 {
        type external;
        import reject-some-routes;
        peer-as 64515;
        neighbor 10.0.0.9;
```

```
    }
}
```

```
user@R6# show policy-options
policy-statement reject-some-routes {
    term find-routes {
        from as-path [ orig-in-64513 orig-in-64514 ];
        then reject;
    }
}
policy-statement send-static {
    term 1 {
        from protocol static;
        then accept;
    }
}
as-path orig-in-64513 ".* 64513";
as-path orig-in-64514 ".* 64514";
```

```
user@R6# show routing-options
static {
    route 10.60.1.0/24 reject;
    route 10.60.2.0/24 reject;
    route 10.60.3.0/24 reject;
}
autonomous-system 64516;
```

□□□□ □□□ □□□□ □□□□□□□ commit□(□) □□□□□.

□□

in this section

- □□□□ R2□□ □□ □□ | **417**
- □□□□ R6□□ □□□ □□□□□□ □□ | **418**

□□□ □□□□ □□□□ □□□ □□□□□.

□□□□ R2□□ □□ □□

□□

□□□□ R2□□ □□□ □□□□ show route aspath-regex □□□□ □□□□ □□□ □□□□.

□□

AS 64516□ □□□□ R6□□ □□□ □□□ □□□□.

```
user@R2> show route terse aspath-regex ".* 64516"

inet.0: 21 destinations, 21 routes (21 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A V Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* ? 10.60.1.0/24       B 170        100                           64511 64515 64516 I
  unverified                                      >10.2.0.2
* ? 10.60.2.0/24       B 170        100                           64511 64515 64516 I
  unverified                                      >10.2.0.2
* ? 10.60.3.0/24       B 170        100                           64511 64515 64516 I
  unverified                                      >10.2.0.2
```

AS 64514 □□ AS 64516□□ □□□ □□□ □□□□.

```
user@R2> show route terse aspath-regex ".* (64514|64516)"

inet.0: 21 destinations, 21 routes (21 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A V Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* ? 10.40.1.0/24       B 170        100                           64511 64513 64514 I
  unverified                                      >10.2.0.2
* ? 10.40.2.0/24       B 170        100                           64511 64513 64514 I
  unverified                                      >10.2.0.2
* ? 10.40.3.0/24       B 170        100                           64511 64513 64514 I
  unverified                                      >10.2.0.2
* ? 10.60.1.0/24       B 170        100                           64511 64515 64516 I
  unverified                                      >10.2.0.2
* ? 10.60.2.0/24       B 170        100                           64511 64515 64516 I
  unverified                                      >10.2.0.2
```

```
* ? 10.60.3.0/24       B 170        100                          64511 64515 64516 I
  unverified                                    >10.2.0.2
```

AS 64513□ □□ □□□□□ □□□□ □□□ □□□□.

```
user@R2> show route terse aspath-regex ".* 64513 .+"

inet.0: 21 destinations, 21 routes (21 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A V Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* ? 10.40.1.0/24       B 170        100                          64511 64513 64514 I
  unverified                                    >10.2.0.2
* ? 10.40.2.0/24       B 170        100                          64511 64513 64514 I
  unverified                                    >10.2.0.2
* ? 10.40.3.0/24       B 170        100                          64511 64513 64514 I
  unverified
```

□□

□□□□ □□□ AS □□ □□ □□□□ □□□□ □□□ □□□ □□□ □□□□□.

□□□□ R6□□ □□□ □□□□□□□ □□

□□

□□□□ R6□□ □□□ □□□□ `show route` and `show route hidden` AS 64513 □ AS 64514□□ □□□□ □□□ □□□□ R6□ □□□ □□□□ □□ □□□□□ □□□□□.

□□

```
user@R6> show route 10.30.0/22
inet.0: 21 destinations, 21 routes (15 active, 0 holddown, 6 hidden)
```

```
user@R6> show route 10.40.0/22
inet.0: 21 destinations, 21 routes (15 active, 0 holddown, 6 hidden)
```

```
user@R6> show route hidden

inet.0: 21 destinations, 21 routes (15 active, 0 holddown, 6 hidden)
+ = Active Route, - = Last Active, * = Both

10.30.1.0/24        [BGP ] 02:24:47, localpref 100
                      AS path: 64515 64511 64513 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/1.0
10.30.2.0/24        [BGP ] 02:24:47, localpref 100
                      AS path: 64515 64511 64513 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/1.0
10.30.3.0/24        [BGP ] 02:24:47, localpref 100
                      AS path: 64515 64511 64513 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/1.0
10.40.1.0/24        [BGP ] 02:24:47, localpref 100
                      AS path: 64515 64511 64513 64514 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/1.0
10.40.2.0/24        [BGP ] 02:24:47, localpref 100
                      AS path: 64515 64511 64513 64514 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/1.0
10.40.3.0/24        [BGP ] 02:24:47, localpref 100
                      AS path: 64515 64511 64513 64514 I, validation-state: unverified
                    > to 10.0.0.9 via fe-1/2/1.0
```

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AS □□□ □□ □□□ □□ □□□ AS(Autonomous System) □□□ *□□□*□ □□□□. AS □□□ □□□ □□□ □□ AS □□□ □□□ □□□ □ □□□ □□ □□□ □□□□□. AS □□ □□ □□□□ □□ AS □□□ □ □□ □□□□ BGP□□ □ □□□□□.

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- BGP□ □□ □□□ □□ □ □□ □□ □□ □(□□ □□□□□ □)□ □□□□.
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Junos OS □□□ 9.1 □□, RFC 4893 4□□ *□□ AS □□ □□□ □□ BGP □□* □□□ 4□□□ AS □□□ □□□ □□ □□□, Junos OS□ □ □ □□□□□ □□□□ 2□□□ AS □□□ □□□ □ □□□□. □□ □□ □□□□□ 1□□ 4,294,967,295 □□□ □□ □□□ □ □□□□.

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□: AS □□ □□□□ □□ □□□ □□ □□ | 421

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? ???? ?? *prependpolicy1* ??? ??? ?? ?? *prependterm1*? ??????. ??? ??? ??? ??? ??? ????? ??? ?? ? 172.16.0.0/12, 192.168.0.0/16 ? 10.0.0.0/8 ???? ???? ??? AS ?? 65001? ? ???????. ? ?? ??? ??? ??? ? ?? ???? ?????? ??? ?? ? ??? ??????. ? *prependpolicy1* ??? AS 65001? R1?? AS ?? 65000? R2? ???? BGP ??? ???? ?? ?? ??????. ??? ??? ??? ???? ?? ???? AS ?? ???? ???? ????.

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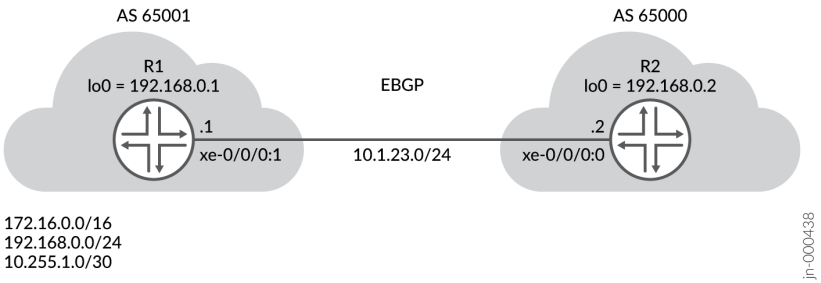

□□□□□□ EBGP □□□□ R1□ R2 □□□ □□□□□. 10.1.23.0/24 □□□ □□□ □□ □□ □□□□□ □□□□ □□□□□. R1□ AS □□ 65001 □ □□□, R2□ □□□ □ □□□□ □□ □□ □□□ AS □□ □□ □□□□□ □□□□□.

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BGP □□ □□□ □□ □□□ □□□ □(□) □□□□□□ *Understanding BGP Path Selection*.

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```
set system host-name R1

set interfaces xe-0/0/0:1 unit 0 family inet address 10.1.23.1/24
set interfaces xe-0/0/0:0 unit 0 family inet address 10.255.1.1/30
set interfaces xe-0/0/0:0 unit 0 family inet address 172.16.0.1/24
set interfaces xe-0/0/0:0 unit 0 family inet address 10.200.1.1/24
set interfaces lo0 unit 0 family inet address 192.168.0.1/32

set policy-options policy-statement prependpolicy1 term prependterm1 from protocol direct
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
172.16.0.0/16 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
192.168.0.0/24 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
10.255.1.0/24 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 then as-path-prepend "65001
65001 65001"
set policy-options policy-statement prependpolicy1 term prependterm1 then accept
set policy-options policy-statement prependpolicy1 term else from protocol direct
set policy-options policy-statement prependpolicy1 term else from route-filter 10.200.0.0/16
orlonger
set policy-options policy-statement prependpolicy1 term else then accept

set routing-options autonomous-system 65001
set routing-options router-id 192.168.0.1

set protocols bgp group ebgp type external
set protocols bgp group ebgp export prependpolicy1
set protocols bgp group ebgp peer-as 65000
set protocols bgp group ebgp neighbor 10.1.23.2
```

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1. [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R1#
[edit]
set interfaces xe-0/0/0:1 unit 0 family inet address 10.1.23.1/24
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
```

2. AS [illegible], RID [illegible] [illegible] BGP [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] *prependpolicy1* . [illegible] [illegible] R1[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R1#
[edit]
set routing-options autonomous-system 65001
set routing-options router-id 192.168.0.1

set protocols bgp group ebgp type external
set protocols bgp group ebgp export prependpolicy1
set protocols bgp group ebgp peer-as 65000
set protocols bgp group ebgp neighbor 10.1.23.2
```

3. *prependpolicy1* [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] or-longer [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] exact [illegible] [illegible] [illegible] [illegible]. [illegible] *else* [illegible] [illegible] [illegible] *prependterm1* [illegible] [illegible] [illegible] [illegible] *else* [illegible] [illegible] AS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R1#
[edit]
set policy-options policy-statement prependpolicy1 term prependterm1 from protocol direct
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
172.16.0.0/16 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
192.168.0.0/24 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
10.255.1.0/24 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 then as-path-prepend
"65001 65001 65001"
set policy-options policy-statement prependpolicy1 term prependterm1 then accept
set policy-options policy-statement prependpolicy1 term else from protocol direct
set policy-options policy-statement prependpolicy1 term else from route-filter 10.200.0.0/16
```

```
orlonger
set policy-options policy-statement prependpolicy1 term else then accept
```

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```
user@R1#
[edit]
set interfaces xe-0/0/0:0 unit 0 family inet address 10.255.1.1/30
set interfaces xe-0/0/0:0 unit 0 family inet address 172.16.0.1/24
set interfaces xe-0/0/0:0 unit 0 family inet address 10.200.1.1/24
```

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□□ □□□□ , **show protocols bgp**, **show routing-options**□ **show interfaces** □□□ □□□□ **show policy-options**□□□ □□□□□. □□□ □□□ □□□ □□□□ □□□, □ □□ □□ □□□ □□□□ □□□□□.

```
user@R1#[edit]
user@R1# show policy-options
policy-statement prependpolicy1 {
    term prependterm1 {
        from {
            protocol direct;
            route-filter 172.16.0.0/16 orlonger;
            route-filter 192.168.0.0/24 orlonger;
            route-filter 10.255.1.0/24 orlonger;
        }
        then {
            as-path-prepend "65001 65001 65001";
            accept;
        }
    }
    term else {
        from {
            protocol direct;
            route-filter 10.200.0.0/16 orlonger;
        }
```

```
        then accept;
    }
}

[edit]
user@R1# show protocols bgp
group ebgp {
    type external;
    export direct;
    peer-as 65000;
    neighbor 10.1.23.2;
}

[edit]
user@R1# show routing-options
autonomous-system 65001;
router-id 192.168.0.1

user@R1# show interfaces xe-0/0/0:0
unit 0 {
    family inet {
        address 10.255.1.1/30;
        address 172.16.0.1/24;
        address 10.200.1.1/24;
    }
}
[edit]
user@R1# show interfaces xe-0/0/0:1
unit 0 {
    family inet {
        address 10.1.23.1/24;
    }
}
[edit]
user@R1# show interfaces lo0
unit 0 {
    family inet {
        address 192.168.0.1/32;
    }
}
```

R1 [illegible] **commit**.

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- AS ?? ??? ?? | 428

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?? ????? **show policy** ***prependpolicy1*** ??? ??????.

```
user@R1> show policy prependpolicy1
Policy prependpolicy1:  [CHANGED/RESOLVED/]
    Term prependterm1:
        from proto Direct
             route filter:
                 172.16.0.0/16 orlonger
                 192.168.0.0/24 orlonger
                 10.255.1.0/24 orlonger
        then aspathprepend 65001 65001 65001 accept
    Term else:
        from proto Direct
             route filter:
                 10.200.0.0/16 orlonger
        then accept
```

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□□ □□□□ **show bgp neighbor 10.1.23.2** □□□ □□□□□.

```
user@R1> show bgp neighbor 10.1.23.2
Peer: 10.1.23.2+49642 AS 65000 Local: 10.1.23.1+179 AS 65001
  Group: ebgp                  Routing-Instance: master
  Forwarding routing-instance: master
  Type: External    State: Established    Flags: <Sync>
  Last State: OpenConfirm   Last Event: RecvKeepAlive
  Last Error: None
  Export: [ prependpolicy1 ]
  Options: <PeerAS Refresh>
  Options: <GracefulShutdownRcv>
  Holdtime: 90 Preference: 170
  Graceful Shutdown Receiver local-preference: 0
  Number of flaps: 1
  Last flap event: RecvNotify
  Error: 'Cease' Sent: 0 Recv: 1
  Peer ID: 192.168.0.2   Local ID: 192.168.0.1    Active Holdtime: 90
  . . .
  Input messages:  Total 2498   Updates 1       Refreshes 0     Octets 47510
  Output messages: Total 2500   Updates 3       Refreshes 0     Octets 47620
  Output Queue[1]: 0            (inet.0, inet-unicast)
```

□□ □□□ BGP □□□ □□□□□ R1□ □□□ □□□□□ □□ *prependpolicy1* □□□ □□□□□.

AS □□ □□□ □□

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□□□□ □□□ □□□□ □□□ AS □□□ □□□□ □□□ □□□□□ □□□□□.

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□□ □□□□ R2□ **show route protocol bgp** □□□ □□□□□. □□ at R1□ **show route advertising-protocol bgp 10.1.23.2** □□□□ R2□ □□□□ □□□ □□ □□ □□□ □□□□□.

```
user@R2> show route protocol bgp

inet.0: 14 destinations, 14 routes (14 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.200.1.0/24      *[BGP/170] 00:04:46, localpref 100
                      AS path: 65001 I, validation-state: unverified
                    >  to 10.1.23.1 via xe-0/0/0:0.0
10.255.1.0/30      *[BGP/170] 00:04:46, localpref 100
                      AS path: 65001 65001 65001 65001 I, validation-state: unverified
                    >  to 10.1.23.1 via xe-0/0/0:0.0
172.16.0.0/24      *[BGP/170] 00:04:46, localpref 100
                      AS path: 65001 65001 65001 65001 I, validation-state: unverified
                    >  to 10.1.23.1 via xe-0/0/0:0.0
192.168.0.1/32     *[BGP/170] 00:04:46, localpref 100
                      AS path: 65001 65001 65001 65001 I, validation-state: unverified
                    >  to 10.1.23.1 via xe-0/0/0:0.0
```

□□□ □□ □□□□ AS □□ □□□□ □□□□□. 10.200.1.0/24 □□□□ AS □□ 65001□ □□□□□ □□□ □□□□. □ □□□ □□□ □□ □□ □ *prependterm1prependpolicy1* □ □□□□ □□□□ □□□□ □□□□ □□□□.

□□□□ □□ R2□ □□□□ BGP □□□ □□ R1□ □□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.1.23.2

inet.0: 16 destinations, 16 routes (16 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.200.1.0/24           Self                                    I
* 10.255.1.0/30           Self                                    65001 65001 65001 [65001] I
* 172.16.0.0/24           Self                                    65001 65001 65001 [65001] I
* 192.168.0.1/32          Self                                    65001 65001 65001 [65001] I
```

?? ?? ??

R1? ?? ?? ??????.

```
set system host-name R1
set interfaces xe-0/0/0:0 unit 0 family inet address 10.255.1.1/30
set interfaces xe-0/0/0:0 unit 0 family inet address 172.16.0.1/24
set interfaces xe-0/0/0:0 unit 0 family inet address 10.200.1.1/24
set interfaces xe-0/0/0:1 unit 0 family inet address 10.1.23.1/24
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set policy-options policy-statement prependpolicy1 term prependterm1 from protocol direct
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
172.16.0.0/16 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
192.168.0.0/24 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 from route-filter
10.255.1.0/24 orlonger
set policy-options policy-statement prependpolicy1 term prependterm1 then as-path-prepend "65001
65001 65001"
set policy-options policy-statement prependpolicy1 term prependterm1 then accept
set policy-options policy-statement prependpolicy1 term else from protocol direct
set policy-options policy-statement prependpolicy1 term else from route-filter 10.200.0.0/16
orlonger
set policy-options policy-statement prependpolicy1 term else then accept
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 65001
set protocols bgp group ebgp type external
set protocols bgp group ebgp export prependpolicy1
set protocols bgp group ebgp peer-as 65000
set protocols bgp group ebgp neighbor 10.1.23.2
```

R2? ?? ?? ??????.

```
set system host-name R2
set interfaces xe-0/0/0:0 unit 0 family inet address 10.1.23.2/24
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 65000
set protocols bgp group ebgp type external
set protocols bgp group ebgp peer-as 65001
set protocols bgp group ebgp neighbor 10.1.23.1
```

BGP AS ??? AS ?? ?? ??

?? ??? AS ??? ?????? AS ????? ??? ? ?????. ?? AS ??? ??? ????? ?? AS ??? ??????. AS ??? ????? ?? AS ??? ? ?? ???? ???? BGP?? ?????? ?????. ?? ???? ???? AS ??? ????? ?? ????? *n* ?????, ???? ?(? *n*) 1?? 32 ???? ??????. ?? AS ?? ?? ???? ???? AS ?? ????? ?????? ?? ????? AS ?? ?? ????? ???? ??????.

?: ???? ????? ? as-path-prepend ?? ???? ?? as-path-expand ????? ??, ???? AS ?? ???? ???? ? ?? AS ???? ???? ???? ????? ?? ?? as-path-prepend ?? ?? ????? as-path-expand ???.

?? ??, AS 1?? AS 4? ????? ? ?? ???? ??(AS 2 ? AS 3? ??)? ?????. ?? ???? ???? AS 2? ????? ???? ?????? ? ? ???? ?. ???? BGP? AS 2? ????? ???? ?????? AS 3? ????? ???? ? ?????? ?? ????. AS 1???? ?? AS ???? ???? ? ?????.

```
[edit]
policy-options {
    policy-statement as-path-expand {
        term expand {
            from {
                route-filter 192.168.0.0/16 orlonger;
                route-filter 172.16.0.0/12 orlonger;
                route-filter 10.0.0.0/8 orlonger;
            }
            then as-path-expand last-as count 4;
        }
    }
}
```

AS 2? ???? ??, ?? ? ???? 1 2 2 2 2 2?? ???, ???? 1? AS 1??, AS 2? 2? ? ? ?? ?????, ???? 2? ?? ?????? ???? ?? 2????.

?? ??

> ?: BGP?? ?? ?? ?? | 432
>
> ?: AS ?? ????? ?? ???? ?? ?? | 421

?: BGP?? ?? ?? ??

in this section

- ?? ?? | 432
- ?? | 432
- ?? | 434
- ?? | 461

? ?????? BGP ???? ??? ?? ??? ????? ?? ?? ??? ?????? ??????. BGP?? ?? ??? ???? ?? RFC 7911(*BGP?? ?? ?? ??*)? ??????????.

?? ??

? ??? ???? ???? ? ?????? ?? ??? ??? ????.

- BGP ?? ???? 8?.
- BGP ?? ???? ? 5?? ???? ???? ???. ?? ??, EX ??? ??? ???? ??????.
- BGP ?? ???? ? 3?? ?? ??? ?????? ?????? (?? ?? ?? ??? ?? ???) ??????. ??? 3?? BPG ?? ?????? M ??? ? ???? ?? ???, MX ??? 5G ???? ??? ??? ?? T ??? ?? ?????? ???.
- ??? ??? 3?? Junos OS ??? 11.4 ??? ???? ???.

??

in this section

- ???? ?????? | 433

?? ??? ???? ?? ?? ??? ???? ? ??????.

```
[edit protocols bgp group group-name family family]
add-path {
    receive;
```

```
    send {
        include-backup-path include-backup-path;
        multipath;
        path-count path-count;
        path-selection-mode {
            (all-paths | equal-cost-paths);
        }
        prefix-policy [ policy-names ... ];
    }
}
```

□ □□□□ □□□ R5, □□□ R6, □□□ R7□ BGP□ □□ □□□□ □□□□□□. □□□ R1 □ □□□ R4□ □□ □□□□□□□. □□□ R2 □ □□□ R3□ □□ □□□□ R1□ □□□□□□□□. □□□ R8□ □□ □□□□ R4□ □□□□□□□□.

□□ □□□□□ BGP□□ □□ □□ □□□ □□□□□ □□ □□□□ □□□□□.

add-path send path-count 6 □□□□□ □□□ R1□ (□□□ □) □□ 6□□ □□□ □□□ R4□ □□□□□ □□□□□.

add-path receive □□□□□ □□□ R4□ □□□ R1□□□□ □□ □□□ □□□□□ □□□□□.

add-path send path-count 6 □□□□□ □□□ R4□ □□ 6□□ □□□ □□□ R8□ □□□□□ □□□□□.

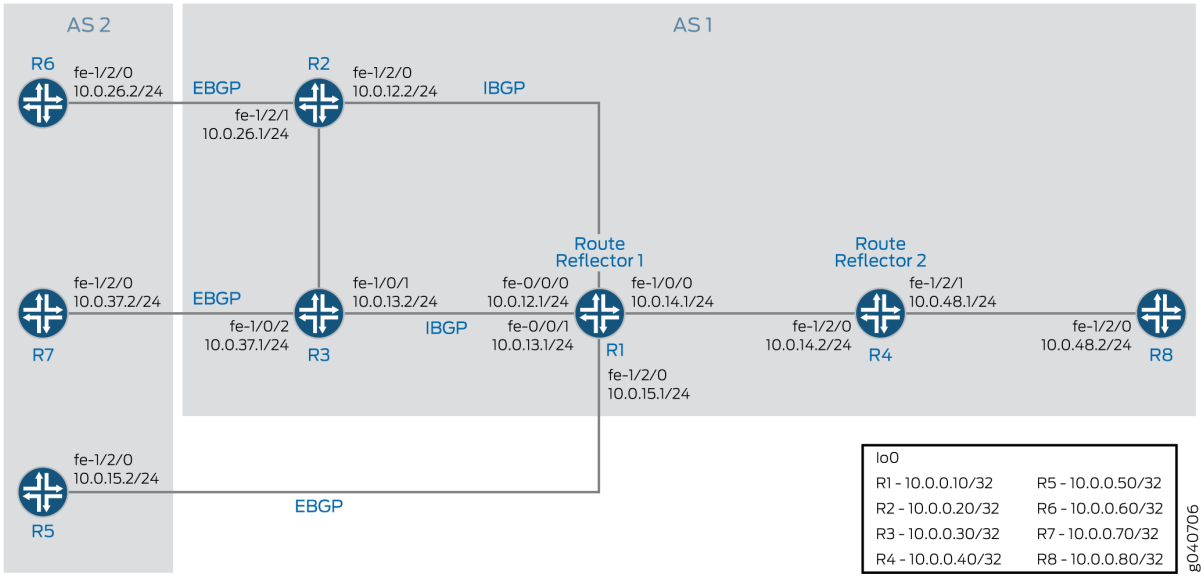
add-path receive □□□□□ □□□ R8□ □□□ R4□□□ □□ □□□ □□□□□ □□□□□.

add-path send prefix-policy allow_199 □□ □□□ □□□□ □□□ □□□□ □□□ □□□ R4□ 172.16.199.1/32 □□□ □□□□ □□ □□□ □□□□□ □□□□□.

□□□□ □□□□□

□□ 31 □□□ 434 □ □□□□ □□□□ □□□□□ □□□□□.

?? 31: BGP?? ?? ?? ??



??

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- ??? R2 ???? | 442
- ??? R3 ?? | 445
- ??? R4 ?? | 448
- ??? R5 ?? | 452
- ??? R6 ?? | 454
- ??? R7 ?? | 457
- ??? R8 ?? | 459
- ?? | 460

CLI □□ □□

□ □□ □□□ □□□□□, □□ □□□ □□□□ □□□ □□□ □□ □□ □□ □□ □□□□□□□□ □□□□, □□□□ □□□ □□□□ □ □□□ □□ □□□ □□□ [edit] □ □ □□□□ □□□ CLI□ □□□ □□ □□□□.

□□□ R1

```
set interfaces fe-0/0/0 unit 12 family inet address 10.0.12.1/24
set interfaces fe-0/0/1 unit 13 family inet address 10.0.13.1/24
set interfaces fe-1/0/0 unit 14 family inet address 10.0.14.1/24
set interfaces fe-1/2/0 unit 15 family inet address 10.0.15.1/24
set interfaces lo0 unit 10 family inet address 10.0.0.10/32
set protocols bgp group rr type internal
set protocols bgp group rr local-address 10.0.0.10
set protocols bgp group rr cluster 10.0.0.10
set protocols bgp group rr neighbor 10.0.0.20
set protocols bgp group rr neighbor 10.0.0.30
set protocols bgp group e1 type external
set protocols bgp group e1 neighbor 10.0.15.2 local-address 10.0.15.1
set protocols bgp group e1 neighbor 10.0.15.2 peer-as 2
set protocols bgp group rr_rr type internal
set protocols bgp group rr_rr local-address 10.0.0.10
set protocols bgp group rr_rr neighbor 10.0.0.40 family inet unicast add-path send path-count 6
set protocols ospf area 0.0.0.0 interface lo0.10 passive
set protocols ospf area 0.0.0.0 interface fe-0/0/0.12
set protocols ospf area 0.0.0.0 interface fe-0/0/1.13
set protocols ospf area 0.0.0.0 interface fe-1/0/0.14
set protocols ospf area 0.0.0.0 interface fe-1/2/0.15
set routing-options router-id 10.0.0.10
set routing-options autonomous-system 1
```

□□□ R2

```
set interfaces fe-1/2/0 unit 21 family inet address 10.0.12.2/24
set interfaces fe-1/2/1 unit 26 family inet address 10.0.26.1/24
set interfaces lo0 unit 20 family inet address 10.0.0.20/32
set protocols bgp group rr type internal
set protocols bgp group rr local-address 10.0.0.20
set protocols bgp group rr neighbor 10.0.0.10 export set_nh_self
set protocols bgp group e1 type external
set protocols bgp group e1 neighbor 10.0.26.2 peer-as 2
set protocols ospf area 0.0.0.0 interface lo0.20 passive
```

```
set protocols ospf area 0.0.0.0 interface fe-1/2/0.21
set protocols ospf area 0.0.0.0 interface fe-1/2/1.28
set policy-options policy-statement set_nh_self then next-hop self
set routing-options autonomous-system 1
```

??? R3

```
set interfaces fe-1/0/1 unit 31 family inet address 10.0.13.2/24
set interfaces fe-1/0/2 unit 37 family inet address 10.0.37.1/24
set interfaces lo0 unit 30 family inet address 10.0.0.30/32
set protocols bgp group rr type internal
set protocols bgp group rr local-address 10.0.0.30
set protocols bgp group rr neighbor 10.0.0.10 export set_nh_self
set protocols bgp group e1 type external
set protocols bgp group e1 neighbor 10.0.37.2 peer-as 2
set protocols ospf area 0.0.0.0 interface lo0.30 passive
set protocols ospf area 0.0.0.0 interface fe-1/0/1.31
set protocols ospf area 0.0.0.0 interface fe-1/0/2.37
set policy-options policy-statement set_nh_self then next-hop self
set routing-options autonomous-system 1
```

??? R4

```
set interfaces fe-1/2/0 unit 41 family inet address 10.0.14.2/24
set interfaces fe-1/2/1 unit 48 family inet address 10.0.48.1/24
set interfaces lo0 unit 40 family inet address 10.0.0.40/32
set protocols bgp group rr type internal
set protocols bgp group rr local-address 10.0.0.40
set protocols bgp group rr family inet unicast add-path receive
set protocols bgp group rr neighbor 10.0.0.10
set protocols bgp group rr_client type internal
set protocols bgp group rr_client local-address 10.0.0.40
set protocols bgp group rr_client cluster 10.0.0.40
set protocols bgp group rr_client neighbor 10.0.0.80 family inet unicast add-path send path-
count 6
set protocols bgp group rr_client neighbor 10.0.0.80 family inet unicast add-path send prefix-
policy allow_199
set protocols ospf area 0.0.0.0 interface fe-1/2/0.41
set protocols ospf area 0.0.0.0 interface lo0.40 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/1.48
set policy-options policy-statement allow_199 from route-filter 172.16.199.1/32 exact
```

```
set policy-options policy-statement allow_199 term match_199 from prefix-list match_199
set policy-options policy-statement allow_199 then add-path send-count 20
set policy-options policy-statement allow_199 then accept
set routing-options autonomous-system 1
```

??? R5

```
set interfaces fe-1/2/0 unit 51 family inet address 10.0.15.2/24
set interfaces lo0 unit 50 family inet address 10.0.0.50/32
set protocols bgp group e1 type external
set protocols bgp group e1 neighbor 10.0.15.1 export s2b
set protocols bgp group e1 neighbor 10.0.15.1 peer-as 1
set policy-options policy-statement s2b from protocol static
set policy-options policy-statement s2b from protocol direct
set policy-options policy-statement s2b then as-path-expand 2
set policy-options policy-statement s2b then accept
set routing-options autonomous-system 2
set routing-options static route 172.16.199.1/32 reject
set routing-options static route 172.16.198.1/32 reject
```

??? R6

```
set interfaces fe-1/2/0 unit 62 family inet address 10.0.26.2/24
set interfaces lo0 unit 60 family inet address 10.0.0.60/32
set protocols bgp group e1 type external
set protocols bgp group e1 neighbor 10.0.26.1 export s2b
set protocols bgp group e1 neighbor 10.0.26.1 peer-as 1
set policy-options policy-statement s2b from protocol static
set policy-options policy-statement s2b from protocol direct
set policy-options policy-statement s2b then accept
set routing-options autonomous-system 2
set routing-options static route 172.16.199.1/32 reject
set routing-options static route 172.16.198.1/32 reject
```

??? R7

```
set interfaces fe-1/2/0 unit 73 family inet address 10.0.37.2/24
set interfaces lo0 unit 70 family inet address 10.0.0.70/32
set protocols bgp group e1 type external
set protocols bgp group e1 neighbor 10.0.37.1 export s2b
set protocols bgp group e1 neighbor 10.0.37.1 peer-as 1
```

```
set policy-options policy-statement s2b from protocol static
set policy-options policy-statement s2b from protocol direct
set policy-options policy-statement s2b then accept
set routing-options autonomous-system 2
set routing-options static route 172.16.199.1/32 reject
```

□□□ R8

```
set interfaces fe-1/2/0 unit 84 family inet address 10.0.48.2/24
set interfaces lo0 unit 80 family inet address 10.0.0.80/32
set protocols bgp group rr type internal
set protocols bgp group rr local-address 10.0.0.80
set protocols bgp group rr neighbor 10.0.0.40 family inet unicast add-path receive
set protocols ospf area 0.0.0.0 interface lo0.80 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.84
set routing-options autonomous-system 1
```

□□□ R1 □□□□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□* □□□□□□□.

□□□ R1□ □□□□□ □□□ □□ □□□□.

1. □□□ R2, □□□ R3, □□□ R4 □ □□□ R5□ □□ □□□□□□ □□□□ □□□(lo0) □□□□□□ □□□□□.

```
[edit interfaces]
user@R1# set fe-0/0/0 unit 12 family inet address 10.0.12.1/24
user@R1# set fe-0/0/1 unit 13 family inet address 10.0.13.1/24
user@R1# set fe-1/0/0 unit 14 family inet address 10.0.14.1/24
user@R1# set fe-1/2/0 unit 15 family inet address 10.0.15.1/24
user@R1#set lo0 unit 10 family inet address 10.0.0.10/32
```

2. □□□□□□ BGP□ □□□□ IBGP □□ □□□□□ □□□□□.

```
[edit protocols bgp]
user@R1# set group rr type internal
user@R1# set group rr local-address 10.0.0.10
user@R1# set group rr cluster 10.0.0.10
```

```
user@R1# set group rr neighbor 10.0.0.20
user@R1# set group rr neighbor 10.0.0.30
user@R1# set group rr_rr type internal
user@R1# set group rr_rr local-address 10.0.0.10
user@R1# set group e1 type external
user@R1# set group e1 neighbor 10.0.15.2 local-address 10.0.15.1
user@R1# set group e1 neighbor 10.0.15.2 peer-as 2
```

3. [illegible] R1[illegible] [illegible] [illegible] [illegible] R4[illegible] [illegible] 6[illegible] [illegible] [illegible] [illegible].

   [illegible] R1[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit protocols bgp]
user@R1# set group rr_rr neighbor 10.0.0.40 family inet unicast add-path send path-count 6
```

4. [illegible] [illegible] [illegible] [illegible](OSPF)[illegible] [illegible].

```
[edit protocols ospf]
user@R1# set area 0.0.0.0 interface lo0.10 passive
user@R1# set area 0.0.0.0 interface fe-0/0/0.12
user@R1# set area 0.0.0.0 interface fe-0/0/1.13
user@R1# set area 0.0.0.0 interface fe-1/0/0.14
user@R1# set area 0.0.0.0 interface fe-1/2/0.15
```

5. [illegible] ID [illegible] AS(Autonomous System) [illegible] [illegible].

```
[edit routing-options]
user@R1# set router-id 10.0.0.10
user@R1# set autonomous-system 1
```

6. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R1# commit
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ??? ??? ????? ????? ???? ? ?? ???? ????? ???? ????????.

```
user@R1# show interfaces
fe-0/0/0 {
    unit 12 {
        family inet {
            address 10.0.12.1/24;
        }
    }
}
fe-0/0/1 {
    unit 13 {
        family inet {
            address 10.0.13.1/24;
        }
    }
}
fe-1/0/0 {
    unit 14 {
        family inet {
            address 10.0.14.1/24;
        }
    }
}
fe-1/2/0 {
    unit 15 {
        family inet {
            address 10.0.15.1/24;
        }
    }
}
lo0 {
    unit 10 {
        family inet {
            address 10.0.0.10/32;
        }
```

```
    }
}
```

```
user@R1# show protocols
bgp {
    group rr {
        type internal;
        local-address 10.0.0.10;
        cluster 10.0.0.10;
        neighbor 10.0.0.20;
        neighbor 10.0.0.30;
    }
    group e1 {
        type external;
        neighbor 10.0.15.2 {
            local-address 10.0.15.1;
            peer-as 2;
        }
    }
    group rr_rr {
        type internal;
        local-address 10.0.0.10;
        neighbor 10.0.0.40 {
            family inet {
                unicast {
                    add-path {
                        send {
                            path-count 6;
                        }
                    }
                }
            }
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.10 {
            passive;
        }
        interface fe-0/0/0.12;
```

```
        interface fe-0/0/1.13;
        interface fe-1/0/0.14;
        interface fe-1/2/0.15;
    }
}
```

```
user@R1# show routing-options
router-id 10.0.0.10;
 autonomous-system 1;
```

□□□ R2 □□□□

□□□ □□

□□□ □□□□ □□□ R2□ □□□□□□:

1. □□□(lo0) □□□□□□□ □□□ R6 □ □□□ R1□ □□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set fe-1/2/0 unit 21 family inet address 10.0.12.2/24
user@R2# set fe-1/2/1 unit 26 family inet address 10.0.26.1/24
user@R2# set lo0 unit 20 family inet address 10.0.0.20/32
```

2. □□□ R2□ □□□□□□□ BGP □ OSPF□ □□□□□.

```
[edit protocols]
user@R2# set bgp group rr type internal
user@R2# set bgp group rr local-address 10.0.0.20
user@R2# set bgp group e1 type external
user@R2# set bgp group e1 neighbor 10.0.26.2 peer-as 2
user@R2# set ospf area 0.0.0.0 interface lo0.20 passive
user@R2# set ospf area 0.0.0.0 interface fe-1/2/0.21
user@R2# set ospf area 0.0.0.0 interface fe-1/2/1.28
```

3. [illegible] R2[illegible] [illegible] R1[illegible] [illegible] [illegible] [illegible], [illegible] R1[illegible] 10.0.26.0/24 [illegible] [illegible] R6[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] R2[illegible] [illegible] [illegible] [illegible].

```
[edit]
user@R2# set policy-options policy-statement set_nh_self then next-hop self
user@R2# set protocols bgp group rr neighbor 10.0.0.10 export set_nh_self
```

4. AS(Autonomous System) [illegible] [illegible].

```
[edit]
user@R2# set routing-options autonomous-system 1
```

5. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R2# commit
```

[illegible]

[illegible] [illegible] show interfaces, show protocols, show policy-options [illegible] show routing-options[illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R2# show interfaces
fe-1/2/0 {
    unit 21 {
        family inet {
            address 10.0.12.2/24;
        }
    }
}
fe-1/2/1 {
    unit 26 {
        family inet {
            address 10.0.26.1/24;
        }
    }
}
lo0 {
    unit 20 {
        family inet {
```

```
            address 10.0.0.20/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group rr {
        type internal;
        local-address 10.0.0.20;
        neighbor 10.0.0.10 {
            export set_nh_self;
        }
    }
    group e1 {
        type external;
        neighbor 10.0.26.2 {
            peer-as 2;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.20 {
            passive;
        }
        interface fe-1/2/0.21;
        interface fe-1/2/1.28;
    }
}
```

```
user@R2# show policy-options
policy-statement set_nh_self {
    then {
        next-hop self;
```

```
    }
}
```

```
user@R2# show routing-options
 autonomous-system 1;
```

□□□ R3 □□

□□□ □□

□□□ □□□□ □□□ R3□ □□□□□□□.

1. □□□(lo0) □□□□□□ □□□ R7 □ □□□ R1□ □□□□□□□ □□□□□.

```
[edit interfaces]
user@R3# set fe-1/0/1 unit 31 family inet address 10.0.13.2/24
user@R3# set fe-1/0/2 unit 37 family inet address 10.0.37.1/24
user@R3# set lo0 unit 30 family inet address 10.0.0.30/32
```

2. □□□ R3□ □□□□□□ BGP □ OSPF□ □□□□□.

```
[edit protocols]
user@R3# set bgp group rr type internal
user@R3# set bgp group rr local-address 10.0.0.30
user@R3# set bgp group e1 type external
user@R3# set bgp group e1 neighbor 10.0.37.2 peer-as 2
user@R3# set ospf area 0.0.0.0 interface lo0.30 passive
user@R3# set ospf area 0.0.0.0 interface fe-1/0/1.31
user@R3# set ospf area 0.0.0.0 interface fe-1/0/2.37
```

3. □□□ R3□□ □□□ R1□ □□□ □□□ □□, □□□ R1□ 10.0.37.0/24 □□□□□□ □□□ R7□ □□□ □□ □□□ □□ □□ □□□ □□□ R3□ □□ □□□ □□□□□.

```
[edit]
user@R3# set policy-options policy-statement set_nh_self then next-hop self
user@R3# set protocols bgp group rr neighbor 10.0.0.10 export set_nh_self
```

4. AS(Autonomous System) ??? ?????.

```
[edit]
user@R3# set routing-options autonomous-system 1
```

5. ???? ??? ???? ?? ??? ?????.

```
user@R3# commit
```

??

?? ???? show interfaces, show protocols, show policy-options ? show routing-options ??? ???? ??? ?????. ?? ??? ??? ???? ???? ??? ? ?? ??? ???? ??? ??????.

```
user@R3# show interfaces
fe-1/0/1 {
    unit 31 {
        family inet {
            address 10.0.13.2/24;
        }
    }
}
fe-1/0/2 {
    unit 37 {
        family inet {
            address 10.0.37.1/24;
        }
    }
}
lo0 {
    unit 30 {
        family inet {
            address 10.0.0.30/32;
        }
```

```
    }
}
```

```
user@R3# show protocols
bgp {
    group rr {
        type internal;
        local-address 10.0.0.30;
        neighbor 10.0.0.10 {
            export set_nh_self;
        }
    }
    group e1 {
        type external;
        neighbor 10.0.37.2 {
            peer-as 2;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.30 {
            passive;
        }
        interface fe-1/0/1.31;
        interface fe-1/0/2.37;
    }
}
user@R3# show policy-options
policy-statement set_nh_self {
    then {
        next-hop self;
    }
}
```

```
user@R3# show routing-options
 autonomous-system 1;
```

□□□ R4 □□

□□□ □□

□□□ □□□□ □□□ R4□ □□□□□□.

1. □□□ R1 □ □□□ R8□ □□ □□□□□□ □□□□ □□□(lo0) □□□□□□ □□□□□.

```
[edit interfaces]
user@R4# set fe-1/2/0 unit 41 family inet address 10.0.14.2/24
user@R4# set fe-1/2/1 unit 48 family inet address 10.0.48.1/24
user@R4# set lo0 unit 40 family inet address 10.0.0.40/32
```

2. □□□□□□ BGP□ □□□□ IBGP □□ □□□□□ □□□□□.

```
[edit protocols bgp]
user@R4# set group rr type internal
user@R4# set group rr local-address 10.0.0.40
user@R4# set group rr neighbor 10.0.0.10
user@R4# set group rr_client type internal
user@R4# set group rr_client local-address 10.0.0.40
user@R4# set group rr_client cluster 10.0.0.40
```

3. □□□ R4□ □□ □□□□ □□□ R8□ □□ 6□□ □□□ □□□□□ □□□□□.

   □□□ R4□ □□ □□□ □□ □□ □□□ □□ □□□□ □□ □□□ □□□□ □ □ □□□□.

```
[edit protocols bgp]
user@R4# set group rr_client neighbor 10.0.0.80 family inet unicast add-path send path-count 6
```

4. □□□ R4□ □□ □□□□ □□□ R1□□ □□ □□□ □□□□□ □□□□□.

   □□□ R1□ □□ □□□ □□ □□ □□□ □□ □□□□ □□ □□□ □□□□ □ □ □□□□.

```
[edit protocols bgp group rr family inet unicast]
user@R4# set add-path receive
```

5. □□□□□□□ □□ □□ □□(OSPF)□ □□□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R4# set interface fe-1/2/0.41
user@R4# set interface lo0.40 passive
user@R4# set interface fe-1/2/1.48
```

6. □□□ R4□ □□□ R8□ 172.16.199.1/32 □□□□ □□ □□ □□□ □□□□□ □□□□ □□□ □□□□□.

   - □□□ R4□ 172.16.198.1/32 □□ □ 172.16.199.1/32 □□□ □□ □□ □□□ □□□□□. □□□ □ □□□□ □□ □□□ R4□ 172.16.199.1/32 □□□□ □□ □□ □□□□ □□□ □ □□□□.

     ```
     [edit protocols bgp group rr_client neighbor 10.0.0.80 family inet unicast]
     user@R4# set add-path send prefix-policy allow_199
     [edit policy-options policy-statement allow_199]
     user@R4# set from route-filter 172.16.199.1/32 exact
     user@R4# set then accept
     ```

   - □□, *add-path □□ □□□□* □□ □□□ □□ □□□ R4□ □□ 20BGP add-path □□□ □□□□□ □□□ □ □□□□.

     ```
     [edit policy-options policy-statement allow_199]
     user@R4# set term match_199 from prefix-list match_199
     user@R4# set then add-path send-count 20
     ```

7. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R4# set autonomous-system 1
```

8. □□□□ □□□ □□□□ □□ □□□ □□□□□.

```
user@R4# commit
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□□.

```
user@R4# show interfaces
fe-1/2/0 {
    unit 41 {
        family inet {
            address 10.0.14.2/24;
        }
    }
}
fe-1/2/1 {
    unit 48 {
        family inet {
            address 10.0.48.1/24;
        }
    }
}
lo0 {
    unit 40 {
        family inet {
            address 10.0.0.40/32;
        }
    }
}
```

```
user@R4# show protocols
bgp {
    group rr {
        type internal;
        local-address 10.0.0.40;
        family inet {
            unicast {
                add-path {
                    receive;
                }
            }
        }
        neighbor 10.0.0.10;
```

```
    }
    group rr_client {
        type internal;
        local-address 10.0.0.40;
        cluster 10.0.0.40;
        neighbor 10.0.0.80 {
            family inet {
                unicast {
                    add-path {
                        send {
                            path-count 6;
                            prefix-policy allow_199;
                        }
                    }
                }
            }
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.40 {
            passive;
        }
        interface fe-1/2/0.41;
        interface fe-1/2/1.48;
    }
}
```

```
user@R4# show policy-options
policy-statement allow_199 {
    from {
        route-filter 172.16.199.1/32 exact;
    }
    from term match_199 {
        prefix-list match_199;
    }
        then add-path send-count 20;
```

```
    then accept;
}
```

```
user@R4# show routing-options
 autonomous-system 1;
```

□□□ R5 □□

□□□ □□

□□□ □□□□ □□□ R5□ □□□□□□□.

1. □□□(lo0) □□□□□ □ □□□ R1□ □□ □□□□□□□ □□□□□.

   ```
   [edit interfaces]
   user@R5# set fe-1/2/0 unit 51 family inet address 10.0.15.2/24
   user@R5# set lo0 unit 50 family inet address 10.0.0.50/32
   ```

2. □□□ R5□ □□□□□□ BGP□ □□□□□.

   ```
   [edit protocols bgp group e1]
   user@R5# set type external
   user@R5# set neighbor 10.0.15.1 peer-as 1
   ```

3. BGP□ □□□□ □□ □□□□ □□□□□.

   ```
   [edit routing-options]
   user@R5# set static route 172.16.199.1/32 reject
   user@R5# set static route 172.16.198.1/32 reject
   ```

4. □□ □ □□ □□□□ BGP□ □□□□□□.

   ```
   [edit protocols bgp group e1 neighbor 10.0.15.1]
   user@R5# set export s2b
   [edit policy-options policy-statement s2b]
   user@R5# set from protocol static
   user@R5# set from protocol direct
   ```

```
user@R5# set then as-path-expand 2
user@R5# set then accept
```

5. AS(Autonomous System) ??? ?????.

```
[edit routing-options]
user@R5# set autonomous-system 2
```

6. ????? ??? ????? ?? ??? ??????.

```
user@R5# commit
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ??? ??? ????? ????? ???? ? ?? ???? ????? ???? ????????.

```
user@R5# show interfaces
fe-1/2/0 {
    unit 51 {

        family inet {
            address 10.0.15.2/24;
        }
    }
}
lo0 {
    unit 50 {
        family inet {
            address 10.0.0.50/32;
        }
    }
}
```

```
user@R5# show protocols
bgp {
    group e1 {
        type external;
```

```
        neighbor 10.0.15.1 {
            export s2b;
            peer-as 1;
        }
    }
}
```

```
user@R5# show policy-options
policy-statement s2b {
    from protocol [ static direct ];
    then {
        as-path-expand 2;
        accept;
    }
}
```

```
user@R5# show routing-options
static {
    route 172.16.198.1/32 reject;
    route 172.16.199.1/32 reject;
}
 autonomous-system 2;
```

□□□ R6 □□

□□□ □□

□□□ □□□□ □□□ R6□ □□□□□□.

1. □□□(lo0) □□□□□ □ □□□ R2□ □□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R6# set fe-1/2/0 unit 62 family inet address 10.0.26.2/24
user@R6# set lo0 unit 60 family inet address 10.0.0.60/32
```

2. ??? R6? ??????? BGP? ??????.

```
[edit protocols]
user@R6# set bgp group e1 type external
user@R6# set bgp group e1 neighbor 10.0.26.1 peer-as 1
```

3. BGP? ????? ?? ????? ??????.

```
[edit]
user@R6# set routing-options static route 172.16.199.1/32 reject
user@R6# set routing-options static route 172.16.198.1/32 reject
```

4. ??? R6? ???? ?????? ?? ? ?? ????? BGP? ???????.

```
[edit protocols bgp group e1 neighbor 10.0.26.1]
user@R6# set export s2b
[edit policy-options policy-statement s2b]
user@R6# set from protocol static
user@R6# set from protocol direct
user@R6# set then accept
```

5. AS(Autonomous System) ??? ??????.

```
[edit routing-options]
user@R6# set autonomous-system 2
```

6. ????? ???? ????? ?? ??? ??????.

```
user@R6# commit
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ???? ???? ????? ????? ???? ? ?? ???? ????? ???? ???????.

```
user@R6# show interfaces
fe-1/2/0 {
```

```
    unit 62 {

        family inet {
            address 10.0.26.2/24;
        }
    }
}
lo0 {
    unit 60 {
        family inet {
            address 10.0.0.60/32;
        }
    }
}
```

```
user@R6# show protocols
bgp {
    group e1 {
        type external;
        neighbor 10.0.26.1 {
            export s2b;
            peer-as 1;
        }
    }
}
```

```
user@R6# show policy-options
policy-statement s2b {
    from protocol [ static direct ];
    then accept;
}
```

```
user@R6# show routing-options
static {
    route 172.16.198.1/32 reject;
    route 172.16.199.1/32 reject;
}
 autonomous-system 2;
```

□□□ R7 □□

□□□ □□

□□□ □□□□ □□□ R7□ □□□□□□.

1. □□□(lo0) □□□□□ □ □□□ R3□ □□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R7# set fe-1/2/0 unit 73 family inet address 10.0.37.2/24
user@R7# set lo0 unit 70 family inet address 10.0.0.70/32
```

2. □□□ R7□ □□□□□□ BGP□ □□□□□.

```
[edit protocols bgp group e1]
user@R7# set type external
user@R7# set neighbor 10.0.37.1 peer-as 1
```

3. BGP□ □□□□ □□ □□□□ □□□□□.

```
[edit]
user@R7# set routing-options static route 172.16.199.1/32 reject
```

4. □□□ R7□ □□□ □□□□□ □□ □ □□ □□□□ BGP□ □□□□□□.

```
[edit protocols bgp group e1 neighbor 10.0.37.1]
user@R7# set export s2b
[edit policy-options policy-statement s2b]
user@R7# set from protocol static
user@R7# set from protocol direct
user@R7# set then accept
```

5. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R7# set autonomous-system 2
```

6. ????? ??? ????? ?? ??? ??????.

```
user@R7# commit
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ??? ??? ????? ????? ??? ? ?? ??? ????? ??? ???????.

```
user@R7# show interfaces
fe-1/2/0 {
    unit 73 {

        family inet {
            address 10.0.37.2/24;
        }
    }
}
lo0 {
    unit 70 {
        family inet {
            address 10.0.0.70/32;
        }
    }
}
```

```
user@R7# show protocols
bgp {
    group e1 {
        type external;
        neighbor 10.0.37.1 {
            export s2b;
            peer-as 1;
        }
```

```
    }
}
```

```
user@R7# show policy-options
policy-statement s2b {
    from protocol [ static direct ];
    then accept;
}
```

```
user@R7# show routing-options
static {
    route 172.16.199.1/32 reject;
}
 autonomous-system 2;
```

??? R8 ??

??? ??

??? ????? ??? R8? ???????.

1. ???(lo0) ?????? ? ??? R4? ?? ???????? ??????.

```
[edit interfaces]
user@R8# set fe-1/2/0 unit 84 family inet address 10.0.48.2/24
user@R8# set lo0 unit 80 family inet address 10.0.0.80/32
```

2. ??? R8? ??????? BGP ? OSPF? ??????.

```
[edit protocols]
user@R8# set bgp group rr type internal
user@R8# set bgp group rr local-address 10.0.0.80
user@R8# set ospf area 0.0.0.0 interface lo0.80 passive
user@R8# set ospf area 0.0.0.0 interface fe-1/2/0.84
```

3. ??? R8? ?? ????? ??? R4?? ?? ??? ?????? ??????.

□□□ R4□ □□ □□□ □□ □□ □□□ □□ □□□□ □□ □□□ □□□□ □ □ □□□□.

```
[edit protocols]
user@R8# set bgp group rr neighbor 10.0.0.40 family inet unicast add-path receive
```

4. AS(Autonomous System) □□□ □□□□□.

```
[edit]
user@R8# set routing-options autonomous-system 1
```

5. □□□□ □□□ □□□□ □□ □□□ □□□□□.

```
user@R8# commit
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R8# show interfaces
fe-1/2/0 {

    unit 84 {

        family inet {
            address 10.0.48.2/24;
        }
    }
}
lo0 {
    unit 80 {
        family inet {
            address 10.0.0.80/32;
        }
```

```
    }
}
```

```
user@R8# show protocols
bgp {
    group rr {
        type internal;
        local-address 10.0.0.80;
        neighbor 10.0.0.40 {
            family inet {
                unicast {
                    add-path {
                        receive;
                    }
                }
            }
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.80 {
            passive;
        }
        interface fe-1/2/0.84;
    }
}
```

```
user@R8# show routing-options
 autonomous-system 1;
```

??

in this section

- BGP ??? ?? ?? ?? ? ?? ???? ??? ?? | 462
- ??? R1? ?? ???? ?????? ?? | 463

- □□□ R4□ □□ □□□ □□ □ □□□□□ □□ | 464
- □□□ R8□ □□ □□□ □□□□□ □□ | 465
- □□ ID □□ | 465

□□□ □□□□ □□□□ □□□ □□□□□.

BGP □□□ □□ □□ □□ □ □□ □□□ □□□ □□

□□

show bgp neighbor □□□ □□□ □□ □□□ □ □□ □□ □ □□ □□ □□□□□ □□□□□.

- NLRI's for which peer can receive multiple paths: inet-unicast
- NLRI's for which peer can send multiple paths: inet-unicast

□□

```
user@R1> show bgp neighbor 10.0.0.40
Peer: 10.0.0.40+179 AS 1       Local: 10.0.0.10+64227 AS 1
  Type: Internal    State: Established    Flags: <Sync>
...  NLRI's for which peer can receive multiple paths: inet-unicast
...
```

```
user@R4> show bgp neighbor 10.0.0.10
Peer: 10.0.0.10+64227 AS 1     Local: 10.0.0.40+179 AS 1
  Type: Internal    State: Established    Flags: <Sync>
...
  NLRI's for which peer can send multiple paths: inet-unicast
...
```

```
user@R4> show bgp neighbor 10.0.0.80
Peer: 10.0.0.80+55416 AS 1     Local: 10.0.0.40+179 AS 1
  Type: Internal    State: Established  (route reflector client)Flags: <Sync>
  ,,,
```

```
  NLRI's for which peer can receive multiple paths: inet-unicast
  ...
```

```
user@R8> show bgp neighbor 10.0.0.40
Peer: 10.0.0.40+179 AS 1       Local: 10.0.0.80+55416 AS 1
  Type: Internal    State: Established    Flags: <Sync>
  ...
  NLRI's for which peer can send multiple paths: inet-unicast
  ...
```

□□□ R1□ □□ □□□ □□□□□ □□

□□

172.16.198.1/32 □□□□ □□ □□ □□□ 172.16.199.1/32 □□□□ □□ □□ □□□ □□□ R4□ □□□□□ □□□□□.

□□

```
user@R1> show route advertising-protocol bgp 10.0.0.40
inet.0: 21 destinations, 25 routes (21 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.50/32            10.0.15.2                    100        2 2 I
* 10.0.0.60/32            10.0.0.20                    100        2 I
* 10.0.0.70/32            10.0.0.30                    100        2 I
* 172.16.198.1/32            10.0.0.20                    100        2 I
                          10.0.15.2                    100        2 2 I
* 172.16.199.1/32            10.0.0.20                    100        2 I
                          10.0.0.30                    100        2 I
                          10.0.15.2                    100        2 2 I
* 172.16.200.0/30            10.0.0.20                    100        2 I
```

□□

□□□ □□□□ 1□ □□□ □□ □□ □□□□ □□, □□□ R4□ □□ □□□ □□□□ □□□□□.

□□□ R4□ □□ □□□ □□ □ □□□□□ □□

□□

172.16.199.1/32 □□□□ □□ □□ □□□ □□□ R1□□ □□□□ □□□ R8□ □□□□□ □□□□□. 172.16.198.1/32 □□□□ □□ □□ □□ □ □□□ R1□□ □□□□, □ □□□□ □□ □□□ □□□□ □□□ R8□ □□□□□ □□□□□.

□□

```
user@R4> show route receive-protocol bgp 10.0.0.10
inet.0: 19 destinations, 22 routes (19 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.50/32            10.0.15.2                    100        2 2 I
* 10.0.0.60/32            10.0.0.20                    100        2 I
* 10.0.0.70/32            10.0.0.30                    100        2 I
* 172.16.198.1/32            10.0.0.20                    100        2 I
                          10.0.15.2                    100        2 2 I
* 172.16.199.1/32            10.0.0.20                    100        2 I
                          10.0.0.30                    100        2 I
                          10.0.15.2                    100        2 2 I
* 172.16.200.0/30            10.0.0.20                    100        2 I
```

```
user@R4> show route advertising-protocol bgp 10.0.0.80
inet.0: 19 destinations, 22 routes (19 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.50/32            10.0.15.2                    100        2 2 I
* 10.0.0.60/32            10.0.0.20                    100        2 I
* 10.0.0.70/32            10.0.0.30                    100        2 I
* 172.16.198.1/32            10.0.0.20                    100        2 I
* 172.16.199.1/32            10.0.0.20                    100        2 I
                          10.0.0.30                    100        2 I
                          10.0.15.2                    100        2 2 I
* 172.16.200.0/30            10.0.0.20                    100        2 I
```

□□

show route receive-protocol □□□ □□□ R4□ 172.16.198.1/32 □□□□ □□ 2□□ □□□ 172.16.199.1/32 □□□□ □□ 3□□ □□□ □□□□ □□ □□□□□. show route advertising-protocol □□□ □□□ R4□ 172.16.198.1/32 □□□□ □□ □□□ □□□□ □□□□, 172.16.199.1/32 □□□□ □□ 3□ □□□ □□ □□□□ □□ □□□□□.

□□□ R4□ □□□□ □□□ □□□□ □□, □□□ R4□ 172.16.198.1/32 □□□□ □□ □□ □□□ □□□□ □□□□. □□□ R4□ □□ □□□ □□□□□ □ 172.16.198.1/32 □□□□ □□ □□□ □□□□ □□□□□.

□□□ R8□ □□ □□□ □□□□□ □□

□□

□□□ R8□ □□□ R4□ □□ 172.16.199.1/32 □□□□ □□ □□ □□□ □□□□□ □□□□□. □□□ R8□ □□□ R4□ □□ 172.16.198.1/32 □□□□ □□ □□□ □□□□ □□□□□ □□□□□.

□□

```
user@R8> show route receive-protocol bgp 10.0.0.40
inet.0: 18 destinations, 20 routes (18 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.50/32            10.0.15.2                    100        2 2 I
* 10.0.0.60/32            10.0.0.20                    100        2 I
* 10.0.0.70/32            10.0.0.30                    100        2 I
* 172.16.198.1/32            10.0.0.20                    100        2 I
* 172.16.199.1/32            10.0.0.20                    100        2 I
                          10.0.0.30                    100        2 I
                          10.0.15.2                    100        2 2 I
* 200.1.1.0/30            10.0.0.20                    100        2 I
```

□□ ID □□

□□

□□□□□ □□□□(□□□ R4 □ □□□ R8)□□ □□ ID□ □□ □□□ □□□□ □□□□□ □□□□□. Addpath Path ID: □□□□ □□□□□□.

□□

```
user@R4> show route 172.16.199.1/32 detail
```

```
inet.0: 18 destinations, 20 routes (18 active, 0 holddown, 0 hidden)
172.16.199.1/32 (3 entries, 3 announced)
        *BGP    Preference: 170/-101
                Next hop type: Indirect
                Next-hop reference count: 9
                Source: 10.0.0.10
                Next hop type: Router, Next hop index: 676
                Next hop: 10.0.14.1 via lt-1/2/0.41, selected
                Protocol next hop: 10.0.0.20
                Indirect next hop: 92041c8 262146
                State: <Active Int Ext>
                Local AS:     1 Peer AS:     1
                Age: 1:44:37    Metric2: 2
                Task: BGP_1.10.0.0.10+64227
                Announcement bits (3): 2-KRT 3-BGP RT Background 4-Resolve tree 1
                AS path: 2 I (Originator) Cluster list:  10.0.0.10
                AS path:  Originator ID: 10.0.0.20
                Accepted
                Localpref: 100
                Router ID: 10.0.0.10
                Addpath Path ID: 1
         BGP    Preference: 170/-101
                Next hop type: Indirect
                Next-hop reference count: 4
                Source: 10.0.0.10
                Next hop type: Router, Next hop index: 676
                Next hop: 10.0.14.1 via lt-1/2/0.41, selected
                Protocol next hop: 10.0.0.30
                Indirect next hop: 92042ac 262151
                State: <NotBest Int Ext>
                Inactive reason: Not Best in its group - Router ID
                Local AS:     1 Peer AS:     1
                Age: 1:44:37    Metric2: 2
                Task: BGP_1.10.0.0.10+64227
                Announcement bits (1): 3-BGP RT Background
                AS path: 2 I (Originator) Cluster list:  10.0.0.10
                AS path:  Originator ID: 10.0.0.30
                Accepted
                Localpref: 100
                Router ID: 10.0.0.10
                Addpath Path ID: 2
         BGP    Preference: 170/-101
                Next hop type: Indirect
```

```
                Next-hop reference count: 4
                Source: 10.0.0.10
                Next hop type: Router, Next hop index: 676
                Next hop: 10.0.14.1 via lt-1/2/0.41, selected
                Protocol next hop: 10.0.15.2
                Indirect next hop: 92040e4 262150
                State: <Int Ext>
                Inactive reason: AS path
                Local AS:     1 Peer AS:     1
                Age: 1:44:37    Metric2: 2
                Task: BGP_1.10.0.0.10+64227
                Announcement bits (1): 3-BGP RT Background
                AS path: 2 2 I
                Accepted
                Localpref: 100
                Router ID: 10.0.0.10
                Addpath Path ID: 3
```

```
user@R8> show route 172.16.199.1/32 detail

inet.0: 17 destinations, 19 routes (17 active, 0 holddown, 0 hidden)
172.16.199.1/32 (3 entries, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Indirect
                Next-hop reference count: 9
                Source: 10.0.0.40
                Next hop type: Router, Next hop index: 1045
                Next hop: 10.0.48.1 via lt-1/2/0.84, selected
                Protocol next hop: 10.0.0.20
                Indirect next hop: 91fc0e4 262148
                State: <Active Int Ext>
                Local AS:     1 Peer AS:     1
                Age: 1:56:51    Metric2: 3
                Task: BGP_1.10.0.0.40+179
                Announcement bits (2): 2-KRT 4-Resolve tree 1
                AS path: 2 I (Originator) Cluster list:  10.0.0.40 10.0.0.10
                AS path:  Originator ID: 10.0.0.20
                Accepted
                Localpref: 100
                Router ID: 10.0.0.40
                Addpath Path ID: 1
```

```
        BGP    Preference: 170/-101
               Next hop type: Indirect
               Next-hop reference count: 4
               Source: 10.0.0.40
               Next hop type: Router, Next hop index: 1045
               Next hop: 10.0.48.1 via lt-1/2/0.84, selected
               Protocol next hop: 10.0.0.30
               Indirect next hop: 91fc1c8 262152
               State: <NotBest Int Ext>
               Inactive reason: Not Best in its group - Router ID
               Local AS:     1 Peer AS:     1
               Age: 1:56:51    Metric2: 3
               Task: BGP_1.10.0.0.40+179
               AS path: 2 I (Originator) Cluster list:  10.0.0.40 10.0.0.10
               AS path:  Originator ID: 10.0.0.30
               Accepted
               Localpref: 100
               Router ID: 10.0.0.40
               Addpath Path ID: 2
        BGP    Preference: 170/-101
               Next hop type: Indirect
               Next-hop reference count: 4
               Source: 10.0.0.40
               Next hop type: Router, Next hop index: 1045
               Next hop: 10.0.48.1 via lt-1/2/0.84, selected
               Protocol next hop: 10.0.15.2
               Indirect next hop: 91fc2ac 262153
               State: <Int Ext>
               Inactive reason: AS path
               Local AS:     1 Peer AS:     1
               Age: 1:56:51    Metric2: 3
               Task: BGP_1.10.0.0.40+179
               AS path: 2 2 I (Originator) Cluster list:  10.0.0.40
               AS path:  Originator ID: 10.0.0.10
               Accepted
               Localpref: 100
               Router ID: 10.0.0.40
               Addpath Path ID: 3
```

BGP□□ □□ □□□□ □□ □□ □□ □□ □□

BGP AS □□□ AS □□ □□ □□ | 431

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BGP AS □□ □ □□□ □□ □□ □□□□ □□□ □ BGP □□□ □□□□ □□ □□□□ □□□□ □□ AS □□□□ AS(Autonomous System) □□ □ □□□ □ □□□□. BGP □□□ AS□ AS-list □□ As-list-group□ □□□□ □□□□ □□□ □□□ true□ □□□□□. □□□□ □□, neighbor □□ transit AS□ □□□□□ BGP □□□ □□□ □ □□□□. □ □□□ □□ □□□□ □□□□ □□□ □□□, □□ □ □□ AS □□□ □□□□□ □ □□ □□□ □ □□□□.

BGP □□□□ □□□□ □□□□ □□ □□ AS-Path□ □□:

- □□, □□ □□, □□ AS□ □□ □□□□ □□□ □□□ □□□□□□.
- □□ □□□□ □ □□ □□□ □□□□□.

AS □□□□ AS□ □□□□□ □□ □□ □□□ □□□□□.

- **Match the Originating AS in the AS Path(AS □□□□ □□ AS□ □□)** - □□□ □□□ AS□ □□□□□. AS □□□□ □□ □□□□ □ □ AS □□□ □□ □□□□ □□ □□ □□□ □□ `as-list-group` □ □ `as-list` □□□ □□□□□[`edit policy-options policy-statement` *`policy-name`* `from`].`as-path-origins` □□□ □□□□□□□□ □□ AS□ □□□ AS □□□ □□□ □□, `as-path-origins` AS □□□ □□□ AS □ □□ □□ □□□ □□ `as-list-group` □ □ `as-list` □□ □□□□ `as-path-origins` **true**□ □□□□□.

- **AS ????? ?? AS ??** - AS ????? ?? AS? ??????. AS ???? ? ?? AS ???? ?? ???? ?? ?? ???? ?? as-list-group ? ?? as-list ???? ??????[edit policy-options policy-statement *policy-name* from].as-path-neighbors ?? AS ??? AS ?? ? ??, as-path-neighbors AS ???? ???? AS? ?? ?? ???? ?? as-list-group ? ???? as-list ?? ????? as-path-neighbors true? ??????.

- **AS ????? ?? AS ?? - AS** ??? ?? AS? ??????. AS? ?? ????? ?? ?? ???? ?? as-list-group ? ? as-list ? ? ?????? [edit policy-options policy-statement *policy-name* from].as-path-transit AS-set? ?? as-path-transit ????? AS-set? ?? AS? ??????.

????? ????? ?? AS ?? ?? ??

???, ???? ? ?? AS? ?? AS ?? ?? AS ?? ???? ????? AS ?? ???? ????? ????? ????? ?? ???? ????? ? ?????.

? ?? ????? ????? ? ?? ?? ???? ? ?? ?? ???? ?? ???? ???? ??????.

?? ??	?? ????? ????? ?? ?? ??	? ?? ?? ???? ???? ??
??	?? ???? ?? ?? ?? "^101.*"? ??????.	policy-options as-list peer-match members 101 ??
??	?? ???? ?? ?? ?? ".*61453.*10001.*40007$"? ??????.	policy-options as-list transit-match ?? ?? 61453
??	?? ???? ?? ?? ?? ".*54367$"? ??????.	policy-options as-list origin-match ?? ?? 54367

?? ?? ???? ??, ?? ?? ? ?? AS? ?? AS ??(as-list *as-list-name*)? ????? ???? ????? ????? ?? ???? ????? ???? ?????? ???? ??????.

1??: ???, ?? ? ?? AS? ?????? ?? AS ???? ????? ?? ???? ????? ???? ????? ???? ???????.

```
set policy-options as-list origin-match members 54367
set policy-options as-list neighbor-match members 101
set policy-options as-list transit-match members 61453
set policy-options as-list transit-match members 10001
```

?: ?? ????, ???? ? ?? AS? ?????? ?? AS ?? ??(as-list-group *group-name*)? ????? ???? ????? ???? ? ???? ? ?????. ???? ???? ????? ???? ?????? ?? ?? AS? ????? AS ?? ???? ????? ?? ??????.

```
set policy-options as-list-group origin_group as-list origin-match-1 members 3-4
set policy-options as-list-group origin_group as-list origin-match-2 members 6-9
set policy-options policy-statement neighbor-accept term 1 from as-path-origins as-list-group origin_group
```

```
set policy-options policy-statement neighbor-accept term 1 then accept
set policy-options policy-statement neighbor-accept term 2 then reject
```

□: □□, □□ □□ □ □□ AS□ □□□□ AS □□ □□□ AS □□(□: 101) □□ AS □□ □□(□: 6-9)□ □ □□□□. □ □□ 6, 7, 8, 9□□ □□□□ □□ □□□ □□□□□.

AS □□□ □□(as-start to as-finish)□ □□□□ □□, as-start □□ □□ as-finish □□ □□□ □□□ □□□ □□□. AS □□ □□ AS □□ □□(as-start to as-finish)□ 0□ □ □□□□.

as-list □□ as-list-group □ AS □□□ □□□□□.

□□ □ □□ □□□□ □□ AS □□ □□□ □□□□ □□ AS □□□ □ □□ □□ □□□ AS□ □□□□□. □□□ □□ AS □□ □□□ □□□ □ □□ AS □□□□ □□ □ □□□ □ □□□□.

2□□: □□□, □□□, □□ AS□ □□□□ □□□ □□□□□ □□□□□□ □□□ □□□□□.

```
set policy-options policy-statement as-list-match term transit-match from as-path-transits as-
list transit-match
set policy-options policy-statement as-list-match term transit-match then local-preference 300
set policy-options policy-statement as-list-match term transit-match then accept
set policy-options policy-statement as-list-match term origin-match from as-path-origins as-list
origin-match
set policy-options policy-statement as-list-match term origin-match then local-preference 400
set policy-options policy-statement as-list-match term origin-match then accept
set policy-options policy-statement as-list-match term neighbor-match from as-path-neighbors as-
list peer-match
set policy-options policy-statement as-list-match term peer-match then local-preference 200
set policy-options policy-statement as-list-match term peer-match then accept
```

3□□: □□ □□ □□□□ □□□□□.

```
set routing-options autonomous-system 100
```

4□□: □□□ BGP □□□□ □□□□ □□□□ □□□ □□□□□□.

```
set protocols bgp group ebgp-1 type external
set protocols bgp group ebgp-1 import as-list-match
set protocols bgp group ebgp-1 family inet unicast
```

```
set protocols bgp group ebgp-1 neighbor 192.168.1.2 peer-as 101
set protocols bgp group ebgp-1 neighbor 192.168.1.6 peer-as 102
```

□: □ □□□ □□□ □□□ □□ □□□ □□□□ □□ □□□ □□□□□ □□□□ □□ □□□□ □□□□ □□□ □ □□□□.

CLI □□□ □□□□ show route □□□ □□□□ □□□ □ □ □□□□.

□: from □ □□ □□□ □□ □□ □ [edit policy-options policy-statement *policy-name* term *term-name* from] □□ □□ □□□□ [edit policy-options policy-statement *policy-name* from] □□□□.

chapter label in part6

?? ???? ???? ??

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- ?: ??? ???? ?? ???? ?? | 506
- ?: BGP ??? ???? ?? | 518
- ?: BGP ???? ?? ???? ??? ?? ?? | 531
- ?: BGP ????? ???? ??? ?? ?? | 542

BGP ????, ?? ???? ? ??? ?????? ??? ?? ?? ???? ??

BGP ????? ?? ??? ???? ?? ?????. ???? ??? BGP ???? ???? ?? ???? ?????. ? ??? ???? ???? ???? ? ??? ? ?? ??? ??? ?? ?? ???? ??? ??? ? ??? ???. ???? ? ??? ???? ??? ???? ??, ??, ?? ?? ???? ?? ??? ??? ??? ? ? ????.

??(??, ?? ?? ??? ??? ??) ?? ???? ??? ??? ?? ? BGP ??? ???? ??? ??? ? ????. ?? ?? BGP? ??? ??? ? ??? ??? ???? ? ????.

???? ?? ? ?? ?? ???? ??? 32?? ?????. ?? ?? 16??? ????? ??? ????? AS ??? ?????, ??? 16??? AS?? ?? ? ?? ??? ?????. ? ???? ???? ? AS? ?? ????? ??? ???? ? ??? ????? ?????. Junos OS? ? ??? *as-number*:*community-value*? ????, ??? ? ?? ???????. 0 ? 65,535? AS ?? ???? ???, ?? AS ?? ?? ?? ???? ?? ???? ????. ? ???? ?? ???? ???? ?? ?? ??? `[edit policy-options]` ??? ??????. ?????? ??? ??? ?????? ?????? ???? ? ??? ??? ???? ???? ??????. ?? ?? ???? ?? 64510:1111? ??? ?? ???? `AS64510-routes`? ?? ? ????. ???? ??? ? ?? ?? ??? ?? ?? ?? ???? ????? ???. ?????? ??? ?? ?? ??? ??? ????. ?? ?? `community` *`name`* `members` [*`community-ids`*]. *`community-ids`* ? ?? ???? ?? ?? ?? ???? ?????. ???? ??? ? ? ??? ?? ???? ??? ?????? ?? ???? ?? ??? AND? ??????. ?, ??? ???? ??? ???? ?? ??? ?? ?? ??? ???.

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BGP □□ □□□□ □□ □□□□ □ □□ □□□ □□□□. *type*:*administrator*:*assigned-number*. □□□ □□□□ □□ target □□ origin □□ □□ □ □□□ □□□ □□□□□. □□□ □□□ AS □□ IPv4 □□□ 10□□□ □□□□ □□, □□□ □□ □□□□ □□ □□(2□□□ □□ 65,535, 4□□□ □□ 4,294,967,295)□□ □□ □□ □□□□ □□□□□.

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□□ BGP □□□□ □□□ 16□□ □□□ □□□ □□ □□□ 4□□□ □ □□□□ □□□ □□ □□ □□□□□. □□□ □□□ AS □□□ □□□□, □□□ □□□ AS □□□□ □□□ □□ □□ □□□□. 4□□□ ASN□ □□□ □□ 4□□□ BGP □□ □□□□ □ 6□□□ BGP □□ □□□□□ □ □□ BGP □□□□ □□□ □□ □ □ □□□□. □□□□ BGP □□□□□ □□ □□□ AS □□□ □□□□□ □□□ □□□, □□ □□□ □□□□ □□□ ASN:ASN□□ □□□□□. 4□□□ ASN □ □□□□ □□□□□□ 8□□□□ □□□□□. BGP □□ □□□□□□□ 4□□□ AS□ □□ □□□ □□□ □□□□ □ □□□ □□ □□□ □□□□ 2□□□□ □□ □□ □ □□□ □□□□. □□□ 6□□□ □□ □□□□ □□□ □□□□ □□□□. □□ □□□□ □□ Junos OS□ □□ □□□□□ □□ □□□ □□□ □□□□□ □□ □□ □ □□ 4□□□ □□ □□□□ 12□□□ BGP □□□ □□□□□ RFC 8092□ □□□ □□ □□ □□□□□ □□ □□□ 2□□ 4□□□ □□ □□□ □□□□ □□□ □ □□ □□ □□□ □□□ □ □□□ □□□□□. □ [edit routing-options static route *ip-address* community] □□ □□□□ BGP □□□ □□□□ □ [edit policy-options community *community-name* members] □□□ □ □□□□. BGP □□□ □□□□ □□ □□□□ 4□□ □□□ □□□□. large:*global administrator*:*assigned number*:*assigned number*.

BGP IPv6 □□□□□ □□□ □□ □□□□□ 20□□□ □ □□□□ □□□□□□. 20□□□ □□ □□ □□□□ □□□□□.

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IPv6 □□□□□ □□□ BGP □□ □□□□ □□□ □□□ ipv6-target, ipv6-origin, □□ ipv6-extended IPv6 □ □□ □□□□ <, > □ :□ □□□ □ □□ □□□□□.

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```
[edit policy-options]
community name {
    invert-match;
    members [ community-ids ];
}
```

name □□□□□ □□□□□. □□, □□ □ □□□(-)□ □□□ □ □□□ □□ 255□ □□□□□. □□□ □□□ □□□□□, □□ □□□ □□□(" ")□ □□□ □□□.

community-ids □□□□□ □ □ □□□ □□□□ □□□□□. □ □□□□ ID□ □□ □□□□ □□□□ □ □□ □□ □□□ □□□□□.

```
as-number:community-value;
```

- *as-number*- □□□□ □□□□ AS □□□□□. 0□□ 65,535 □□□ □□ □ □ □□□□. AS □□□ □□□ □ □□ □□□□ □□□ □ □□□□.
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  - □□(*) - □□ AS □□□ □□□□ □□□□□ □□□□□. (□□□□ □□□ □□□□ □□□ □ □□□ □ 21 □□□ 477□□ □□□□□ □□□.)
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- *community-value*- □□□□ □□□□ □□□□□□. 0□□ 65,535 □□□ □□□ □ □□□□. □□□□ ID□ □□□ □ □□ □□□□ □□□ □ □□□ □.

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- ??(*) - ?? ????? ?? ????? ?????? ??????. (????? ??? ????? ??? ? ??? ? 21 ??? 477?? ?????? ???.)
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?? ????? ???? ??? ?? ? ??? ????? ??(RFC 1997, *BGP ????? ???* ???) *community-ids* ? ??? ??? ? ????? `members` . ??? ?? ?? ??? `[policy-options policy-statement]` ??? ??? ?? ?? ????? ??? ??? ??????. ??? ?????? BGP ????? ????? ??? ??? ?? ??? ????? ???.

- no-advertise - ? ????? ??? ??? ?? BGP ??? ????? ??? ???.
- no-export - ? ?????? ??? BGP ??????? ?? ??? ??????? ? ????. ??? ??? ?? ??? ?? ????? ?? ??? ?????? ?? ?.
- no-export-subconfed—? ?????? ??? BGP ??????? ? ?? ??? AS? ?? ??? ????? ?? BGP ??? ??????? ? ?? ?.

IPv6 ?????? ??? ?? ?????? ????? ?? ?? IPv6 ?????? ?? ????? ??(RFC 5701, BGP ????? ??? ???)? ??? ? ?????.

```
[edit policy-options]
policy-statement send-direct {
term 1 {
        then {
            community add community-name;
            community add community-name;
            community add community-name;
            accept;
        }
    }
}
community community-name members [ ipv6-target:<IPv6 unicast address>:operator-defined local values ipv6-target:<IPv6 unicast address>:operator-defined local values ];
community community-name members [ ipv6-origin:<IPv6 unicast address>:operator-defined local values ipv6-origin:<IPv6 unicast address>:operator-defined local values ];
community community-name members [ ipv6-extended:type-and-subtype value:<IPv6 unicast address>:operator-defined local values ipv6-extended:type-and-subtype value:<IPv6 unicast address>:operator-defined local values ];
```

ipv6-target ?(?) ?? ??? ????? VPN IPv6 ?? ?????? ??? ??????. *ipv6-origin* ?(?) ?? ????? IPv6 ?????? ??? ??? ??????. *ipv6-extended* ?(?) ?? ????? IPv6 ?????? ??? ?? ??? ??????.

□□□□ □□□ UNIX □□ □□□ □□

□□□ members [*community-ids*] □□□ BGP □□□□□ □□□ □□□ □ UNIX □□□ □□□□ □□□□ AS □□□ □□ □□□□ □□□ □ □□□□. □□ □□□□ □ □□ □□ □□□ □□□□, □□ □□□□ □□□□□.

```
term operator;
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term □(□) □□□□ □□□□ □□□□□.

operator □□□ □□□□ □□ □□□ □□□□□. □ 21 □□□ 477 □(□) □□□□ ID□□ □□□□ □□ □□□ □□□□ □□□□□. □ □ □□□ □□□□ □□ □(|) □ □□(-) □□□□ □□ □□ □□□ □□□ □□ □□ □□ □□ □□ *term* □□□□ □□□□□. □ 22 □□□ 478 □(□) □□□□ □□ □□□□ □□□□ □ □□□ *community-ids* □□□ □□ □□□□□. □□□□ □□ □□□□□.

□□□□ □□ □□□□ UNIX □□ □□□□ □□□□□. □ □ POSIX 1003.2□ □□□ □□ □□□(□□ □□) □□ □□□□ □□□□□.

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□: Junos OS □□□ 9.1 □□, RFC 4893 4□□ *□□ AS □□ □□□ □□ BGP □□*□ □□□ 4□□□ AS □□□ □□□ □ □ □□□, Junos OS□ □□ □□□□□ □□□□ 2□□□ AS □□□ □□□ □ □□□.

□ 21: □□□□ □□ □□ □□□ □□□

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{*m*,*n*}	□ *m*□□ □ □ □□ □ *n* *term*□□. *m* □ *n* □□ □□ □□□□, *m*□(□) *n*□□ □□□ □□□.
{*m*}	□ □□□ □ *m*□□. *term*□(□) □□ □□□□ *m*□□□.
{*m*,}	*m*□ □ □□ *term*□□. □(□) □□ □□□□ *m*□□□.
*	*term*□ 0□ □□□ □□. □□ □ □□□□□ {0,}.
+	*term*□ 1□ □□□ □□. □□ □ □□□□□ {1,}.
?	*term*□ 0 □□ 1□ □□. □□ □ □□□□□ {0,1}.

□ 21: □□□□ □□ □□ □□□ □□□ *(Continued)*

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□ 22: □□□□ □□ □□ □□□□ □ ***(Continued)***

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AS □□□ 56 □□ 78□□□. □□□□ □□□ 2□ □□□□ 2□□ 8□ □□□ □□□□□.	^((56) | (78)): (2.*[2–8])$	56:22 56:21197 78:2678

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```
[edit policy-options]
community name {
    members [ community-ids ];
}
```

name □□□□□ □□□□□. □□, □□ □ □□□(-)□ □□□ □ □□□ □□ 255□ □□□□□. □□□ □□□ □□□□□, □□ □□□ □□□(" ")□ □□□ □□□.

community-ids □□□□□ □ □ □□□ □□□□ □□□□□. □ □□□□ ID□ □□ □□□□ □□□□ □ □□ □□ □□□ □□□□□.

```
type:administrator:assigned-number
```

type □ □□ □□□□□ □□□□ □□ BGP □□ □□□□□ 16□□ □□ □□□□□□ □□ □□ □ □□□ □ □□□□.

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- domain-id- □□□ □□□ OSPF □□□□ □□□□□.

- origin- □□□ □□□ □□□ □□□□□.

- rt-import- ??? ???? ??? ??? ??????.

  ?: AS ??? ?? IP ??? ??? ???? ???.

- src-as- ??? ??? AS? ??????. IP ??? ?? AS ??? ???? ???.

  ?: IP ??? ?? AS ??? AS? ???? ???.

- target- ??? ?? ???? ??????.

  ?: VPN ??? ? ???(VRF) ?????? ?? ???? ??? ??, ?? ??? ?? ??? ???? ???. ?? VRF ???? ?? ? ?? ???? ?????? ?? ?? ???? ??? ? ????. VRF ???? ??? ?? ??? ?? ???? ? ?? ?? ???? ?? ?.

administrator ? ???????. ?? ???? ??? ?? AS ?? ?? IP ?? 4(IPv4) ?? ???????.

assigned-number ?? ???? ??????.

Junos OS ??? 9.1 ??, RFC 4893 4?? *?? AS ?? ??? ?? BGP ??* ??? 4??? AS ??? ??? ?? ???, Junos OS? ? ? ?????? ???? 2??? AS ??? ??? ? ????. ?? ?? ?????? 1?? 4,294,967,295 ??? ?? ??? ? ????. ?? ?? ??? 4? ?? AS ??? ???? ?? origin ?? ?????? ?????? target ?? ?? ?? "L"? ??????. ?? ??, 4??? AS ??? 334,324?? ?? ? ?? 132? ?? ?????? ? target:334324L:132??????.

?: 4??? AS? ?? ?????? ???? ??? ? ???? ?? 'L'? ?? BGP ??? ??????? ???? ????. ?? ?? ??? ?????? ?? ??? ?????? ? ?? ? target:334324L:* ? ?? origin:334324L:* ??? ???? ???? ?????? 334324L:*

Junos OS ??? 9.2 ?????? ? ?? ?????? ?? 4??? AS ??? ??? ? AS-dot ???? targetorigin ??? ?? ????. ???? ?? ? ? ?? ??? ??????. *16-bit high-order value in decimal.16-bit low-order value in decimal.* ?? ??, ?? ?? ???? 65546?? ???? 4??? AS ??? AS-dot ????? 1.10?? ??????.

?: BGP ?? ???? ??

? ?? ?? 10458 ? ? ??? ??? ?? ?????? ??????.20

```
[edit policy-options]
community test-a members [ target:10458:20 ];
```

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```
[edit policy-options]
community test-a members [ target:10.1.1.1:20 ];
```

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```
[edit policy-options]
community test-a members [ origin:10.1.1.1:20 ];
```

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```
[edit policy-options]
community test-b members [ target:100000L:130 ];
```

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BGP □□□□ □ □□ □□□□□ □□□ □□□ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□□□ □□□ □□ □□□□□.

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```
[edit]
policy-options {
    policy-statement one {
        from {
            community [comm-one comm-two];
        }
    }
    community comm-one members [ 1:2 "^4:(5|6)$" ];
    community comm-two members [ 7:8 9:10 ];
}
```

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```
community example1 members 100:100
community example2 members 100:1..
```

□□□□ □□ 1100:100□ □□□ □□□□ □ □□□ □□ community example2 □□□ □□□□□ □□□□ example1.

- □□□ □□one□ □□□□□ □□□ □□ comm-two□ □□□□ comm-one □□□.

- □□ comm-one□□□ □□□ 1:2□ □□□□ □□□□□ 4:5 □□ 4:6□ □□□□ □□□□□ □□□ □□□.

- □□ comm-two□□□ □□□ 7:8□ □□□□ □□□□□ 9:10□ □□□□ □□□□□ □□□ □□□.

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```
family inet-vpn {
    unicast {
```

```
        aggregate-label {
            community community-name;
        }
    }
}
```

```
family inet-vpn {
    labeled-unicast {
        aggregate-label {
            community community-name;
        }
    }
}
```

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```
user@host> show route table VPN detail | match "^10 | Communities | Push"
10.1.1.0/30 (1 entry, 1 announced)
                Label operation: Push 101040
                Push 101040
                Communities: target:65000:1000 origin:65200:2000
10.1.1.4/30 (1 entry, 1 announced)
                Label operation: Push 101056
                Push 101056
                Communities: target:65000:1000 origin:65200:2000
```

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- site-of-origin □□ □□□□ □□□ □□ □□□ □□□ □□ □□ □□□□□ □ □□□□□ □□□□ □□□.
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```
user@host# set policy-options community community-name members "52..:.*"
user@host# commit
```

```
user@host> show route table VPN detail | match "^10 | Communities | Push"
10.1.1.0/30 (1 entry, 1 announced)
                Label operation: Push 101040
                Push 101040
                Communities: target:65000:1000 origin:65200:2000
10.1.1.4/30 (1 entry, 1 announced)
                Label operation: Push 101040
                Push 101040
                Communities: target:65000:1000 origin:65200:2000
```

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```
user@host# set policy-options community community-name members "origin:65...:.*"
user@host# commit
```

```
user@host> show route table VPN detail | match "^10 | Communities | Push"
10.1.1.0/30 (1 entry, 1 announced)
                Label operation: Push 101040
                Push 101040
                Communities: target:65000:1000 origin:65200:2000
10.1.1.4/30 (1 entry, 1 announced)
                Label operation: Push 101040
                Push 101040
                Communities: target:65000:1000 origin:65200:2000
```

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community □□ □□□ □□□□ □□□□, □□□ □□□□ community □□□ □□□□ Junos OS□ TRUE □□□ □□□□□. □□□ □□ □□, Junos OS□ FALSE □□□ □□□□□. □□□□ Junos OS□ invert-match □□□ □□□□□ □□□. □□□□ □□□ □□□ Junos OS□ FALSE □□□

□□□□□. □□□□ □□□ □□□ Junos OS□ TRUE □□□ □□□□□. □□□□ □□□ □□ □□□ □□□□□□ □□□□ □□□ □□ □□□□□ invert-match .

```
[edit policy-options community name]
invert-match;
```

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□□□□:

- 5200:1000
- target:65000:1000
- origin:65200:2000

□□□□ □□:

- □□□□ □□ □□□ "5...:.*"

□ □□, □□ □□□□ □□ 5200:1000 □ □□ □□□□ □□ origin:65200:2000□(□) □□ □□□□ □□□ □□□□ □□□□□. □□□ □□□ □□ □□□ □□□ □□□□ □□□□.

```
user@host> show route table VPN detail | match "^10 | Communities | Push"
10.1.1.0/30 (1 entry, 1 announced)
                Label operation: Push 101040
                Push 101040
                Communities: 5200:1000 target:65000:1000 origin:65200:2000
10.1.1.4/30 (1 entry, 1 announced)
                Label operation: Push 101056
                Push 101056
                Communities: 5200:1000 target:65000:1000 origin:65200:2000
```

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```
user@host# set policy-options community community-name members "^5...:.*"
user@host# commit
```

```
user@host> show route table VPN detail | match "^10 | Communities | Push"
10.1.1.0/30 (1 entry, 1 announced)
               Label operation: Push 101040
               Push 101040
               Communities: 5200:1000 target:65000:1000 origin:65200:2000
10.1.1.4/30 (1 entry, 1 announced)
               Label operation: Push 101040
               Push 101040
               Communities: 5200:1000 target:65000:1000 origin:65200:2000
```

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□□ □□□□□ Ex-OR □□□ □□□□□.

□□ BGP□ □□□ □□□□□ □□□□ AND □□ □□□ □□□□.

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- □□□□—5200:1000 □□:65000:1000
- □□□□—□□:65000:1000 □□:65200:2000
- □□□□ □□ - □□□□ □□□□ □□ □□□ ["^5...:.*" origin:65.*:.*]

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```
user@host> show route table VPN detail | match "^10 | Communities | Push"
10.1.1.0/30 (1 entry, 1 announced)
               Label operation: Push 101040
               Push 101040
               Communities: target:65000:1000 origin:65200:2000
10.1.1.4/30 (1 entry, 1 announced)
```

```
                Label operation: Push 101040
                Push 101040
                Communities: target:65000:1000 origin:65200:2000

10.1.1.16/30 (1 entry, 1 announced)
                Label operation: Push 121104
                Push 101104
                Communities: 5200:1000 target:65000:1000
10.1.1.20/30 (1 entry, 1 announced)
                Label operation: Push 121104
                Push 101104
                Communities: 5200:1000 target:65000:1000
```

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```
user@host> show policy-options community community-name
members [ "(^1...:*)|(^3...:*)|(^4...:*)" origin:2.*:* origin:3.*:* origin:6.*:* ]
```

□ □□ □□□□ 1, 3 □□ 4□ □□□□ □□□□ □□ □□□□, □□ □□ 2, 3 □□ 6□□ □□□□ □□ □□□ □□ □□□□ □□ □□□□□.

□□□ □□ □□ □□□ BGP □□□□ □ □□ □□□□ □□

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```
from {
    community [ names ];
}
```

□□ □□□ □□□□ none □□ □□□ BGP □□□□ □□□ □□□□□ □□□ □ □□□□. □□□ □□□ □□□□ □□□ □□□□□□ □□□ □□ defaults □□□ route □□□ □ □ □□□ □□□□□.

□□ □□□ □□ □□□□□ community □□□ □□□ □ □□□□. □□□ □□ □□□ □□□□ □□ □□□ □□□□□ □□□□ □□□(□□□ □□□ □□□ OR □□□).

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□: □□□ □□□□□ □□□□ □□ | 488

□: □□□ □□□□ □□ □□□□ □□ | 506

□: BGP □□□□□ □□□□ □□□ □□ □□ | 542

□: BGP □□□□ □□ □□□□ □□□ □□ □□ | 531

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- Junos OS □□□ 21.1R1□□ vMX□ □□□□ □□□□ □ □□□□□□□□.

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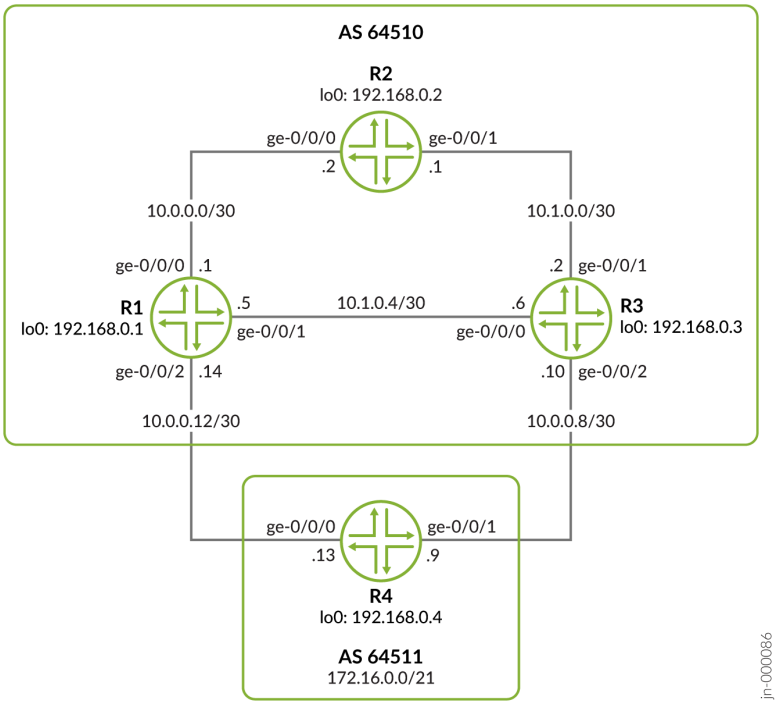
□□ 32 □□□ 489□□ □□ □□□(AS) 64510□ □□ BGP(IBGP) □□□□ □□□□ R1, □□□□ R2 □ □□□□ R3□ □□ □□□□. □□□□ R4 □ AS 64511□□ □□ □□ 172.16.0.0/21□ □□□□ □□□□.

????

?? 32: ?? BGP ?????? ????



???? R1? ???? R4??? ??? ?? ??? ??? ????.

```
user@R1> show route receive-protocol bgp 10.0.0.13

inet.0: 24 destinations, 28 routes (24 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.0.0/24           10.0.0.13                               64511 I
* 172.16.1.0/24           10.0.0.13                               64511 I
* 172.16.2.0/24           10.0.0.13                               64511 I
* 172.16.3.0/24           10.0.0.13                               64511 I
  172.16.4.0/24           10.0.0.13                               64511 I
  172.16.5.0/24           10.0.0.13                               64511 I
  172.16.6.0/24           10.0.0.13                               64511 I
  172.16.7.0/24           10.0.0.13                               64511 I
```

AS 64511? ???? ???? R1???? ?? ??? ???? ???? ???? R3??? ?? ??? ???? ????? ???. ? ?? ??? ???? ?? ? ??? R4? ?? ?? ??? ???? ? 64511:1? ???? ?? ?? ??? ???? ? 64511:3? ?????. AS 64510 ?? ??? ??? ????

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□□□□ R1□□ □□□□ □□ 64511:1□ □□□□ □□ □□ □□ 200□ □□□□ □□□□ □□ 64511:3□ □□□□ □□ □□ □□ 50□ □□□□□. □□□ □ R3□□□ □□□ □□□□ □□ 64511:3□ □□□ □□ □□ □□ 200□ □□□□ □□□□ □□ 64511:1□ □□□ □□ □□ □□ 50□ □□□□□. □□ □ □ □ □□□ □□□□ R1 □ □□□□ R3□ □□ IBGP□ □□ □□□□ R2□ □□□□□.

"CLI □□ □□" □□□ 490□(□) □□ 32 □□□ 489 □ □□ □□□□□ □□□ □□□□□.

"□□□ □□" □□□ 493 □□□□□ □□□□ R1 □ R4□ □□ □□□ □□ □□□□□.

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in this section

- CLI □□ □□ | **490**

CLI □□ □□

□ □□ □□□ □□□□□, □□ □□□ □□□□ □□□ □□□ □□ □□ □□ □□ □□□□□□□ □□□□, □□□□ □□□ □□□□ □ □□□ □□ □□□ □□□ [edit] □ □ □□□□ □□□ CLI□ □□□ □□ □□□□.

□□□□ R1

```
set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.1/30
set interfaces ge-0/0/1 unit 0 family inet address 10.1.0.5/30
set interfaces ge-0/0/2 unit 0 family inet address 10.0.0.14/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set policy-options policy-statement change-local-preference term find-R1-routes from community
R1_PREFERRED
set policy-options policy-statement change-local-preference term find-R1-routes then local-
preference 200
set policy-options policy-statement change-local-preference term find-R3-routes from community
R3_PREFERRED
set policy-options policy-statement change-local-preference term find-R3-routes then local-
preference 50
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 from route-filter 10.0.0.12/30 exact
set policy-options policy-statement send-direct term 1 then accept
set policy-options community R3_PREFERRED members 64511:3
```

```
set policy-options community R1_PREFERRED members 64511:1
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.1
set protocols bgp group int export send-direct
set protocols bgp group int neighbor 192.168.0.2
set protocols bgp group int neighbor 192.168.0.3
set protocols bgp group ext type external
set protocols bgp group ext import change-local-preference
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.0.0.13
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
```

□□□□ R2

```
set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.2/30
set interfaces ge-0/0/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.2
set protocols bgp group int neighbor 192.168.0.1
set protocols bgp group int neighbor 192.168.0.3
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 64510
```

□□□□ R3

```
set interfaces ge-0/0/0 unit 0 family inet address 10.1.0.6/30
set interfaces ge-0/0/1 unit 0 family inet address 10.1.0.2/30
set interfaces ge-0/0/2 unit 0 family inet address 10.0.0.10/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set policy-options policy-statement change-local-preference term find-R3-routes from community
R3_PREFERRED
```

```
set policy-options policy-statement change-local-preference term find-R3-routes then local-
preference 200
set policy-options policy-statement change-local-preference term find-R1-routes from community
R1_PREFERRED
set policy-options policy-statement change-local-preference term find-R1-routes then local-
preference 50
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 from route-filter 10.0.0.8/30 exact
set policy-options policy-statement send-direct term 1 then accept
set policy-options community R1_PREFERRED members 64511:1
set policy-options community R3_PREFERRED members 64511:3
set protocols bgp group int type internal
set protocols bgp group int local-address 192.168.0.3
set protocols bgp group int export send-direct
set protocols bgp group int neighbor 192.168.0.1
set protocols bgp group int neighbor 192.168.0.2
set protocols bgp group ext type external
set protocols bgp group ext import change-local-preference
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.0.0.9
set protocols ospf area 0.0.0.0 interface ge-0/0/1.0
set protocols ospf area 0.0.0.0 interface ge-0/0/0.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 64510
```

???? R4

```
set interfaces ge-0/0/0 unit 0 family inet address 10.0.0.13/30
set interfaces ge-0/0/1 unit 0 family inet address 10.0.0.9/30
set interfaces lo0 unit 0 family inet address 192.168.0.4/32
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 from route-filter 172.16.0.0/24 exact
set policy-options policy-statement send-static term 1 from route-filter 172.16.1.0/24 exact
set policy-options policy-statement send-static term 1 from route-filter 172.16.2.0/24 exact
set policy-options policy-statement send-static term 1 from route-filter 172.16.3.0/24 exact
set policy-options policy-statement send-static term 1 then community add R1_PREFERRED
set policy-options policy-statement send-static term 1 then accept
set policy-options policy-statement send-static term 2 from protocol static
set policy-options policy-statement send-static term 2 from route-filter 172.16.4.0/24 exact
set policy-options policy-statement send-static term 2 from route-filter 172.16.5.0/24 exact
```

```
set policy-options policy-statement send-static term 2 from route-filter 172.16.6.0/24 exact
set policy-options policy-statement send-static term 2 from route-filter 172.16.7.0/24 exact
set policy-options policy-statement send-static term 2 then community add R3_PREFERRED
set policy-options policy-statement send-static term 2 then accept
set policy-options policy-statement send-static term 3 then reject
set policy-options community R3_PREFERRED members 64511:3
set policy-options community R1_PREFERRED members 64511:1
set protocols bgp group to-R1 type external
set protocols bgp group to-R1 export send-static
set protocols bgp group to-R1 peer-as 64510
set protocols bgp group to-R1 neighbor 10.0.0.14
set protocols bgp group to-R3 type external
set protocols bgp group to-R3 export send-static
set protocols bgp group to-R3 peer-as 64510
set protocols bgp group to-R3 neighbor 10.0.0.10
set routing-options router-id 192.168.0.4
set routing-options autonomous-system 64511
set routing-options static route 172.16.0.0/24 reject
set routing-options static route 172.16.1.0/24 reject
set routing-options static route 172.16.2.0/24 reject
set routing-options static route 172.16.3.0/24 reject
set routing-options static route 172.16.4.0/24 reject
set routing-options static route 172.16.5.0/24 reject
set routing-options static route 172.16.6.0/24 reject
set routing-options static route 172.16.7.0/24 reject
```

??? ??

?? ?? ?? ???? ??? ??? ??? ?????. CLI ??? ?? ??? ??? Junos OS CLI ??? ???? "?? ???? CLI ??? ??" ??? 1787?(?) ???????.

???? R1 ??

1. ?????? ?????.

```
[edit interfaces]
user@R1# set ge-0/0/0 unit 0 family inet address 10.0.0.1/30
user@R1# set ge-0/0/1 unit 0 family inet address 10.1.0.5/30
user@R1# set ge-0/0/2 unit 0 family inet address 10.0.0.14/30
user@R1# set lo0 unit 0 family inet address 192.168.0.1/32
```

2. □□□□ R2 □ R3□ □□ □□ □□□□□ □□□□(IGP) □□□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R1# set interface ge-0/0/0.0
user@R1# set interface ge-0/0/1.0
user@R1# set interface lo0.0 passive
```

3. □□□□ R2 □ R3□ □□ IBGP □□□ □□□□□.

```
[edit protocols bgp group int]
user@R1# set type internal
user@R1# set local-address 192.168.0.1
user@R1# set export send-direct
user@R1# set neighbor 192.168.0.2
user@R1# set neighbor 192.168.0.3
```

4. □□□□ R4□ □□ EBGP □□□ □□□□□.

```
[edit protocols bgp group ext]
user@R1# set type external
user@R1# set import change-local-preference
user@R1# set peer-as 64511
user@R1# set neighbor 10.0.0.13
```

5. □□ send-direct□(□) □□□□□.

   □ □□□ IBGP □□□□ □□□□ □□□□ R2□ □□ □□□□ □□□ □ □□□ □□□. □□□ □□□□ R1 □ □□□□ R3□□ next-hop self □□□ □ □□□ □□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R1# set from protocol direct
user@R1# set from route-filter 10.0.0.12/30 exact
user@R1# set then accept
```

6. □□□ □□□□ □□□ □□ □□□ □□ □□ □□□ □□□□ □□□ □□□□□.

```
[edit policy-options ]
user@R1# set policy-statement change-local-preference term find-R1-routes from community
```

```
R1_PREFERRED
user@R1# set policy-statement change-local-preference term find-R1-routes then local-
preference 200
user@R1# set policy-statement change-local-preference term find-R3-routes from community
R3_PREFERRED
user@R1# set policy-statement change-local-preference term find-R3-routes then local-
preference 50
user@R1# set community R3_PREFERRED members 64511:3
user@R1# set community R1_PREFERRED members 64511:1
```

7. [illegible](AS) [illegible] ID[illegible].

```
[edit routing-options]
user@R1# set router-id 192.168.0.1
user@R1# set autonomous-system 64510
```

[illegible] R4 [illegible]

1. [illegible].

```
[edit interfaces]
user@R4# set ge-0/0/0 unit 0 family inet address 10.0.0.13/30
user@R4# set ge-0/0/1 unit 0 family inet address 10.0.0.9/30
user@R4# set lo0 unit 0 family inet address 192.168.0.4/32
```

2. [illegible] R1 [illegible] R3[illegible] [illegible] EBGP [illegible] [illegible].

```
[edit protocols bgp]
user@R4# set group to-R1 type external
user@R4# set group to-R1 export send-static
user@R4# set group to-R1 peer-as 64510
user@R4# set group to-R1 neighbor 10.0.0.14
user@R4# set group to-R3 type external
user@R4# set group to-R3 export send-static
user@R4# set group to-R3 peer-as 64510
user@R4# set group to-R3 neighbor 10.0.0.10
```

3. [illegible] [illegible] [illegible].

```
[edit policy-options ]
user@R4# set community R3_PREFERRED members 64511:3
user@R4# set community R1_PREFERRED members 64511:1
```

4. [illegible] send-static[illegible]([illegible]) [illegible].

   [illegible] [illegible] R1 [illegible] [illegible] R3[illegible] [illegible] EBGP [illegible] [illegible]. [illegible] [illegible] 64511:1(PREFERRED) [illegible] [illegible] [illegible] [illegible] 64511:3(NOT_PREFERRED) [illegible] [illegible] [illegible] [illegible].

```
[edit policy-options]
user@R4# set policy-statement send-static term 1 from protocol static
user@R4# set policy-statement send-static term 1 from route-filter 172.16.0.0/24 exact
user@R4# set policy-statement send-static term 1 from route-filter 172.16.1.0/24 exact
user@R4# set policy-statement send-static term 1 from route-filter 172.16.2.0/24 exact
user@R4# set policy-statement send-static term 1 from route-filter 172.16.3.0/24 exact
user@R4# set policy-statement send-static term 1 then community add R1_PREFERRED
user@R4# set policy-statement send-static term 1 then accept
user@R4# set policy-statement send-static term 2 from protocol static
user@R4# set policy-statement send-static term 2 from route-filter 172.16.4.0/24 exact
user@R4# set policy-statement send-static term 2 from route-filter 172.16.5.0/24 exact
user@R4# set policy-statement send-static term 2 from route-filter 172.16.6.0/24 exact
user@R4# set policy-statement send-static term 2 from route-filter 172.16.7.0/24 exact
user@R4# set policy-statement send-static term 2 then community add R3_PREFERRED
user@R4# set policy-statement send-static term 2 then accept
user@R4# set policy-statement send-static term 3 then reject
```

5. [illegible] [illegible] [illegible].

```
[edit routing-options static]
user@R4# set route 172.16.0.0/24 reject
user@R4# set route 172.16.1.0/24 reject
user@R4# set route 172.16.2.0/24 reject
user@R4# set route 172.16.3.0/24 reject
user@R4# set route 172.16.4.0/24 reject
user@R4# set route 172.16.5.0/24 reject
user@R4# set route 172.16.6.0/24 reject
user@R4# set route 172.16.7.0/24 reject
```

6. □□ □□□(AS) □□ □ □□□ ID□ □□□□□.

```
[edit routing-options]
user@R4# set router-id 192.168.0.4
user@R4# set autonomous-system 64511
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

□□□ R1

```
user@R1# show interfaces
ge-0/0/0 {
    unit 0 {
        family inet {
            address 10.0.0.1/30;
        }
    }
}
ge-0/0/1 {
    unit 0 {
        family inet {
            address 10.1.0.5/30;
        }
    }
}
ge-0/0/2 {
    unit 0 {
        family inet {
            address 10.0.0.14/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
```

```
    }
}
```

```
user@R1# show protocols
bgp {
    group int {
        type internal;
        local-address 192.168.0.1;
        export send-direct;
        neighbor 192.168.0.2;
        neighbor 192.168.0.3;
    }
    group ext {
        type external;
        import change-local-preference;
        peer-as 64511;
        neighbor 10.0.0.13;
    }
}
ospf {
    area 0.0.0.0 {
        interface ge-0/0/0.0;
        interface ge-0/0/1.0;
        interface lo0.0 {
            passive;
        }
    }
}
```

```
user@R1# show policy-options
policy-statement change-local-preference {
    term find-R1-routes {
        from community R1_PREFERRED;
        then {
            local-preference 200;
        }
    }
    term find-R3-routes {
        from community R3_PREFERRED;
        then {
```

```
            local-preference 50;
        }
    }
}
policy-statement send-direct {
    term 1 {
        from {
            protocol direct;
            route-filter 10.0.0.12/30 exact;
        }
        then accept;
    }
}
community R3_PREFERRED members 64511:3;
community R1_PREFERRED members 64511:1;
```

```
user@R1# show routing-options
router-id 192.168.0.1;
autonomous-system 64510;
```

□□□□ R4

```
user@R4# show interfaces
ge-0/0/0 {
    unit 0 {
        family inet {
            address 10.0.0.13/30;
        }
    }
}
ge-0/0/1 {
    unit 0 {
        family inet {
            address 10.0.0.9/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.4/32;
```

```
        }
    }
}
```

```
user@R4# show protocols
bgp {
    group to-R1 {
        type external;
        export send-static;
        peer-as 64510;
        neighbor 10.0.0.14;
    }
    group to-R3 {
        type external;
        export send-static;
        peer-as 64510;
        neighbor 10.0.0.10;
    }
}
```

```
user@R4# show policy-options
policy-statement send-static {
    term 1 {
        from {
            protocol static;
            route-filter 172.16.0.0/24 exact;
            route-filter 172.16.1.0/24 exact;
            route-filter 172.16.2.0/24 exact;
            route-filter 172.16.3.0/24 exact;
        }
        then {
            community add R1_PREFERRED;
            accept;
        }
    }
    term 2 {
        from {
            protocol static;
            route-filter 172.16.4.0/24 exact;
            route-filter 172.16.5.0/24 exact;
```

```
            route-filter 172.16.6.0/24 exact;
            route-filter 172.16.7.0/24 exact;
        }
        then {
            community add R3_PREFERRED;
            accept;
        }
    }
    term 3 {
        then reject;
    }
}
community R3_PREFERRED members 64511:3;
community R1_PREFERRED members 64511:1;
```

```
user@R4# show routing-options
router-id 192.168.0.4;
autonomous-system 64511;
static {
    route 172.16.0.0/24 reject;
    route 172.16.1.0/24 reject;
    route 172.16.2.0/24 reject;
    route 172.16.3.0/24 reject;
    route 172.16.4.0/24 reject;
    route 172.16.5.0/24 reject;
    route 172.16.6.0/24 reject;
    route 172.16.7.0/24 reject;
}
```

□□□□ □□□ □□□□ □□□□□□□ commit□(□) □□□□□.

□□

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- □□□□ R4□□ □□□ □□ □□ | 502
- □□□□ R2□□ □□□ □□ □□ | 504

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□□□ R4□□ □□□ □□ □□

□□

□□□ R4□□, □□□□ R1 □ □□□□ R3□□ □□□ □□□ □□□□□.

□□

```
user@R4> show route advertising-protocol bgp 10.0.0.14 extensive

inet.0: 13 destinations, 13 routes (13 active, 0 holddown, 0 hidden)
* 172.16.0.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.1.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.2.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.3.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.4.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3
```

```
* 172.16.5.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3

* 172.16.6.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3

* 172.16.7.0/24 (1 entry, 1 announced)
 BGP group to-R1 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3
```

```
user@R4> show route advertising-protocol bgp 10.0.0.10 extensive

inet.0: 13 destinations, 13 routes (13 active, 0 holddown, 0 hidden)
* 172.16.0.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.1.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.2.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1
```

```
* 172.16.3.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:1

* 172.16.4.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3

* 172.16.5.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3

* 172.16.6.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3

* 172.16.7.0/24 (1 entry, 1 announced)
 BGP group to-R3 type External
     Nexthop: Self
     AS path: [64511] I
     Communities: 64511:3
```

??

???? R4? ???? 64511:1 ? 64511:3? ?? ??? ??? ???? ???? R1 ? R3?? ??????.

???? R2?? ??? ?? ??

??

???? R2??, ???? R1 ? ???? R3?? ??? ??? ?????.

??

```
user@R2> show route receive-protocol bgp 192.168.0.1

inet.0: 25 destinations, 25 routes (25 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.12/30            192.168.0.1                  100        I
* 172.16.0.0/24           10.0.0.13                    200        64511 I
* 172.16.1.0/24           10.0.0.13                    200        64511 I
* 172.16.2.0/24           10.0.0.13                    200        64511 I
* 172.16.3.0/24           10.0.0.13                    200        64511 I
```

```
user@R2> show route receive-protocol bgp 192.168.0.3

inet.0: 25 destinations, 25 routes (25 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 10.0.0.8/30             192.168.0.3                  100        I
* 172.16.4.0/24           10.0.0.9                     200        64511 I
* 172.16.5.0/24           10.0.0.9                     200        64511 I
* 172.16.6.0/24           10.0.0.9                     200        64511 I
* 172.16.7.0/24           10.0.0.9                     200        64511 I
```

```
user@R2> show route match-prefix 172.16.*

inet.0: 25 destinations, 25 routes (25 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.0.0/24      *[BGP/170] 1w3d 00:02:11, localpref 200, from 192.168.0.1
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.0.0.1 via ge-0/0/0.0
172.16.1.0/24      *[BGP/170] 1w3d 00:02:11, localpref 200, from 192.168.0.1
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.0.0.1 via ge-0/0/0.0
172.16.2.0/24      *[BGP/170] 1w3d 00:02:11, localpref 200, from 192.168.0.1
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.0.0.1 via ge-0/0/0.0
172.16.3.0/24      *[BGP/170] 1w3d 00:02:11, localpref 200, from 192.168.0.1
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.0.0.1 via ge-0/0/0.0
```

```
172.16.4.0/24      *[BGP/170] 1w3d 00:01:50, localpref 200, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.1.0.2 via ge-0/0/1.0
172.16.5.0/24      *[BGP/170] 1w3d 00:01:50, localpref 200, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.1.0.2 via ge-0/0/1.0
172.16.6.0/24      *[BGP/170] 1w3d 00:01:50, localpref 200, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.1.0.2 via ge-0/0/1.0
172.16.7.0/24      *[BGP/170] 1w3d 00:01:50, localpref 200, from 192.168.0.3
                      AS path: 64511 I, validation-state: unverified
                    >  to 10.1.0.2 via ge-0/0/1.0
```

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???? R2?? ??(*)? ???? ???? ?? ?? ?? ???? ?? ?? ???? ?? ???? ????.

?: BGP ???? ?? ???? ???? ?? ??

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> ?: ??? ???? ?? ???? ?? | 506
>
> No Link Title
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> ?: ?? Community ??? ???? BGP ??? IS-IS? ??????? ??? ?? ??

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- ?? ?? | 507
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- ?? | 508
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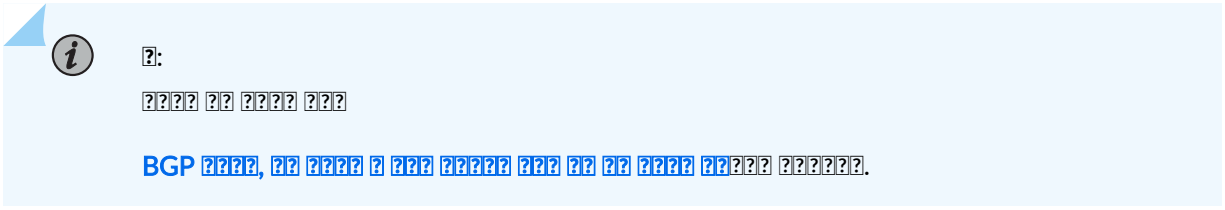
- □□□□ | 507

□ □□□ □□□□ R1 □ □□□□ R2□ AS(Autonomous System) 64510□ OSPF neighbor□□□. □□□□ R3□ □□□□ R1□ □□ □□ BGP(EBGP) □□□ □□□□□. □□□□ R2□ □□□ □□□□□(lo0)□ □□□ □□□□□□ 172.16/16 □□ □□□ □□ □□□□□ □□□□□. □□□□ □ R1□□ □□ 172.16□ □□ □□ □□□ □□□□.*x*□□□□ /24□□ □□□ □□□ □□□□ □□□□ □□□ □□□□□. □□ □□ □□□□ R1□ □□□□ □□ □ □□□□ □□□□ R3□ □□□ □□□□□. □□□□ R3□ □□□ □□□ □□□□ □□□□ □□□ □□□□ □□□ □□□□ □□ □□□ □□□□□.



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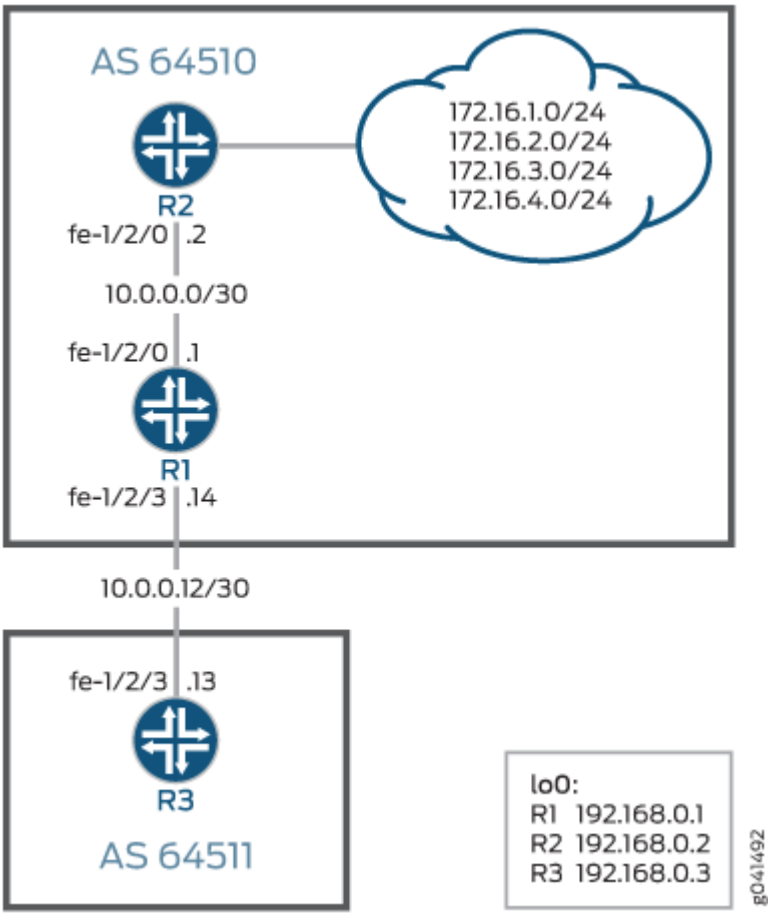
□□ 33 □□□ 508□ □□ □□□□□ □□□□□.

□□ 33: □□□ BGP □□□□□ □□ □□□□



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□□ "No Link Title" □□□ 511□ □□□□ R3□ □□□ □□□□□.

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- □□ | **510**

CLI □□ □□

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□□□□ R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/3 unit 0 family inet address 10.0.0.14/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32 primary
set protocols bgp group ext type external
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.0.0.13
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 172.16.1.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.1.0/24 community 64510:1
set routing-options static route 172.16.2.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.2.0/24 community 64510:2
set routing-options static route 172.16.3.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.3.0/24 community 64510:3
set routing-options static route 172.16.4.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.4.0/24 community 64510:4
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
```

□□□□ R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set interfaces lo0 unit 0 family inet address 172.16.1.1/32
set interfaces lo0 unit 0 family inet address 172.16.2.2/32
set interfaces lo0 unit 0 family inet address 172.16.3.3/32
set interfaces lo0 unit 0 family inet address 172.16.4.4/32
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 64510
```

□□□□ R3

```
set interfaces fe-1/2/3 unit 0 family inet address 10.0.0.13/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group to-R1 type external
set protocols bgp group to-R1 import set-ext-comms
set protocols bgp group to-R1 peer-as 64510
set protocols bgp group to-R1 neighbor 10.0.0.14
set policy-options policy-statement set-ext-comms term route-1 from route-filter 172.16.1.0/24
exact
set policy-options policy-statement set-ext-comms term route-1 then community add target-as
set policy-options policy-statement set-ext-comms term route-1 then accept
set policy-options policy-statement set-ext-comms term route-2 from route-filter 172.16.2.0/24
exact
set policy-options policy-statement set-ext-comms term route-2 then community add target-ip
set policy-options policy-statement set-ext-comms term route-2 then accept
set policy-options policy-statement set-ext-comms term route-3 from route-filter 172.16.3.0/24
exact
set policy-options policy-statement set-ext-comms term route-3 then community add origin-as
set policy-options policy-statement set-ext-comms term route-3 then accept
set policy-options policy-statement set-ext-comms term route-4 from route-filter 172.16.4.0/24
exact
set policy-options policy-statement set-ext-comms term route-4 then community add origin-ip
set policy-options policy-statement set-ext-comms term route-4 then accept
set policy-options community origin-as members origin:64511:3
set policy-options community origin-ip members origin:172.16.7.7:4
set policy-options community target-as members target:64511:1
set policy-options community target-ip members target:172.16.7.7:2
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 64511
```

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□□□□ R3 □□:

1. ??????? ??????.

```
[edit interfaces]
user@R3# set fe-1/2/3 unit 0 family inet address 10.0.0.13/30
user@R3# set lo0 unit 0 family inet address 192.168.0.3/32
```

2. ???? R1? EBGP ??? ??????.

```
[edit protocols bgp group to-R1]
user@R3# set type external
user@R3# set import set-ext-comms
user@R3# set peer-as 64510
user@R3# set neighbor 10.0.0.14
```

3. ???? R1?? ??? ??? ??? ????? ?? ????? ??? ??????.

   ?? ?????? ? ???? *type*:*administrator*:*assigned-number*?????.

   ?? ????? ?? ? ??? *community (Policy Options)*?? ?? ?? ?? ??? ?? ??? ????? ?? ?? ? ? ?????.

```
[edit policy-options policy-statement set-ext-comms]
user@R3# set term route-1 from route-filter 172.16.1.0/24 exact
user@R3# set term route-1 then community add target-as
user@R3# set term route-1 then accept
user@R3# set term route-2 from route-filter 172.16.2.0/24 exact
user@R3# set term route-2 then community add target-ip
user@R3# set term route-2 then accept
user@R3# set term route-3 from route-filter 172.16.3.0/24 exact
user@R3# set term route-3 then community add origin-as
user@R3# set term route-3 then accept
user@R3# set term route-4 from route-filter 172.16.4.0/24 exact
user@R3# set term route-4 then community add origin-ip
user@R3# set term route-4 then accept
[edit policy-options]
user@R3# set community origin-as members origin:64511:3
user@R3# set community origin-ip members origin:172.16.7.7:4
user@R3# set community target-as members target:64511:1
user@R3# set community target-ip members target:172.16.7.7:2
```

4. □□ □□□(AS) □□ □ □□□ ID□ □□□□□.

```
[edit routing-options]
user@R3# set router-id 192.168.0.3
user@R3# set autonomous-system 64511
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R3# show interfaces
fe-1/2/3 {
    unit 0 {
        family inet {
            address 10.0.0.13/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.3/32;
        }
    }
}
```

```
user@R3# show protocols
bgp {
    group to-R1 {
        type external;
        import set-ext-comms;
        peer-as 64510;
        neighbor 10.0.0.14;
```

```
    }
}
```

```
user@R3# show policy-options
policy-statement set-ext-comms {
    term route-1 {
        from {
            route-filter 172.16.1.0/24 exact;
        }
        then {
            community add target-as;
            accept;
        }
    }
    term route-2 {
        from {
            route-filter 172.16.2.0/24 exact;
        }
        then {
            community add target-ip;
            accept;
        }
    }
    term route-3 {
        from {
            route-filter 172.16.3.0/24 exact;
        }
        then {
            community add origin-as;
            accept;
        }
    }
    term route-4 {
        from {
            route-filter 172.16.4.0/24 exact;
        }
        then {
            community add origin-ip;
            accept;
        }
    }
```

```
}
community origin-as members origin:64511:3;
community origin-ip members origin:172.16.7.7:4;
community target-as members target:64511:1;
community target-ip members target:172.16.7.7:2;
```

```
user@R3# show routing-options
router-id 192.168.0.3;
autonomous-system 64511;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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- □□□□ R3□□ □□ □□ | 516

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□□□□ R1□□ □□ □□

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□□□□ R1□□ 172.16□ □□□□□. □□□ □□□□ □□□□□.

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```
user@R1> show route protocol static match-prefix 172.16.* detail

inet.0: 15 destinations, 15 routes (15 active, 0 holddown, 0 hidden)
172.16.1.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 835
                Address: 0x9260250
                Next-hop reference count: 19
```

```
                Next hop: 10.0.0.2 via fe-1/2/0.0, selected
                State: <Active Int Ext>
                Local AS: 64510
                Age: 2:06:08
                Task: RT
                Announcement bits (2): 2-KRT 3-BGP_RT_Background
                AS path: I
                Communities: 64510:1

172.16.2.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 835
                Address: 0x9260250
                Next-hop reference count: 19
                Next hop: 10.0.0.2 via fe-1/2/0.0, selected
                State: <Active Int Ext>
                Local AS: 64510
                Age: 2:06:08
                Task: RT
                Announcement bits (2): 2-KRT 3-BGP_RT_Background
                AS path: I
                Communities: 64510:2

172.16.3.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 835
                Address: 0x9260250
                Next-hop reference count: 19
                Next hop: 10.0.0.2 via fe-1/2/0.0, selected
                State: <Active Int Ext>
                Local AS: 64510
                Age: 2:06:08
                Task: RT
                Announcement bits (2): 2-KRT 3-BGP_RT_Background
                AS path: I
                Communities: 64510:3

172.16.4.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 835
                Address: 0x9260250
                Next-hop reference count: 19
                Next hop: 10.0.0.2 via fe-1/2/0.0, selected
```

```
                State: <Active Int Ext>
                Local AS: 64510
                Age: 2:06:08
                Task: RT
                Announcement bits (2): 2-KRT 3-BGP_RT_Background
                AS path: I
                Communities: 64510:4
```

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????? R3?? ?? ??

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????? R3?? 172.16? ??????. ???? ????? ??????.

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```
user@R3> show route protocol bgp match-prefix 172.16.* detail
betsy@tp5# run show route protocol bgp match-prefix 172.16.* detail logical-system R3

inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
172.16.1.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 611
                Address: 0x9260130
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                State: <Active Ext>
                Local AS: 64511 Peer AS: 64510
                Age: 1:57:27
                Task: BGP_64510.10.0.0.14+54618
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:1 target:64511:1
```

```
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1

172.16.2.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 611
                Address: 0x9260130
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                State: <Active Ext>
                Local AS: 64511 Peer AS: 64510
                Age: 1:57:27
                Task: BGP_64510.10.0.0.14+54618
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:2 target:172.16.7.7:2
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1

172.16.3.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 611
                Address: 0x9260130
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                State: <Active Ext>
                Local AS: 64511 Peer AS: 64510
                Age: 1:57:27
                Task: BGP_64510.10.0.0.14+54618
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:3 origin:64511:3
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1

172.16.4.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 611
```

```
                Address: 0x9260130
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                State: <Active Ext>
                Local AS: 64511 Peer AS: 64510
                Age: 1:57:27
                Task: BGP_64510.10.0.0.14+54618
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:4 origin:172.16.7.7:4
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1
```

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>
> No Link Title
>
> No Link Title
>
> ?: ?? Community ???? ????? BGP ???? IS-IS? ??????? ???? ?? ??

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- MX □□□ □□□ 3□
- □□ □□□□□□ Junos OS □□□ 17.3 □□ □□

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□ □□□ □□□□ R1 □ □□□□ R2□ AS(Autonomous System) 64510□ OSPF neighbor□□□. □□□□ R3□ □□□□ R1□ □□ □□ BGP(EBGP) □□□ □□□□□. □□□□ R2□ □□□ □□□□□(lo0)□ □□□ □□□□□□ 172.16/16 □□ □□□ □□ □□□□□ □□□□□. □□□□ □ R1□ □□ 172.16.x/24 □□□□□ □□ □□ □□□ □□□□, □□□ □□□ □□ □□□□ □□ □□□□□. □□ □□ □□□□ R1□ □□□□ □□□ □□□□ □□□□ R3□ □□□ □□□□□. □□□□ R3□ □□□ □□□ □□□□ □□□□ □□□ □□□□ □□□ □□□ □□□□ □□ □□□□□.

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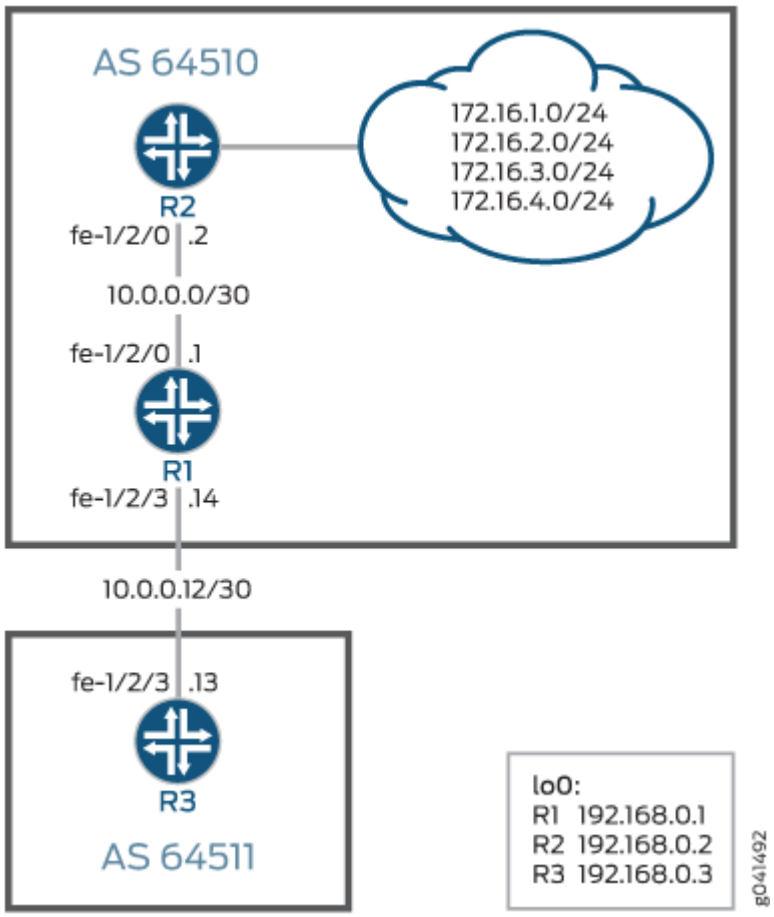

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[edit] ?? ???? CLI? ???????.

[illegible] R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/3 unit 0 family inet address 10.0.0.14/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32 primary
set routing-options static route 172.16.1.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.1.0/24 community 64510:1
set routing-options static route 172.16.1.0/24 community large:64510:100:1
set routing-options static route 172.16.2.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.2.0/24 community 64510:2
set routing-options static route 172.16.2.0/24 community large:64510:200:2
set routing-options static route 172.16.3.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.3.0/24 community 64510:3
set routing-options static route 172.16.4.0/24 next-hop 10.0.0.2
set routing-options static route 172.16.4.0/24 community 64510:4
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
set protocols bgp group ext type external
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.0.0.13
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
```

[illegible] R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set interfaces lo0 unit 0 family inet address 172.16.1.1/32
set interfaces lo0 unit 0 family inet address 172.16.2.2/32
set interfaces lo0 unit 0 family inet address 172.16.3.3/32
set interfaces lo0 unit 0 family inet address 172.16.4.4/32
set routing-options router-id 192.168.0.2
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
```

□□□□ R3

```
set interfaces fe-1/2/3 unit 0 family inet address 10.0.0.13/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 64511
set protocols bgp group to-R1 type external
set protocols bgp group to-R1 import set-large-comms
set protocols bgp group to-R1 peer-as 64510
set protocols bgp group to-R1 neighbor 10.0.0.14
set policy-options policy-statement set-large-comms term route-1 from route-filter 172.16.1.0/24
exact
set policy-options policy-statement set-large-comms term route-1 then community add large2-as
set policy-options policy-statement set-large-comms term route-1 then accept
set policy-options policy-statement set-large-comms term route-2 from route-filter 172.16.2.0/24
exact
set policy-options policy-statement set-large-comms term route-2 then community add large2-ip
set policy-options policy-statement set-large-comms term route-2 then accept
set policy-options policy-statement set-large-comms term route-3 from route-filter 172.16.3.0/24
exact
set policy-options policy-statement set-large-comms term route-3 then community add large1-as
set policy-options policy-statement set-large-comms term route-3 then accept
set policy-options policy-statement set-large-comms term route-4 from route-filter 172.16.4.0/24
exact
set policy-options policy-statement set-large-comms term route-4 then community add large1-ip
set policy-options policy-statement set-large-comms term route-4 then accept
set policy-options community large1-as members large:64511:3:1
set policy-options community large1-ip members large:7777:4:1
set policy-options community large2-as members large:64511:1:1
set policy-options community large2-ip members large:7777:2:1
```

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□□□□ R3 □□:

1. ??????? ??????.

```
[edit interfaces]
set fe-1/2/3 unit 0 family inet address 10.0.0.13/30
set lo0 unit 0 family inet address 192.168.0.3/32
```

2. ?? ???(AS) ?? ? ??? ID? ??????.

```
[edit routing-options]
set router-id 192.168.0.3
set autonomous-system 64511
```

3. ???? R1? EBGP ??? ??????.

```
[edit protocols bgp group to-R1]
set type external
set import set-large-comms
set peer-as 64510
set neighbor 10.0.0.14
```

4. ???? R1?? ??? ??? ? ????? ?? ????? ??? ??????.

??? ????? :*global administrator*:*assigned number*:*assigned number*? large???? ??????. ?? ???? ??? ?? ?? ?? ? ?? ?? ??? ????? ?? ?? ? ? ?????.

```
[edit policy-options policy-statement set-large-comms]
set term route-1 from route-filter 172.16.1.0/24 exact
set term route-1 then community add large2-as
set term route-1 then accept
set term route-2 from route-filter 172.16.2.0/24 exact
set term route-2 then community add large2-ip
set term route-2 then accept
set term route-3 from route-filter 172.16.3.0/24 exact
set term route-3 then community add large1-as
set term route-3 then accept
set term route-4 from route-filter 172.16.4.0/24 exact
```

```
set term route-4 then community add large1-ip
set term route-4 then accept
```

```
[edit policy-options ]
set community large1-as members large:64511:3:1
set community large1-ip members large:7777:4:1
set community large2-as members large:64511:1:1
set community large2-ip members large:7777:2:1
```

??

?? ???? show interfaces, show protocols, show policy-options ? show routing-options ??? ???? ??? ??????. ?? ??? ??? ???? ???? ???? ? ?? ??? ???? ??? ???????.

```
user@R3# show interfaces
fe-1/2/3 {
    unit 0 {
        family inet {
            address 10.0.0.13/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.3/32;
        }
    }
}
```

```
user@R3# show protocols
bgp {
    group to-R1 {
        type external;
        import set-large-comms;
        peer-as 64510;
        neighbor 10.0.0.14;
```

```
    }
}
```

```
user@R3# show policy-options
policy-statement set-large-comms {
    term route-1 {
        from {
            route-filter 172.16.1.0/24 exact;
        }
        then {
            community add large2-as;
            accept;
        }
    }
    term route-2 {
        from {
            route-filter 172.16.2.0/24 exact;
        }
        then {
            community add large2-ip;
            accept;
        }
    }
    term route-3 {
        from {
            route-filter 172.16.3.0/24 exact;
        }
        then {
            community add large1-as;
            accept;
        }
    }
    term route-4 {
        from {
            route-filter 172.16.4.0/24 exact;
        }
        then {
            community add large1-ip;
            accept;
        }
    }
```

```
  }
community large1-as members large:64511:3:1;
community large1-ip members large:7777:4:1;
community large2-as members large:64511:1:1;
community large2-ip members large:7777:2:1;
```

```
user@R3# show routing-options
router-id 192.168.0.3;
autonomous-system 64511;
```

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R1 □□

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□□□□ R1□□ 172.16□ □□□□□. □□□ □□□□ □□□□□.

□□

```
user@R1> show route protocol static match-prefix 172.16.* detail
inet.0: 17 destinations, 17 routes (17 active, 0 holddown, 0 hidden)
172.16.1.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 580
                Address: 0xb7a1270
                Next-hop reference count: 9
                Next hop: 10.0.0.2 via fe-1/2/0.0, selected
```

```
                Session Id: 0x140
                State: < Active Int Ext >
                Local AS: 64510
                Age: 4d 19:02:23
                Validation State: unverified
                Task: RT
                Announcement bits (2): 0-KRT 4-BGP_RT_Background
                AS path: I
                Communities: 64510:1 large:64510:100:1

172.16.2.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 580
                Address: 0xb7a1270
                Next-hop reference count: 9
                Next hop: 10.0.0.2 via fe-1/2/0.0.0, selected
                Session Id: 0x140
                State: < Active Int Ext >
                Local AS: 64510
                Age: 4d 19:02:23
                Validation State: unverified
                Task: RT
                Announcement bits (2): 0-KRT 4-BGP_RT_Background
                AS path: I
                Communities: 64510:2 large:64510:200:2

172.16.3.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Router, Next hop index: 580
                Address: 0xb7a1270
                Next-hop reference count: 9
                Next hop: 10.0.0.2 via fe-1/2/0.0.0, selected
                Session Id: 0x140
                State: < Active Int Ext >
                Local AS: 64510
                Age: 4d 22:17:12
                Validation State: unverified
                Task: RT
                Announcement bits (2): 0-KRT 4-BGP_RT_Background
                AS path: I
                Communities: 64510:3

172.16.4.0/24 (1 entry, 1 announced)
```

```
        *Static Preference: 5
                Next hop type: Router, Next hop index: 580
                Address: 0xb7a1270
                Next-hop reference count: 9
                Next hop: 10.0.0.2 via fe-1/2/0.0.0, selected
                Session Id: 0x140
                State: < Active Int Ext >
                Local AS: 64510
                Age: 4d 22:17:12
                Validation State: unverified
                Task: RT
                Announcement bits (2): 0-KRT 4-BGP_RT_Background
                AS path: I
                Communities: 64510:4
 . . .
```

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R3 ??

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???? R3?? 172.16? ?????. ??? ???? ?????.

??

```
user@R3> show route protocol bgp match-prefix 172.16.* detail

inet.0: 14 destinations, 14 routes (14 active, 0 holddown, 0 hidden)
172.16.1.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 581
                Address: 0xb7a10f0
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
```

```
                Session Id: 0x140
                State: < Active Ext >
                Local AS: 64511 Peer AS: 64510
                Age: 3d 16:36:18
                Validation State: unverified
                Task: BGP_64510.10.0.0.14
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:1 large:64510:100:1 large:64511:1:1
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1

172.16.2.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 581
                Address: 0xb7a10f0
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                Session Id: 0x140
                State: < Active Ext >
                Local AS: 64511 Peer AS: 64510
                Age: 3d 16:36:18
                Validation State: unverified
                Task: BGP_64510.10.0.0.14
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:2 large:7777:2:1 large:64510:200:2
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1

172.16.3.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 581
                Address: 0xb7a10f0
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                Session Id: 0x140
                State: < Active Ext >
                Local AS: 64511 Peer AS: 64510
```

```
                Age: 3d 16:36:18
                Validation State: unverified
                Task: BGP_64510.10.0.0.14
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:3 large:64511:3:1
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1

172.16.4.0/24 (1 entry, 1 announced)
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 581
                Address: 0xb7a10f0
                Next-hop reference count: 8
                Source: 10.0.0.14
                Next hop: 10.0.0.14 via fe-1/2/3.0, selected
                Session Id: 0x140
                State: < Active Ext >
                Local AS: 64511 Peer AS: 64510
                Age: 3d 16:36:18
                Validation State: unverified
                Task: BGP_64510.10.0.0.14
                Announcement bits (1): 0-KRT
                AS path: 64510 I
                Communities: 64510:4 large:7777:4:1
                Accepted
                Localpref: 100
                Router ID: 192.168.0.1
. . .
```

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? ?? ?? BGP(EBGP) ??? ?? ? ??? ?????? ??????. ???? R2? BGP ??? ???? ???? R1? 2?? ?? ??? ??????. ??? ? R1?? ???? ??? BGP ?? ??? ???? ??? ??? ?????? ?? 5??? ??? ? ??? ??????. ?? ??, ??? ? ?? ?????? ??? ? ? ???? ??? ???? ??????. ??? 6? ??? ?????? ??? ?? ???? ?? ??? ???? ??????.

EBGP? ?? ??? ?? ??? ???? ??? ???? ???. ????? ?? ??? ?????? ??? ?? ?? ?? ??? ???? `then reject` ???.

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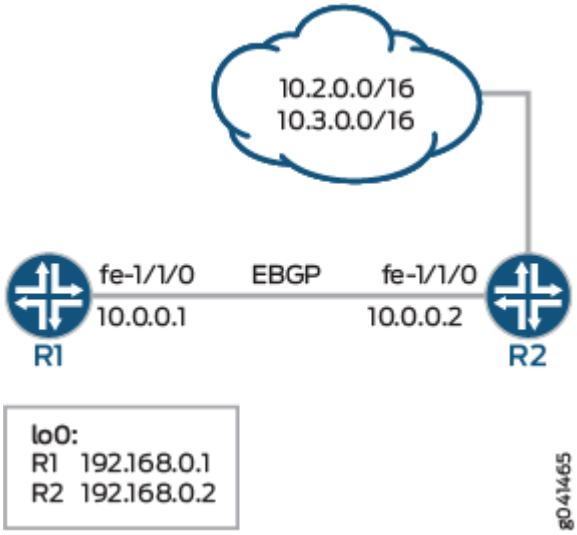

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□□□□ R1

```
set interfaces fe-1/1/0 unit 0 description to-R2
set interfaces fe-1/1/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group external-peers type external
set protocols bgp group external-peers peer-as 2
set protocols bgp group external-peers neighbor 10.0.0.2 import import-communities
set policy-options policy-statement import-communities term 1 from protocol bgp
set policy-options policy-statement import-communities term 1 from community-count 5 orlower
set policy-options policy-statement import-communities term 1 then accept
```

```
set policy-options policy-statement import-communities term 2 then reject
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 1
```

???? R2

```
set interfaces fe-1/1/0 unit 0 description to-R1
set interfaces fe-1/1/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group external-peers type external
set protocols bgp group external-peers export statics
set protocols bgp group external-peers peer-as 1
set protocols bgp group external-peers neighbor 10.0.0.1
set policy-options policy-statement statics from protocol static
set policy-options policy-statement statics then community add 1
set policy-options policy-statement statics then accept
set policy-options community 1 members 2:1
set policy-options community 1 members 2:2
set policy-options community 1 members 2:3
set policy-options community 1 members 2:4
set policy-options community 1 members 2:5
set policy-options community 1 members 2:6
set policy-options community 1 members 2:7
set policy-options community 1 members 2:8
set policy-options community 1 members 2:9
set policy-options community 1 members 2:10
set routing-options static route 10.2.0.0/16 reject
set routing-options static route 10.2.0.0/16 install
set routing-options static route 10.3.0.0/16 reject
set routing-options static route 10.3.0.0/16 install
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 2
```

??

??? ??

?? ?? ?? ???? ??? ??? ??? ?????. CLI ?? ?? ??? Junos OS CLI ??? ???? *?? ????? CLI ??? ??* ???????.

???? R1 ??

1. ??????? ??????.

```
[edit interfaces]
user@R1# set fe-1/1/0 unit 0 description to-R2
user@R1# set fe-1/1/0 unit 0 family inet address 10.0.0.1/30
user@R1# set lo0 unit 0 family inet address 192.168.0.1/32
```

2. BGP? ??????.

   ???? R2?? BGP ??? ??? ???? ??? ??????.

```
[edit protocols bgp group external-peers]
user@R1# set type external
user@R1# set peer-as 2
user@R1# set neighbor 10.0.0.2 import import-communities
```

3. ?? ??? ???? ??? ??? ??????.

```
[edit policy-options policy-statement import-communities]
user@R1# set term 1 from protocol bgp
user@R1# set term 1 from community-count 5 orlower
user@R1# set term 1 then accept
user@R1# set term 2 then reject
```

4. AS(Autonomous System) ??? ??? ID? ??????.

```
[edit routing-options ]
user@R1# set router-id 192.168.0.1
user@R1# set autonomous-system 1
```

??? ??

?? ?? ?? ???? ??? ??? ??? ??????. CLI ?? ?? ??? Junos OS CLI ??? ???? *?? ?????? CLI ??? ??* ???????.

???? R2 ??:

1. ??????? ??????.

```
[edit interfaces]
user@R2# set fe-1/1/0 unit 0 description to-R1
user@R2# set fe-1/1/0 unit 0 family inet address 10.0.0.2/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. ??? ID ? AS(Autonomous System) ??? ??????.

```
[edit routing-options]
user@R2# set router-id 192.168.0.3
user@R2# set autonomous-system 2
```

3. BGP? ??????.

```
[edit  protocols bgp group external-peers]
user@R2# set type external
user@R2# set peer-as 1
user@R2# set neighbor 10.0.0.1
```

4. ?? ?????? ?????? ?? ????? ?? ?? ?????? ??????.

```
[edit policy-options community 1]
user@R2# set members 2:1
user@R2# set members 2:2
user@R2# set members 2:3
user@R2# set members 2:4
user@R2# set members 2:5
user@R2# set members 2:6
user@R2# set members 2:7
user@R2# set members 2:8
user@R2# set members 2:9
user@R2# set members 2:10
```

5. ?? ??? ??????.

```
[edit routing-options static]
user@R2# set route 10.2.0.0/16 reject
```

```
user@R2# set route 10.2.0.0/16 install
user@R2# set route 10.3.0.0/16 reject
user@R2# set route 10.3.0.0/16 install
```

6. □□ □□□ BGP□ □□□□ BGP □□□□□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement statics]
user@R2# set from protocol static
user@R2# set then community add 1
user@R2# set then accept
```

7. □□□□ □□□ □□□□□.

```
[edit protocols bgp group external-peers]
user@R2# set export statics
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

□□□□ R1

```
user@R1# show interfaces
fe-1/1/0 {
    unit 0{
        description to-R2;
        family inet {
            address 10.0.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
    }
```

```
}
}
```

```
user@R1# show protocols
bgp {
    group external-peers {
        type external;
        peer-as 2;
        neighbor 10.0.0.2 {
            import import-communities;
        }
    }
}
```

```
user@R1# show policy-options
policy-statement import-communities {
    term 1 {
        from {
            protocol bgp;
            community-count 5 orlower;
        }
        then accept;
    }
    term 2 {
        then reject;
    }
}
```

```
user@R1# show routing-options
router-id 192.168.0.1;
autonomous-system 1;
```

????? R2

```
user@R2# show interfaces
fe-1/1/0 {
    unit 0 {
        description to-R1;
```

```
        family inet {
            address 10.0.0.2/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group external-peers {
        type external;
        export statics;
        peer-as 1;
        neighbor 10.0.0.1;
    }
}
```

```
user@R2# show policy-options
policy-statement statics {
    from protocol static;
    then {
        community add 1;
        accept;
    }
}
community 1 members [ 2:1 2:2 2:3 2:4 2:5 2:6 2:7 2:8 2:9 2:10 ];
```

```
user@R2# show routing-options
static {
    route 10.2.0.0/16 {
        reject;
        install;
    }
```

```
    route 10.3.0.0/16 {
        reject;
        install;
    }
}
router-id 192.168.0.3;
autonomous-system 2;
```

□□□□ □□□ □□□□ □□□□□□□ commit□(□) □□□□□.

□□

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BGP □□ □□

□□

□□□□ R1□ □□□ □□□□ □□□□ BGP □□□ □□□□ □□□ □□□□□.

□□

1. □□□□ R1□□ □□□ □□□□□ show route protocols bgp .

```
user@R1> show route protocols bgp

inet.0: 5 destinations, 5 routes (3 active, 0 holddown, 2 hidden)
```

2. □□□□ R1□□ community-count □□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement import-communities term 1]
user@R1# set from community-count 5 orhigher
user@R1# commit
```

3. ????? R1?? ??? ?????? show route protocols bgp .

```
user@R1> show route protocols bgp

inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.2.0.0/16        *[BGP/170] 18:29:53, localpref 100
                      AS path: 2 I, validation-state: unverified
                    > to 10.0.0.2 via fe-1/1/0.0
10.3.0.0/16        *[BGP/170] 18:29:53, localpref 100
                      AS path: 2 I, validation-state: unverified
                    > to 10.0.0.2 via fe-1/1/0.0
```

4. ????? R1?? ??? ????? show route protocols bgp extensive ??? ?????? ??????.

```
user@R1> show route protocols bgp extensive
inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
10.2.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.2.0.0/16 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 671
                Address: 0x9458270
                Next-hop reference count: 4
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via fe-1/1/0.0, selected
                Session Id: 0x100001
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 18:56:10
                Validation State: unverified
                Task: BGP_2.10.0.0.2+179
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Communities: 2:1 2:2 2:3 2:4 2:5 2:6 2:7 2:8 2:9 2:10
                Accepted
                Localpref: 100
                Router ID: 192.168.0.3

10.3.0.0/16 (1 entry, 1 announced)
```

```
TSI:
KRT in-kernel 10.3.0.0/16 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 671
                Address: 0x9458270
                Next-hop reference count: 4
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via fe-1/1/0.0, selected
                Session Id: 0x100001
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 18:56:10
                Validation State: unverified
                Task: BGP_2.10.0.0.2+179
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Communities: 2:1 2:2 2:3 2:4 2:5 2:6 2:7 2:8 2:9 2:10
                Accepted
                Localpref: 100
                Router ID: 192.168.0.3
```

??

??? ????? R1? ??? ?????? ????? R2?? ??? BGP ??? ??? ??? ??????. ????? R1? `community-count` ????? ?? ??? ? ??? BGP ??? ? ?? ????? ????.

?? ??

> ?: ?? Community ??? ????? BGP ??? IS-IS? ??????? ??? ?? ??
>
> ?? BGP ??? ?? ??

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? ?? BGP ??? ????? ???? BGP ????? ???? ??? ??? ??? ?????.

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? ?? ?? BGP(EBGP) ??? ?? ? ??? ????? ?????. ???? R2? BGP ??? ???? ???? R1? 2?? ?? ??? ?????. ??? ? R1?? ???? ??? ?? BGP ????? ???? ????? ??? ?????.

????? EBGP ??? ????? ???? ????? ???? ?????. ??????? ?? ????? ??? ????? ?? ???? ?? ??? ???? ??? ? ?? ? ????. ??? ??? ? ???? ??? ?? ???? ??? ???? ????. ?? ????? ????? ?? ????? ???? ??? ?????(??? ?? ?? ??? wild).

```
[edit policy-options]
community wild members "* : *";
```

□□ □□ □□□ □□ □□□ □□□ □□□□□.community delete

```
[edit policy-options]
policy-statement policy-name {
    term term-name {
        then community delete wild;
    }
}
```

AS(Autonomous System)□□ □□ □□□□□ □□□□□ □□□□□ □ community wild members "*:*community-value*"□□□□□.

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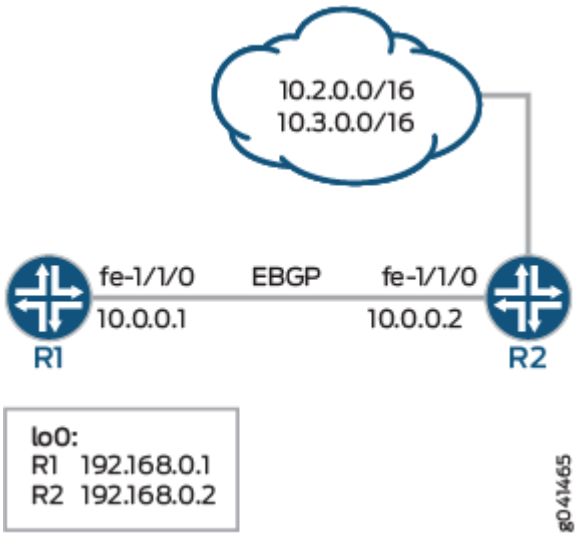
□□ 35: □□□□□ □□□□ BGP □□



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□□□□ R1

```
set interfaces fe-1/1/0 unit 0 description to-R2
set interfaces fe-1/1/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group external-peers type external
set protocols bgp group external-peers peer-as 2
set protocols bgp group external-peers neighbor 10.0.0.2 import remove-communities
set policy-options policy-statement remove-communities term 1 from protocol bgp
set policy-options policy-statement remove-communities term 1 then community delete wild
set policy-options policy-statement remove-communities term 1 then accept
set policy-options policy-statement remove-communities term 2 then reject
set policy-options community wild members *:*
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 1
```

□□□□ R2

```
set interfaces fe-1/1/0 unit 0 description to-R1
set interfaces fe-1/1/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group external-peers type external
set protocols bgp group external-peers export statics
set protocols bgp group external-peers peer-as 1
set protocols bgp group external-peers neighbor 10.0.0.1
set policy-options policy-statement statics from protocol static
set policy-options policy-statement statics then community add 1
set policy-options policy-statement statics then accept
set policy-options community 1 members 2:1
set policy-options community 1 members 2:2
set policy-options community 1 members 2:3
set policy-options community 1 members 2:4
set policy-options community 1 members 2:5
set policy-options community 1 members 2:6
set policy-options community 1 members 2:7
set policy-options community 1 members 2:8
set policy-options community 1 members 2:9
```

```
set policy-options community 1 members 2:10
set routing-options static route 10.2.0.0/16 reject
set routing-options static route 10.2.0.0/16 install
set routing-options static route 10.3.0.0/16 reject
set routing-options static route 10.3.0.0/16 install
set routing-options router-id 192.168.0.3
set routing-options autonomous-system 2
```

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□□□ R1 □□

1. □□□□□□ □□□□□.

```
[edit interfaces]
user@R1# set fe-1/1/0 unit 0 description to-R2
user@R1# set fe-1/1/0 unit 0 family inet address 10.0.0.1/30
user@R1# set lo0 unit 0 family inet address 192.168.0.1/32
```

2. BGP□ □□□□□.

   □□□ R2□□ BGP □□□ □□□ □□□ □□□ □□□□□.

```
[edit protocols bgp group external-peers]
user@R1# set type external
user@R1# set peer-as 2
user@R1# set neighbor 10.0.0.2 import remove-communities
```

3. □□□□□ □□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement remove-communities]
user@R1# set term 1 from protocol bgp
user@R1# set term 1 then community delete wild
user@R1# set term 1 then accept
user@R1# set term 2 then reject
```

4. AS(Autonomous System) □□□ □□□ ID□ □□□□□.

```
[edit routing-options ]
user@R1# set router-id 192.168.0.1
user@R1# set autonomous-system 1
```

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□*□ □□□□□□.

□□□□ R2 □□:

1. □□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set fe-1/1/0 unit 0 description to-R1
user@R2# set fe-1/1/0 unit 0 family inet address 10.0.0.2/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. □□□ ID □ AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R2# set router-id 192.168.0.3
user@R2# set autonomous-system 2
```

3. BGP□ □□□□□.

```
[edit  protocols bgp group external-peers]
user@R2# set type external
user@R2# set peer-as 1
user@R2# set neighbor 10.0.0.1
```

4. □□ □□□□□ □□□□□ □□ □□□□ □□ □□ □□□□□ □□□□□.

```
[edit policy-options community 1]
user@R2# set members 2:1
user@R2# set members 2:2
user@R2# set members 2:3
```

```
user@R2# set members 2:4
user@R2# set members 2:5
user@R2# set members 2:6
user@R2# set members 2:7
user@R2# set members 2:8
user@R2# set members 2:9
user@R2# set members 2:10
```

5. [illegible]

```
[edit routing-options static]
user@R2# set route 10.2.0.0/16 reject
user@R2# set route 10.2.0.0/16 install
user@R2# set route 10.3.0.0/16 reject
user@R2# set route 10.3.0.0/16 install
```

6. [illegible] BGP[illegible] [illegible] BGP [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit policy-options policy-statement statics]
user@R2# set from protocol static
user@R2# set then community add 1
user@R2# set then accept
```

7. [illegible] [illegible] [illegible].

```
[edit protocols bgp group external-peers]
user@R2# set export statics
```

[illegible]

[illegible] [illegible] show interfaces, show protocols, show policy-options [illegible] show routing-options [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] R1

```
user@R1# show interfaces
fe-1/1/0 {
    unit 0{
        description to-R2;
```

```
        family inet {
            address 10.0.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.1/32;
        }
    }
}
```

```
user@R1# show protocols
bgp {
    group external-peers {
        type external;
        peer-as 2;
        neighbor 10.0.0.2 {
            import remove-communities;
        }
    }
}
```

```
user@R1# show policy-options
policy-statement remove-communities {
    term 1 {
        from protocol bgp;
        then {
            community delete wild;
            accept;
        }
    }
    term 2 {
        then reject;
    }
```

```
}
community wild members *:*;
```

```
user@R1# show routing-options
router-id 192.168.0.1;
autonomous-system 1;
```

□□□□ R2

```
user@R2# show interfaces
fe-1/1/0 {
    unit 0 {
        description to-R1;
        family inet {
            address 10.0.0.2/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group external-peers {
        type external;
        export statics;
        peer-as 1;
        neighbor 10.0.0.1;
    }
}
```

```
user@R2# show policy-options
policy-statement statics {
```

```
    from protocol static;
    then {
        community add 1;
        accept;
    }
}
community 1 members [ 2:1 2:2 2:3 2:4 2:5 2:6 2:7 2:8 2:9 2:10 ];
```

```
user@R2# show routing-options
static {
    route 10.2.0.0/16 {
        reject;
        install;
    }
    route 10.3.0.0/16 {
        reject;
        install;
    }
}
router-id 192.168.0.3;
autonomous-system 2;
```

□□□□ □□□ □□□□ □□□□□□□ commit□(□) □□□□□.

□□

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BGP □□ □□

□□

□□□□ R1□ □□□ □□□□ BGP □□□□□ □□□□ □□ □□□ □□□□□.

□□

1. □□□□ R1□□ □□□ □□□□□ show route protocols bgp extensive .

```
user@R1> show route protocols bgp extensive

inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
10.2.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.2.0.0/16 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 671
                Address: 0x9458270
                Next-hop reference count: 4
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via lt-1/1/0.5, selected
                Session Id: 0x100001
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 20:39:01
                Validation State: unverified
                Task: BGP_2.10.0.0.2+179
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Accepted
                Localpref: 100
                Router ID: 192.168.0.3

10.3.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.3.0.0/16 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 671
                Address: 0x9458270
                Next-hop reference count: 4
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via lt-1/1/0.5, selected
                Session Id: 0x100001
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 20:39:01
                Validation State: unverified
```

```
                Task: BGP_2.10.0.0.2+179
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Accepted
                Localpref: 100
                Router ID: 192.168.0.3
```

2. ????? R1?? ????? ???? ???? ????? community remove ???.

```
[edit policy-options policy-statement remove-communities term 1]
user@R1# deactivate then community delete wild
user@R1# commit
```

3. ????? R1?? ???? ????? show route protocols bgp extensive ???? ?????? ??????.

```
user@R1> show route protocols bgp extensive
inet.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
10.2.0.0/16 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.2.0.0/16 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 671
                Address: 0x9458270
                Next-hop reference count: 4
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via lt-1/1/0.5, selected
                Session Id: 0x100001
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 20:40:53
                Validation State: unverified
                Task: BGP_2.10.0.0.2+179
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Communities: 2:1 2:2 2:3 2:4 2:5 2:6 2:7 2:8 2:9 2:10
                Accepted
                Localpref: 100
                Router ID: 192.168.0.3

10.3.0.0/16 (1 entry, 1 announced)
TSI:
```

```
KRT in-kernel 10.3.0.0/16 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 671
                Address: 0x9458270
                Next-hop reference count: 4
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via lt-1/1/0.5, selected
                Session Id: 0x100001
                State: <Active Ext>
                Local AS:     1 Peer AS:     2
                Age: 20:40:53
                Validation State: unverified
                Task: BGP_2.10.0.0.2+179
                Announcement bits (1): 0-KRT
                AS path: 2 I
                Communities: 2:1 2:2 2:3 2:4 2:5 2:6 2:7 2:8 2:9 2:10
                Accepted
                Localpref: 100
                Router ID: 192.168.0.3
```

??

??? ????? R1? ??? ?????? ????? R2?? ??? BGP ????? ?????? ????? ??????. ????? R1? `community remove` ????? ?? ??? ??????? ?????? ? ?? ????? ?????.

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> ?: ?? Community ??? ????? BGP ??? IS-IS? ??????? ??? ?? ??
>
> ?? BGP ??? ?? ??

BGP ?? ??? ???? ???? ??? ??

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BGP *??? ????* BGP ???? ???? ??? ??? ???? ?? ??? ?? ???? ???? ??? ??? ?????. BGP *??? ???* BGP ?? ?? ???? ???? ??? ?? ?? ???? ??? ?? ???? ??? ???? ??? ?? ???? ??? ??? ??? ??? ??????.

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? ???? ??? ????. Junos OS ??? 12.2?? ?? ??? ???? ?? ??? ??? ? ????. Junos OS ??? 12.2 ?? ???? ?? ?? ? ???? ?? ??? ??? IBGP? EBGP ???? ??????.

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? 23: ?? ????

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half-life *minutes*	Decay half-life(??? ??) - ??? ?????? ??? ?? ??? ?? ???? ???? ??(?)???.	**15**(?)	**1?? 45??**

□ 23: □□ □□□□ *(Continued)*

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max-suppress ***minutes***	□□□ □□ □□ □□(□)□□□.	**60** (□)	**1□□ 720□□**
reuse	□□□ □□□ - □□□ □□□ □□ □□□ □ □□ □□ □□□.	**750**	**1□□ 20,000□□**
suppress	Cutoff (suppression) threshold(□□□(□□) □□□) - □□□ □ □□ □□□□□ □□□ □□□ □ □□ □□□ □□□□.	**3000**	**1□□ 20,000□□**

□□ BGP □□ □□ □□ □□□□□ □□□ □□ □□ □□ □□□ □□□□ □□ □□□ □□ □□□ □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□□ BGP □□ □□ □□□ □□□□□ □□□.

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release heading in release-history	desc heading in release-history
12.2	Junos OS □□□ 12.2□□ □□ □□□ □□□□ □□ □□□ □□□ □ □□□□.

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- □□ □□ □□□□ □□ □□ □□□□ | 559
- BGP □□ Damping □□ | 559

BGP *□□ □□□□* BGP □□□□ □□□□ □□□ □□□ □□□□ □□ □□□ □□ □□□□ □□□□ □□□ □□□ □□□□□. BGP *□□ □□* □ BGP □□ □□ □□□□ □□□□ □□□ □□ □□ □□ □□□□ □□□ □□□□ □□□ □□ □□□□ □□□ □□□ □□□ □□□ □□□□□.

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BGP □□ □□ □□ □□ □□

□□ □□□□□ □□□□□ □□□□ □□□□□.damping

```
[edit policy-options]
damping name {
    disable;
    half-life minutes;
    max-suppress minutes;
    reuse number;
    suppress number;
}
```

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□ 24: □□ □□□□

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half-life *minutes*	□□□ □□(□)	15□	1-45□
max-suppress *minutes*	□□ □□ □□(□)	60□	1□□□ 720□□□
reuse	□□□ □□□	750 (□□ □□)	1□□ 20,000□□(□□ □□)

□ 24: □□ □□□□ *(Continued)*

□□ □□□□	□□	□□□	□□□ □
suppress	□□□(□□) □□□	3000 (□□ □□)	1□□ 20,000□□(□□ □□)

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> **□:** □□□□ □□, max-suppress□□ □□ □□ □□□□□□□. □□□□ □□□, □□□ □□□□□.

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> **□:** max-suppress□ □□ □□□□□ □ □□ □□□□□. □□□ □□□, □□□ □□□□□.

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□□□ □□□ □□□ □ □□ □□ □□□ □□ □□□ ε_c□ □□ □□□ □□□□ □□□□□.

$\varepsilon_c \leq \varepsilon_r \, e^{(t / \lambda) (\ln 2)}$

ε_r □ □□ □□ □□□ □□□, t□ □□ □□ □□ □□(□), λ□ □□□(□)□□□. □□ □□, □ □□□□ □□ □□ □□ □□ □□□□□ □□□□ 30□□□ □□□□ □□ □□□ □□□ □□□□.

$\varepsilon_C \leq 750 \, E^{(120/30) (LN 2)}$

$\varepsilon_c \leq 12000$

□: □□□ □□□□ suppress □□□□ □□□ □□□□ □□ □□□(ε_c)□□ □□□ □□□ □□□. □□□ □□□ □□□ □□ □□ □□□ □□□□ □□ □□□□□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□.

□□ □□ □□□ □□□□□ □□□ □□□□□ show policy damping .

□□ □□□ □□□ □□□ □□ □□□ □□ □□□ □□□□□. □□□ □□□□□ □□ □□ □□□ □□□□□ □□□ □□□□□ show route detail .

□□□ □□ □□□□ BGP □□ □□□ □□□□ □□

BGP □□ □□□ □□□ □□ □□□ □□□□ □□□□□ □□ □□□□ □□ [edit policy-options policy-statement *policy-name* term *term-name* from] □□ □□□□ □□□□ □□□ □□ □□ □□□ □□□ □□□□□damping.route-filter

```
[edit policy-options policy-statement policy-name term term-name from]
route-filter destination-prefix match-type {
    damping damping-parameters;
}
```

□□ □□ □□□□ [edit policy-options policy-statement *policy-name* term *term-name* then]:

```
[edit policy-options policy-statement policy-name term term-name then]
damping damping-parameters;
```

[illegible]

[illegible]. [illegible].disable

```
[edit policy-options damping name]
disable;
```

[illegible]

[illegible], [illegible] damping none [illegible] 10.0.0.0/8[illegible] Policy-A[illegible]. [illegible] Policy-A [illegible] 10.0.0.0/8[illegible] none[illegible] damping [illegible]. [illegible].

```
[edit]
policy-options {
    policy-statement Policy-A {
        from {
            route-filter 10.0.0.0/8 exact;
        }
        then damping none;
    }
    damping none {
        disable;
    }
}
```

BGP [illegible] Damping [illegible]

BGP [illegible].

```
[edit]
routing-options {
    autonomous-system 666;
}
protocols {
    bgp {
        damping;
        group group1 {
            traceoptions {
```

```
                file bgp-log size 1m files 10;
                flag damping;
            }
            import damp;
            type external;
            peer-as 10458;
            neighbor 192.168.2.30;
        }
    }
}
policy-options {
    policy-statement damp {
        from {
            route-filter 192.168.0.0/32 exact {
                damping high;
                accept;
            }
            route-filter 172.16.0.0/32 exact {
                damping medium;
                accept;
            }
            route-filter 10.0.0.0/8 exact {
                damping none;
                accept;
            }
        }
    }
    damping high {
        half-life 30;
        suppress 3000;
        reuse 750;
        max-suppress 60;
    }
    damping medium {
        half-life 15;
        suppress 3000;
        reuse 750;
        max-suppress 45;
    }
    damping none {
        disable;
```

```
    }
}
```

□ □□□ □□ □□ □□□□□ □□□□□ □□ □□□ □□□□□.show policy damping

```
user@host> show policy damping
Damping information for "high":
  Halflife: 30 minutes
  Reuse merit: 750 Suppress/cutoff merit: 3000
  Maximum suppress time: 60 minutes
  Computed values:
    Merit ceiling: 3008
    Maximum decay: 24933
Damping information for "medium":
  Halflife: 15 minutes
  Reuse merit: 750 Suppress/cutoff merit: 3000
  Maximum suppress time: 45 minutes
  Computed values:
    Merit ceiling: 6024
    Maximum decay: 12449
Damping information for "none":
Damping disabled
```

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□: BGP □□ □□ □□ □□ □□ □□ | 561

□: MBGP MVPN □□ □□□□ □□□□ BGP □□ □□ □□ □□ | 575

□: BGP □□ □□ □□ □□ □□ □□

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□□□□ R1 □ □□□□ R3□□ □□□ □□□□ □□□ □□ □□ □□□ □□□, □□□ □□ □□□ BGP□ □□ □□□□ R2□ □□□□□.

□□□□ R2□ □□ □□□ □□ □□□□ R1 □ □□□□ R3□□ □□□ □□□ □□□□□.

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- □□□ □□□ 0□□ 8 □□□ Damp □□□ □□□ □□□ 8□□ □ □□□□ □□□□.
- 10.128.0.0/9 □□□□ □□ □□□□□ □□□□.

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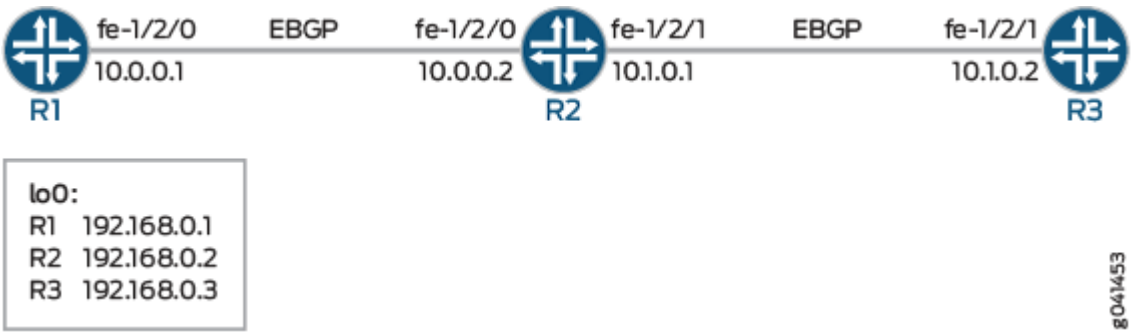
□□ 36 □□□ 562□ □□ □□□□□ □□□□□.

□□ 36: BGP □□ □□ □□□□



"CLI □□ □□" □□□ 563□(□) □□ 36 □□□ 562 □ □□ □□□□□ □□□ □□□□□.

□□ "No Link Title" □□□ 565□ □□□□ R2□ □□□ □□□□□.

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- ?? | 563

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CLI ?? ??

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???? R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct-and-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set policy-options policy-statement send-direct-and-static term 1 from protocol direct
set policy-options policy-statement send-direct-and-static term 1 from protocol static
set policy-options policy-statement send-direct-and-static term 1 then accept
set routing-options static route 172.16.0.0/16 reject
set routing-options static route 172.16.128.0/17 reject
set routing-options static route 172.16.192.0/20 reject
set routing-options static route 10.0.0.0/9 reject
set routing-options static route 172.16.233.0/7 reject
set routing-options static route 10.224.0.0/11 reject
set routing-options static route 0.0.0.0/0 reject
set routing-options autonomous-system 100
```

???? R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
```

```
set protocols bgp damping
set protocols bgp group ext type external
set protocols bgp group ext import damp
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols bgp group ext neighbor 10.1.0.2 peer-as 300
set policy-options policy-statement damp term 1 from route-filter 10.128.0.0/9 exact damping dry
set policy-options policy-statement damp term 1 from route-filter 0.0.0.0/0 prefix-length-
range /0-/8 damping timid
set policy-options policy-statement damp term 1 from route-filter 0.0.0.0/0 prefix-length-
range /17-/32 damping aggressive
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set policy-options damping aggressive half-life 30
set policy-options damping aggressive suppress 2500
set policy-options damping timid half-life 5
set policy-options damping dry disable
set routing-options autonomous-system 200
```

???? R3

```
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct-and-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.1.0.1
set policy-options policy-statement send-direct-and-static term 1 from protocol direct
set policy-options policy-statement send-direct-and-static term 1 from protocol static
set policy-options policy-statement send-direct-and-static term 1 then accept
set routing-options static route 10.128.0.0/9 reject
set routing-options autonomous-system 300
```

??? ??

?? ?? ?? ????? ??? ??? ??? ??????. CLI ?? ?? ??? Junos OS CLI ??? ???? *?? ?????? CLI ??? ??* ???????.

?? ?? ??? ??????:

1. ??????? ??????.

```
[edit interfaces]
user@R2# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
user@R2# set fe-1/2/1 unit 0 family inet address 10.1.0.1/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. BGP ?? ?????? ??????.

```
[edit protocols bgp group ext]
user@R2# set type external
user@R2# set neighbor 10.0.0.1 peer-as 100
user@R2# set neighbor 10.1.0.2 peer-as 300
```

3. ?? ????? ??? ????? ??????.

```
[edit policy-options]
user@R2# set damping aggressive half-life 30
user@R2# set damping aggressive suppress 2500
user@R2# set damping timid half-life 5
user@R2# set damping dry disable
```

4. ?? ??? ??????.

```
[edit policy-options policy-statement damp term 1]
user@R2# set from route-filter 10.128.0.0/9 exact damping dry
user@R2# set from route-filter 0.0.0.0/0 prefix-length-range /0-/8 damping timid
user@R2# set from route-filter 0.0.0.0/0 prefix-length-range /17-/32 damping aggressive
```

5. BGP? ?? ??? ???????.

```
[edit protocols bgp]
user@R2# set damping
```

6. □ □□□ BGP □□ □□□□ □□ □□□□ □□□□ □□□□□.

```
[edit protocols bgp group ext]
user@R2# set import damp
```

□: □□□□□ □□ import □□□ □□□ □□□ □□□ □ □ □□ □□□ □ □□□□.

7. □□□□ □□□ □□□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R2# set from protocol direct
user@R2# set then accept
```

8. □□□□ □□□ □□□□□.

```
[edit protocols bgp group ext]
user@R2# set export send-direct
```

9. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R2# set autonomous-system 200
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R2# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
```

```
fe-1/2/1 {
    unit 0 {
        family inet {
            address 10.1.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    damping;
    group ext {
        type external;
        import damp;
        export send-direct;
        neighbor 10.0.0.1 {
            peer-as 100;
        }
        neighbor 10.1.0.2 {
            peer-as 300;
        }
    }
}
```

```
user@R2# show policy-options
policy-statement damp {
    term 1 {
        from {
            route-filter 10.128.0.0/9 exact damping dry;
            route-filter 0.0.0.0/0 prefix-length-range /0-/8 damping timid;
            route-filter 0.0.0.0/0 prefix-length-range /17-/32 damping aggressive;
        }
    }
```

```
}
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
damping aggressive {
    half-life 30;
    suppress 2500;
}
damping timid {
    half-life 5;
}
damping dry {
    disable;
}
```

```
user@R2# show routing-options
autonomous-system 200;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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- □□ □□ □□□□□ □□□□□ □□ | 572
- □□ □□ □□□ | 574

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□□□□ R1 □ □□□□ R3□ □□ □□□□ □□□ □□□□□ `restart routing` .

> **□□**: □□□□ □□□□□□□□ □ □□□ □□□□ □□□□ □□□.

```
user@R1> restart routing

R1 started, pid 10474
```

```
user@R3> restart routing

R3 started, pid 10478
```

□□

□□□□ R2□□□ □□ □□□□ □□ □□□ □□□□ □□ □□□□□.

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??

?? ????? show bgp summary ??? ??????.

```
user@R2> show bgp summary

Groups: 1 Peers: 2 Down peers: 0
Table          Tot Paths  Act Paths Suppressed    History Damp State    Pending
inet.0
                      12          1         11          0          11          0
Peer                     AS      InPkt     OutPkt    OutQ   Flaps Last Up/Dwn State|#Active/
Received/Accepted/Damped...
10.0.0.1                100         10         10       0       4        2:50
0/9/0/9              0/0/0/0
10.1.0.2                300         10         10       0       4        2:53
1/3/1/2              0/0/0/0
```

??

? ??? ????? R2? ?? ?????? ??? ?????? 4? ?? ???? ?? ?????????.

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??

??? ?? ???? ???? ??? ??????.

??

?? ????? show route damping suppressed ??? ??????.

```
user@R2> show route damping suppressed

inet.0: 15 destinations, 17 routes (6 active, 0 holddown, 11 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0           [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
10.0.0.0/9          [BGP ] 00:00:12, localpref 100
```

```
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
10.0.0.0/30         [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
10.1.0.0/30         [BGP ] 00:00:15, localpref 100
                      AS path: 300 I, validation-state: unverified
                    > to 10.1.0.2 via fe-1/2/1.0
10.224.0.0/11       [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.0.0/16       [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.128.0/17     [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
172.16.192.0/20     [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
192.168.0.1/32      [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
192.168.0.3/32      [BGP ] 00:00:15, localpref 100
                      AS path: 300 I, validation-state: unverified
                    > to 10.1.0.2 via fe-1/2/1.0
172.16.233.0/7        [BGP ] 00:00:12, localpref 100
                      AS path: 100 I, validation-state: unverified
                    > to 10.0.0.1 via fe-1/2/0.0
```

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□□

□□ □□□□ show route damping suppressed 172.16.192.0/20 detail □□□ □□□□□.

```
user@R2> show route damping suppressed 172.16.192.0/20 detail

inet.0: 15 destinations, 17 routes (6 active, 0 holddown, 11 hidden)
172.16.192.0/20 (1 entry, 0 announced)
         BGP                /-101
                Next hop type: Router, Next hop index: 758
                Address: 0x9414484
                Next-hop reference count: 9
                Source: 10.0.0.1
                Next hop: 10.0.0.1 via fe-1/2/0.0, selected
                Session Id: 0x100201
                State: <Hidden Ext>
                Local AS:   200 Peer AS:   100
                Age: 52
                Validation State: unverified
                Task: BGP_100.10.0.0.1+55922
                AS path: 100 I
                Localpref: 100
                Router ID: 192.168.0.1
                Merit (last update/now): 4278/4196
                damping-parameters: aggressive
                Last update:       00:00:52 First update:       01:01:55
                Flaps: 8
                Suppressed. Reusable in:       01:14:40
                Preference will be: 170
```

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/16 □□□□ □□ □□□ □□□ □□□ □□ □□□□□ □□□□□ □□□ □ □□□□.

??

?? ????? show route damping suppressed detail | match 0/16 ??? ??????.

```
user@R2> show route damping suppressed detail | match 0/16

172.16.0.0/16 (1 entry, 0 announced)
```

```
user@R2> show route damping suppressed 172.16.0.0/16 detail

inet.0: 15 destinations, 17 routes (6 active, 0 holddown, 11 hidden)
172.16.0.0/16 (1 entry, 0 announced)
         BGP                 /-101
                Next hop type: Router, Next hop index: 758
                Address: 0x9414484
                Next-hop reference count: 9
                Source: 10.0.0.1
                Next hop: 10.0.0.1 via fe-1/2/0.0, selected
                Session Id: 0x100201
                State: <Hidden Ext>
                Local AS:   200 Peer AS:   100
                Age: 1:58
                Validation State: unverified
                Task: BGP_100.10.0.0.1+55922
                AS path: 100 I
                Localpref: 100
                Router ID: 192.168.0.1
                Merit (last update/now): 3486/3202
                Default damping parameters used
                Last update:       00:01:58 First update:       01:03:01
                Flaps: 8
                Suppressed. Reusable in:       00:31:40
                Preference will be: 170
```

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- ???? ???? 17?? ???? ?? ?? ????? ???? ???? 9?? 16 ???? ????? ? ?????? ??????.

- [illegible] [illegible] 0[illegible] 8 [illegible] Damp [illegible] [illegible] [illegible] 8[illegible] [illegible] [illegible] [illegible].
- 10.128.0.0/9 [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible]

[illegible]

OR [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible] [illegible] show route damping suppressed [illegible] [illegible].

```
user@R2> show route damping suppressed detail | match "0 announced | damp"

0.0.0.0/0 (1 entry, 0 announced)
                damping-parameters: timid
10.0.0.0/9 (1 entry, 0 announced)
                Default damping parameters used
                damping-parameters: aggressive
                damping-parameters: aggressive
10.224.0.0/11 (1 entry, 0 announced)
                Default damping parameters used
172.16.0.0/16 (1 entry, 0 announced)
                Default damping parameters used
172.16.128.0/17 (1 entry, 0 announced)
                damping-parameters: aggressive
172.16.192.0/20 (1 entry, 0 announced)
                damping-parameters: aggressive
192.168.0.1/32 (1 entry, 0 announced)
                damping-parameters: aggressive
192.168.0.3/32 (1 entry, 0 announced)
                damping-parameters: aggressive
172.16.233.0/7 (1 entry, 0 announced)
                damping-parameters: timid
```

[illegible]

EBGP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] clear bgp damping [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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???? ??? ???? BGP ?? ??? ?? | 555

?: MBGP MVPN ?? ???? ???? BGP ?? ?? ?? ??

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- ?? | 587

? ?? BGP ?? ?? ??? ???? ??????? BGP ????? VPN(??? MVPN???? ?)? ???? ??? ?????.

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? ???? Junos OS ??? 12.2? ?????. ?? MBGP MVPN? ?? BGP ?? ?? ?? ??? Junos OS ??? 12.2?? ??????? ?.

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BGP ?? ?? ??? ??? ????? ??? ? ????? ???? ????? ??? ?? ???? ?? ????? ??? ? ??? ???.

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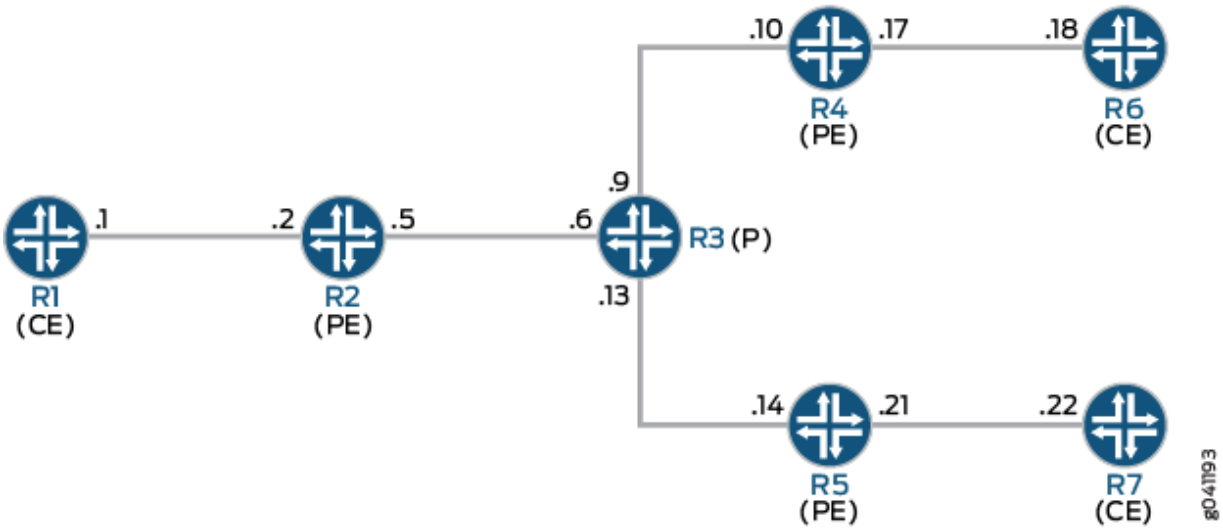
?? 37 ??? 576 ? ???? ???? ????? ?????.

□□ 37: BGP □□ □□ □□□ □□□□ MBGP MVPN



PE □□□□ R4□□ BGP □□ □□ □□□ □□ □□□ inet-mvpn□ □□ □□□□□. □□ dampPolicy □□□ □□□ □□ □□□ □□□□ nlri-route-type MVPN □□ □□ 3, 4, 5□ □□□□□. □□ □□ MVPN □□ □□□ □□□□ □□□□.

□ □□ □□□ □□ □□□□□ "CLI □□ □□" □□□ 576 □□ □□ □□□ □□□□□. □ "□□□□ R4 □□" □□□ 581 □□□□□ PE □□□□ R4□ □□ □□□ □□□ □□□□□.

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- □□□□ R4 □□ | 581
- □□ | 584

CLI □□ □□

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□□□□ R1

```
set interfaces ge-1/2/0 unit 1 family inet address 10.1.1.1/30
set interfaces ge-1/2/0 unit 1 family mpls
```

```
set interfaces lo0 unit 1 family inet address 172.16.1.1/32
set protocols ospf area 0.0.0.0 interface lo0.1 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/0.1
set protocols pim rp static address 172.16.100.1
set protocols pim interface all
set routing-options router-id 172.16.1.1
```

□□□□ R2

```
set interfaces ge-1/2/0 unit 2 family inet address 10.1.1.2/30
set interfaces ge-1/2/0 unit 2 family mpls
set interfaces ge-1/2/1 unit 5 family inet address 10.1.1.5/30
set interfaces ge-1/2/1 unit 5 family mpls
set interfaces vt-1/2/0 unit 2 family inet
set interfaces lo0 unit 2 family inet address 172.16.1.2/32
set interfaces lo0 unit 102 family inet address 172.16.100.1/32
set protocols mpls interface ge-1/2/1.5
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 172.16.1.2
set protocols bgp group ibgp family inet-vpn any
set protocols bgp group ibgp family inet-mvpn signaling
set protocols bgp group ibgp neighbor 172.16.1.4
set protocols bgp group ibgp neighbor 172.16.1.5
set protocols ospf area 0.0.0.0 interface lo0.2 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/1.5
set protocols ldp interface ge-1/2/1.5
set protocols ldp p2mp
set policy-options policy-statement parent_vpn_routes from protocol bgp
set policy-options policy-statement parent_vpn_routes then accept
set routing-instances vpn-1 instance-type vrf
set routing-instances vpn-1 interface ge-1/2/0.2
set routing-instances vpn-1 interface vt-1/2/0.2
set routing-instances vpn-1 interface lo0.102
set routing-instances vpn-1 route-distinguisher 100:100
set routing-instances vpn-1 provider-tunnel ldp-p2mp
set routing-instances vpn-1 vrf-target target:1:1
set routing-instances vpn-1 protocols ospf export parent_vpn_routes
set routing-instances vpn-1 protocols ospf area 0.0.0.0 interface lo0.102 passive
set routing-instances vpn-1 protocols ospf area 0.0.0.0 interface ge-1/2/0.2
set routing-instances vpn-1 protocols pim rp static address 172.16.1.2 with 172.16.4.1100.1
set routing-instances vpn-1 protocols pim interface ge-1/2/0.2 mode sparse
set routing-instances vpn-1 protocols mvpn
```

```
set routing-options router-id 172.16.1.2
set routing-options autonomous-system 1001
```

????? R3

```
set interfaces ge-1/2/0 unit 6 family inet address 10.1.1.6/30
set interfaces ge-1/2/0 unit 6 family mpls
set interfaces ge-1/2/1 unit 9 family inet address 10.1.1.9/30
set interfaces ge-1/2/1 unit 9 family mpls
set interfaces ge-1/2/2 unit 13 family inet address 10.1.1.13/30
set interfaces ge-1/2/2 unit 13 family mpls
set interfaces lo0 unit 3 family inet address 172.16.1.3/32
set protocols mpls interface ge-1/2/0.6
set protocols mpls interface ge-1/2/1.9
set protocols mpls interface ge-1/2/2.13
set protocols ospf area 0.0.0.0 interface lo0.3 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/0.6
set protocols ospf area 0.0.0.0 interface ge-1/2/1.9
set protocols ospf area 0.0.0.0 interface ge-1/2/2.13
set protocols ldp interface ge-1/2/0.6
set protocols ldp interface ge-1/2/1.9
set protocols ldp interface ge-1/2/2.13
set protocols ldp p2mp
set routing-options router-id 172.16.1.3
```

????? R4

```
set interfaces ge-1/2/0 unit 10 family inet address 10.1.1.10/30
set interfaces ge-1/2/0 unit 10 family mpls
set interfaces ge-1/2/1 unit 17 family inet address 10.1.1.17/30
set interfaces ge-1/2/1 unit 17 family mpls
set interfaces vt-1/2/0 unit 4 family inet
set interfaces lo0 unit 4 family inet address 172.16.1.4/32
set interfaces lo0 unit 104 family inet address 172.16.100.1/32
set protocols rsvp interface all aggregate
set protocols mpls interface all
set protocols mpls interface ge-1/2/0.10
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 172.16.1.4
set protocols bgp group ibgp family inet-vpn unicast
set protocols bgp group ibgp family inet-vpn any
```

```
set protocols bgp group ibgp family inet-mvpn signaling damping
set protocols bgp group ibgp neighbor 172.16.1.2 import dampPolicy
set protocols bgp group ibgp neighbor 172.16.1.5
set protocols ospf traffic-engineering
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface lo0.4 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/0.10
set protocols ldp interface ge-1/2/0.10
set protocols ldp p2mp
set policy-options policy-statement dampPolicy term term1 from family inet-mvpn
set policy-options policy-statement dampPolicy term term1 from nlri-route-type 3
set policy-options policy-statement dampPolicy term term1 from nlri-route-type 4
set policy-options policy-statement dampPolicy term term1 from nlri-route-type 5
set policy-options policy-statement dampPolicy term term1 then accept
set policy-options policy-statement dampPolicy then damping no-damp
set policy-options policy-statement dampPolicy then accept
set policy-options policy-statement parent_vpn_routes from protocol bgp
set policy-options policy-statement parent_vpn_routes then accept
set policy-options damping no-damp disable
set routing-instances vpn-1 instance-type vrf
set routing-instances vpn-1 interface vt-1/2/0.4
set routing-instances vpn-1 interface ge-1/2/1.17
set routing-instances vpn-1 interface lo0.104
set routing-instances vpn-1 route-distinguisher 100:100
set routing-instances vpn-1 vrf-target target:1:1
set routing-instances vpn-1 protocols ospf export parent_vpn_routes
set routing-instances vpn-1 protocols ospf area 0.0.0.0 interface lo0.104 passive
set routing-instances vpn-1 protocols ospf area 0.0.0.0 interface ge-1/2/1.17
set routing-instances vpn-1 protocols pim rp static address 172.16.100.1
set routing-instances vpn-1 protocols pim interface ge-1/2/1.17 mode sparse
set routing-instances vpn-1 protocols mvpn
set routing-options router-id 172.16.1.4
set routing-options autonomous-system 64501
```

□□□□ R5

```
set interfaces ge-1/2/0 unit 14 family inet address 10.1.1.14/30
set interfaces ge-1/2/0 unit 14 family mpls
set interfaces ge-1/2/1 unit 21 family inet address 10.1.1.21/30
set interfaces ge-1/2/1 unit 21 family mpls
set interfaces vt-1/2/0 unit 5 family inet
set interfaces lo0 unit 5 family inet address 172.16.1.5/32
```

```
set interfaces lo0 unit 105 family inet address 172.16.100.5/32
set protocols mpls interface ge-1/2/0.14
set protocols bgp group ibgp type internal
set protocols bgp group ibgp local-address 172.16.1.5
set protocols bgp group ibgp family inet-vpn any
set protocols bgp group ibgp family inet-mvpn signaling
set protocols bgp group ibgp neighbor 172.16.1.2
set protocols bgp group ibgp neighbor 172.16.1.4
set protocols ospf area 0.0.0.0 interface lo0.5 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/0.14
set protocols ldp interface ge-1/2/0.14
set protocols ldp p2mp
set policy-options policy-statement parent_vpn_routes from protocol bgp
set policy-options policy-statement parent_vpn_routes then accept
set routing-instances vpn-1 instance-type vrf
set routing-instances vpn-1 interface vt-1/2/0.5
set routing-instances vpn-1 interface ge-1/2/1.21
set routing-instances vpn-1 interface lo0.105
set routing-instances vpn-1 route-distinguisher 100:100
set routing-instances vpn-1 vrf-target target:1:1
set routing-instances vpn-1 protocols ospf export parent_vpn_routes
set routing-instances vpn-1 protocols ospf area 0.0.0.0 interface lo0.105 passive
set routing-instances vpn-1 protocols ospf area 0.0.0.0 interface ge-1/2/1.21
set routing-instances vpn-1 protocols pim rp static address 172.16.100.2
set routing-instances vpn-1 protocols pim interface ge-1/2/1.21 mode sparse
set routing-instances vpn-1 protocols mvpn
set routing-options router-id 172.16.1.5
set routing-options autonomous-system 1001
```

□□□□ R6

```
set interfaces ge-1/2/0 unit 18 family inet address 10.1.1.18/30
set interfaces ge-1/2/0 unit 18 family mpls
set interfaces lo0 unit 6 family inet address 172.16.1.6/32
set protocols sap listen 233.1.1.1
set protocols ospf area 0.0.0.0 interface lo0.6 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/0.18
set protocols pim rp static address 172.16.100.2
set protocols pim interface all
set routing-options router-id 172.16.1.6
```

□□□□ R7

```
set interfaces ge-1/2/0 unit 22 family inet address 10.1.1.22/30
set interfaces ge-1/2/0 unit 22 family mpls
set interfaces lo0 unit 7 family inet address 172.16.1.7/32
set protocols ospf area 0.0.0.0 interface lo0.7 passive
set protocols ospf area 0.0.0.0 interface ge-1/2/0.22
set protocols pim rp static address 172.16.100.2
set protocols pim interface all
set routing-options router-id 172.16.1.7
```

□□□□ R4 □□

□□□ □□

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□ □□ □□□ Junos OS CLI □□□ □□□□ *□□ □□□□□ CLI □□□ □□*□ □□□□□□.

□□□□ R4 □□:

1. □□□□□□ □□□□□.

```
[edit interfaces]
user@R4# set ge-1/2/0 unit 10 family inet address 10.1.1.10/30
user@R4# set ge-1/2/0 unit 10 family mpls
user@R4# set ge-1/2/1 unit 17 family inet address 10.1.1.17/30
user@R4# set ge-1/2/1 unit 17 family mpls
user@R4# set vt-1/2/0 unit 4 family inet
user@R4# set lo0 unit 4 family inet address 172.16.1.4/32
user@R4# set lo0 unit 104 family inet address 172.16.100.4/32
```

2. □□□□□□□ MPLS □ □□ □□□□□ □□□□□.

```
[edit protocols]
user@R4# set mpls interface all
user@R4# set mpls interface ge-1/2/0.10
user@R4# set rsvp interface all aggregate
user@R4# set ldp interface ge-1/2/0.10
user@R4# set ldp p2mp
```

3. BGP□ □□□□□.

BGP ??? ?? ???? ?? BGP ?? ?? ??? inet-mvpn ??????. ?? BGP ??? ?? ??? ??? dampPolicy??? ???? ?? ???. ? ??? ?? PE ???? R2? ??????.

```
[edit protocols bgp group ibgp]
user@R4# set type internal
user@R4# set local-address 172.16.1.4
user@R4# set family inet-vpn unicast
user@R4# set family inet-vpn any
user@R4# set family inet-mvpn signaling damping
user@R4# set neighbor 172.16.1.2 import dampPolicy
user@R4# set neighbor 172.16.1.5
```

4. ?? ?????? ?????? ??????.

```
[edit protocols ospf]
user@R4# set traffic-engineering
[edit protocols ospf area 0.0.0.0]
user@R4# set interface all
user@R4# set interface lo0.4 passive
user@R4# set interface ge-1/2/0.10
```

5. MVPN ?? ?? 3, 4, 5? ?????? ?? ??? ???? nlri-route-type ?? ??? ??????.

```
[edit policy-options policy-statement dampPolicy term term1]
user@R4# set from family inet-mvpn
user@R4# set from nlri-route-type 3
user@R4# set from nlri-route-type 4
user@R4# set from nlri-route-type 5
user@R4# set then accept
```

6. BGP ?? ?? ??? damping ???????? ??? ??????.

??(damping no-damp disable)? no-damp ??? ???? ???? ?? ?? ??? ?????? ???. ?? then damping no-damp ??? ?? ?? ?? no-damp ?? ?? ??? ???? from . ??? ? term1 ???? ?? ?? ??? ? ??? ????, ? ?? ?? ?? MVPN ?? ??? ? ??? ????.

```
[edit policy-options policy-statement dampPolicy]
user@R4# set then damping no-damp
user@R4# set then accept
```

```
[edit policy-options]
user@R4# set damping no-damp disable
```

7. parent_vpn_routes □□ □□□□ □□□ □□ □□ □□ BGP □□□ □□□□□ □(□) inet-mvpn □□□□□.

   □ □□□ □□□ □□□□□□□ OSPF □□□□ □□□□ □□□□□.

```
[edit policy-options policy-statement parent_vpn_routes]
user@R4# set from protocol bgp
user@R4# set then accept
```

8. VPN □□□ □ □□□(VRF) □□□□□ □□□□□.

```
[edit routing-instances vpn-1]
user@R4# set instance-type vrf
user@R4# set interface vt-1/2/0.4
user@R4# set interface ge-1/2/1.17
user@R4# set interface lo0.104
user@R4# set route-distinguisher 100:100
user@R4# set vrf-target target:1:1
user@R4# set protocols ospf export parent_vpn_routes
user@R4# set protocols ospf area 0.0.0.0 interface lo0.104 passive
user@R4# set protocols ospf area 0.0.0.0 interface ge-1/2/1.17
user@R4# set protocols pim rp static address 172.16.100.2
user@R4# set protocols pim interface ge-1/2/1.17 mode sparse
user@R4# set protocols mvpn
```

9. □□□ ID □ AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R4# set router-id 172.16.1.4
user@R4# set autonomous-system 1001
```

10. □□□□ □□□ □□□□ □□ □□□ □□□□□.

```
user@R4# commit
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options, show routing-instances □ show routing-options □□□ □□ □□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R4# show interfaces
ge-1/2/0 {
    unit 10 {
        family inet {
            address 10.1.1.10/30;
        }
        family mpls;
    }
}
ge-1/2/1 {
    unit 17 {
        family inet {
            address 10.1.1.17/30;
        }
        family mpls;
    }
}
vt-1/2/0 {
    unit 4 {
        family inet;
    }
}
lo0 {
    unit 4 {
        family inet {
            address 172.16.1.4/32;
        }
    }
    unit 104 {
        family inet {
            address 172.16.100.4/32;
        }
```

```
    }
}
```

```
user@R4# show protocols
rsvp {
    interface all {
        aggregate;
    }
}
mpls {
    interface all;
    interface ge-1/2/0.10;
}
bgp {
    group ibgp {
        type internal;
        local-address 172.16.1.4;
        family inet-vpn {
            unicast;
            any;
        }
        family inet-mvpn {
            signaling {
                damping;
            }
        }
        neighbor 172.16.1.2 {
            import dampPolicy;
        }
        neighbor 172.16.1.5;
    }
}
ospf {
    traffic-engineering;
    area 0.0.0.0 {
        interface all;
        interface lo0.4 {
            passive;
        }
        interface ge-1/2/0.10;
    }
```

```
}
ldp {
    interface ge-1/2/0.10;
    p2mp;
}
```

```
user@R4# show policy-options
policy-statement dampPolicy {
    term term1 {
        from {
            family inet-mvpn;
            nlri-route-type [ 3 4 5 ];
        }
        then accept;
    }
    then {
        damping no-damp;
        accept;
    }
}
policy-statement parent_vpn_routes {
    from protocol bgp;
    then accept;
}
damping no-damp {
    disable;
}
```

```
user@R4# show routing-instances
vpn-1 {
    instance-type vrf;
    interface vt-1/2/0.4;
    interface ge-1/2/1.17;
    interface lo0.104;
    route-distinguisher 100:100;
    vrf-target target:1:1;
    protocols {
        ospf {
            export parent_vpn_routes;
            area 0.0.0.0 {
```

```
                interface lo0.104 {
                    passive;
                }
                interface ge-1/2/1.17;
            }
        }
        pim {
            rp {
                static {
                    address 172.16.100.2;
                }
            }
            interface ge-1/2/1.17 {
                mode sparse;
            }
        }
        mvpn;
    }
}
```

```
user@R4# show routing-optons
router-id 172.16.1.4;
autonomous-system 1001;
```

??

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- ?? ?? ?? ?? | 588

??? ???? ???? ??? ?????.

□□ □□ □□□ □□□□□□□□ □□□□

□□

3, 4, 5 □□□ MVPN □□ □□□ □□ □□□ □□□□□□ □□□ □□□ no-damp □□□□□.

□□

□□ □□□□ show policy damping □□□ □□□□□.

```
user@R4> show policy damping
Default damping information:
  Halflife: 15 minutes
  Reuse merit: 750 Suppress/cutoff merit: 3000
  Maximum suppress time: 60 minutes
  Computed values:
    Merit ceiling: 12110
    Maximum decay: 6193
Damping information for "no-damp":
  Damping disabled
```

□□

□□□ □□ □□ □□□□□ □□□□ no-damp □□□ □□□ □□ □□□□ □□□□ □□□□□.

□□ □□ □□ □□

□□

BGP □□□ □□□□□□ □□□□□.

□□

□□ □□□□ show bgp summary □□□ □□□□□.

```
user@R4> show bgp summary
Groups: 1 Peers: 2 Down peers: 0
Table          Tot Paths  Act Paths Suppressed    History Damp State    Pending
bgp.l3vpn.0
                       6          6          0          0          0          0
```

```
bgp.l3vpn.2
                       0          0          0          0          0          0
bgp.mvpn.0
                       2          2          0          0          0          0
Peer                     AS      InPkt     OutPkt    OutQ   Flaps Last Up/Dwn State|#Active/
Received/Accepted/Damped...
172.16.1.2               1001       3159       3155       0       0    23:43:47 Establ
  bgp.l3vpn.0: 3/3/3/0
  bgp.l3vpn.2: 0/0/0/0
  bgp.mvpn.0: 1/1/1/0
  vpn-1.inet.0: 3/3/3/0
  vpn-1.mvpn.0: 1/1/1/0
172.16.1.5               1001       3157       3154       0       0    23:43:40 Establ
  bgp.l3vpn.0: 3/3/3/0
  bgp.l3vpn.2: 0/0/0/0
  bgp.mvpn.0: 1/1/1/0
  vpn-1.inet.0: 3/3/3/0
  vpn-1.mvpn.0: 1/1/1/0
```

??

Damp State(?? ??) ??? bgp.mvpn.0 ??? ???? ??? ??? ?? 0?? ?????. ? ??? ???? State(??) ??? ??? ??? BGP ?? 172.16.1.2? ?? 0?? ??? ??????? ??????.

?? ??

> *?? ???? ??*
>
> ??? ??? ???? BGP ?? ??? ?? | 555
>
> *?: BGP ?? ?? ?? ?? ?? ??*

chapter label in part8

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- SCU? ?? ? ?? | 594
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SCU(?? ??? ??)? IP ?? ??? IP ?? ??? ?? ??? ???? ???? ??? ??? ?????. SCU? ???? ????? ??? ?? ????? ? ??? ?? ??? ?? ???? ??? ???? ??? ? ????. ???? ? ????? ??? ????? ???? SCU ????? ????? ???.

DCU(□□ □□□ □□)□ IP □□ □□□ □□□ □□□□ □□□ □□□ □□□□□. DCU□ □□□□ □□ □□□□ □□□□ □□□□□ □□ □□□□ □□ □□□□ □ □□ □□□□ □□□ □ □□□□.

T □□□ □□ □□□ □ M320 □□□□□ □□ □□□□□□ □□ □□□□ □□ □□□□ □□□ □□□□ □□ □□□□ □□□□. □□□ □□□ □□□ □□□□.

- T □□□ □ M320 □□□□□□ □□□ □□□□ □□□□ □□ SCU □ DCU □□□□□ □□□□□.
- T □□□ □ M320 □□□□□□ □□ □□□ □□□□ □□ DCU□ □□□□□.
- M □□□ □□□□□, DCU□ □□ □□□ □□□ □□ □□□□□.
- □□ □□□ M □□□ □□□□□□ □□□□ □□□□ □□, □□□ □□□ DCU □□□□ □□□□□.
- □□ □□□ T □□□ □ M320 □□□□□ □□□□ □□□□ □□, □□□ □□□ DCU □□□ □□□□□.

□: FPC3 □ PTX1000 □□□□ □□ PTX □□□ □□□□ □□ SCU□ DCU□ □□□□□ □□□□ □□ □□□ □□□□ □□□.

MPC/MIC □□□□□□ □□ MX □□□ □□□□□□ SCU □ DCU□ □□ □□□ □□□ □ □□□□□. □□ □□□ □□ □□□ □□□ SCU □□ DCU □□□ □□□□ □□□□.

□ MPC/MIC □□□□□□ □□ MX □□□ □□□□□□ □□ □□□ □□□□ □□ SCU □ DCU□ □□□□□. □□ □□□ □□ □□□ □□□ SCU □ DCU □□□ □□□□□.

PTX □□□ □□□□□□ □□ □□□ □□□□ □□ SCU □ DCU □□□□□ □□□□□. □□ □□□ □□ □□□ □□□ SCU □ DCU □□□ □□□□□. PTX10003, PTX10004, PTX10008, PTX10001-36MR □ □□ □□ JNP10K-LC1201□□ SCU □ DCU □□□□ □□□ □□□ □□□□ □□ □□□□ FIB(Forwarding Information Base) □□□□□ □ □□ □□□ □□□□□. □□□ □□ □□□□ □□□ □□□ □□ □□□□ □□□.

□□□ □□ FPC(T640-FPC1-ES, T640-FPC2-ES, T640-FPC3-ES, T640-FPC4-1P-ES □ T1600-FPC4-ES)□□ □□ □□□ □□□□□ □□ □ □□□□□. Junos OS □□□ 14.2□□ SCU □□□□□ T4000 □□ 5 FPC□□ □□ □ □□□□□. □□□ □□□ □□□ □□□ □.

- SCU □□□□□ □□□ T4000 Type 5 FPC(□□ FPC)□□ Enhanced Scaling FPC(□□ FPC)□ □□□ □ □□□□□.
- SCU □□□□□ □□□ Enhanced Scaling FPC(□□ FPC)□□ T4000 Type 5 FPC(□□ FPC)□ □□□ □ □□□□□.

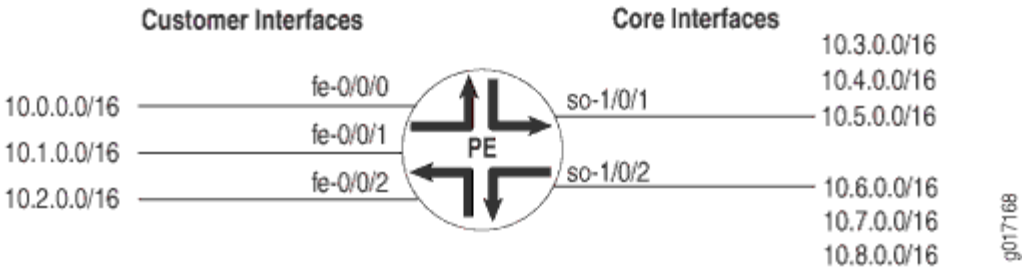
□: □□□□□ □□□ □□□□ □□□ □□□ □□□□ SCU□ DCU □□□ □□ □□□ □□□ □□□ □□□□ □□□□.

□□ □□□ □□□ □□ □□□ □□□ □□□ □□, □□□ □□ □ □□□ □□□ □□□ □□□ □ □□□ □□□□□ Junos OS □□□□ □□□□□ □□□□□□ □□□□ □□.

?? ??? ?? ??

SCU(?? ??? ??)? DCU(?? ??? ??) ??? ??? ?????. DCU? ??? ???? ??? ??? ???? ??? ???? ?? ???????? ?? ? ? ??? ?????????. ?? 38 ??? 592 ?(?) ??? ?????? ??(PE) ??? ??????? ??????.

?? 38: DCU/SCU ??



?? ??? ???????? ??? ???? ???? ???? SONET/SDH ??????? ?????? ?? ???? ???? ??????. ?? ??? ??????? DCU? ????, ??? ?????? ? ??(? ??, ?? ??? ??????)?? ???? ???? ??? ?? ???? ???? ???? ?? ??? ? ?????.

??? DCU? ?????? ???? ???? ???? ??? ??????. ?? ??????? ???? ?? ???? ??? ?? ???? ??? ? ???, ?? ?????? ?? ??????? ???? ???? ??? ? ?????. ?? ??, DCU? ?????? `fe-0/0/0`? ??? ?? ???? ??? ? ???, ?? ?? ???? ?? ?? ??? `10.3.0.0/16` ?? ???? ??? ?? ????.

SCU? ???? ?? ?? ???? ??? ? ???, ?? ?? ?? ?????? ???? ??? ?? ?????? ? ?????. ? ??? ???? ???? ???? ???? ??? ???? ?? ??? ??? ? ?????.

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SCU? ?? ??? ?? ?? | 594

SCU ??? ?? ??? | 595

??? 3 VPN?? SCU? ???? ?? ??? | 596

SCU ?? | 603

SCU(??? 3 VPN ?? ??) | 614

SCU ?? ??

SCU ?? DCU? ???? ?? ?? ??? ??? ??? ???.

- M ??? ??? ?? Junos OS ??? 5.6 ?????? ?? ??? ?? ?? ????? *???? ???* ?? ????? ??? ? ?????. ?????? ?? ????? ?? source-class ?? **destination-class**[edit firewall filter *firewall-name* term *term-name* from] ??????. ???? ?? ? ?? ??? ??? *Junos ?? ?????? ?? ????* ???????.

- ?? 126?? ?? ????? 126?? ?? ????? ??? ? ?????.

- ?? ?? ?? ???? ? ????? ? ???? ?? ? ???? ?? ????? ???? ? ?????. ?, ???? ???? ? ? ???? ?? ????? ???? ? ?????.

- ?? ?? ?? ????? ???? ???? ?? ?? ? ?? ???? ??????. ????? ????? ???? ?? ???? ????? SCU? ?? ???? ???? ?? DCU ? ???? ??????. SCU ? DCU ????? M-???? ? T-????? ????? SCU/DCU? ????? ?? ????(?: MX ?? PTX ????)?? ?? ? ???? ???? ???? ? ?????.

  M ??? ? T ??? ??????? SCU? ????? ?? ????? DCU? ??????. ? ???? ???? ?? ???? ?? ?? ????? ???? ????? ?? ? ????? ????? ????. ?? ??????? ? ?? ????? ???? ???????.

  SCU? DCU ???? ?? ???? ???? ???????? ???? ??????. ???? ?? ???? SCU ????? ????? ???? DCU ????? ??????. ???? ??, ???? ?? ???? ???? ?? SCU ????? ??????. DCU ????? ??????. ? ??, ???? SCU ????? ???? ???? ???? ??????? ???? ???? ??????.

  ???? ??????? ????????? SCU ???? ?????. ???? ????? ?? ???? ?? ????? ?? ???????? SCU? ?? ????? ???? ???? SCU? ?? ????? ????? ?? ???????. ???????, ????? DCU ????? ???????? DCU? ????? ????????? SCU? ??????? ???? DCU ? ???? ????? ?????.

? ???? ?????? ????? ? ??????? ???????? ?? ???? ??????? ???? ?? ???????? ???? ???? ???? ????? ????.

- ????? ?? ???????? ???? ?? ???? ????? ???? ? ?????. ?? DCU ? SCU ????? ??????.

- ?? ?? ???? ?? ???? ????? ?? ?? ???? ????? ???? ????? ? ?? ????? ????. ???? ?? ?? ???? ????? ?? ?? ?? ???? ???? ? ?? ???? ? ?????.

- ???? ??????? ????????? CLI(Command Line Interface) show ?? ? ????? ????? ????? SCU ????? ??????. SCU ?? ?? SCU **output** ???????? ??????.

- ? **output** SCU ??????? ?? ???? ?? **input** ????? ? ??????? ???????? ????? ??????.

- M320 ? T ??? ??????? ?? ? ?? ????? ???? ????? ?? ????? ?????. ???? ????? ??, ???? ????? ????? ?? SCU ? DCU ??????? ?????, ?? ???? ????? ?? DCU? ??????.

- ?? ???? M120 ???? ? M320 ???? ???? M ???? ??????? ????? ????? ??, ???? ???? DCU ????? ??????. ?? ??? M320 ? T ???? ??????? ????? ????? ??, ???? ???? DCU ???? ??????.

?? ??

?? ???? ?? ?? | 592

SCU? ?? ???? ?? ?? | 594

SCU ???? ?? ???? | 595

SCU ?? | 603

SCU? ?? ??? ?? ??

SCU? ????? ???? ?? ?? ??? ???? ???.

- M120 ? MX ??? ??? ??? ?? Junos OS ??? 8.2 ??
- IPv6 SCU? Junos OS ??? 6.2 ??
- Junos OS ??? 5.6 ????? ?? ??? ?? ?? ???? ??? ??? ?? ???? ??
- IPv4 SCU? Junos OS ??? 5.4 ??
- ?? SCU? ??? ???? M ???, MX ??? ?? T ??? ??? 3?? ??? 3 VPN? ???? SCU? ??? 5?. ? ???? ?? ??? ? ? ?? ??? ??? ??, ?? ???? ???? ????? ??? 3 VPN? ???? ? ??????.
- M ??? ? T ??? ????? ??, ??? 3 VPN? ???? SCU? ?? ??? PIC

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?? ??? ?? ?? | 592
SCU ??? ?? ??? | 595
??? 3 VPN?? SCU? ???? ?? ??? | 596
SCU ?? | 603
SCU(??? 3 VPN ?? ??) | 614

SCU? ?? ? ??

in this section

- DCU(?? ??? ??) | 595
- SCU(?? ??? ??) | 595
- ?? ??(SA) | 595
- ?? ??(DA) | 595

DCU(□□ □□□ □□)

□□ □□□ □□□□ □□□□□ CLI show □□, □□ □□□ □□ SNMP□ □□ □□□ □□□ □□□□□□ □□□□□. DCU□ □□ □□□□ □□□ □ □□ □□ □□□ □□□□□. DCU□ □□ □□□ □□□ *Junos □□ □□□□□ □□ □□□□* □□□□□□.

SCU(□□ □□□ □□)

□□ □□□ □□□□ □□□□□ CLI show □□, □□ □□□ □□ SNMP□ □□ □□□ □□□ □□□□□□ □□□□□. SCU□ □□ □□□□ □□□ □ □□ □□ □ □□ □□□□□. SCU□ □□ □□□ □□□ *Junos □□ □□□□□ □□ □□□□* □□□□□□.

□□ □□(SA)

□□□ □□□□ □□□□□ IP □□□□□. □ □□□ IP □□□ □□□□ □□ □□ □□□, □□□, CoS(Class of Service) □ SCU□ □□□ □□□ □□□□ □□ □□□□ □□ □□□□□.

□□ □□(DA)

□□□ □□□□ □□□ □□□□□ IP □□□□□. □ □□□ IP □□□ □□□□ □□□ □□□ □□ □ DCU □□ □□□□ □□□□ □□ □□□□□.

SCU □□□ □□ □□□

SCU(□□ □□□ □□)□ □□□□□ □□□ □□□□ □□□.

1. □□□□□ IPv4 □□ IPv6 □□ □□□ □□□□ □□□ □□ □□□ □□□□ □□□ □□□ □□□□□. "□□□ □□□□ □□ □□ □ □□ □□□ □□" □□□ 596□(□) □□□□□.
2. □□□ □□□□ □□□ □□□□□. "□□□ □□□□ □□ □□" □□□ 597□(□) □□□□□.
3. □□□□ □ □□□□□ □□□□□□□ □□□□□ □□□□□□. "□□□□ □ □□□□□ □□□□□□□ □□ □□" □□□ 598□(□) □□□□□.

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> □□ □□□ □□ □□ | 592
>
> SCU□ □□ □□□ □□ □□ | 594
>
> SCU □□ | 603

??? 3 VPN?? SCU? ???? ?? ???

SCU? ?? ??????? ?? ??? ? ????. ?? ??? 3 VPN? ?? ??????. ?? ?????? ??(PE) ????? SCU ???? ? ?? ? "SCU ??? ?? ???" ??? 595??? ?? ??? ??????. ??? MPLS ??? ?? ???? ??? 3 VPN? ?? ?? ???? ?????? ??? ?? ? ? ? ?? ??? ???? ???.

1. ?? PE ???? ?? ??? ??(vt) ???????? SCU? ??????. "?? PE ???? vt ???????? ?? SCU ??" ??? 599?(?) ?? ???.
2. ?? ???? SCU ?? ?? ??????? VRF(Virtual Routing and Forwarding) ?????? ??????. "SCU ?? vt ??????? VRF ?????? ??" ??? 600?(?) ??????.
3. ?? ???? ?? ???????? SCU? ??????. "?? ???????? SCU ??" ??? 601?(?) ??????.
4. ???? ???? ???? ?? ???? ?? ???? ???? ??????. ?? ??? ??? ?? ?? ??, ??? ?? ??? ?? ? SCU ??? ??? ??? ???? ??? ??? ? ????. "SCU ???? ???? ???? ??" ??? 601?(?) ??????.

> ?: SCU? ??? 2 VPN?? ???? ????.

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?? ??? ?? ?? | 592

SCU? ?? ??? ?? ?? | 594

SCU(??? 3 VPN ?? ??) | 614

??? ???? ?? ?? ? ?? ??? ??

?? ??? ??? ?? ??? ???? SCU ??? ??????. ??? ???? ?????? IPv4 ?? IPv6 ?? ??? ??????. ?? ?? ??? ??? ??? ?? ???? ???? ??? ???? ???.

```
[edit policy-options]
policy-statement policy-name {
    term term-name {
        from {
            route-filter address/prefix;
        }
        then source-class class-name;
```

```
    }
}
```

□: □□ □□ □□ □□□ □ □□□□ □ □□□ □□ □ □□□ □□ □□□□ □□□ □ □□□□. □, □□□ □□□ □ □ □□□ □□ □□□□ □□ □ □ □□□□.

□□ □□□ □□□□ **forwarding-class** □□ □□ □□□ □□ □ □□□□□. □□ □□ IPv4 □□ IPv6 □□ □□□ SCU □□□, DCU □□□ □□ □ □ □ □□□ □□□ □ □□□□. □□ □□□ **from** □□□□ □□ □□ □□□□ □ `then` □□ □□□ □ □□□□ [`edit policy-options policy-statement` *`policy-name`*] .

```
[edit policy-options]
policy-statement policy-name {
    from {
        route-filter 105.15.0.0/16 orlonger;
    }
    then forwarding-class class-name;
}
```

□ □□ □□□ □ □□ DCU □□ □□ **destination-class**□□□. DCU□ □□ □□□ □□□ *Junos □□ □□□□□ □□ □□□□*□□□□□□.

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□□ □□□ □□ □□ | 592

SCU□ □□ □□□ □□ □□ | 594

SCU □□□ □□ □□□ | 595

SCU □□ | 603

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□□ □□ □□□ □□□ □□□ □□□□ □□□□□. □□□ □□□□ □□□ □□□□ □□□□ □□□ □□ □□□□ □□□□□.

```
[edit routing-options]
forwarding-table {
    export policy-name;
}
```

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□□ □□□ □□ □□ | 592

SCU□ □□ □□□ □□ □□ | 594

SCU □□□ □□ □□□ | 595

SCU □□ | 603

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□□ □□□□□□□□ □□□□ □□ DCU□ □□ SCU□ □□ □□□□□ □□ □ □□ □□□□□□□□ □□□□□□ □□□. □□ □□□□ □□□□ □□□□ □ □□□□□ □□□ □□ □□□ □□□□□□□□□. SCU□□ □□□□□□ □□□□ □□□□ □□□ □□□ □□□□ □ □□□□□□□ □□□□□ □□□□ □□□. □□ SCU□ □□□ □ □□□□ □ □□ □□□ □□□□ □□□□□. □□ □□(SA) □ □□ □□(DA) □□. □□, DCU□□ □□ □□ □□ □□□ □□□□. □□ SCU SA □□□ □□□ □□□ □□□□□□□ □□□□ □□□ □□□ □□□ □□□□ □ □□□□.

□□ SCU □□□□□□□ □□ □□□□□, □□ □□□□□ □□ □ □□ □□□ □ □□□□. SCU□ IPv4() □□ IPv6(**family inetfamily inet6**) □□□ □□□ □□□□ □ □□□□. SCU □□□□□ source-class-usage □□□□□ □□ □□□□ □□ □□□□□.[edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet 6) accounting]

```
[edit]
interfaces {
    interface-name {
        unit unit-number {
            family (inet | inet6) {
                accounting {
                    source-class-usage {
                        (input | output | input output);
                    }
                    destination-class-usage;
                }
            }
        }
    }
}
```

□□ SCU □□□ □□□□ □, SCU □□ □□□□□□ □□□□ □□ □□□ SA □□ □□□ □□ □□ DA □□ □□□ □□□ □□□. □□ □□□ □□ SCU □□□ □ □□ □□ □□□ □□□ □□□□□ □ □□□□ □□□□□ □□□□ □□ □□ □□□□□.

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□□ □□□□ □□ □□ | 592
SCU□ □□ □□□□ □□ □□ | 594
SCU □□□□ □□ □□□□ | 595
SCU □□ | 603

□□ PE □□□□ vt □□□□□□□□ □□ SCU □□

□□□ 3 VPN□□ SCU□ □□□□□□□ □□ PIC□ □□ □□□□□ □□ PIC□ □□□□ □□ PE □□□□ □□ □□□□ □□(**vt**) □□□□□□□□ □□ □□□□ □□□□ □□□□□. □□□□□□ □□□□ SCU □□□□□□ □□□□□ □□ □□□□ □□ □□□□□input.[edit interfaces *vt-interface-number* unit 0 family inet accounting source-class-usage]

```
[edit]
interfaces {
    vt-0/3/0 {
        unit 0 {
            family inet {
                accounting {
                    source-class-usage {
                        input;
                    }
                }
            }
        }
    }
}
```

□□ □□

□□ □□□□ □□ □□ | 592
SCU□ □□ □□□□ □□ □□ | 594
□□□ 3 VPN□□ SCU□ □□□□□ □□ □□□□ | 596
SCU(□□□ 3 VPN □□ □□) | 614

SCU ?? vt ?????? VRF ????? ??

?? ?? ?? ???? ??? VRF ????? [edit routing-instances *routing-instance-name*] VPN ??? ?? ?????? ?????.

```
[edit]
routing-instances {
                                    routing-instance-name               {
        instance-type vrf;
        interface at-2/1/1.0;
        interface vt-0/3/0.0;
        route-distinguisher 10.250.14.225:100;
        vrf-import import-policy-name;
        vrf-export export-policy-name;
        protocols {
            bgp {
                group to-r4 {
                    local-address 10.20.253.1;
                    peer-as 400;
                    neighbor 10.20.253.2;
                }
            }
        }
    }
}
```

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?? ??? ?? ?? | 592

SCU? ?? ??? ?? ?? | 594

??? 3 VPN?? SCU? ???? ?? ??? | 596

SCU(??? 3 VPN ?? ??) | 614

?? ???????? SCU ??

VPN ???? VPN ??? ?? ??????? ?? ?? ???? ???? ??? ? ???? ?? ?? ??????? ???? ???. SCU ??? ????? ?? ? ??? exit ???????? ?? ??? ??? ?? ??? ?????.

```
[edit interfaces]
at-1/1/0 {
    unit 0 {
        family inet {
            accounting {
                source-class-usage {
                    output;
                }
            }
        }
    }
}
```

?? ??

?? ??? ?? ?? | 592

SCU? ?? ??? ?? ?? | 594

??? 3 VPN?? SCU? ???? ?? ??? | 596

SCU(??? 3 VPN ?? ??) | 614

SCU ???? ???? ???? ??

?? ???? ????, ???? ? ????? ???????? ????, ??? ???? ???? ?? ???? ?? ???? ??? ??? ? ????. ?? ???? [edit accounting-options class-usage-profile] ?? ???? ?????. SCU ?? ??? ?? DCU ?? ???? ?? ???? ??? ? ?? ??. ?? ??? ??? ?? ?? ??, ??? ?? ???? ?? ? SCU ??? ??? ??? ??? ???? ??(?)? ??? ? ????.

```
[edit]
accounting-options {
    file filename;
    class-usage-profile profile-name {
        file filename;
```

```
        interval minutes;
        source-classes {
            source-class-name;
        }
        destination-classes {
            destination-class-name;
        }
    }
}
```

□: SCU □□□□□ □□ □□□ □□□□ □□ □□□□□ □□□□□□□□ □□□□□. SCU □□ □□□ □□□□□ □□□□ SCU □□□□ □ □ □□□□ □□□ □ □□ □□□□ □□□ □ □□□□. SCU □□□ □□ □□□ □□ □□□ □□□□□ □□ □□□ □□ traceoptions □ □□ □□□□ □□□. □□□ □□, SCU □□□ □□□□ □□□ □□□ □□ □□ □□□ □□□□□ □□□ □ □□□□.

DCU □□□□□ □□□ □□□□ □□ □□□□□ DCU□ □ □□ □□□ □□□ □□ □□□□.

□□ □□

□□ □□□ □□ □□ | 592

SCU□ □□ □□□ □□ □□ | 594

□□□ 3 VPN□□ SCU□ □□□□ □□ □□□ | 596

SCU(□□□ 3 VPN □□ □□) | 614

SCU □□□□ □□□□ □□

in this section

- □□ | 602
- □□ | 603

□□

□□□ SCU □□□□ □□□□□ □□□ □□□.

??

???? ?????? **/var/log** ??????. ???? ???? ?? ???? ???? ?????? ???. SCU ?????? ?????? ??? ????.

```
profile_name,epoch-timestamp,interface-name,source-class-name,packet-count,
byte-count
```

???? ?? ?? ?? ???? ????.

```
scu_profile,980313078,ge-1/0/0.0,gold,82,6888
scu_profile,980313078,ge-1/0/0.0,silver,164,13776
scu_profile,980313078,ge-1/0/0.0,bronze,0,0
scu_profile,980313678,ge-1/0/0.0,gold,82,6888
scu_profile,980313678,ge-1/0/0.0,silver,246,20664
scu_profile,980313678,ge-1/0/0.0,bronze,0,0
```

SCU ?? ???? ?? ???? ???? ???? ??? show accounting-options class-usage-profile *scu-profile-name* ? ????.

?? ??

?? ??? ?? ?? | 592

SCU? ?? ???? ?? ?? | 594

SCU ???? ???? ???? ?? | 601

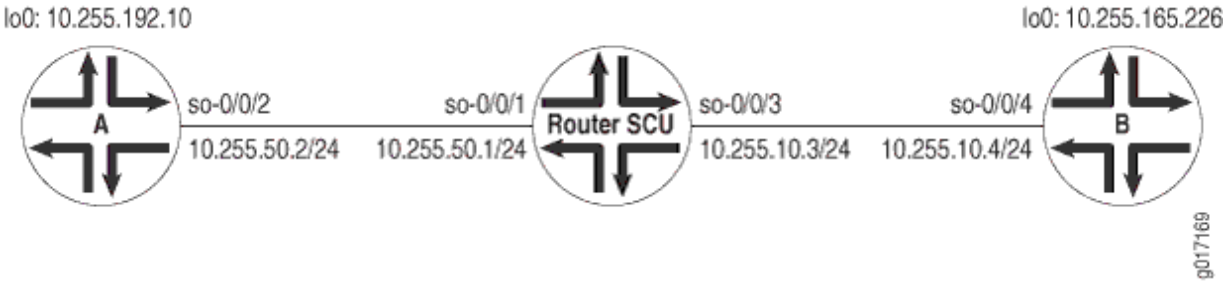
SCU ??

in this section

- SCU ?? | 604
- ?? ?? | 607

SCU ??

?? 39: SCU ???? ??????



?? 39 ??? 604 ? ??? 3?? ?? ?? SCU ??? ??????. ?? ??? A? B? ??????? ?? ????? ??? ??? ??????. ????? ?? ? ?? ?? ?????? ?? ??? SCU?? ??????.

??? A?? ??? ??????. ??? A? ??? ????? ??? SCU? ?? ??? A? ??? ????? ??? ??????. ??? ? ??????? SCU? ??? ? ?????. ??? ?? OSPF ????? ?? ??? A? ????? OSPF ??????? ??? ??????? `so-0/0/2` ??????? ??????.

??? A:

```
[edit]
interfaces {
    so-0/0/2 {
        unit 0 {
            family inet {
                address 10.255.50.2/24;
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 10.255.192.10/32;
            }
        }
    }
}
protocols {
    ospf {
        area 0.0.0.0 {
            interface so-0/0/2.0;
            interface lo0.0;
```

```
        }
    }
}
```

□ □□□ □□□ SCU□ □□□ □□□□ □□□□□. □□□ SCU□ [edit interfaces *interface-name* unit *unit-number* family inet accounting] □□ □□□□ □□□□ □ □□□□□ □□□□□□□ □□ □□□ □□□ □□□□□. □□ □□□(□□□ □□, □ □□ □ □ □□)□ □□□□ □□□.

□□ □□ □□□ A□ B□ □□□ □□ □□□□ □□□□ □□ □□ □□ □□ □□□□□.□□□ A□ □□□ □□ scu-class-a □ □□□ □□□□ □□□ B□ □□□ □ □ □ □□ □□□□ scu-class-b□□□□ □□□ □□ □□□□□.□□ □□□ □□□□ □□ □□□ □□□□ □□□ □□□□□□.

□□□□□, □□□ □□□□ □□□ □□□□□.

□□□ SCU

```
[edit]
interfaces {
    so-0/0/1 {
        unit 0 {
            family inet {
                accounting {
                    source-class-usage {
                        input;
                        output;
                    }
                }
                address 10.255.50.1/24;
            }
        }
    }
    so-0/0/3 {
        unit 0 {
            family inet {
                accounting {
                    source-class-usage {
                        input;
                        output;
                    }
                }
                address 10.255.10.3/24;
            }
        }
    }
    lo0 {
```

```
        unit 0 {
            family inet {
                address 10.255.6.111/32;
            }
        }
    }
}
protocols {
    ospf {
        area 0.0.0.0 {
            interface so-0/0/1.0;
            interface so-0/0/3.0;
        }
    }
}
routing-options {
    forwarding-table {
        export scu-policy;
    }
}
policy-options {
    policy-statement scu-policy {
        term 0 {
            from {
                route-filter 10.255.192.0/24 orlonger;
            }
            then source-class scu-class-a;
        }
        term 1 {
            from {
                route-filter 10.255.165.0/24 orlonger;
            }
            then source-class scu-class-b;
        }
    }
}
```

□□□ B□□ □□ □□□ □□□□□. □□□ A□ □□ □□□□ □□□□ □□□, □□□ B□ □□□ □□□ □□□ SCU□ □ □□□ scu-class-b □□□□ □□□□ □. □□ □□□□, □ □□□□□□ SCU □□□ □□□□ □□□□ □□ OSPF □□□□ □□ □□□ B□ □□□□ OSPF □□□□□ □□□ □□□□□□ □□□□□□ so-0/0/4 □□□□□.

??? B:

```
[edit]
interfaces {
    so-0/0/4 {
        unit 0 {
            family inet {
                address 10.255.10.4/24;
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 10.255.165.226/32;
            }
        }
    }
}
protocols {
    ospf {
        area 0.0.0.0 {
            interface so-0/0/4.0;
            interface lo0.0;
        }
    }
}
```

?? ??

SCU? ??? ?????? ?????? ?? ??? ??????.

- show interfaces *interface-name* statistics
- show interfaces *interface-name* extensive (| detail)
- show routeextensive (| detail)
- show interfaces source-class *source-class-name interface-name*
- clear interface *interface-name* statistics

?? ??? ?????? SCU ????????? SCU ??? output ?? ????? ????. ?? ? ???? ????? SCU? ???? ???? ? ?????.

1. SCU□ □□□□ □□□□ □□ □□□□ □□□ □□□□ □□ □□□ □□□□□.

2. □ □□ □□□□□ □□ □□ □□□□ ping□ □□□□ SCU □□ □□□□□ SCU □□□□ □□□□□.

3. □□□□□ □□□□□□□ □□□□ □□□□ □□□□ □□□ □□□□□.

□□ □□□□□ □□ □□□ □□ □□□□ □□□ □□□ □□□ □□ □□□.

```
user@scu> clear interfaces statistics all

user@scu>  show interfaces so-0/0/1.0 statistics
  Logical interface so-0/0/1.0 (Index 4) (SNMP ifIndex 119)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Source class                            Packets                Bytes
                      scu-class-a                    0                    0
                     scu-class-b                   0                    0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.50/24, Local: 10.255.50.1

user@scu> show interfaces so-0/0/3.0 statistics
  Logical interface so-0/0/3.0 (Index 6) (SNMP ifIndex 113)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Source class                            Packets                Bytes
                      scu-class-a                   0                    0
                      scu-class-b                   0                    0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.10/24, Local: 10.255.10.3

user@scu> show interfaces source-class scu-class-a so-0/0/3.0
    Protocol inet
      Source class                            Packets                Bytes
                      scu-class-a                   0                    0

user@scu> show interfaces source-class scu-class-b so-0/0/1.0
    Protocol inet
      Source class                            Packets                Bytes
                      scu-class-b                   0                    0

user@routerB> ping 10.255.192.10 source 10.255.165.226 rapid 10000

user@routerA> ping 10.255.165.226 source 10.255.192.10 rapid 10000
```

```
user@scu> show interfaces source-class scu-class-a so-0/0/3.0
    Protocol inet
      Source class                             Packets                Bytes
                     scu-class-a                 20000              1680000

user@scu> show interfaces source-class scu-class-a so-0/0/1.0
    Protocol inet
      Source class                             Packets                Bytes
                     scu-class-b                 20000              1680000

user@scu> show interfaces so-0/0/3.0 statistics
  Logical interface so-0/0/3.0 (Index 6) (SNMP ifIndex 113)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Source class                             Packets                Bytes
                     scu-class-a                 20000              1680000
                     scu-class-b                     0                    0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.10/24, Local: 10.255.10.3

user@scu> show interfaces so-0/0/1.0 statistics
  Logical interface so-0/0/1.0 (Index 4) (SNMP ifIndex 119)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Source class                             Packets                Bytes
                     scu-class-a                     0                    0
                     scu-class-b                 20000              1680000
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.50/24, Local: 10.255.50.1
```

```
user@scu> show route extensive 10.255.192.0

inet.0: 26 destinations, 28 routes (25 active, 0 holddown, 1 hidden)
10.255.192.0/18 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.255.192.0/18 -> {so-0/0/1.0}
Source class: scu-class-a
        *OSPF   Preference: 150
                Next hop: via so-0/0/1.0, selected
```

```
                State: <Active Int Ext>
                Age: 2:49:31  Metric: 0  Tag: 0
                Task: OSPF
                Announcement bits (1): 0-KRT
                AS path: I
```

```
user@scu> show route extensive 10.255.165.0
inet.0: 26 destinations, 28 routes (25 active, 0 holddown, 1 hidden)
10.255.165.0/20 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.255.165.0/20 -> {so-0/0/3.0}
Source class: scu-class-b
        *OSPF   Preference: 150
                Next hop: via so-0/0/3.0, selected
                State: <Active Int Ext>
                Age: 2:49:31  Metric: 0  Tag: 0
                Task: OSPF
                Announcement bits (1): 0-KRT
                AS path: I
```

```
user@scu> show interfaces so-0/0/1 detail
Physical interface: so-0/0/1, Enabled, Physical link is Up
  Interface index: 12, SNMP ifIndex: 17, Generation: 11
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 46 (last seen 00:00:01 ago)
    Output: 45 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
```

```
  Last flapped   : 2002-04-19 11:49:22 PDT (03:10:09 ago)
  Statistics last cleared: 2002-04-19 14:52:04 PDT (00:07:27 ago)
  Traffic statistics:
   Input  bytes  :              1689276                   40 bps
   Output bytes  :              1689747                   48 bps
   Input  packets:                20197                    0 pps
   Output packets:                20200                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort                20053                20053                    0
    1 expedited-fo                   0                    0                    0
    2 assured-forw                   0                    0                    0
    3 network-cont                 146                  146                    0
  SONET alarms   : None
  SONET defects  : None
  Logical interface so-0/0/1.0 (Index 4) (SNMP ifIndex 119) (Generation 3)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: SCU-in, SCU-out
    Generation: 6 Route table: 0
       Source class                            Packets                Bytes
                    scu-class-a                     0                    0
                    scu-class-b                 20000              1680000
      Filters: Input: icmp-so-0/0/1.0-i, Output: icmp-so-0/0/1.0-o
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.50/24, Local: 10.255.50.1, Broadcast: Unspecified,
        Generation: 8

user@scu>  show interfaces so-0/0/1 extensive
Physical interface: so-0/0/1, Enabled, Physical link is Up
  Interface index: 12, SNMP ifIndex: 17, Generation: 11
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 51 (last seen 00:00:04 ago)
    Output: 50 (last sent 00:00:05 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
```

```
CHAP state: Not-configured
Last flapped   : 2002-04-19 11:49:22 PDT (03:11:05 ago)
Statistics last cleared: 2002-04-19 14:52:04 PDT (00:08:23 ago)
Traffic statistics:
 Input  bytes  :              1689884                 264 bps
 Output bytes  :              1690388                 280 bps
 Input  packets:                20215                   0 pps
 Output packets:                20217                   0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
  HS link FIFO overflows: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
  HS link FIFO underflows: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets
  0 best-effort                20053                20053                    0
  1 expedited-fo                   0                    0                    0
  2 assured-forw                   0                    0                    0
  3 network-cont                 164                  164                    0
SONET alarms   : None
SONET defects  : None
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    0            0
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      0
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    0            0
  REI-L                     0            0
  RDI-L                     0            0  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      0
  SES-L                     0
```

```
  UAS-L                     0
  ES-LFE                    0
  SES-LFE                   0
  UAS-LFE                   0
SONET path:
  BIP-B3                    0           0
  REI-P                     0           0
  LOP-P                     0           0  OK
  AIS-P                     0           0  OK
  RDI-P                     0           0  OK
  UNEQ-P                    0           0  OK
  PLM-P                     0           0  OK
  ES-P                      0
  SES-P                     0
  UAS-P                     0
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x00
  V5(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x00
Received path trace: e so-0/0/1
  65 20 73 6f 2d 30 2f 30 2f 31 00 00 00 00 00 00   e so-0/0/1......
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a   ................
Transmitted path trace: scu so-0/0/1
  67 68 62 20 73 6f 2d 30 2f 30 2f 31 00 00 00 00   scu so-0/0/1....
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
```

```
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface so-0/0/1.0 (Index 4) (SNMP ifIndex 119) (Generation 3)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: SCU-in, SCU-out
    Generation: 6 Route table: 0
       Source class                            Packets                Bytes
                     scu-class-a                     0                    0
                     scu-class-b                 20000              1680000
      Filters: Input: icmp-so-0/0/1.0-i, Output: icmp-so-0/0/1.0-o
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.50/24, Local: 10.255.50.1, Broadcast: Unspecified,
        Generation: 8
```

□□ □□

□□ □□□ □□ □□ | 592

SCU□ □□ □□□ □□ □□ | 594

SCU □□□ □□ □□□ | 595

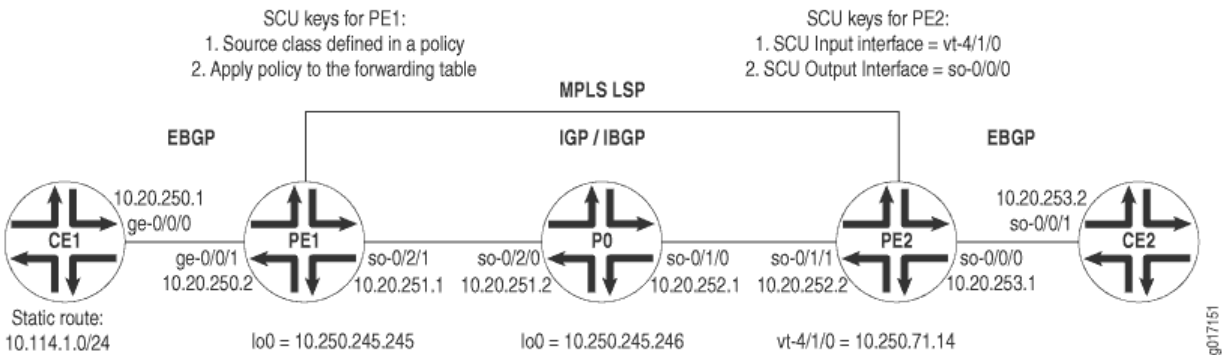
SCU(□□□ 3 VPN □□ □□)

in this section

- □□□ 3 VPN□□ SCU □□ | 615
- □□ □□ | 623

??? 3 VPN?? SCU ??

?? 40: ??? 3 VPN ???? ??????? SCU



?? 40 ??? 615 ?(?) ??? 3 VPN ?????? ??????. CE1 ? CE2? ?????? ??? PE1, P0 ? PE2? ?? VPN?? ??? ?? ?? (CE) ???????. EBGP? ??? CE1? PE1 ??? ?????, IBGP? IS-IS/MPLS/LDP ??? ?? ??? PE1? PE2? ?????, ??? PE2? CE2 ??? ? ?? EBGP ??? ?????.

??? CE1?? PE1? ?? EBGP ??? ????? VPN? ??????. ? ?? ??? `10.114.1.0/24` ????? ? ??? EBGP neighbor? ???? ??.

??? CE1

```
[edit]
interfaces {
    ge-0/0/0 {
        unit 0 {
            family inet {
                address 10.20.250.1/30;
            }
        }
    }
}
routing-options {
    static {
        route 10.114.1.0/24 reject;
    }
    autonomous-system 100;
}
protocols {
    bgp {
        group to-pe1 {
```

```
            local-address 10.20.250.1;
            export inject-direct;
            peer-as 300;
            neighbor 10.20.250.2;
        }
    }
}
policy-options {
    policy-statement inject-direct {
        term 1 {
            from {
                protocol static;
                route-filter 10.114.1.0/24 exact;
            }
            then accept;
        }
        term 2 {
            from protocol direct;
            then accept;
        }
    }
}
```

PE1□□ VRF □□□ □□□□□ □□ CE1□ □□ EBGP □□□ □□□□□. BGP □□□□ □□□□□ □□ VRF □□□□□ □□ □□□□ □□□ VPN □ □ □□□□ □□□□ □□□□ □□ □□ □□□□ □□□□ □□□ □□□□□. □□□□□, IS-IS, MPLS □ LDP □□□ □□ □□□□ □□□ PE2□ □□ IBGP □□□ □□□□□.

□□□ PE1

```
[edit]
interfaces {
    ge-0/0/1 {
        unit 0 {
            family inet {
                address 10.20.250.2/30;
            }
        }
    }
    so-0/2/1 {
        unit 0 {
            family inet {
                address 10.20.251.1/30;
```

```
            }
            family iso;
            family mpls;
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 10.250.245.245/32;
            }
            family iso;
            family mpls;
        }
    }
}
routing-options {
    autonomous-system 300;
}
protocols {
    mpls {
        interface so-0/2/1;
    }
    bgp {
        group ibgp {
            type internal;
            local-address 10.250.245.245;
            family inet-vpn {
                unicast;
            }
            neighbor 10.250.71.14;
        }
    }
    isis {
        interface so-0/2/1;
    }
    ldp {
        interface so-0/2/1;
    }
}
policy-options {
    policy-statement red-import {
        from {
            protocol bgp;
```

```
            community red-com;
        }
        then accept;
    }
    policy-statement red-export {
        from protocol bgp;
        then {
            community add red-com;
            accept;
        }
    }
    community red-com members target:20:20;
}
routing-instances {
    red {
        instance-type vrf;
        interface ge-0/0/1.0;
        route-distinguisher 10.250.245.245:100;
        vrf-import red-import;
        vrf-export red-export;
        protocols {
            bgp {
                group to-ce1 {
                    local-address 10.20.250.2;
                    peer-as 100;
                    neighbor 10.20.250.1;
                }
            }
        }
    }
}
```

P0□□ PE1 □ PE2□ □□ IBGP neighbor□ □□□□□. □□ □□□□□□ VPN □□ □□□□(MPLS, LDP □ IGP)□ □□□□ □□□.

□□□ P0

```
[edit]
interfaces {
    so-0/1/0 {
        unit 0 {
            family inet {
                address 10.20.252.1/30;
```

```
            }
            family iso;
            family mpls;
        }
    }
    so-0/2/0 {
        unit 0 {
            family inet {
                address 10.20.251.2/30;
            }
            family iso;
            family mpls;
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 10.250.245.246/32;
            }
            family iso;
            family mpls;
        }
    }
}
routing-options {
    autonomous-system 300;
}
protocols {
    mpls {
        interface so-0/1/0;
        interface so-0/2/0;
    }
    isis {
        interface all;
    }
    ldp {
        interface all;
    }
}
```

PE2□□ □□□ PE1□□ IBGP □□□ □□□□□. VRF □□□ □□□□□ □□ CE2□ □□ EBGP □□□ □□□□□. BGP □□□□ □□□□□ □□□□ VRF □□□□□ □□ □□□□ □□□ VPN □□ □□□□□ □□□□ □□□□ □□ □□ □□□□ □□□□ □□□ □□□□□. □□ □□ CE1□ □□ □□□ □□ □□

□□□□ GOLD1□□□□ □□□ □□□□□. □□ □ SCU □□□ □□□ □□□□ □□□□□. □□□□□, □□□□□□ SCU □□ □□□□□□ □□□□ vt CE □□ □ □□□□□ so-0/0/0 SCU □□ □□□□□□ □□□□□.

□□□ PE2

```
[edit]
interfaces {
    so-0/1/1 {
        unit 0 {
            family inet {
                address 10.20.252.2/30;
            }
            family iso;
            family mpls;
        }
    }
    so-0/0/0 {
        unit 0 {
            family inet {
                accounting {
                    source-class-usage {
                        output;
                    }
                }
                address 10.20.253.1/30;
            }
        }
    }
    vt-4/1/0 {
        unit 0 {
            family inet {
                accounting {
                    source-class-usage {
                        input;
                    }
                }
                address 10.250.71.14/32;
            }
            family iso;
            family mpls;
        }
    }
```

```
}
routing-options {
    autonomous-system 300;
    forwarding-table {
        export inject-customer2-dest-class;
    }
}
protocols {
    mpls {
        interface so-0/1/1;
        interface vt-4/1/0;
    }
    bgp {
        group ibgp {
            type internal;
            local-address 10.250.71.14;
            family inet-vpn {
                unicast;
            }
            neighbor 10.250.245.245;
        }
    }
    isis {
        interface so-0/1/1;
    }
    ldp {
        interface so-0/1/1;
    }
}
routing-instances {
    red {
        instance-type vrf;
        interface so-0/0/0.0;
        interface vt-4/1/0.0;
        route-distinguisher 10.250.71.14:100;
        vrf-import red-import;
        vrf-export red-export;
        protocols {
            bgp {
                group to-ce2 {
                    local-address 10.20.253.1;
                    peer-as 400;
                    neighbor 10.20.253.2;
```

```
                }
            }
        }
    }
}
policy-options {
    policy-statement red-import {
        from {
            protocol bgp;
            community red-com;
        }
        then accept;
    }
    policy-statement red-export {
        from protocol bgp;
        then {
            community add red-com;
            accept;
        }
    }
    policy-statement inject-customer2-dest-class {
        term term-gold1-traffic {
            from {
                route-filter 10.114.1.0/24 exact;
            }
            then source-class GOLD1;
        }
    }
    community red-com members target:20:20;
}
```

□□□ CE2□□ PE2□ □□ EBGP □□□ □□□□ VPN □□□ □□□□□.

□□□ CE2

```
[edit]
interfaces {
    so-0/0/1 {
        unit 0 {
            family inet {
                address 10.20.253.2/30;
            }
```

```
        }
    }
}
routing-options {
    autonomous-system 400;
}
protocols {
    bgp {
        group to-pe2 {
            local-address 10.20.253.2;
            export inject-direct;
            peer-as 300;
            neighbor 10.20.253.1;
        }
    }
}
policy-options {
    policy-statement inject-direct {
        from {
            protocol direct;
        }
        then accept;
    }
}
```

?? ??

SCU? ??? 3 VPN?? ??? ????? ????? ?? ??? ?????.

- show interfaces *interface-name* statistics
- show interfaces source-class *source-class-name interface-name*
- show interfaces *interface-name* extensive (| detail)
- show route extensive (| detail)
- clear interface *interface-name* statistics

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1. SCU? ????? ???? ?? ???? ???? ???? ?? ??? ?????.
2. ?? CE ????? ? ?? CE ????? ?? ???? SCU ?? VPN ??? ?? SCU ???? ?????.

3. ?????? ???????? ???? ???? ???? ??? ??????.

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```
user@pe2> clear interfaces statistics all

    user@pe2> show interfaces so-0/0/0.0 statistics
      Logical interface so-0/0/0.0 (Index 6) (SNMP ifIndex 113)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Source class                            Packets               Bytes
 GOLD1                          0                   0
      Addresses, Flags: Is-Preferred Is-Primary

    user@pe2> show interfaces source-class GOLD1 so-0/0/0.0
    Protocol inet
      Source class                            Packets               Bytes
GOLD1                          0                   0

user@ce1> ping 10.20.253.2 source 10.114.1.1 rapid count 10000

user@scu>  show interfaces source-class GOLD1 so-0/0/0.0
    Protocol inet
      Source class                            Packets               Bytes
GOLD1                      20000             1680000

user@scu>  show interfaces so-0/0/0.0 statistics
  Logical interface so-0/0/0.0 (Index 6) (SNMP ifIndex 113)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Source class                            Packets               Bytes
GOLD1                      20000             1680000
      Addresses, Flags: Is-Preferred Is-Primary
         Destination: 10.20.253/24, Local: 10.20.253.1
```

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SCU? ?? ??? ?? ?? | 594

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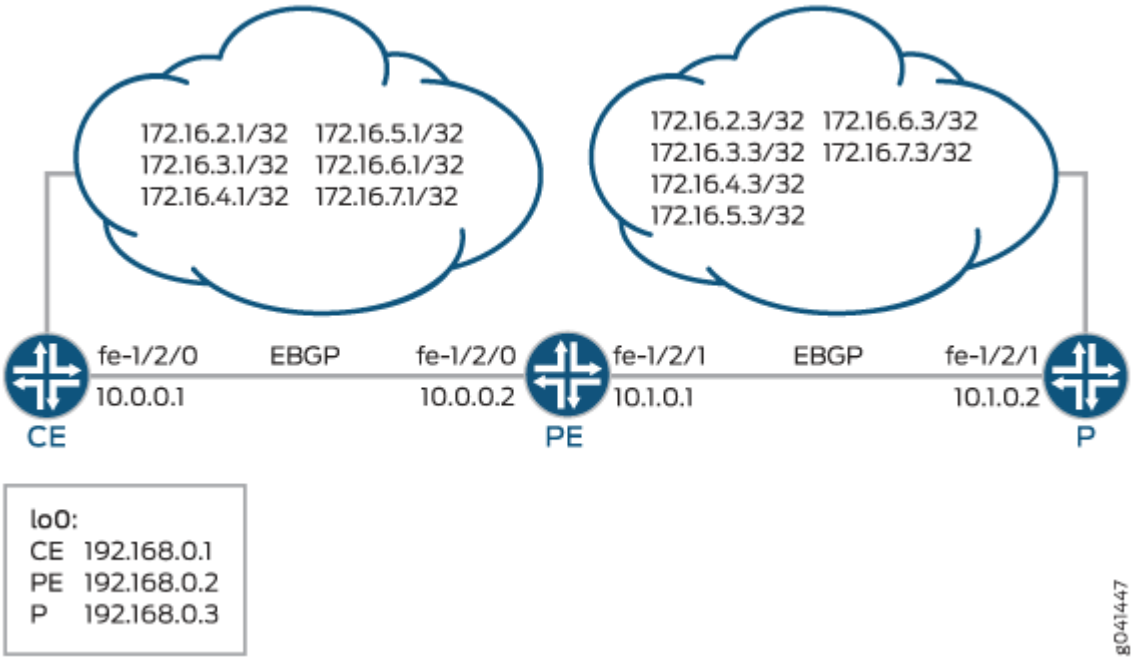
?? 41 ??? 626? ?? ?????? ??????.

□□ 41: SCU □ DCU □□ □□□□



SCU(□□ □□□ □□)□ IP □□ □□ □ IP □□ □□□ □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□. SCU□ □□□□ □□□□□ □□□ □□ □□□□ □ □□□□ □□ □□□ □□ □□□□ □□□ □□□□ □□□ □ □□□□.

DCU□ IP □□ □□□ □□□□ □□□ □□□ □□□□□. DCU□ □□□□ □□ □□□□ □□□□ □□□□□ □□ □□□□ □□ □□□□ □□□ □□□□ □□□ □ □ □□□.

□□□□□ □□(□□□□ P□ □□)□ □□□ □□□□ PE□ fe-1/2/1 □□□□□□□ SCU □□□ □□□□ P□□ □□□□ □□□□ CE□ □□□ □□□□ □□□ □ □□ □□□ source-class-usage input □□□□□. □□ □□□ □□□□□□□ destination-class-usage □□ □□□□ CE□□ □□□□ □□ □□□ □□□ □□□ □□□□ □□□□□ □□□□□.

```
user@PE# show interfaces fe-1/2/1 unit 0 family inet
accounting {
    source-class-usage {
        input;  # tracks traffic destined to customer edge
    }
    destination-class-usage; # tracks traffic destined to provider core
}
address 10.1.0.1/30;
```

□□ □□□□□□□□ □□□□ □□ DCU(□□ □□□ □□)□ □□ SCU□ □□ □□□□□ □□ □ □□ □□□□□□□ □□□□□□ □□□. □□ □□□□ □□□□ □□ □□ □ □□□□□ □□□□□□□□. SCU□□ □□□□□□ □□□□ □□□□ □□□ □□□ □□□□ □ □□□□□□ □□□□□ □□□□ □□□. □□ SCU□ □□□ □ □□□□ □ □□ □□□ □□□□ □□□□□. □□ □□(SA) □ □□ □□(DA) □□. □□, DCU□□ □□ □□ □□ □□□ □□□□.

□□□□ CE□ □□□ □□□□ PE□ fe-1/2/0 □□□□□□□ SCU □□□ □□□ source-class-usage output □□□□□.

```
user@PE# show interfaces fe-1/2/0 unit 0 family inet
accounting {
    source-class-usage {
        output;
    }
}
address 10.0.0.2/30;
```

□□□□ □□□□ □□□□ □□□□ □□ scu_class□□ □□□ □□ □□□ □□□□ □□□□ gold1, gold2 □ gold3 □□□□ □□□□□.

```
user@PE# show policy-options
policy-statement scu_class {
    term gold1 {
        from {
            route-filter 172.16.2.0/24 orlonger;
        }
        then source-class gold1;
    }
    term gold2 {
        from {
            route-filter 172.16.3.0/24 orlonger;
        }
        then source-class gold2;
    }
    term gold3 {
        from {
            route-filter 172.16.4.0/24 orlonger;
        }
        then source-class gold3;
    }
}
```

□□□□□□□ □□□□ □□□□ □□□□ □□ dcu_class□□ □□□ □□ □□□ □□□□ □□□□ silver1, silver2, silver3 □□□□ □□□□□.

```
user@PE# show policy-options
policy-statement dcu_class {
    term silver1 {
        from {
            route-filter 172.16.5.0/24 orlonger;
```

```
        }
        then destination-class silver1;
    }
    term silver2 {
        from {
            route-filter 172.16.6.0/24 orlonger;
        }
        then destination-class silver2;
    }
    term silver3 {
        from {
            route-filter 172.16.7.0/24 orlonger;
        }
        then destination-class silver3;
    }
}
```

□□ □□ □□□ □□□ □□□□ □□□□□.

```
forwarding-table {
    export [ dcu_class scu_class ];
}
```

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"CLI □□ □□" □□□ 629□(□) □□ 41 □□□ 626 □ □□ □□□□□ □□□ □□□□□.

□ □□□□□ "No Link Title" □□□ 631 □□□□ PE□ □□□ □□□□□.

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in this section

- □□ | **629**

□□

CLI □□ □□

□ □□ □□□□ □□□□□□, □□ □□□□ □□□□□ □□□□ □□□□ □□ □□ □□ □□ □□□□□□□□□ □□□□□, □□□□□ □□□□ □□□□□ □ □□□□ □□ □□□□ □□□□ [edit] □ □ □□□□□ □□□□ CLI□ □□□□ □□ □□□□□.

□□ CE

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.1.0.0/30 next-hop 10.0.0.2
set routing-options autonomous-system 100
```

□□□□ PE

```
set interfaces fe-1/2/0 unit 0 family inet accounting source-class-usage output
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 family inet accounting source-class-usage input
set interfaces fe-1/2/1 unit 0 family inet accounting destination-class-usage
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols bgp group ext neighbor 10.1.0.2 peer-as 300
set policy-options policy-statement dcu_class term silver1 from route-filter 172.16.5.0/24
```

```
orlonger
set policy-options policy-statement dcu_class term silver1 then destination-class silver1
set policy-options policy-statement dcu_class term silver2 from route-filter 172.16.6.0/24
orlonger
set policy-options policy-statement dcu_class term silver2 then destination-class silver2
set policy-options policy-statement dcu_class term silver3 from route-filter 172.16.7.0/24
orlonger
set policy-options policy-statement dcu_class term silver3 then destination-class silver3
set policy-options policy-statement scu_class term gold1 from route-filter 172.16.2.0/24 orlonger
set policy-options policy-statement scu_class term gold1 then source-class gold1
set policy-options policy-statement scu_class term gold2 from route-filter 172.16.3.0/24 orlonger
set policy-options policy-statement scu_class term gold2 then source-class gold2
set policy-options policy-statement scu_class term gold3 from route-filter 172.16.4.0/24 orlonger
set policy-options policy-statement scu_class term gold3 then source-class gold3
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options autonomous-system 200
set routing-options forwarding-table export dcu_class
set routing-options forwarding-table export scu_class
```

□□□□ P

```
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.1.0.1
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.0.0.0/30 next-hop 10.1.0.1
set routing-options static route 172.16.2.0/24 discard
set routing-options static route 172.16.3.0/24 discard
```

```
set routing-options static route 172.16.4.0/24 discard
set routing-options static route 172.16.5.0/24 discard
set routing-options static route 172.16.6.0/24 discard
set routing-options static route 172.16.7.0/24 discard
set routing-options autonomous-system 300
```

??? ??

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??? ?????? ?? ? ??? ???? ????????:

1. ??? ???????? ??????.

```
[edit interfaces]
user@PE# set fe-1/2/0 unit 0 family inet accounting source-class-usage output
user@PE# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
user@PE# set fe-1/2/1 unit 0 family inet accounting source-class-usage input
user@PE# set fe-1/2/1 unit 0 family inet accounting destination-class-usage
user@PE# set fe-1/2/1 unit 0 family inet address 10.1.0.1/30
user@PE# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. BGP? ?????.

```
[edit protocols bgp group ext]
user@PE# set type external
user@PE# set export send-direct
user@PE# set neighbor 10.0.0.1 peer-as 100
user@PE# set neighbor 10.1.0.2 peer-as 300
```

3. DCU ??? ?????.

```
[edit policy-options policy-statement dcu_class]
user@PE# set term silver1 from route-filter 172.16.5.0/24 orlonger
user@PE# set term silver1 then destination-class silver1
user@PE# set term silver2 from route-filter 172.16.6.0/24 orlonger
user@PE# set term silver2 then destination-class silver2
```

```
user@PE# set term silver3 from route-filter 172.16.7.0/24 orlonger
user@PE# set term silver3 then destination-class silver3
```

4. SCU ??? ??????.

```
[edit policy-options policy-statement scu_class]
user@PE# set term gold1 from route-filter 172.16.2.0/24 orlonger
user@PE# set term gold1 then source-class gold1
user@PE# set term gold2 from route-filter 172.16.3.0/24 orlonger
user@PE# set term gold2 then source-class gold2
user@PE# set term gold3 from route-filter 172.16.4.0/24 orlonger
user@PE# set term gold3 then source-class gold3
```

5. ??? ????? ??? ??????.

```
[edit routing-options forwarding-table]
user@PE# set export dcu_class
user@PE# set export scu_class
```

?: ?????? ?? ????? ??? ??? ??? ??? ? ? ?? ??? ? ????.

6. (?? ??) ?? ??? ????? ??? ??? ??????.

```
[edit policy-options policy-statement send-direct term 1]
user@PE# set from protocol direct
user@PE# set then accept
```

7. AS(Autonomous System) ??? ??????.

```
[edit routing-options]
user@PE# set autonomous-system 200
```

??

?? ????? show interfaces, show protocols, show policy-options ? show routing-options ??? ????? ??? ??????. ?? ??? ??? ????? ????? ???? ? ?? ???? ????? ???? ????????.

```
user@PE# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            accounting {
                source-class-usage {
                    output;
                }
            }
            address 10.0.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        family inet {
            accounting {
                source-class-usage {
                    input;
                }
                destination-class-usage;
            }
            address 10.1.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@PE# show protocols
bgp {
```

```
    group ext {
        type external;
        export send-direct;
        neighbor 10.0.0.1 {
            peer-as 100;
        }
        neighbor 10.1.0.2 {
            peer-as 300;
        }
    }
}
```

```
user@PE# show policy-options
policy-statement dcu_class {
    term silver1 {
        from {
            route-filter 172.16.5.0/24 orlonger;
        }
        then destination-class silver1;
    }
    term silver2 {
        from {
            route-filter 172.16.6.0/24 orlonger;
        }
        then destination-class silver2;
    }
    term silver3 {
        from {
            route-filter 172.16.7.0/24 orlonger;
        }
        then destination-class silver3;
    }
}
policy-statement scu_class {
    term gold1 {
        from {
            route-filter 172.16.2.0/24 orlonger;
        }
        then source-class gold1;
    }
    term gold2 {
```

```
        from {
            route-filter 172.16.3.0/24 orlonger;
        }
        then source-class gold2;
    }
    term gold3 {
        from {
            route-filter 172.16.4.0/24 orlonger;
        }
        then source-class gold3;
    }
}
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
```

```
user@PE# show routing-options
autonomous-system 200;
forwarding-table {
    export [ dcu_class scu_class ];
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

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- DCU □□□ □□□□□ □□ | 636
- SCU □□□ □□□ □□□□□ □□ | 637

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DCU □□□ □□□□□□ □□

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□□

1. □□□□ P□□ □□ □□□□□ □□□ ping□□□.

```
user@P> ping rapid count 10000000 172.16.0.1

PING 172.16.0.1 (6.0.0.1): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!
```

2. □□□□ PE□□ □□□□□ □□□ □□□ □□□□□□ □□□□□ □□□ □□□□□.

```
user@PE> show interfaces statistics fe-1/2/1.0

  Logical interface fe-1/2/1.0 (Index 108) (SNMP ifIndex 546)
    Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
    Input packets : 251956
    Output packets: 251961
    Protocol inet, MTU: 1500
      Flags: Sendbcast-pkt-to-re, DCU, SCU-in
                                            Packets                Bytes
      Destination class            (packet-per-second)    (bits-per-second)

                          silver1                7460               626640
                                  (                 0) (                 0)
                          silver2               22440              2401416
                                  (               256) (            171963)
                          silver3                9004               756336
                                  (                 0) (                 0)
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.1.0.0/30, Local: 10.1.0.1, Broadcast: 10.1.0.3
```

[illegible]

[illegible].

[illegible] show interfaces destination-class all [illegible].

SCU [illegible]

[illegible]

[illegible] SCU [illegible].

[illegible]

1. [illegible] CE[illegible] ping[illegible].

```
user@CE> ping rapid count 10000000 172.16.0.1

PING 172.16.0.1 (6.0.0.1): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!
```

2. [illegible] PE[illegible].

```
user@PE> show interfaces statistics fe-1/2/0.0

  Logical interface fe-1/2/0.0 (Index 93) (SNMP ifIndex 554)
    Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
    Input packets : 32246
    Output packets: 32245
    Protocol inet, MTU: 1500
```

```
        Flags: Sendbcast-pkt-to-re, Is-Primary, SCU-out
                                                Packets                 Bytes
        Source class                    (packet-per-second)    (bits-per-second)

                              gold1                  8871                745164
                                    (                 259) (             174497)
                              gold2                  1812                152208
                                    (                   0) (                 0)
                              gold3                  5711                479724
                                    (                   0) (                 0)
        Addresses, Flags: Is-Preferred Is-Primary
          Destination: 10.0.0.0/30, Local: 10.0.0.2, Broadcast: 10.0.0.3
```

??

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?? ??? ???? show interfaces source-class all ??? ??? ??? ? ????.

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chapter label in part9

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- ???? ??? ??? ????? ??? ?? ?? ?? | 641
- ?: ??? ???? ???? ??? ??? ????? ??? ??? ??? ?? ?? | 643

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BGP? neighbor?? ??? ?? ? ?? ??? ???? RIB-In ???? ?????. ??? ??? BGP ???? ??? ????, inet.0 ??? ???? ???? ???. ?? ??? ???? ?? ??, ?? ??? ??? ?? ?? ?? ??? ?? ??? ???? ?? ?? ??? ?? ? ????.

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- ??? ??? ??:
- ??? ??? ?????:
- ?? ?? ?? ??

? ?? ?? ?? ??? ????.

```
[edit]
policy-options {
    condition condition-name {
        if-route-exists address table table-name;
    }
}
```

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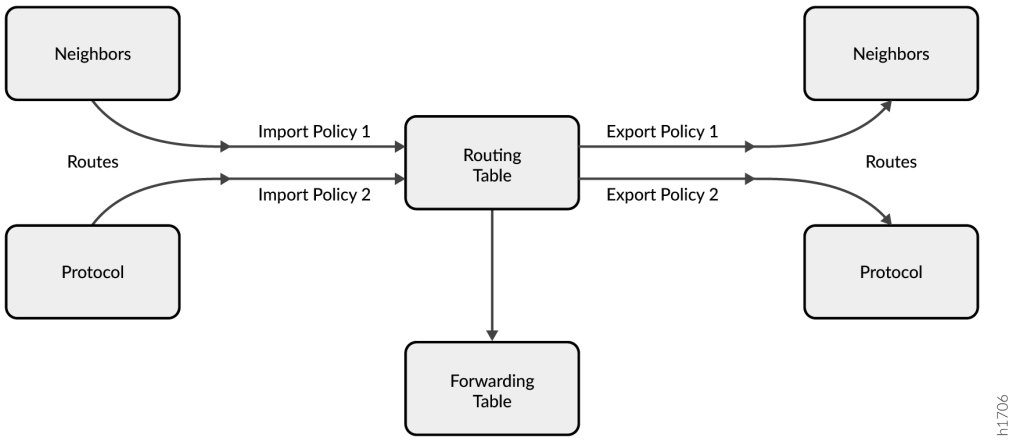
??? ??? ??? ???? ?? ???? ??? ???? ? ?? ???? ???? ??? ? ????. ???? ??? ??? ?? ? ? ?? ??? ??? ???? ? ? ?? ???? ???? ??? ??? ?????. ??? ???? ??? ??? ??? ???? ????, ??? ??????? ???? ????.

□□ 42 □□□ 640□ BGP □□□□ □ □□□□ □□□ □□□□ □□□ □□□□□. □□□□ □□□ show route receive-protocol bgp *neighbor-address* □□□ □□□□ □□□ □□□□ □□□ □□□□□. □□□□ □□□ show route advertising-protocol bgp *neighbor-address* □□□ □□□ □ □□□ □□□□□ □□□ □□□□□.

□□ 42: BGP □□□□ □ □□□□ □□



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□□□ □□□ □□□ □□ □□ □□□ □□□□ □□□ condition □□ □□□ □□□ □□□ □□□□ □□□□ □□□, □□□ BGP □□□ □□□□□ □□□□. □□□ □ □□ □□□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □□□□□ □□□□ □□□ □□□□□.

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1. □□□□ □□□□ □□ condition □□ □□□□.

```
[edit]
policy-options {
    condition condition-name {
        if-route-exists address table table-name;
    }
}
```

2. condition □□ □□□□ □□ □□□ □□□□ □□□□ □□□ □□□□.

```
[edit]
policy-options {
```

```
    policy-statement policy-name {
        term 1 {
            from {
                protocols bgp;
                condition condition-name;
            }
            then {
                accept;
            }
        }
    }
}
```

3. ??? ?????? ??? ???? ???? ?? ??? ???? ??? ??????.

```
[edit]
protocols bgp {
    group group-name {
        export policy-name;
    }
}
```

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> *???? ??? ??? ????? ??? ?? ?? ??*

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????? ?????? AS(Autonomous System)?? ?? ???? ?? ? ?? ??? ???????. ?????? BGP? ???? ??? AS?? ?? ?? ? ???? ??? ?? BGP(IBGP)?? ???. ?????? BGP? ???? ?? ?? AS?? ?? ??? ????, ?? ?? BGP(EBGP)?? ???.

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?????? ??? ?? ??? BGP ??? ???? ??? ??????? ???? ??? ??? ??? ??? ???? ? ?? ?????? ???? ?? ??? ??? ? ? ???.

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- **Non-aggregated route advertisements**—□□□ □□ □□□ □ □□□ □□□ ISP□ □□ □□□□ □□ □□□ □ □□□□. □□□ □□□ □ □□□ □□□ □□□□ □ □□□□ □□□□ □□□. □□ □□ □□□□ □□□□□ □□□ □□ □□□ □□□□, □□ □□ □□□□ □□□□ □□ BGP □□□ □□□□ □□□□ □□□.
- **BGP route manipulation**—□□□ □□ □□□□ BGP □□□ □□□□ □□□ □□□□ □□□□ □□□ □□□□ □□□□ □□ □ □□□□.
- **BGP route hijacking**—BGP □□□ □□□ □□□□ □□□ □□□□ □□ □□□ □□□ □□□□□ □□□□ □□□ □□□□ □□□□ □□ □□□ □□□ □□ □□□ □□□□ □□□ □□□□□ □□ □□□□□□ □□ □□ □□□□□ □□□□ □□□□□ □□ □ □□□□.
- **BGP denial of service (DoS)**—□□□ □□ □□□□ □□□□□ □□□□ □□ BGP □□□□ □□□□□ □□ □□ □□□ □□□ □□□ □□ BGP □□□□ □□□□ □□□ □□, □□□ BGP □□ □□□ □□□□ □□□ □□□ □□□ □ □□□□.

□□□□ □□□ □□□ □□□ □□□ □□ □□□ □□□□ □ □□□ □ □□□□. □□□ □□ □□□□□ □□□□□ □□ □□, □□ □□□□□ □□□ □□□□ □□□ □□□□ □□ □□□ □□□ □ □□□□. □□ □□□□ EBGP □□□□□□ □□□□ □□□□ □□□□ □□□ □□□ □□□□□□.

AS□ □□□ □□ □ □□□ □□□□□ □□ □□ □□□ □□□ □□□□. AS□ □□ □□□ □□□□ □□□□□ □ □□ □□ AS □□□□ □□ AS □□□ □ □ □□□ □. □□□ □□ AS□ □□ □□□□ □□□ □□□ □□ □□□□ □□□ □□ □ □□□ □□ □□ □□□ □□□□ □□□ □□ □□□ □□ □□□□□. □□□ □□□ □□□□ □□ □ □□□ □□□ BGP □□□ neighbor□ □□□□ □□, □□ neighbor□□ □□□□ □□, □□□ □□□ AS □□ □□□□ □□□ □□□ □□□ □□□□ □□□ □□□□ □□□.

BGP □□□□ □□□ □□□ □□□□□ AS □□ □□□ □□□□ □□□□□ □□□ □□□ □□□□ □ □□□□ □□□ □□□ □ □□ □□□ □□□ □□□□. □□ □□ □□□□ □□□ □□□ □□□□ □□ □□□ □□□□ □□□ □□□□□ □□□□□. □□□□ □□□ AS-Path□ □□□, □□ □ □, community □, □□□ □□, □□ address family □□ □□□ □ □□□□.

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- ?? | 643
- ?? | 646
- ?? | 656

? ?? BGP ???? ??? ???? ??? ??? ? ???? ??? ??? ???? ??? ?????.

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- M ??? Multiservice ?? ???, MX ??? 5G ???? ??? ??? ?? T ??? ?? ???
- Junos OS ??? 9.0 ??

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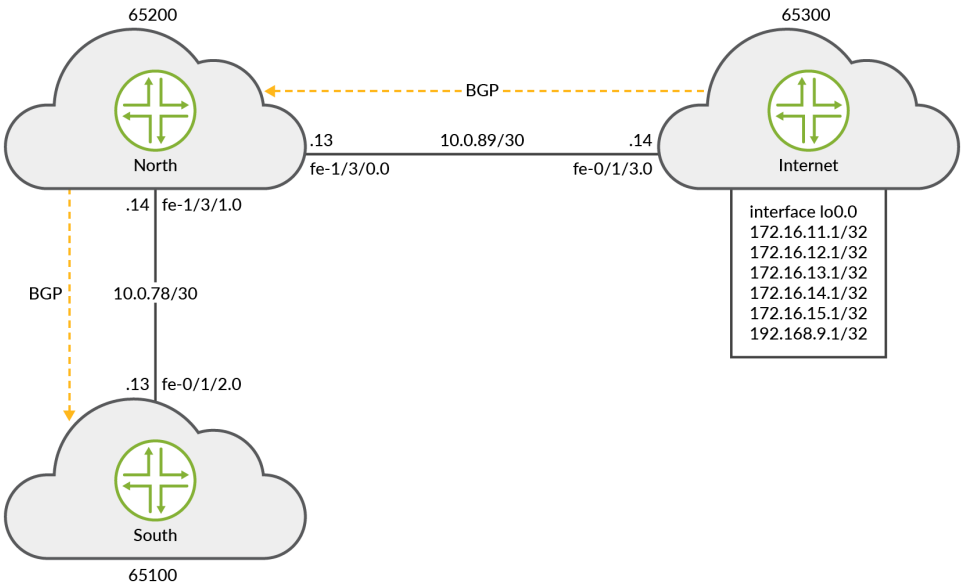
? ???? ? ?? ?? AS(Autonomous System) ? ??? 3?? BGP ????? ?? ? ???? ????. ???? ???? ??? ??? Internet?? lo0.0 ??? ??????(172.16.11.1/32, 172.16.12.1/32, 172.16.13.1/32, 172.16.14.1/32, ? 172.16.15.1/32)? ??? ?? ?? ?? ???, ?? ??? ??(192.168.9.1/32)? ??? ID? ??????. ? ?? ?? ?? BGP? ?????? Internet? ??? ???? BGP ??? ??? ???? ????????, North? ??????.

North ? South ???? 10.0.89.12/30 ? 10.0.78.12/30 ????? ????, ??? ??? ??? 192.168.7.1 ? 192.168.8.1? ?? ??????.

?? 43 ??? 644 ? ???? ???? ?????? ??????.

□□ 43: □□□□ □□□ □□



□□□ North□ □□□ □□□□□ □□□ South□□ □□□□ 172.16.0.0/16 BGP □□□ □□□□□. □□□ □□□ □□□ □□□□ □□□□ □□□ □□ □ □□□ □ □□□□. □□ □□ 172.16.11.1/32 □□□ □□ □□, □□□ North□ □□ □□ □□□ □□□□. 172.16.11.1 □□□ □□□ □□□ □□ □ □□□□ Tier 1 □□ □□□ □□□□□□ □□ □□□ □□□□ □□□ □□□ □ □□□□.

□□□ South□ 6□□ □□ □□□ □□□□□ □□□ □□□□ □□ □□□ □□□ □□ □□ □□(172.16.11.1/32)□□ □□□□ □□□.

□□□□□, □ □□ □□ □□ □□□ □□□□□:

- North□□□ □□ 172.16/16 □□□□ □□□□. □□ inet.0 □□□ □□□(□ □□□□□ 172.16.11.1/32)□ □□ □□□ □□ □□□□ 0/0□ South□ □□□□.
- South□□□ □□□ □ □□□ □□□□ □□ □□□ 172.16.11.1/32 □□□ □□□□ □□□□□. □□ □□ □□□ □□□□□. South□ □□ □□□ □ □□ □□□□ □□□ □ □□ □□□ □□□□□ □ □□□□. □□□□□ □□□□ South□ □□ □□□ □□□ □□ □□ □□□□ □□□ □□□□.

□ □□ □□ □□□ North□ □□□□ □□□ □□□□□:

```
user@North# show policy-options
policy-statement conditional-export-bgp {
    term prefix_11 {
        from {
            protocol bgp;
            route-filter 172.16.0.0/16 orlonger;
        }
        then accept;
```

```
    }
    term conditional-default {
        from {
            route-filter 0.0.0.0/0 exact;
            condition prefix_11;
        }
        then accept;
    }
    term others {
        then reject;
    }
}
condition prefix_11 {
    if-route-exists {
        172.16.11.1/32;
        table inet.0;
    }
}
```

□□□ □□□□ □□□ □□□ □□□ □□ □□□ □ □□□□: 0/0□ □□□□, 172.16.11.1/32□ □□□□ 0/0 □□□□ □□□□. □□□ 172.16.11.1/32□ □□□□ □□□ 0/0□ □□□ □□□□ □□□□□.

□ □□ □□ □□□ South□ □□□□ □□□ □□□□□:

```
user@South# show policy-options
policy-statement import-selected-routes {
    term 1 {
        from {
            rib inet.0;
            neighbor 10.0.78.14;
            route-filter 0.0.0.0/0 exact;
            route-filter 172.16.11.1/32 exact;
        }
        then accept;
    }
    term 2 {
        then reject;
    }
}
```

□ □□□ South□ □□□□ □□ □□□ □□ □ □□ □□□□□. North□ □□□□ □□□ Internet□□ □□□ □□ □□□ □□□□, South□ □□□□ □□□ □ □□ □ □□□ □□□□ □□□□□.

□□□□ □□(□□□□ □□ □□)□ □□□ □□□□, □□□ □□□□ □□□□ □□, □□ □□□ □□ □□□ □□□□ □□ □□ □□□, Junos OS□□ □ □□□□ □□ □ □□□ □ □□□□ □□□□□ □□ □□□□ □ □□□□□. □ □□□ □□□ □□ □□ □□□ □□□□ □□□ □ □□□□. □□□ □□□□ □□□ □□□ □□□□□. □□□ □□□□□ □□□□ □□□□ □□□□□ □□□□ □□ □□ □□□□ □□□ □□□□□□ □□□□ □□□□ □□□ □□ □□□ □□□ □□□ □□□□ □□ □ □□□□.

□□□ □□□ show route receive-protocol bgp *neighbor-address* hidden □□□ □□□□ □ □ □□□□. □□ □□ □□□ □□□ [edit protocols bgp]□□ [edit protocols bgp group *group-name*]□□ □□□□ keep all | none□□ □□□□ □□□ □□□□□ □□□□□ □□□ □ □□□□.

BGP □□ □□ □□□ □□□ □□□□:

- □□□□□ AS □□□ □□□□ □□□ □□□□ BGP□□ □□□ □□ □□□ □□□□□. (AS □□□ □□ AS□ □□□□□.)
- keep all □□ □□□□, BGP□□ □□□ □□ □□(AS □□ □ □□ AS □□□ □□)□ □□□□□.
- keep none □□ □□□□, BGP□ □□□□□ □□□□□ □□□□ □□ □□ □□ □□□ □□□ □□□ □□□ □□□□. □ □□ □□□□ □□□□ □□□ □□□□, Junos OS□ □□□ □□□□ □□ □□□ □□ □□□□□.

keep all □□ keep none□(□) □□□□ □□□ □□ □□□□□ □□□□, □□ □□□□ □□□□ □□□□ □□□ □□□□ □□□ □□□□□. □ □□□ □□ □□□ □ □ □□□□ □□□□. □□□ □□□□ □□□ □□□□□ show bgp neighbor□□□ □□□□ Peer supports Refresh capability□(□) □□□□□□.

□□: keep all □□ keep none□(□) □□□□ □□□ □□ □□□□ □□□□ □□□, □□□ BGP □□□ □□ □□□□□(□□□).

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??? Internet

```
set interfaces lo0 unit 0 family inet address 172.16.11.1/32
set interfaces lo0 unit 0 family inet address 172.16.12.1/32
set interfaces lo0 unit 0 family inet address 172.16.13.1/32
set interfaces lo0 unit 0 family inet address 172.16.14.1/32
set interfaces lo0 unit 0 family inet address 172.16.15.1/32
set interfaces lo0 unit 0 family inet address 192.168.9.1/32
set interfaces fe-0/1/3 unit 0 family inet address 10.0.89.14/30
set protocols bgp group toNorth local-address 10.0.89.14
set protocols bgp group toNorth peer-as 65200
set protocols bgp group toNorth neighbor 10.0.89.13
set protocols bgp group toNorth export into-bgp
set policy-options policy-statement into-bgp term 1 from interface lo0.0
set policy-options policy-statement into-bgp term 1 then accept
set routing-options router-id 192.168.9.1
set routing-options autonomous-system 65300
```

??? North

```
set interfaces fe-1/3/1 unit 0 family inet address 10.0.78.14/30
set interfaces fe-1/3/0 unit 0 family inet address 10.0.89.13/30
set interfaces lo0 unit 0 family inet address 192.168.8.1/32
set protocols bgp group toInternet local-address 10.0.89.13
set protocols bgp group toInternet peer-as 65300
set protocols bgp group toInternet neighbor 10.0.89.14
set protocols bgp group toSouth local-address 10.0.78.14
set protocols bgp group toSouth export conditional-export-bgp
set protocols bgp group toSouth peer-as 65100
set protocols bgp group toSouth neighbor 10.0.78.13
set policy-options policy-statement conditional-export-bgp term prefix_11 from protocol bgp
set policy-options policy-statement conditional-export-bgp term prefix_11 from route-filter
172.16.0.0/16 orlonger
set policy-options policy-statement conditional-export-bgp term prefix_11 then accept
set policy-options policy-statement conditional-export-bgp term conditional-default from route-
filter 0.0.0.0/0 exact
set policy-options policy-statement conditional-export-bgp term conditional-default from
condition prefix_11
set policy-options policy-statement conditional-export-bgp term conditional-default then accept
set policy-options policy-statement conditional-export-bgp term others then reject
set policy-options condition prefix_11 if-route-exists 172.16.11.1/32
```

```
set policy-options condition prefix_11 if-route-exists table inet.0
set routing-options static route 0/0 reject
set routing-options router-id 192.168.8.1
set routing-options autonomous-system 65200
```

??? South

```
set interfaces fe-0/1/2 unit 0 family inet address 10.0.78.13/30
set interfaces lo0 unit 0 family inet address 192.168.7.1/32
set protocols bgp group toNorth local-address 10.0.78.13
set protocols bgp group toNorth import import-selected-routes
set protocols bgp group toNorth peer-as 65200
set protocols bgp group toNorth neighbor 10.0.78.14
set policy-options policy-statement import-selected-routes term 1 from neighbor 10.0.78.14
set policy-options policy-statement import-selected-routes term 1 from route-filter
172.16.11.1/32 exact
set policy-options policy-statement import-selected-routes term 1 from route-filter 0.0.0.0/0
exact
set policy-options policy-statement import-selected-routes term 1 then accept
set policy-options policy-statement import-selected-routes term 2 then reject
set routing-options router-id 192.168.7.1
set routing-options autonomous-system 65100
```

???? ??? ?? ??

??? ??

?? ?? ?? ????? ???? ???? ???? ??????. CLI ?? ?? ???? Junos OS CLI ???? ????? *?? ?????? CLI ???? ??*? ????????.

???? ??? ?? ??:

1. ??? ? ? ???? ??? ????? ??? ??????? ??????.

   ```
   Router Internet
   [edit interfaces]
   user@Internet# set fe-0/1/3 unit 0 family inet address 10.0.89.14/30
   ```

   ```
   Router North
   [edit interfaces]
   ```

```
user@North# set fe-1/3/1 unit 0 family inet address 10.0.78.14/30
user@North# set fe-1/3/0 unit 0 family inet address 10.0.89.13/30
```

```
Router South
[edit interfaces]
user@South# set fe-0/1/2 unit 0 family inet address 10.0.78.13/30
```

2. □□□ Internet□ □□□ □□□□□ □□ □□ □□ □□□□ □□□ South□ □□□ □□□□ □□□□ □□ Internet□□ □□□ BGP □□□ □□□□□ □□, □□□ ID□ □□□ □□ □□(192.168.9.1/32)□ □□□□□.

```
Router Internet
[edit interfaces lo0 unit 0 family inet]
user@Internet# set address 172.16.11.1/32
user@Internet# set address 172.16.12.1/32
user@Internet# set address 172.16.13.1/32
user@Internet# set address 172.16.14.1/32
user@Internet# set address 172.16.15.1/32
user@Internet# set address 192.168.9.1/32
```

□□ □□□ North □ South□ □□□ □□□□□ □□□ □□□□□.

```
Router North
[edit interfaces lo0 unit 0 family inet]
user@North# set address 192.168.8.1/32
```

```
Router South
[edit interfaces lo0 unit 0 family inet]
user@South# set address 192.168.7.1/32
```

3. □□□ North□ □□□□□ □□□ South□ □□ □□ □□□ □□□□□.

```
[edit routing-options]
user@North# set static route 0/0 reject
```

4. ??? North? ??? ?????? ????? ????? ?? ??? ??????.

```
[edit policy-options condition prefix_11]
user@North# set if-route-exists 172.16.11.1/32
user@North# set if-route-exists table inet.0
```

5. ??? Internet? North?? ?????? ????? ??(into-bgp ? conditional-export-bgp)? ????? BGP? ??? ??????.

?: ????? ?? ? ?? prefix_11("4" ??? 650???? ??)? ???????.

```
Router Internet
[edit policy-options policy-statement into-bgp ]
user@Internet# set term 1 from interface lo0.0
user@Internet# set term 1 then accept
```

```
Router North
[edit policy-options policy-statement conditional-export-bgp]
user@North# set  term prefix_11 from protocol bgp
user@North# set  term prefix_11 from route-filter 172,16.0.0/16 orlonger
user@North# set  term prefix_11 then accept
user@North# set  term conditional-default from route-filter 0.0.0.0/0 exact
user@North# set  term conditional-default from condition prefix_11
user@North# set  term conditional-default then accept
user@North# set term others then reject
```

6. ??? South?? ????? ??(import-selected-routes)? ????? ??? North? ?? ????? ?? ???? ???? ????? ??????.

```
[edit policy-options policy-statement import-selected-routes ]
user@South# set term 1 from neighbor 10.0.78.14
user@South# set term 1 from route-filter 172.16.11.1/32 exact
user@South# set term 1 from route-filter 0.0.0.0/0 exact
user@South# set term 1 then accept
user@South# set term 2 then reject
```

7. ??? ? ?? BGP? ????? AS(Autonomous System) ? ????? ??? ???????.

□: □□□ □□□ □□□□□ □□ □ BGP □□□ □□□ □□□□ □ □□□□ □□□ □□□□□ □□□□.

```
Router Internet
[edit protocols bgp group toNorth]
user@Internet# set local-address 10.0.89.14
user@Internet# set peer-as 65200
user@Internet# set neighbor 10.0.89.13
user@Internet# set export into-bgp
```

```
Router North
[edit protocols bgp group toInternet]
user@North# set local-address 10.0.89.13
user@North# set peer-as 65300
user@North# set neighbor 10.0.89.14
```

```
[edit protocols bgp group toSouth]
user@North# set local-address 10.0.78.14
user@North# set peer-as 65100
user@North# set neighbor 10.0.78.13
user@North# set export conditional-export-bgp
```

```
Router South
[edit protocols bgp group toNorth]
user@South# set local-address 10.0.78.13
user@South# set peer-as 65200
user@South# set neighbor 10.0.78.14
user@South# set import import-selected-routes
```

8. □□□ □ □□ □□ □□□ ID □ AS(Autonomous System) □□□ □□□□□.

□: □ □□□ □□□ ID□ □□□□ lo0.0 □□□□□□□ □□□ □□□ □□□□ □□□□□.

```
Router Internet
[edit routing options]
```

```
user@Internet# set router-id 192.168.9.1
user@Internet# set autonomous-system 65300
```

```
Router North
[edit routing options]
user@North# set router-id 192.168.8.1
user@North# set autonomous-system 65200
```

```
Router South
[edit routing options]
user@South# set router-id 192.168.7.1
user@South# set autonomous-system 65100
```

□□

□□ □□□□ show interfaces, show protocols bgp, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

□□□□ Internet

```
user@Internet# show interfaces
fe-0/1/3 {
    unit 0 {
        family inet {
            address 10.0.89.14/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 172.16.11.1/32;
            address 172.16.12.1/32;
            address 172.16.13.1/32;
            address 172.16.14.1/32;
            address 172.16.15.1/32;
            address 192.168.9.1/32;
        }
```

```
    }
}
```

```
user@Internet# show protocols bgp
group toNorth {
    local-address 10.0.89.14;
    export into-bgp;
    peer-as 65200;
    neighbor 10.0.89.13;
}
```

```
user@Internet# show policy-options
policy-statement into-bgp {
    term 1 {
        from interface lo0.0;
        then accept;
    }
}
```

```
user@Internet# show routing-options
router-id 192.168.9.1;
autonomous-system 65300;
```

???? North

```
user@North# show interfaces
fe-1/3/1 {
    unit 0 {
        family inet {
            address 10.0.78.14/30;
        }
    }
}
fe-1/3/0 {
    unit 0 {
        family inet {
            address 10.0.89.13/30;
        }
```

```
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.8.1/32;
        }
    }
}
```

```
user@North# show protocols bgp
group toInternet {
    local-address 10.0.89.13;
    peer-as 65300;
    neighbor 10.0.89.14;
}
group toSouth {
    local-address 10.0.78.14;
    export conditional-export-bgp;
    peer-as 65100;
    neighbor 10.0.78.13;
}
```

```
user@North# show policy-options
policy-statement conditional-export-bgp {
    term prefix_11 {
        from {
            protocol bgp;
            route-filter 172.16.0.0/16 orlonger;
        }
        then accept;
    }
    term conditional-default {
        from {
            route-filter 0.0.0.0/0 exact;
            condition prefix_11;
        }
        then accept;
    }
    term others {
```

```
        then reject;
    }
}
condition prefix_11 {
    if-route-exists {
        172.16.11.1/32;
        table inet.0;
    }
}
```

```
user@North# show routing-options
static {
    route 0.0.0.0/0 reject;
}
router-id 192.168.8.1;
autonomous-system 65200;
```

???? South

```
user@South# show interfaces
fe-0/1/2 {
    unit 0 {
        family inet {
            address 10.0.78.13/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.7.1/32;
        }
    }
}
```

```
user@South# show protocols bgp
bgp {
    group toNorth {
        local-address 10.0.78.13;
```

```
        import import-selected-routes;
        peer-as 65200;
        neighbor 10.0.78.14;
    }
}
```

```
user@South# show policy-options
policy-statement import-selected-routes {
    term 1 {
        from {
            neighbor 10.0.78.14;
            route-filter 172.16.11.1 exact;
            route-filter 0.0.0.0/0 exact;
        }
        then accept;
    }
    term 2 {
        then reject;
    }
}
```

```
user@South# show routing-options
router-id 192.168.7.1;
autonomous-system 65100;
```

□□□ □□□□ □□ □□, □□ □□□□□ commit□(□) □□□□□□.

□□

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- □□□□ □□□ □□ □□ □□(□□) | **662**

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BGP □□

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BGP □□□ □□□ □ □ □□□ □□□□□□□ □□□□□□.

□□

□□ □□□□□ show bgp neighbor *neighbor-address* □□□ □□□□□□.

1. □□□ Internet□□ BGP □□□ □□□□□ □□□ North□ neighbor□□ □□□□□□.

```
user@Internet> show bgp neighbor 10.0.89.13
Peer: 10.0.89.13+179 AS 65200    Local: 10.0.89.14+56187 AS 65300
  Type: External    State: Established    Flags: [ImportEval Sync]
  Last State: OpenConfirm   Last Event: RecvKeepAlive
  Last Error: None
  Export: [ into-bgp ]
  Options: [Preference LocalAddress PeerAS Refresh]
  Local Address: 10.0.89.14 Holdtime: 90 Preference: 170
  Number of flaps: 0
  Peer ID: 192.168.8.1     Local ID: 192.168.9.1       Active Holdtime: 90
  Keepalive Interval: 30         Group index: 0    Peer index: 0
  BFD: disabled, down
  Local Interface: fe-0/1/3.0
  NLRI for restart configured on peer: inet-unicast
  NLRI advertised by peer: inet-unicast
  NLRI for this session: inet-unicast
  Peer supports Refresh capability (2)
  Stale routes from peer are kept for: 300
  Peer does not support Restarter functionality
  NLRI that restart is negotiated for: inet-unicast
  NLRI of received end-of-rib markers: inet-unicast
  NLRI of all end-of-rib markers sent: inet-unicast
  Peer supports 4 byte AS extension (peer-as 65200)
  Peer does not support Addpath
  Table inet.0 Bit: 10000
    RIB State: BGP restart is complete
    Send state: in sync
    Active prefixes:              0
```

```
    Received prefixes:            0
    Accepted prefixes:            0
    Suppressed due to damping:    0
    Advertised prefixes:          6
  Last traffic (seconds): Received 9    Sent 18   Checked 28
  Input messages:  Total 12     Updates 1       Refreshes 0     Octets 232
  Output messages: Total 14     Updates 1       Refreshes 0     Octets 383
  Output Queue[0]: 0
```

2. □□□ North□□ BGP □□□ □□□□ □□□ Internet□ neighbor□□ □□□□□.

```
user@North> show bgp neighbor 10.0.89.14
Peer: 10.0.89.14+56187 AS 65300  Local: 10.0.89.13+179 AS 65200
  Type: External    State: Established    Flags: [ImportEval Sync]
  Last State: OpenConfirm   Last Event: RecvKeepAlive
  Last Error: None
  Options: [Preference LocalAddress PeerAS Refresh]
  Local Address: 10.0.89.13 Holdtime: 90 Preference: 170
  Number of flaps: 0
  Peer ID: 192.168.9.1     Local ID: 192.168.8.1       Active Holdtime: 90
  Keepalive Interval: 30         Group index: 0    Peer index: 0
  BFD: disabled, down
  Local Interface: fe-1/3/0.0
  NLRI for restart configured on peer: inet-unicast
  NLRI advertised by peer: inet-unicast
  NLRI for this session: inet-unicast
  Peer supports Refresh capability (2)
  Stale routes from peer are kept for: 300
  Peer does not support Restarter functionality
  NLRI that restart is negotiated for: inet-unicast
  NLRI of received end-of-rib markers: inet-unicast
  NLRI of all end-of-rib markers sent: inet-unicast
  Peer supports 4 byte AS extension (peer-as 65300)
  Peer does not support Addpath
  Table inet.0 Bit: 10001
    RIB State: BGP restart is complete
    Send state: in sync
    Active prefixes:              6
    Received prefixes:            6
    Accepted prefixes:            6
    Suppressed due to damping:    0
    Advertised prefixes:          0
```

```
  Last traffic (seconds): Received 14   Sent 3    Checked 3
  Input messages:  Total 16     Updates 2       Refreshes 0     Octets 402
  Output messages: Total 15     Updates 0       Refreshes 0     Octets 348
  Output Queue[0]: 0
```

□ □□□□ □□ □□□ □□□□ BGP □□□ □□□□□□ □□□□□:

- **Peer**-□□ AS □□□ □□□ □□□ □□□□□.
- **Local**-□□ AS □□□ □□□ □□□ □□□□□.
- **State**-□□ **Established**□□ □□□□□. □□□ □□□ □□□ □□ □□□□ `show bgp neighbor`□(□) □□□ □□ □□□□ □ □□□ □□□ □□□□□.

□□□□□, □□□ North □ South□ □□ □□ □□□ □□□□□ □□□□□.

□□

BGP □□□ □□□ □ □ □□□ □□□□□.

□□□ Internet□□ □□□ North□□ □□□ □□ □□

□□

□□□ Internet□□ □□□ □□□ □□□ North□□ □□□□□ □□□□□.

□□

1. □□□ Internet□ □□ □□□□ `show route advertising-protocol bgp` *neighbor-address* □□□ □□□□□.

```
user@Internet> show route advertising-protocol bgp 10.0.89.13
inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.11.1/32            Self                                    I
* 172.16.12.1/32            Self                                    I
* 172.16.13.1/32            Self                                    I
* 172.16.14.1/32            Self                                    I
* 172.16.15.1/32            Self                                    I
* 192.168.9.1/32            Self                                    I
```

□□□□ □□□ Internet□ □□□ North□ □□ 172.16.11.1/32, 172.16.12.1/32, 172.16.13.1/32, 172.16.14.1/32, 172.16.15.1/32, □ 192.168.9.1/32(□□□ ID□ □□□□ □□□ □□)□ □□□□□ □□□□□.

2. □□□ North□ □□ □□□□ `show route receive-protocol bgp` *`neighbor-address`* □□□ □□□□□.

```
user@North> show route receive-protocol bgp 10.0.89.14
inet.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.11.1/32            10.0.89.14                              65300 I
* 172.16.12.1/32            10.0.89.14                              65300 I
* 172.16.13.1/32            10.0.89.14                              65300 I
* 172.16.14.1/32            10.0.89.14                              65300 I
* 172.16.15.1/32            10.0.89.14                              65300 I
* 192.168.9.1/32            10.0.89.14                              65300 I
```

□□□□ □□□ North□ □□□ Internet□ □□□□ □□ □□□ □□□□□ □□□□□.

□□

□□□ Internet□ □□□ □□□□ □□□ North□ □□□ □□□□ □□□□□ □□□□□□□.

□□□ North□□ □□□ South□□ □□□ □□ □□

□□

□□□ Internet□□ □□□ □□□ □□ □□ □□□ □□□ North□□ □□□ South□ □□□□□ □□□□□.

□□

1. □□□ North□ □□ □□□□ `show route 0/0 exact` □□□ □□□□□.

```
user@North> show route 0/0 exact
inet.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[Static/5] 00:10:22
                       Reject
```

□□□□ □□□ North□ □□□ □□□ □ □□ □□ □□(0.0.0.0/0)□ □□□ □□□□□.

2. ??? North? ?? ????? show route advertising-protocol bgp *neighbor-address* ??? ??????.

```
user@North> show route advertising-protocol bgp 10.0.78.13
inet.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 0.0.0.0/0               Self                                    I
* 172.16.11.1/32             Self                                 65300 I
* 172.16.12.1/32             Self                                 65300 I
* 172.16.13.1/32             Self                                 65300 I
* 172.16.14.1/32             Self                                 65300 I
* 172.16.15.1/32             Self                                 65300 I
```

????? ??? North? ??? Internet?? ????? ?? ?? ? 172.16.11.1/32 ??? ????? ??? South?? ?? ?? ??? ??? ? ? ?????? ??????.

???? ??? ?? BGP ????? ?? ??

??

BGP ????? ??? ??? ????? ?????? ?????? ??????.

??

??? North?? ?? ?? ??? ?????? 172.16.11.1/32 ??? ??? ????? ??????? ????? ??? South? ????? ??? ??? ??? ??.

?? ????? show route receive-protocol bgp *neighbor-address* ??? ??????.

```
user@South> show route receive-protocol bgp 10.0.78.14
inet.0: 10 destinations, 11 routes (6 active, 0 holddown, 4 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 0.0.0.0/0               10.0.78.14                              65200 I
* 172.16.11.1/32          10.0.78.14                              65200 65300 I
```

????? ??? South?? BGP ????? ??? ?????, ??? North?? 0.0.0.0/0? ?? ?? ?? ? ??? Internet?? 172.16.11.1/32 ??? ??? South? ??? ????? ??????? ??????.

??

??? BGP ????? ?? ??? ????? ??? ?????? ??????.

□□□ North□□ □□□ South□ □□□ □□□□ □□

□□

□□□□ Internet□ 172.16.11.1/32 □□□ □□□□ □□ □, □□□□ North□ □□ 0/0 □□□ □□□ □□□□ □□□□□.

□□

1. □□□ □□□□□□ 172.16.11.1/32 □□□ □□□□□□ □□□□ Internet□ 172.16.11.1/32 □□ □□□ □□□□□.

```
[edit interfaces lo0 unit 0 family inet]
user@Internet# deactivate address 172.16.11.1/32
user@Internet# commit
```

2. □□□ North□ □□ □□□□ show route advertising-protocol bgp *neighbor-address* □□□ □□□□□.

```
user@North> show route advertising-protocol bgp 10.0.78.13
inet.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.12.1/32            Self                                   65300 I
* 172.16.13.1/32            Self                                   65300 I
* 172.16.14.1/32            Self                                   65300 I
* 172.16.15.1/32            Self                                   65300 I
```

□□□□ □□□ North□ □□□ South□ □□ □□□ □□□□ □□□□ □□ □□□□□. □□□ 172.16.11.1/32 □□□ □□□□ □□ □ □□□□ □□ □□□.

3. □□□□ Internet□ □□□ □□□□□□□ 172.16.11.1/32 □□□ □□ □□□□□□.

```
[edit interfaces lo0 unit 0 family inet]
user@Internet# activate address 172.16.11.1/32
user@Internet# commit
```

□□□□ □□□ □□ □□ □□(□□)

□□

□□□ South□□ □□□ □□□□ □□□ □□ □□□ □□ □□□ □□□□□.

□: □ □□□ □□□ □□ □□□ □□ □ □□ □□□ □□ □□□ □□□ □□□□□.

□□

□□□ South□ □□□ □□□ □□□□□ □□□ □□□ □□□□□:

- show route receive-protocol bgp *neighbor-address* □□□ hidden □□□ □□□□□.
- □□□□ □□□ □□□□□□□.

1. □□ □□□□ show route receive-protocol bgp *neighbor-address* hidden □□□ □□□□ □□□ □□□ □□□□□.

```
user@South> show route receive-protocol bgp 10.0.78.14 hidden
inet.0: 10 destinations, 11 routes (6 active, 0 holddown, 4 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  172.16.12.1/32             10.0.78.14                           65200 65300 I
  172.16.13.1/32             10.0.78.14                           65200 65300 I
  172.16.14.1/32             10.0.78.14                           65200 65300 I
  172.16.15.1/32             10.0.78.14                           65200 65300 I
```

   □□□□ □□□ South□ □□□□ □□(172.16.12.1/32, 172.16.13.1/32, 172.16.14.1/32, □ 172.16.15.1/32)□□ □□ □ □□□ □□□ □□□□□.

2. [edit protocols bgp group *group-name*] □□ □□□□ deactivate import□□ □□□□ BGP □□□□ □□□ □□□□□□□.

```
[edit protocols bgp group toNorth]
user@South# deactivate import
user@South# commit
```

3. show route receive-protocol bgp *neighbor-address* □□ □□ □□□ □□□□ □□□□ □□□ □□□□□ □ □□□ □□□□□.

```
user@South> show route receive-protocol bgp 10.0.78.14
inet.0: 10 destinations, 11 routes (10 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 0.0.0.0/0                10.0.78.14                           65200 I
* 172.16.11.1/32           10.0.78.14                           65200 65300 I
* 172.16.12.1/32           10.0.78.14                           65200 65300 I
* 172.16.13.1/32           10.0.78.14                           65200 65300 I
```

```
* 172.16.14.1/32          10.0.78.14                          65200 65300 I
* 172.16.15.1/32          10.0.78.14                          65200 65300 I
```

□□□□ □□□ □□□ □□(172.16.12.1/32, 172.16.13.1/32, 172.16.14.1/32, □ 172.16.15.1/32)□ □□□ □□□□□.

4. [edit protocols bgp group *group-name*] □□ □□□□ activate import□ keep none□□ □□□□ BGP □□□□ □□□ □□□□□ □□□ □□□□□ □□□ □□□ □□□□□.

```
[edit protocols bgp group toNorth]
user@South# activate import
user@South# set keep none
user@South# commit
```

5. □□ □□□□, □□□□ □□□ □□□□□ keep none□□ □□□ □ □□□ □□□□ show route receive-protocol bgp *neighbor-address* hidden□□□ □□□□□.

```
user@South> show route receive-protocol bgp 10.0.78.14 hidden

inet.0: 6 destinations, 7 routes (6 active, 0 holddown, 0 hidden)
```

□□□ keep none □□ □□ □□□ □□□ □□□ □□□ □□□□□ □□□□ □□□□ □□ □□□ □□□□□.

□□ □□

> *□□□□ □□□ □□□ □□□□□ □□□ □□ □□ □□*
>
> *□□□ □□ □ □□ □□ □□□ □□□□ □□(□□□ □□□)*

chapter label in part10

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?: Junos OS? ?? ???? ???? ????? PLP? ??????. ?? ???? ???? ???? ?? PLP? ????? ???? ????? ?????.

?? ???? ?????? ????? 4?? PLP ???? ??????. low,medium-low,medium-high, ? high. ? ???? ???? ????? ???? ?? ????? ? 25 ??? 665

? 25: ?????? ??? ???

?????? ??? ???	CoS ??? ??? ??
be	Best-effort ???
no-loss	TCP ??? ?? ??
fcoe	FCoE(Fibre Channel over Ethernet) ??? ?? ??
nc	???? ?? ???

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1. □□□ □□ □□ □ □□ □□□ □□□□□.

```
[edit]
user@switch# edit firewall family inetfilter ingress-filter
```

2. □ loss-priority □□ □□□□ □□□□ □□□ □□□ forwarding-class □□□□ □□□□□. □□ □□, □□□ □□ □ □□□ □□□ □□ □□ □□□ □□ □□ □□□ □□□ □□□ □ □□ □□ □□□□□ □□□□□.

   - □ □□□ corp-traffic □□ □□□ □□ 10.1.1.0/24 □□ IPv4 □□□ □□□□□ □□ □□ □□□ □□□ □□□ □□□□ no-loss □□□□□.low

```
[edit firewall family inet filter ingress-filter]
user@switch# set term corp-traffic from source-address 10.1.1.0/24;
user@switch# set term corp-traffic then forwarding-class no-loss
user@switch# set term corp-traffic then loss-priority low
```

   - □ □□□ data-traffic □□ IPv4 □□□ 10.1.2.0/24 □□ □□□ □□□□□ □□ □□ □□□ □□□ □□□ □□□ be (□□□ □□)□ □□□□ □.medium-high

```
[edit firewall family inet filter ingress-filter]
user@switch# set term data-traffic from source-address 10.1.2.0/24;
user@switch# set term data-traffic then forwarding-class be
user@switch# set term data-traffic then loss-priority medium-high
```

   - □□□ □□□ accept-traffic □□ □□□ □□□□ □□ □□ □□□ □□□□ □□ □□ □□□ □□□ □□□ □□□□ be □□□□□.high

```
[edit firewall family inet filter ingress-filter]
user@switch# set term accept-traffic then forwarding-class be
user@switch# set term accept-traffic then loss-priority high
```

3. □□□ 3 □□□□□□ □□□ ingress-filter □□□□□. □□ □□□ □□ □□□ □□□ □ □□□□□□□ "□□□ □□ □□" □□□ 1729. (□□□ □□□ □ PLP □□□ □□ □□□□□ □□□□□.)

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CoS ??? ??

CoS ??? ??? ??

?? ??????? ?? ?? ??

??(dsc) ??????? ??? ??? ??? ?(ICMP ???? ???? ??) ??? ??? ? ?? ?? ??????????. ?? DoS(Denial-of-Service) ??? ??? ??????. ??? ?? IP ??? ?? ?? ?? ???????? ??? ?? ??? ?? ??????? ???? ?????? ??? ??? ? ?????. ????? ?, ??? ??? ????? ??? ??? ?? ??? ??? ????? ?????? ????? ?? IP ??? ????? ??????? ICMP ?? ????? ???? ?????? ?? ??? ??(DDoS) ?????? ?? ?? ??? ? ?????.

dsc ??????? ??? ??? ??????? ?? 0??? ??? ? ??? ?????? ??? dsc ?????? ??????.

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```
[edit interfaces interface-name]
dsc {
    unit 0 {
        family inet {
            filter {
                output filter-name;
            }
        }
    }
}
```

BGP ?????? ?? ??????? ?????? ?? ??? ??? ? ?????. ?????? ?? ??????? ?????? ?? ??? ??????:

```
[edit]
policy-options {
    community community-name members [ community-id ];
    policy-statement statement-name {
        term term-name {
            from community community-name;
            then {
                next-hop address; # Remote end of the point-to-point interface
                accept;
            }
        }
```

```
    }
}
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
policy-options {
    policy-statement statement-name {
        term term-name {
            from prefix-list name;
            then community (set | add | delete) community-name;
        }
    }
}
```

[illegible] [illegible]

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?? ???? ????? ????? ???? ????? ?? ???? ???? ? ?????. Junos OS?? ?? ????? ????? ? ?? ???? ?? ???? ????? ? ?? ?? ? ? ?? ?? ???? ????? ?????. ?? ?? ???? ???? discard ??????.

? ?? ?? ?? ???? ?????.

```
user@host# show routing-options
static {
    route 192.0.2.101/32 discard;
    route 192.0.2.103/32 discard;
    route 192.0.2.105/32 discard;
}
```

```
user@host> show route protocol static terse
inet.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A V Destination        P Prf   Metric 1   Metric 2  Next hop        AS path
* ? 192.0.2.101/32     S   5                        Discard
* ? 192.0.2.103/32     S   5                        Discard
* ? 192.0.2.105/32     S   5                        Discard
```

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```
user@host# show interfaces dsc
unit 0 {
    family inet {
        address 192.0.2.102/32 {
            destination 192.0.2.101;
        }
        address 192.0.2.104/32 {
            destination 192.0.2.103;
```

```
        }
        address 192.0.2.106/32 {
            destination 192.0.2.105;
        }
    }
}
```

```
user@host> show interfaces terse dsc
b
Interface               Admin Link Proto    Local                 Remote
dsc                     up    up
dsc.0                   up    up   inet     192.0.2.102         --> 192.0.2.101
                                            192.0.2.104         --> 192.0.2.103
                                            192.0.2.106         --> 192.0.2.105
```

□□ □□ □□□ □□□□ □□ □□ □□□□□□ □□□□ □□ □□□□□□ □□ □□□ □□□, □□ □ □□□□ □□ □□□ □□□□ □□□□□□ □□□ □ □□□ □□□ □□□□. □ □□□□□ □□ □□ □□□.

□□□ □□□ □□□□□ BGP □□□ □□□ □□□ □□□ □□□□□. □□ □□ □□□ □□□□ □□ □□, □□□ □□ □□ BGP □□□□ □□ □□□ □ □□□□.

□□ □□ □□ □□□ □□□□ □□□ □□□ □□□□.

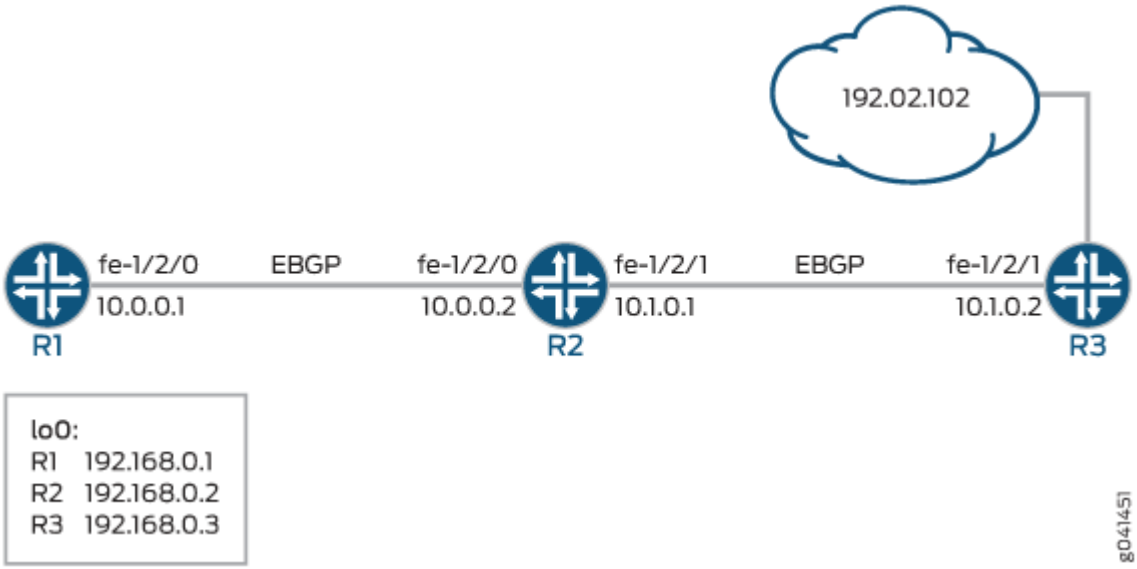
□□ □□

```
protocols {
    bgp {
        import blackhole-by-route;
    }
}
policy-options {
    policy-statement blackhole-by-route {
        term specific-routes {
            from {
                route-filter 10.10.10.1/32 exact;
                route-filter 10.20.20.2/32 exact;
                route-filter 10.30.30.3/32 exact;
                route-filter 10.40.40.4/32 exact;
            }
            then {
                next-hop 192.0.2.101
            }
        }
```

```
    }
}
```

?? 44 ??? 671? ?? ?????? ??????.

?? 44: ?????? ?? ????? ??



? ???? ?? BGP(EBGP) ??? ???? ???? 3?? ???? ????.

????? R1? ?? ?????? ??????. ????? R3? ???? ?? ?? ?????? ?? ???? ????? ??????. ????? R2? ???? ?? ??????? ????? ???? ??????.

? ????? ?? ??????? ???? ?????? ???? ?? ???.

> ?: ?? null ?? ?? ???? ???? ???? ???????. ?? ?? ???? ???? ????? ???????. ????? ?? ???? ???? DCU(? ? ???? ??)? ????? ???? ?? ????? ? null ?? ?????? ??????. ?? ?? ???? ????? DCU ???? ??????. ?? ?? ? "?: ?? ????? ????? ?? ?? ?? ??" ??? 1144? ???????"?: ?? ? ?? ????? ???? ????? ???" ??? 625.

?? ?? ? ???? ???? ????? ?? ???? ? ????? ?? ????? ?? ???? ?? ???? ????? ?? ???? ?? ??????. ???? ? ?? ???? ?? ????? ?.

?????? ?? ?? ?? BGP(EBGP) ?? ???? ???? ????. null ?? ????? ?? ?? ?? ?????? EBGP ????? ?? ? ???? ????? ????.

"CLI ?? ??" ??? 672?(?) ?? 44 ??? 671 ? ?? ?????? ???? ??????.

?? "No Link Title" ??? 673? ????? R2? ???? ??????.

??

in this section

- ?? | 672

??

CLI ?? ??

? ?? ??? ??????, ?? ??? ????? ??? ??? ?? ?? ?? ?? ????????? ?????, ????? ??? ????? ? ??? ?? ??? ??? [edit] ? ? ????? ??? CLI? ??? ?? ?????.

???? R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set routing-options autonomous-system 100
```

???? R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces dsc unit 0 family inet filter output log-discard
set interfaces dsc unit 0 family inet address 192.0.2.102/32 destination 192.0.2.101
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp import blackhole-policy
set protocols bgp group ext type external
set protocols bgp group ext multihop
set protocols bgp group ext export dsc-export
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols bgp group ext neighbor 10.1.0.2 peer-as 300
set policy-options policy-statement blackhole-policy term blackhole-communities from community
blackhole-all-routers
set policy-options policy-statement blackhole-policy term blackhole-communities then next-hop
```

```
192.0.2.101
set policy-options policy-statement dsc-export from route-filter 192.0.2.101/32 exact
set policy-options policy-statement dsc-export from route-filter 192.0.2.102/32 exact
set policy-options policy-statement dsc-export then community set blackhole-all-routers
set policy-options policy-statement dsc-export then accept
set policy-options community blackhole-all-routers members 100:5555
set routing-options static route 192.0.2.102/32 next-hop 192.0.2.101
set routing-options autonomous-system 200
set firewall filter log-discard term one then count counter
set firewall filter log-discard term one then log
```

[illegible] R3

```
set interfaces fe-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set interfaces lo0 unit 0 family inet address 192.0.2.102/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.1.0.1
set routing-options autonomous-system 300
```

[illegible]

[illegible] Junos OS CLI [illegible] "[illegible] CLI [illegible]" [illegible] 1787.

[illegible] R2 [illegible]:

1. [illegible]

```
[edit interfaces]
user@R2# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
user@R2# set fe-1/2/1 unit 0 family inet address 10.1.0.1/30
user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. [illegible]

```
[edit firewall filter log-discard term one]
user@R2# set then count counter
user@R2# set then log
```

3. ?? ??????? ????? ?? ??? ??? ??????.

   ?? ??? ??? ? ?????? ??? ?? ?????.

```
[edit interfaces dsc unit 0 family inet]
user@R2# set filter output log-discard
user@R2# set address 192.0.2.102/32 destination 192.0.2.101
```

4. ?? ??????? ??? ?? ??? ?? ?? ????? ?? ??? ??????.

```
[edit routing-options static]
user@R2# set route 192.0.2.102/32 next-hop 192.0.2.101
```

5. BGP ???? ??????.

```
[edit protocols bgp ]
user@R2# set group ext type external
user@R2# set group ext multihop
user@R2# set group ext neighbor 10.0.0.1 peer-as 100
user@R2# set group ext neighbor 10.1.0.2 peer-as 300
```

6. ??? ??? ??????.

```
[edit policy-options policy-statement blackhole-policy term blackhole-communities]
user@R2# set from community blackhole-all-routers
user@R2# set then next-hop 192.0.2.101
[edit policy-options policy-statement dsc-export]
user@R2# set from route-filter 192.0.2.101/32 exact
user@R2# set from route-filter 192.0.2.102/32 exact
user@R2# set then community set blackhole-all-routers
user@R2# set then accept
[edit policy-options community blackhole-all-routers]
user@R2# set members 100:5555
```

7. ??? ??? ??????.

```
[edit protocols bgp ]
user@R2# set import blackhole-policy
user@R2# set group ext export dsc-export
```

8. AS(Autonomous System) ??? ??????.

```
[edit routing-options]
user@R2# set autonomous-system 200
```

??

?? ????? , show protocols , show policy-options, show routing-options? show firewall ??? ????? show interfaces??? ? ?????. ?? ??? ??? ????? ????? ??? ? ?? ??? ????? ??? ????????.

```
[edit]
user@R2# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        family inet {
            address 10.1.0.1/30;
        }
    }
}
dsc {
    unit 0 {
        family inet {
            filter {
                output log-discard;
            }
            address 192.0.2.102/32 {
                destination 192.0.2.101;
```

```
            }
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    import blackhole-policy;
    group ext {
        type external;
        multihop;
        export dsc-export;
        neighbor 10.0.0.1 {
            peer-as 100;
        }
        neighbor 10.1.0.2 {
            peer-as 300;
        }
    }
}
```

```
user@R2# show policy-options
policy-statement blackhole-policy {
    term blackhole-communities {
        from community blackhole-all-routers;
        then {
            next-hop 192.0.2.101;
        }
    }
}
policy-statement dsc-export {
    from {
        route-filter 192.0.2.101/32 exact;
```

```
        route-filter 192.0.2.102/32 exact;
    }
    then {
        community set blackhole-all-routers;
        accept;
    }
}
community blackhole-all-routers members 100:5555;
```

```
user@R2# show routing-options
static {
    route 192.0.2.102/32 next-hop 192.0.2.101;
}
autonomous-system 200;
```

```
user@R2# show firewall
filter log-discard {
    term one {
        then {
            count counter;
            log;
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

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- 192.0.2.101 □□ ping | 678
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□□□□ □□ □□□ □(0) □□□□ □□□□□ □□□□□.

□□

1. □□□□ R2□□ □□□ □□□□□ `clear firewall .`

```
user@R2> clear firewall filter log-discard
```

2. □□□□ R2□□ □□□ □□□□□ `show firewall .`

```
user@R2> show firewall filter log-discard
Filter: /log-discard
Counters:
Name                                                Bytes              Packets
counter                                                 0                    0
```

192.0.2.101 □□ ping

□□

□□ □□□ □□□ □□□□.

□□

□□□□ R1□□ □□□ □□□□□ `ping .`

```
user@R1> ping 192.0.2.101
PING 192.0.2.101 (192.0.2.101): 56 data bytes
^C
--- 192.0.2.101 ping statistics ---
4 packets transmitted, 0 packets received, 100% packet loss
```

□□

□□□□ ping □□□ □□□□ □□□ □□□□ □□□□. □□□ □□□□□.

□□ □□ □□

□□

□□□□ R2□ □□□ □□□ □□□ □□□□ □□□ □□□□□.

□□

□□□□ R2□□ □□□ □□□□□ show firewall filter log-discard .

```
user@R2> show firewall filter log-discard
Filter: log-discard
Counters:
Name                                                Bytes              Packets
counter                                               336                    4
```

□□

□□□□ □□□□ □□□□ □□□□.

□: ping □□□ □□□ 20□□□□ IP □□□□□ 8□□□□ ICMP □□□ □□□□□.

□□□□ □□ □□

□□

□□□ community □□□□ □□□□ □□□ □□□□□.

□□

□□□□ R1□□ □□□□ R2□ show route extensive □□ □□ 192.0.2.101□ □□□□ □□□ □□□□□.

```
user@R1> show route 192.0.2.101 extensive
```

```
inet.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
192.0.2.101/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 192.0.2.101/32 -> {10.0.0.2}
        *BGP    Preference: 170/-101
                Next hop type: Router, Next hop index: 684
                Address: 0x94141d8
                Next-hop reference count: 2
                Source: 10.0.0.2
                Next hop: 10.0.0.2 via fe-1/2/0.0, selected
                Session Id: 0x8000a
                State: <Active Ext>
                Local AS:   100 Peer AS:   200
                Age: 53:03
                Validation State: unverified
                Task: BGP_200.10.0.0.2+63097
                Announcement bits (1): 2-KRT
                AS path: 200 I
                Communities: 100:5555
                Accepted
                Localpref: 100
                Router ID: 192.168.0.2
```

??

???? ???? R2? ???? R1? 192.0.2.101 ??? ???? ???? R2? 100:5555 ???? ??? ?????.

?? ??

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?: ???? ?? ???? ?? ?? | 362

chapter label in part11

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- ?? ??????? ??? ???? ??? ?? ?? | 682
- BGP? ?? ??? ?? ?? | 684
- NSR ??? ?? ?? ? BGP ??? ?? ??? ?? | 684

?? ??? ???? ? ??? ?? ??????? ??? ????? ??? ??? ? ????. ?? ??, 20,000? ??? ??? ?? ? ??? ???? ???? ??? ? ? ?? 20?? ?? ? ????. ??? ?? ?? ??? ?? ? ???? ??? ? ??? ??? ? ????.

Junos OS ??? 9.5 ????? ?? ?? ????????? ???? ?? ??? ??? ??? ?? ?? ????????? ??? ?? ? ?? ??? ?? ??? ?? ? ? ????. ??? ?? ???????? ?? ?? ??? ???? ? ??? ??? ?? ?? ????????? ?? ????. ?? ?? ?? ????????? ???? ?? ? ???? ??? ?? ? ?? ??? ??? ? ????. BGP? ?? ???????? ??? ?? ? ?? ??? ???? ??? ??? ??? ? ?? ??? ?????? ??. ?? ???????? ??? ??? ???? ??? ??? ???? ??? ??? ?? ??????? ??? ???? ?? ??? ??? ???? ????? ? ????.

??: Junos OS? ?? ???????? ?? ?? ??? ???? ?? ??? ? ??? ??? ?? ???? ?? ?? ?? ?? ??? ??? ?? ???? ???.

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Junos OS □□□ 9.5 □□□ □□ □□□□□□□ *□□ □□□□□□□* □□□□, □ □□□□□□□ □□ □□ □□□□□□□ □□□ □□□□ □□□ □ □□□ □□ □□ □ □□□□ □ □□□ □□ □□□□□ □□□□ □□□□. □□□ □□ □□□ □□□□ □ □□□ □□□ □□ □□□□□. □□ □□ □□ □□□□□□□ □□□ □□ □ □□ □□ □ □□ □□□□ □□□ □□□ □□□□ □□□ □ □□□□. □□ □□□□□□□ □□□□□ □□□□□ **/var/run/db/juniper.dyn** .

□□ □□□□□□□ □□□□□ □□□ □□□□ configure dynamic □□ □□□□□□□ □□ □□□ □□□□□.

```
user@host> configure dynamic
Entering configuration mode

[edit dynamic]
user@host#
```

□ □□ □□ □□□□□□□□□□ □□ □□□□ □□ □□□□ □□□ □ □□□□ [edit policy-options] .

- as-path *name*
- as-path-group *group-name*
- community *community-name*
- condition *condition-name*
- prefix-list *prefix-list-name*
- policy-statement *policy-statement-name*

□: □□ □□□□ □□ □□□ □□□□ [edit dynamic] □□□□.

policy-statement *policy-statement-name* □□□□ □□□□ □□ □□ □□□□□□□□□□ □□ □□□ □□□ □□□□□.

□□ □□□□□□□ □□ □□ □□□ □□□□□ □□ □□ [edit dynamic] □□ □□□□ □□□ □□ exit configuration-mode □□□ □□□ □□□□ □□□ □□□□□exit.

□□ □□□□□□ □□□ □□□□ □□□ □□ □□

□□ □□ □□□□□ □□ □□□□□□□ □□ □□□□ □□□ [edit dynamic] □□ □ □□ □□□ □□□□ □□□ □□□ □□□ □ □□□□. □□ □□□□□□ □□□ □□□□ □□□ □□□ □□□□□ □□ □□□□ □□□□ □□□□□dynamic-db.[edit policy-options policy-statement *policy-statement-name*]

```
[edit policy-options]
policy-statement policy-statement-name {
```

```
    dynamic-db;
}
```

□□ □□□□□□□□□ □□□ □□□ □□□ □□□□ □□ □□ □□□ □□□ □□ □□□□. □□ □□□□□□□ □□□□ □□ □□□ □□□□□ □□ □□□□ □□ □ [edit policy-options] □ □□ □□ □□□□□dynamic-db.

- as-path *name*
- as-path-group *group-name*
- community *community-name*
- condition *condition-name*
- prefix-list *prefix-list-name*

□□ □□□□□ □□ □□□□□□□ □□□ □□□ □□□□ □□ □□□□ □□□ □□ □□ □□□ □□□□ □□□ □□□ □□□ □□ □□□□.

□□ □□, □□ □□ □□□□□ □□ □□□□□□□ □□□ □□□ □□(□□□□ □prefix-list pl2)□ □□□□ □□□ □□□ prefix-list pl2 □□□□□.

```
[edit policy-options]
prefix-list pl2 {
    dynamic-db; # Reference a prefix list configured in the dynamic database.
}
```

□□ □□ □□□ □□□□ prefix-list pl2□□ □□□□ □□□ □□□ □□□□□.

```
[edit policy-options]
policy-statement one {
    term term1 {
        from {
            prefix-list pl2; # Include the prefix list configured in the standard configuration
# database, but which references a prefix list configured in the dynamic database.
        }
        then accept;
    }
    then reject;
}
```

□ prefix-list pl2□□□ □□□□□□ □□ □□ □□ □□□ □□□□ □□ □□□□□□ □□□□ [edit dynamic] □□□□□□□. □□ □□ □□ □□ □□□□□ □□□□□ □ □□□ □□□ □□□ □□ □□ □□ □□□ □□□ □ □□□□.

□: Junos OS□ Junos OS □□□ 9.4 □□□ □□□□□□□□□ □□, □□ □□ □□□□□□□□ □□□□ □□□ □□□ □□□□ □□□.
□, □□□ dynamic-db □□□ □□ □□□ □□ □□ □□ □□□ □□□□ □□□.

BGP□ □□ □□□ □□ □□

BGP□ □□ □□□□□□ □□□ □□□□ □□□ □□□ □□□ □ □□ □□□ □□□ □□□□□□□□. □□□ □□□ □□ □□□ □□□□ □□□. □□ □□□ BGP □□□ □ □□ □□□□ □□□ □□□ □ □□□□. □□ □□□, □□ □□ neighbor □□ □□□□□ □□□ □ □□□□.

BGP □□□□ □□□ □□□□□ , [edit protocols bgp group *group-name*]□□ [edit protocols bgp group *group-name* neighbor *address*] □□ □□□□ □□ [edit protocols bgp]□□□□□export [*policy-names*].

```
[edit]
protocols
    bgp {
        export [ policy-names ];
    }
}
```

BGP □□□□ □□□ □□□□□ , [edit protocols bgp group *group-name*]□□ [edit protocols bgp group *group-name* neighbor *address*] □□ □□□□ □□ [edit protocols bgp]□□□□□import [*policy-names*].

```
[edit]
protocols
    bgp {
        import [ policy-names ];
    }
}
```

□□ □□□□□□□□ □□□ □□□ □□□□ □□ □□□ □□ □□□ [edit policy-options *policy-statement*] □□□ □□ □□□ □□ □□□ □□□□□.

NSR □□□ □□ □□ □ BGP □□□ □□ □□□ □□

□□ NSR(Nonstop Routing)□ □□□□ □□, □□ □□□□□□□□ □□ □□□ □□□ □□□□□ □□□□. □ □□, □□ □□□ □□□□□ □□□ □□□□ □ □, □□ □□□ □□ □□□ □□□□ □□□□ □□□□ □ □□□□ □□□ □ □□ □□□□ □□ □ □□□□. □□□ □□□ □□□□ □□ BGP □□□ □□□ □□□□ □□ □□□□ □□□ □ □ □□□□.

□□□ □□ □□ □□ □□□□ □□□ □□□□ □□□ □□ □□□ □□□ □□ □ BGP □□□ □□□ □□□□□ □□□ □□□□ □□□ □ □□□□. idle-after-switch-over (*seconds* | forever), [edit protocols bgp group *group-name*]□□ [edit protocols bgp group *group-name* neighbor *address*] □□ □□□□ □□ □□□□□.[edit protocols bgp]

```
[edit]
bgp {
    protocols {
        idle-after-switch-over (seconds | never);
    }
}
```

□ *seconds*, □□ 1□□ 4,294,967,295(2^{32} – 1) □□□ □□ □□□□□. BGP □□□ □□□ □□□ □□□ □□ □□□ □□ □□□□ □□□□. □□□ □ □□□ forever □□□ □□□ □□□ BGP □□□ □□□ clear bgp neighbor □□□□ □□□□.

□□ □□

□: □□ □□□ □□ □□ | 685

Junos OS □□□□ □□□ □□□

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in this section

- □□ □□ | 685
- □□ | 686
- □□ | 687
- □□ | 698

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??

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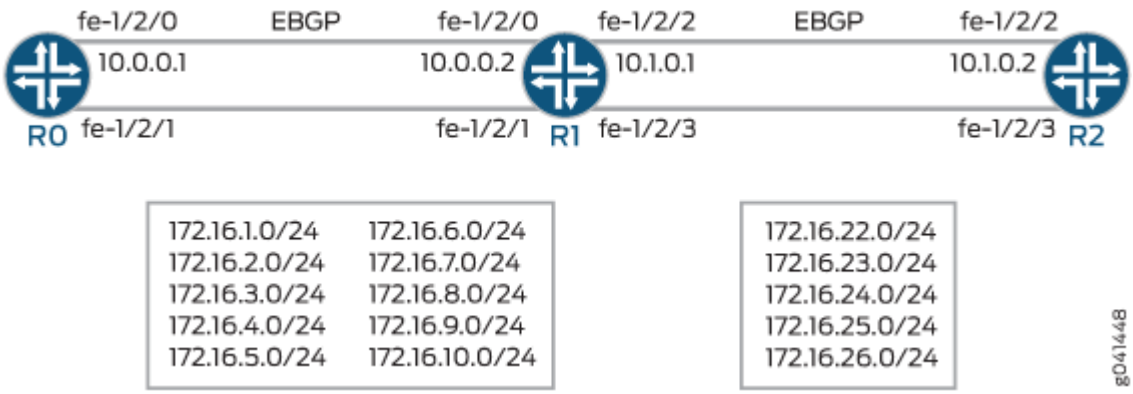
?? ????????? ?? ?? ??? ????? ? ??? ??? ?? ?? ????????? ?? ?????. ?? ????????? ????? ??? ????? ??? ?? ? ?? ??? ??? ? ?????. BGP? ?? ???????? ??? ?? ? ?? ??? ????? ??? ??? ??? ? ?? ??? ????????. ?? ???????? ??? ??? ????? ??? ??? ????? ??? ??? ?? ???????? ??? ????? ?? ??? ??? ????? ?????? ? ?????.

??: Junos OS? ?? ???????? ?? ?? ??? ????? ?? ??? ? ??? ??? ?? ????? ?? ?? ?? ?? ??? ??? ?? ????? ???.

?? 45 ??? 686? ?? ?????? ??????.

?? 45: ?? ??? ?? ?? ????



? ??? ?? BGP(EBGP) ??? ??? ??? 3?? ???? ????. ???? R1? ?? ??????? ??????.

???? R0? fe-1/2/1 ????????? ?? IPv4 ??????? ????, ??? ??? ???? R0? fe-1/2/1 ??????? ??? ?? IP ??? ?? ?? ?? ??? ???? ?? ??? ???? `from interface fe-1/2/1.0` ??? ???? BGP? ??????.

????? ???? R2? fe-1/2/3 ????????? ?? IPv4 ??? ???? ??? ??? ??? ???? BGP? ??????. ???? R2? ??? ??? ??? ??? ?????? ??? ???? R0? ??? ?? ????.

???? R1? ?? ????????? ? ?? ??? ??? ??????, ??? ???? R0?? ??? ?????? ??? ?? ??? ?? ??? ???? R2?? ??? ?????? ??? ?? ????. ???? R1? ?? ????????? ?? ???????? ??? ?? ??? ??? ??? ?? ??? ??? ???? ????.

???? R0?? ?? ???? ???? R1? ?? ??????? ??? ??????. ??????, ???? R2?? ?? ???? ???? R1? ??? ?? ??????? ? ??????.

??? ??? ??? ??? ???? ?????? "??" ??? 698 .

"CLI ?? ??" ??? 687?(?) ?? 45 ??? 686 ? ?? ?????? ??? ??????.

? ?????? "No Link Title" ??? 690 ???? R1? ?? ????????? ?? ??? ??????.

□ □□□□□ "No Link Title" □□□ 691 □□□□ R1□ □□ □□□□□□□□ □□ □□□ □□□□□.

□□

in this section

- □□ | 687

□□

CLI □□ □□

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□□□□ R0

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces fe-1/2/1 unit 0 family inet address 172.16.4.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.3.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.2.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.1.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.5.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.6.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.7.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.8.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.9.1/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.10.1/24
set interfaces lo0 unit 0 family inet address 10.255.14.151/32
set protocols bgp group ext type external
set protocols bgp group ext neighbor 10.0.0.2 export t2
set protocols bgp group ext neighbor 10.0.0.2 peer-as 200
set policy-options policy-statement t2 from interface fe-1/2/0.0
set policy-options policy-statement t2 from interface fe-1/2/1.0
set policy-options policy-statement t2 then accept
set routing-options router-id 10.255.14.151
set routing-options autonomous-system 100
```

[illegible] R1 [illegible]

```
[edit dynamic]
set policy-options prefix-list dyn_prfx1 172.16.1.0/24
set policy-options prefix-list dyn_prfx1 172.16.2.0/24
set policy-options prefix-list dyn_prfx1 172.16.3.0/24
set policy-options prefix-list dyn_prfx1 172.16.4.0/24
set policy-options prefix-list dyn_prfx1 172.16.5.0/24
set policy-options prefix-list dyn_prfx1 172.16.6.0/24
set policy-options prefix-list dyn_prfx1 172.16.7.0/24
set policy-options prefix-list dyn_prfx1 172.16.8.0/24
set policy-options prefix-list dyn_prfx2 172.16.2.0/24
set policy-options prefix-list dyn_prfx2 172.16.3.0/24
set policy-options prefix-list dyn_prfx2 172.16.4.0/24
set policy-options prefix-list dyn_prfx2 172.16.5.0/24
set policy-options prefix-list dyn_prfx2 172.16.6.0/24
set policy-options policy-statement dyn_policy1 term t1 from prefix-list dyn_prfx1
set policy-options policy-statement dyn_policy1 term t1 then accept
set policy-options policy-statement dyn_policy1 term t2 then reject
set policy-options policy-statement dyn_policy2 term t1 from prefix-list dyn_prfx2
set policy-options policy-statement dyn_policy2 term t1 then accept
set policy-options policy-statement dyn_policy2 term t2 then reject
```

[illegible] R1 [illegible]

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces fe-1/2/2 unit 0 family inet address 10.1.0.1/30
set interfaces fe-1/2/1 unit 0 family inet address 172.16.4.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.3.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.2.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.1.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.5.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.6.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.7.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.8.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.9.2/24
set interfaces fe-1/2/1 unit 0 family inet address 172.16.10.2/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.22.2/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.23.2/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.24.2/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.25.2/24
```

```
set interfaces fe-1/2/3 unit 0 family inet address 172.16.26.2/24
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group to_r0 idle-after-switch-over 300
set protocols bgp group to_r0 neighbor 10.0.0.1 import dyn_policy1
set protocols bgp group to_r0 neighbor 10.0.0.1 export dyn_policy2
set protocols bgp group to_r0 neighbor 10.0.0.1 peer-as 100
set protocols bgp group to_R2 import static_policy1
set protocols bgp group to_R2 export static_policy2
set protocols bgp group to_R2 idle-after-switch-over 300
set protocols bgp group to_R2 neighbor 10.1.0.2 peer-as 300
set policy-options prefix-list static_prfx1 172.16.22.0/24
set policy-options prefix-list static_prfx1 172.16.23.0/24
set policy-options prefix-list static_prfx1 172.16.24.0/24
set policy-options prefix-list static_prfx1 172.16.25.0/24
set policy-options prefix-list static_prfx2 172.16.1.0/24
set policy-options prefix-list static_prfx2 172.16.2.0/24
set policy-options prefix-list static_prfx2 172.16.3.0/24
set policy-options prefix-list static_prfx2 172.16.4.0/24
set policy-options policy-statement dyn_policy1 dynamic-db
set policy-options policy-statement dyn_policy2 dynamic-db
set policy-options policy-statement static_policy1 term t1 from prefix-list static_prfx1
set policy-options policy-statement static_policy1 term t1 then accept
set policy-options policy-statement static_policy1 term t2 then reject
set policy-options policy-statement static_policy2 term t1 from prefix-list static_prfx2
set policy-options policy-statement static_policy2 term t1 then accept
set policy-options policy-statement static_policy2 term t2 then reject
set routing-options autonomous-system 200
```

□□□□ R2

```
set interfaces fe-1/2/2 unit 0 family inet address 10.1.0.2/30
set interfaces fe-1/2/3 unit 0 family inet address 172.16.22.1/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.23.1/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.24.1/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.25.1/24
set interfaces fe-1/2/3 unit 0 family inet address 172.16.26.1/24
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set protocols bgp group to_vin neighbor 10.1.0.1 export p1
set protocols bgp group to_vin neighbor 10.1.0.1 peer-as 200
set policy-options prefix-list ppx1 172.16.22.0/24
set policy-options prefix-list ppx1 172.16.23.0/24
set policy-options prefix-list ppx1 172.16.24.0/24
```

```
set policy-options prefix-list ppx1 172.16.25.0/24
set policy-options prefix-list ppx1 172.16.26.0/24
set policy-options policy-statement p1 term t1 from family inet
set policy-options policy-statement p1 term t1 from prefix-list ppx1
set policy-options policy-statement p1 term t1 then accept
set routing-options autonomous-system 300
```

??? ??

?? ?? ?? ????? ??? ??? ??? ??????. ?? ????? ??? ?? ??? Junos OS CLI ??? ???? ???????"?? ????? CLI ??? ??" ??? 1787.

???? R1? ?? ???????? ?????? ??? ?? ????.

1. ?? ????????? ?? ?? ??? ??????.

```
user@R1> configure dynamic
Entering configuration mode
[edit dynamic]
```

2. ???? RO?? ??? ?????? ??? ?? ??? ??? ??????.

```
[edit dynamic policy-options prefix-list dyn_prfx1]
user@R1# set 172.16.1.0/24
user@R1# set 172.16.2.0/24
user@R1# set 172.16.3.0/24
user@R1# set 172.16.4.0/24
user@R1# set 172.16.5.0/24
user@R1# set 172.16.6.0/24
user@R1# set 172.16.7.0/24
user@R1# set 172.16.8.0/24
```

3. ???? R2?? ??? ?????? ??? ?? ??? ??? ??????.

```
[edit dynamic policy-options prefix-list dyn_prfx2]
user@R1# set 172.16.2.0/24
user@R1# set 172.16.3.0/24
user@R1# set 172.16.4.0/24
```

```
user@R1# set 172.16.5.0/24
user@R1# set 172.16.6.0/24
```

4. ??? ??? ??????.

```
[edit dynamic policy-options policy-statement dyn_policy1]
user@R1# set term t1 from prefix-list dyn_prfx1
user@R1# set term t1 then accept
user@R1# set term t2 then reject
user@R1# set term t1 from prefix-list dyn_prfx2
user@R1# set term t1 then accept
user@R1# set term t2 then reject
```

??? ??

?? ?? ?? ????? ??? ??? ??? ??????. ?? ????? ??? ?? ??? Junos OS CLI ??? ???? ???????"?? ???? CLI ??? ?
?" ??? 1787.

???? R1? ?? ???????? ?????? ??? ??????.

1. ??? ??????? ??????.

```
[edit interfaces]
user@R1# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
user@R1# set fe-1/2/2 unit 0 family inet address 10.1.0.1/30
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.4.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.3.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.2.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.1.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.5.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.6.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.7.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.8.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.9.2/24
user@R1# set fe-1/2/1 unit 0 family inet address 172.16.10.2/24
user@R1# set fe-1/2/3 unit 0 family inet address 172.16.2.2/24
user@R1# set fe-1/2/3 unit 0 family inet address 172.16.3.2/24
user@R1# set fe-1/2/3 unit 0 family inet address 172.16.4.2/24
user@R1# set fe-1/2/3 unit 0 family inet address 172.16.5.2/24
```

```
user@R1# set fe-1/2/3 unit 0 family inet address 172.16.6.2/24
user@R1# set lo0 unit 0 family inet address 192.168.0.2/32
```

2. [illegible]

```
[edit policy-options]
user@R1# set policy-statement dyn_policy1 dynamic-db
user@R1# set policy-statement dyn_policy2 dynamic-db
```

3. [illegible] R0[illegible] BGP [illegible].

```
[edit protocols bgp group to_r0]
user@R1# set neighbor 10.0.0.1 peer-as 100
```

4. [illegible] R0[illegible] BGP [illegible].

```
[edit protocols bgp group to_r0]
user@R1# set neighbor 10.0.0.1 import dyn_policy1
user@R1# set neighbor 10.0.0.1 export dyn_policy2
```

5. [illegible] R0[illegible].

```
[edit policy-options prefix-list static_prfx2]
user@R1# set 172.16.1.0/24
user@R1# set 172.16.2.0/24
user@R1# set 172.16.3.0/24
user@R1# set 172.16.4.0/24
```

6. [illegible] R2[illegible].

```
[edit policy-options prefix-list static_prfx1]
user@R1# set 172.16.2.0/24
user@R1# set 172.16.3.0/24
user@R1# set 172.16.4.0/24
user@R1# set 172.16.5.0/24
```

7. □□ □□□□□□□ □□□ □□□□□□.

```
[edit policy-options policy-statement static_policy1]
user@R1# set term t1 from prefix-list static_prfx1
user@R1# set term t1 then accept
user@R1# set term t2 then reject
[edit policy-options policy-statement static_policy2]
user@R1# set term t1 from prefix-list static_prfx2
user@R1# set term t1 then accept
user@R1# set term t2 then reject
```

8. □□□□ R2□□ BGP □□□□ □□□□□□.

```
[edit protocols bgp group to_R2]
user@R1# set neighbor 10.1.0.2 peer-as 300
```

9. □□□□ R2□□ BGP □□□□ □□ □□□□□□□ □□□ □□□□□□.

```
[edit protocols bgp group to_R2]
user@R1# set import static_policy1
user@R1# set export static_policy2
```

10. (□□ □□) □□□ □□ □□ □□ □□□□ □□□ □□□□ □□□ □□ □□□ □□□ □□ □ BGP □□□ □□□ □□□□□ □□□ □□□□ □□□□□.

□ □□□□ NSR(Nonstop Active Routing)□ □□□□ □ □□ □□□□□□□ □□ □□□ □□□ □□□□□ □□ □□□ □□ □□□ □□□□ □□ □□□□□. □ □□, □□ □□□ □□□□□ □□□ □□□□ □□, □□ □□□ □□ □□□ □□□□ □□□□ □□□□ □ □□□□ □□□ □ □□ □□□□ □□ □ □□ □□. □□□ □□□ □□□□ □□ BGP □□□ □□□ □□□□ □□ □□□□ □□□ □ □ □□□□.

```
[edit protocols bgp]
user@R1# set group to_r0 idle-after-switch-over 300
user@R1# set group to_R2 idle-after-switch-over 300
```

11. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@R1# set routing-options autonomous-system 200
```

□□

□□ □□□□□□□□ show interfaces□□ □□□□ □□□□ □□□□ □□ □□□□□□□□ □□ □□□□ , show protocols, show policy-options □ show routing-options □□□ □□□□ show □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

□□□□ R1 □□

```
[edit dynamic]
user@R1# show
policy-options {
    prefix-list dyn_prfx1 {
        172.16.1.0/24;
        172.16.2.0/24;
        172.16.3.0/24;
        172.16.4.0/24;
        172.16.5.0/24;
        172.16.6.0/24;
        172.16.7.0/24;
        172.16.8.0/24;
    }
    prefix-list dyn_prfx2 {
        172.16.2.0/24;
        172.16.3.0/24;
        172.16.4.0/24;
        172.16.5.0/24;
        172.16.6.0/24;
    }
    policy-statement dyn_policy1 {
        term t1 {
            from {
                prefix-list dyn_prfx1;
            }
            then accept;
        }
        term t2 {
            then reject;
        }
    }
    policy-statement dyn_policy2 {
        term t1 {
            from {
                prefix-list dyn_prfx2;
```

```
            }
            then accept;
        }
        term t2 {
            then reject;
        }
    }
}
```

□□□□ R1 □□

```
[edit]
user@R1# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        family inet {
            address 172.16.4.2/24;
            address 172.16.3.2/24;
            address 172.16.2.2/24;
            address 172.16.1.2/24;
            address 172.16.5.2/24;
            address 172.16.6.2/24;
            address 172.16.7.2/24;
            address 172.16.8.2/24;
            address 172.16.9.2/24;
            address 172.16.10.2/24;
        }
    }
}
fe-1/2/2 {
    unit 0 {
        family inet {
            address 10.1.0.1/30;
        }
    }
```

```
}
fe-1/2/3 {
    unit 0 {
        family inet {
            address 172.16.2.2/24;
            address 172.16.3.2/24;
            address 172.16.4.2/24;
            address 172.16.5.2/24;
            address 172.16.6.2/24;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R1# show protocols
bgp {
    group to_r0 {
        idle-after-switch-over 300;
        neighbor 10.0.0.1 {
            import dyn_policy1;
            export dyn_policy2;
            peer-as 100;
        }
    }
    group to_R2 {
        import static_policy1;
        export static_policy2;
        idle-after-switch-over 300;
        neighbor 10.1.0.2 {
            peer-as 300;
        }
```

```
    }
}
```

```
user@R1# show policy-options
prefix-list static_prfx1 {
    172.16.2.0/24;
    172.16.3.0/24;
    172.16.4.0/24;
    172.16.5.0/24;
}
prefix-list static_prfx2 {
    172.16.1.0/24;
    172.16.2.0/24;
    172.16.3.0/24;
    172.16.4.0/24;
}
policy-statement dyn_policy1 {
    dynamic-db;
}
policy-statement dyn_policy2 {
    dynamic-db;
}
policy-statement static_policy1 {
    term t1 {
        from {
            prefix-list static_prfx1;
        }
        then accept;
    }
    term t2 {
        then reject;
    }
}
policy-statement static_policy2 {
    term t1 {
        from {
            prefix-list static_prfx2;
        }
        then accept;
    }
    term t2 {
```

```
        then reject;
    }
}
```

```
user@R1# show routing-options
autonomous-system 200;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

- □□□□ R1□□ □□□ □□ □□ | 698
- □□□□ RO□□ □□□□ R1□ □□□ □□ □□ | 700
- □□□□ R1□ □□□□ RO□□□□ □□□□ □□ □□ | 700
- □□□□ R2□□ □□□□ R1□ □□□ □□ □□ | 701
- □□□□ R1□ □□□□ R2□□□ □□□□ □□ □□ | 702
- □□□□ R1□ □□□□ RO□ □□□□ □□ □□ | 703
- □□□□ R1□ □□□□ R2□ □□□□ □□ □□ | 704

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□□

□□□□ R1□□ □□□ □□□□□ show policy .

```
user@R1> show policy
Configured policies:
dyn_policy1
```

```
dyn_policy2
static_policy1
static_policy2
dyn_policy1
dyn_policy2
```

??

?? ???? ?? ????????? ? ????? ?? ???? ? ? ?????? ? ? ??????. ?? ???? ???? ?? ?? ????????? ????? ?? ????????? ?????.

?? ????????? ??

```
policy-statement dyn_policy1 {
    term t1 {
        from {
            prefix-list dyn_prfx1;
        }
        then accept;
    }
    term t2 {
        then reject;
    }
}
policy-statement dyn_policy2 {
    term t1 {
        from {
            prefix-list dyn_prfx2;
        }
        then accept;
    }
    term t2 {
        then reject;
    }
}
```

?? ????????? ???

```
policy-statement dyn_policy1 {
    dynamic-db;
}
policy-statement dyn_policy2 {
```

```
    dynamic-db;
}
```

□□□□ RO□□ □□□□ R1□ □□□ □□ □□

□□

□□□□ RO□ □□□ □□□ □□□□□ □□□□□.

□□

□□□□ RO□□ □□□□ R1□ show route advertising-protocol bgp □□ □□□ □□□□ □□□ □□□□□.

```
user@R0> show route advertising-protocol bgp 10.0.0.2
inet.0: 28 destinations, 28 routes (28 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.0/24             Self                                    I
* 172.16.2.0/24             Self                                    I
* 172.16.3.0/24             Self                                    I
* 172.16.4.0/24             Self                                    I
* 172.16.5.0/24             Self                                    I
* 172.16.6.0/24             Self                                    I
* 172.16.7.0/24             Self                                    I
* 172.16.8.0/24             Self                                    I
* 172.16.9.0/24             Self                                    I
* 172.16.10.0/24            Self                                    I
* 10.0.0.0/30             Self                                  I
```

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□□□□ RO□ □□ □□□ □□□□ R1□ □□□□ □□□□.

□□□□ R1□ □□□□ RO□□□□ □□□□ □□ □□

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□□□□ R1□ □□□□ □□□ □□□ □□□□□ □□□□□.

??

???? R1?? ???? R0? show route receive-protocol bgp ?? ??? ???? ??? ?????.

```
user@R1> show route receive-protocol bgp 10.0.0.1
inet.0: 35 destinations, 51 routes (35 active, 0 holddown, 4 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  172.16.1.0/24              10.0.0.1                             100 I
  172.16.2.0/24              10.0.0.1                             100 I
  172.16.3.0/24              10.0.0.1                             100 I
  172.16.4.0/24              10.0.0.1                             100 I
  172.16.5.0/24              10.0.0.1                             100 I
  172.16.6.0/24              10.0.0.1                             100 I
  172.16.7.0/24              10.0.0.1                             100 I
  172.16.8.0/24              10.0.0.1                             100 I
```

??

???? R0? ?? ??? ?? ? ???? ???? R1? ?? ???? ????. ?? 172.16.9.0/24, 172.16.10.0/24 ? 10.0.0.0/30? ?? ?????. ?? ???? ???? import dyn_policy1 ???? R0?? BGP ??? ??? ??? ???? R1? ???? ??? ?? ??? ??? ??? ? ?? ?????? ???? ??????.

```
prefix-list dyn_prfx1 {
    172.16.1.0/24;
    172.16.2.0/24;
    172.16.3.0/24;
    172.16.4.0/24;
    172.16.5.0/24;
    172.16.6.0/24;
    172.16.7.0/24;
    172.16.8.0/24;
}
```

???? R2?? ???? R1? ??? ?? ??

??

???? R2? ??? ??? ?????? ??????.

??

???? R2?? ???? R1? show route advertising-protocol bgp ?? ??? ???? ??? ?????.

```
user@R2> show route advertising-protocol bgp 10.1.0.1
inet.0: 17 destinations, 17 routes (17 active, 0 holddown, 0 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.2.0/24             Self                                    I
* 172.16.3.0/24             Self                                    I
* 172.16.4.0/24             Self                                    I
* 172.16.5.0/24             Self                                    I
* 172.16.6.0/24             Self                                    I
```

??

???? R2? ?? ??? ???? R1? ???? ????.

???? R1? ???? R2??? ???? ?? ??

??

???? R1? ???? ??? ??? ????? ?????.

??

???? R1?? ???? RO? show route receive-protocol bgp ?? ??? ???? ??? ?????.

```
user@R1> show route receive-protocol bgp 10.1.0.2
inet.0: 35 destinations, 51 routes (35 active, 0 holddown, 4 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
  172.16.2.0/24              10.1.0.2                                300 I
  172.16.3.0/24              10.1.0.2                                300 I
  172.16.4.0/24              10.1.0.2                                300 I
  172.16.5.0/24              10.1.0.2                                300 I
```

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□□□□ R2□ □□□ □□ □ □□□ □□□□ R1□ □□ □□□□ □□□□. □□ 172.16.6.0/24□ □□□□□□□□. □□ □□□□ □□□□ import static_policy1 □□□□ R2□□ BGP □□□ □□□ □□□ □□□□ R1□ □□□□ □□□ □□ □□□ □□□ □□□ □□□ □□□□□ □□□□ □□□□□.

```
prefix-list static_prfx1 {
    172.16.2.0/24;
    172.16.3.0/24;
    172.16.4.0/24;
    172.16.5.0/24;
}
```

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□□□□ R1□ □□□□ □□□ □□□ □□□□□ □□□□□.

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□□□□ R1□□ □□□□ R0□ show route advertising-protocol bgp □□ □□□ □□□□ □□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.0.0.1
inet.0: 35 destinations, 51 routes (35 active, 0 holddown, 4 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.2.0/24             Self                                    I
* 172.16.3.0/24             Self                                    I
* 172.16.4.0/24             Self                                    I
* 172.16.5.0/24             Self                                    I
* 172.16.6.0/24             Self                                    I
```

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□□□ □□□ □□ □□□□ R1□ □□□□ R2□□ BGP□ □□ □□□□ □□ □□(172.16.6.0/24)□ □□□□ R1□□ BGP□ □□ □□□□ R0□□ □ □□□ □□□□. □□□ □ □□ □□□ □□□□□. □ □□ □□□□ □□ 172.16.6.0/24□ □□□ □□ □□ □□□□□ □□□ □□□□ R1□ □□□ □□□□ □□ □ □□□□.

```
user@R1> show route 172.16.6.0/24 protocol direct
inet.0: 35 destinations, 51 routes (35 active, 0 holddown, 4 hidden)
```

```
+ = Active Route, - = Last Active, * = Both

172.16.6.0/24          *[Direct/0] 2d 22:51:41
                      > via fe-1/2/3.0
```

□ □□ □□□ □□□□ □□□□ export dyn_policy2 □□□□ R0□□ BGP □□□ □□□ □□□ □□□□ R1□ □□□□ □□□ □□ □□□ □□□ □□□ □□ □ □□□□□ □□□□ □□□□□.

```
prefix-list dyn_prfx2 {
    172.16.2.0/24;
    172.16.3.0/24;
    172.16.4.0/24;
    172.16.5.0/24;
    172.16.6.0/24;
}
```

172.16.6.0/24□ □□□□ □□□□.

□□□□ R1□ □□□□ R2□ □□□□ □□ □□

□□

□□□□ R1□ □□□□ □□□ □□□ □□□□□ □□□□□.

□□

□□□□ R1□□ □□□□ R2□ show route advertising-protocol bgp □□ □□□ □□□□ □□□ □□□□□.

```
user@R1> show route advertising-protocol bgp 10.1.0.2
inet.0: 35 destinations, 51 routes (35 active, 0 holddown, 4 hidden)
  Prefix                  Nexthop              MED     Lclpref    AS path
* 172.16.1.0/24             Self                                    I
* 172.16.2.0/24             Self                                    I
* 172.16.3.0/24             Self                                    I
* 172.16.4.0/24             Self                                    I
```

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□□□□ R1□ □□ □□□ □□□□ R2□ □□□□ □□□□. □□□□ □□□□ `export static_policy2` □□□□ R2□□ BGP □□□ □□□ □□□□ □□□□ R1□ □□□□ □□□ □□ □□□ □□□ □□□ □□□ □□□□□ □□□□□.

```
prefix-list static_prfx2 {
    172.16.1.0/24;
    172.16.2.0/24;
    172.16.3.0/24;
    172.16.4.0/24;
}
```

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- ??? ?? ??? ?? | 706
- ?: ??? ???? ??? ??? ?? ??? | 708

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- ?: ??? ?? ??? | 707

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```
user@host> test policy policy-name prefix
```

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??? test policy ?? ??? ?? ?????? ?? ??? ??????. ?????? ??? ??? ? ??? ??? ??? ??? ?? ? ????. ?? ?? ??? ?? ?? ??? ???? BGP? ?? ??? ???? ?? ???? ???? BGP? ???? ???? ???? BGP ??? BGP ??? ??????. ??? ??? ? ??? test policy ??? ??? ?????? ?? ??? ??? ? BGP ??? ??????? ??? ? ????.

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```
[edit policy-options]
policy-statement reject-unwanted-routes {
    term drop-these-routes {
        from {
            route-filter 0/0 exact;
            route-filter 10/8 orlonger;
            route-filter 172.16/12 orlonger;
            route-filter 192.168/16 orlonger;
            route-filter 224/3 orlonger;
        }
        then reject;
    }
}
```

???? ????? ?? ???? ?? ? ???? ????????.

```
user@host> test policy reject-unwanted-routes 0/0
```

?? ?? ???? ?? ? ???? ????????.

```
user@host> test policy reject-unwanted-routes 10.49.0.0/16
```

?? ??

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?: ???? ????? ???? ???? ?? ????

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- ?? ?? | 708
- ?? | 708
- ?? | 711
- ?? | 716

? ????? ???? ????? test policy ???? ???? ?????? ???? ????? ???? ????? ?? ???? ???? ?????? ????? ???? ??????. ????, ?? ???? ????? ???? ?????? ????? ? ?????. ? ?????? ???? ????? test policy ????? ???? ???? ???? ????? ???? ??????.

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- ????? | 710

? ?? ?? BGP(EBGP) ???? ?? ? ???? ?????? ??????. ????? R2? BGP ??? ????? ?? ???? ????? R1? ?????. ???? ?? ? ???? ?? ????? ?? ????? ?????.

```
user@R2> show route match-prefix 172.16.* detail

inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
172.16.1.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Reject
                Address: 0x8fd0dc4
                Next-hop reference count: 8
                State: <Active Int Ext>
                Local AS: 64511
```

```
                Age: 21:32:13
                Validation State: unverified
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I
                Communities: 64510:1 64510:10 64510:11 64510:100 64510:111

172.16.2.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Reject
                Address: 0x8fd0dc4
                Next-hop reference count: 8
                State: <Active Int Ext>
                Local AS: 64511
                Age: 21:32:13
                Validation State: unverified
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I
                Communities: 64510:2 64510:20 64510:22 64510:200 64510:222

172.16.3.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Reject
                Address: 0x8fd0dc4
                Next-hop reference count: 8
                State: <Active Int Ext>
                Local AS: 64511
                Age: 21:32:13
                Validation State: unverified
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I
                Communities: 64510:3 64510:30 64510:33 64510:300 64510:333

172.16.4.0/24 (1 entry, 1 announced)
        *Static Preference: 5
                Next hop type: Reject
                Address: 0x8fd0dc4
                Next-hop reference count: 8
                State: <Active Int Ext>
                Local AS: 64511
                Age: 21:32:13
```

```
                Validation State: unverified
                Task: RT
                Announcement bits (1): 0-KRT
                AS path: I
                Communities: 64510:4 64510:40 64510:44 64510:400 64510:444
```

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```
policy-statement test-regex {
    term find-routes {
        from community complex-regex;
        then accept;
    }
    term reject-the-rest {
        then reject;
    }
}
community complex-regex members "^64510:[13].*$";
```

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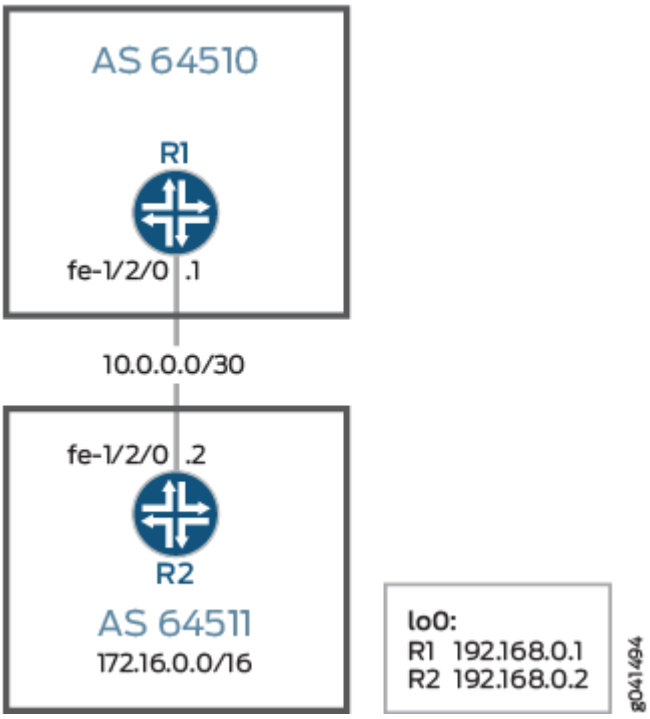

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?? "No Link Title" ??? 713? ???? R2? ??? ??????.

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CLI ?? ??

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????? R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 64511
set protocols bgp group ext neighbor 10.0.0.2
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 64510
```

????? R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext peer-as 64510
set protocols bgp group ext neighbor 10.0.0.1
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set policy-options policy-statement send-static term 2 then reject
set policy-options policy-statement test-regex term find-routes from community complex-regex
set policy-options policy-statement test-regex term find-routes then accept
set policy-options policy-statement test-regex term reject-the-rest then reject
set policy-options community complex-regex members "^64510:[13].*$"
set routing-options static route 172.16.1.0/24 reject
set routing-options static route 172.16.1.0/24 community 64510:1
set routing-options static route 172.16.1.0/24 community 64510:10
set routing-options static route 172.16.1.0/24 community 64510:11
set routing-options static route 172.16.1.0/24 community 64510:100
set routing-options static route 172.16.1.0/24 community 64510:111
set routing-options static route 172.16.2.0/24 reject
set routing-options static route 172.16.2.0/24 community 64510:2
set routing-options static route 172.16.2.0/24 community 64510:20
set routing-options static route 172.16.2.0/24 community 64510:22
set routing-options static route 172.16.2.0/24 community 64510:200
set routing-options static route 172.16.2.0/24 community 64510:222
set routing-options static route 172.16.3.0/24 reject
set routing-options static route 172.16.3.0/24 community 64510:3
set routing-options static route 172.16.3.0/24 community 64510:30
set routing-options static route 172.16.3.0/24 community 64510:33
set routing-options static route 172.16.3.0/24 community 64510:300
```

```
set routing-options static route 172.16.3.0/24 community 64510:333
set routing-options static route 172.16.4.0/24 reject
set routing-options static route 172.16.4.0/24 community 64510:4
set routing-options static route 172.16.4.0/24 community 64510:40
set routing-options static route 172.16.4.0/24 community 64510:44
set routing-options static route 172.16.4.0/24 community 64510:400
set routing-options static route 172.16.4.0/24 community 64510:444
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 64511
```

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□□□ R2 □□:

1. □□□□□□ □□□□□.

   ```
   [edit interfaces]
   user@R2# set fe-1/2/0 unit 0 family inet address 10.0.0.2/30
   user@R2# set lo0 unit 0 family inet address 192.168.0.2/32
   ```

2. BGP□ □□□□□.

   □□□ R2□□ BGP □□□ □□□ □□□ □□□ □□□□□.

   ```
   [edit protocols bgp group ext]
   user@R2# set type external
   user@R2# set peer-as 64510
   user@R2# set neighbor 10.0.0.1
   ```

3. □□ □□□ □□□ □□□ □□□ □□□□□.

   ```
   [edit policy-options policy-statement send-static]
   user@R2# set term 1 from protocol static
   user@R2# set term 1 then accept
   user@R2# set term 2 then reject
   ```

4. □□ □□□□ □□□□□ □□□ □□□ □□□□□.

```
[edit policy-options policy-statement test-regex]
user@R2# set term find-routes from community complex-regex
user@R2# set term find-routes then accept
user@R2# set term reject-the-rest then reject
[edit policy-options community]
user@R2# set complex-regex members "^64510:[13].*$"
```

5. □□ □□□ □□□□ □□□□ □□ □□□□□.

```
[edit routing-options static route 172.16.1.0/24]
user@R2# set reject
user@R2# set community [ 64510:1 64510:10 64510:11 64510:100 64510:111 ]
[edit routing-options static route 172.16.2.0/24]
user@R2# set reject
user@R2# set community [ 64510:2 64510:20 64510:22 64510:200 64510:222 ]
[edit routing-options static route 172.16.3.0/24]
user@R2# set reject
user@R2# set community [ 64510:3 64510:30 64510:33 64510:300 64510:333 ]
[edit routing-options static route 172.16.4.0/24]
user@R2# set reject
user@R2# set community [ 64510:4 64510:40 64510:44 64510:400 64510:444 ]
```

6. AS(Autonomous System) □□□ □□□ ID□ □□□□□.

   □□ □□□□ R2□ □□□ □□□□ □□□ □□□, □□□□ R1 □ □□□□ R3□□ □□□ □□□ □□□□.

```
[edit routing-options ]
user@R2# set router-id 192.168.0.2
user@R2# set autonomous-system 64511
```

□□

□□ □□□□ show interfaces, show protocols, show policy-options □ show routing-options □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R2# show interfaces
fe-1/2/0 {
```

```
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group ext {
        type external;
        peer-as 64510;
        neighbor 10.0.0.1;
    }
}
```

```
user@R2# show policy-options
policy-statement send-static {
    term 1 {
        from protocol static;
        then accept;
    }
    term 2 {
        then reject;
    }
}
policy-statement test-regex {
    term find-routes {
        from community complex-regex;
        then accept;
    }
    term reject-the-rest {
        then reject;
```

```
    }
}
community complex-regex members "^64510:[13].*$";
```

```
user@R2# show routing-options
static {
    route 172.16.1.0/24 {
        reject;
        community [ 64510:1 64510:10 64510:11 64510:100 64510:111 ];
    }
    route 172.16.2.0/24 {
        reject;
        community [ 64510:2 64510:20 64510:22 64510:200 64510:222 ];
    }
    route 172.16.3.0/24 {
        reject;
        community [ 64510:3 64510:30 64510:33 64510:300 64510:333 ];
    }
    route 172.16.4.0/24 {
        reject;
        community [ 64510:4 64510:40 64510:44 64510:400 64510:444 ];
    }
}
router-id 192.168.0.2;
autonomous-system 64511;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

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□□□ □□□□□ □□□□ □□ □□□ □□□□□ □ □□□□□ test policy*policy-name*.

□□

1. □□□□ R2□□ □□□ □□□□□□ test policy test-regex 0/0 .

```
user@R2> test policy test-regex 0/0


inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.1.0/24      *[Static/5] 1d 00:32:50
                      Reject
172.16.3.0/24      *[Static/5] 1d 00:32:50
                      Reject

Policy test-regex: 2 prefix accepted, 5 prefix rejected
```

2. □□□□ R2□□ □□ 2□ □□□□□□ □□□□ □□□□ □□ □□□□□□ □□□□ □□□□□□.

```
[edit policy-options community complex-regex]
user@R2# delete members "^64510:[13].*$"
user@R2# set members "^65020:2+$"
user@R2# commit
```

3. □□□□ R2□□ □□□ □□ □□□□□□ test policy test-regex 0/0 .

```
user@R2> test policy test-regex 0/0

inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

172.16.2.0/24      *[Static/5] 1d 00:31:36
                      Reject
```

```
Policy test-regex: 1 prefix accepted, 6 prefix rejected
```

□□

172.16.1.0 /24 □ 172.16.3.0/24 □□□□ ^64510:[13].*$ □□ □□□□ □□□□□ □□□□ □□□□. 172.16.2.0/24 □□□□ ^65020:2+$ □□ □□□□ □□□□□ □□□□.

2

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- ??? ?? ???? ? ?? ??(EX9200 ???) | **1781**

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Junos® ?? ??(Junos OS)? ??? ??? ??? ?? ? ??? ??? ??? ? ??? ???? Junos OS ?? ??? *??* *??????* ??????.

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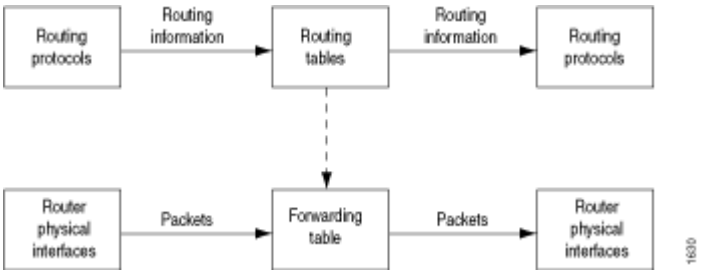

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```
set firewall family inet filter finet interface-specific
set firewall family inet filter finet term t1 from source-address 10.0.0.2/32
set firewall family inet filter finet term t1 from destination-address 10.0.0.1/32
set firewall family inet filter finet term t1 from protocol tcp
set firewall family inet filter finet term t1 from source-port ssh
set firewall family inet filter finet term t1 from destination-port ssh
set firewall family inet filter finet term t1 then count c1
set firewall family inet filter finet term t1 then log
set interfaces lo0 unit 0 family inet filter input finet
```

? 26 ??? 725, ? 27 ??? 725, ? 28 ??? 726, ? ? 29 ??? 726 (?) Junos OS Evolved? Lo0/Lo6 ??? ?? ? ??? ?? ????? ?? ?? ? ??? ??????.

□ 26: □□□ Junos OS□ □□ □□□ □□□□ □□□ □□□ □□ □□ □□

□□□ □□ □□ □□	Lo0 (□□)	LO6 (□□)
ip-destination-address	□	□
ip-source-address	□	□
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IP □□□□	□	□
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is-fragment	□	□□□
tcp-□□□	□	□
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□ 27: □□□ Junos OS□ □□ □□□ □□□□ □□□ □□□ □□ □□ □□

□□□ □□ □□ □□	Lo0 (□□)	LO6 (□□)
ip-destination-address	□□□	□

□ 27: □□□ Junos OS□ □□ □□□ □□□□ □□□ □□□ □□ □□ □□ *(Continued)*

□□□ □□ □□ □□	Lo0 (□□)	LO6 (□□)
ip-source-address	□□□	□
□□ □□□ □□	□□□	□
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□ 28: Junos OS Evolved□ □□ □□□□ □□□□ □□□ □□□ □□□ □□ □□

□□	Lo0 (□□)	LO6 (□□)
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□ 29: Junos OS Evolved□ □□ □□□□ □□□□ □□□ □□□ □□□ □□ □□

□□	Lo0 (□□)	LO6 (□□)
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□□ □□□□ Linux □□□□ □□□□ □□□□□□ netfilters□ □□□□ □□□ □□ □□□ □□□□□. □ □□□ □□ □□ □□ □□ □ □□□ □□□□□. □□□ □□□□ Junos OS□ □□□ Junos OS □□ □ □□ □□ □□□□ □□ □□□ □□□ □□□□ □□□□.

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```
set firewall family inet filter f1 interface-specific
set firewall family inet filter f1 term t1 from protocol tcp
set firewall family inet filter f1 term t1 then count c1
set firewall family inet filter f1 term t1 then accept
set firewall family inet filter f1 term t2 from protocol icmp
set firewall family inet filter f1 term t2 then count c3
set firewall family inet filter f1 term dft then count dft_cnt
set firewall family inet filter f1 term dft then accept
set interfaces re0:mgmt-0 unit 0 family inet filter input f1
```

□ 30 □□□ 727, □ □ 31 □□□ 729□ □ 32 □□□ 730 (□) □□ □□□□□□□ □□□□ □□□ □□ □□ □□ □ □□□ □□□□□.

□ 30: □□□ Junos OS□ IPv6 □□□ □□ □□□□ □□ □□□□□□ □□□□ □□□ □□ □□ □□

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address	□
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□ 30: □□□ Junos OS□ IPv6 □□□ □□ □□□□ □□ □□□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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icmp □□ □□	□
ICMP□	□
icmp □□ □□	□
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□ 30: □□□ Junos OS□ IPv6 □□□ □□ □□□□ □□ □□□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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tcp □□	□
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tcp-□□□	□
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□ 31: Junos OS Evolved□ IPv4 □□□ □□ □□□□ □□ □□□□□□ □□□□ □□□ □□ □□ □□

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dscp □□	□
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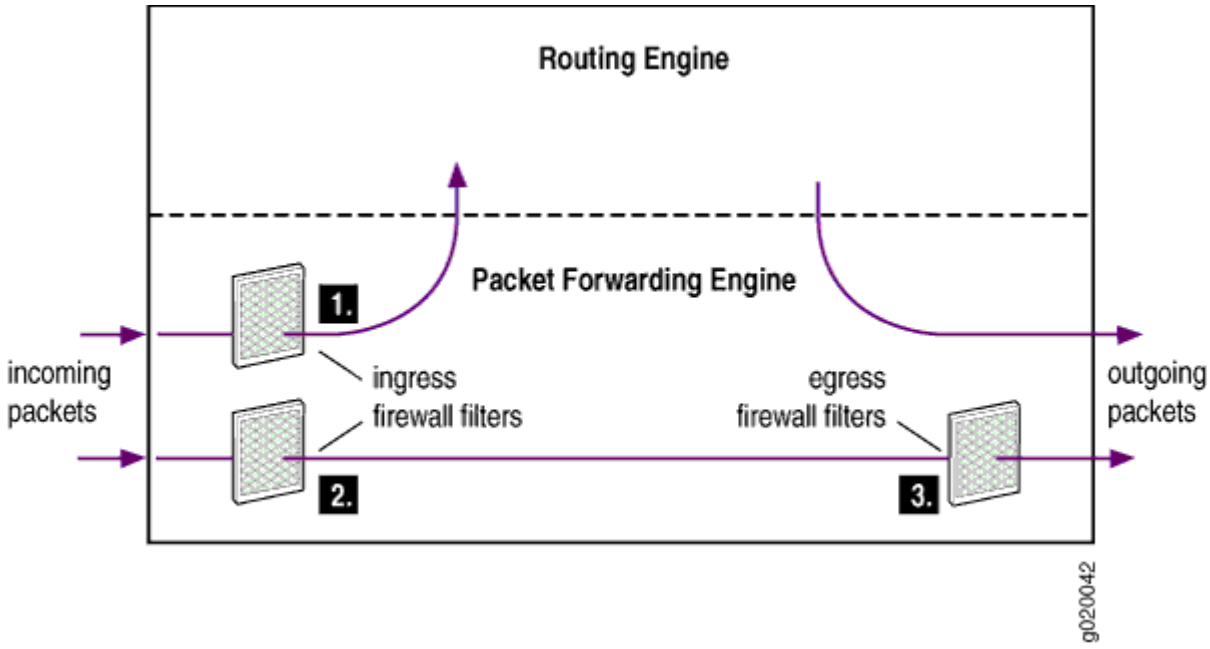

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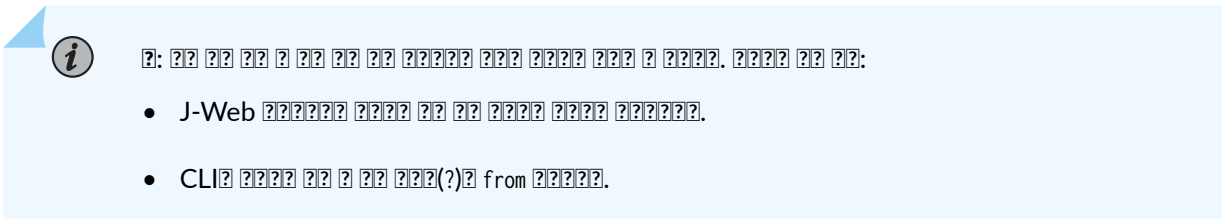

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, , ⍰⍰ ⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ `reject` `discard` `accept` ⍰⍰ , `log`, ⍰⍰ `syslog` ⍰ ⍰⍰ `count` ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ `accept` ⍰⍰⍰⍰⍰. ⍰⍰ ⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰⍰ `next term` .

> ⍰: Junos OS Evolved⍰⍰ `next term` ⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰⍰⍰ ⍰ ⍰⍰⍰⍰. `next term` ⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰.

⍰ ⍰⍰⍰ ⍰⍰ 1⍰⍰ ⍰⍰⍰ ⍰⍰ `accept` ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ 2⍰ ⍰⍰⍰⍰ ⍰⍰⍰⍰.

```
[edit firewall filter test]
term 1 {
    from {
        source-address {
            0.0.0.0/0;
        }
    }
    then {
        log;
        <accept>  #By default if not specified
    }
}
term 2 {
    then {
        reject;
    }
}
```

⍰ ⍰⍰⍰⍰ ⍰⍰ 1⍰ ⍰⍰⍰ `next term` ⍰⍰⍰ ⍰⍰ ⍰⍰⍰ ⍰⍰⍰⍰ ⍰⍰ 2⍰ ⍰⍰⍰⍰⍰.

```
[edit firewall filter test]
term 1 {
    from {
        source-address {
            0.0.0.0/0;
        }
    }
    then {
```

```
        log;
        next term;
    }
}
term 2 {
    then {
        reject;
    }
}
```

?? ?? ??

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> ??? ??? ?? ??
>
> ??? ?? FMC(Flexible Match Condition) | **809**
>
> *Junos OS ??? ? ??? ??*
>
> Junos OS CLI ??? ???

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□ 35 □□□ 740 □□□□ □□□□ □□□□ □ □□ □ □□□□ □□ □□□□□□. □ □□□□□□□ □□□□ □□ □□□□ □□ □□□□□ □□□□□ □□□□ □□ □□, □□□□ □□□□ □ □□ □□□□(□□ □□□□) □□ □□ □ □□□□□ □□ □□□□ □□□□□ □□□□□.

□ 35: Stateless Firewall Filter Configuration and Application Summary(□□□□ □□□□ □□ □□ □ □□□□□□□ □□)

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□□□ □□□□ □□
 	
□□ [edit firewall] □□□□□ filter *filter-name* □□ □□□□ □□□□□□.
 	
filter *filter-name*;
 	
□: □□□□□ □□□□□ family □□□□ □□□□ □ □□ □□□□□□ IPv4 □□□□□ □□□□□□.
	□□□□ □□□□□□
	
	[edit interfaces *interface-name* unit *unit-number* family inet] □□ output *filter-name* □□ □□□□□ input *filter-name* □□ □□□□ □ □□□□□□.
	
	filter {
	input *filter-name*;
	output *filter-name*;
	}
	
	□: □□□□ inet □□□□□ □□□□ □□□□ □□ □ □□ □□ □□ □□ □□ □□ □□ □□□□ □□□□ □ □□□□□.
	
	□: T4000 □□ 5 FPC□□ □□□□ 2 □□□□□□□ □□□□(□, □□□□ □□□□□□ □ □)□ □□□□ □□□□ DSCP, DSCP V6, inet-precedence, □□ □□ □ □□ 3 □□□□□ □□ □□□□ □□□□ □□□□ □ □□□□ □□□□ □ □□□□□ mpls-exp.
		□□ □□□□□ □□□□□.
		
		• T □□□□ □□□□
		• M320 □□□□
		• □□□□ CFEB(CFEB-e)□ □□□□ M7i □□□□
		• □□□□ CFEB-e□ □□□□ M10i □□□□
		
		MX □□□□ □□□□□ □□ MPC(Modular Port Concentrator)□□□□ □□□□□□.
		
		• 10□□□□□ □□□□ MPC
		• 60□□□□□ □□□□ □□ MPC
		• 60□□□□□ □□□□ □□□□ □□ MPC
		• 100□□□□□ □□□□ MPC
		• EX □□□□ □□□□□□□ □□

□ 35: Stateless Firewall Filter Configuration and Application Summary(□□□ □□□ □□ □□ □ □□□□□□ □□) *(Continued)*

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□□□ □□□ □□
 	
[edit firewall family *family-name*] □□ □□□□ □□□□ □□ □□□□ □□□□ □.
 	
filter *filter-name*;
 	
□ *family-name* □□ □□□□ □□□ □ □□□ □ □□□□.
 	
• any
• bridge
• **ethernet-switching**
• **ccc**
• inet
• inet6
• mpls
• vpls
	□□□ □□□□□□□ □□□□ □□□
	
	[edit interfaces *interface-name* unit *unit-number* family *family-name*], input-list, output □□ output-list □□ □□□□ input□ □ □□□□ □□□□□.
	
	filter {
	input *filter-name*;
	input-list [*filter-names*];
	output *filter-name*;
	output-list [*filter-names*];
	}
		□□□□ □□□ bridge □ MX □□□ □□□□□□ □□□□□.

□□□ □□□ □□	□□□ □□ □□□ □□□□□	

□ 35: Stateless Firewall Filter Configuration and Application Summary(□□□ □□□ □□ □□ □ □□□□□□ □□) *(Continued)*

□□ □□	□□□□□□ □□□	□□

□□□ □□
 	
[edit firewall family (inet | inet6)] □□ □□□□ □□□□ □□ □□□□ □□ □□□.
 	
service-filter *service-filter-name*;
	□□□ inet □□ inet6 □□□ □□□□□
	
	□□ □□□□ service-set □□ □□□□ □ □□ □□□ □□□ □□□ [edit interfaces *interface-name* unit *unit-number* family (inet | inet6)] □□ □□ □□ □□ □□□ □□□□□.
	
	service {
	input {
	service-set *service-set-name* service-filter *filter-name;*
	
	}
	output {
	service-set *service-set-name* service-filter *filter-name;*
	
	}
	}
	
	□□ □□ □□□□ □□ □□□□ □□□ □□□ [edit services] □□□□□.
	
	service-set *service-set-name*;
		□□□ □□□(AS) □ □□□□□(MS) PIC□□□ □□□□□.

표 35: Stateless Firewall Filter Configuration and Application Summary(□□□ □□□ □□ □□ □ □□□□□□ □□) *(Continued)*

□□ □□	□□□□□□ □□□	□□

□□ □□□ □□
 	
[edit firewall family (inet | inet6)] □□ □□□□ □□□□ □□ □□□□ □□ □□□.
 	
service-filter *service-filter-name*;
	□□□ inet □□ inet6 □□□ □□□□□
	
	[edit interfaces *interface-name* unit *unit-number* family (inet | inet6)] □□□ □□□ □□ □□ □ □□□□ □□ □□□□ post-service-filter □□ □□□□ □□□□□.
	
	service {
	input {
	post-service-filter *filter-name*;
	}
	}
		□□ □□□ □□□ □□□ □□ □ □□□ □□□□□□ □□□□□ □□□□ □□□□□. □□□ □□□ □□□ □□□□ □□□ □□□□ □□□□□.

□□□ □□ [edit firewall family inet] □□ □ □□□ □□□□ □□ □□□□ □□□□□. simple-filter *filter-name*	□□□ □□□□□□ □□□ inet [edit interfaces *interface-name* unit *unit-number* family inet] □□ □□ □□□□ □□ □□□□ □□□□ □. simple-filter *simple-filter-name*;	□□ □□□ □□ □□□□ □□□ □ □□□□. □□ □□□□□□ □□□□□. • M120, M320 □ T □□□ □□□□ □□□□ □□□ □□□ □□(IQ2) PIC. • MX □□□ □□□(□ EX □□□ □□□)□ □□□ □□ EQ DPC(Dense Port Concentrator).

□ 35: Stateless Firewall Filter Configuration and Application Summary(□□□ □□□ □□ □□ □ □□□□□□ □□) *(Continued)*

□□ □□	□□□□□□ □□□	□□

RPF(Reverse Packet Forwarding) □□ □□
 	
□□ □□ □□□□ □□ □□□□ □□□□□ [edit firewall family (inet | inet6)].
 	
filter *filter-name*;
	□□□ inet □□ inet6 □□□ □□□□□
	
	[edit interfaces *interface-name* unit *unit-number* family (inet | inet6)] □□ □□ □□□□ □□ □□□□ □□□□□.
	
	rpf-check fail-filter *filter-name*
	
	□ □□□□ □□ □□□ □□□ □□□ RPF □□ □□□ □□□□□.
	
	rpf-check {
	fail-filter *filter-name*;
	mode loose;
	}
		MX □□□ □□□ □ EX □□□ □□□□□□ □□□□□.

□□ □□□ □□□ □□□ □□□□ □□

in this section

- □□□ □□ □□ □□ □□ | 745
- □□ □□□ □□□□ □□ □□ | 745
- □□ □□: □□□□□ □□□□ □□ □□ □□□□ □□□□□ □□ | 746
- □□ □□: □□□□□ □□□□ □□ □□□□ □□□□□ □□□□□. | 747
- □□ □□□□□□ □□□ □□ □□□ □□ | 747
- □□ □□□□□□ □□□ □□ □□□ □□ | 747

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1. ?????? ??? ? ?? ????? ????? ??? ??? ??? ?? ??? ?????? ??????.

   - ??? ??? ??? ?? ??? ????? ?????? ?? ??? ??? ?? ??? ??????.
   - ??? ??? ??? ?? ??? ????? ??? ?????? ??? ?? ??(?? ??? ?? ??)? ????? ?? ??? ?? ??? ??????.
   - ??? ??? ??? ??? ????? ??? ?????? ?????? ??? ??????.

2. ??? ?? ? ?? ??? ?? ??? ??? ?? ??? ??? ??? ??? ?? ?? ?? ??? ??? ?????? `next term` .

   ?: Junos ? Junos OS Evolved `next term` ??? ??? ??? ??? ??? ? ?????. `next term`? ????? ????? ?? ???? ?? ???? ?? ?? ?? ??? ????? ?????.

   - ????? ??? ??? ??? `next term` ?? ?????? ??? ?? ?? ?? ????? ?? ??? ??????.
   - ????? ??? ??? ????? `next term` ?? ?? ??? ??? ??? ?? ?? ??? ? ????? ??????. ?????? ? ???? ?? ???? ?? ?? ? ????? ?????.

   ??? ?? ??? ?? 1024 `next term` ?? ??? ??????. ? ??? ????? ??? ??? ????? ?? ??? ?? ??? ??????.

3. ??? ?? ?? `next term` ??? ?????? ??? ??? ??? ??? ??? ????? ?? ??, ?????? ??? ??? ??? ?? ?? ??? ??????.

4. ?? ???? ?? ???? ??? ??? ??? ??????? ????? ??? ??? ? ? ??????. ? ?? ???? ??? ??? ????? ?? ?? ??? ?? ??? ????? ?????, ? ?? ???? ????? ???? ??? ??????? ????? ??? ????? ??????.

   ?: ?? ??(??? ??? ?????? ??? ??? ?? ????? ??? ??)?? ?????? ??? ????? ???, Telnet ?? SSH? ?? IP ????? ?? ???, ICMP(Internet Control Message Protocol)? ?? ?? ?????? ?? ????? ??? ??.

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? 36 ??? 746 ?(?) ?? ??? ??? ??? ????? ?????????? ?? ??? ??? ??????.

□: Junos OS Evolved□□ next term□ □□□ □□□ □□□ □□□ □ □□□□. next term□ □□□□ □□□□□□ □□□ □□ □□□ □□ □□ □□ □□□ □□□□ □□□□.

□ 36: □□ □□□ □□□□ □□ □□

□□□ □□ □□□	□□	□□ □□
□□□ □□ □□□ □□ □□□ □□□□ □□□□.	□ □□□ □□□□□ □□ □□□ □□□□□ □□□□□ □□ □ □□ □□□ □□□ □□□□□.	□□ □□□ □□□ □□□ next term □□, □□ □□□ □□□ □□ □□□ □□ □□□ □□ □□ □□ □ □□□□□(□□ □□□ □□□□ □□).
□□□ □□□ □□ □□□ □□□ □□ □□□ □□□□□.	□□□□□ □□ □□□ □□□ □□□ □□□□□.	□□ □□□ □□□ □□□ next term □□, □□ □□□ □□□ □□ □□□ □□ □□□ □□ □□ □□ □ □□□□□(□□ □□□ □□□□ □□).
□□□ □□□ □□ □□□ □□□ □□ □□□ □□□□□ □□ □ □□□ □□□ □□□□ □□□□.	□□□□□ □□□ □□□□□ □□□□□.	□□ □□□ □□□ □□□ next term □□, □□ □□□ □□□ □□ □□□ □□ □□□ □□ □□ □□ □ □□□□□(□□ □□□ □□□□ □□).
□□□ □□□ □□ □□□ □□□ □□ □□□ □□□□ □□□ □.	□□□□□ □□ □□□ □□□ □□□ □□□□ □□□□.	□□□□□ □□ □□ □□ □□□ □□ □□ □□□ □ □□□□(□□ □□□ □□□□ □□).

□□□ □□□ □□□ □□□□ □□□□.	□□□□□ □□□□□ □□□ □□□□
	
	□□ □□□ □□ □□□□ □□ □□ □□□ discard □□□ □□□□□. □ □□□ □□ □□□ □□□ □□□□ □□ □ □ □□ t_explicit_discard □ □□ □□□ □□□□ □□ □□□□.
	
	term t_explicit_discard {
	then discard;
	}	

□□ □□: □□□□□ □□□□ □□ □□ □□□□ □□□□□ □□

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□□ □□ □□□□□ □□□ □□□ t_allow_all_else □□□ □□□ □□□ □□□□ □□□ □□□□□ □□□□ □□ □□ □□□□ □□□□□ □□□ □□□ □□□□□ □□□□□.

```
term t_allow_all_else {
    then accept;
}
```

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```
term t_deny_all_else {
    then reject;
}
```

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- Junos OS□ □□□ □□□ □ □□□□□□ □□□□□□ □□□□□ □□□ □□□□□□ □□□ □□□□□.

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fast-lookup-filter

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- PTX □□□□ □□□ □□ □□□ □□ | 751
- □: □□□ □□□ □□ □□□(PTX □□□) | 752

PTX □□□□ □□□ □□□ □□ □□□

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- □□ □□ □□□□□□ □□ □□□ □□□ □□□□, □□□ □□□□ □□□□□(□: DDoS □□ □). □□□□□ □□□ □□□ □□□□ □□ □□ □□□□□ □□□ □□□□□. □□□ □□□□ □□□ □□ □□□□□ □□□□ □□□□ □□□ □□□ □□□□ □□□□ □□□ □□ □□□□□ □ □□□□. □□□ □□□□□ PTX□ □ □ □□ □□ □□□ □□□□□ □□ □□□□□ □□□□□, PTX□□□ □□ □□□ □□□□ □□ □□ □□□□□ □□□ □□□□□ □□ □□□ □□ □□ □□□□ □ □□ □□□□□. □□□□ □ □□ □□□□ □□□□□ □□□ □ □□ □□□ □□□□ □ □□ □□ □□ □□ □□(□□□ □□□)□ □□□□□. □□□ □□ □□□ □□□ □□ □□□□ □□□□ □□ □□ □□□□□□□ □□□□□. □ □□□□□ □□ □□□□ □□□ □□□□ □□□ □□□ □□□□ □□ □□ □□ □□□□□ □□□□ □□ □□□.

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□□□ □□ □□□□ □□□□ □□ PTX □□□□ □□□ □□□□ □ □□ □□□ □□□ □□□□ □□□□□□□. source-class □ destination-class.

CLI □□□ □□□ □□□□, **src-class-name** □□ **dest-class-name** □ □□ □□□□ □□□ □□□ □□□□□.

```
routing-options forwarding-table source-class src-class-name family [inet | inet6] filter
<filter-name>
```

```
routing-options forwarding-table destination-class dest-class-name family [inet | inet6] filter
<filter-name>
```

□□ □□ SCU □ DCU □□□□ □□ □□□□□ □□□ □□□ □ □□□□. □□□□□ □□□ □□□ □ □□□ □□□ □□□ □□ □□□□□□□□□. □□□□□ □□□ □□ □ □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □□□□□.

```
firewall family [inet | inet6] filter <filter name> instance-specific
```

PTX □□□□ □□□ □□ □□□ □□

□□□□ SCU(Source Class Usage) □□□ □□□□ □□ □□□(□□ □□□□ □□)□□ □□ □□□□□□ □□□ □□□□ □□ □□□ □□□□□. DCU(Destination Class Usage)□ □□ □□ □□□□ □□□□ □□ □□□□□ □□□□□□□ □□□ □□□□ □□ □□□ □□□□ □□ □□□□□□□.

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- □□□ □□□ □□ □□ □ □□□(forwarding-options family inet filter<filter-name> □□ □□). Express 2(PE) □ Express 3(ZX) □□□□□ □□□□□. □□□ □□□ □□ □□□□□□□ □□□□□□□□ □□ □□□ □□ □□ □□□□□ □□□ □□□□□.
- □□ □□ □□ □□□□ □□□ □□(set routing-options forwarding-table source-class src-class-name family [inet | inet6] filter<filter- name>). Express 2(PE), Express 3(ZX) □ Express 4(BT) □□□□□ □□□□□. □ □□□ □□ □□□□□ □□ □□□□□□□□. □□ □□□ □□□□ □□□ □ □□□□ □□□□□. □ □□□ □□□ □□□□ □□□□□ □□□ □□□ □□□ □□□□ □□ □□□□ □□□□□. □□ □□ □□□ □□□□□□ □□ □□□□□□□ □□□□ □□□□ □□ □□□□ □□ □□□□□□□□□ □□□□ □□□.

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- uRPF □□□ □□□□□□ uRPF □□ □□□ □□ □□□ □□□ SCU/DCU □□□ □□□ □□□□. □□□, □□□ □□□ □□ □ □□ □□□ □□□ □□□ □ □□□□.

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- DCU ?????? ??? ?? ??? ??? ??????.
- SCU ?? ?????? ??? ?? ??? ???? ???? ????.
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- IPv4 ? IPv6? ???? ???? ????????. MPLS? ???? ????.
- ??? SCU? DCU ??? ??? ?? ?? ??? ???? ??? ??(?, DCU ??)? ??? ???? ? ?? ??? ?????? ????.

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? ?? ?? ?? ?? ??? ???? IPv4 ? IPv6 ??? ???? ??? ??(??, ?? ?? ???)? ???? ??? ??????. ?? Junos Evolved OS ??? 21.2? ???? PTX10001-36MR, PTX10003-160C, PTX10003-80C, PTX10004 ? PTX10008 ??? PTX10016, JUNOS Evolved OS ??? 21.4? ???? ??? ?? PTX3000, PTX-5000, PTX1000, PTX10002, PTX10008 PTX10016 Junos OS ??? 21.2 ??? ??????? ???? ???? ??????.

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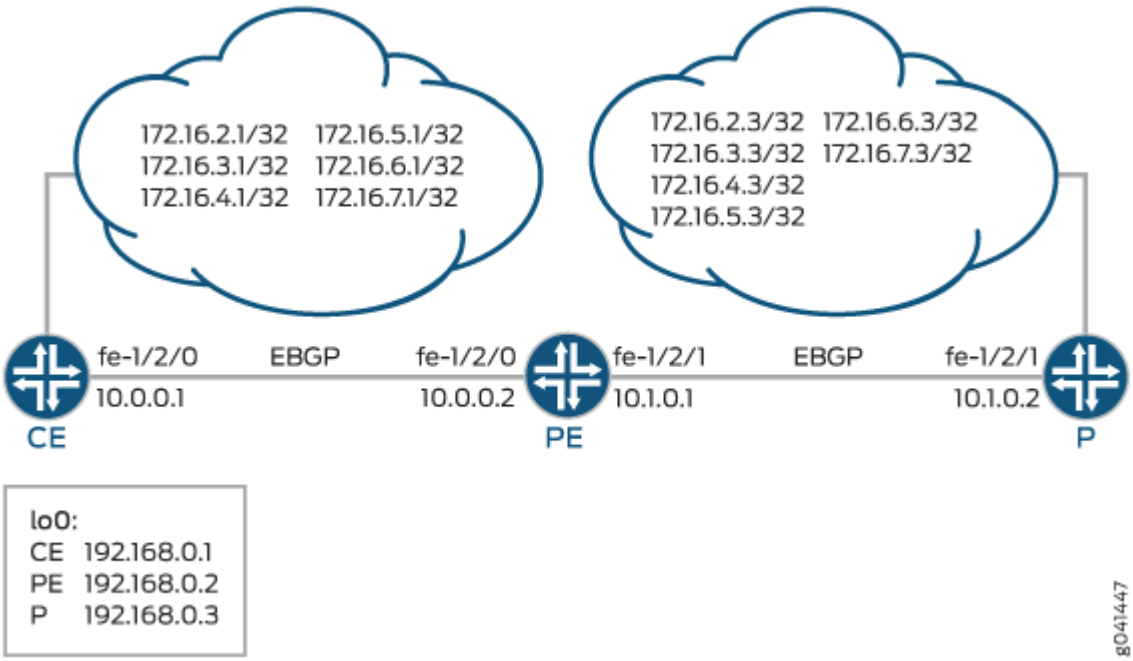

□ □□□□ □ □□ □□□ □□□□ □□□□□. **SCU-1** □ **SCU-2**□ □□, □ □□□ □□□ 172.16.2.0/24□ □□□□ □□□□ □ □□□ □□□ 172.16.3.0/24□ □□□□ □□□□□. □□ □□□□□ □□□ □□□ □□□□. □□ CLI □□□□□ □ □ □□□ □□□ □□□ PE □□□□ □□□□ source-class scu-1 □ source-class scu-2□ □□□□ □□□□□.

```
show policy-options
policy-statement scu-class {
    term gold {
        from {
            route-filter 172.16.2.0/24 orlonger;
              }
        then source-class scu-1;
        accept;
    term silver {
        from {
            route-filter 172.16.3.0/24 orlonger;
```

```
            }
        then source-class scu-2;
        accept;
        }
```

CE□□ PE□ □□□□□□□ □□□□ □□□□ □□□□ □□ PE □□□□ □□□ **dcu-class** □□ □□□ □□ □□□ □□□□ **□□□□ dcu-1**□ □□□□, □□ □ □□□□ □□□ □□□ □□□□.

```
show policy-options
policy-statement dcu-class {
    term gold {
        from {
            route-filter 172.16.5.0/24 orlonger;
            }
        then destination-class dcu-1;
        accept;
        }
```

□□ □□ □□□ □□□ □□□□ □□□□□.

```
forwarding-table {
    export [ dcu_class scu_class ];
}
```

□□ □□□□□ PE □□□□ □□□ □□□□□.

```
show firewall {
    family inet {
        filter f1 {
            term t1 {
                from {
                    protocol icmp;
                    }
                then {
                    count c1;
                    }
                }
            }
```

```
        }
    }
```

□□□ □ □□□ PE □□□□ □□ □□ □ □□ □□□ □□□ □□□□ □□□□□.

```
show routing-options forwarding-table
source-class scu-1 {
    family inet {
        filter {
            f1;
        }
    }
}
destination-class dcu-1 {
    family inet {
        filter {
            f1;
        }
    }
}
```

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□□ CE

```
set interfaces et-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
```

```
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set policy-options policy-statement send-direct term 1 from protocol direct set policy-options
policy-statement send-direct term 1 then accept
set policy-options policy-statement send-static term 1 from protocol static set policy-options
policy-statement send-static term 1 then accept
set routing-options static route 10.1.0.0/30 next-hop 10.0.0.2 set routing-options autonomous-
system 100
```

□□□□ PE

```
set interfaces et-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces et-1/2/1 unit 0 family inet accounting source-class-usage input
set interfaces et-1/2/1 unit 0 family inet accounting destination-class-usage
set interfaces et-1/2/1 unit 0 family inet address 10.1.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols bgp group ext neighbor 10.1.0.2 peer-as 300
set policy-options policy-statement dcu_class term gold from route-filter 172.16.5.0/24 orlonger
set policy-options policy-statement dcu_class term gold then destination-class dcu-1
set policy-options policy-statement scu_class term gold from route-filter 172.16.2.0/24 orlonger
set policy-options policy-statement scu_class term gold then source-class scu-1
set policy-options policy-statement scu_class term silver from route-filter 172.16.3.0/24
orlonger
set policy-options policy-statement scu_class term silver then source-class scu-1
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set firewall family inet filter f1 term 0 from protocol icmp
set firewall family inet filter f1 term 0 then count c1
set firewall family inet filter f1 term 0 then accept
set routing-options autonomous-system 200
set routing-options forwarding-table export dcu_class
set routing-options forwarding-table export scu_class
```

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```
set interfaces et-1/2/1 unit 0 family inet address 10.1.0.2/30
set interfaces lo0 unit 0 family inet address 192.168.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set interfaces lo0 unit 0 family inet address 172.16.0.3/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext export send-static
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.1.0.1
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set policy-options policy-statement send-static term 1 from protocol static
set policy-options policy-statement send-static term 1 then accept
set routing-options static route 10.0.0.0/30 next-hop 10.1.0.1
set routing-options static route 172.16.2.0/24 discard
set routing-options static route 172.16.3.0/24 discard
set routing-options static route 172.16.4.0/24 discard set routing-options static route
172.16.5.0/24 discard set routing-options static route 172.16.6.0/24 discard set routing-options
static route 172.16.7.0/24 discard set routing-options autonomous-system 300
```

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1. PE □□□□ □□□ □□□□□□□ □□□□□.

```
[edit interfaces]
set et-1/2/0 unit 0 family inet accounting source-class-usage output
set et-1/2/0 unit 0 family inet address 10.0.0.2/30
set et-1/2/1 unit 0 family inet accounting source-class-usage input
set et-1/2/1 unit 0 family inet accounting destination-class-usage
set et-1/2/1 unit 0 family inet address 10.1.0.1/30
set lo0 unit 0 family inet address 192.168.0.2/32
```

2. PE □□□□□ BGP□ □□□□□.

```
[edit]
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols bgp group ext neighbor 10.1.0.2 peer-as 300
```

3. PE □□□□ AS(Autonomous System) □□□ □□□□□.

```
[edit]
set routing-options autonomous-system 200
```

4. PE □□□□□ DCU □□□ □□□□□.

```
[edit]
set policy-options policy-statement dcu_class term class-1 from route-filter 172.16.5.0/24
orlonger
set policy-options policy-statement dcu_class term class-1 then destination-class dcu-1
```

5. PE □□□□□ SCU □□□ □□□□□.

```
[edit]
set policy-options policy-statement scu_class term class-1 from route-filter 172.16.2.0/24
orlonger
set policy-options policy-statement scu_class term class-1 then source-class scu-1
```

6. PE □□□□ □□□ □□□□ □□□ □□□□□.

```
[edit]
set routing-options forwarding-table export dcu_class
set routing-options forwarding-table export scu_class
```

7. PE □□□□ □□□ □□□□□.

```
[edit]
set firewall family inet filter f1 from protocol icmp then count c1
```

8. □□□ PE □□□□ □□ □□□ □ □□ □□□ □□□ □□□□ □□□□□□.

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```
[edit]
set routing-options forwarding-table destination-class dcu-1 family inet filter f1
```

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```
[edit]
set routing-options forwarding-table source-class scu-1 family inet filter f1
```

9. (□□ □□) PE □□□□□ □□ □□□ □□□□ □□□ □□□ □□□□□.

```
[edit]
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
```

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□□ □□ □□ PE □□□□ , show interfacesshow protocols, show policy-options, □ show routing-options □□□ □□□□ □□□ □□□□ □. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
show interfaces
et-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
            }
```

```
        }
     }
et-1/2/1 {
    unit 0 {
        family inet {
            accounting {
                source-class-usage { input;
                    }
            }
            address 10.1.0.1/30;
            }
        }
     }
lo0 {
    unit 0 {
        family inet {
            address 192.168.0.2/32;
                }
            }
        }
```

```
show interface statistics et-1/2/0
Physical interface: et-1/2/0:0, Enabled, Physical link is Up
    Interface index: 1087, SNMP ifIndex: 622
    Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, BPDU Error: None, Loop
Detect PDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
    Source filtering: Disabled, Flow control: Enabled, Media type: Fiber Device flags    :
Present Running
    Interface flags: SNMP-Traps
    CoS queues    : 8 supported, 8 maximum usable queues
    Current address: e4:5d:37:4e:e8:40, Hardware address: e4:5d:37:4e:e8:40 Last flapped    :
2021-03-16 09:33:43 PDT (03:39:51 ago)
    Statistics last cleared: 2021-03-16 13:13:01 PDT (00:00:33 ago) Input rate    : 0 bps (0 pps)
    Output rate    : 0 bps (0 pps) Input errors: 0, Output errors: 0 Active alarms : None
    Active defects : None
    PCS statistics    Seconds
        Bit errors    0
        Errored blocks    0
    PRBS Mode : Disabled
    Interface transmit statistics: Disabled Link Degrade :
```

```
        Link Monitoring    :  Disable

    Logical interface et-1/2/0:0.0 (Index 1047) (SNMP ifIndex 673)
        Flags: Up SNMP-Traps
        Encapsulation: ENET2
        Input packets : 14
        Output packets: 6
        Protocol inet, MTU: 1500
        Flags: Sendbcast-pkt-to-re, SCU-out
                            Packets     Bytes
       Source class (packet-per-second) (bits-per-second)
                scu-1  6   504
                   (   0)(    0)
    Addresses, Flags: Is-Preferred Is-Primary
        Destination: 44.4.4/24, Local: 44.4.4.4, Broadcast: 44.4.4.255
    Protocol inet6, MTU: 1500
        Flags: None, SCU-out
                    Packets  Bytes
        Source class (packet-per-second) (bits-per-second)
            scu-1    0    0
            (        0) ( 0)
        Addresses, Flags: Is-Preferred Is-Primary
            Destination: 4001::/64, Local: 4001::4001
        Addresses, Flags: Is-Preferred
            Destination: fe80::/64, Local: fe80::e65d:37ff:fe4e:e840
        Protocol multiservice, MTU: Unlimited
            Flags: None
```

```
show firewall
Filter: f1
Counters:
Name        Bytes        Packets
c1            0            0
Filter: v4_instance_new-scu-scu-1
Counters:
Name                            Bytes        Packets
c_v4_instance_new-scu-scu-1       504            6
Filter: v6_instance_new-scu-scu-1
Counters:
```

```
Name                              Bytes        Packets
c_v6_instance_new-scu-scu-1         0            0
```

```
show policy-options
policy-statement dcu_class {
    term class-1 {
        from {
            route-filter 172.16.5.0/24 orlonger;
            }
        then destination-class dcu-1;
            }
        }
policy-statement scu_class {
    term class-1 {
        from {
            route-filter 172.16.2.0/24 orlonger;
            }
        then source-class scu-1;
        }
       }
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
    }
}
```

```
show routing-options
autonomous-system 200;
forwarding-table {
    export [ dcu_class scu_class ];
}
```

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in this section

- ??? ?? ??? ?? ? ?? | 763
- ??? ?? ???? ??? | 764
- ??? ?? ?? ? ?? | 765
- ??? ?? ?? | 765
- ??? ?? ?? ?? | 765
- ??? ?? ?? | 767

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```
firewall {
    family family-name {
        filter filter-name {
            accounting-profile name;
            instance-shared;
            interface-specific;
            physical-interface-filter;
            term term-name {
                filter filter-name;
            }
            term term-name {
                from {
                    match-conditions;
                    ip-version ip-version {
                        match-conditions;
                        protocol (tcp | udp) {
                            match conditions;
                        }
```

```
                    }
                }
                then {
                    actions;
                }
            }
        }
    }
}
```

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- [edit]
- [edit logical-systems *logical-system-name*]

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□: ACX7100 □□□□□ VPLS □□□ □□□ □□□ □□ family VPLS□□□ family ethernet-switching □□□□□. □□ □□□ □□□ □□ inet6 □□ inet □□□□ □□□ □□□ □□ □□□□□.

set interfaces re0:mgmt-0 unit *logical-unit-number* family family-name filter input *filter-name*.

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- family any- □□□□ □□□ □□□□ □□□□□□.
- family inet- □□□ □□□□ □□ 4(IPv4) □□□□ □□□□□□.
- family inet6- IPv6(Internet Protocol version 6) □□□□ □□□□□□.
- family mpls- MPLS □□□□ □□□□□□.
- family vpls- VPLS(Virtual Private LAN Service) □□□□ □□□□□□.
- family ccc- □□□ 2 CCC(Circuit Cross-Connection) □□□□ □□□□□□.
- family bridge- MX □□□ 3D □□□□ □□ □□□□ □□□□ □□□ 2 □□□ □□□□ □□□□□□.

- family ethernet-switching- ??? 2(???) ????? ???????.

?? family *family-name* IPv4 ??? ????? ????? ????? ?? ??????. IPv4 ??? ??? ?????? ? [edit firewall family inet] ? ? ??? ?????? ?? ????? family inet ?? ?? ????? ??? [edit firewall] ??? ? ?????[edit firewall].

?: ??? ??? ??? ?? *ip-protocol* ?? ??? IPv4? ????? ????? IPv6? ????? ????? ?????. ?? MX 3D MPC ?? ??? ?? Junos Trio ??? ????? ?? ??? ??????.

??? ?? ?? ? ??

family *family-name* ? ??? ??? ??? ??? ??? ????? ?? ??? filter *filter-name* ? ?????. ?? ??? ??, ?? ? ???(-)? ??? ? ??? ?? 64? ??????. ??? ??? ?????? ?? ??? ???(" ")? ?????.

[edit firewall family *family-name* filter *filter-name*] ?? ????? ?? ?? ?? ??????.

- accounting-profile
- instance-shared (MPCS(Modular Port Concentrator)? ?? MX ??? ????? ??)
- interface-specific
- physical-interface-filter

??? ?? ??

filter *filter-name* ? ??? ?? ????? term *term-name* ?? ??? ????? ??? ??? ? ?????.

- ??? ????? ?? ??? ??? ????? ???.
- ??? ?? ??? ? ??? ?? ??? ??? ????? ???. ?? ??? ??, ?? ? ???(-)? ??? ? ??? ?? 64??? ??????. ??? ??? ?? ??? ?? ??? ???(" ")? ?????.
- ??? ?? ?? ??? ??? ????? ??? ??????. ??? ?? ??? ??? ????? ??????. ?????? ? ??? ?? ?? ??? ?? ??????. ?? ?? ??? insert ????? ??? ??? ??? ????? ? ?????.

[edit firewall family *family-name* filter *filter-name* term *term-name*] ?? ????? ?? filter *filter-name* ?? then ?? from ??? ??? ????? ?????. ? ?? ??? filter *filter-name* ??? ?? ??? ??? *??* ?? ? ??????.

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MPLS ??? ??? IPv4 ?? IPv6 ????? ?????, ?????? from ??? ?? ??? ??????. MPLS ??? ??? IPv4 ????? ??, ??? ip-version ipv4 ??? IPv4 ??? ?? ??? ????? ??? protocol (tcp | udp) ??? IPv4 ??? ?? ??? ??????.

MPLS □□□ □□□ IPv6 □□□□ □□, □ □□□ ip-version ipv6 □□□ IPv6 □□□ □□ □□□ □□□□ □ □□□ protocol (tcp | udp) □□□ IPv6 □□□ □□ □□□ □□□□□.

□ 37 □□□ 766 □□□ □□□ □□□ □□□ □ □□ □□□ □□□ □□□□□.

□ 37: □□□□ □□□□ □□□ □□ □□ □□

□□□ □□	□□ □□□ □□□□ □□ □□
□□□□ □□□	[edit firewall family any filter *filter-name* term *term-name*] □□ □□□ □□ □□□ "□□□□ □□□ □□□□ □□ □□□ □□ □□ □□□" □□□ 891 □□□□□□.
IPv4	[edit firewall family inet filter *filter-name* term *term-name*] □□ □□□ □□ □□□ "IPv4 □□□□ □□ □□□ □□ □□ □□□" □□□ 894 □□□□□□.
IPv6	[edit firewall family inet6 filter *filter-name* term *term-name*] □□ □□□ □□ □□□ " IPv6 □□□□ □□ □□□ □□ □□ □□□" □□□ 911 □□□□□□.
MPLS	[edit firewall family mpls filter *filter-name* term *term-name*] □□ □□□ □□ □□□ "MPLS □□□□ □□ □□□ □□ □□ □□□" □□□ 949 □□□□□□.
MPLS □□□□ IPv4 □□	[edit firewall family mpls filter *filter-name* term *term-name* ip-version ipv4] □□ □□□ □□ □□□ "MPLS □□□ □□□ IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□□" □□□ 957 □□□□□□.
MPLS □□□□ IPv4 □□	[edit firewall family mpls filter *filter-name* term *term-name* ip-version ipv4 protocol (tcp | udp)] □□ □□□ □□ □□□ "MPLS □□□ □□□ IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□□" □□□ 957 □□□□□□.
MPLS □□□□ IPv6 □□	[edit firewall family mpls filter *filter-name* term *term-name* ip-version ipv6] □□ □□□ □□ □□□ "MPLS □□□ □□□ IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□□" □□□ 957 □□□□□□.
MPLS □□□□ IPv6 □□	[edit firewall family mpls filter *filter-name* term *term-name* ip-version ipv6 protocol (tcp | udp)] □□ □□□ □□ □□□ "MPLS □□□ □□□ IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□□" □□□ 957 □□□□□□.

□ 37: □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

□□□ □□	□□ □□□ □□□□ □□ □□
VPLS	[edit firewall family vpls filter *filter-name* term *term-name*] □□ □□□ □□ □□□ "VPLS □□□□ □□ □□□ □□ □□ □□□" □□□ 960 □□□□□□.
□□□ 2 CCC	[edit firewall family ccc filter *filter-name* term *term-name*] □□ □□□ □□ □□□ "□□□ 2 CCC □□□□ □□ □□□ □□ □□ □□□" □□□ 977 □□□□□□.
□□□ 2 □□□ (MX □□□ □□□ □ EX □□□ □□□□ □□)	[edit firewall family bridge filter *filter-name* term *term-name*] [edit firewall family ethernet-switching filter *filter-name* term *term-name*] (EX □□□ □□ □ □□) □□ □□□ □□ □□□ "□□□ 2 □□□ □□□□ □□ □□□ □□ □□ □□□" □□□ 982 □□□□□□.

□□ □□(address, destination-address, □□ source-address □□ □□)□□ IPv6 □□□ □□□□ □□ RFC 4291, *IP □□ 6 □□ □□ □□□ □□* □□□ □□□ □□ □□□ □□□□□. IPv6 □□□ □□ □□□ □□□ IPv6 □□ □ □□□□ IPv6 □□□ □□□□□□.

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□□□ □□ □□□ then □□ □□□ □□□ □□□□ □□□ □□ □□□ □□□ □□□ □ □□□□.

□ 38 □□□ 767 □□□ □□ □□□ □□□ □ □□ □□ □□□ □□□□□.

□ 38: □□□ □□ □□ □□

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□ 38: □□□ □□ □□ □□ *(Continued)*

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□□□ □□	□□ □□□ □□□ □□□□ next term □ □□□ □□□(□□ □□□)□ □□□ □□ □□□ □□□ □□□□□ □□□ □□, □□□ □□□□ □□ □□□ □□ □□□ □□□□ □□□ □□□□□. next term □□□ □□□ □□ □□□ □□□ □□ □□□ □□ □□□□ □□□ □□□□□. □□□ □□□ □□□□ □□□ □□□ □□ □ □□ □□□ □□ □□□□ □□□□. □□ □□, nonterminating □□ count□□ □□□ □□□□ □□□ □ □□ □□□ discard □□ □□□ accept□□ □□□□□. □ next term □□□ □□□ □□□ □□ □□□□□ □□□□□.	□□□ □□ □□□□ next term □□ □□□□ □□□ □□□ □ □ □□□. □□□ □□□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □ □ □ □□□ □□□ □ □□□□. □□ □□□ □□ □□□ □□ 1024 next term □□ □□□ □□ □□□. □ □□□ □□□□ □□ □□□ □□□ □□□□ □□ □□□ □□ □□□ □□□□□. □: Junos OS Evolved□□ next term□ □□□ □ □□ □□□ □□□ □ □□□□. next term□ □□□□ □□□□ □□ □□□ □□ □□□ □□ □□ □□ □□□ □□□□ □□□□.

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in this section

- □□□ □□ □□ □□ | 769
- □□□ □□ □□□ □□ □ □□ | 770
- □□□ □□ □□□ □□ □□ □□ | 771

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?? ??????	??? ??? ??? ? ? ?? ??? ? ?????. M120 ? M320 ????? ??? M ??? ?????? ??? ??? ?? ??????? ????? ?? ??? ?? ??????? ????? ? ??? ????? ?? ?? ??????. T ???, M120, M320 ? MX ??? ?????? ??????? ?? ?? ??? ?? ??? ??????. ??? ??????? ??? ??? ??? ??? ??? ? ???, ? ??? ?? ??????? ??? ? ?? ??????? ??? ??? ????? ? ??????? ????? ? ??? ?? ??? ????? ??????. ??? ??? "??????? ??? ?? ????? ???" ??? 1294 ???????.

□ 39: □□ □□ □□□ □□□ □□ □□ *(Continued)*

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□□ □□□ □□□ □□□ □□□□□□ □□□□□ □□ [edit logical-systems *logical-system-name*] □□ □□□□ □□□ [edit] □□□ □□□□□□ □ □ □□□□ □□□□□filter. filter □ □□□ □□ □ □ □□ □□□ □□□ □ □□□□. group *group-number*, input *filter-name*, input-list *filter-name*, output *filter-name* □□ output-list *filter-name*□ □□□ □□□□ □□□□.. □□ □□□□ filter □□ □□□ □□ □□ □□ □□ □ □□□□ □□□ □□ □□□□.

MX □□□ □□□□ □□□□ □□ □□□ □□

MX □□□ □□□□ □□□ □□□□□□ □□□□ □□□ □□□ □□□ □□□□□ □□□ □□ */□/* □□□ □□□□ □□□□□filter.

```
interfaces {
    interface-name {
        unit logical-unit-number {
            filter {
                group group-number;
```

```
                input filter-name;
                input-list [ filter-names ];
                output filter-name;
                output-list [ filter-names ];
            }
        }
    }
}
```

[illegible]

MX [illegible] *[illegible]* [illegible] filter [illegible].

```
interfaces {
    interface-name {
        unit logical-unit-number {
            family family-name {
                ...
                filter {
                    group group-number;
                    input filter-name;
                    input-list [ filter-names ];
                    output filter-name;
                    output-list [ filter-names ];
                }
            }
        }
    }
}
```

[illegible]

[illegible]

Input filters- [illegible].

- [illegible] filter [illegible]input *filter-name*.
- [illegible] filter [illegible]input-list [*filter-names*]. [illegible] 16[illegible].

Output filters- □□□ □□□ □□ □ □□□ □ □□□ □□□ □□ □□ □□ □□□ □□ □□ □□□ □□□□□□ □□□ □ □□□□.

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- □□□□□□ □□□ □□□ □□□□ □ □□□ □□□ □□□ □□□ □□□ □□□□□ □□□□ filter □□ □□□□□output-list [*filter-names*]. □□ □□ □□□□ □□ 16□□ □□□ □□□ □□□ □ □□□□.

□□□ MPLS □ □□□ 2 CCC □□□ □□

input-list *filter-names* □ mpls □□□□ □□□□ □□□ □□ ccc □ □□ □ output-list *filter-names* □□ □□□ □□□ □□ □□□□□□ □□ □□□.

- □□ □□□□□ □ □□ □□□ □□□□□(fxp □□ em0)
- □□□ □□□□□(lo0)
- USB □□ □□□□□(umd)

MX □□□ □□□ □ EX □□□ □□□□ □□□ 2 CCC □□□ □□

MX □□□ □□□ □ EX □□□ □□□□□□ □□□ 2 CCC □□□ □□□ □□(□□ □□□□ □□□ [edit firewall filter family ccc] □□□ □□) □ □□ □□□ □□□ □ □□□□. MX □□□ □□□ □ EX □□□ □□□□□ □□ □□ family ccc □□□ □□□ □□□ □□ □□□□ □□□ □ □□□□.

PTX □□□ □□ □□ □□□□ IPv6 □□□ □□

PTX10001-20C □□□□□□ IPv6 □□□ □□□ □□□ □□□ □ □□□□.

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- IRB □□□□□
- □□ □□□□□
- □□ □□□□ □□□ [edit firewall family inet6 filter filter-name] □□□□□□ □□.
- □□ □□□
- Junos Telemetry Interface

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family(□□□)

family(□□□□□)

filter(□□□ □□□□□□ □□)

filter(□□ □)

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Junos OS□ □□□□ □□□ □□ RFC□ □□□□□.

- RFC 792, *□□□ □□ □□□ □□□□*
- RFC 2460, *□□□ □□□□, □□ 6(IPv6)*
- RFC 2474, *□□□□ □□□(DS) □□ □□*
- RFC 2475, *□□□□ □□□□ □□ □□□□*
- RFC 2597, *□□□ □□□ PHB □□*
- RFC 3246, *□□□ □□□ PHB(□□ □□)*
- RFC 4291, *IP □□ 6 □□ □□ □□□□*
- RFC 4443, *□□□ □□□□ □□ 6(IPv6) □□□ □□ □□□ □□ □□□ □□□□(ICMPv6)*

□: ACX □□□ □□□□ RFC 2460, RFC 4291 □ RFC 4443 □□□ □□□□ □□□□.

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??

show firewall ?? ?? ??? ?????.

```
user@switch> show firewall
Filter: egress-vlan-watch-employee
Counters:
Name                                                Bytes              Packets
counter-employee-web                                 3348                   27
Filter: ingress-port-limit-tcp-icmp
Counters:
Name                                                Bytes              Packets
```

```
icmp-counter                                          560                  10
Policers:
Name                                                Packets
icmp-connection-policer                                10
tcp-connection-policer                                  0
Filter: ingress-vlan-rogue-block
Filter: ingress-vlan-limit-guest
```

??

??? show firewall ??? ?? ??? ??, ??? ? ????? ??? ??????. ?? ??? ??? ? ????? ?? ?? ????? ????? ??? ??? ?? ?? ? ?? ?? ?? ??????. ?? ??? ??? ? ????? ?? ?? ??? ??? ?? ??? ????? ??? ?? ?? ?? ??????.

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??

show firewall filter *filter-name* ?? ?? ??? ??????.

```
user@switch> show firewall filter ingress-port-limit-tcp-icmp
Filter: ingress-port-limit-tcp-icmp
Counters:
Name                                                Bytes              Packets
icmp-counter                                          560                   10
```

□□

□ show firewall filter *filter-name* □□□ □□□ □□□□ □□ □□□□ □□□□ □ □□□□□ □□ □□ □□□□ □□□□□□.

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□□

show firewall policer *policer-name* □□ □□ □□□□ □□□□□□.

```
user@switch> show firewall policer icmp-connection-policer
Filter: ingress-port-limit-tcp-icmp
Policers:
Name                                                Packets
icmp-connection-policer                                  10
```

□□

□□□ show firewall policer *policer-name* □□□ □□□□□ □□ □□ □□□□ □□□□ □□ □□ □□□□□□.

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QFX10000 ??? ?? ??

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- Protect-RE(???) ??? ??? EM0 ??????? ??? ??? ????? ????. | 778

? ?????? QFX10000 ???? ??? ??? ?? ??????.

?? ?? ???? ?? ?? ??? ???? ????

QFX10000 ????? ??? 2? ??? ?? ???? ?? ?? ??? ???? family ethernet-switching ????. (?? ??, ??? ??? MAC ?? ? IP ??? ???? ??? ???? ????.) ??? ?? ??? ????? ????? ???? ????. ?? ??? ?? ?? ???? ?????. L2 filter *filter-name* doesn't support mixed L2 and L3/L4 match conditions. Please re-config.

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LLDP(Link Layer Discovery Protocol) □ BPDU(Bridge Protocol Data Unit)□ □□ L2(Layer 2) □□ □□□ □□□ □□□ □□□□ □□□ □ □□□□.

□□□

L2 □□ □□□ DDoS(Distributed Denial-of-Service) □□□ □□□□ □ □□□ □□□ □ □□□ □□ □□□ 1□ □□□□□. □□ □□

```
[edit system ddos-protection protocols protocol name]
```

user@host# **set aggregate bandwidth 1**

```
[edit system ddos-protection protocols protocol name]
```

user@host# **set aggregate burst 1**

Protect-RE(□□□) □□□ □□□ EM0 □□□□□□ □□□ □□□ □□□□□ □□□□.

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- □□□ | **778**

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QFX10000 □□□□□ Protect-RE(□□□) □□□ □□□ SNMP, Telnet □ □□ □□□□ □□□ EM0 □□□□□□ □□□ □□□ □□□□□ □□□ □.

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- ???? VLAN? ???? ?? ??? ?? | 786
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- ?? ???? BGP ??? ??? ? ?? | 787
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? ????? QFX10000 ??? ??? QFX ???? ??? ??? ?? ?????. ? ??? OCX1100 ??? ? EX4600 ????? ?????.

??? ?? ??? TCAM ????? ?? ??? ??? ??? ???

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??? ?? ??? ?? ??? TCAM(Ternary Content Addressable Memory) ??? ???? ????? ?? syslogd ???? ?????.

```
No space available in tcam.
Rules for filter filter-name will not be installed.
```

??, VLAN ?? ??? 3 ??????? ??? ??? ??? TCAM ????? ?? ??? ??? ???? ?? ?? ?? ???? ? ???? ?????. ??? ???? ??? ??? ?? ??? ?? ?? ??? CLI ???? ??????.

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??? ?? ???? ???? ? ?? ? ??? ??? ??? ???? ????? ??? ?????.

1. ??? ??, VLAN ?? ??? 3 ??????? ?? ???? ?????. ? ?? ?? ?? ??? ????.

```
[edit]
user@switch# delete firewall family ethernet-switching filter ingress-vlan-rogue-block
user@switch# delete vlans employee-vlan description "filter to block rogue devices on
employee-vlan"
user@switch# delete vlans employee-vlan filter input ingress-vlan-rogue-block
```

2. ?? ??? ?????.

```
[edit]
user@switch# commit
```

3. ?? ??? TCAM ??? ?? ???? ?? ? ?? ??? ? ?? ??? ?????. ? ?? ?? ?? ??? ????.

```
[edit]
user@switch# set firewall family ethernet-switching filter new-ingress-vlan-rogue-block ...
```

4. □ □□□ □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□(□□□)□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit]
user@switch# set vlans employee-vlan description "filter to block rogue devices on employee-
vlan"
user@switch# set vlans employee-vlan filter input new-ingress-vlan-rogue-block
```

5. □□ □□□ □□□□□.

```
[edit]
user@switch# commit
```

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1. □□ □□□□ □ □□ □□□ □□□ □□□ □□□□□.

```
[edit]
user@switch# set firewall family ethernet-switching filter new-ingress-vlan-rogue-block...
```

2. □□□ □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□□□ □□ □□□ □□□□ □□□□□. □:

```
[edit]
user@switch# set vlans employee-vlan description "smaller filter to block rogue devices on
employee-vlan"
user@switch# set vlans employee-vlan filter input new-ingress-vlan-rogue-block
```

VLAN□ □□□ □□□ □□□ □□□ □□□ □ □□ □□□ VLAN□ □□ □□ □□□ □□□ □□□□ □ □□□ □□ new-ingress-vlan-rogue-block □ □□□□□.

3. □□ □□□ □□□□□.

```
[edit]
user@switch# commit
```

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□□ VLAN □□□ □□ □□□□ 192.168.1.0/24 □□□ □□□ □□□ □□□□ □□□□. □□ □□ □□□ □□□ □□□□ □□□ □□□ □□□□ □□□□ □ □□□□. □□□ □□□□ □□□ □□ □□ □□□ □□ □□□□ □□□□ □□□□ □□□□.

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1. □□(□□□ 2) □□
2. VLAN □□
3. □□□(□□□ 3) □□

□□ □□:

1. □□□(□□□ 3) □□
2. VLAN □□
3. □□(□□□ 2) □□

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QFX ??? ???? ???? ??? ?? ???? ?? ???? ?? ???? ?? ?????.

- loss-priority
- policer

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QFX ??? ?????? ???? QFX ?????? ???? ?? ?? ???? ??? ??? ??? ?? ???? ???? ? ????. ? ??? ICMP(ping), STP, LACP ?? ?? ?????? ?? ?? ???? ??????.

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?? dot1q-user-priority ? ?? ??? dot1q-tag ???? ??? ??? ???? ??? VLAN? ???? ??? ??? ??? ??? ???? ??, Q-in-Q EtherType? 0x8100?? ??? ?? ??? ???? ????. (Q-in-Q ???? ?????? ??? ??????? ??? ?????? ?? ?????? ?????? ??? ?????? ??? VLAN? ??????.)

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????? VLAN? ????? ?? ???? ??

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- ?? VLAN ???? ????? ????????? ??(???? ?? ???)? ???? ????
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- ????? ???? ????? PVLAN ???? ???? ???? ????
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- PVLAN ???? ????? ???? ???????. ????? ???? ????

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L2PT ???? ?? ???? QFX3500 ????? ???? ????. ?, ???????? ????? ??????? L2PT? ???? ?? ??? ??? ???? ?? ??????? ?? ????? ?? ???? ?? ???? ???? ?? ????. ??? ???? ??? ???? ?? ??? ??? L2PT ?? ???? ???? ? ???.

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TTL(Time-to-Live) ?? 1?? ? BGP ??? ??? ??????? ?????? ??? 3 ??????? ?? ??? ??? ??? ??? ???? ??? ? ?? ??. TTL ?? 1 ?? 0? BGP ??? ??? ??????? ??? ??? ??? ?????? ??? 3 ??????? ?? ??? ??? ? ?????.

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- ? 500?? ????? ????? ?? ???? ????? 1,000?? TCAM ???? ?????? ???? ??????. ???? ?? ???? ?? ? ?? ?? ???? ???? ??.
  - 20?? ?? 20?? ????? A? ???????. ?? ????? ???? TCAM ???? ?? ???? ? ???? ?? ???? ??????.
  - ?? B? ?? A ???? ?? 5?? ?? 5?? ????? ?????. *??*????? ?? ???? ???? ????? ?? ???? ? ???? ?? ???? ????? ???? ?. (5?? TCAM ???? ?????? 4?? ???? ? ?????.)

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- Action(□□) - □□□ □□ □□□ □□□□ □□ □□□ □□□ □□□□□. □□□ □□□□ □□□ □□, □□ □□ □□□ □□ □□□, □□ □ □□□□ □□ □□ □ □□ □□□ □ □□□□. □□□ □□ □□□ □□□□ □□ □□, □□□□ □□□□ □□□ □□□□ □□□□.

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Junos OS Evolved□ □□ IPv6 □□□ □□□ □□ □□ □□□ □ □□ □□□(profile-one □)□ profile-two□□□□□. □ □□□□ IPv6 □□□ □□ □□ □□□ □□ □□□ □□□□□. □□□□ □□ □□ □□□ □□□ □□□□□. □□□ □□□ □□ □ □□□□□ □□□ □□ □□□ □□□ □□□□ □□□□□. □□□ □□□ □ingress-inet6-lo0-acl(□) ingress-inet6-user-acl □□□. 24.4R1□□□ □□□ □□□□ egress-inet6-user-acl □ □□□□□.

- ingress-inet6-user-acl □□□ □□□ □□□ 3 □□□ □□□□□ □□ □□□ □□□□□ □□ □ IPv6 □□ □□(□ □□)□ □□□ □□□ □□□ □□ □□ □□.
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24.4R1□□:

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- □ ingress-inet6-lo0-acl □□□ □□□ □□ingress-inet6-user-acl, □□ □□ □□ □□□□ □ □□□ □□□ □□□□ □□ profile-two □(□) □□□ profile-one □ □□□□. □□□□ □ □□□ □□□ □□ □□□ □□□□ □□□□□.

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set system packet-forwarding-options firewall-profile profile-one>/<profile-two
```

- 24.4R1□□□ □□□□ □□□□ □□ profile-two □□ ingress-inet6-lo0-acl □□□ profile-one □□ □□ □□ □□□□□.

```
set system packet-forwarding-options firewall-profile ingress lo0-inet6 profile-one/profile-
two
```

- 24.4R1□□□ □□□□ □□□□ □□ profile-two □□ egress-inet6-user-acl □□□ profile-one □□ □□ □□ □□□□□.

```
set system packet-forwarding-options firewall-profile egress inet6 profile-one/profile-two
```

□:

- □□□□□ □(□) profile-two □□ □□□ □□□ □□ □□□□□□.
- □□ □□ □□(PFE)□ □□□ □□□ □□□□ □□ □□□ □□□ □□□ □□ □ □□□□ □□ □□□□.
- 24.4R1 □□:
  - show evo-pfemand filter profile-summary □□ □□ □□ □□□□ □□□□ □ □□□ □ □□□□.
  - show evo-pfemand filter profile-info □□ □□□□ □□ □□□ □□□ □□□□ □ □□□ □ □□□□.
  - show evo-pfemand filter hw summary □ □□ □□□(23.1R1 □□)□□□ □□□ □□ □□□□ □□□□ □ □□□ □ □□□□.

  24.4R1 □□:

  - show system packet-forwarding-options firewall-profile profile-summary □□ □□□ □□□ □□□□ □□ □□□□ □□□□ □ □□□ □ □□□□.
  - show system packet-forwarding-options firewall-profile profile-info □□ □□□ □□□ □□ □□□□ □□ □□□ □□□ □□□□ □ □□□ □ □□□□.
- □□ □□□ □□□ □□ □□□ □□ □□□ □ □□□□.

□□□ □□□□□ □□□□ □□□ □□ □□ □□□ □□□□□. □ □□□ □□□ □□ □□□□ □□ □□ □□ □ □□□ □□□ □□□□ □□□□.

□ 41: □□/□□ IPv6 □□□ □□ □□ □□

□□□ □□ □□ □□	□□□ 2	□□□ 1
source-address(□□ 64□□)	□	□
source-prefix-list(□□ 64□□)	□	□
prefix-list(□□ 64□□)	□	□
source-address(□□ 128□□)	□□□	□

□ 41: □□/□□ IPv6 □□□ □□ □□ □□ ***(Continued)***

□□□ □□ □□ □□	□□□ 2	□□□ 1
source-prefix-list(□□ 128□□)	□□□	□
prefix-list(□□ 128□□)	□□□	□
□ □□	□	□□□
tcp □□	□	□□□
tcp-□□□	□	□□□
tcp-□□□	□	□□□
□□□ □□□	□	□□□

□ 42: □□ □□□(lo0) □□□ □□ □□ □□

□□□ □□ □□ □□	□□□ 2	□□□ 1
destination-address(□□ 64□□)	□	□
destination-prefix-list(□□ 64□□)	□	□
prefix-list(□□ 64□□)	□	□
destination-address (□□ 128□□)	□□□	□
destination-prefix-list(□□ 128□□)	□□□	□
prefix-list(□□ 128□□)	□□□	□
□ □□	□	□□□

□ 42: □□ □□□(lo0) □□□ □□ □□ □□ ***(Continued)***

□□□ □□ □□ □□	□□□ 2	□□□ 1
tcp □□	□	□□□
tcp-□□□	□	□□□
tcp-□□□	□	□□□
□□□ □□□	□	□□□

□ 43: □□□□ □□□□□□□

□□□□□□□	□□□ 2(□□)	□□□ 2(□□ □□□)	Profile One(□□)	Profile One(□□ □□□)
□□□ □□□ □□(FTF)	□	NA	□□□	NA
BGP □□□ □□ □□	□	NA	□□□	NA
□□□ □□ routing-instance(lo0.1, lo0.2 □)	NA	□	NA	□□□

□□□ □□ □□ □□ □□

in this section

- □□ □□ □□ | **797**
- □□ □□ □□ □□ | **797**
- □□□□□ □□ □□ □□ | **798**
- IP □□ □□ □□ □□ | **798**

- ?? ?? ?? ?? ?? | 799

??? ???? ?? ???? ????? ?? ???? ???? ????? ???? ??????, ??, ?? ? ?? ?? ?? ?? ???? ????? ???? ?? ???? ?? ???? ????? ???.

?? ?? ??

from*???? ??* ???? ????? ????? ???? then ????? ?? ???? ????? ?? ???? ??????. ???? ?????? ?? ???? ????? ????. ?? ???? ? ???? ???? ????? ?????. ???? ???? ?? ???? ???? ?? ???? ????? ??????.

??? ???? ?? ?? ?? ????? ?? ?? ? ? ???? ?? ???? ?? ???? ??????. ?? ??, ????? ????? source-address ?? IP ?? ???? ? ???? ?? ???? IP ?? ?? ? ???? ????? ???? ???? ??????. ???? ?? ???? ?? ???? ?? ????? ?? ???? ???? ?? ?? ?? ???? ? ?? ??.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set protocol (icmp | udp)
```

?? ????? ???? ?? ?? ?? ????? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-address 10.1.1.1
user@switch# set source-address 10.1.1.2
```

???? ?? ???? ????? ???? ?? ???? ?? ???? ??????.

?: ?? Junos OS ???? ???? ??, ???? ????? ?? ????? ???? except ? ?????.

?? ?? ?? ??

?? ? ????? ???? ?? ?? ???? ????? ?? ?? ?? ???? ???? ? ?????. ?? ?? ?? ???? ??, ???? ???? ???? ????? ?? ????? ?? ?? ? ?? ?? ??????.

?? ?? ? ???? ?? ?? ???? ? ?????.

- ?? ?? - ?? ?? ??? ???? ??? ??????. ?? ?? ?? ???? ??????? ??? ??????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-port 23
```

- Text synonym for a single number(?? ??? ?? ??? ???) - ?? ?? ???? ???? ??? ???? ??? ??????. ?? ?? ? ? ???? ??????? ??? ??????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-port telnet
```

- ?? ???? ??? ?? ??? ?? ?? ?? ?????? ? ?? ?? ?? ?? ??????. ?? ??, ??? ?? ?? ?? 22 ?? 23? ?? ?? ???? ?? ? ??????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-port 22
user@switch# set source-port 23
```

????? ?? ?? ??

??? ?????? ???? ??????? ?????? ?????? ?? ?? ??? ??? ? ????. ? ??? ??? ??(0)? ?? ??? ??????. ?????? ??? ?? ? ??????(*)? ??? ? ????. ? ?? ?? ?? ??? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set interface ge-0/*/6.0
user@switch# set interface ge-0/1/*.0
user@switch# set interface ge-0/0/6.*
```

?? ??? ?? ? ?? ??????? ???? ???.

IP ?? ?? ?? ??

??? IP ?? ?? ?? ?? ?? ???? ?????? ?? ?? ?? ??? ??? ? ????. ?? ?? ??? ??? ?? ?? ??? ??? ??????. ? ?? ?? ?? ??? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-address 10.2.1.0/24;
```

□□□ □□□ □□□□ □□□□ /32□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-address 10
[edit firewall family family-name filter filter-name term term-name from]
user@switch# show
destination-address {
 10.0.0.0/32;
}
```

□□ □□□ □ □ □□□ IP □□ □□ □□□□ □□□□□ □□ □□ □□ □ □□ □□ □□□□ □□□□□. □□ □□, □□□ □□ □□□ □□ □□□ □ □□□ □□□□ □ □ □□ □□□□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-address 10.1.0.0/16
user@switch# set source-address 10.2.0.0/16
```

□□ □□ □□ □□ □□

□□ □□ □□ □□ □□□ □□□□ □□□ □□□□ IP, TCP, UDP □ ICMP □□□ □□ □□ □□ □□ □□□ □□□□ □ □□□□. □□□□□ □□□□ □□□ □ □□□ □□ □□□ □□□□ □□ □□ □□ □□□ □□□ □□□□□.

□□□□ □□ □□□□ □□□□ □□□□ □□□ □□□ □ □□□□. □□ □□, TCP SYN □□□□ □□□□□□ □□□ □□ □□□ syn□ □□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags syn
```

SYN □□□ 8□□ tcp-flags □□□ □ □□ □□□ □□□□ □□□ □□□ 0x02 □□ □□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags 0x02
```

□□ □□ □□ □□ □□□□□□ □ □ 44 □□□ 800□□□ □□ □□□□ □□□□□. □□□□ □□ □□□ □□ □□□ □□□□□. □□□ □□□□ □□□□□ □□□ □□.

표 44: □□□ □□□ □□ □□

□□ □□□	□□
!	□□
&	□□ AND
|	□□□ OR

□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□ □□□□ □□□□. □□ □□, □□ □□ TCP □□□□□□□ □ □□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "syn&ack"
```

□□ □□□ □□□□□□□ □ □□ □□□□ □□□□. □□ □□, □□ □□ TCP □□□□□□□ □□ □□□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "syn&!ack"
```

□□□ □□□□ □□□□ □ □□ □□□□ □□ □□ □□□ □□□ □ □□□□.□□ □□, □□ □□ TCP □□□□□□□ □□ □□□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-initial
```

□□ □□

> □□□ □□□ □□□□□ □□□□□ □□ □□ | **1752**
>
> □□□ □□ □□ □□ □ □□(QFX □ EX □□□ □□□) | **1652**
>
> □□□ □□ □□ | **1729**

??? ?? ?? ??

??? *???* ????? ????? ?? ??? ??? ??? ?? ?? ? ??? ????? ??? ????? ??? ???????. ?? ?? ??, ??? ??? ?? ? ??? ? ?, ??? ??? ??? ??? ????? ?? ??????.

??(?? ? ??)? ?? ??? ???????? ??? ??? ??? ??? ? ?????. ?? ??, ??? ???????? ?? ?? ??? ?? ??? ??? ????? ?? ?? ? ??? ??? ??? ? ?????. ???? ?? ???? ?? ?? ?? ?? ???? ? ?? ???? ???? ? ?? ???? ? ????? ? ????? ? ??? ??? ????? ? ?(??)? ?? ?????? ????? ???.

??? ??? ????? ????? ?? ? ???? ?? ?? ???? ??????.

1. ??? ??? ??????

   ?? ??, ????? ?? ???? ????? ???? ?????, ???? ???? ?????, ???? ???? ????? ?????, ???? ?? ? ??????, ???? ?? ???? ??? ? ?????.

2. ??? ?? ???? ??????? ???? ?? ???? ?????? ?? ?? ?? ???? ??????. ???? ???? ???? ?????.

   - ??? 3 ?? ?? - ?? ? ?? IP ??, ????? ? IP ??(IP ?????, IP ???? ???? ?? TTL ??).
   - TCP ?? ?? - ?? ? ?? ???? ????.
   - ICMP ?? ?? - ?? ?? ? ??.

3. ??? ???? ?? ???? ? ???? ???? ??????

   ????? ???? ??, ?? ?? ???? ? ?????.

4. ?? ?? ?? ????? ???? ? ?????

   ?? ??, ???? ???? ???? ????(??)????, ????? ???? ???????, ???? ???? ??????, ???? ?????? ????? ???? ? ?????.

5. ??? ???? ?? ??? 3 ??????? ????? ????

   ???? ???? ???? ??????? ????? ?? ?? ???? ?? ????????? ???? ???? ?? ???? ?? ? ???? ????? ????. ?????? ???? ?? ?? ?? IP ??, IP ????? ?? ????? ??(?: ICMP ???? ??, TCP ?? UDP ?? ??)? ????? ?? ?? ?????? ???? ???? ??????. ? ?? ???? ?? IP ?? *???* ????? ?? ?? ?????? ???? ???? ????? ????. ???? ?? ?????? ?? ???? ????? ???? ?? ?? ?? ???? ?? ??????? ???? ? ?? ?? ????? ?????? ?? ? ?????.

6. ??? ???? ?? ????? ????? ???

   ?????? ??????? ????? ????? ?? ????????? ???? ????? ?? ????? ???? ?? ???? ??????.

7. ??? ? ?? ????? ???

???? ?? | 2066

???? ?? ?? ?? ?? | 802

???? ?? ?? | 1729

??? ?? ?? ?? ??

???? ???? ?? ???? ???? ????? ?? ?? ?? ???? ??????. ???? ???? ????? ?? ????? ?? ?? ???? ????? ???? ???? ?? ???? ???? ? ???? ????? ????.

??? ???? ?? ???? ???? ?? ???? ???? ?? ??????.

- ???? ?? ???? ????? ?? ???? then ??????.
- ???? ?? ???? ????? ?? then ???? ???? ???? ?? ???? **accept** ??????.
- ???? ?? ???? ????? ???? ????? ???? ??????.

??? ???? ? ???? ???? ???? ?? ???? ?????? ??????.

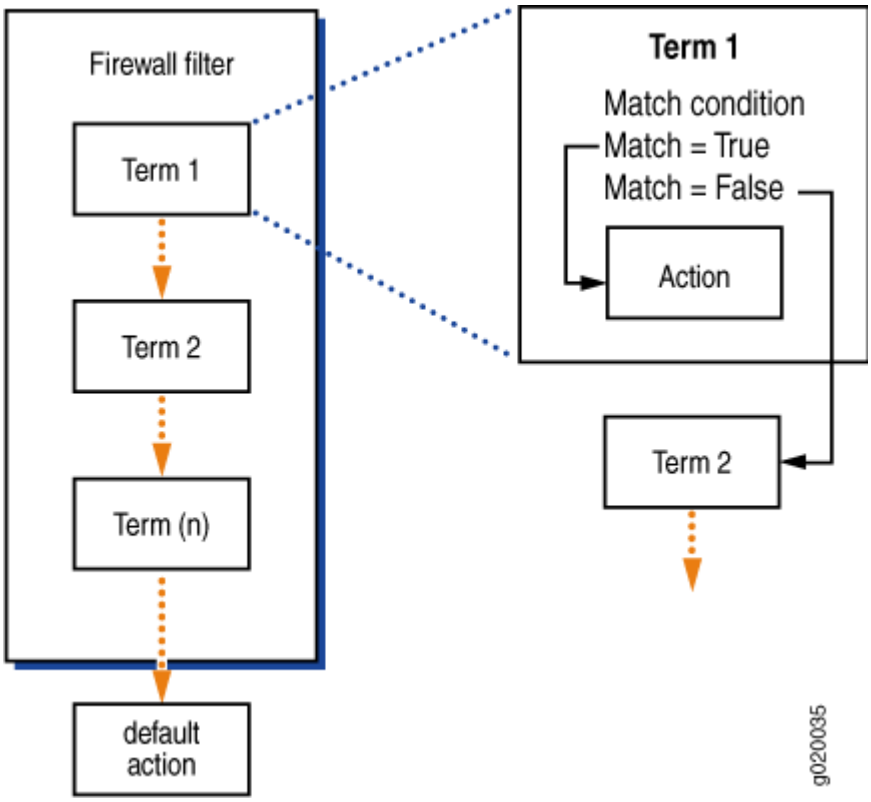
1. ???? ? ?? ???? ?? from ?? ???? ?? ??????.
2. ???? ???? ?? ???? ????? ?? ???? then ????? ???? ??????. ???? ?? ?? ????? ?????.
3. ???? ???? ?? ???? ????? ???? ???? ? ?? ???? ?? ???? from ?? ??????.

   ? ?????? ???? ?? ?? ? ????? from ?? ?? ???? ?????? ???? ? ?? ???? ?? ???? ??????.
4. ???? ?? ?? ???? ?? ???? ????? ????? ?? ??????.

?: ???? ????? ???? ?????? ?? ???? ????? ???? ?? ?? from ???? ????? ?????.

?? 50 ???? 803 ?(?) ????? ???? ?? ?? ???? ????? ???? ??????.

?? 50: ??? ?? ?? ?? ??



??? ???? ???? from ??? ?? ??? ??? ???? ???? ?? then ?????. ??? ???? ???? then ?? ??? ???? then ??? ?? ?? ?? ??, ??? ???? ?? ??? ?????.

?? ??? ???? ?? ?? ??? ?? ??? ?? ??? ???? ??? deny ?? ???? ????.

```
term implicit-rule {
    then discard;
}
```

??? ??? ??? ??? ???? ?? ??? ?????. ??? ?? ??? ???? ??? ???? ?? ??? ?????.

?: ??? ???? ?? 64??? ??? ???? ?????.

?? ??

??? ?? ?? ?? ?? | 804

??? ?? | 2066

□□□ □□ □□ | 1729

□□□ □□ □□ □□ □□

in this section

- □□ □□ □□ | 804
- □□ □□ □□ □□ | 805
- □□□□□ □□ □□ □□ | 805
- IP □□ □□ □□ □□ | 806
- MAC □□ □□ □□ □□ | 806
- □□ □□ □□ □□ □□ | 807

□□□ □□□ □□ □□□ □□□□ □□ □□□ □□□ □□□□ □□□ □□□□□, □□, □□ □ □□ □□ □□ □□ □□□ □□□□ □□□ □□ □□□ □□ □□□ □□□□ □□□.

□□ □□ □□

from□□□ □□ □□□ □□□□ □□□□ □□□ then □□□□ □□ □□□ □□□□ □□ □□□ □□□□□. □□□ □□□□□ □□ □□□ □□□□ □□□. □□ □□□ □ □□□ □□□ □□□□ □□□□. □□□ □□□ □□ □□□ □□□ □□ □□□ □□□□ □□□□□.

□□□ □□□ □□ □□ □□ □□□□ □□ □□ □ □ □□□ □□ □□□ □□ □□□ □□□□□. □□ □□, □□□□ □□□□ source-address □□ IP □□ □□□ □ □□□ □□ □□□ IP □□ □□ □ □□□ □□□□ □□□ □□□ □□□□□. □□□ □□ □□□ □□ □□□ □□ □□□□ □□ □□□ □□□ □□ □□ □□ □□□ □ □□ □□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set protocol (icmp | udp)
```

□□ □□□□ □□□ □□ □□ □□ □□□□ □□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-address 10.1.1.1
user@switch# set source-address 10.1.1.2
```

□□□ □□ □□□ □□□□ □□□ □□ □□□ □□ □□□ □□□□□.

□: □□ Junos OS □□□ □□□ □□, □□□ □□□□ □□ □□□□ □□□ except □ □□□□.

□□ □□ □□ □□

□□ □ □□□□ □□□ □□ □□ □□□ □□□□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□ □□□ □□, □□□ □□□ □□□ □□□□ □□ □□□□ □□ □□ □ □□ □□ □□□□□.

□□ □□ □ □□□ □□ □□ □□□ □ □□□□.

- □□ □□ - □□ □□ □□□ □□□□ □□□ □□□□□. □□ □□ □□ □□□□ □□□□□□□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-port 23
```

- Text synonym for a single number(□□ □□□ □□ □□□ □□□) - □□ □□ □□□□ □□□□ □□□ □□□□ □□□ □□□□□. □□ □□ □ □ □□□□ □□□□□□□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-port telnet
```

- □□ □□□□ □□□ □□ □□□ □□ □□ □□ □□□□□ □ □□ □□ □□ □□ □□□□□. □□ □□, □□□ □□ □□ □□ 22 □□ 23□ □□ □□ □□□□ □□ □ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-port 22
user@switch# set source-port 23
```

□□□□□ □□ □□ □□

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```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set interface ge-0/0/6.0
```

□ □□□ □□□ □□(0)□ □□ □□□ □□□□□. □□□□□ □□□ □□□ □□□□□(*)□ □□□ □ □□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set interface ge-0/*/6.0
user@switch# set interface ge-0/1/*.0
user@switch# set interface ge-0/0/6.*
```

□□ □□□ □□ □ □□ □□□□□□□ □□□□ □□□.

IP □□ □□ □□ □□

□□□ IP □□ □□ □□ □□ □□ □□□□ □□□□□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□□ □□□ □□ □□ □□□ □□□ □□□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-address 10.2.1.0/24;
```

□□□ □□□ □□□□ □□□□ /32□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-address 10
[edit firewall family family-name filter filter-name term term-name from]
user@switch# show
destination-address {
 10.0.0.0/32;
}
```

□□ □□□ □ □ □□□ IP □□ □□ □□□□ □□□□□ □□ □□ □□ □ □□ □□ □□□□ □□□□□. □□ □□, □□□ □□ □□□ □□ □□□ □ □□□ □□□□ □ □ □□ □□□□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-address 10.1.0.0/16
user@switch# set source-address 10.2.0.0/16
```

MAC □□ □□ □□ □□

□□ □□ □□ MAC □□□ □□□□□ MAC □□ □□ □□ □□□ □□□ □ □□□□. □□□ □□□□ □□□ □□□□ □□ □□□□ □□ □□ □□□ □□ □□□□ □.

MAC ??? ?? ?? ? ???? 6?? 16?? ???? ??? ? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-mac-address 00:11:22:33:44:55
```

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-mac-address 0011.2233.4455
```

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-mac-address 001122334455
```

???? ??? ???? ???? ??? ?? ??(? ?? 00:11:22:33:44:55)?? ?????.

?? ??? MAC ??? ? ? ?? ????? ? MAC ??? ?? ?? ?? ?????. ?? ??, MAC ?? ??? ?? ?? ?? ? ??? ???? ?? ?? ???? ??? ?????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-mac-address 00:11:22:33:44:55
user@switch# set source-mac-address 00:11:22:33:20:15
```

?? ?? ?? ?? ??

?? ?? ?? ?? ??? ???? ??? ???? IP, TCP, UDP ? ICMP ??? ?? ?? ?? ?? ??? ???? ? ????. ????? ???? ??? ? ??? ?? ??? ???? ?? ?? ?? ??? ??? ?????.

???? ?? ???? ???? ???? ??? ??? ? ????. ?? ??, TCP SYN ???? ?????? ??? ?? ??? syn? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags syn
```

SYN ??? 8?? tcp-flags ??? ? ?? ??? ???? ??? ??? 0x02 ?? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags 0x02
```

?? ?? ?? ?? ?????? ? ? 45 ??? 808??? ?? ???? ?????. ???? ?? ??? ?? ??? ?????. ??? ???? ????? ??? ??.

표 45: □□□ □□□ □□ □□

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!	□□
&	□□ AND
|	□□□ OR

□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□ □□□□ □□□□. □□ □□, □□ □□ TCP □□□□□□□ □ □□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "syn&ack"
```

□□ □□□ □□□□□□□ □ □□ □□□□ □□□□. □□ □□, □□ □□ TCP □□□□□□□ □□ □□□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "syn&!ack"
```

□□□ □□□□ □□□□ □ □□ □□□□ □□ □□ □□□ □□□ □ □□□□.□□ □□, □□ □□ TCP □□□□□□□ □□ □□□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-initial
```

□□ □□

□□□ □□□ □□□□□ □□□□□ □□ □□ | **1752**

□□□ □□ □□ □□ □ □□(EX4100, EX4100-F, EX4100-H, EX4400, EX4600, EX4650, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210) | **1653**

□□□ □□ □□ | **1729**

??? ?? FMC(Flexible Match Condition)

in this section

- ??? ?? | 809
- ??? ?? ?? ?? | 810
- ??? ?? ?? ?? ?? | 811
- ??? ?? ?? ?? | 812

?? ??? ?? ?? ??? ???? ???? ???? ???? ?? ????. ?? ??, ??? ???? ???? ??? ? ?? ??? inet ?? inet6 ???? ?? ?? ??? ? ?? ??? ????. ??? ? ???? ??? ??? ??? ??? ? ?? ??? ???? ??? ?? ???? ????. ?, ??? ?? ??? ?? ?? ??? ???? ???? ? ????.

??? ?? ??? ???? ??? 2, ??? 3, ??? 4 ?? ???? ???? ??? ???? ??? ??? ??? ? ????. ???? ?? ??? ??? ???? ? ? ?? ??? ?? ??? ?? ???? ?? ??? ??? ? ????.

??? ?? ?? ??? ?? ??? ?? ??? ?????? ?? ?? ?? ??? MPC ?? MIC ??????? ??????. ??? ?? ?? ??? ?? ???? ??? ?? [edit firewall] ??? ?? ????. ?? ?? ??? ?? ?? ??? ??? ???? ??? ? ????.

MX ??? ???? ??, ??? ?? ??? MPC ?? MIC??? ??????. FPC, PIC ?/?? DPC? MPC ?? MIC? ?? ??? ?????? ? ?? ?? ??? ?? ??? MPC ?? MIC ??????? ???? ???.

?: MPC? ?? MX ??? ???? ??, ?? SNMP ?? ?? ???(MIB)? ?? ?? ?? ???(MIB)?? Trio ?? ?? ??? ?? ?? ???? ?????? ???. ?? ?? Trio ?? ??? ???? ?????? ??? ??? ?? ??? ?? ??? ???? ?? ?. show snmp mib walk *(ascii | decimal)* object-id. ?? Junos? ?? ???? ???? ?? ??? ?????? ??? (?? ??? ?????? ?? ? ?? ??? ?? ???? ???? ?? ? ?? ??????). Trio ?? ?? ??? Trio ?????? ???? ? ? ??? ?? ?? ?? ??? ???? ??????.

? ??? ?? enhanced-mode ??? ??? ??????. ?? offset-range ?? offset-maskgre-key? ?? ??? ?? ?? ?? ? " IPv6 ???? ?? ??? ?? ?? ???" ??? 911 ?? ?? ?? ? ??? ??????"IPv4 ??? ??? ?? ??" ? ?? 894. payload-protocol, extension headers, is_fragment. ?? "??? ?? ?? ??" ??? 828? ??? ? ? ???? ??????. encapsulate ?? decapsulate, ?? ?? "??? ?? ? ?? ??" ??? 817? ??? ??????. policy-map, ? clear-policy-map.

??? ??

???? ?? ?? ??? ? ? 46 ??? 810??? ?? ? ?? ???? ??????. flexible-match ??? ?? ???? ??????[edit firewall]. ??? ?? ???? ???? ? ??????. ? flexible-match-range ?(?flexible-filter-match-mask) ???? [edit firewall family

[inet|inet6|bridge|ethernet-switching|ccc|vpls] filter *<filter-name>* term *<term-name>* from] □□□□□. family ethernet-switching EX9200 □□□□ □□□ □□□□□.

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□ 46: □□□ □□ □□ □□

□□□ □□ □□ □□	□□ □□□ □□	□□
flexible-match	*<name>*	□□□□ *<name>* □□□ □□□ □□ □□□□ □□□□.
	bit-length	□□ □□□ □□□ □□□□ □□, □□□ □□□ □□□□ □□(0..32) QFX5120 □ EX4650 □□□□ □□ 16□ 32□ □□□□ □□□ □□ □□□□□.
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	match-start	□□ □□ □□□
flexible-match-mask	bit-length	□□ □□□ □□□ □□□□ □□, □□□ □□□ □□□□ □□(0..128)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-mask-name	□□ □□□ □□□ □□□□ □□□ □□□ □□□□□. □(□) □□□□ □□ □ match-start □□□□□.
	mask-in-hex	□□□ □□ □□□□ □□□ □□□□□□.
	match-start	□□ □□ □□□. □(□) □□□□ □□ □ flexible-mask-name □□□□.
	prefix	□□□□ □ □□□/□□□□□□.

□ 46: □□□ □□ □□ □□ *(Continued)*

□□□ □□ □□ □□	□□ □□□ □□	□□
flexible-match-range	bit-length	□□□□ □□□□ □□(□□)□□□. (0..32) □(□) □□□□ □□ □ flexible-range-name □□□□□.
	bit-offset	(□□ □□ + □□□) □□□ □□□ □□ □□□□□□. (0..7)
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-range-name	□□ □□□ □□□□□ □□□ □□□ □□□□□.
	match-start	□□ □□ □□□. □(□) □□□□ □□ □ flexible-range-name □□□□□.
	range	□□□□ □□ □□□□□.
	range-except	□□□□ □□ □□ □□□□□.

□: flexible-match-range EX2300, EX3400, EX4100 □ EX4400□□□ □□□□ □□□□.

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□□□ □□ □□□□ □□ □□□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ □□□ □□□□ □□□ □□□□ □ □□□□.

□ 47: □□□ □□ □□ □□ □□

□□□□ □□□	□□ □□□ □□ □□
inet	layer-3, layer-4 and payload QFX5120 □ EX4650 □□□□ □□, □□□ 2 □ □□□ 3(□□) □□□□ □□ □□□ □□ □□□ Junos □□□ 20.1R1□ □□□□□ □□.
inet6	layer-3, layer-4, payload QFX5120 □ EX4650 □□□□ □□, □□□ 2 □ □□□ 3(□□) □□□□ □□ □□□ □□ □□□ Junos □□□ 20.1R1□ □□□□□ □□.
bridge	layer-2, layer-3, layer-4 and payload
ccc	layer-2, layer-3, layer-4 and payload
mpls	layer-3 and payload
vpls	layer-2, layer-3, layer-4 and payload
ethernet-switching	(EX9200 □□□) layer-2, layer-3, layer-4 and payload QFX5120 □ EX4650 □□□□ □□, □□□ 2 □ □□□ 3(□□) □□□□ □□ □□□ □□ □□□ Junos □□□ 20.1R1□ □□□□□ □□. □□□ 2 □□ □□□ □ □□ □□□ □□□□ □□ □□□□ □□□ □ □□□□.

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□□ □□□□□ □ □□ □ □□□□ flexible-match-mask□□ □□□.

```
from {
    flexible-match-mask {
        flexible-mask-name <mask-name>;
        mask-in-hex <mask>;
        prefix <pattern>;
```

```
            }
        }
```

□(□ *<mask-name>*) □□□ □□ □□□ □□□□ □□ □□□ □□□□ □□□□□ *flexible-mask-name* . □□□□ □□□□ □□□ □□ □□□ □□□□ □ □□ □□(□□)□ □□□□□ □□□ □ □□□□.

□ □□ *<mask>mask-in-hex* 16□□ □□□□□. □□ □□, □ □□□ □□□ `0xf0fc` □ □ □□ □□□□ □ □□ 4□□(□□ *<mask-name>*□□)□ □ □□ □□□□ □□ 6□□□ □□ □□□ □□□□□. □□□ IPv4 □□□□ *<mask-name>* L3 □□□ □□ □ □□□□ □□□□ □□ IP □□ □□ □ DSCP □□□ □□□□□. □ □□ □□, □□□ □□□ `0xffc0` □ □□ □ □□ □□□□ □ □□ □□□□□ □ □□□ □□ □□□ □□□□□. □(□ *<mask-name>*) L3 □□□ □□ □ □□□□ □□□□ □□□ IPv6 □□□ □□, □□□ □□□ □□□ IP □□ □□□ DSCP□ □□□□□.

□□□ for *prefix* □ *<pattern>* ASCII □□□□□□. □□ □ □□□ `0x`□ □□ □□□□ □□□ □□□ □□□□□ 16□□□ □□□□□. □□ □□, □□□ `0xf0fc` □ □□□□ *<mask-name>* L3 □□□ □□ 2□□□□ □□□□ □□□ □□□ `0x40c0` □ □□ 4□□(□□ □□□ 4□ □□) □ `1100 00` IPv4 DSCP □□(DSCP□ cs6□ □□)□□ □ □□ `0100` □□□ □□□□□. □□ □□□ *<mask-name>*`0xffc0` □ □□ □□□ □□□ `0x6c00` □ □□□□ L3 □□□ □□ 2□□□□ □□□□ □□ 4□□(□□ □□□ 6□ □□) □ `1100 00` IPv6 DSCP □□(DSCP□ CS6□ □□)□□ □ □□ `0110` □□□ □□□ □□.

□ □□ □□□□□ □□□ □□□ □□ L3 □□□□ □□ 2□□□(16□□)□ □□□□ □□□ □□□□ □□□□□.

```
firewall {
    flexible-match FM-FIRST-TWO-L3-BYTES {
        match-start layer-3;
        byte-offset 0;
        bit-offset 0;
        bit-length 16;
    }
}
```

□□ □□□□□ □□□ □□□ □□ □□ □□□□□ □ □□□□ □□ □□ □□□(32□□)□ □□□□ □□□ □□□□ □□□□□.

```
firewall {
    flexible-match FM-FOUR-PAYLOAD-BYTES {
        match-start payload;
        byte-offset 2;
        bit-offset 0;
        bit-length 32;
    }
}
```

□ □□ *□□□□ JNPR* (ASCII □□: 0x4a, 0x4e, 0x50,) 0x52□ □□ □□□□□ □ □□□□ □□ □□ □□□□ □□□□. □□□ □□ □□□□ □□□ FM-FOUR-PAYLOAD-BYTES □□□ □□□□ □□□□□.

```
firewall {
    family ccc filter FF-COUNT-JNPR-PACKETS {
        term JNPR-STRING {
            from {
                flexible-match-mask {
                    mask-in-hex 0xffffffff;
                    prefix JNPR;
                    flexible-mask-name FM-FOUR-PAYLOAD-BYTES;
                }
            }
            then {
                count CNT-JNPR-YES
                accept;
            }
        }
        term DEAFULT {
            then {
                count CNT-JNPR-NO
                accept;
            }
        }
    }
}
```

□ □□ □□□□ □□□ IPv4□□ IPv6□□□ □□□□ DSCP□ DSCPef□ □ cs6 □□ □□ family ccc □□□ □□□□□. □ □□ □□□□ □□□ FM-FIRST-TWO-L3-BYTES □□□ □□□□ □□□□□.

```
firewall {
    family ccc filter FF-DSCP-CLASSIFY {
        term ROUTING-IPV4 {
            from {
                flexible-match-mask {
                    mask-in-hex 0xf0fc;
                    prefix 0x40c0;        # DSCP=cs6 in IPv4 header
                    flexible-mask-name FM-FIRST-TWO-L3-BYTES;
                }
            }
            then {
```

```
            count ROUTING-IPV4;
            accept;
        }
    }
    term ROUTING-IPV6 {
        from {
            flexible-match-mask {
                mask-in-hex 0xffc0;
                prefix 0x6c00;        # DSCP=cs6 in IPv6 header
                flexible-mask-name FM-FIRST-TWO-L3-BYTES;
            }
        }
        then {
            count ROUTING-IPV6;
            accept;
        }
    }
    term VOICE-IPV4 {
        from {
            flexible-match-mask {
                mask-in-hex 0xf0fc;
                prefix 0x40b8;            # DSCP=ef in IPv4 header
                flexible-mask-name FM-FIRST-TWO-L3-BYTES;
            }
        }
        then {
            count VOICE-IPV4;
            accept;
        }
    }
    term VOICE-IPV6 {
        from {
            flexible-match-mask {
                mask-in-hex 0xffc0;
                prefix 0x6b80;             # DSCP=ef in IPv6 header
                flexible-mask-name FM-FIRST-TWO-L3-BYTES;
            }
        }
        then {
            count VOICE-IPV6;
            accept;
        }
    }
```

```
        term DEFAULT {
            then {
                accept;
            }
        }
    }
}
```

□ □□□□ Junos □□□ 20.1R1□ □□□□ QFX5120-32C, QFX5120-48Y □□ EX4650 □□□□□ □□ □□□ □□□□ □□□ 2 □□ □□□□□ □□□□ □□ □□□ □□□□ □□□ □□□□□. □□□□ 32 □□□ □□ □□□ □□□□ ethernet-switching □□□□□ (inetinet6 □□□ 3 □□ □□ □□□□ □□□ □□□).

```
user@device# show firewall family ethernet-switching
filter udf_eth {
    term t1 {
        from {
            flexible-match-mask {
                match-start layer-2;
                byte-offset 8;
                bit-length 32;
                prefix 168430090;
            }
        }
        then count c1;
    }
}
```

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□□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□. Feature Explorer □ □□□□ □□□□□ □□□ □□□□□ □□□□□.

release heading in release-history	desc heading in release-history
23.2R1	Junos OS □□□ 23.2R1□□ □□□□ EX4100-24P, EX4100-24T, EX4100-24MP, EX4100-48P, EX4100-48T, EX4400-24T, EX4400-24X □ EX4400-48F □□□□□ □□□ 2 □ □□□ 3(□□)□ □□□ □□ □□□ □□□ □□.
20.1R1	QFX5120 □ EX4650 □□□□ □□, □□□ 2 □ □□□ 3(□□) □□□□ □□ □□□ □□ □□□ Junos □□□ 20.1R1□ □□□□□□□.

IPv4 ??? ??? ?? ?? | 894

IPv6 ???? ?? ??? ?? ?? ?? | 911

??? 2 CCC ???? ?? ??? ?? ?? ?? | 977

VPLS ???? ?? ??? ?? ?? ?? | 960

??? ?? ? ?? ??

??? ??? ??? ?? ??? ???? ? ???? ???? ?? ?? ?? ???? ?? ?? ??? ?????. ? ??????? *nonterminating* ? ?? ??? ??? ??? ??? ?? ? ??? ?? ??? */?/* ??? ?? ? ??? ?????. ??? ??? ?? ???? `next term`*/?/* ???? ??? ??? ? ????. ??? ? ?? ?? ???? `next term`*/????/ /?/*?? ???? ??? ??? ? ????.

> **?:** Junos OS ? Junos OS Evolved `next term` ??? ??? ??? ??? ??? ? ????. `next term`? ???? ?? ???? ??? ?? ??? ?? ?? ?? ??? ???? ????.

? 48 ??? 818 ??? ?? ??? ?? ??? ? ?? ??? ??? ?? ?????.

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Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
bgp-output-queue-priority priority *(expedited | (1-16))*	□□□□□ □□□ 17□□ BGP □□ □□□ □ □□□ □□□ □□□□□.	• family evpn • family inet • family inet-mdt • family inet-mvpn • family inet-vpn • family inet6 • family inet6-mvpn • family inet6-vpn • family iso-vpn • family l2vpn • family route-target • family traffic-engineering
count *counter-name*	□□□ □□□□ □□□ □□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family mpls • family vpls

□ 48: □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
dont-fragment (set | clear)	IPv4 □□□□ Don't Fragment □□(□□□) □□ □□□□ □□□□□□ □□□□ □ □□□ □□□ □ □□□□. • set- □□□ □□ 1□ □□□□ □□□□ □□□□□. • clear- □□□ □□ 0□□ □□□□ □□□□ □□□□□. □: □□□ dont-fragment (set | clear) MPC□□□ □□□□□.	family inet
dscp *value*	IPv4 DSCP(Differentiated Services Code Point) □□□ □□□□□. □□ □□ 63□ □ □□ 0 □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □ □□□ □□ □□□□□ □□□□ b□(□) □□□□□ □□□. □□ DSCP □□ be (best effort) □□ 0□□□. □□ □□□ □□□ □ □□□ □□□ □□ □□□□. • af11- □□□ □□□ □□□ 1, □□ □□ □□ □□(1) • af12- □□□ □□□ □□□ 1, □□ □□ □□ □□(2) • af13—□□□ □□□ □□□ 1, □□ □□ □□□□(3); □□ □□ af43, □□□ □□□ □□□ 4, □□ □□ □□ □□ • be—□□□ □□ • cs0- □□□ □□□ 0; cs7□□ , □□□ □□□ 0 • ef—□□ □□ □: □ □□□ PTX □□□ □□□□□□ □□□□ □□□□. □: MX □□□ □□□□□ □□□□ MPC □□ □□□ □□□ □□ □□□ □□ □□ □(0□□ 63□□) □ set dscp □□□□□. □: □ dscp 0dscp be □□□ T320, T640, T1600, TX Matrix, TX Matrix Plus □ M320 □□□□ 10□□□□ □□□ MPC(Modular Port Concentrator)□ □□ □□□□□. □□□ □□□ □□□ M320 □□□□ Enhanced III FPC(Flexible PIC Concentrator)□□□ □□□□ □□□□. T4000 □□□ dscp 0 □□□ T1600 Enhanced Scaling Type 4 FPC□ T4000 Type 5 FPC □□ □□ □□ □□□ □ □□ □□□□ □□□□.	family inet

□ 48: □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
enhanced-hierarchical-policer	□□□ □□□ □□ □□□□ □□□□ □□□ □□□□□ □□□ □□□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family VPLS
force-premium	□□□□□ □□□ □□□□ □□□□ □□□ □□□□ □□ □□□□ □□□□ □□□□□. □□□□ □□ □□ □□□ □ □□□□ □□□ □□□□□ □□□□ □□□□□. □□□ force-premium □□□ □□□□ □□□□ □□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□ □□□□□ □□□□□ □□□. □ □□□□ □□ □□□□ □□□ □□ □□ □□□□□ □□□□□. □: force-premium □□ □□□ MPC□□□ □□□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family VPLS
forwarding-class *class-name*	□□□ □□□ □□□ □□□□ □□□□□. • *forwarding-class-name* • assured-forwarding • best-effort • expedited-forwarding • network-control	• family any • family bridge • family ccc • family inet • family inet6 • family mpls • family vpls

□ 48: □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
hierarchical-policer	□□□ □□□ □□□□ □□□□ □□□ □□□□□	• family any • family bridge • family ccc • family inet • family inet6 • family mpls • family vpls
ipsec-sa *ipsec-sa*	□□□ IPsec □□ □□□ □□□□□. □: □ □□□ MX □□□ □□□, T4000 □□□□ □□ 5 FPC □ PTX □□□ □□ □□ □□□□ □□ □□□□ □□□□.	family inet
load-balance *group-name*	□□□ □□ □□ □□□ □□□□□. □: □ □□□ MX □□□ □□□ □□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.	family inet
log	□□ □□ □□ □□ □□□ □□ □□ □□□ □□□□□. □□□ □□□□□(CLI)□□ show firewall log □□□ □□□□ □ □□□ □□□□ □ □□□□. □: □□□ 2(L2) □□□ □□ □□□ MPC□ □□ MX □□□ □□□□□□ □□□ □ □□□□(□□□ □ MPC□ □□ □□ MPC □□, MPC □ DCP□ □□ □□ □□ □□). DPC□ □□ MX □ □□ □□□□ □□ □□□ □□ L2 □□□□ □□ □□ □□□ □□□□□.	• family bridge • family ccc • family inet • family inet6 • family vpls
logical-system *logical-system-name*	□□□ □□ □□□ □□□□□ □□□□.	• family inet • family inet6

□ 48: □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
loss-priority (high | medium-high | medium-low | low)	□□ □□ □□□□(PLP) □□□ □□□□□. □□□ □□□ □□ □□□ three-color-policer □□ □□□□ □□ □□□ □□□ □□ □□□□. □ □ □□ □ □□ □□□ □□ □□□□□□. □ □□□ M120 □ M320 □□□□□ □□□□□. □□□ CFEB(CFEB-E)□ □□ M7i □ M10i □□□; □ MX □□□ □□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□ □ T □□□□ IP □□□□ □□, [edit class-of-service]□□ □□□ tri-color □□ □□□□ 4 □□ □□□ □□□□ □□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. □□ tri-color □□ □□□ □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□□ □□□ □□ □□ □ □□□ *□□ □□ □□□□ □□□ □ □□ □□□□ □□ □□□ □□□□ □□ □□*□□□ □□□□□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family mpls • family vpls
next-hop-group *group-name*	□□□ □□ □ □□□ □□□□□. □□□ □□□ □□□□ □□ port-mirror □□□ □□ port-mirror-instance □□□□ □□ next-hop-group □□ □□□□.	• family any • family inet
next-interface *interface-name*	(MX □□□) □□□ □□ □□□□□□ □□□ □□□□.	• family inet • family inet6
next-ip *ip-address*	(MX □□□) □□□ □□ IPv4 □□□ □□□ □□□□.	family inet
next-ip6 *ipv6-address*	(MX □□□) □□□ □□ IPv6 □□□ □□□ □□□□.	family inet6
packet-mode	□□ □ □□□ □□ □□□ □□□□□□ □□□ □□ □□□□ □□□□ □□□□ □□□□□. □□ □□□□ □□ packet-mode □□□ □□ □□ □□ □□□ □□□ □□□ □□ □□□ □□□ □□□□□. SRX100, SRX210, SRX220, SRX240, SRX650 □□□□□□ □□□□□. □□□ □□ □□□ □□ □□ □□□□ □□ □□□ □□□ *Junos OS □□ □□ □□□□* □□□□□□.	family any

□ 48: □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
policer *policer-name*	□□□ □□ □□□ □□□ □□□□ □□□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family mpls • family vpls
policy-map *policy-map-name*	(MX □□□) □□ □□□□ □□ □□ □□ □□□ □□□□ □ □□□□ □□ □□ □□□□□.	• family any • family ccc • family inet • family inet6 • family mpls • family vpls
port-mirror *instance-name*	□□□ □□□□ □□□□ □□□ □□ □□□□□□□. □ □□□ M120 □□□, Enhanced III FPC□ □ □□ M320 □□□, MX □□□ □□□ □ PTX □□□ □□ □□ □□□□□□ □□□□□. □□□ □□□ □□□□ □ next-hop-groupport-mirror □□□ □□ □□□□ □□ □□ □□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family vpls • family mpls

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Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
port-mirror-instance *instance-name*	□□□ □□□□□ □□ □□□ □□□□□□. □ □□□ MX □□□ □□□□□□ □□□□□. □□□ □□□ □□□□ □ next-hop-groupport-mirror-instance □□□ □□ □□□□ □□ □ □ □□□□.	• family any • family bridge • family ccc • family inet • family inet6 • family vpls • family mpls
prefix-action *action-name*	□□□ □□ □□□ □□□□ □□□ □□□□□ □□□□□. □: □ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.	family inet
routing-instance *routing-instance-name*	□□□ □□□ □□□□□ □□□ □□□□.	• family inet • family inet6 •
sample	□□□ □□□□□□. □: Junos OS□ □□□□□ □□□□ □□□ □□□□□ □□□□. □□□ □□□□ □□□□□□ □□ □□ □□□□ □□ □□□□□□ □□□□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□ □□□□ □□□□ □ □□ □□□□□ □□□□.	• family inet • family inet6 • family mpls
service-accounting	□□□ □□□□ □□□ □□□ □ □□□ □□□ □□□□□ □□□□□. □□□ □□□□□ □□ □□□ □□□□□. □□□□ RADIUS□ □□□ □ □□ □□ □□□ □□□ (__junos-dyn-service-counter)□ □□□□□. service-accounting □ service-accounting-deferred □□□□ □□ □ □□□ □□ □□ □□□□□□. □: □ □□□ T4000 □□ 5 FPC □ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.	• family any • family inet • family inet6

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Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
service-accounting-deferred	□□□ □□□□ □□□ □□□ □ □□□ □□□ □□□□□ □□□□□. □□□□ RADIUS□ □□□ □ □□ □ □ □□□ □□□(__junos-dyn-service-counter)□ □□□□□. service-accounting □ service-accounting-deferred □□□□ □□ □ □□□ □□ □□ □□□□□□. □: □ □□□ T4000 □□ 5 FPC □ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.	• family any • family inet • family inet6
service-filter-hit	(□□□□ service-filter-hit □□ □□ □□ □□□□ □□ □□□ □□□ □□□□) □□□ □□ □□□ □□□ □□□□. □□□ □□ □□□ □□□ □□ □□□□□□ □□□□□. □ □□□ □□ □□□ service-filter-hit □□ □□□ □□□□ □□ □□□ □□□□□ □ □□□ □□□. □: □ □□□ T4000 □□ 5 FPC □ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.	• family any • family inet • family inet6
slice *slice-name*	□□□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□ □□□ □□□□ □□□□ □□□□ □□□□□. □□□ □(□□□ □□ □□)□ □□□□□□.	• family any • family bridge • family ccc • family evpn • family inet • family inet6 • family mpls • family vpls

표 48: □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
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three-color-policer (single-rate | two-rate) *policer-name*	□□□ □□ □□ □□ 2 □□ 3□ □□□□ □□□□ □□□ □□□□□. □: □□□ □□□ □□ □□□ □□ □□□ loss-priority □□□ □ □□□□. □ □ □□□ □□ □□□ □□□.	• family bridge • family ccc • family inet • family inet6 • family mpls • family vpls

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Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
traffic-class *value*	□□□ □□□ □□ □□□□ □□□□□. □□ □□ 63□□ □□ 0 □□□ □ □□□□. 16□□ □□□□ □□ □□ □□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □□□□□ □□□□ b□(□) □□□□□ □□□. □□ traffic-class □□ □□□ □□, □ be □□ □□□ 0. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□. • af11- □□□ □□□ □□□ 1, □□ □□ □□ □□ • af12—□□□ □□□ □□□ 1, □□ □□ □□ □□ • af13- □□□ □□□ □□□ 1, □□ □□ □□ □□ • af21—□□□ □□□ □□□ 2, □□ □□ □□ □□ • af22—□□□ □□□ □□□ 2, □□ □□ □□ □□ • af23—□□□ □□□ □□□ 2, □□ □□ □□ □□ • af31—□□□ □□□ □□□ 3, □□ □□ □□ □□ • af32—□□□ □□□ □□□ 3, □□ □□ □□ □□ • af33—□□□ □□□ □□□ 3, □□ □□ □□ □□ • af41—□□□ □□□ □□□ 4, □□ □□ □□ □□ • af42—□□□ □□□ □□□ 4, □□ □□ □□ □□ • af43—□□□ □□□ □□□ 4, □□ □□ □□ □□ • be—□□□ □□ • cs0- □□□ □□□ 0 • cs1- □□□ □□□ 1 • cs2- □□□ □□□ 2 • cs3- □□□ □□□ 3 • cs4- □□□ □□□ 4	family inet6

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	• cs5- □□□ □□□ 5 • cs6—□□□ □□□ 6 • cs7- □□□ □□□ 7 • ef—□□ □□ □: □ traffic-class 0traffic-class be □□□ T □□□ □ M320 □□□□ MX □ □□ □□□□ 10□□□□ □□□ MPC(Modular Port Concentrator), 60□□□□ □□ □ MPC, 60□□□□ □□□ □□ MPC □ 60□□□□ □□□ Enhanced □□ MPC□□□ □□□□□. □□□ □□□ □□□ M320 □□□□ Enhanced III FPC(Flexible PIC Concentrator)□□□ □□□□ □□□□.	

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Junos OS □ Junos OS Evolved`next term`□□□ □□□ □□□ □□□ □□□ □ □□□□. `next term`□ □□□□ □□□□□ □ □□□ □□ □□□ □□ □□ □□ □□□ □□□□ □□□□.

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decapsulate gre [routing-instance *instance-name*]	IPv4 □□ □□□□□ □□□□□ □□(PE)□ □□□ MX □□□ □□□□ □□ □□ □□□□□□□ □□ □□ GRE □□□ □□ □□ □□ GRE(Generic Routing Encapsulation) □□□ □ □□ □□□ □□□□□□. □ □□□ GRE □□□□□ □□ □□ □□ □□□ □□□□ □□ □ □□ □□□□ □□ □□□ □□□ □ □□□□. IPv4 □□□ □□ (□□protocol 47) □□ □□ □ □□□□□ protocol gre . □□□□ MIC(Modular Interface Card) □□ MPC(Modular Port Concentrator)□ □□□ □□□ □□□□□ □□ □□□□□ □ □□□ □□□□□□ □□□ □□ □ □□□□□. □□ □□ GRE □□□□ □□□□ □□ □□□□□ □ □□□ □□ □□□ □□□□ □ □□ □□□□ □□, □□□□ □□ □□□□ □□□ □□□□ □□□□ syslog □□ □□□□ □□□. □□□□□□ □□□□ □□□ □□ □□ □□ □□ □□□□ □□□□ □□□□□ □□ □□□ □□□□□. • □□ GRE □□□ □□□□ □. • □□ □□□ □□□□ □□ □ □□□ □□□ □□ □□□□ □□□□□. □□□□□ □□ □□ □□□ □□ □□□ □□□□□ □□□□ □□□	• family inet

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decapsulate l2tp [routing-instance *instance-name*] [forwarding-class *class-name*] [output-interface *interface-name*] [cookie *l2tpv3-cookie*] [sample]	IPv4 □□ □□□□□ □□□□□ □□(PE)□ □□□ MX □□□ □□□□ □□ □□ □□□□□□□ □□ □□ L2TP □□□ □□ □ □□□ L2TP(Layer 2 Tunneling Protocol) □□□ □□□ □□□ □□□□□□. □ □□□ L2TP □□□□□ □ □ □□ □□ □□□ □□□□ □□ □□□ □□□□ □□ □□□ □□□ □ □□□□. IPv4 □□□□ □ □, □□ □□□ □□ $junos-input-filter □ □□ □□ □ □□□ $junos-output-filter □□□□□□ □□□□ □. □□□□ MIC(Modular Interface Card) □□ MPC(Modular Port Concentrator)□ □□□ □□□ □□□□□ □□ □□□□□ □ □□□ □□□□□□ □□□ □□ □ □□□□□. □□ □□ L2TP □□□□ □□□□ □□ □□□□□ □ □□□ □□ □□□ □□□□ □ □□ □□□□ □□, □□□□ □□ □□□□ □□□ □□□□ □□□□ syslog □□ □□□□ □□□. □□ □□ □□□□□□ □□□□□ □□□ MAC □□□ □□□ IP □□ □□□ □□□□. □□□□ □ □□ □□ MAC □□□ □□□ □ MAC □□□ □□□□ □□ □□, □□□ □□□ □□□□□ □ □ □□□ □□□□ □□□□, □□ □□□□ □□□□ □□□ □□ □ □□□□□. □□□□ □□□ □□ MAC □□□ □□□□ MAC □□□ □□□ □□, □□□ □□□	family inet

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	□ □□□□□ □□□ □ □□ □□(□□□ □□□□□ MAC □□ □□). • cookie *l2tpv3-cookie*- (□□ □□) L2TP □□□ □□ □□□ □□□ □□ L2TP □□□ □□□□□. □□□ □□□ □ □ □□□ □□□□ □□ □□ □ □□ □□□ □□□□ □□ □□. □ □□ □□□ □□ □ □□ □□□ □□□ □□ □□ □ □□□ □□ □ □□□□ □□ □□□ □□□□ □□□ □ □□□□□. • sample- (□□ □□) □□ □ □□□□□□. Junos OS□ □□□□□ □□□□ □□□ □□□□□ □□□□. □□□ □□□□ □□□□□□ □□ □□ □□□□ □□ □□ □□□□ □□□□ □□ □□ □ □□□□□□. □□□ □□ □□ □□ □□ □□□□ □□ □□ □□□ □□□□□ □□ □□. □: decapsulate l2tp □□ □□□□ □□□□ [edit firewall family inet filter *filter-name* term *term-name*] □□□ IPv4 □ IPv6 □□□ □ □ □□□□ □□□□ □□□□. □□□□□, □□□ □□□ □□ □□□□ L2TP □□ □□□ □□□ □□□ □□ □□□□□.	

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encapsulate *template-name*	IPv4 □□ □□□□□ □□□□□ □□(PE)□ □□□ MX □□□ □□□□ □□ □□ □□□□□□□□ □□□ □□ □□□□ □□□□ □□ □□ GRE(Generic Routing Encapsulation) □□□□ □□□□□□. □ □□□ □□□ □□ □□□ □□ □□ □□ □□□ □□□ □□ □□ □□ MIC(Modular Interface Card) □□ MPC(Modular Port Concentrator)□ □□□ □□□ □□□□□ □□ □□□□□ □ □□□ □□□□□□ □□□ □□ □ □□□ □ □□□□. □□ □□ GRE □□□□ □□□□ □□ □ □□□□□ □□□ □□□ □□□□ □□□ □□□□ □□, □□□□ □ □□□□□ □□□ □□□□ □□□ □ syslog □□ □□□□ □□ □. □□□□□□ □□□□ □□□ □□ □□ □□ □□ □□□□ □□□□ □□□□□ □□□ □□ □□□□ □ □□ □□□□ □□ □□□ □□□□ □. 1. □□ □□□□ □□□ □□ GRE □□(□□ □ □ □□ □□ □□)□ □□□□□. 2. IPv4 □□ □□□□□ □□ □□□ □□□□□. 3. □□ □□ □□□□□□□ □□ □□(□□ PE □□□)□□ □□ GRE □□□ □□□□ □.	• family inet • family inet6 • family any • family mpls

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encapsulate *template-name* (L2TP □□□ □□)	IPv4 □□ □□□□□ □□□□□ □□(PE)□ □□□ MX □□□ □□□□ □□ □□ □□□□□□□ □□□ □□ □□□□ □□□□ □□ □□ L2TP □□□□ □□□□□ □. □ □□□ □□□ □□ □□□ □□□□ □□ □□□ □□□ □□ □□□□ MIC(Modular Interface Card) □□ MPC(Modular Port Concentrator)□ □□□ □□□ □□□□□ □□ □□□□□ □ □□□ □□□□□□ □□□ □□ □ □□□ □ □□□□. □□ □□ GRE □□□□ □□□□ □□ □ □□□□□ □□□ □□□ □□□□ □□□ □□□□ □□, □□□□ □ □□□□□ □□□ □□□□ □□□ □ syslog □□ □□□□ □□ □. □□□□□□ □□□□ □□□ □□□□ □□ □□ □□□□ □□□ □ □□□□□ □□□ □□ □□□□ □□□ □□□□ □□ □□□ □□□ □□.	• family inet

1. L2TP □□□ □□□□□ (□□ □□□□ □□□ □□ □ □ □ □□ □□□□□ □□□ □ □□).
2. IPv4 □□ □□□□□ □□ □□□ □□□□□.
3. □□ □□ □□□□□□□ □□ □□(□□ PE □□□)□□ □□ L2TP □□□ □□□ □□. □□□ □□ □□□□ □ □ [edit logical-systems *logical-system-name*

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	firewall] □ □□ □□ □ [edit firewall] □□ □□□□ tunnel-end-point □□□□ □□ □.	
exclude-accounting	L2TP LAC□□ □□□□ □ □□□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□ □□□□□. □□□□□ DHCPv6 □□ ICMPv6 □□ □□□□ □□□ □ □□□ □□□□□. □□□ □□ □ □□□□ □□□ □□ □□ □□ □□ □□□□□ □□□ □□□ □□ □ □□□□□ □□□□ □□ □□□ □□□□ □□□□. (□□ □□ □□ □ □□□ □□□ □□ □□□ client-idle-timeout □ client-idle-timeout-ingress-only □□□ □□□□□.) □ □□□ □□□ □□□□ □□□ □□ □ □□□□ □□ □□□ □□ □□□ □□ □□□□ □□□□ □□ □ □□□□□. □□□ □□□ □□ □□□□□ □□□ □□□□□. □ □□□ □ inet6 □□□ □ inet □□□ inet6□□ □□□□ □ □□□ □□ □□□□□.	• family inet • family inet6
logical-system *logical-system-name*	□□□ □□□ □□□ □□□□□ □ □□□. □: □ □□□ PTX □□□ □□ □□ □□□□□□□ □□□ □ □□□□.	• family inet • family inet6

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reject *message-type*	□□□ □□□□ ICMPv4 □□ ICMPv6 □□□□ □□□□□. • no *message-type* □ □□□□ destination unreachable □□□□ □ □□□□ □□□□□. • □ □□□ *message-type*tcp-reset □□ tcp-reset □ □□□ TCP □□□ □□□□ □□ □□□. administratively-prohibited □□□ □ □□ □□ 13□ □□□□ □ □□□□. • □□ *message-type* □ □□ □□□□ □□ □□□□ □□□□□. □: □□ syslog □□□ □ □□□ sample □□ □□□ □□□ □□□□□□ □□□ □ □□□□. MX2K-MPC11E□ □□, ICMP □□ □□□□ □□ □□, □□□ □ CoS(Class of Service) □□□ □□□□ □ □□□ □□□ □□□□□. □□□□ destination unreachable □□□□□ □□. □(□ *message-type*) □□ □ □ □□□ □ □□□□. address-unreachable, administratively-prohibited, bad-host-	• family inet • family inet6

□ 49: □□□ □□□ □□ □□ □□ *(Continued)*

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	tos, bad-network-tosbeyond-scopefragmentation-neededhost-prohibitedhost-unknownhost-unreachablenetwork-prohibitednetwork-unknownnetwork-unreachableno-routeport-unreachableprecedence-cutoffprecedence-violationprotocol-unreachablesource-host-isolatedsource-route-failedtcp-reset PTX1000 □□□□□ □□ □□□ □□ □□□□□□□□ □□ □□□.	
routing-instance *instance-name*	□□□ □□□ □□□ □□□□□ □ □□□.	• family inet • family inet6

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topology *topology-name*	□□□ □□□ □□□□□ □□□□. □: □ □□□ PTX □□□ □□ □□ □□□□□□ □□□ □ □□□□. □ □□□ □□□□(□□ □□ □□ □□□)□ □□ □□□ □ □□□ □□□□ □□□ □□ □ □□□□ □□□□□. □□ □□ □□ □□□□ □□, □□ □□ □□□□□ □□□ □□□ □□ □□ □□ □□□ □□□(□: □ □ □□□)□ □□ □□□□□ □□□□ □ □□□□. □□□ □□□ □□□ □□□□ □□□ □ □□□□ □□ □□□□□ □ □□ □□□□ □□□□□.	• family inet • family inet6

□: QFX5120-48Y □ QFX5120-32C □□□ □□□□□ BFD □□□ □□□□ □□ □□□ □□□□□ □□□□□ discard . □□□ □□ □□ discard □□□ □□□ □□ □□ port-mirror BFD □□□ □□□□ □□□□.

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□□□ □□ □ □□ □□ | 817

IPv4 □□□ □□□ □□ □□ | 894

IPv6 □□□□ □□ □□□ □□ □□ □□ | 911

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□□□ □□ FMC(Flexible Match Condition) | 809

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□ 50: ACX □□□ □□□□ □□□□ □□□□ □□ □□□ □□ □□ □□

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□□□□ □□□	[edit firewall family any filter *filter-name* term *term-name*] ACX □□□ □□□□□ □ □□□ □□□ □□ □□□□ □□ □□□ □□□□.
IPv4	[edit firewall family inet filter *filter-name* term *term-name* □□ □□□ □□ □□□ "IPv4 □□□□ □□ □□ □□(ACX □□□ □□□)□" □□□ 849 □□□□□□.
MPLS	[edit firewall family mpls filter *filter-name* term *term-name*] □□ □□□ □□ □□□ "MPLS □□□□ □□ □□ □□(ACX □□□ □□□)□" □□□ 860 □□□□□□.
□□□ 2 CCC	[edit firewall family ccc filter *filter-name* term *term-name*] ACX □□□ □□□□□ □ □□□ □□□ □□ □□□□ □□ □□□ □□□□.
□□□	[edit firewall family bridge filter filter-name term term-name] [edit firewall family ethernet-switching filter filter-name term term-name] (ACX5048 □ ACX5096 □□□□□ □□□□□.)

□□□ACX5448 external-tcam□ □□□□ □□ □□ □□ □□□ □□□ □□□ □ □□□□.

- □□ ethernet-switching
- □□ ccc
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- □□ inet6
- □□ mpls

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□ 51 □□□ 845 □□□ □□ □□ □□□ □□□ □□ □□□ □□□ □ □□ □□ □□□ □□□□□.

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□□□□ □□	□□□ □□ □□ □□(□: □□□ □□ □□, □□ □□□ □□ □□ □□, □ □ □□□ □□□ □□ □□□ □□ □□□ □□□□ □□ □□□□ □□ □□) □ □□□□□ □□□ □□□ □ □□ □□□ □□□□□.	"Nonterminating Actions(ACX □□□ □□□)□" □□□ 860 □□□□□□.

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□: ACX5448 □ ACX7000 □□□ □□□□□□ □□□ □□□□ IRB□ □□□ □□□□ □□□□ □□□□ □□□ 2 □□□ □□□□ □□□ 2 □□□ □□□ □□□□ □□□. □□□ □□□ 3□□ □□□□ IRB□ □□□ 3 □□□ □□□□ □□□.

□: ACX □□□ □□□□□□ IRB □□□□□□ □□ □□□□ □□□ □□□ □□□ □ □□□□.

□ 52 □□□ 846 □□□ □□□ □□□ □□□ □□ □□□□ □□ □□□ □□ □□□.

□ 52: ACX □□□ □□□□ □□ □□□ □□□ □□□ □□ □□ □□

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□□□ □□	TCP/UDP □□ □□ □□
destination-prefix-list	□□□ □□□□ IP □□ □□□□ □□□□□□.
□□ □□ □□□	DiffServ(Differentiated Services) □□ □□□ □□
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icmp □□	ICMP □□□ □□ □□
ICMP□	ICMP □□□ □□ □□
interface-group	□□□□□ □□ □□
ip-destination-address	IP □□ □□ □□
IP □□ □□	IP □□ □□ □ □□
IP □□□□	IP □□□□ □□ □□
ip-source-address	IP □□ □□ □□
learn-vlan-1p-□□ □□	□□□ 802.1p VLAN □□ □□□ □□

□ 52: ACX □□□ □□□□ □□ □□□ □□□ □□□ □□ □□ □□ *(Continued)*

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□□-vlan-dei	□□□ VLAN ID DEI □□ □□
learn-vlan-id	□□□ VLAN ID □□
□□ MAC □□	□□ MAC □□ □□
source-prefix-list	□□□ □□□□ IP □□ □□□□ □□□□□□.
□□ □□	TCP/UDP □□ □□ □□
□□□-vlan-1p-□□□□	□□□ □□ 802.1p VLAN □□ □□
□□□-vlan-id	□□□ VLAN ID □□
vlan-ether-□□	VLAN □□□ □□ □□

□ 53 □□□ 847 □□ □□□□ □□ □□□ □□□□□.

□ 53: ACX □□□ □□□□ □□ □□□ □□□ □□□ □□ □□ □□

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□ 53: ACX □□□ □□□□ □□ □□□ □□□ □□□ □□ □□ □□ *(Continued)*

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□□□	□□□ □□ □□□ □□□ □□□□ □□
syslog	□□□ □□□ □□ □□□ □□□□□.
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- CCC □□□ □□□ □□□ □□ □□ □□ | 848

CCC □□□ □□□ □□□ □□ □□ □□

ACX □□□ □□□□□□ CCC(Circuit Cross-Connection) □□□(family ccc)□ □□ □□ □□□□ □□ □□□ □□□ □□□ □ □□□□.

□ 54 □□□ 848 □□ □□ □□□□ □□□ □ □□ □□ □□□ □□□□ □□□□ [edit firewall family ccc filter *filter-name* term *term-name*] .

□ 54: ACX □□□ □□□□ □□ CCC □□□ □□□ □□ □□ □□

□□	□□
destination-mac-address	□□ MAC □□

□ 54: ACX □□□ □□□□ □□ CCC □□□ □□□ □□ □□ □□ *(Continued)*

□□	□□
destination-port	TCP/UDP □□ □□□ □□□□□.
dscp	□□□□ □□□(DiffServ) □□ □□□□ □□□□□.
icmp-code	ICMP □□□ □□□ □□□□□.
icmp-type	ICMP □□□ □□□ □□□□□.
ip-destination-address	□□ IP □□□ □□□□□.
ip-precedence	IP □□ □□ □□ □□□□□.
ip-protocol	IP □□□□ □□□ □□□□□.
ip-source-address	□□ IP □□□ □□□□□.
learn-vlan-1p-priority	□□□ 802.1p VLAN □□ □□□ □□
source-mac-address	□□ MAC □□
source-port	TCP/UDP □□ □□□ □□
user-vlan-1p-priority	□□□ 802.1p VLAN □□ □□□ □□

IPv4 □□□ □□ □□(ACX □□□ □□□)

ACX □□□ □□□□□□ IP □□ 4(IPv4) □□□(family inet)□ □□ □□ □□□□ □□ □□□ □□□ □□□ □□□ □ □□□□. □ 55 □□□ 850 □ (□) □□ □□□□ □□□ □ □□ [edit firewall family inet filter *filter-name* term *term-name* from] □□ □□□ □□□□□.

□ 55: ACX □□□ □□□□ IPv4 □□□□ □□ □□□ □□ □□ □□

□□ □□	□□
destination-address *address*	IPv4 □□ □□ □□□ □□□□□□. □: ACX □□□ □□□□□□ □ □□□ □□ □□□ □□□ □ □□□□. IPv4 □□ □□ □□□ □□□□ □□□□.
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□□□ □□ □□ □□□□□ □ □□□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).
destination-prefix-list	□□□ □□□□ IP □□ □□□□ □□□□□□.

□ 55: ACX □□□ □□□□ IPv4 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□

dscp *number*	DSCP(Differentiated Services Code Point)□ □□□□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. □□□ □□□ *□□ □□(BA) □□□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□*□ □□□□□□.
	
	0□□ 63 □□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ 0x□ □□□□ □□□□□□. 2□□ □□□□ □□ □□□ □□ b□ □□□□ □□□□□.
	
	□□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□).
	• *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*□ RFC 3246□ □□□ □□ □□□□ □□□□ □. ef(46).
	• *AF(Assured Forwarding) PHB □□*□ RFC 2597□ □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □□ □ □□ 4□□ □□□□ □□□□□.
	  • af11 (10), af12 (12), af13 (14)
	  • af21 (18), af22 (20), af23 (22)
	  • af31 (26), af32 (28), af33 (30)
	  • af41 (34), af42 (36), af43 (38)

fragment-flags *number*	(□□ □□) IP □□□ 3□□ IP □□□ □□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). dont-fragment(0x4), more-fragments(0x2) □□ reserved(0x8).

□ 55: ACX □□□ □□□□ IPv4 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
icmp-code *number*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ protocol icmp □□ □□□ □□□□ □□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip-header-bad (0), required-option-missing (1) • □□□□: redirect-for-host (1), redirect-for-network (0), redirect-for-tos-and-host (3), redirect-for-tos-and-net (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • □□ □□: 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)
icmp-type *number*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ protocol icmp □□ □□□ □□□□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). 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) □□ unreachable (3).
ip-options *values*	8□□ IP □□ □□(□□ □□)□ □□□ □□ □□□□□□. ACX □□□ □□□□ □□□ ip-options_any □□□ □□ □□ □□ □□□□ □□□□□ □□ □□ □□□ □□□□□. □: ACX □□□ □□□□□□ IP □□ □□ □□□ □□□ □ □□□□. □□ □□ □□□□ □□ □□□□ □□□□.

□ 55: ACX □□□ □□□□ IPv4 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
precedence *ip-precedence-field*	IP □□□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp(0xa0), flash(0x60), flash-override(0x80), immediate(0x40), internet-control(0xc0), net-control(0xe0), priority(0x20) □□ routine(0x00). 16□□, 2□□ □□ 10□□ □□□□ □□□□□ □□□ □ □ □□□.
protocol *number*	IP □□□□ □□ □□□ □□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). dstopts(60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), (58), igmpicmpv6 (2), ipip (4 ipv6), (41), no-next-header, (ospf 89), pim (103), routing(rsvp 46), sctp (132), tcp (6), udp (17) □□ vrrp (112).
source-address *address*	□□□ □□□□ □□ □□□ IPv4 □□□ □□□□□□.
source-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. IPv4 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □□ □ □□, destination-port *number* □□ □□□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
source-prefix-list	□□□ □□□□ IP □□ □□□□ □□□□□□.

□ 55: ACX □□□ □□□□ IPv4 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
tcp-flags *value*	TCP □□□ 8□□ TCP □□□ □□□□ □□ □□□ □□□ 6□□□ □□□□□□. □□ □□ □□□ □□□□ □□ □□ □□□ □□□□ 16□□ □□ □□□ □ □□□□. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP □□□□, SYN □□□□ □□□ □□ □□□□□ □□□□ □□ □□, ACK □□□□ □□ □□ □ □□□ □□ □□□ □□□□ □□□ □. □□ □□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □□□□. □□□ □□ □□ □□ □□□ tcp-initial □□, □□ □□□ □□□□□□.
tcp-initial	TCP □□□ □□ □□ □□□ □□□□□□. □□ tcp-flags "(!ack & syn)"□ □□□□□.
ttl *number*	IPv4 TTL(time-to-live) □□□ □□□□□□. TTL □ □□ TTL □ □□□ □□□□□. □ □□ *number*2□□ 255 □□□ □□ □□ □□ □□□ □ □□□□.

IPv6 □□□ □□ □□(ACX □□□ □□□)

□□□ □□□□ □□ 6(IPv6) □□□(family inet6)□ □□ □□ □□□□ □□□ □□□ □□□ □ □□□□. □(□) □ 56 □□□ 855 □□ □□□□ □□□ □ □□ [edit firewall family inet6 filter *filter-name* term *term-name* from] □□ □□□ □□□□□.

□ 56: IPv6 □□□□ □□ □□□ □□ □□ □□

□□ □□	□□
destination-address *address*	IPv6 □□ □□ □□□ □□□□□□.
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□.
destination-prefix-list	□□□ □□□□ IP □□ □□□□ □□□□□□.
extension-headers *header-type*	Next Header □□ □□□□ □□□ □□□ □□ □□ □□□ □□□□□□. □□□ □ □□ □□□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□□□. □□□□□ □□□ □□ □□□ □□□□(□□ □□□□□) □□ □ □ □□□ □□□ □□□ □ □□ □□□ □□□ □□ □□ □□ □□□ □□ □□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah (51), (60), destinationesp (50), fragment (44), hop-by-hop (0), mobility (135) □□ routing (43). □□ □□ □□ *□ □□ □□* □□□□ □□□ □□□ any□ □□□□□. □: IPv6 □□□ □ □□ □□ □□□ □□□□ □ □□□□. □□□ IPv6 □□ □□□ □□□□ L4 □□□ □□□□□.
hop-limit *hop-limit*	□ □□□ □□□ □ □□ □□ □ □□ □□□ □□□□□□. *hop-limit*□ □□, □□ □ □□ 0~255 □ □□□ □□□□□.

□ 56: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
icmp-code *message-code*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip6-header-bad(0), unrecognized-next-header (1), unrecognized-option (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • destination-unreachable: administratively-prohibited(1), address-unreachable (3), no-route-to-destination (0), port-unreachable (4)
icmp-type *message-type*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). certificate-path-advertisement(149), certificate-path-solicitation (148), destination-unreachable (1), echo-reply (129), echo-request (128), home-agent-address-discovery-reply (145), home-agent-address-discovery-request (144), inverse-neighbor-discovery-advertisement (142), (141), membership-queryinverse-neighbor-discovery-solicitation (130), membership-report (131), membership-termination (132), mobile-prefix-advertisement-reply (147), mobile-prefix-solicitation (146), neighbor-advertisement (136), neighbor-solicit (135), node-information-reply (140), node-information-request (139), packet-too-big (2), parameter-problem (4), private-experimentation-100 (100), private-experimentation-101 (101), private-experimentation-200 (200), private-experimentation-201 (201), redirect (137), router-advertisement (134), router-renumbering (138), router-solicit (133), time-exceeded □□ (3). (201)□ □□ private-experimentation-201 □□□ □□ □ □□□ □□□ □□ □□□□.

□ 56: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
next-header *header-type*	□□□ □ □□ 8□□ Next Header □□□ □□□□□□. □□□ □□ □□□ □□ next-header □□□ Junos OS □□□ 13.3R6 □□□□ □□□ □ □□□□. IPv6□ □□, □□ □□□□ □□□ □□□ □□□ □ □□ □□ next-header □□□ □□□□ payload-protocol □□ □□□ □. □ □ □□□ □□□ payload-protocol □ □□□ □□ □□□□ □□□□□ □□□□ □□ □□□ □□ □□□ □ □□□ □ □□ □ □ □□□ □□□□ □□ next-header , □□ □□□□□ □□ □□ □□ □□ □□ IPv6 □□ □□□ □ □□ □□□ □□□□ □□ □□ □□□□. □□ □(□) IPv6□ □□ □□□□ □□ next-header □□ □□ □□ □□ □□□□□ □□□□ □□ □□ □□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstops (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), mobility (135), no-next-header (59), ospf (89), pim (103), routing (43), rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112). □: next-header icmp6 □ next-header icmpv6 □□ □□□ □□□ □□□ □□□□□. next-header icmp6 □ □□ □□□□□. next-header icmpv6 Junos OS CLI□ □□□ □□□□.
source-address *address*	□□□ □□□□ □□ □□□ IPv6 □□□ □□□□□□.
source-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□.
source-prefix-list	□□□ □□□□ IP □□ □□□□ □□□□□□.

□ 56: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
tcp-flags *flags*	TCP □□□ 8□□ TCP □□□ □□□□ □□ □□□ □□□ 6□□□ □□□□□□□. □□ □□ □□□ □□□□ □□ □□ □□□ □□□□ 16□□ □□ □□□ □ □□□□. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP □□□□, SYN □□□□ □□□ □□ □□□□□ □□□□ □□ □□, ACK □□□□ □□ □□ □ □□□ □□ □□□ □□□□ □□ □□. □□ □□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □□□□. □□□ □□ □□ □□ □□□ □□, tcp-established □ tcp-initial □□ □□□ □□□□□□.
tcp-initial	TCP □□□ □□ □□ □□□ □□□□□□. □□□ □ □□□ □□□ tcp-flags "(!ack & syn)"□□□. □ □□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ next-header tcp □□ □ □□ □□□□ □□ □□□□.

□ 56: IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
`traffic-class` *number*	□□□ CoS(Class of Service) □□ □□□ □□□□ 8□□ □□□ □□□□□□. □ □□□ □□□ IPv4□□ □□□ □□(ToS) □□□ □□□□□□□. 0□□ 63□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □ □□□□ □□□□ b□(□) □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*□ RFC 3246□ □□□ □□ □□□□ □□□□ □. ef(46). • *AF(Assured Forwarding) PHB □□*□ RFC 2597□ □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □ □□ □□ 4□□ □□□□ □□□□□. • af11 (10), af12 (12), af13 (14) • af21 (18), af22 (20), af23 (22) • af31 (26), af32 (28), af33 (30) • af41 (34), af42 (36), af43 (38)

□: □□ □□(address, destination-address, □□ source-address □□ □□)□□ IPv6 □□□ □□□□ □□ RFC 4291, *IP □□ 6 □□ □□ □□□□□* □□□ □□□ □□ □□□ □□□□□. IPv6 □□□ □□ □□□ □□□ IPv6 □□ □ □□□□ IPv6 □□□ □□□□□□.

□□□ □□□ □□□ inet6 □□□ □□□□.

```
user@host# show firewall family inet6
filter ipv6-filter {
    term t1 {
        from {
            source-address {
                2001:0000:0020:0020:0000:0000:0000:0150/128;
            }
            destination-address {
                2001:0000:0040:0040:0000:0000:0000:0150/128;
```

```
                }
                next-header tcp;
                source-port 1000;
                destination-port 2000;
                extension-header dstopts;
                traffic-class ef;
                tcp-flags 0x20;
                hop-limit 254;
            }
            then count ipv6-t1-count;
        }
        term t2 {
            from {
                icmp-type neighbor-solicit;
            }
            then count ipv6-t2-count;
        }
    }
```

MPLS □□□□ □□ □□ □□(ACX □□□ □□□)

ACX □□□ □□□□□□ MPLS □□□()□ □□ □□ □□□□ □□ □□□□□□ □□□ □□□ □□□ □ □□□□.family mpls

□: input-list *filter-names* □□□□ □□□□ mpls □□□ □□□ □□ □ output-list *filter-names* □□□□ □□ □□□□ □ □ □□ □□□ □□□□□(fxp □□ em0), □□□ □□□□□(lo0), USB □□ □□□□□(umd)□ □□□ □□ □□□□□□□ □□□□□.

□ 57 □□□ 860 □□ □□ □□□□ □□□ □ □□ □□ □□□ □□□□ □□□□ [edit firewall family mpls filter *filter-name* term *term-name* from].

□ 57: ACX □□□ □□□□ MPLS □□□□ □□ □□ □□□ □□ □□ □□

□□ □□	□□
exp *number*	MPLS □□□ □□□(EXP) □□ □□ □□ □□ □□ □□□□□. □ □□ *number*0□□ 7 □□□ □□ □□□ □□ 10□□, 2□□ □ □ 16□□ □□□□ □□□ □ □□□□.

□ □□ □□(ACX □□□ □□□)

□□ □□□ □□□ □□□ □ □□□□ □□□□ □□ □□ □□ □□□ □□□ □□□ □□□□□.

□: ACX □□□ □□□□ next term □ □□□ □□□□ □□□□.

ACX □□□ □□□□ □□□ **inet** □ □□□ **bridge**□ □□ □ □□ □□□□ □□ □ syslog □□□ □□□□□.

ACX5448, ACX710 □ ACX7100 □□□ □□□□ □□ □□□□ , **syslog**, **forwarding-classreject**, □ **loss-priority** □ □□□□ **log**□□□□. □□ □ □□ □□□□ □□□□ □□□□□□□ □□□ □□□□□.

□ 58 □□□ 861 □□ □□□□ □□ □□□□ □□ □□□□ □ □□ □□□□ □□□□ □□ □□□□□.

□ 58: ACX □□□ □□□□ □□ □□□ □□□ □□ □□□ □□

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
count *counter-name*	□□□ □□□□ □□□ □□□□□.	• family any • family inet • • family mpls • family ccc • family bridge • family vpls
forwarding-class *class-name*	□□□ □□□ □□□□ □□□□ □□□ □□□□□. • assured-forwarding • best-effort • expedited-forwarding • network-control □: □ □□□ □□ □□□ □□□□□.	• family inet • family inet6 • • family mpls • family ccc • family bridge • family vpls

표 58: ACX 시리즈 라우터 및 패킷 전달 엔진 지원 방화벽 필터 일치 조건 *(Continued)*

Nonterminating Action(종료되지 않는 작업)	설명	지원되는 패밀리
log	패킷 헤더 정보 및 패킷 전송 결과를 기록합니다. 명령줄 인터페이스(CLI)에서 show firewall log 명령을 실행하여 이 로그를 볼 수 있습니다. 참고: 이 기능은 이 플랫폼에서 지원되지 않습니다. 이 기능은 inet6 패밀리 주소 지원을 제공합니다.	• family inet • family inet6 • family bridge
loss-priority (high | medium-high | low)	패킷 손실 우선순위(PLP) 값을 설정합니다. 이 작업은 three-color-policer 및 스토리지 액세스 노드 구성에 사용합니다. 두 가지 수준 중 하나를 지정해야 합니다. 이 4개 중 하나 PLP 값을 [edit class-of-service] 계층 tri-color 문. tri-color 및 스토리지 노드 중, low 또는 high 값을 선택합니다. 이 값은 스토리지 노드에서 사용됩니다. tri-color 및 이 문 *및 스토리지 노드*에서 지원됩니다. 이 값은 PLP 및 스토리지 노드 및 서비스(BA) 분류 기준 이 값은 *이 패킷 스토리지 노드 패킷 스토리지 노드*에서 지원됩니다. 참고: 이 기능은 이 플랫폼에서 지원되지 않습니다.	• family any • family inet • family inet6 • family mpls • family ccc • family bridge • family vpls

□ 58: ACX □□□ □□□□ □□ □□□ □□□ □□ □□□ □□ ***(Continued)***

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
policer *policer-name*	□□□ □□ □□□ □□□ □□□□ □□□□□.	• family any • family inet • family inet6 • family mpls • family ccc • family bridge • family vpls
port-mirror	□□□ □□□□ □□□□ □□□ □□ □□□□□□. □: □ □□□ □□ □□□ □□□□□. ACX5048 □ ACX5096 □□□□ □(□) □□□□ **port-mirror**□□□□.	family inet
syslog	□□□ □□□ □□ □□□ □□□□□. □: □ □□□ □□ □ □□□□ □□□□□. □ □□ □□ □□□ inet6 □□□□ □□ □□ □□ □□□□.	• family inet • family inet6 • family bridge
three-color-policer (single-rate | two-rate) *policer-name*	□□□ □□ □□ □□ 2 □□ 3□ □□□□ □□□ □ □□□ □□□□□. □□□ □□□ □□ □□□ □□ □□□ loss-priority □□□ □ □□□□. □ □ □□□ □ □ □□□□□□.	• family any • family inet • family inet6 • family mpls • family ccc • family bridge • family vpls

표 58: ACX 시리즈 라우터 및 개별 노드 시뮬레이션 지원 작업 및 매개변수 *(Continued)*

Nonterminating Action(종료되지 않는 작업)	설명	지원되는 패밀리
traffic-class	패킷 헤더의 트래픽 클래스 필드 설정 참고: 이 작업은 출력 필터에서만 지원됩니다.	family inet6

작업 수정자(ACX 시리즈 라우터)

작업 수정자는 패킷 처리 방법을 수정하는 데 사용되는 작업입니다.

참고: ACX 시리즈 라우터는 next term 및 점프 오프셋 작업을 지원하지 않습니다.

표 59 시작 864 페이지에서 계속 작업 수정자 및 지원되는 패밀리를 나열합니다.

표 59: ACX 시리즈 라우터 및 개별 노드 시뮬레이션 지원 작업 수정자

작업 수정자	설명	지원되는 패밀리
accept	패킷을 수락합니다.	• family any • family inet • family mpls • family ccc
discard	패킷을 조용히 삭제(ICMP) 오류 메시지를 생성하지 않고 패킷을 삭제합니다. 패킷을 삭제하면 패킷을 추가로 처리할 수 없습니다.	• family any • family inet • family mpls • family ccc

□ 59: ACX □□□ □□□□ □□ □□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□	□□□□
reject *message-type*	□□□ □□□□ ICMPv4 □□ ICMPv6 □□□□ □□□□□. • □□□ □□□ □□□□ destination-unreachable □□□ □□□□□ □□□□ □□□□□. • if tcp-reset □ □□□ □□□□ tcp-reset □□□□ □□□ TCP □□□ □□□□ □□□□□. administratively-prohibited □□□ □□□ □□ 13□ □□□□ □□□□□. • □□ □□□ □□□ □□□□ □□ □□□□ □□□□□. □: • □□ syslog □□□ □□□□ sample □□ □□□ □□□ □□□□□□□ □□□ □ □□□□. • □ □□□ □□ □□□ □□□□□. □□□ *message-type* □□ □ □ □□□ □□ □ □□□□. address-unreachable, administratively-prohibited, bad-host-tos, bad-network-tosbeyond-scopefragmentation-neededhost-prohibitedhost-unknownhost-unreachablenetwork-prohibitednetwork-unknownnetwork-unreachableno-routeport-unreachableprecedence-cutoffprecedence-violationprotocol-unreachablesource-host-isolatedsource-route-failedtcp-reset	family inet
routing-instance *routing-instance-name*	□□□ □□□ □□□ □□□□□ □□□□.	• family inet

ACX □□□ □□□□ □□□ □□ □□ □□ □ □□(Junos OS Evolved)

in this section

- □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ □ □□ | 866

??? Junos OS? ???? ACX ??? ???? ?? ? ?? ???? ???? ??? ?? ?? ?? ? ??

??? ??? ? ??? *??* *???????* ??????. ?? ??? ??? ??? ???? ?? ???? ?? ??? ????. *??* *??* ?? ?? ?? ?? ??? ??? ? ?????. ?? ?? ?? ???? ?? ? ???, ? ?? ??? ?? ??? ??????.

??? ??? ???? ???? ??? ??? ??? ??????. ?? ?? ???? ???? ??? ???, ???, ?? ?? ? ??? ? ?????. ??? ?? ?? ??? ???? ?? ?? ???? ?????? ??? ??????. ? ? 61 ??? 887? ????????? 60 ??? 866.

? 60: ??? Junos OS? ???? ACX ??? ???? ?? ? ?? ???? ???? ??? ?? ?? ??

?? ??	??	??	??	??? ?? ???(??)	??? ?? ???(??)
?? ?? ip-destination-address	??? ?? ?? ?? ??? ? IPv4 ??????. ??? ??? ? CCC ???? ?? `ip-destination-address`	?	?	IPv4, IPv6, ??? ??? ? CCC	IPv4 ? IPv6
?? ?? ip-source-address	??? ???? ?? ??? IPv4 ??????. ??? ??? ? CCC ???? ?? `ip-source-address`	?	?	IPv4, IPv6, ??? ??? ? CCC	IPv4
?? ??? ??	IP ?? ??? ?? ??? ??. ?? ???? ?? prefix-list ?? ?? ? IP ?? ??? ??? ??? ? ????. ?? ? ??? ? ??? `[edit policy-options]` ??????.	?	?	IPv4, IPv6 ? ??? ???	IPv4, IPv6

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□	□□	□□	□□□ □□ □□□(□□)	□□□ □□ □□□(□□)
□□ □□□ □□	IP □□ □□□ □□□□□. □□ □□□□ □□ prefix-list □□ □□ □ IP □□ □□□ □□□ □□□ □ □□□□. □□ □ □□□ □ □□□ [edit policy-options] □□□□□.	□	□	IPv4, IPv6 □ □□□ □□□	IPv4

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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□□□ □□	TCP □□ UDP □□ □□. □□□□□ □ □□ □ □□ match □□ protocol □□ □□□ □□. □□□ □□ □ □□□ □□□ □□ □□□ □□□□ □□□ □ □□□□(□□ □ □□ □□□□ □□). 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), ftp-data (20), http (80), https (443), ident (113), imap (143), kerberos-sec (88), klogin (543), , krb-prop (754)kpasswd (761), krbupdate (760), , kshell (544)	□	□	IPv4, IPv6, □□□ □□□ □ CCC	IPv4, IPv6, □□□ □□□ □ CCC

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	ldap (389), login (513), mobileip-agent (434), mobilip-mn (435), msdp (639), netbios-dgm (138), , netbios-ns (137), nfsd (2049)netbios-ssn (139), nntp (119), ntalk (518), , ntp (123) pop3 (110), pptp (1723), printer (515), radacct (1813),radius (1812), rip (520), rkinit (2108), smtp (25), , snmp (161), snpp (444)sunrpc (111)snmptrap (162)ssh (22)socks (1080)syslog (514), tacacs-ds (65), talk (517), , telnet (23), tftp (69), timed (525) who (513),				

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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	xdmcp (177), zephyr-clt (2103), zephyr-hm (2104)				
□□ □□	TCP □□ UDP □□ □□. □□□□□ □ □□ □ □□ match □□ protocol □□ □□□ □□. □□ □□ □□ destination-port □□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□ □.	□	□	IPv4, IPv6, □□□ □□□ □ CCC	IPv4, IPv6, □□□ □□□ □ CCC
□□□□ IP □□□□	IP □□□□ □□ □□□ □□□ □ CCC □□□□ □□ ip-protocol	□	□	IPv4, □□□ □□□ □ CCC	IPv4, □□□ □□□ □ CCC

표 60: 지원 Junos OS의 릴리스 ACX 라우터 플랫폼 및 이 장에서 설명하는 기능 및 기능 (*Continued*)

기능 이름	설명	기본	구성	지원 대상(계속)	지원 안 함(계속)
첫 번째 조각	첫 번째 조각 일치 조건은 패킷 조각의 첫 번째 조각을 식별합니다. 첫 번째 조각은 조각 오프셋 필드가 0인 조각입니다. 첫 번째 조각 일치 조건은 조각 오프셋 필드가 0인 패킷을 찾습니다. 이 일치 조건은 IPv4 fragment-offset 0 조각 패킷에 적용됩니다. 이 일치 조건은 IPv6 조각 헤더 패킷에 적용됩니다. 이 일치 조건은 is-fragment 및 first-fragment .	없음	방화기	IPv4	NA

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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icmp □□	ICMP □□ □□□□□. □□ □□□ □□□ icmp-type□ □□ □□ □□□ □ □□ icmp-code□□ □□ □ □□ icmp-type □□ □□□ □ □□□. □□ □□ □□□ □□ □□□ □□□ □ □□ □ □□□ □ □□□□(□□ □□ □□□□ □□). □□□ □ ICMP □□□□ □□ □□□ □□□ □□ □□□ □□□ □□□□. • *IPv4:* parameter-problem—ip-header-bad (0), required-option-missing (1) • *IPv6:* parameter-problem—ip6-header-bad (0), unrecognized-next-header (1), unrecognized-option (2) • redirect—redirect-for-network (0), redirect-	□	□	IPv4, IPv6, □□□ □□□ □ CCC	IPv4, IPv6, □□□ □□□ □ CCC

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	for-host (1), redirect-for-tos-and-net (2), redirect-for-tos-and-host (3) • time-exceeded—ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • *IPv4:* □□□ □ □ □—network-unreachable (0), host-unreachable (1), protocol-unreachable (2)port-unreachable (3)fragmentation-needed (4)source-route-failed (5)destination-network-unknown (6)destination-host-unknown (7)source-				

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	host-isolated (8)destination-network-prohibited (9)destination-host-prohibited (10)network-unreachable-for-TOS (11)host-unreachable-for-TOS (12)communication-prohibited-by-filtering (13)host-precedence-violation (14)precedence-cutoff-in-effect (15) • *IPv6:* □□□ □ □ □—address-unreachable (3), administratively-prohibited (1), no-route-to-destination (0), port-				

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	unreachable (4)				

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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ICMP□	ICMP □□□ □□ □□ □□□. □□□□□ □ □□ □□□ match □□ protocol □□ □□□ □ □□□□ □□ □□ □□ □□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□ (□□ □□ □□□□ □□). *IPv4:* echo-reply (0), destination unreachable (3), source-quench (4)redirect (5)echo-request (8)IPv4 (inet)-advertisement (9)IPv4 (inet)-solicit (10)time-exceeded (11)parameter-problem (12)timestamp (13)timestamp-reply (14)info-request (15)info-reply (16)mask-request (17)mask-reply (18) *IPv6:* destination-unreachable (1), packet-too-big (2), time-exceeded	□	□	IPv4, IPv6, □□□ □□□ □ CCC	IPv4, IPv6, □□□ □□□ □ CCC

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	(3)parameter-problem (4)echo-request (128)echo-reply (129)membership-query (130)membership-report (131)membership-termination (132)router-solicit (133)router-advertisement (134)neighbor-solicit (135)neighbor-advertisement (136)redirect (137)router-renumbering (138)node-information-request (139)node-information-reply (140) □ icmp-code variable□□□□□□.				
ip-□□	IP □□□ □□ □□□ □□ □ □□□ □□ □□ □□ □ □□ □□□□ □□□□□ any .	□	□□□	IPv4	NA

표 60: 지원되는 Junos OS용 릴리스 ACX 라우터 플랫폼 및 이 주제 플랫폼 플랫폼 지원 정보 *(Continued)*

기능 이름	설명	기본	구성	지원되는 플랫폼(IPv4)	지원되는 플랫폼(IPv6)
분류 기준 IP 분류 기준	IP 분류 기준 프로필. 분류 기준 프로필 이름 및 프로필 내용 프로필 이름(분류 기준 프로필 이름). critical-ecp (0xa0), flash (0x60), flash-override (0x80), immediate (0x40), internet-control (0xc0), net-control (0xe0), priority (0x20) 및 routine (0x00). 지원되는 플랫폼 CCC 프로필 프로필 ip-precedence .	아니요	프로필	IPv4, 지원되는 플랫폼 및 CCC	NA
is-fragment	IP 패킷 More Fragments 플래그 프로필 지원되는 플랫폼 및 이 주제 플랫폼 패킷 플랫폼 지원 정보.	아니요	프로필	IPv4	NA

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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tcp □□	□□□ TCP 3□□ □□ □□□ □□(SYN, SYN-ACK, ACK) □ □□□ □□□□□□□. □ □□□ □□ □□□ □□□ SYN □□□ □□□□□ □□□□□□□ □ □□ □□□ □□. □ □□□ □□, □ □ □ □□□□ □□□□ tcp-initial □□□. □ □□□ tcp-established□ □□ □□ □□□□□ TCP□□ □□□□□ □□□□ □□□□ □. □□ □□□ protocol tcp □□□ □ □□□.	□	□	IPv4 □ IPv6	IPv4 □ IPv6
tcp-□□□	□□ □□□ TCP □□□: • ack (0x10) • fin (0x01) • push (0x08) • rst (0x04) • syn (0x02) • urgent (0x20)	□	□□□	IPv4 □ IPv6	NA

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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tcp-□□□	□□□ □ □□ TCP □□ □ □□□□□□□. TCP □ □□□ □□□□ TCP □ □□ SYNACK □ □□□□ □□ □□ □□□ □□□□ □. □ □□□ tcp-initial□ □□□□ □ □□□□ TCP□□ □□□ □□ □□□□ □□□□. □ □ □□□ protocol tcp □□□□ □□□.	□	□□□	IPv4 □ IPv6	NA
□□ □□ □□□	IP TTL(Time-to-Live) □□(10□□)□□ □. □□ 1-255□ □ □ □□□.	□	□	IPv4	IPv4
□□ MAC □□	□□□ □□ MAC □□ □□□.	□	□	□□□ □□□ □ CCC	□□□ □□□ □ CCC
□□ MAC □□	□□□ □□ MAC(□□ □ □□□ □□) □□□□□.	□	□	□□□ □□□ □ CCC	□□□ □□□ □ CCC

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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□□ □□ □□□	DSCP(Differentiated Services Code Point)□□□. DiffServ □□□□□ IP □□□ □□□ □□ (ToS) □□□□ □□□□ □. □ □□□□ □□ □□□ 6□□□ DSCP□ □□ □□□. DSCP□ 16□□, 2□ □ □□ 10□□ □□□□ □□□ □ □□□□. □□ □ □□ □□ □□□ □ □□ □ □□□ □□□ □ □ □□□(□□ □□ □□□□ □□). • be- Best Effort(□□□) • ef (46)- RFC 3246, *□□ □□ PHB□* □□□□ □□□□. • af11 (10), af12 (12), af13 (14); af21 (18), af22 (20), af23 (22); af31 (26), af32 (28), af33 (30);	□	□	IPv4, □□□ □□□ □ CCC	IPv4, □□□ □□□ □ CCC

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	af41 (34), af42 (36), af43 (38) □ 12□□ □□ □□ □□ □□ □ □□□□ 3□□ □□ □□ □□ □ □□ □ 4□□ □ □□□ RFC 2597, *Assured Forwarding PHB*□ □□□□ □□□□. • cs0, , cs1, cs3cs6cs2cs5 cs4cs7,cs5				

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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□□□ □□	□□□ □□□ □□ □□□□ □. EtherType □□ □□□ □□□□□ □□ □□ □□□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□ □(□□ □□ □□□□ □ □). • aarp (0x80F3)- EtherType □ AARP • appletalk (0x809B)— EtherType □ AppleTalk • arp (0x0806)- EtherType □ ARP • fcoe (0x8906)- EtherType □ FCoE • fip (0x8914)- EtherType □ FIP • ipv4 (0x0800)- EtherType □ IPv4	□	□	□□□ □□□ □ CCC	□□□ □□□ □ CCC

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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	• ipv6 (0x08DD)- EtherType □ IPv6 • mpls-multicast (0x8848)- EtherType □ MPLS □□□□□ • mpls-unicast (0x8847)— EtherType □ MPLS □□□□□ • oam (0x88A8)- EtherType □ OAM • ppp (0x880B)- EtherType □ PPP • pppoe-discovery (0x8863)— EtherType □ PPPoE □□□□ □ □□□□ • pppoe-session (0x8864)— EtherType □ PPPoE □□ □□ □□				

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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	• sna (0x80D5)-EtherType □ SNA				
learn-vlan-1p-□ □ □□	□□□ VLAN □□ (802.1Q VLAN □□□ □□ □□ □□ □□ □□ □□□ □□ □□ 802.1Q VLAN □ □□ □□ □□ □□ □□□ □ □□ □□)□□ IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□□□. 0□□ 7 □□ □ □□ □ □□ □□ □□ □□□□□.	□	□	□□□ □□□ □ CCC	□□□ □□□ □ CCC
□□□-vlan-1p-□□ □□	□□□□ 0-7□□□ 802.1p VLAN □ □ □□□ □□□□□.	□	□	□□□ □□□ □ CCC	□□□ □□□ □ CCC
□□	MPLS EXP □□□□ □□□□□.	□	□□□	MPLS	NA
□□□	MPLS □□□ □□□□ □□□□□.	□	□□□	MPLS	NA

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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□□□ □□□	□□□ CoS(Class of Service) □□ □□ □ □□□□ 8□□ □□□□ □. traffic-class □ □□ DSCP(DiffServ Code Point) □□ □ □□□ □ □□□□□. □ □ □□ □□□ IPv4□□ □ □□ □□(ToS) □□□ □ □□□□□, □ □□(□: DSCP)□ □□ □□□ IPv4□ □□ □□□ □□ □□□. □□ □□□ □□□ □ □□ □ □□□ □ □□□□(□□ □□ □□□□ □□). af11 (10), af12 (12), af13 (14)af21 (18)af22 (20)af23 (22)af31 (26)af32 (28)af33 (30)af41 (34)af42 (36)af43 (38)cs0 (0)cs1 (8)cs2 (16)cs3 (24)cs4 (32)cs5 (40)cs6 (48)cs7 (56)ef (46)	□	□	IPv6	IPv6

□ 60: □□□ Junos OS□ □□□□ ACX □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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□ □□	□□□ □ □□ □□ □ □□ □□□ □□□□□□□. □□ □ □□ 0□□ 255 □□ □ □ □□□ □□□□□.	□	□	IPv6	IPv6
□□ □□	IPv4 □□ IPv6 □□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□ □ □□□ □ □□□□(□□ □□ □□□□ □□). hop-by-hop (0),icmp (1), icmp6 (58)igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	□	□	IPv6	IPv6

□ 61: □□□ Junos OS□ □□□□ ACX □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□

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□□□□□□	□□□ □□□□ □□ □□ □□□□□.	□	□	IPv4, IPv6, □□□ □□□, CCC, MPLS □ □□	IPv4, IPv6, □□□ □□□, CCC □ □□

□ 61: □□□ Junos OS□ □□□□ ACX □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ ***(Continued)***

□□	□□	□□	□□	□□□ □□ □□□(□□)	□□□ □□ □□□(□□)
□□□	ICMP(Internet Control Message Protocol) □□□□ □ □□ □□ □□□ □□□ □ □□□.	□	□	IPv4, IPv6, □□□ □□□, CCC, MPLS □ □□	IPv4, IPv6, □□□ □□□, CCC □ □□
□□	□□□ □□□ □□□ □□ □□□ □□□□□. □ □□ □ □□□ □□ □□ □□□ show firewall log □□□□□.	□	□□□	IPv4 □ IPv6	NA
□□□ □□□	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□ □ □□□□□ □□□ □□□ □□. • best-effort • fcoe • mcast • network-control • no-loss □□: □□□ □□□□ □□□□□ □□ □□□□□ □□□□ □ □□.	□	□□□	IPv4, IPv6, □□□ □□□, CCC □ MPLS	NA
□□ □□□□□	□□□ □□ □□□□□□ □ □□ □□□□□.	□	□□□	IPv4 □ IPv6	NA

□ 61: □□□ Junos OS□ □□□□ ACX □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ ***(Continued)***

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□□ □□ □□	□□ □□ □□□□(PLP) □□□ □□□□□. □□□ □□□ □□ □□□ three-color-policer □□ □□□□ □□ □□□ □□□ □□ □ □□□. □ □ □□ □ □□ □□□ □□ □□□□□□.	□	□□□	IPv4, IPv6, □□□ □□□, CCC □ MPLS	NA
□□□-IP	□□□ □□ IPv4 □□□ □□□ □□□□□.	□	□□□	□	NA
□□□-IP6	□□□ □□ IPv6 □□□ □□□ □□□□.	□	□□□	IPv6	NA
□□□	□□□ □□ □□□ □□□ □□□□ □□□□□.	□	□	IPv4, IPv6, □□□ □□□, CCC, MPLS □ □□	IPv4, IPv6, □□□ □□□, CCC □ □□

□ 61: □□□ Junos OS□ □□□□ ACX □□□□ □□ □ □□ □□□□ □□□□ □□□ □□ □□ ***(Continued)***

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□□	□□□ □□□□ "□□□ □ □□ □ □□" ICMPv4 □□□(□□ 3)□ □□□□. □□□ □□ □ □□□□□ □□ □□□□ □□□□□ syslog . □□ □□□ □□ □ □□□ □□□ □ □□□□. administratively-prohibited (default), bad-host-tos, bad-network-tos, host-prohibited, host-unknown, host-unreachable, network-prohibited, network-unknown, network-unreachable, port-unreachable, precedence-cutoff, precedence-violation, protocol-unreachable, source-host-isolated, source-route-failed, □□ tcp-reset.	□	□□□	IPv4 □ IPv6	NA

□ 61: ??? Junos OS□ ???? ACX ???? ?? □ ?? ???? ???? ??? ?? ?? *(Continued)*

??	??	??	??	??? ?? ???(??)	??? ?? ???(??)
	□ ??? tcp-reset□ ?, ??? TCP ???? ????? TCP ???? ???, ??? ??? ?? ?? ???? ????. ??? ??? ???? ?? □ ICMP ?? "??? ??? □ ??"□ ?? ?? □ "?? ????? ??? ?"□ ?? ?????.				
syslog	□ ??? ?? ??? ?? ???.	□	???	IPv4 □ IPv6	NA
??	?? ???? ???????. ??? ???? ???? □ ??? □ ??? ?????? ?.	□	???	IPv4 □ IPv6	NA
3□ ???	3□ ???? ??? ??? ??(?? ??? ???? ??).	□	□	IPv4, IPv6, ??? ???, CCC, MPLS □ ??	IPv4, IPv6, ??? ???, CCC □ ??

?: , discard, log, three-color-policersyslogrejectpolicer□ ?(?) ?? ??? ?? ??????? ??? IPv4/IPv6 ??? ???? ???? ?????. count

???? ??? ???? ?? ??? ?? ?? ??

???? ??? ???()□ ?? ?? ???? ??? ??? ??? □ ????.family any

???? ??? ??? ??? ??? ??????? ?????? ??? ?? ??? ???? ?????? filter .

참고: MX 시리즈 라우터에서 이 *필터* 문은 다음 filter 계층 수준에서 지원되지 않습니다.

- [edit interfaces *name* unit *number* filter]
- [edit logical-systems *name* interfaces *name* unit *number* filter]

이러한 계층 수준에서 필터를 구성하려면() 다음 계층 수준에서 filter 문을 포함합니다 .family any

- [edit interfaces *name* unit *number* family any filter]
- [edit logical-systems *name* interfaces *name* unit *number* family any filter]

표 62 시작 892에서 [edit firewall family any filter *filter-name* term *term-name* from]계층 수준에서 사용할 수 있는 *match-conditions*문(문) 목록입니다.

표 62: 방화벽 필터 일치 조건 문 및 작업 문

문 및 작업	설명
forwarding-class *class*	패킷이 분류되는 전달 클래스입니다. assured-forwarding, best-effort, expedited-forwarding 및 network-control문(문) 중에서 선택합니다. 이러한 기준 중 하나 이상 또는 다음 *일치 조건 목록* 중 하나와 일치하는 패킷입니다. 참고: T4000 라우터 및 5 FPC에서 이 2 가지 방법(즉, 이러한 일치 조건)은 이 DSCP, DSCP V6, inet-precedence, 및 이 3 가지 일치 조건 중 하나 또는 mpls-exp.
forwarding-class-except *class*	이러한 일치 조건과 일치하지 않습니다. 이 이 forwarding-class 중 이러한 패킷입니다.
interface *interface-name*	이러한 이름 패킷입니다. 참고: 이름 중 하나 이상 와일드카드 문자 및 이 이름 이름 중, 이 이름 이름 이름.
interface-set *interface-set-name*	이러한 이름 패킷입니다 이름 이름 이름. 이름 이름 이름 [edit firewall]계층 수준에서 interface-set문 이름 이름. 이 이름 "이름 이름 이름 이 이름 이름" 이름 1297를 참조하십시오.

□ 62: □□□□ □□□ □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
loss-priority *level*	□□ □□ □□□□(PLP) □□□ □□□□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□, Enhanced CFEB(CFEB-E)□ □□ M7i □ M10i □□□ □□□ MX □□□ □□□□□ □□□□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□ □ T □□□□ IP □□□□ □□, [edit class-of-service]□□ □□□ tri-color□□ □□□□ 4□□ □□□ □□□□ □□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□. tri-color □□ □□ □□□ *□□ □□ □□□ □□ □ □□*□ □□□□□□. □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□ □ □□□ □□ □□□ □□□ *□□□ □□□□ □□ □□□□ □□□□ □□□□ □□ □□□□□* □□□□□□.
loss-priority-except *level*	PLP □□□ □□□□□ □□□□. □□□ □□□ loss-priority □□ □□□ □□□□□□. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.
packet-length *bytes*	□□□ □□ □□□ □□□□ □□□□□□. □□□ □□ □□□ □□□ IP □□□ □□□□, □□□ 2 □□□ □□□□□ □□□□ □□□□. □□ □□□ □□ □□□ □□□ □ □□□□.
packet-length-except *bytes*	□□□ □□ □□(□□□)□ □□□□□ □□□□. □□□ □□□ packet-length □□ □□□ □□□□□□.
packet-length *bytes*	□□□ □□ □□□ □□□□ □□□□□□. □□□ □□ □□□ □□□ IP □□□ □□□□, □□□ 2 □□□ □□□□□ □□□□ □□□□. □□ □□□ □□ □□□ □□□ □ □□□□.
vlan-id *number*	□□□ VLAN ID□ □□□□□□. □□□ 0 - 4095□□□.
egress-interface *interface-name*	□□□ □□ □□□□□□ □□□□□□. □□(□□) □□□□ □□□□ □□□ □□□□□.
mpls-bottom-of-stack *bytes*	MPLS □□□□ □□□ □ □□(□, □□□□ □□ □□□ □□□)□ □□ □□□□□□. MPLS □□□□ □□□□ □□□ □□□□□.

□ 62: □□□□ □□□ □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
□□ □	□□ □□□ □□ □(□: QoS □□ □□ □□)□ □□□□ □□□ □□□□□□□. □□ □□ □□ [edit policy-options policy-map]

□□ □□

□□□ □□ □□ □□ | 763

□□□ □□ □□ □□ | 828

□□□ □□ □ □□ □□ | 817

IPv4 □□□ □□□ □□ □□

□□□ □□□□ □□ 4(IPv4) □□□(family inet) □□ □□□□ □□□ □□□ □□□ □ □□□□.

□: MPC□ □□□□ □□ MX □□□ □□□□ □□, □□ SNMP MIB(□: show snmp mib walk *name* ascii)□(□) □□□□ □□ □□ □□ □□□(MIB)□ □□□ □□ □□ □□□ □□ □□ □□□□ □□□□□ □□□. □□ Junos□ □□ □□□□ □□□□□ □□□□ □□ □□□ □□□□□ □□□□□(□□ □□□ □□□□□ □□ □ □□ □□ □□ □□□□ □□□□ □□ □ □□ □□□□□.). □ □□□ □□□ □□ □□□ □□, □□□ □□□ □□ □□ □ □□ □□ □□□ □□ □□□ □□ □□□□□. □□□ □□□ □□ □□□ □□□ □□□ □□□□□□.

□ 63 □□□ 894□□ [edit firewall family inet filter *filter-name* term *term-name* from]□□ □□□□ □□□ □ □□ *match-conditions*□(□) □□□□ □□□□.

□ 63: IPv4 □□□ □□□ □□ □□

□□ □□	□□
address *address* [except]	except □□□ □□□□ □□ □□ □ IPv4 □□ □□ □□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□, IPv4 □□ □□ □□ □□ □□□ □□□□□ □□□□. except □□ □□□ EX2300 □ EX3400 □□□□□ □□□□ □□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
ah-spi *spi-value*	(M120 □ M320□ □□□ M □□□ □□□) IPsec □□ □□(AH) □□ □□□□ □□(SPI) □□ □□□□□□. □: □ □□ □□□ PTX □□□ □□□□□□ □□□□ □□□□.
ah-spi-except *spi-value*	(M120 □ M320□ □□□ M □□□ □□□) IPsec AH SPI □□ □□□□□ □□□□. □: □ □□ □□□ PTX □□□ □□□□□□ □□□□ □□□□.
destination-address *address* [except]	except □□□ □□□□ □□ □□ □ IPv4 □□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□, IPv4 □□ □□ □□□ □□□□ □ □□□□. □□□ □□□ address □ destination-address □□ □□□ □□ □□□ □ □□□□.
destination-class *class-names*	□□ □□□ □□□ □□ □□□ □□□ □□□□□□(□□ □□□□□ □□□ □□□ □□□ □□ □□□ □□). □□□ □□□ "□□ □□□□ □□ □ □□□ □□ □□ □□" □□□ 942□ □□□□□□.
destination-class-except *class-names*	□□ □□□ □□□ □□ □□□ □□□ □□□□□ □□□□. □□□ □□□ destination-class □□ □□□ □□□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□. □□ □□□ □□□□ □□□ □□□ □ □□□ □□ □□□ □□ □□□ protocol udp□□ protocol tcp□□ □□ □□□□ □□□. □□ □□ □□□□□ □□□ □□ □□□ □□□ □ □□□□.
port-list	□□□ □□□ □□ □□ □□ □□□ □□□□□□.
destination-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ destination-port □□ □□□ □□□□□□.
destination-port-list *port-list*	□□□ □□□ □□ □□□ □□□□□□
destination-prefix-list *name* [except]	except □□□ □□□□ □□ □□ □ □□□ □□□ □□ □□ □□□□ □□□□□□. □□□ □□□□ □□ □□, □□□ □□□ □□ □□□□ □□□□□ □□□□. [edit policy-options prefix-list *prefix-list-name* □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
dscp *number*	DSCP(Differentiated Services Code Point)□ □□□□□□□. DiffServ □□□□□ IP □□□ □□□ □□ (ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. □□□ □□□ *□□ □□(BA) □□□□ □□□□ □□ □□ □□□□ □□□□ □□ □□□□*□ □□□□□□□. DSCP(Differentiated Services Code Point) □□□ □ GRE(Generic Routing Encapsulation) □ □□□□ IS-IS □□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □□ □□ □□□ □□□□□□□. □□□□□, □□□ □□(CoS) □ □□□ □□□ □□ □□□□ DSCP □□ □□□ □□□ □□ □□□ □□ □□□□ Junos OS □□ □□□□ □□□□□□ □ □□□ □□ □ □□□ □□□□ CoS □□□□ □□□□□□. □□□ □□□ □□□ □□ □□□□□□□. □, □□□ □□□ □□□ □□, □□ □□□□□□ □□□ □□□□ □□□ □□□ CoS□□ □□□□□□. 0□□ 63□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □ □□□□ □□□□ b□(□) □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□).
dscp-except *number*	DSCP □□□ □□□□□ □□□□. □□□ □□□ dscp □□ □□□ □□□□□□.
esp-spi *spi-value*	IPsec ESP(Encapsulating Security Payload) SPI □□ □□□□□□. □ □□ SPI □□ □□□□□□. 16□□, 2□□ □□ 10□□ □□□□ ESP SPI □□ □□□ □ □□□□.
esp-spi-except *spi-value*	IPsec ESP SPI □□ □□□□□□. □ □□ SPI □□ □□□□□ □□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□	
first-fragment	□□□ □□□□ □□□ □ □□ □□□ □□ □□□□□□□. □□□ □□□□ □□□ □□□ □□□ □□ □□□□□ □□□□. □□□□ □□□ □ □ □ □□□ 0□ □□ □□□ □□ □□□□. □ □□ □□□ □□ □□ □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□□ □□□ □ □□□□. first-fragment □ is-fragment.	
first-byte-of-payload	□□□□ □□ □ □□ □□□□ □□□□□□□. □□ □□□ □□□□ □□□□ □□□ □ □□□□. □□□ □□□ □□□□ □□□□ □□□□ □□□□ □□□□. INET, INET6 □ ANY □□□ □□ □□□□□□ □□□□□. FFT □□ □ □□□□ FLT □□□□□ □□□□ □□□□.	
first-byte-of-payload-except	□□□ □□□□ □□ □ □□ □□□□ □□□□□ □□□□. □□ □□□ □□□□ □□□□ □□□ □ □□□□. □□□ □□□ □□□□ □□□□ □□□□ □□□□ □□□□. INET, INET6 □ ANY □□□ □□ □□□□□□ □□□□□. FFT □□ □ □□□□ FLT □□□□□ □□□□ □□□□.	
flexible-match-mask *value*	bit-length	□□ □□□ □□□ □□□□ □□, □□□ □□□ □□□□ □□ (0..128)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-mask-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	mask-in-hex	□□□ □□ □□□□□ □□ □□□ □□
	match-start	□□ □□ □□□
	prefix	□□□ □ □□□/□□□

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□	
flexible-match-range *value*	bit-length	□□ □□□ □□□ □□□□ □□(0..32)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-range-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	match-start	□□ □□ □□□
	range	□□□ □ □□
	range-except	□□□ □ □□□ □□□□□ □□□□
forwarding-class *class*	□□ □□□ □□□□ □□□□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□. □□□ □□□ □ □□□ □□ □□ □□ □□ □□□ *□□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□* □ □□□□□□.	
forwarding-class-except *class*	□□ □□□ □□□□ □□□□□ □□□□. □□□ □□□ forwarding-class □□ □□□ □□□□□□.	
fragment-flags *number*	(□□ □□) IP □□□ 3□□ IP □□□ □□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). dont-fragment(0x4), more-fragments(0x2) □□ reserved(0x8).	

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
fragment-offset *value*	IP □□□ 13□□ □□ □□□ □□□ □□□□□□□. □ □□ □□□ □□□ □□ □□ □□□□□ □□□□ □□□(8□□□ □□)□□□. □□ □, □ □□ □□ □ □□□ □□□□□. 0□ □□□ □□ □□□□ □□□ □ □□ □□□ □□□□□. first-fragment □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□(first-fragment □ is-fragment)□ □□□ □ □□□□.
fragment-offset-except *number*	13□□ □□ □□□ □□□ □□□□□ □□□□.
gre-key *range*	GRE □ □□□ □□□□□□□. GRE □ □□□ GRE □□□ □□□ □□ □□□ 4□□ □□□□□. GRE □□□□ □□□□ □□□ □□ □□□. *range*□(□) □□ GRE □ □□ □□ □ □□ □□□ □ □ □□□□. MPC□ □□□□ □□ MX □□□ □□□□ □□, □□ SNMP □□ □□ □□□(MIB)□ □□□□□□□ □ □□□ □□□□ □□□ □ □□ □□□ □□□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

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icmp-code *number*	ICMP □□□ □□ □□□ □□□□□□.
	
	□: □ □□ □□□ □□□ □, **icmp**□□□ □□□□□ □□□ □□□□ □□ □□ □□ □□□ □□□ protocol icmp□□ □□□ □ □□□ □□□.
	□□□□ □□ □□□ □□□□ □□ □□, INET □ INET6 □□ □□□ □□ □□□ protocol icmp □□ □□□ □□□□□.
	
	`term Allow _ICMP {`
	`from protocol icmp {`
	`icmp-code ip-header-bad;`
	`icmp-type echo-reply;`
	`}`
	`then {`
	`policer ICMP_Policier;`
	`count Allow_ICMP;`
	
	□□ □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□.
	
	□□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□.
	
	• □□□□ □□: ip-header-bad (0), required-option-missing (1)
	
	• □□□□: redirect-for-host (1), redirect-for-network (0), redirect-for-tos-and-host (3), redirect-for-tos-and-net (2)
	
	• □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0)
	
	• □□ □□: 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)

icmp-code-except *message-code*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □□□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

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icmp-type *number*	ICMP □□□ □□ □□□ □□□□□□.
	
	□: □ □□ □□□ □□□ □, **icmp**□□□ □□□□□ □□□ □□□□ □□ □□ □□ □□□ □□□ protocol icmp□□ □□□ □ □□□ □□□.
	
	□□□□ □□ □□□ □□□□ □□ □□, INET □ INET6 □□ □□□ □□ □□□ protocol icmp □□ □□□ □□□□□.
	
	`term Allow _ICMP {`
	`from protocol icmp {`
	`icmp-code ip-header-bad;`
	`icmp-type echo-reply;`
	`}`
	`then {`
	`policer ICMP_Policier;`
	`count Allow_ICMP;`
	
	□□ □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□.
	
	□: Junos OS□ Junos OS Evolved □□□ □□ □□□ □□□ protocol □□ □□ □□□□ □□□.
	
	□□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). 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) □□ unreachable (3).

icmp-type-except *message-type*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-type □□ □□□ □□□□□□.
interface *interface-name*	□□□ □□□ □□□□□□ □□□□□□. □: □□□□ □□ □□□□□□ □□□□ □ □□ □□□ □□□ □□, □□□ □□□ □□□□ □□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
interface-group *group-number*	□□□ □□□ □□ □□□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□□□. *group-number*□ □□, □□ □ □□ 0~255 □ □□□ □□□□□. □□ □□□□□□□ □□□□□ □□□ *group-number*□□□□□ [interfaces *interface-name* unit *number* family *family* filter group]□□ □□□□ □(□) *group-number*□□□□ □□□. □: □ □□ □□□ PTX □□□ □□□□□□□ □□□□ □□□□. □□□ □□□ "□□□□□ □□ □□□□ □□□ □□ □□□ □□" □□□ 1296□ □□□□□□.
interface-group-except *group-number*	□□□ □□□ □□ □□□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□ □□□□. □□□ □□□ interface-group □□ □□□ □□□□□□□. □: □ □□ □□□ PTX □□□ □□□□□□□ □□□□ □□□□.
interface-set *interface-set-name*	□□□ □□□ □□□□□□□ □□□ □□□□□ □□□ □□□□□□□. □□□□□ □□□ □□□□□ [edit firewall]□□ □□□□ interface-set□□ □□□□□ □□□. □: □ □□ □□□ PTX □□□ □□□□□□□ □□□□ □□□□. □□□ □□□ "□□□□□ □□□□ □□□ □□ □□□ □□" □□□ 1297□ □□□□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

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ip-options *values*	□□□□ □□, 8□□ IP □□ □□□ □□□ □ □□ □ □□□ □□□□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). loose-source-route(131), record-route(7), router-alert(148), security(130), stream-id(136), strict-source-route(137) □□ timestamp(68). IP □□□ □□ *□□* □□ □□□□□□ □□□ □□□ any□(□) □□□□ □□□. *□□* □□ □□□□□□ □□□ □□ □ □□([□])□ □□ □□ □□□. □□ *□□□* □□□□□□ □ □□ [*value1-value2*]□(□) □□□□ □□□. □□ □□, □□ □□ ip-options [0-147]□(□) loose-source-route, record-route □□ security □ □□ 0~147 □□□ □□ □□ □□□□ IP □□ □□□ □□□□□□□. □□□ □ □□ □□□ router-alert □(148)□ □□□□ IP □ □ □□□ □□□□ □□□□. □□□□ □□□□□□ □□, □□ □□□ *□□* IP □□ □(□□□ any□)□ □□ □□ □□ □□□□ □□ ip-option□□□ □□ □□□ □ □□ □□□□ □□□□ □□□ □□ □□□ IP □□ □□□ □□□ □ □□□□. • □□ □□□ □□ IP □□ □□ □□ □□ □□ ip-option□□□□ □□□ □□ □□□ □□, □□□ □□□ discard□□ □□□ □ □□□ □□ □ countlog, □□ syslog□ □□ □□□ □□□ □ *□□□□* □ □□□ □□□□ □□□ □□□□□□ □□□ □□□ □ □ □□□ □□ □□□□ □□□□□. • □□□ □□ □□□ □□□ □□ □□□ □□□ □□□ □□□□□. □□ □□□□ □□□ □□ □□ □□(□□□□□□ □□ □□□ □□□□ □□)□□ □□□□□ □□□□□ ip-options any □□ □□□ □□□□ □□□. MX □□□□ 10□□□□ □□□ MPC(Modular Port Concentrator), 100□□□□ □□□ MPC, 60□□□□ □□□ MPC, 60□□□□ □□ □□□ MPC □ 60□□□□ □□□ Enhanced □□ MPC□ IPv4 □□ □□□ IP □□ □ □□ □□□ □ □□□□. □□□ MPC□ □□□ □□□□□ □□, ip-options □□ □□□ □□□□ □□□□ *□□* □□□ □□□ □□ □ □□ □□□□ □□□□□. Junos Evolved OS □□□ 20.2R1□□ ip-options *any* □□ □□□ PTX10003 □ PTX10008 □□□ □ □□□□ □□□□□. □: • MX □□□ □□□□□ ip-options□(□) □□□□ □□ □□ □□□ □□(□□) □□□ □□ □□□ □ □□□□. • M □ T □□□ □□□□□ □□□ □□□ □□ □□ □ □□□□□ □□□ □□ ip-options □□□ □□□□ □ □□□□. □□ □ □□ □□□ show pfe statistics ip options □□□ □□□□ PFE □□□ □□ ip-options □□□ □□ □□□□. □□ □□□ pfe □□ ip □□□ □□□□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
ip-options-except *values*	IP □□ □□□ □□□ □ □□ □ □□□ □□□□□ □□□□. *values* □□□ □□ □□□ □□□ ip-options □□ □□□ □□□□□ □.
is-fragment	□ □□□ □□□□ IP □□□ More Fragments □□□□ □□□□□ □□ □□□ □□□□ 0□ □□ □□ □□□ □□□□□. MX □□□ □□□□□ is-fragment□(□) □□ □□, □ □ □□ □□(fragment-offset = 0), □□□ □□(more-fragments = 0) □□□ □ □□□ □□□ □□ □□□ □□ □□□ □□□□□□□. □: □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□(first-fragment □ is-fragment)□ □ □□ □ □□□□.
loss-priority *level*	□□ □□ □□□□(PLP) □□□ □□□□□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□, Enhanced CFEB(CFEB-E)□ □□ M7i □ M10i □□□ □□□ MX □□□ □□□□□ □□□□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□ □ T □□□□ IP □□□□ □□, [edit class-of-service]□□ □□□ tri-color □□ □□□□ 4□□ □□□ □□□□ □□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. tri-color □□ □□ □□□ □□ □□ □□ □□□□□□. □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□ □ □□□ □□ □□□ □□ □□(BA) □□□□ □□□□ □□□□ □□□□ □□□□ □□ □□□□□ □□□□□□.
loss-priority-except *level*	PLP □□□ □□□□□ □□□□. □□□ □□□ loss-priority □□ □□□ □□□□□□.
packet-length *bytes*	□□□ □□ □□□ □□□□ □□□□□□. □□□ □□ □□□ □□□□ IP □□□ □□□□ □□ □□□ 2 □□□ □□□□□ □□□□ □□□□. □□ □□□ □□ □□□ □□□ □ □□□□.
packet-length-except *bytes*	□□□ □□ □□(□□□)□ □□□□□ □□□□. □□□ □□□ packet-length □□ □□□ □□□□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
port *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ destination-port □□ □□ □□ source-port □□ □□□ □□□ □ □□□□. □□ □□□ □□□□ □□□ □□□ □ □□□ □□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□□. □□ □□ □□□□□ □□□ □□ □□□ □□□ □ □□□□. □□ □ □□, destination-port□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
port-except *number*	□□ □□ □□ UDP□ TCP □□ □□□ □□□□□ □□□□. □□□ □□□ port □□ □□□ □□□□□□□.
precedence *ip-precedence-value*	IP □□□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp(0xa0), flash(0x60), flash-override(0x80), immediate(0x40), internet-control(0xc0), net-control(0xe0), priority(0x20) □□ routine(0x00). 16□□, 2□□ □□ 10□□ □□□□ □□□□□ □□□ □ □□□□.
precedence-except *ip-precedence-value*	IP □□□□ □□□ □□□□□ □□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp(0xa0), flash(0x60), flash-override(0x80), immediate(0x40), internet-control(0xc0), net-control(0xe0), priority(0x20) □□ routine(0x00). 16□□, 2□□ □□ 10□□ □□□□ □□□□□ □□□ □ □□□□.
prefix-list *name* [except]	except □□□ □□□□ □□ □ □□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□□□. □□□ □□□□ □□ □□, □□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□□ □□□□. □□□ □□□ [edit policy-options prefix-list *prefix-list-name*] □□ □□□ □□□□ □□□□. □: □ □□ □□□ PTX1000 □□□□□□ □□□□ □□□□.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
protocol *number*	IP □□□□ □□ □□□ □□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstopts(60), egp(8), esp(50), fragment(44), gre(47), hop-by-hop(0), icmp(1), icmp6(58), icmpv6(58), igmp(2), ipip(4), ipv6(41), ospf(89), pim(103), rsvp(46), sctp(132), tcp(6), udp(17) □□ vrrp(112).
protocol-except *number*	IP □□□□ □□ □□□ □□□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstopts(60), egp(8), esp(50), fragment(44), gre(47), hop-by-hop(0), icmp(1), icmp6(58), icmpv6(58), igmp(2), ipip(4), ipv6(41), ospf(89), pim(103), rsvp(46), sctp(132), tcp(6), udp (17) □□ vrrp(112).
rat-type *tech-type-value*	Proxy Mobile IPv4(PMIPv4) □□□ □□ □□ □□□ □□ 8□□ Tech-Type □□□ □□□□ □□ RAT(Radio Access Technology) □□□ □□□□□□. □□ □□□ □□□□ □□□ □□□ □□□□ □□ □□ □□□ □□□□□ □□□ □□□□ □ □□□□□. □□ □, □ □□ □□ □ □□□ □□□□□. 0~255 □□□ □□ □ □□ □□□ □□□□ □□ □□□ □□□ □ □□□□. • □□ □□ □□ □ □□□ □□ □□□ □□□□. • □□ □ 1□ IEEE 802.3□ □□□□□. • □□ □ 2□ IEEE 802.11a/b/g□ □□□□□. • □□ □ 3□ IEEE 802.16e□ □□□□□. • □□ □ 4□ IEEE 802.16m□ □□□□□. • □□□ □□□ eutran□(□) 4G□ □□□□□. • □□□ □□□ geran□(□) 2G□ □□□□□. • □□□ □□□ utran□(□) 3G□ □□□□□.
rat-type-except *tech-type-value*	RAT □□□ □□□□□ □□□□.

표 63: IPv4 필드 일치 조건 및 작업 *(Continued)*

조건 또는 작업	설명
service-filter-hit	service-filter-hit 조건은 패킷이 서비스 필터와 일치하는지 확인합니다. 참: 이 기능은 PTX 시리즈 라우터에서 지원되지 않습니다.
source-address *address* [except]	except 옵션을 포함하여 이 조건에 하나 이상의 IPv4 주소를 나열합니다. 패킷이 나열된 주소 중 하나, 패킷이 나열된 IPv4 주소 중 하나와 일치합니다. 이 조건은 address 및 source-address 문과 함께 사용할 수 있습니다.
source-class *class-names*	이 조건을 사용하여 하나(또는 여러 개의 공백으로 구분된 이름)의 클래스를 지정합니다. 자세한 내용은 "방화벽 필터 일치 조건 및 작업" 페이지 942을 참조하십시오.
source-class-except *class-names*	이 조건을 사용하여 패킷이 source-class 문과 일치하지 않는지 확인합니다.
source-port *number*	UDP 또는 TCP 헤더 소스 포트 필드를 검사합니다. 이 조건은 port 및 source-port 문과 함께 사용할 수 있습니다. 이 조건은 protocol udp 또는 protocol tcp 문과 함께 사용해야 합니다. 이 조건은 단편화된 패킷에서 작동하지 않습니다. 또는 또는, destination-port *number* 문을 사용하여 패킷의 대상 포트 필드를 검사합니다.
source-port-except *number*	UDP 또는 TCP 헤더 소스 포트 필드를 검사합니다. 패킷이 source-port 문과 일치하지 않는지 확인합니다.
source-port-list *port-list*	이 조건은 소스 포트 필드를 검사합니다.
source-prefix-list *name* [except]	except 옵션을 포함하여 이 조건에 하나 이상의 주소 접두사 목록을 나열합니다. 패킷이 나열된 주소 중 하나, 패킷이 나열된 주소 중 하나와 일치합니다. [edit policy-options prefix-list *prefix-list-name*] 문을 사용하여 접두사 목록을 정의합니다.

□ 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
tcp-established	□□□ TCP □□□ TCP □□(□□□ □ □□ □□ □□□ □□)□ □□□□□□. □□ tcp-flags "(ack | rst)"□ □□□□□. □ □□ □□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □□ □□□□□ protocol tcp □□ □□□ □□□□ □□□.
tcp-flags *value*	TCP □□□ 8□□ TCP □□□ □□□□ □□ □□□ □□□ 6□□□ □□□□□□. □□ □□ □□□ □□□□ □□ □□ □□□ □□□□ 16□□ □□ □□□ □ □□□□. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP □□□□, SYN □□□□ □□□ □□ □□□□□ □□□□ □□ □□, ACK □□□□ □□ □□ □ □□□ □□ □□□ □□□□ □□ □□. □□ □□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □□□□. □□□ □□ □□ □□ □□□ □□, tcp-established □ tcp-initial □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ protocol tcp □□ □□ □□□□ TCP □□□□□ □□□□ □□□□□ □□□□ □□ □□ □□. IPv4 □□□□ □□□□, □ □□ □□□ □□□□□□ □□□□ □□□ □ □□ □□□ □□□□□ □□□□□ □□□□ □□□□. IPv4 □□ □□□ □□□□ □ □□□ □□□□□ first-fragment □□ □□□ □□□□ □□□.
tcp-initial	TCP □□□ □□ □□ □□□ □□□□□□. □□ tcp-flags "(!ack & syn)"□ □□□□□. □ □□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ protocol tcp □□ □□□ □□□□ □□ □□□□.

표 63: IPv4 □□□ □□□ □□ □□ *(Continued)*

□□ □□	□□
`ttl` *number*	IPv4 TTL(time-to-live) □□□ □□□□□□□. TTL □ □□ TTL □ □□□ □□□□□. *number*□ □□, □□ □□□ □ (0~255)□ □□□ □ □□□□. □ □□ □□□ M120, M320, MX □□□, SRX □□□, T □□□ □□□□□□□ □□□□□.
`ttl-except` *number*	IPv4 TTL □□□ □□□□□ □□□□. □□□ □□□ `ttl` □□ □□□ □□□□□□.
`policy-map` *policy-name*	□□□ `policy-map` □□(□: □□ □□□ □□ □□□ □□)□ □□□□ □□□□ □□□□□□.
`redirect-reason`	□□□ □□□□ □□□ □□□□ □□□□ □□□□□□.

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□□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□. Feature Explorer □ □□□□ □□□□□ □□□ □□□□□ □□□□□.

release heading in release-history	desc heading in release-history
13.3R7	DSCP(Differentiated Services Code Point) □□□ □ GRE(Generic Routing Encapsulation)□ □□□□ IS-IS □□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □□ □□ □□□ □□□□□□□.

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□□□ □□ □□ □□ | **763**

□□□ □□ □□ □□ | **828**

□□□ □□ □ □□ □□ | **817**

IPv6 □□□□ □□ □□□ □□ □□ □□ | **911**

□□□ □□

□□□ □□ FMC(Flexible Match Condition) | **809**

IPv6 □□□□ □□ □□□ □□ □□ □□

□□□ □□□□ □□ 6(IPv6) □□□()□ □□ □□ □□□□ □□□ □□□ □□□ □ □□□□.family inet6

> □: MPC□ □□ MX □□□ □□□□ □□, □□ SNMP □□ □□ □□□(MIB)□ □□□□□□ □□□ □□ □□ □□□ □□ □□ □□□ □ □□□□□ □□□(□: show snmp mib walk *name* ascii). □□ Junos□ □□ □□□□ □□□□ □□ □□□ □□□□□ □□□. □ □□□ □□ □□ □□ □□□ □□, □□□ □□□ □□ □□ □ □□ □□ □□□ □□ □□□ □□□□□. □□□ □□□ □□ □□□ □□□ □□□ □□ □□□□.

□ 64 □□□ 911 □□ □□ □□□□ □□□ □ □□ □□ □□□ □□□□ □□□□ [edit firewall family inet6 filter *filter-name* term *term-name* from].

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□

□□ □□	□□
address *address* [except]	except □□□ □□□□ □□ □□ □ IPv6 □□ □□ □□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□, IPv6 □□ □□ □□ □□ □□□ □□□□□ □□□□.
apply-groups	□□ □□□□ □□□□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□. □□ □□□□□ □□□□ □□□□ □□□. □ □□ □□□ □□ □□□□ □□ □□□ □□□□□ □□□□ □□□□.
apply-groups-except	□□ □□□□ □□□□ □□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□.
destination-address *address* [except]	except □□□ □□□□ □□ □□ □ IPv6 □□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□, IPv6 □□ □□ □□□ □□□□ □ □□□□. □□□ □□□ address □ destination-address □□ □□□ □□ □□□ □ □□□□.
destination-class *class-names*	□□ □□□ □□□ □□ □□□ □□□ □□□□□□(□□ □□□□□ □□□ □□□ □□□ □□ □□□ □□). □□□ □□□ "□□ □□□□ □□□ □□□ □□ □□ □□" □□□ 942□ □□□□□□.
destination-class-except *class-names*	□□ □□□ □□□ □□ □□□ □□□ □□□□□ □□□□. □□□ □□□ destination-class □□ □□□ □□□□□□.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □: Junos OS Evolved□ □□, □□□ □□□ next-header □□ □□ □□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).
destination-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ destination-port □□ □□□ □□□□□□.
destination-prefix-list *prefix-list-name* [except]	□□□ □□□□ □□ □□ □ IPv6 □□ □□□□ □□□ □□ □ □□□□□□ except . □□□ □□□□ □□ □□, IPv6 □□ □□□□ □□□ □□□ □□□□□ □□□□. □□□ □□□] □□ □□□□ □□□□□ [edit policy-options prefix-list *prefix-list-name*.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□	
extension-headers *header-type*	Next Header □□ □□□□ □□□ □□□ □□ □□ □□□ □□□□□□. □: □ □□ □□□ MX □□□ □□□□ MPC□□□ □□□□□. □□□ □ □□ □□□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□□□. □□□□□ □□□ □□ □□□ □□□□(□□ □□□□□) □□ □ □ □□□ □□□ □□□ □ □□ □□□ □□□ □□ □□ □□ □□□ □□ □□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah (51), (60), destinationesp (50), fragment (44), hop-by-hop (0), mobility (135) □□ routing (43). □□ □□ □□ *□ □□ □□* □□□□ □□□ □□□ any□ □□□□□. MPC□ □□□□ □□ MX □□□ □□□□ □□, □□ SNMP □□ □□ □□□(MIB)□ □□□□□□□ □ □□□ □□□□ □□□ □ □□ □□□ □□□□□□.	
first-fragment	□□□ □ □□ □□□□□□ □□ □□□□□□.	

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
□□□ □□□ *flow label value*	IPv6 □□ □□□ 20□□ flow-label □□□ □□□□□□□. □□ □□□ 0x1□□ 0xFFFFF □□□□□. *flow-label*□ *next-header*□□ □□□ □□□ □ □□□□. □□□ □□ □□ □ □□□ □ □□ □□□ □ □□□□. *flow-label*/□ □□□□□ *next-header*□ □□□□□□□ □□ □□□ □□□□□. `set firewall v6-flowlabel-enable`. □□ □□□ */□ /□* □□□ *flow-label*□□ □□□ □□□ □□□□ □□□□.

□□□□	□□	□□ □□□□	□□
1	□□ □□	□□□ □□□	□□□ □□□ □□□ □□□□ □□□.
2	□□ □□	□□ □□	□ □□ □□ □□□ □□ □□ □□ □□□ □□□□ □□□□. □□□ payload-protocol□ □□□□□.
3	no-next-header-to-payload-protocol-mapping	□□□ □□□	□□□ □□□ □□□ □□□□ □□□.
4	no-next-header-to-payload-protocol-mapping	□□ □□	□ □□ □□ □□□ □□ □□ □□ □□□ □□□□□.
5	v6-flow□□□ □□	□□□ □□□	flow-label □□ □□
6	v6-flow□□□ □□	□□ □□	□ □□ □□ □□□ □□ □□ □□ □□□ □□□□ □□□□. □□□ payload-protocol□ □□□□□.

□: `v6-flowlabel-enable` □ `flow-label` □□ □□□ PTX10001-36MR, PTX10003, PTX10004, PTX10008 □ PTX10016□ Junos EVO□□□ □□□□□.

표 64: IPv6 헤더의 필드 일치 조건 및 작업 (*Continued*)

조건 및 작업	설명	
헤더 필드 *flow label value* 및 *mask value*	특정 *flow-label* 값 또는 값 범위 및 마스크 값 또는 범위. 마스크 값 또는 *flow-label* 값 및 범위. 참고: flow-label 헤더 필드 및 mask 필드 일 때 PTX10001-36MR, PTX10003, PTX10004, PTX10008 및 PTX10016은 Junos EVO에서 지원됩니다.	
extension-headers-except *header-type*	지정된 확장 헤더 외의 모든 확장 헤더. 기본 extension-headers 값 없음.	
flexible-match-mask *value*	bit-length	일치 비트 수 (1..32 비트); (바이트) 오프셋 및 비트(1..128비트)
	bit-offset	(바이트 + 비트) 오프셋(0..7) 비트 수
	byte-offset	바이트 오프셋 기준
	flexible-mask-name	일치 조건 이름 및 바이트
	mask-in-hex	마스크 값
	match-start	바이트
	prefix	헤더 및 오프셋/길이
	헤더 필드 "헤더 및 필드 값 설명" 참조 RFC 809
flexible-match-range *value* 헤더 및 필드 범위 일치. *Integer-Integer*	bit-length	일치 비트 수(0..32)
	bit-offset	(바이트 + 비트) 오프셋(0..7) 비트 수

표 64: IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-range-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	match-start	□□ □□ □□□
	range	□□□ □ □□
	range-except	□□□ □ □□□ □□□□□ □□□□
	□□□ □□□ "□□□ □□ □□□ □□ □□□" □□□ 809 □□□□□□	
forwarding-class *class*	□□ □□□ □□□□ □□□□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□. □□□ □□□ □ □□□ □□ □□ □□ □□ □□□ *□□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□*□ □□□□□□.	
forwarding-class-except *class*	□□ □□□ □□□□ □□□□□ □□□□. □□□ □□□ forwarding-class □□ □□□ □□□□□□.	
hop-limit *hop-limit*	□ □□□ □□□ □ □□ □□ □ □□ □□□ □□□□□□. *hop-limit*□ □□, □□ □ □□ 0~255 □ □□□ □□□□□. MX □□□ □□□□ MIC □□ MPC□□ □□□□□ □□□□□□□□ □□□□□. □: □ □□ □□□ □□□□□ □□□ □ enhanced-mode PTX □□□ □□□□□ □□□□□.	
hop-limit-except *hop-limit*	□ □□□ □□□ □ □□ □□ □ □□ □□□ □□□□□ □□□□. □□□ □□□ hop-limit □□ □□□ □□□□□□. MX □□□ □□□□ MIC □□ MPC□□ □□□□□ □□□□□□□□ □□□□□. □: □ □□ □□□ □□□□□ □□□ □ enhanced-mode PTX □□□ □□□□□ □□□□□.	

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
icmp-code *message-code*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip6-header-bad(0), unrecognized-next-header (1), unrecognized-option (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • destination-unreachable: administratively-prohibited(1), address-unreachable (3), no-route-to-destination (0), port-unreachable (4)
icmp-code-except *message-code*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □□□□□□.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
icmp-type *message-type*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□□. □: Junos OS Evolved□ □□, □□□ □□□ next-header □□ □□ □□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). certificate-path-advertisement(149), certificate-path-solicitation (148), destination-unreachable (1), echo-reply (129), echo-request (128), home-agent-address-discovery-reply (145), home-agent-address-discovery-request (144), inverse-neighbor-discovery-advertisement (142), (141), membership-queryinverse-neighbor-discovery-solicitation (130), membership-report (131), membership-termination (132), mobile-prefix-advertisement-reply (147), mobile-prefix-solicitation (146), neighbor-advertisement (136), neighbor-solicit (135), node-information-reply (140), node-information-request (139), packet-too-big (2), parameter-problem (4), private-experimentation-100 (100), private-experimentation-101 (101), private-experimentation-200 (200), private-experimentation-201 (201), redirect (137), router-advertisement (134), router-renumbering (138), router-solicit (133), time-exceeded □□ (3). (201)□ □□ private-experimentation-201 □□□ □□ □ □□□ □□□ □□ □□□□.
icmp-type-except *message-type*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-type □□ □□□ □□□□□□□.
interface *interface-name*	□□□ □□□ □□□□□□ □□□□□□. □: □□□□ □□ □□□□□□□ □□□□ □ □□ □□□ □□□ □□, □□□ □□□ □□□□ □□□□.
interface-group *group-number*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□□□. □ □□ *group-number*□□ □ □□ □ □ □□□ 255□ 0 □□□ □□□□□. □□ □□□□□□ □□□□□ □□*group-number*□ □□□□□ [interfaces *interface-name* unit *number* family *family* filter group] □□ □□□□ *group-number*□(□) □□□□ □□□. □□□ □□□ "□□□□□ □□ □□□□ □□□ □□ □□□ □□" □□□ 1296□ □□□□□□.

표 64: IPv6 헤더의 필드 및 옵션 및 값 *(Continued)*

필드 및 값	설명
interface-group-except *group-number*	지정된 인터페이스 그룹을 제외한 모든 인터페이스에 필터를 적용합니다. 최대 interface-group 수는 플랫폼에 따라 다릅니다.
interface-set *interface-set-name*	지정된 인터페이스 세트에 필터를 적용합니다. 인터페이스 세트는 [edit firewall] 계층 수준에서 interface-set을 구성합니다. 자세한 내용은 "인터페이스 세트를 사용한 필터 적용" 1297을 참조하십시오.
ip-options *values*	패킷 헤더, 8비트 IP 옵션 필드 및 값 중 하나와 일치합니다. 옵션 값은 숫자 또는 텍스트 별칭으로 지정할 수 있습니다. loose-source-route(131), record-route(7), router-alert(148), security(130), stream-id(136), strict-source-route(137) 및 timestamp(68). IP 옵션 값 *범위*의 any(0) 패킷과 일치합니다. *범위*의 시작 및 끝 값([ ])을 포함합니다. 범위 *값*의 *value1-value2*](0) 패킷과 일치합니다. 예를 들어, 다음 ip-options [0-147](0) loose-source-route, record-route 및 security 및 0~147 범위 내의 모든 IP 옵션과 일치합니다. 이는 또한 router-alert (148)과 같은 IP 옵션 패킷과 일치합니다. 패킷 헤더에 있을 *때*, 이 필터 *용*IP 옵션 (또는 any)을 포함하는 모든 패킷 ip-option과 일치합니다. 이 필터 패킷 및 IP 옵션 필드 값과 일치합니다. • 이 필터 IP 옵션 ip-option패킷 필터 옵션, 필터 discard하는 필터 및 countlog, 및 syslog을 수행 필터 *패킷*. 및 필터 패킷 필터 헤더에 필터 및 필터 패킷 옵션 패킷. • 필터 옵션 필터 및 필터 필터 패킷. 이 패킷 필터 및 및(헤더에 및 필터 패킷 및)및 패킷 패킷 ip-options any 및 필터 패킷 필터. MX 패킷 10패킷 필터 MPC(Modular Port Concentrator), 100패킷 필터 MPC, 60패킷 필터 MPC, 60패킷 및 필터 MPC 및 60패킷 필터 Enhanced 및 MPC에 IPv4 및 필터 IP 옵션 및 필터 및 패킷. 필터 MPC에 필터 패킷 및, ip-options 및 필터 패킷 패킷 *범위* 필터 필터 및 및 및 패킷 패킷.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
ip-options-except *values*	IP □□ □□□ □□□ □ □□ □ □□□ □□□□□ □□□□. *values* □□□ □□ □□□ □□□ ip-options □□ □□□ □□□□□ □.
is-fragment	□□□ □□□ □□ □□□□□□.
last-fragment	□□□ □□□ □□□ □□ □□□□□□.
loss-priority *level*	□□ □□ □□□□(PLP) □□□ □□□□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□□□ □□; □□□ CFEB(CFEB-E)□ □□ M7i □ M10i □□□; MX □□□ □□□□ EX □ □□ □□□□ □□□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□, T □□□ □□□ □ EX □□□ □ □□□ IP □□□□ □□, □□ □□□ □□ [edit class-of-service] □□ tri-color □□ □□□ 4□ □□ □ □□□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. tri-color □□ □□ □□□ *□□ □□ □□□ □□ □ □□*□ □□□□□□. □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□ □ □□□ □□ □□□ □□□ *□□□ □□□□ □□ □□□□ □□□□ □□□□ □□ □□□□□* □□□□□□.
loss-priority-except *level*	PLP □□□ □□□□□ □□□□. □□□ □□□ loss-priority □□ □□□ □□□□□□.

표 64: IPv6 헤더의 필드 검사 조건 설정 *(Continued)*

필드 이름	설명
next-header *header-type*	헤더 내 특정 8비트 Next Header 필드 일치시킵니다. 이 옵션은 next-header 필드 Junos OS 릴리스 13.3R6 이후부터 지원합니다. 참: MX 시리즈 라우터 및 일부 NH(Next Header)를 지원하지 않는 payload-protocol 필드 NH를 사용하여 일부 필드 검사next-header. 또한 EVO-PTX 시리즈 라우터 NH를 next-header 필드를 사용하여 NH를 검사합니다. 또한 지원하지 않는 NH를 필터링하지, 또한 PTX 시리즈 라우터 지원하지 않습니다. 또한 next-header 를 사용하여 NH를 검사하려면 payload-protocol 를 사용하여 NH를 지원하지 MX 시리즈 라우터 및 일부 지원하지 않습니다. WAN 인터페이스 카드에 IPv6 패킷 next-header 필드 검사하려면 필터를 사용하여 지원하지 않습니다. 이 옵션은 Junos OS Evolved 에서 지원합니다. • 21.4R2-S1-EVO, 21.4R2-S2-EVO, 21.4R3-S1-EVO 이상 • 21.4R3-EVO 이상 • 22.2R2-이상 • 22.3R1-이상 헤더 내 특정 8비트 Next Header 필드 일치시킵니다. 또는 다음 중 하나의 프로토콜 이름(또는 해당 번호). ah(51), dstops (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), mobility (135), no-next-header (59), ospf (89), pim (103), routing (43), rsvp (46), sctp (132), tcp (6), udp (17) 또는 vrrp (112). 참: • next-header icmp6 및 next-header icmpv6 두 필드 모두 동일한 패킷 검사합니다. next-header icmp6 를 사용하십시오. next-header icmpv6 Junos OS CLI에 나타나지 않습니다. • Junos OS Evolved에서 QFX5000 라인 스위치의 ERACLv6에 대해 next-header 필드 검사, 또는 payload-protocol 필드를 검사합니다.
next-header-except *header-type*	IPv6 헤더 필드 검사 조건 중 헤더 내 특정 8비트 Next Header 필드 일치하지 않습니다. 이 옵션은 next-header 필드 검사합니다.
packet-length *bytes*	패킷 길이 필드 일치시킵니다. 이 옵션은 IP 헤더 필드 길이 2 바이트 필드 일치시킵니다.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
packet-length-except *bytes*	□□□ □□ □□(□□□)□ □□□□□ □□□□. □□□ □□□ packet-length □□ □□□ □□□□□□.
payload-protocol *protocol-type*	□□□□ □□□□ □□□ □□□□□□. □□ □ □□ *protocol-type* □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□). □□ □ □□ □□ □□□ □□□□□. ah(51), dstopts (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58, igmp (2), ipip (4 ipv6), (41), no-next-header, ospf (89), pim (103), routing, rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112) (dstopts (60), fragment (44), hop-by-hop 0) □ □□□□ Junos OS □□□ 16.1 □□□□ □□□ □ □□). □□ □ □□□ □□□□ payload-protocol □□□ □□□□ □□□□ □□□ □ □□ □□ □□ □□□ □□□□ □□ □□□□. □□□ □□ □□ □□ □□ □□□ □□□ □ □□□□. □□□□ □□□□ □□□ □ □□ □ □□ □□ □□ □□□ □□□ payload-protocol □□ □□ □□ □□ □□□□ □□□□□. □□□ □□□ □□□□ □□□□ □□□ □ □□ □ □□ □□ □□ □□□ □□□□□. □: □ □□ □□□ MX □□□ □□□□ MPC□□□ □□□□□. □□ SNMP □□ □□ □□□(MIB)□ □□□□□□□ □ □□□ □□□□ □ □□□ □□□ □□□□□□□.
payload-protocol-except *protocol-type*	□□□□ □□□□ □□□ □□□□□ □□□□. □□□ □□□ payload-protocol □□ □□□ □□□□□□□. □: □ □□ □□□ MX □□□ □□□□ MPC□□□ □□□□□
port *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ destination-port □□ □□ □□ source-port □□ □□□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □: Junos OS Evolved□ □□, □□□ □□□ next-header □□ □□ □□□□ □□□. □□ □ □□, destination-port□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
port-except *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□ □□□□. □□□ □□□ port □□ □□□ □□□□□□□.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
prefix-list *prefix-list-name* [except]	except □□□ □□□□ □□ □ □□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□□□. □□□ □□□□ □□ □□, □□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□□ □□□□. □□□ □□□ [edit policy-options prefix-list *prefix-list-name*] □□ □□□ □□□□ □□□□.
service-filter-hit	service-filter-hit □□□ □□□ □□□□ □□□ □□□ □□□□□□.
source-address *address* [except]	except □□□ □□□□ □□ □□ □ □□□ □□□□ □□ □□□ IPv6 □□□ □□□□□□. □□□ □□□□ □□ □□, □□□ □□□□ □□ □□□ IPv6 □□□ □□□□□ □□□□. □□□ □□□ address □ source-address □□ □□□ □□ □□□ □ □□□□.
source-class *class-names*	□□ □□□ □□□ □□ □□□ □□(□□ □□□□□ □□□ □□□ □□□□ □□ □□ □□□ □□)□ □□□□□□. □□□ □□□ "□□ □□□□ □□□ □□□ □□ □□ □□" □□□ 942□ □□□□□□.
source-class-except *class-names*	□□ □□□ □□□ □□ □□□ □□□ □□□□□ □□□□. □□□ □□□ source-class □□ □□□ □□□□□□.
source-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □: Junos OS Evolved□ □□, □□□ □□□ next-header □□ next-header tcp □□ □□ □□□□ □□□. □□ □ □□, destination-port *number* □□ □□□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
source-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ source-port □□ □□□ □□□□□□.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
source-prefix-list *name* [except]	□□□ □□□□ □□ □□ □ □□ □□ □□□ IPv6 □□ □□□□ except □□□□□□. □□□ □□□□ □□ □□, □□ □□ □□□ IPv6 □□ □□□□ □□□□□ □□□□. □□ □□□□ □□□ [edit policy-options prefix-list *prefix-list-name*] □□□ □□ □□□ □□□□□.
tcp-established	□□□ □ □□ □□ □□□ TCP □□□ □□□□□□. □□□ (0x14)□ tcp-flags "(ack | rst)" □□□ □□□□□□. □: □ □□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □□ □□□□□ protocol tcp □□ □□□ □□□□ □□□. □ □□ □□□ □□□□ □□, □□□ □□□ next-header tcp □□ □□□ □□□□ □□ □□□□.
tcp-flags *flags*	TCP □□□ 8□□ TCP □□□ □□□□ □□ □□□ □□□ 6□□□ □□□□□□. □□ □□ □□□ □□□□ □□ □□ □□□ □□□□ 16□□ □□ □□□ □ □□□□. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP □□□□, SYN □□□□ □□□ □□ □□□□□ □□□□ □□ □□, ACK □□□□ □□ □□ □ □□□ □□ □□□ □□□□ □□ □□. □□ □□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □□□□. □□□ □□ □□ □□ □□□ □□, tcp-established □ tcp-initial □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ □□□ □□ next-header tcp □□ TCP □□□□□ □□□□ □□□□□ □□□□ □□ □□□□.

□ 64: IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
tcp-initial	TCP □□□ □□ □□ □□□ □□□□□□. □□□ □ □□□ □□□ tcp-flags "(!ack & syn)"□□□. □ □□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ next-header tcp □□ □ □□ □□□□ □□ □□□□.
traffic-class *number*	□□□ CoS(Class of Service) □□ □□□ □□□□ 8□□ □□□ □□□□□□. □ □□□ □□□ IPv4□□ □□□ □□(ToS) □□□ □□□□□□□. 0□□ 63□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □ □□□□ □□□□ b□(□) □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*□ RFC 3246□ □□□ □□ □□□□ □□□□ □. ef(46). • *AF(Assured Forwarding) PHB □□□* RFC 2597□ □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □ □□ □□ 4□□ □□□□ □□□□□. • af11 (10), af12 (12), af13 (14) • af21 (18), af22 (20), af23 (22) • af31 (26), af32 (28), af33 (30) • af41 (34), af42 (36), af43 (38)
traffic-class-except *number*	□□□ CoS □□□□□ □□□□ 8□□ □□□ □□□□□ □□□□. □□□ □□□ □□ □□□ □□□□□□ traffic-class .

□: source-port-range-optimize □ destination-port-range-optimize □(□) □□ □□□□ □□ □□□ IPv6 □□□ □ □□ [edit firewall family inet6 filter <filter-name> term <term-name> from] □□ □□□□□. □□ □□□ □□□□□□□□ □ □□□ □ □□ TCAM □□□ □□□□ □□□□. TCAM □□□ □□ □□ □□ □□ □□ □□ □□□□ □□□ □□□ □ □ □□□ □ □□□□. □ □□□ □□□□ □□ CLI□□ □□□ □ □□□, source-port-range-optimizedestination-

port-range-optimize □□ □□ □□□ □□ □□ □□□□ □□ □□ □□ □□ □□□ □□□ □ □□□□ TCAM □□ □□ □□□ □□ □ □□□□.

□□ □□ □□□ □□□□.

```
set firewall family ethernet-switching filter TEST term t1 from source-port 2000-10000
set firewall family ethernet-switching filter TEST term t1 from source-port-range-
optimize
set firewall family ethernet-switching filter TEST term t1 from destination-port
3000-9000
set firewall family ethernet-switching filter TEST term t1 from destination-port-
range-optimize
```

□: □□ □□(address, destination-address, □□ source-address □□ □□)□□ IPv6 □□□ □□□□ □□ RFC 4291, *IP □□ 6 □□ □□ □□□□* □□□ □□□ □□ □□□ □□□□□. IPv6 □□□ □□ □□□ □□□ IPv6 □□ □ □□□□ IPv6 □□□ □□□□□□.

□□ □□ □

□□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□. Feature Explorer □ □□□□ □□□□□ □□□ □□□□□ □□□□□.

release heading in release-history	desc heading in release-history
13.3R6	□□□ □□ □□□ □□ next-header □□□ Junos OS □□□ 13.3R6 □□□□ □□□ □ □□□□.

□□ □□

- □□□ □□ □□ □□ | 763
- □□□ □□ □□ □□ | 828
- □□□ □□ □ □□ □□ | 817
- IPv4 □□□ □□□ □□ □□ | 894
- *□□□ □□*
- □□□ □□ FMC(Flexible Match Condition) | 809

?? ?? ??? ??? ???? ? ??? ?? ?? ??

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- ?? ?? ?? ?? ?? | 927
- ?? ? ???? ?? | 927
- ?? ?? ?? ??? ?? ?? | 927
- ?? ? ?? ??? ?? ??? ?? ?? | 928

?? ?? ?? ?? ??

?? ?? ?? ?? ??? ?? ??? ??? ?? */??? /??* ?? ??? ??? ? ????. ?? ??? ?? ?? ?? ??? ??? ?? 25?? ??? ?????.

```
[edit firewall family inet filter filter1 term term1 from]
user@host# set source-port 25
```

?? ? ???? ??

?? ?? ?? ?? ??? ?? ? ??? ???? ??? ?? ??? ?? ?? ??? ??? ? ????. ?? ???? ?? ??? 65,535?? ?? ?? 1024 ? ? ??? ?????.

```
[edit firewall family inet filter filter2 term term1 from]
user@host# set source-port 1024-65536
```

?? ?? ?? ??? ?? ??

?? ?? ?? ?? ??? ???? ?? ?? */??* ???? ??? ?? ??? ??? ?? ??? ?? ?? ??? ??? ? ????. ?? ??? ?? ?? ?? ??? 25? ?? ??? ?????. ? destination-port ?? ??? source-port ??, ??? ??smtp? ?? ? 25? ?????.

```
[edit firewall family inet filter filter3 term term1 from]
user@host# set source-port smtp
```

[illegible]

[illegible] 20([illegible] [illegible]ftp-data[illegible] [illegible]) [illegible] 25[illegible] [illegible] 65535[illegible] [illegible]1024.

```
[edit firewall family inet filter filter3 term term1 from]
user@host# set source-port [ smtp ftp-data 25 1024-65535 ]
```

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] | 763

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 928

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 933

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 942

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

in this section

- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 929
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 929
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 930
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 931
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 931
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 932
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] OR[illegible] [illegible] [illegible] | 932
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] AND[illegible] [illegible] [illegible] | 932
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 933

?? ?? ?? ?? ?? ??

? 65 ??? 929 ?(?) ??? ?? ?? ??? ??????? ??? ??? *???? ??* ?? ??? ??????. ? ??? ? ?? ??? ?? ??? ???? ??? ??? ??? ??????.

? 65: ??? ??? ?? ?? ? ?? ?? ?? ??

?? ?? ?? ??	? ??	?? ??????? ??? ??? ? ? ???? ???	??? ??? ?? ???? ???
fragment-flags *flags*	IP ??? 3?? IP ??? ??? ??? ?? 16?? ? ?? ??? ??.	**family inet**	**family inet**
fragment-offset *value*	IP ??? 13?? ?? ??? ??? ?? 16?? ? ? ? ??? ??????.	**family inet**	**family inet**
tcp-flags *value*†	TCP ??? ?? 8?? TCP ??? ??? ?? 6?? ? ?? 16?? ? ?? ??? ??????.	**family inet** **family inet6** **family vpls** **family bridge**	**family inet** **family inet6**

† Junos OS? IPv4 ???? ?? TCP ???? ???? ? ? ?? ????? ??? ???? ???? ????. IPv4 ???? ???? ? ?? ?? ??? **first-fragment** ????? ?? ??? ??????.

?? ?? ?? ? ?? ??? ?? ?? ??

? 66 ??? 930 ???? ?????? ???? ?? ? ?? ?? ?? *??* ??????? ??? ???? ?? ??? ?? ?? ??? ??????.

??? ???? ???? ? ?? ???? ?? ?? ??? ??? ? ????. ?? ??? ??? ?? ??? ? ??? **tcp-initial** ? ????.

?: ?? ?? ?? ? ?? ?? ?? ?????? ??? ???? ??? ? ????. ???? ?? ??:

- J-Web ??????? ???? ?? ?? ???? ???? ???????.
- CLI? ???? ?? ? ?? ???(?)? **from** ??????.

□ 66: □□ □□□ □□ □□ □□ □□ □□

□□ □□	□□	□□ □□□□□□ □□□ □□□ □ □ □□□□ □□□	□□□ □□□ □□ □□□□ □□□
first-fragment	□□ □□ □□ □□□ **fragment-offset 0**□□ □□ □ □□□□, □□□□ □□□ □ □□ □□□ □□□□□.	**family inet**	**family inet**
is-fragment	□□ □□ □□ □□□ **fragment-offset 0 except**□□ □□□ □□□□, □□□□ □□□ □□ □□□ □□□□□.	**family inet**	**family inet**
tcp-established	□□ □□ □□ □□ **tcp-flags "(ack | rst)"**□ □□ □□, □□□ TCP □□□ □□□□□ TCP □□□ □ □ □ □□□ □□□□ □□□□.	**family inet** **family inet6**	—
tcp-initial	□□ □□ □□ □□ **tcp-flags "(!ack & syn)"**□ □□□□, TCP □□□ □ □□ □□□ □□□□□ □□□ TCP □□□ □□□□ □□□□.	**family inet** **family inet6**	—

□□ □□ □□ □□ □□ □□□

□ 67 □□□ 930 □ □□□ □□□ □□ □□ □□□ □□□ □ *□/□* □□ □□ □□□ □ □□ □□ □□□□ □□□□□. □□□□ □□ □□□ □□ □□□ □□□□ □□□□□. □□□ □□ □□□□, □□ □□□ □□□□ □□□□□ □□□□ □□□□□.

□ 67: □□ □□ □□ □□□

□□ □□ □□	□□ □□ □□ □□□	□□
1	(*complex-match-condition*)	□□□ - □□ □□ □□□□ □□□□ □□ □□□ □□ □□□ □□□□□.
2	! *match-condition*	□□ - □□ □□□ □□□□ □□□ □□□□□.
3	*match-condition-1* & *match-condition-2* □□ *match-condition-1* + *match-condition-2*	□□□ AND - □ □□ □□□ □□ □□□ □□□ □□□□□.

표 67: □□ □□ □□ □□□ *(Continued)*

□□ □□ □□	□□ □□ □□ □□□	□□
4	*match-condition-1* **|** *match-condition-2* □□ *match-condition-1* **,** *match-condition-2*	□□□ OR - □□ □□ □ □□□ □□□ □□□ □□□□□.

□□ □□ □□ □ □□ □□□ □□□ □□

□ **tcp-flags** □□ □□ □□□ **fragment-flags** □□, □□ □□□ □□ □□□ □□□□□□□ □□□ □□ □□□ □□ □□ □□□ □□□ □ □□□□.

- □□ □□□ □□□□ □□ □ - 1□□□ □□□ □□ □□ □□□□ □□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□□ □□ 10□□ □, 2□□ □ □□ 16□□ □□ □□□ □ □□□□. □□ □□ □□□□□ □□□ **b**□ □□ □□□ □□□□□. 16□□ □□ □□□□□ □□□ **0x**□ □□□ □□□□□.

  □□ □□□□ TCP □□□ □□□ □□□ □□□ □□ **RST** □□□ □□□□□.

  ```
  [edit firewall family inet filter filter_tcp_rst_number term term1 from]
  user@host# set tcp-flags 0x04
  ```

- □□ □□□ □□□□ □□□ □□ - □□□□□ □□□□(" ")□ □□ □□□ □□□ □□□□ □□ □□ □□ □□ □□□ □□□□□.

  □□ □□□□ TCP □□□ □□□ □□□ □□□ □□ **RST** □□□ □□□□□.

  ```
  [edit firewall family inet filter filter_tcp_rst_alias term term1 from]
  user@host# set tcp-flags “rst”
  ```

□□ □□ □□ □ □□ □□□ □□□ □□ □□

□□ □□□ □□ □□ □□□ □□□□□□ □□□ □□ □□□ □□ □□ □□□ □□□ □ □□□□.

- □□ □□ □□□ □□□□ □□ □□ □ - □□ □□□ □ □ □□□ □□ □□□ □□ □□ □□ □□□□ □ □□ □□ □□□ □□ AND□ □□□□□.

  □□ □□□ □ □□ □□□ □□□□□. □□ **0x01** □□ **0x02** □ □□□□ □□ □□ □□□ □□□□□.

  ```
  [edit firewall family inet filter reset_or_not_initial_packet term term5 from]
  user@host# set tcp-flags “!0x3”
  user@host# set tcp-flags “!(0x01 & 0x02)”
  ```

- ?? ?? ?? ??? ???? ??? ?? - ??? ??? ???? ? ?? ?? ?? ?? ??? ??? ? ????. ??? ?? ??? ?? ???? ?????.

  ?? ?? **tcp-established** ?? ? ?? **“(ack | rst)”**? ??? ??? ? ?? ??? ?? TCP ???? ??? ????? ?????.

```
[edit firewall family inet filter reset_or_not_initial_packet term term6 from]
user@host# set tcp-established
```

?? ?? ?? ?? ?? ??

?? ??? ??????? ? ?? ???? ????.

?? ???? TCP ??? ??? ??? **RST** ???? ?? ?? ??? ?????.

```
[edit firewall family inet filter filter_tcp_rst term term1 from]
user@host# set tcp-flags “!rst”
```

? ?? ?? ?? ?? OR? ?? ??

(| ?? **,)**? ???? ?? ??? ??? ? ?? ?? ? ? ??? ???? ?? ??? ????? ??? ? ????.

?? ????? ??? TCP ??? ?? ??? */?/?* ?? ??? ?????.

```
[edit firewall family inet filter not_initial_packet term term3 from]
user@host# set tcp-flags "!syn | ack"
```

TCP ????, SYN ???? ??? ?? ????? ???? ?? ??, ACK ???? ?? ?? ? ??? ?? ??? ???? ????. TCP ??? ?? ??? ?? ????? SYN ???? ???? ???? ACK ???? ???? ????.

? ?? ?? ?? ?? AND? ?? ??

(& ?? **+)**? ???? ?? ??? ??? ? ?? ?? ? ??? ???? ?? ??? ????? ??? ? ????.

?? ????? ??? TCP ??? ?? ??? ?? ??? ?????.

```
[edit firewall family inet filter initial_packet term term2 from]
user@host# set tcp-flags “syn & !ack”
```

TCP ????, SYN ???? ??? ?? ????? ???? ?? ??, ACK ???? ?? ?? ? ??? ?? ??? ???? ????. TCP ??? ?? ??? ???? SYN ???? ???? ACK ???? ???? ????.

?? ?? ?? ?? ???

? ????? ?? ?? ??? ?? ??? ?? ?? ????? ????? ?? ?????? ??? ? ?????.

?? ?????? ??? TCP ??????? ??? TCP ??? ?? ??? ?? ?? ??? ??????.

```
[edit firewall family inet filter reset_or_not_initial_packet term term4 from]
user@host# set tcp-flags “!(syn & !ack) | rst”
```

TCP ????, SYN ????? ??? ?? ?????? ????? ?? ??, ACK ????? ?? ?? ? ??? ?? ??? ????? ?????. TCP ????? ?? ?? ? //?????? SYN ????? ????? ?? ACK ??? ??????.

?? ??

??? ?? ?? ?? | 763

?? ?? ??? ??? ????? ? ??? ?? ?? ?? | 927

?? ??? ????? ? ??? ?? ?? ?? | 933

?? ????? ???? ???? ?? ?? ?? | 942

?? ??? ????? ? ??? ?? ?? ??

in this section

- ?? ??? ????? ??? ?? ?? ??? ?? '0/0 ??' ??? ?? ??? ?? | 934
- ?? ??? ??? ??? ?? ????? ?????? | 934
- ?? ??? ??? ? ?? | 935
- IP ?? ??? ?? ?? ?? | 939
- ?? ??? ????? ?? ????? ?? | 940
- ?? ??? ??? ??? ?????? | 941

??? ?? ?? ??? ?? ?? ?? ?? ??(IPv4 ?? ? ?? ??, IPv6 ?? ? ?? ?? ?? ??? ??? ??(MAC) ?? ? ?? ??)? ????? //?//?? ??? ??? ? ?????.

?? ??? ???? ??? ?? ?? ??? ?? '0/0 ??' ??? ?? ??? ??

?? ?? ?? ??? ??? ???? ?? ?? ??? ?? ?? ??? ?? 0.0.0.0/0 except (IPv4 ?? VPLS ???? ??) ?? 0:0:0:0:0:0:0:0/0 except (IPv6 ???? ??)? ?? ??? ??? ??????. ? ??, ??? ?? ??? ??? ?? ?? ?? ???? ???? ?? ??? ?? ??? ?????? ????.

?? ??? ??? ??? ?? ???? ??????

??? ?? ??? ?? ??? ?? ?? ?? ?? ??? ?????? ?? ?? ??? ??? ? ????.

IPv4 ??? ??? ???

IPv4 ??? ?? ??? ?? ?? ??? ??? ?? ??? ? ????. ? ?? ?? ?? ??? ????.

```
[edit firewall family inet filter filter_on_dst_addr term term3 from]
user@host# set address 10.0.0.10/255.0.0.255
```

??? ???

?? ???? ?????? /*prefix-length* ???*prefix*? ??????. ?? ??? ?? ??? ??? 10.0.0.0/8? ???? ??? ??????.

```
[edit firewall family inet filter filter_on_dst_addr term term1 from]
user@host# set destination-address 10.0.0.0/8
```

IPv4 ??? ?? ??? ??

IPv4 ??? ???? /*prefix-length* ??? ??? ??? ?????? ? ?????? /32. ?? ?????? ?? ??? ?? ?? ???.

```
[edit firewall family inet filter filter_on_dst_addr term term2 from]
user@host# set destination-address 10
user@host# show
destination-address {
    10.0.0.0/32;
}
```

IPv6 □□□ □□ □□□ □□

IPv6 □□□ □□□□ */prefix-length* □□□ □□□ □□□ □□□□□ □ □□□□□ **/128**. □□ □□□□□ □□ □□□ □□ □□ □□□.

```
[edit firewall family inet6 filter filter_on_dst_addr term term1 from]
user@host# set destination-address ::10
user@host# show
destination-address {
    ::10/128;
}
```

MAC □□□ □□ □□□ □□

VPLS, □□□ 2 CCC □□ □□□ 2 □□□ □□□ □□□ □□□ □□(MAC) □□□ □□□□ */prefix-length* □□□ □□□ □□□ □□□□□ □ **/48**□ □□□□. □□ □□□□□ □□ □□□ □□ □□ □□□.

```
[edit firewall family vpls filter filter_on_dst_mac_addr term term1 from]
user@host# set destination-mac-address 01:00:0c:cc:cc:cd
user@host# show
destination-address {
    01:00:0c:cc:cc:cd/48;
}
```

□□ □□□ □□□ □ □□

□□ □□ □□ □□□ □□, □□□□ **except** □□□□ □□□ □□ □□ □□□□ □□□□ □□ □□ □□□ □□ □□□ □□□□ □□□ □ □□□□.

IPv4 □□ IPv6 □□□□ IP □□ □□

□□ IPv4 □ IPv6 □□ □□□ □□, □□□□ **except** □□□□ □□□ IP □□ □□ □□□□ □□□□ □□ IP □□ □□□ □□ □□□ □□□□ □□□ □ □□□ □.

- **address** *address* **except**- □□ IP □□ □□ □□ IP □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.
- **source-address** *address* **except**- □□ IP □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.
- **destination-address** *address* **except**- □□ IP □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.

□□ □□□□ □ □□□ □□□ □□□□ □□□□ **172.0.0.0/8** □□□ □□ IPv4 □□ □□□ □□ □□□ **172.16.0.0/16**□□□□□. □□ □□ □□□ □□ □□□ □ □□□ □□□□ □□□□.

```
[edit firewall family inet filter filter_on_dst_addr term term1 from]
user@host# set destination-address 172.16.0.0/16 except
user@host# set destination-address 172.0.0.0/8
user@host# show
destination-address {
    172.16.0.0/16 except;
    172.0.0.0/8;
}
```

□□ □□□□ □□□ **10.1.1.0/24**□ □□□ □□ □□ IPv4 □□ □□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter_on_dst_addr term term24 from]
user@host# set destination-address 0.0.0.0/0
user@host# set destination-address 10.1.1.0/24 except
user@host# show
destination-address {
    0.0.0.0/0;
    10.1.1.0/24 except;
}
```

VPLS □□ □□□ 2 □□□ □□□□□ IP □□ □□

MX □□□ □□□□□□ □□ VPLS □ □□□ 2 □□□ □□ □□□ □□, □□□□ **except** □□□□ □□□ IP □□ □□ □□□□ □□□□ □□ IP □□ □□□ □ □ □□□ □□□□□ □□□ □ □□□□.

- **ip-address *address* except**- □□ IP □□ □□ □□ IP □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.
- **source-ip-address *address* except**- □□ IP □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.
- **destination-ip-address *address* except**- □□ IP □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.

MX □□□ □□□□□ VPLS □□□□ □□□□□ □□ □□□ □□ IP □□□ □ □□ □□□ □□□ □□ IP □□□ □□□□ **5172.16.5.0/8**□□ □□□ □□□ □□.**55.0.1.0/255.0.255.0**

```
[edit]
firewall {
    family vpls {
        filter fvpls {
```

```
            term 1 {
                from {
                    ip-address {
                        55.0.0.0/8;
                        55.0.1.0/255.0.255.0 except;
                    }
                }
                then {
                    count from-55/8;
                    discard;
                }
            }
        }
    }
}
```

VPLS □□ □□□ 2 □□□ □□□□□ MAC □□ □□

□□ VPLS □□ □□□ 2 □□□ □□□ □□ □□□ □□, □□□□ **except** □□□□ □□□ MAC □□ □□ □□□□ □□□□ □□ MAC □□ □□□ □□ □□ □ □□□□□ □□□ □ □□□□.

- **source-mac-address** ***address*** **except**- □□ MAC □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.
- **destination-mac-address** ***address*** **except**- □□ MAC □□□ □□□ □□ □□ □□□□ □□□□ □□□ □□□ □□□□□.

□□ □□□ □□□□□ '0/0' □□□ □□ □□□ □□□ □□□□□.

□□ □□□ □□ *□/□* □□ □□(□□□□ **except** □□□□ □□ □□ □□)□□ □□□□□ *□/□ □/□/□* □□ □□ □□□ □□ □□□ □□ □□ □□□ □□□□ □□□□ □□, □□□ □□□ □ □□ □□ □□□□ □□ □□□ □□ □□ □□□ □□□□□. □□-□□ □□ □□□ □□□ □□ □□□ □□□ □□□ □□ □□□ □□□□□ □□□□□ □□□ □□ □□□ □□□ □□□□□ □□ **0/0** □ □□□ □□□□□.

IPv4 □□□□ □□ □□ □□□ □□ □□□ □□, **from-trusted-addresses** □ □□□ □□□□ □□□□ □□□□ □□□ **INTRUDERS-COUNTshow firewall** *□/□ □/□ □/□* □□□□ □□□□ □□□□□.

```
[edit]
user@host# show policy-options
prefix-list TRUSTED-ADDRESSES {
    10.2.1.0/24;
    192.168.122.0/24;
}
```

```
[edit firewall family inet filter protect-RE]
user@host# show
term from-trusted-addresses {
    from {
        source-prefix-list {
            TRUSTED-ADDRESSES except;
        }
        protocol icmp;
    }
    then {
        count INTRUDERS-COUNT;
        discard;
    }
}
    term other-icmp {
        from {
            protocol icmp;
        }
        then {
            count VALID-COUNT;
            accept;
        }
    }
    term all {
        then accept;
    }
```

```
[edit]
user@host# run show firewall
Filter: protect-RE
Counters:
Name                                                Bytes              Packets
VALID-COUNT                                          2770                   70
Filter: __default_bpdu_filter__
```

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```
[edit firewall family inet filter protect-RE]
user@host# show term from-trusted-addresses
from {
```

```
        source-address {
           0.0.0.0/0;
    }
        source-prefix-list {
            TRUSTED-ADDRESSES except;
    }
    protocol icmp;
}
```

□□ □□□□ □□ □□□□ □□□□ □□ **0.0.0.0/0** □□, □□□ □□□□□ □□□□□ □□□□□, **from-trusted-addresses** INTRUDERS-COUNT □ □□□□ □□ □□ □□□□ □□□□ □□□□□□.**show firewall**

```
[edit]
user@host# run show firewall
Filter: protect-RE
Counters:
Name                                                Bytes              Packets
VALID-COUNT                                          2770                   70
INTRUDERS-COUNT                                       420                    5
Filter: __default_bpdu_filter__
```

IP □□ □□□□ □□ □□ □□

MX □□□□ □□□□□ IPv4 □ IPv6 □□□□□ VPLS □ □□□□ 2 □□□□ □□□□□ □□, □□ □□ □□□□ □□□□□ □□ □□ □□ □□□□ □□ □□ □□ □□ IP □□ □□□□ □□□□□ □ □□□□□.

IPv4 □□ IPv6 □□□□□ IP □□ □□ □□

IPv4 □□ IPv6 □□□□□ □□, □□ □□ □□□□ □□□□□ □□ □□ □□ IP □□ □□□□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□ □ □□□□□. □ **destination-address** □□ □□□□ □□ □□□□ □□□□ □□□□□ □□□□ □□ □□□□ **source-address** □□□□ □□ □□ □□□□ **address** □□□□□□. □□ IP □□ */□□* □□ IP □□□□ □□□□ □□ □□ □□□□□ */□□□□ /□□* □□□□□□.

□□ □□□□ □□ □□□□□ **exceptaddress** □□□□□ □□, □□□□ □□□□□ */□□* □□ IP □□□□ □□ IP □□□□ */□□* □□□□ □□ □□□□□ □□□□ □□□□□□.

□□ **destination-address** □□ □□□□ □□□□□ **source-address** □□□□ □□ □□□□□□ □□ □□□□ □□□□ **address** □□ □□□□□.

VPLS □□ □□□□ 2 □□□□ □□□□□ IP □□ □□ □□

MX □□□□ □□□□□ VPLS □□ □□□□ 2 □□□□ □□□□□ □□, □□ □□ □□□□ □□□□□ □□ □□ □□ IP □□ □□□□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □ □□□□□. □ **destination-ip-address** □□ □□□□ □□ □□□□ □□□□ □□□□□ □□□□ □□ □□□ **source-ip-address** □□□□ □□ □□ □□□□ **ip-address** □□□□□□. □□ IP □□ */□□* □□ IP □□□□ □□□□ □□ □□ □□□□□ */□□□□ /□□* □□□□□□.

□□ □□□□ □□ □□□□□ **exceptip-address** □□□□□ □□, □□□□ □□□□□ */?/?*□□ IP □□□□ □□ IP □□□□ */?/?*□□□□ □□ □□□□□ □□□□ □□□□□□.

□□ **destination-ip-address** □□ □□□□ □□□□□ **source-ip-address** □□□□ □□ □□□□□□ □□ □□□□ □□□□ **ip-address** □□ □□□□□.

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IPv4 □□□□□ □□□□□, IP □□ □□ □□ □□ □□□□ □□□□ □□□□□ □□□□□□ □□ □□ □□□□ □□□□□□□□. □□□□□ □□□□□ □□□□ □□□□□. □, □□ **destination-address** □□ □□ □□ **source-address** □□□□□□ □□ □□□□□□ □□□□ □□□□ □□□□□.

□□ □□□□□ □□ □□□□ □□□□ □□ □□□□□ **10.0.0.0/8** □□□□□ □□□□ **192.168.0.0/32** □□□□□□.

```
[edit firewall family inet filter filter_on_dst_addr term term5 from]
user@host# set destination-address 10.0.0.0/8
user@host# set destination-address 192.168.0.0/32
user@host# show
destination-address {
    destination-address 10.0.0.0/8;
    destination-address 192.168.0.0/32;
}
```

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```
[edit firewall family inet filter filter_on_src_addr term term1 from]
source-address {
    172.16.0.0/10;
    172.16.2.0/24 except;
    192.168.1.0;
    192.168.1.192/26 except;
    192.168.1.254;
    172.16.3.0/24; # ignored
    10.2.2.2 except; # ignored
}
```

□□ □□ □□□□□ **source-address** □ □□ □□□□ □□□□□□. □ **172.16.3.0/16** □□ □□□□ □□□□ □□ **172.16.0.0/10**□ □□□□ □□□□ □□□□ □□. □ **10.2.2.2 except** □□ □□□□ **0.0.0.0/0 except** □□ □□ □□□□□□ □□□□□□.

□□ □□ IP □□□ □ □□□ □□□ □□ □□□□□ □□□ □□□□□.

- Source IP address(□□ IP □□ **172.16.1.2**) - □ □□□ □□□□ **172.16.0.0/10** □□□□□ □□ □□□ **then** □□□□□.
- □□ IP □□ **172.16.2.2**- □ □□□ □□□□ □□□□□ **172.16.2.0/24** . □ □□□□ □□□□□(□, □□□ □□ **except**) □□□ *□□□* □ □□□ □□. □□□ □□ □□ □□ □□ □□□□□. □ □□ □□□ □□□ □□□ □□□□□.
- □□ IP □□ **10.1.2.3**- □ □□□ □□□ □□□ **source-address** □□□□ □□□□ □□□□. □□, □□ □□□□ □□□ **source-address** □□□ □□□ □□ □□ □□□ **0.0.0.0/0 except** □□□ □□□□, □□□□ □□□□□.

  □□□□ **172.16.3.0/24** □□□ **172.16.0.0/10**□□□ □□□ □□□□□. □ □ □□□ □□□□□.

  □□□□ **10.2.2.2 except** □□ □□ □□□ **source-address** □□□ □□□ □□□ □□ □□ □□□ **0.0.0.0/0 except** □□□□ □□□□ □□ □ □□□□□.

□□-□□: □□□ □□ □□□ □□ □□□ □□ **from address** *address* □□ □□ □□□ □□□ □□□ □□ □□ □□□ □□□ **from source-address** *address* □□, □□□ □□ □□□ □□□□ □□ □□□ □□□ □□ □□□ □ □□□□. □ □□, □□ □□□ □□ □□□□□ □ □ □□□ □□ □□□□□ □□□□□ □□ □□□ □□ □□□ □ □□□□.

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IPv4 □□ IPv6 □□ □□□ □□□ □□□□□ □□ □□□□□ **prefix-list** *prefix-list* .

```
prefix-list name {
    ip-addresses;
    apply-path path;
}
```

□□ □□ □□□□ □□□□ □□□ □ □□□□.

- **[edit policy-options]**
- **[edit logical-systems** *logical-system-name* **policy-options]**

□□□ □□□ □□□ □□□ IPv4 □□ IPv6 □□ □□□□ □□□□ □□□ □□ □□ □□□ □□□ □ □□ □□□ □ □□□□.

```
[edit firewall family family-name filter filter-name term term-name]
from {
```

```
    source-prefix-list {
        prefix-lists;
    }
    destination-prefix-list {
        prefix-lists;
    }
}
```


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in this section

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- SCU □□ DCU □□□ □□□ □□ □□□□□□ □□□□ □□ □□ | 943

IPv4 □ IPv6 □□□□ □□□□ □□□ □□ */□/□/* □/□□ □□□□ □□ □□□ □□ □□ □□□□ □□ □□ □□□ □□□□ □ □□□□.

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SCU(Source-class usage)□ □□□□ □□ □□□□□ □□□□ □□□ □□ □□□□□ □ □□□□. □ □□□ □□□□ □□□□ □□□□ □□□□ □□□ □□ □□ □□ □□□ □□□ □ □□□□.

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DCU(Destination-Class Usage)? ????? ??? ?????? ? ????? ????? ????? ??? ?? ????? ????? ????? ?? ??? ? ???? ?.

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> Junos OS ??? ??, ??? ?? ? ??? ??? ??? ???
> ?? ?? ??? ??? ????? ? ??? ?? ?? ?? | **927**
> ?? ?? ?? ??? ??? ?? ?? ?? | **928**
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- MPLS ???? IP ?? ??? | 944
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- ?? ?? | 946

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□□□ □□ □□□□ [edit firewall family mpls filter *filter-name*term *term-name* then] □□□□□ □□ □□□ counter, accept, □□ discard □□ □□ □□□□ □□ □□□ □□□□□.

- port-mirror
- port-mirror-instance

Port Mirroring

□ □□□ □□□□□□ □□ □□□□ port-mirror □□□□□ □□□□□, □□ □□ □□ □□ □□(PEE) □ □□ □□□□□□ □□□□□.

MPLS □□□ □□□ □□, port-mirror □□□ □□ □□□□ □□ □□□ □□□□□□.

Port Mirroring Instance

□ port-mirror-instance □□□ □□ □□ □□□□ □□ □□ □□□ □□ □□□ □□□ □□ □□ □□ □□□ □ □□ □□□ □□ □□□ □□ □□ □□ □□□ □ □□□□□ □□□ □□□ □ □□□□.

□□ □□□□ □□ [edit forwarding-options port-mirror] □□□□ instance *port-mirror-instance-name* FPC(Flexible PIC Concentrator)□ 2□□ □□ □□□ □□□□□ □□□ □ □□□□. □□ □□ □□□□ □□□□□ □□ □□ □□ □□□ □□□□□ FPC, PIC □□ (FEB(Forwarding Engine Board))□ □□□ □ □□□□.

MPLS □□□ □□□ □□, port-mirror-instance □□ □□□ □□□□□ □□□□ □□□ □□□□□□.

□: □ port-mirror-instance □□ □□□ port-mirror □□ □□□ □□ □□□ □□□ □□□□□ □□ □□□□□□ □□□ MPLS(□□□ 3)□ □□ □□□ 2 □□□□□ □□□□□□ □□□.

□□ □□

IP □□ □□□ □□

```
[edit firewall family mpls filter mpls-filter]
term ipv4-term {
    from {
        ip-version {
            ipv4 {
                source-address {
                    10.10.10.10/24;
                }
                destination-address {
                    20.20.20.20/24;
                }
                protocol tcp {
                    source-port 100;
                    destination-port 200;
                }
                soure-prefix-list ipv4-source-users;
                destination-prefix-list ipv4-destination-users;
            }
        }
        exp 1;
        }
        then port-mirror;
        then accept;
    then count;
}
term ipv6-term {
    from {
        ip-version {
            ipv6 {
                source-address {
                    2000::1/128;
                }
```

```
                destination-address {
                    3000::1/128;
                }
                protocol tcp {
                    source-port 100;
                    destination-port 200;
                }
                source-prefix-list ipv6-source-users;
                destination-prefix-list ipv6-destination-users;
            }
        }
        exp 1;
    }
    then port-mirror-instance port-mirror-instance1;
    then accept;
    then count;
}
```

```
[edit policy-options]
prefix-list ipv4-source-users {
    172.16.1.16/28;
    172.16.2.16/28;
}
prefix-list ipv6-source-users {
    2001::1/128;
    3001::1/128;
}
```

```
[edit interfaces]
xe-0/0/1 {
    unit 0 {
        family inet {
            address 100.100.100.1/30;
        }
        family mpls {
            filter {
                input mpls-filter;
            }
        }
```

```
    }
}
```

□□□ □□ □□□ □□

```
[edit forwarding-options]
port-mirroring {
    input {
        rate 2;
        run-length 4;
        maximum-packet-length 500;
    }
    family any {
        output {
            interface xe-2/0/2.0;
        }
    }
}
```

```
[edit forwarding-options]
port-mirroring {
    instance {
        port-mirror-instance1 {
            input {
                rate 3;
                run-length 5;
                maximum-packet-length 500;
            }
            family any {
                output {
                    interface xe-2/0/2.0;
                }
            }
        }
    }
}
```

□: □□ □□□□□□□ xe-2/0/2.0 □□□ MPLS□ □□ □□□ 2 □□□□ □□ □□□□□.

□ port-mirror-instance □□ □□□ port-mirror □□ □□□□ □□ □□□ □□□ □□□□□ □□ □□□□□□ □□□ MPLS(□□ □ 3)□ □□ □□□ 2 □□□□□ □□□□□□ □□□.

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```
[edit interfaces]
xe-2/0/2 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 0 {
        vlan-id 600;
    }
}
```

```
[edit bridge-domains]
bd {
    domain-type bridge;
    interface xe-2/0/2.0;
}
```

MPLS □□□□ □□ □□□ □□ □□ □□

MPLS □□□()□ □□ □□ □□□□ □□□ □□□ □□□ □ □□□□.family mpls

- input-list *filter-names* □□□□ □□□□ □□□ □□ mpls □ □□ □ output-list *filter-names* □□ □□ □□□□□ □ □□ □□□ □□□□□ (fxp □□ em0), □□□ □□□□□(lo0), USB □□ □□□□□(umd)□ □□□ □□ □□□□□□□ □□□□□
- (QFX5100, QFX5110, QFX5200, QFX5210) □□□ □□□□□□ MPLS □□□ □□□□ □□ , exp, , □□□ 4 tcp □ udp □□ □ □ □□□ □□□label□ □ ttl=1□□□□. TTL□ □□, TTL=1 □□□□ □□□□□ □□ family mpls □ □□□□□ □□□□ ttl=1 □□□. □□□ □ □□ □□□ □□□ accept, discard, □□□ count. □□ □□□□□ □□□ □□□ □ □□□□.
- MPC □ MIC□ □□ MX □□□ □□□□ □□, □□ □□□□ □□ □□□ □□□□ MPLS □□□ □□□ IPv4 □ IPv6 □□ □□□ □□□□ MPLS □□□□ □□□□ □ □□□□□ □□□ □□□□, □□□□ □□□□□ MPLS □□□□ □□□ □□ □□□□ □□□□ □ □□□□(Junos OS □□□ 18.4R1 □□ □□). IP □□ □□□□ □□, MPLS □□ □□ from □□□□ □□□□ □□ □□ □□□ □□□ □ □□□, □□ □□□□ □□□□ □□ □□ □□ then□□□ □ □□□□ □□ □□(□: port-mirror □ port-mirror-instance)□ □□□ □ □□□□.

□ 68 □□□ 950□□ [edit firewall family mpls filter *filter-name* term *term-name* from]□□ □□□□ □□□ □ □□ *match-conditions*□(□) □□□□ □□□□.

□: PTX □□□ Express 4 ASIC □□ □□□□□□ □□ □□□□ MPLS □□□ □□□ □ □□□□. □□□ □□□□□□ □□ MPLS □□□ □□□ □□□□ □□□□.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□

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apply-groups	□□ □□□□ □□□□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□. □□ □□□□□ □□□□ □□□□ □□□. □ □□ □□□ □□ □□□□ □□ □□□ □□□□□ □□□□ □□□□.
apply-groups-except	□□ □□□□ □□□□ □□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□.
destination-port *number*	UDP □□ TCP □□ □□ □□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).
exp *number*	□□□ MPLS □□□ □□ □□□(EXP) □□ □□ □□ □□ □□ □□□□□. □ □□ *number*□□□ □□ 0□□ 7□□ □□□, 10□□ □□ 16□□ □□□□ □□ □□□ □□ □□□ □ □□□□. • □□ EXP □□ - □: **exp 3** • □□ EXP □□ - □: **exp 0,4** • EXP □□ □□(□: **exp [0-5]**). □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□. □: □ □□ □□□ PTX10001-36MR, PTX10003, PTX10004, PTX10008 □ PTX10016 □□□ □□□ □ □□ □□□□ □□□ □ □□ exp0 *number*□□□.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
`exp-except` *number*	MPLS □□□ EXP □□ □□ □□ □□ □□ □□□ □□□□□ □□□□. □ □□ *number*□□ □□ 7□□ □□□ □□ `0` □□□ □ □ □□□. □: □ □□ □□□ PTX10001-36MR, PTX10003, PTX10004, PTX10008 □ PTX10016 □□□ □□□ □ □□ □□□□ □□□ □ □□ `exp0-except`□□□.
`exp0` *number*	□□□ TOS MPLS □□□ □□ □□□(EXP) □□ □□ □□ □□ □□ □□□□□. □ □□ *number*□□□ □□ 0□□ 7□□ □□□, 10□□ □□ 16□□ □□□□ □□ □□□ □□ □□□ □ □□□□. • □□ EXP □□ - □: **exp0 3** • □□ EXP □□ - □: **exp0 0,4** • EXP □□ □□(□: **exp0 [0-5]**). □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.
`exp0-except` *number*	□□□ TOS MPLS □□□□ EXP □□ □□ □□ □□ □□ □□□ □□□□□ □□□□. □ □□ *number*□□□ □□ 0□□ 7□□ □□□, 10□□ □□ 16□□ □□□□ □□ □□□ □□ □□□ □ □□□□. • □□ EXP □□ - □: **exp0-except 3** • □□ EXP □□ - □: **exp0-except 0,4** • EXP □□ □□(□: **exp0-except [0-5]**). □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.
`exp1` *number*	TOS(top of stack) MPLS □□ □□ □□ MPLS □□□ □□□(EXP) □□ □□ □□ □□ □□ □□□□□. □ □□ *number*□□□ □□ 0□□ 7□□ □□□, 10□□ □□ 16□□ □□□□ □□ □□□ □□ □□□ □ □□□□. • □□ EXP □□ - □: **exp1 3** • □□ EXP □□ - □: **exp1 0,4** • EXP □□ □□(□: **exp1 [0-5]**). □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
exp1-except *number*	TOS MPLS □□ □□ □□ MPLS □□□ EXP □□ □□ □□ □□ □□ □□□ □□□□□ □□□□. □ □□ *number*□□□ □□ 0□□ 7□□ □□□, 10□□ □□ 16□□ □□□□ □□ □□□ □□ □□□ □ □□□□. • □□ EXP □□ - □: **exp1-except 3** • □□ EXP □□ - □: **exp1-except 0,4** • EXP □□ □□(□: **exp1-except [0-5]**). □□□ □□ □□□ □□□□□□□ □□□ □□□□ □□□□ □□□□.
forwarding-class *class*	□□□ □□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □ □□□□. □: PTX10001-36MR□□□ PTX10003, PTX10004, PTX10008, PTX10016 □□□ exp0 □ □ exp1 □□□ □□□□ □□□ □□□□ □□□□.
forwarding-class-except *class*	□□□ □□□□□ □□□□□ □□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□.
interface *interface-name*	□□□ □□□ □□□□□□□□□. □□□ □□□ □□□□□□ □□□□ □□□ □□□□ □□ □□□ □□□ □ □□□□. □: □□□□ □□ □□□□□□ □□□□ □ □□ □□□ □□□ □□, □□□ □□□ □□□□ □□□□.
interface-set *interface-set-name*	□□□ □□□ □□□□□□ □□□ □□□□□ □□□ □□□□□□. □□□□□ □□□ □□□□□ □□ □□□□ □□ [edit firewall] □□□□□interface-set. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□. □□□ □□□ "□□□□□ □□□□ □□□ □□ □□□ □□" □□□ 1297□ □□□□□□.
ip-version *number*	□□ IP □□□ □□□□□□. □□ □□, MPLS □□□ □□□ IPv4 □□□ □□□□□□ □□□ □□□ ipv4□ □□□□□□. □□ ip-version *number* □□□ □□ □ □□ □□□ □□□ □□□□ □□□ □□□ □□□□ □ □□□□. □ □ □□□□□□ □ 70 □□ □ 958□ 71 □□□ 959.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
`label` *number*	□□□ MPLS □□□ □□ MPLS □□□ □ □□ □□□ □ □□. □ □□ *number*□□□ □□ 0□□ 1048575 □□□ □□ □□□ □□ 10□□ □□ 16□□ □□□□ □□□ □ □□□□. • □□ □□□ - □: **label 3** • □□ □□□ - □: **label 0,4** • □□□ □□(□: **label [0-5]**. □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□. □: □ □□□ PTX10001-36MR, PTX10003, PTX10004, PTX10008 □ PTX10016 □□□□ □ □□ □□□□ □□□ □ □□ `label0`□□□.
`label0` *number*	□□□ TOS MPLS □□□ □□ MPLS □□□ □ □□ □□□ □ □□. □ □□ *number*□□□ □□ 0□□ 1048575 □□□ □□ □□□ □□ 10□□ □□ 16□□ □□□□ □□□ □ □□□□. • □□ □□□ - □: **label0 3** • □□ □□□ - □: **label0 0,4** • □□□ □□(□: **label0 [0-5]**. □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.
`label0-except` *number*	□□□ TOS MPLS □□□ □□ MPLS □□□ □ □□ □□□ □ □□□ □□□□□ □□□□. □ □□ *number*□□□ □□ 0□□ 1048575 □□□ □□ □□□ □□ 10□□ □□ 16□□ □□□□ □□□ □ □□□□. • □□ □□□ - □: **label0-except 3** • □□ □□□ - □: **label0-except 0,4** • □□□ □□(□: **label0-except [0-5]**. □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.
`label1` *number*	TOS MPLS □□ □□ □□ MPLS □□□ MPLS □□ □□□□ □□ MPLS □□□ □ □□ □□□ □ □□□ □□□□□□. □ □□ *number*□□□ □□ 0□□ 1048575 □□□ □□ □□□ □□ 10□□ □□ 16□□ □□□□ □□□ □ □□□□. • □□ □□□ - □: **label1 3** • □□ □□□ - □: **label1 0,4** • □□□ □□(□: **label1 [0-5]**. □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□ *(Continued)*

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label1-except *number*	TOS MPLS □□ □□ □□ MPLS □□□ MPLS □□ □□□□ □□ MPLS □□□ □ □□ □□□ □ □□□ □□□□□ □□□ □. □ □□ *number*□□□ □□ 0□□ 1048575 □□□ □□ □□□ □□ 10□□ □□ 16□□ □□□□ □□□ □ □□□□. • □□ □□□ - □: **label1-except 3** • □□ □□□ - □: **label1-except 0,4** • □□□ □□(□: **label1-except [0-5]**. □□□ □□ □□□ □□□□□□ □□□ □□□□ □□□□ □□□□.

label *number* top | bottom | offset*offset-value*	□□ MPLS □□□ □□ □□□, □□ □□□ □□ □□□ □□□(□□□ □□□ □□ □□ □□□□)□ □□□□ □□□□□□.
	
	• top - □□ □□□ □□□□ □□ □□□□ □□□□□□.
	
	• bottom - □□ □□□ □□□□ □□ □□□□ □□□□□□.
	
	• offset *<offset-value>* - □□□ □□ □□ □□□ □□□□ MPLS □□ □□□ □□□□ □□□□□□□(□□□ *offset-value* = (0..15).
	
	  • label *number* top offset *offset-value* - MPLS □□ □□ □□□ 0□□ 15□□□ □□ □□□ □□ □ □□□ □□□□□. 0□ □□□ □□□ CLI □□ □□□ □□ □□ □□□ □ □□ □□□ □□□□□.
	
	  • label *number* bottom offset *offset-value* - MPLS □□ □□ □□□ 0□□ 15□□□ □□ □□□ □ □ □□□□ □□□□□. 0□ □□□ □□□ CLI □□ □□□ □□ □□ □□□ □ □□ □□□ □□□□□.
	
	  • label *number* offset *offset-value* - □□ □□ □□ □□□ □□ □□□□ label *number* □□□ □□ □□□ □□□ □□□□ □□ □□ □□□□ □□□□□. □, □□□ □□ □□□ [n = 0..15]□ □□□ □□ □□ □□□ [n = 0..15]□ □□□□□.
	
	• label *number* - □□ label *number* □□□ □□□□ □□□ □□ □□□ □ □ □□□□□ □□□□□(□□□ □□□ 0 □ □□ □□□ □□ □□□).
	
	  □:
	
	  • MPLS □□ □□□□ □□□□ □□ □□□□ □□ □□□ □□□ □□□ □□□□ □□ □ □□□□.
	
	  • □□□ □□□ □□ □□□ □□□ □□, □□□□ MPLS □□ □□□ □□□□ □□□ □□ □□ □ □□□□□ □□□□□.
	
	  • □□□ □ □□ □□□ □□ □□□ □□, □□□□ MPLS □□ □□□ □□□□ □□□ □□□□ □□□□ □□ □□ □□□ □ □□□□.
	
	  □: □□ □□ □□□ Junos □□□ 22.3R1□ □□□□ □□□□.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

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loss-priority *level*	□□ □□ □□□□(PLP) □□□ □□□□□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□□□ □□; □□□ CFEB(CFEB-E)□ □□ M7i □ M10i □□□; MX □□□ □□□□ EX □ □□ □□□□ □□□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□ □ T □□□ □□□□ EX □□□ □□□□ IP □□□□ □□, □□ □□□ □□ [edit class-of-service] □□ tri-color □□ □□□ 4□ □□ □ □□□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. tri-color □□ □□ □□□ *□□ □□ □□□ □□ □ □□*□ □□□□□□. □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□ □ □□□ □□ □□□ □□□ *□□□ □□□□ □□ □□□□ □□□□ □□□□ □□ □□□□□*□□□□□□. □: PTX10001-36MR□□□ □□ □□□□□ □□ □□ PTX10003, PTX10004, PTX10008, PTX10016 □□□ exp0 □□ exp1 □□□ □□□□□.
loss-priority-except *level*	PLP □□□ □□□□□ □□□□. □□□ □□□ loss-priority □□ □□□ □□□□□□. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.
source-port *number*	TCP □□ UDP □□ □□ □□□□ □□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□. IPv4 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□.
ttl0 *number*	□□□ TOS MPLS □□□ □□ TTL □□ □□ □□ □□□ □□□□□□. TTL(Time To Live)□ MPLS □□□□ 8□□ □□□, □□□ □□□ □□ □□□□□□ □□ □□□ □□□□□. □ □□ *number*0□□ 255 □□□ □□ □□□ □ □□□□.
ttl0-except *number*	□□□ TOS MPLS □□□ □□ TTL □□ □□ □□ □□□ □□□□□ □□□□. TTL(Time To Live)□ MPLS □□□□ 8□□ □□□, □□□ □□□ □□ □□□□□□ □□ □□□ □□□□□. □ □□ *number*0□□ 255 □□□ □□ □□□ □ □□□□.

□ 68: MPLS □□□□ □□ □□□ □□ □□ □□ *(Continued)*

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ttl1 *number*	□□□ TOS MPLS □□ □□ □□ MPLS □□□ TTL □□ □□ □□ □□□ □□□□□□. TTL(Time To Live)□ MPLS □□□□ 8□□ □□□, □□□ □□□ □□ □□□□□□ □□ □□□ □□□□□. □ □□ *number*0□□ 255 □□□ □□ □□□ □ □□□□.
ttl1-except *number*	□□□ TOS MPLS □□ □□ □□ MPLS □□□ TTL □□ □□ □□ □□□ □□□□□ □□□□. TTL(Time To Live)□ MPLS □□□□ 8□□ □□□, □□□ □□□ □□ □□□□□□ □□ □□□ □□□□□. □ □□ *number*0□□ 255 □□□ □□ □□□ □ □□□□.

□: exp0, exp0-except, exp1, exp1-exceptlabel0ttl1ip-versionlabel1ttl1-exceptlabel0-exceptlabel1-exceptttl0ttl0-except, PTX10016 PTX10008 PTX10004 PTX10003 PTX10001,

□ 69 □□□ 956 □□□ □□ □□□□ MPLS □□□ □□□ □□ □□□ □ □□ [edit firewall family mpls filter *filter-name* term *term-name* then] □□□ □□□□□.

□ 69: MPLS □□□ □□□ □□ □□□□ □□

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accept	□□ □□
count *counter-name*	□ □□ □□ □□□ □□□□ □□ □□ □□□□□□. □: □ □□ □□□□ □□□ □□□ □□□□ □□ □□ □□□□□ □ □□□ □□□ □□□□ □ □□□ □□ □□□□ □ □□□ □□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□ □□
policer	Junos OS 13.2X51-D15□□□ MPLS □□□ □□□□ □□□□ 2□ □□□□ □□ □ □□□□.
three-color-policer	Junos OS 13.2X51-D15□□□ MPLS □□□ □□□□ □□□□ 3□ □□□□ □□ □ □□□□.

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□□□ □□ □□ □□ | 763

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MPLS □□ □□□ IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□

in this section

- MPLS □□□□□ IPv4 □□ IPv6 □□ □□ □□ □□ □□ □□□ □□ | 957
- MPLS □□□□ □□ IP □□ □□ □□ | 958
- MPLS □□□□ □□ IP □□ □□ □□ | 958
- MPLS □□□□ □□ □□□□□ □□ □□ | 959

MPLS □□□□□ IPv4 □□ IPv6 □□ □□ □□ □□ □□ □□□ □□

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MPLS □□□ □□□ IPv4 □□□ □□□□ □□ □□□ □□□ T320, T640, T1600, TX Matrix □ TX Matrix Plus □□□ □ □□□□ FPC(Flexible PIC Concentrator)□ □□□□□□□ □□□□ □□□□□□. □□□ MPLS □□□ □□□ IPv6 □□□ □□□□ □□ □□□ □□□ T4000 □□ □□□□ Type 5 FPC □□□□□□□ □□□□ □□□□□□. □□□ □□ □□□ □□□ □□□□□□(), □□□ □□ □□□ □□ □□□□□□(lo0fxp0 □□ em0) □□ USB □□ □□□□□□(umd)□□ □□□ □□□□ □□□□□.

MPLS □□□□□ □□□ □□□ 4 □□□ □□ □□ □□ □□ □□□ □□□□ □□□ □□ □□□ □□□□□ □□ □□□ □□□□ ip-version ipv4 □□□ □□ IP □□□ □□□□ □□□ □□□□□□□ □□□□□□.

- IPv4 □□□ □□ □□ □□ □□ □□□□ MPLS □□□ □□□ IPv4 □□□ □□□□□□□ □□ □□□□ □□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* from ip-version ipv4] □□□□□□.
- □□□ 4 □□□ □□ □□ □□ □□ □□□□ MPLS □□□ □□□ IPv4 □□□ □□□□□□□ □□ □□□□ □□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* from ip-version ipv4 protocol (udp | tcp)] □□□□□□.

MPLS □□□□□ □□□ IPv6 □□□ □□ □□ □□ □□ □□□ □□□□ □□□ □□ □□□ □□□□□ □□ □□□ □□□□ ip-version ipv6 □□□ □□ IP □□□ □□□□ □□□ □□□□□□□ □□□□□□.

- IPv6 □□□ □□ □□ □□ □□ □□□□ MPLS □□□ □□□ IPv6 □□□ □□□□□□ □□ □□□□ □□ □□□ □□□□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* from ip-version ipv6].
- □□□ 4 □□□ □□ □□ □□ □□ □□□□ MPLS □□□ □□□ IPv6 □□□ □□□□□□ □□ □□□□ □□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* from ip-version ipv6 protocol (udp | tcp)] □□□□□.

MPLS □□□□ □□ IP □□ □□ □□

□ 70 □□□ 958 □(□) □□ □□□□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* from ip-version *ip-version*] □ □□ IP □□□ □□ □□□ □□□□□.

□ 70: MPLS □□□□ □□ IP □□□ □□□ □□ □□ □□

□□ □□	□□
destination-address *address*	□□□ □□□ □□ □□□ □□□ □□□□□□.
destination-address *address* except	□□□ □□□ □□ □□□ □□□ □□□□□ □□□□.
protocol *number*	IP □□□□ □□ □□□ □□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstopts (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), ospf (89), pim (103), rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112).
source-address *address*	□□□ □□□□ □□ □□□ □□□ □□□□□□.
source-address *address* except	□□□ □□□□ □□ □□□ □□□ □□□□□ □□□□.

MPLS □□□□ □□ IP □□ □□ □□

□ 71 □□□ 959□(□) □□ □□□□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* from ip-version *ip-version* protocol (udp | tcp)] □ □□ □□ IP □□□ *match-conditions* □□□□□.

□ 71: MPLS □□□□ □□ IP □□□ □□□ □□ □□ □□

□□ □□	□□
destination-port *number*	UDP □□ TCP □□ □□ □□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).
destination-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□ □ □□, destination-port □□ □□□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
source-port *number*	TCP □□ UDP □□ □□ □□□□ □□□□□. □□ □□ □□ destination-port □□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
source-port-except *number*	TCP □□ UDP □□ □□ □□□ □□□□□ □□□□.

MPLS □□□□ □□ □□□□□ □□ □□

□ 72 □□□ 960 □□ □□ □□□□ □□□ □ □□ □□□□□□ *match-conditions* □□□ [edit firewall family mpls filter *filter-name* term *term-name*] □□ □□□□.

□ 72: MPLS □□□□ □□ □□□□□□ □□□ □□ □□ □□

□□ □□	□□
interface-group *interface-device name* | *unit-list*	□□□□□ □□□ □□□□□□. □□□ □□□ □□□□. • *interface-device name* - □□□□□ □□□ □□□□□. □□□ □□□ □□□□□. □□□□ □□□□□ □□□□ □□□ □ □□□□ **ge, ae, xe and et.** • *unit-list* - □□ □□□ □□□ □□□□□ □□ □□□□□. • **□□:** <0-16385> □□ <0-16385>-<0-16385> □□□ □□□□□□. □: unit-list[12 23-33 44]

□□ □□

- □□□ □□ □□ □□ | 763
- □□□ □□ □□ □□ | 828
- □□□ □□ □ □□ □□ | 817

VPLS □□□□ □□ □□□ □□ □□ □□

VPLS □□ □□□ from □□□□ □□□□ □□□ then □□□□ □□ □□□ □□□□ □□ □□□ □□□□□. from □□□□ □□ □□□ □□□□ □□□ □□□□□. □ □ □□□ □□□□ □□□ □□□□ □□□□. □□□ □□□ □□ □□□ □□□ □□ □□□ □□□□ □□□□□.

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□□ □□ □□ from □□ □ □□□ □□□ □ □□□□. □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□ □□ □□□ □□ □ □□□ □□ □□□□. □□□ □ □□□ □□□ □ □□□ □ □ □□□ □□□ □□□□ □□□ □□□□□.

□□ □□ □□□ from □□□ □ □□□□. □□□ □□□□ □□□ □□□□ □□□□ □□□. □□ □□, □ □□ forwarding-class □□□ □□ □□□ □□□ forwarding-class-except. □□□ □□ □□□ □□□□ □□ □□ from □□□□ □□ □□□ □□□□, □□□ □□ □□□ □□ □□ □□□□□. □ □□ □□□ □□ □ □□□ □□□□□.

VPLS(Virtual Private LAN Service) □□□(family vpls) □ 73 □□□ 961 □ □□ □□ □□□□ □□□ □□□ □□□ □ □□□□. □□ □□ □□□□ □□□ □ □□ □ *match-conditions* (□) □□□□ □□□□ [edit firewall family vpls filter *filter-name* term *term-name* from] .

□: VPLS □□□□ □□ □□ □□ □□□ □□ □□□ □□□ □□ □□□ □□□□□ □□□□ □□ □□□□. VPLS □□□□ □□ □□ □□ □ □□ MX □□□ 5G □□□□ □□□ □□□□□□ □□□□□.

VPLS □□□□ *PE □□□□* □□ □□□ *□□□□* □□□ □□□ □□□ □□□□ □□ □□□□□ □□□□ □ □□□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□

□□ □□	□□
destination-mac-address *address*	VPLS □□□ □□ □□□ □□□ □□(MAC) □□□ □□□□□□.
destination-port *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).
destination-port-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) TCP □□ UDP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□.
destination-prefix-list *name*	(ACX □□□ □□□, MX □□□ □□□, EX □□□ □□□□ □□) □□□ □□□□ □□ □□□□ □□□□□□. [edit policy-options prefix-list *prefix-list-name* □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□. □: VPLS □□□ □□□ IPv4 □□□ □□□□□. VPLS □□□ □□□ □□□ IPv6 □□□ □□□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
destination-prefix-list *name* except	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ □□□ □□ □□□□ □□□□□ □□□□. □□□ □□□ destination-prefix-list □□ □□□ □□□□□□.
dscp *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) DSCP(Differentiated Services Code Point)□ □□□□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. □□ □ □□□ □□ □□ □□□□ □□□ □ □□ □□□□ □□ □□□ □□□□ □□ □□□□□ □□□□□□. 0□□ 63□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □ □□□□ □□□□ b□(□) □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*□ RFC 3246□ □□□ □□ □□□□ □□□□ □. ef(46). • *AF(Assured Forwarding) PHB □□□* RFC 2597□ □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □ □□ □□ 4□□ □□□□ □□□□□. af11(10), af12 (12), af13 (14), af21(18), af22 (20), af23 (22), af31(26), af32 (28), af33 (30), af41 (34), af42 (36), af43 (38)
dscp-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) DSCP□□ □□□□□ □□□□. □□□ □□□ dscp □□ □□□ □□□□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□	
ether-type *values*	2-□□ IEEE 802.3 Length/EtherType □□□ □□□ □ □□ □ □□□ □□□□□□□. 0□□ 65535(0xFFFF) □□□ 10□□ □□ 16□□ □□ □□□ □ □□□□. 0□□ 1500(0x05DC) □□□ □□ □□□ □□ 1 □□□□ □□□ □□□□□. 1536(0x0600)□□ 65535□□□ □□ □□□ □□ 2 □□□□ EtherType(MAC □ □□□□ □□□□□ □□)□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(16□□ □□ □□□□ □□). aarp(0x80F3), appletalk (0x809B), arp (0x0806), ipv4 (0x0800), ipv6 (0x86DD), mpls-multicast (0x8848), mpls-unicast (0x8847), oam (0x8902), ppp (0x880B), pppoe-discovery (0x8863), pppoe-session (0x8864) □□ sna (0x80D5).	
ether-type-except *values*	2-□□ Length/EtherType □□□ □□□ □ □□ □ □□□ □□□□□ □□□□. *values* □□□ □□ □□□ □□□ ether-type □□ □□□ □□□□□□□.	
flexible-match-mask *value*	bit-length	Junos OS 14.2□□ □□□ □□ □□□□ □□□ □□□ □□ □ □□□□□. □□ □□□ □□□ □□□□ □□, □□□ □□□ □□□□ □□ (0..128)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-mask-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	mask-in-hex	□□□ □□ □□□□□ □□ □□□ □□
	match-start	□□ □□ □□□
	prefix	□□□ □ □□□/□□□

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	
flexible-match-range *value*	bit-length	□□ □□□ □□□ □□□□ □□(0..32)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-range-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	match-start	□□ □□ □□□
	range	□□□ □ □□
	range-except	□□□ □ □□□ □□□□□ □□□□
forwarding-class *class*	□□□ □□□□ □□□□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□.	
forwarding-class-except *class*	□□□ □□□□ □□□□□ □□□□. □□□ □□□ forwarding-class □□ □□□ □□□□□□.	

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
icmp-code *message-code*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip6-header-bad(0), unrecognized-next-header (1), unrecognized-option (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • destination-unreachable: address-unreachable(3), administratively-prohibited (1), no-route-to-destination (0), port-unreachable (4)
icmp-code-except *message-code*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □□□□□□.
icmp-code *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ ip-protocol icmp6 □□ □□□ ip-protocol icmp □□□□ □□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip6-header-bad(0), unrecognized-next-header (1), unrecognized-option (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • destination-unreachable: address-unreachable(3), administratively-prohibited (1), no-route-to-destination (0), port-unreachable (4)

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
icmp-code-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) ICMP □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □ □□□□□.
interface *interface-name*	□□□ □□□ □□□□□□□□. □□□ □□□ □□□□□□ □□□□ □□□ □□□□ □□ □□□ □□□ □ □□□□. □: □□□□ □□ □□□□□□ □□□□ □ □□ □□□ □□□ □□, □□□ □□□ □□□□ □□□□.
interface-group *group-number*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□□. □ □□ *group-number*□□ □ □□ □ □ □□□ 255□ 0 □□□ □□□□□. □□ □□□□□□ □□□□□ □□*group-number*□ □□□□□ [interfaces *interface-name* unit *number* family *family* filter group] □□ □□□□ *group-number*□(□) □□□□ □□□. □□□ □□□ □□□□□ □□ □□□□ □□□ □□ □□□ □□□ □□□□□□. □: □ □□ □□□ T4000 □□ 5 FPC□□□ □□□□ □□□□.
interface-group-except *group-name*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□ □□□□. □□□ □□□ interface-group □□ □□□ □□□□□□. □: □ □□ □□□ T4000 □□ 5 FPC□□□ □□□□ □□□□.
interface-set *interface-set-name*	□□□ □□□ □□□□□□ □□□ □□□□□ □□□ □□□□□□. □□□□□ □□□ □□□□□ [edit firewall]□□ □□□□ interface-set□□ □□□□□ □□□. □□□ □□□ □□□□□ □ □□□ □□□ □□ □□□ □□□ □□□□□□.
ip-address *address*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IPv4 □□□ □□ □□ □□□ □□□ 32□□ □□□□□. □ □□□ □□□ □□ □□ □□□ ether-type IPv4□ □□□ □□□ □□□□ □□□.
ip-destination-address *address*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ □□ □□ □□ □□□ 32□□ □□□□□. □ □□□ □□□ □□ □□ □□□ ether-type IPv4□ □□□ □□□ □□□□ □□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
ip-precedence *ip-precedence-field*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IP □□ □□ □□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□ □□(□□ □□ □□□□ □□). critical-ecp(0xa0), flash(0x60), flash-override(0x80), immediate(0x40), internet-control(0xc0), net-control(0xe0), priority(0x20) □□ routine(0x00).
ip-precedence-except *ip-precedence-field*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IP □□□□ □□□ □□□□□ □□□□.
ip-protocol *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IP □□□□ □□□□□.
ip-protocol-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IP □□□□ □□□ □□□□□ □□□□.
ip-source-address *address*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ □□□□ □□ □□□ IP □□□□□. □ □□□ □□□ □□ □□ □□□ ether-type IPv4□ □□□ □□□ □□□□□ □□□.
ipv6-source-prefix-list *named-list*	(MX □□□□ □□) □ IPv6 □□ □□□ □□□□□□ *named-list*.
ipv6-address *address*	(MX □□□ □ EX9200□ □□) IPv6 □□□ □□ □□ □□□ □□□□ 128□□ □□□□□. Junos OS 14.2□□ □□□ □□□ □□□ IPv6 □□ □□□ MX □□□ □ EX9200 □□□□□ □□□□□.
ipv6-destination-address *address*	(MX □□□ □ EX9200□ □□) □ □□□ □□ □□ □□ □□□ 128□□ □□□□□. □ □□□ □□□ □□ □□□ □□□ □□ □□ □ ether-type IPv6 □□□□ □□□.
ipv6-destination-prefix-list *named-list*	(MX □□□□ □□) □ IPv6 □□ □□□ □□□□□□ *named-list*.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
ipv6-next-header *protocol*	(MX □□□□ □□) IPv6 □□ □□ □□□□ □□□ □□□□□□. □□ □□□ □ □□ *protocol*□□□□ □□ □□□□□. • **ah**—IP □□ □□ □□ • **dstopts**—IPv6 □□ □□ • **egp**—□□ □□□□□ □□□□ • **esp**—IPSec □□□ □□ □□□□ • **fragment**—IPv6 □□□□□ □□ • **gre**—□□ □□□ □□□ • **hop-by-hop**—□□ IPv6 □ □□ • **icmp**—□□□ □□ □□□ □□□□ • **icmp6**—Internet Control Message Protocol □□ 6 • **igmp**—□□□ □□ □□ □□□□ • **ipip**—IP□ IP • **ipv6**—IP□ IPv6 • **no-next-header**—IPv6 □□ □□ □□ • **ospf-** □□ □□ □□ □□ • **pim**—□□□□ □□ □□□□□ • **routing**—IPv6 □□□ □□ • **rsvp**—□□□ □□ □□□□ • **sctp-** □□□ □□ □□ □□□□ • **tcp**—□□ □□ □□□□ • **udp**—□□□ □□□□□ □□□□

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
	• **vrrp**—□□ □□□ □□□ □□□□
`ipv6-next-header-except` *protocol*	(MX □□□□ □□) IPv6 □□ □□ □□□□ □□□ □□□□□ □□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
`ipv6-payload-protocol` *protocol*	(MX □□□□ □□) IPv6 □□□□ □□□□ □□□ □□□□□□□. □□ □□□ □ □□ *protocol*□□□□ □□ □□□□□. • **ah**—IP □□ □□ □□ • **dstopts**—IPv6 □□ □□ • **egp**—□□ □□□□□ □□□□ • **esp**—IPSec □□□ □□ □□□□ • **fragment**—IPv6 □□□□□ □□ • **gre**—□□ □□□ □□□ • **hop-by-hop**—□□ IPv6 □ □□ • **icmp**—□□□ □□ □□□ □□□□ • **icmp6**—Internet Control Message Protocol □□ 6 • **igmp**—□□□ □□ □□ □□□□ • **ipip**—IP□ IP • **ipv6**—IP□ IPv6 • **no-next-header**—IPv6 □□ □□ □□ • **ospf**- □□ □□ □□ □□ • **pim**—□□□□ □□ □□□□□ • **routing**—IPv6 □□□ □□ • **rsvp**—□□□ □□ □□□□ • **sctp**- □□□ □□ □□ □□□□ • **tcp**—□□ □□ □□□□ • **udp**—□□□ □□□□□ □□□□

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
	• **vrrp**—□□ □□□ □□□ □□□□
ipv6-payload-protocol-except *protocol*	(MX □□□□ □□) IPv6 □□□□ □□□□□ □□□□□ □□□□.
ipv6-prefix-list *named-list*	(MX □□□□ □□) □ IPv6 □□□ □□□□□□ *named-list*.
ipv6-source-address *address*	(MX □□□□ □□) □ □□□ □□ □□ □□ □□□ 128□□ □□□□□.
ipv6-traffic-class *number*	(MX □□□□ □□) DSCP(Differentiated Services Code Point)□□□. DiffServ □□□□□ IP □□□ □□ □ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. □□□ □□□ □□ □□(BA) □□□□ □□□ □ □□□□ □□□□ □□□□ □□ □□□□□ □□□□□□□. 0□□ 63□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □ □□□□ □□□□ b□(□) □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*□ RFC 3246□ □□□ □□ □□□□ □□□□ □. ef(46). • *AF(Assured Forwarding) PHB □□□* RFC 2597□ □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □ □□ □□ 4□□ □□□□ □□□□□. af11(10), af12 (12), af13 (14), af21(18), af22 (20), af23 (22), af31(26), af32 (28), af33 (30), af41 (34), af42 (36), af43 (38)
ipv6-traffic-class-except *number*	DSCP number□ □□□□□ □□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
learn-vlan-1p-priority *number*	(MX □□□ □□□, M320 □□□ □ EX □□□ □□□□ □□) □□□ VLAN □□(802.1Q VLAN □□□ □□ □□ □□ □□□□ □□□ □□ □□ 802.1Q VLAN □□□ □□ □□ □□ □□□□ □□ □□)□□ IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□□□. □□ □□ 7□□ □ □□ □□ □□ 0 □□□□□. □□ □□□ □□□□□ user-vlan-1p-priority . □: □ □□ □□□ MX □□□ □□□ □ M320 □□□□ □□ □□ □□□ □□□ □□□□□.
learn-vlan-1p-priority-except *number*	(MX □□□ □□□, M320 □□□ □ EX □□□ □□□□ □□) IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□□□ □ □□□. □□□ □□□ learn-vlan-1p-priority □□ □□□ □□□□□□□. □: □ □□ □□□ MX □□□ □□□ □ M320 □□□□ □□ □□ □□□ □□□ □□□□□.
learn-vlan-dei	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ VLAN ID DEI(Drop Eligability Indicator) □□□ □□□□ □□.
learn-vlan-dei-except	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ VLAN ID DEI □□□ □□□□□ □□□□.
learn-vlan-id *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) MAC □□□ □□□□ VLAN □□□□□□□.
learn-vlan-id-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) MAC □□□ □□□□ VLAN □□□□ □□□□□ □□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
loss-priority *level*	□□ □□ □□□□(PLP) □□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□, Enhanced CFEB(CFEB-E)□ □□ M7i □ M10i □□□ □□□ MX □□□ □□□□□ □□□□□. Enhanced II FPC(Flexible PIC Concentrators) □ EX □□□ □□□□ □□ M320, MX □□□ □ T □□ □ □□□□ IP □□□□ □□, □□ □□□ □□ [edit class-of-service] □□ tri-color □□ □□□ 4□ □□ □ □□□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. □□□□ tri-color □□ □□□ □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□□□ □□□□ □□□ □□ □□□ □□□ □ □□ □□□□ □□ □□□□ □□□□ □□□□ □□ □□□□□ □□□□□□.
loss-priority-except *level*	□□ □□ □□□□ □□□□ □□□□□ □□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□□ □□□ □□ □□□ □□ □□(BA) □□□□ □□□□ □□□□ □□□□ □□ □□ □□ □□□□□ □□□□□□.
port *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) TCP □□ UDP □□ □□ □□ □□□□□. □□□ □□□□ port □□ □□□ destination-port □□ source-port □□ □□□ □□ □□□ □□ □□□□.
port-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) TCP □□ UDP □□ □□ □□ □□□□ □□□□□ □□□□. □□□ □□□□ port □□ □□□ destination-port □□ source-port □□ □□□ □□ □□□ □□ □□□□.
prefix-list *name*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ □□□□ □□ □□ □□ □□□□ □□□□□□. [edit policy-options prefix-list *prefix-list-name* □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□. □: VPLS □□□ □□□ IPV4 □□□ □□□□□. VPLS □□□ □□□ □□□ IPV6 □□□ □□□□□.
prefix-list *name* except	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ □□□□ □□ □□ □□ □□□□ □□□□□ □□□□. □□□ □□□ destination-prefix-list □□ □□□ □□□□□□.

□ 73: VPLS □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
source-mac-address *address*	VPLS □□□ □□ MAC □□□□□.
source-port *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) TCP □□ UDP □□ □□ □□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□.
source-port-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) TCP □□ UDP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□.
source-prefix-list *name*	(ACX □□□ □□□, MX □□□ □□□, EX □□□ □□□□ □□) □□□ □□□ □□□□ □□ □□□□ □□□□□□. □□ □□□□ □ □□ [edit policy-options prefix-list *prefix-list-name*] □□□ □□ □□□ □□□□□. □: VPLS □□□ □□□ IPV4 □□□ □□□□□. VPLS □□□ □□□ □□□ IPV6 □□□ □□□□□.
source-prefix-list *name* except	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ □□□ □□□□ □□ □□□□ □□□□□ □□□□. □□□ □□□ source-prefix-list □□ □□□ □□□□□□.

표 73: VPLS 정책문 문 설명 문 문 문 *(Continued)*

문 문	문
tcp-flags *flags*	TCP 헤더 8비 TCP 헤더 필드의 문 헤더 헤더 6헤더 헤더헤더. 문 문 헤더 필드의 문 문 헤더 필드 16비 문 헤더 중 필드. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP 필드의, SYN 필드의 헤더 문 필드의 필드의 문 문, ACK 필드의 문 문 중 헤더 문 헤더 필드의 문 문. 문 문 문 필드의 필드의 문 문 필드의 문 문 중 필드. IPv6 필드의 문 중 문 헤더 필드의 문, 헤더 헤더 문 헤더 문 next-header tcp 문 TCP 필드의 필드의 필드의 필드의 문 필드의.
traffic-type *type-name*	(MX 헤더 헤더 중 EX 헤더 필드의 문) 헤더 헤더의. broadcast, multicast, unknown-unicast 문 known-unicast중(중) 헤더의.
traffic-type-except *type-name*	(MX 헤더 헤더 중 EX 헤더 필드의 문) 헤더 헤더 헤더의 필드의. broadcast, multicast, unknown-unicast 문 known-unicast중(중) 헤더의.
user-vlan-1p-priority *number*	(MX 헤더 헤더, M320 헤더 중 EX 헤더 필드의 문) 문 VLAN 문(802.1Q VLAN 헤더 문 문 문 중 헤더 문 문)중 IEEE 802.1p 헤더 문 문 문 헤더 헤더헤더. 문 문 7비 중 문 문 문 0 헤더의. 문 헤더 헤더의 learn-vlan-1p-priority . 중: 중 문 헤더 MX 헤더 헤더 중 M320 필드의 문 문 문 헤더 헤더 헤더의.

표 73: VPLS 구성문 계층 수준 요약 *(Continued)*

구성문 계층	요약
user-vlan-1p-priority-except *number*	(MX 시리즈 라우터, M320 router 및 EX 시리즈 이더넷 스위치) IEEE 802.1p 우선 순위 값 또는 값 범위를 제외합니다. 유효 범위는 user-vlan-1p-priority 문과 동일합니다. 참고: 이 문은 MX 시리즈 라우터 및 M320 라우터 또는 EX 시리즈 스위치에서 지원됩니다.
user-vlan-id *number*	(MX 시리즈 라우터 및 EX 시리즈 이더넷 스위치) 지정된 수 또는 범위 VLAN 식별자 구성합니다.
user-vlan-id-except *number*	(MX 시리즈 라우터 및 EX 시리즈 이더넷 스위치) 지정된 수 또는 범위 VLAN 식별자 제외합니다.
vlan-ether-type *value*	VPLS 인터 VLAN 유형 값 구성합니다.
vlan-ether-type-except *value*	VPLS 인터 VLAN 유형 값 또는 값 범위 제외합니다.

참고: 또한 flexible-match-mask 및 또는 flexible-match-range IPV6 필터 일치 조건 및 작업 문 4장 "계층, CCC, VPLS"의 또한 L2 회로 필터 일치 조건 작업. 또한 작업 문 3장 작업 IPV6 작업 필터 또한 작업.

참고: 또한 명령 traffic-type *unknown-unicast* 및 작업 또한 traffic-type *known-unicast* 필터 구성합니다.

릴리스 정보

이 문은 이 릴리스 이후 새로 추가되었습니다. Feature Explorer 를 사용하여 플랫폼 및 릴리스 지원을 확인하십시오.

release heading in release-history	desc heading in release-history
14.2	Junos OS 14.2에서 이 문이 새로 추가되었습니다.
14.2	Junos OS 14.2에서 이 명령이 IPv6 및 지원 MX 시리즈 및 EX9200 스위치를 지원합니다.

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??? ?? ? ?? ??

??? 2 CCC ???? ?? ??? ?? ?? ??

??? 2 CCC(Circuit Cross-Connect) ???(family ccc)? ?? ?? ????? ???? ???? ???? ? ?????.

??? 2 CCC ???? ??? ???? ??? ?? ?? ???? ??????.

- input-list *filter-names* ???? ???? ccc ???? ???? ?? ? output-list *filter-names* ???? ?? ?????? ? ?? ???? ????? ?(fxp ?? em0), ???? ??????(lo0), USB ?? ??????(umd)? ???? ?? ????????? ??????.
- MX ???? ???? ? EX ???? ??????? ???? 2 CCC ???? ???? ??(?? ????? ???? [edit firewall filter family ccc] ??? ??)? ?? ???? ???? ? ?????. MX ???? ???? ? EX ???? ?????? ?? ?? family ccc ???? ???? ???? ?? ????? ???? ? ?????.

? 74 ???? 977?? ?? [edit firewall family ccc filter *filter-name* term *term-name* from]???? ???? ? ?? *match-conditions*?(?) ????? ?????.

? 74: ??? 2 CCC ???? ?? ???? ?? ?? ??

?? ??	??
apply-groups	?? ????? ????? ??? ??????. ?? ???? ?? ?? ???? ? ?????. ?? ?????? ????? ????? ???. ? ?? ??? ?? ????? ?? ???? ?????? ????? ?????.
apply-groups-except	?? ????? ????? ?? ??? ??????. ?? ???? ?? ?? ???? ? ?????.

□ 74: □□□ 2 CCC □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□	
destination-mac-address *address*	(MX □□□ □□□ □ EX □□□ □□□□ □□) VPLS(Virtual Private LAN Service) □□□ □□ MAC(□□□ □ □□ □□) □□□ □□□□□□. □□□ 2 VPN(□□ □□□□ □□□□) □□□ □□□□□ I-□ DPC□ □□□ □□□□□□□ CCC □□□ □□ □□□ □□ □□□□ □□□ □ □ □□ □□□ □□ □□□ □□□□ □□□□□ □□□ 2 VPN □□□ □□□□□ □□□ □□□□ □□□. □□□ 2 □□□ □□ □□□□ □□□□ □□ □□ □□ □□□ □□□□□ □□□□□□ □□□. □□ □□□ □□□ □□□ 2 □□□ □□ □□□□□□ □□ □□ (VC) □□□□ □□□□ □□ □□□ 2 VPN □□□ □□□□□ □□ □□□□□ □□□□□□. □□□ 2 VPN□ □□ □□ □□ □□□ □□□□□ □□□□□□□ □□ □□ □□ □ □□□ □□ □□□□□ no-control-word . • [edit routing-instances *routing-instance-name* protocols l2vpn] • [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols l2vpn] □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□. □□□ □□□ *□□□ 2 VPN□ □□ □□ □□ □□□□□* □□□□□□.	
flexible-match-mask *value*	bit-length	□□ □□□ □□□ □□□□ □□, □□□ □□□ □□□□ □□ (0..128)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-mask-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	mask-in-hex	□□□ □□ □□□□□ □□ □□□ □□
	match-start	□□ □□ □□□
	prefix	□□□ □ □□□/□□□

□ 74: □□□ 2 CCC □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	
flexible-match-range *value*	bit-length	□□ □□□ □□□ □□□□ □□(0..32)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-range-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	match-start	□□ □□ □□□
	range	□□□ □ □□
	range-except	□□□ □ □□□ □□□□□ □□□□
forwarding-class *class*	□□□ □□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □ □□□□.	
forwarding-class-except *class*	□□□ □□□□□ □□□□□ □□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□.	
interface-group *group-number*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□□. □ □□ *group-number*□□ □ □□ □ □ □□□ 255□ 0 □□□ □□□□□. □□ □□□□□□ □□□□□ □□*group-number*□ □□□□□ [interfaces *interface-name* unit *number* family *family* filter group] □□ □□□□ *group-number*□(□) □□□□ □□□. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□. □□□ □□□ "□□□□□ □□ □□□□ □□□ □□ □□□ □□" □□□ 1296□ □□□□□□.		

□ 74: □□□ 2 CCC □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
interface-group-except *number*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□ □□□□. □□□ □□□ interface-group □□ □□□ □□□□□□. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□.
learn-vlan-1p-priority *number*	(MX □□□ □□□, M320 □□□ □ EX □□□ □□□□ □□) □□□ VLAN □□(802.1Q VLAN □□□ □□ □□ □□ □□□□ □□□ □□ □□ 802.1Q VLAN □□□ □□ □□ □□ □□□□ □□ □□)□□ IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□□□. □□ □□ 7□□ □ □□ □□ □□ 0 □□□□□. □□ □□□ □□□□□ user-vlan-1p-priority . □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□. □: □ □□ □□□ MX □□□ □ M320 □□□□ □□ □□ □□□ □□□ □□□□□.
learn-vlan-1p-priority-except *number*	(MX □□□ □□□, M320 □□□ □ EX □□□ □□□□ □□) IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□□□ □ □□□. □□□ □□□ learn-vlan-1p-priority □□ □□□ □□□□□□. □: □ □□ □□□ PTX □□□ □□ □□ □□□□□□ □□□□ □□□□. □: □ □□ □□□ MX □□□ □ M320 □□□□ □□ □□ □□□ □□□ □□□□□.
loss-priority *level*	□□ □□ □□□□(PLP) □□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□□□ □□; □□□ CFEB(CFEB-E)□ □□ M7i □ M10i □□□; MX □□□ □□□□ EX □ □□ □□□□ □□□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□ □ T □□□ □□□□ EX □□□ □□□□ IP □□□□ □□, □□ □□□ □□ [edit class-of-service] □□ tri-color □□ □□□ 4□ □□ □ □□□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. tri-color □□ □□ □□□ *□□ □□ □□□ □□ □ □□* □□□□□□. □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□ □ □□□ □□ □□□ □□□ *□□□ □□□□ □□ □□□□ □□□□ □□□□ □□ □□□□* □□□□□□.

표 74: 지원되는 2 CCC 인터페이스 및 플랫폼 및 구성 문 (*Continued*)

구성 문	설명
loss-priority-except *level*	지정된 손실 우선 순위를 제외한 모든 패킷. 지원되는 수준은 low, medium-low, medium-high 및 high입니다. 참고: 이 기능은 PTX 플랫폼 및 구성에서 지원되지 않습니다. 이 기능은 PLP 모드에서 지원되지 않습니다(BA) 분류기 및 출력 BA 분류기(BA) *분류기 분류기 분류기 분류기 및 및 분류기* 지원되지 않습니다.
user-vlan-1p-priority *number*	(MX 시리즈, M320 라우터 및 EX 시리즈 스위치) 및 VLAN 태그(802.1Q VLAN 헤더 내 두 개 중 첫 번째)의 IEEE 802.1p 우선 순위 값을 지정합니다. 범위는 0부터 7까지 입니다. 기본값은 0입니다. 이 문은 learn-vlan-1p-priority . 참고: 이 기능은 PTX 플랫폼 및 구성에서 지원되지 않습니다. 참고: 이 기능은 MX 시리즈 및 M320 라우터 및 구성에서 지원됩니다.
user-vlan-1p-priority-except *number*	(MX 시리즈, M320 라우터 및 EX 시리즈 스위치) IEEE 802.1p 우선 순위 값을 제외한 모든 값. 이 문은 user-vlan-1p-priority 및 반대입니다. 참고: 이 기능은 PTX 플랫폼 및 구성에서 지원되지 않습니다. 참고: 이 기능은 MX 시리즈 및 M320 라우터 및 구성에서 지원됩니다.

참고: 및 flexible-match-mask 및 및 flexible-match-range IPV6 필터 및 일치기 및 필터 및 4개 "필터, CCC, VPLS"의 및 L2 필터 필터 및 필터 필터. 및 필터 필터 및 필터 3개 필터 IPV6 필터 필터 및 필터.

관련 항목

- 필터 및 및 및 | 763
- 필터 및 및 및 | 828
- 필터 및 및 및 및 | 817

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MX □□□ □□□ □ EX □□□ □□□□□□ □□□ 2 □□□ □□□(family bridge) □ 75 □□□ 982 □ □□ □□ □□□□ □□ □□□□□□ □□□ □□ □ □□□ □ □□□□. □□□ □□ □□□□ □□□ □ □□ [edit firewall family bridge filter *filter-name* term *term-name* from] □ *match-conditions*(□) □□□□□.

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destination-mac-address *address*	□□□ □□□□ □□□ 2 □□□ □□ MAC(□□□ □□□ □□) □□□□□.
destination-port *number*	TCP □□ UDP □□ □□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□.
destination-port-except	TCP/UDP □□ □□□ □□□□□ □□□□.
destination-prefix-list *named-list*	□ IP □□ □□□□ □□□□□□ *named-list*.

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□□ □□	□□
dscp *number*	DSCP(Differentiated Services Code Point)□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□ □ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. □□□ □□□ *□□ □□(BA) □□□□ □□□□ □□□□ □□□□ □□□□ □□ □□□□* □ □□□□□□. 0□□ 63□□ □□ □□ □□□ □ □□□□. 16□□ □□□□ □□ □□□□□ □□□□ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □ □□□□ □□□□ b□(□) □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*□ RFC 3246□ □□□ □□ □□□□ □□□□ □. ef(46). • *AF(Assured Forwarding) PHB □□□* RFC 2597□ □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □ □□ □□ 4□□ □□□□ □□□□□. af11(10), af12 (12), af13 (14), af21(18), af22 (20), af23 (22), af31(26), af32 (28), af33 (30), af41 (34), af42 (36), af43 (38)
dscp-except *number*	DSCP □□□ □□□□□ □□□□. □□□ □□□ dscp-except □□ □□□ □□□□□□□.
ether-type *value*	2-□□ IEEE 802.3 Length/EtherType □□□ □□□ □ □□ □ □□□ □□□□□□□. 0□□ 65535(0xFFFF) □□□ 10□□ □□ 16□□ □□ □□□ □ □□□□. 0□□ 1500(0x05DC) □□□ □□ □□□ □□ 1 □□□□ □□□ □□□□□. 1536(0x0600)□□ 65535□□□ □□ □□□ □□ 2 □□□□ EtherType(MAC □ □□□□ □□□□□ □□)□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(16□□ □□ □□□□ □□). aarp(0x80F3), appletalk (0x809B), arp (0x0806), ipv4 (0x0800), ipv6 (0x86DD), mpls-multicast (0x8848), mpls-unicast (0x8847), oam (0x8902), ppp (0x880B), pppoe-discovery (0x8863), pppoe-session (0x8864), sna (0x80D5). □: ip-address □□ ipv6-address□□ □□□ □ □□□ ip □□□□□□□ □□□□□ □□ ether-type ipv4 □□ ipv6□ □□□□ □□□.

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ether-type-except *value*	2-□□ IEEE 802.3 Length/EtherType □□□ □□□ □ □□ □ □□□ □□□□□ □□□□. *values* □□□ □□ □□□ □□□ ether-type □□ □□□ □□□□□□.	
flexible-match-mask *value*	bit-length	□□ □□□ □□□ □□□□ □□, □□□ □□□ □□□□ □□ (0..128)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-mask-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	mask-in-hex	□□□ □□ □□□□□ □□ □□□ □□
	match-start	□□ □□ □□□
	prefix	□□□ □ □□□/□□
flexible-match-range *value*	bit-length	□□ □□□ □□□ □□□□ □□(0..32)
	bit-offset	(□□ □□ + □□□) □□□(0..7) □□□ □□ □□□
	byte-offset	□□ □□□ □□□ □□□ □□□
	flexible-range-name	□□ □□□ □□□ □□□□ □□□ □□ □□ □□
	match-start	□□ □□ □□□

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	range	□□□ □ □□
	range-except	□□□ □ □□□ □□□□□ □□□□
forwarding class *class*	□□□ □□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □ □□□□.	
forwarding-class-except *class*	□□□ 2 □□ □□□ □□□ □□ □□□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□.	
icmp-code *message-code*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ ip-protocol icmp, ip-protocol icmp6□□ ip-protocol icmpv6 □□ □□□ □□□□ □□ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip6-header-bad(0), unrecognized-next-header (1), unrecognized-option (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • destination-unreachable: address-unreachable(3), administratively-prohibited (1), no-route-to-destination (0), port-unreachable (4)	
icmp-code-except *message-code*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □□□□□□.	

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icmp-type *message-type*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ ip-protocol icmp, ip-protocol icmp6□□ ip-protocol icmpv6 □□ □□□ □□□□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). destination-unreachable(1), echo-reply (129), echo-request (128), membership-query (130), membership-report (131), membership-termination (132), neighbor-advertisement (136), neighbor-solicit (135), node-information-reply (140), node-information-request (139), packet-too-big (2), parameter-problem (4), redirect (137), (134), router-renumberingrouter-advertisement (138), router-solicit (133) □□ time-exceeded (3).
icmp-type-except *message-type*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-type □□ □□□ □□□□□□.
interface *interface-name*	□□□ □□□ □□□□□□□□. □□□ □□□ □□□□□□ □□□□ □□□ □□□□ □□ □□□ □□□ □ □□□□. □: □□□□ □□ □□□□□□ □□□□ □ □□ □□□ □□□ □□, □□□ □□□ □□□□ □□□□.
interface-group *group-number*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□□. □ □□ *group-number*□□ □ □□ □ □ □□□ 255□ 0 □□□ □□□□□. □□ □□□□□□ □□□□□ □□*group-number*□ □□□□□ [interfaces *interface-name* unit *number* family *family* filter group] □□ □□□□ *group-number*□(□) □□□□ □□□. □□□ □□□ "□□□□□ □□ □□□□ □□□ □□ □□□ □□" □□□ 1296□ □□□□□□.
interface-group-except *number*	□□□ □□□ □□ □□□□□□ □□□ □□□□□ □□ □□ □□□□□ □□ □□□ □□□□□ □□□□. □□□ □□□ interface-group □□ □□□ □□□□□□.
interface-set *interface-set-name*	□□□ □□□ □□□□□□ □□□ □□□□□ □□□ □□□□□□. □□□□□ □□□ □□□□□ [edit firewall]□□ □□□□ interface-set□□ □□□□□ □□□. □□□ □□□ "□□□□□ □□□□ □□□ □□ □□□ □□" □□□ 1297□ □□□□□□.

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ip-address *address*	IPv4 □□□ □□ □□ □□□ □□□□ 32□□ □□□□□. □: IPv4 □□□□□□□ □□□ □□□□□ ether-type ipv4□ □□□ □□□ □□□□ □□□.
ip-destination-address *address*	□□□ □□ □□ □□ □□□ 32□□ □□□□□.
ip-precedence *ip-precedence-field*	IP □□ □□ □□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp(0xa0), flash(0x60), flash-override(0x80), immediate(0x40), internet-control(0xc0), net-control(0xe0), priority(0x20) □□ routine(0x00).
ip-precedence-except *ip-precedence-field*	IP □□□□ □□□ □□□□□ □□□□.
ip-protocol *number*	IP □□□□ □□□□□.
ip-protocol-except	IP □□□□ □□□ □□□□□ □□□□.
ip-source-address *address*	□□□ □□□□ □□ □□□ IP □□□□□.
ipv6-address *address*	(MX □□□□ □□) IPv6 □□□ □□ □□ □□□ □□□□ 128□□ □□□□□. □: IPv6 □□□□□□□ □□□ □□□□□ ether-type ipv6□ □□□ □□□ □□□□ □□□.
ipv6-destination-address *address*	(MX □□□□ □□) □ □□□ □□ □□ □□ □□□ 128□□ □□□□□.
ipv6-destination-prefix-list *named-list*	(MX □□□□ □□) □ IPv6 □□ □□□ □□□□□□ *named-list*.

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□□ □□	□□
ipv6-next-header *protocol*	(MX □□□□ □□) IPv6 □□ □□ □□□□ □□□ □□□□□□. □□ □□□ □ □□ *protocol*□□□□ □□ □□□□□. • **ah**—IP □□ □□ □□ • **dstopts**—IPv6 □□ □□ • **egp**—□□ □□□□□ □□□□ • **esp**—IPSec □□□ □□ □□□□ • **fragment**—IPv6 □□□□□ □□ • **gre**—□□ □□□ □□□ • **hop-by-hop**—□□ IPv6 □ □□ • **icmp**—□□□ □□ □□□ □□□□ • **icmp6**—Internet Control Message Protocol □□ 6 • **igmp**—□□□ □□ □□ □□□□ • **ipip**—IP□ IP • **ipv6**—IP□ IPv6 • **no-next-header**—IPv6 □□ □□ □□ • **ospf-** □□ □□ □□ □□ • **pim**—□□□□ □□ □□□□□ • **routing**—IPv6 □□□ □□ • **rsvp**—□□□ □□ □□□□ • **sctp-** □□□ □□ □□ □□□□ • **tcp**—□□ □□ □□□□ • **udp**—□□□ □□□□□ □□□□

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	• **vrrp**—□□ □□□ □□□ □□□□
`ipv6-next-header-except` *protocol*	(MX □□□□ □□) IPv6 □□ □□ □□□□ □□□ □□□□□ □□□□.

□ 75: □□□ 2 □□□□ □□ □□ □□□ □□ □□ □□(MX □□□ □□□ □ EX □□□ □□□□ □□) *(Continued)*

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ipv6-payload-protocol *protocol*	(MX □□□□ □□) IPv6 □□□□ □□□□ □□□ □□□□□□□. □□ □□□ □ □□ *protocol*□□□□ □□ □□□□□. • **ah**—IP □□ □□ □□ • **dstopts**—IPv6 □□ □□ • **egp**—□□ □□□□□ □□□□ • **esp**—IPSec □□□ □□ □□□□ • **fragment**—IPv6 □□□□□ □□ • **gre**—□□ □□□ □□□ • **hop-by-hop**—□□ IPv6 □ □□ • **icmp**—□□□ □□ □□□ □□□□ • **icmp6**—Internet Control Message Protocol □□ 6 • **igmp**—□□□ □□ □□ □□□□ • **ipip**—IP□ IP • **ipv6**—IP□ IPv6 • **no-next-header**—IPv6 □□ □□ □□ • **ospf**- □□ □□ □□ □□ • **pim**—□□□□ □□ □□□□□ • **routing**—IPv6 □□□ □□ • **rsvp**—□□□ □□ □□□□ • **sctp**- □□□ □□ □□ □□□□ • **tcp**—□□ □□ □□□□ • **udp**—□□□ □□□□□ □□□□

표 75: 필터 2 일치하는 패킷 속성 정의(MX 시리즈 및 T 시리즈 라우터만 해당) *(Continued)*

속성 이름	설명
	• **vrrp**—가상 라우터 중복 프로토콜
ipv6-payload-protocol-except *protocol*	(MX 시리즈 전용) IPv6 패킷 헤더에 포함되지 않은 프로토콜.
ipv6-prefix-list *named-list*	(MX 시리즈 전용) 이 IPv6 주소 목록에 *named-list*.
ipv6-source-address *address*	(MX 시리즈 전용) 이 주소 또는 주소 범위 128개 일치합니다.
ipv6-source-prefix-list *named-list*	(MX 시리즈 전용) 이 IPv6 주소 목록에 *named-list*.
ipv6-traffic-class *number*	(MX 시리즈 전용) DSCP(Differentiated Services Code Point)입니다. DiffServ 사용하여 IP 헤더 내(ToS) 트래픽 클래스. 이 필드의 값 범위 6비트 DSCP에 해당합니다. 범위 내에서 *동작 집합(BA) 분류자 구성 및 적용*에 대한 설명을 참조하십시오. 0에서 63까지 값 또는 16진수 형식. 16진수 형식 값 앞에 0x(영)을 입력합니다. 2진수 형식 값 앞에 b(영)을 입력합니다. 값 중 하나 또는 별칭 중 하나를 입력(값 및 별칭 모두). • *EF(Expedited Forwarding) PHB(Per-Hop Behavior)*은 RFC 3246에 정의된 빠른 전달 서비스. ef(46). • *AF(Assured Forwarding) PHB 서비스*는 RFC 2597에 이 12개 클래스 및 클래스 내 3개 폐기 우선 순위 4개 클래스로 구성됩니다. af11(10), af12 (12), af13 (14), af21(18), af22 (20), af23 (22), af31(26), af32 (28), af33 (30), af41 (34), af42 (36), af43 (38)

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□□ □□	□□
ipv6-traffic-class-except *number*	DSCP number□ □□□□□ □□□□.
isid *number*	(□□□□□ □□ □□□[PBB]□ □□ □□□) □□□ □□□ □□□□ □□□□□□.
isid-dei *number*	(PBB□□ □□) □□□ □□□ □□□ DEI(Drop Eligibility Indicator) □□□ □□□□□□.
isid-dei-except *number*	(PBB□□ □□) □□□ □□□ □□□ DEI □□□ □□□□□ □□□□.
isid-priority-code-point *number*	(PBB□□ □□) □□□ □□□ □□□ □□ □□ □□ □□□□ □□□□□□.
isid-priority-code-point-except *number*	(PBB□□ □□) □□□ □□□ □□□ □□ □□ □□ □□□□ □□□□□ □□□□.
learn-vlan-1p-priority *value*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□ VLAN □□(802.1Q VLAN □□□ □□ □□ □□ □□□□ □□□ □ □ □□ 802.1Q VLAN □□□ □□ □□ □□ □□□□ □□ □□)□□ IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□ □□. □□ □□ 7□□ □ □□ □□ □□ 0 □□□□□. □□ □□□ □□□□□ user-vlan-1p-priority .
learn-vlan-1p-priority-except *value*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IEEE 802.1p □□□ VLAN □□ □□ □□□ □□□□□ □□□□. □□□ □□ □ learn-vlan-1p-priority □□ □□□ □□□□□□.
learn-vlan-dei *number*	(□□□ □□) □□□ VLAN(□□ LAN) □□□ DEI □□□ □□□□□□.
learn-vlan-dei-except *number*	(□□□ □□) □□□ VLAN □□□ DEI □□□ □□□□□ □□□□.

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learn-vlan-id *number*	MAC □□□ □□□□ VLAN □□□□□□.
learn-vlan-id-except *number*	MAC □□□ □□□□ VLAN □□□□ □□□□□ □□□□.
loss-priority *level*	□□ □□ □□□□(PLP) □□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high M120 □ M320 □□□□□ □□; □□□ CFEB(CFEB-E)□ □□ M7i □ M10i □□□; MX □□□ □□□□ EX □ □□ □□□□ □□□□. Enhanced II FPC(Flexible PIC Concentrator)□ □□ M320, MX □□□ □ T □□□ □□□□ EX □□□ □□□□ IP □□□□ □□, □□ □□□ □□ [edit class-of-service] □□ tri-color □□ □□□ 4□ □□ □ □□□ PLP □□□ □□□□ □□□. tri-color □□ □□□□□ □□ □□ □□, high □ low □□□ □□□ □ □□□□. □□ □□ □□□□ □□□□ □□□□□. tri-color □□ □□ □□□ *□□ □□ □□□ □□ □ □□*□ □□□□□□. □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□ □ □□□ □□ □□□ □□□ *□□□ □□□□ □□ □□□□ □□□□ □□□□ □□ □□□□□*□□□□□□.
loss-priority-except *level*	□□ □□ □□□□ □□□□ □□□□□ □□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high □□ □□□ PLP □□□ □□□□ □□ □□ □□(BA) □□□ □□□ □□ □□□ □□□ *□□ □□ □□□□ □□□ □ □□ □□□□ □□□□ □ □□□□ □□ □□*□□□ □□□□□□.
port *number*	TCP □□ UDP □□ □□ □□ □□□□□. □□□ □□□□ port □□ □□□ destination-port □□ source-port □□ □□□ □□ □□□ □□ □□□□.
source-mac-address *address*	□□□ 2 □□□ □□ MAC □□□□□.
source-port *number*	TCP □□ UDP □□ □□ □□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□.

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source-port-except	TCP/UDP □□ □□□ □□□□□ □□□□.
tcp-flags *flags*	TCP □□□ 8□□ TCP □□□ □□□□ □□ □□□ □□□ 6□□□ □□□□□□. □□ □□ □□□ □□□□ □□ □□ □□□ □□□□ 16□□ □□ □□□ □ □□□□. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP □□□□, SYN □□□□ □□□ □□ □□□□□ □□□□ □□ □□, ACK □□□□ □□ □□ □ □□□ □□ □□□ □□□□ □□ □□. □□ □□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □□□□. tcp-flags □□ □□□ □□□□□ □□ □□□ □□□□ next-header-tcp □□□.
traffic-type *type*	□□□ □□□□□. broadcast, multicast, unknown-unicast □□ known-unicast□(□) □□□□□.
traffic-type-except *type*	□□□ □□□ □□□□□ □□□□.
user-vlan-1p-priority *value*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□ VLAN □□(802.1Q VLAN □□□ □□ □□ □□ □□□□ □□ □□)□ IEEE 802.1p □□□ □□ □□ □□□ □□□□□□□. □□ □□ 7□□ □ □□ □□ □□ 0 □□□□□. □□ □□□ □□□□□ learn-vlan-1p-priority .

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□□ □□	□□
user-vlan-1p-priority-except *value*	(MX □□□ □□□ □ EX □□□ □□□□ □□) IEEE 802.1p □□□ □□ □□ □□□ □□□□□ □□□□. □□□ □□□ user-vlan-1p-priority □□ □□□ □□□□□□.
user-vlan-id *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□□□ □□□ □ □□ VLAN □□□□ □□□□□□. □□□ 0 - 4095□□□.
user-vlan-id-except *number*	(MX □□□ □□□ □ EX □□□ □□□□ □□) □□□□□ □□□ □ □□ VLAN □□□□ □□□□□ □□□□. □□□ 0 - 4095 □□□.
vlan-ether-type *value*	□□□ 2 □□□ □□□ VLAN □□□ □□ □□□□□.
vlan-ether-type-except *value*	□□□ 2 □□□ □□□ VLAN □□□ □□ □□□ □□□□□ □□□□.

□: □□ flexible-match-mask □ □□ □□ flexible-match-range IPV6 □□□ □□ □□□□□ □ □□□□ □□ 4□ "□□□, CCC, VPLS"□ □□ L2 □□□ □□□ □□ □□□□ □□□□. □□ □□□ □□□□ □□ □□□ 3□ □□□□ IPV6 □□□□ □□□ □□ □□□□.

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```
[edit interfaces]
lo0 {
    unit 0 {
        family <inet | inet6> {
            filter {
                input f1;
            }
        }
    }
}
family <inet | inet6>{
    filter f1 {
        interface-specific; >> Mandatory Field.
        term t1 {
            from {
                protocol ospf;
            }
            then {
                count c1;
                discard;
```

```
            }
        }
        term t2 {
            then {
                count c2;
                accept;
            }
        }
    }
}
```

BGP, OSPF, SSH, Telnet, ICMP, SNMP [illegible] [illegible].

```
set firewall family inet filter LoTest interface-specific
set firewall family inet filter LoTest term tc1-ospfv2 from source-address 10.1.1.3/32
set firewall family inet filter LoTest term tc1-ospfv2 from protocol ospf
set firewall family inet filter LoTest term tc1-ospfv2 then count LoCount
set firewall family inet filter LoTest term tc1-ospfv2 then accept
set firewall family inet filter LoTest term tc1-bgp4 from source-address 10.1.1.3/32
set firewall family inet filter LoTest term tc1-bgp4 from protocol tcp
set firewall family inet filter LoTest term tc1-bgp4 from destination-port bgp
set firewall family inet filter LoTest term tc1-bgp4 then count LoCount
set firewall family inet filter LoTest term tc1-bgp4 then accept
set firewall family inet filter LoTest term tc3-icmp from source-address 10.1.1.5/32
set firewall family inet filter LoTest term tc3-icmp from protocol icmp
set firewall family inet filter LoTest term tc3-icmp from icmp-type 11
set firewall family inet filter LoTest term tc3-icmp from icmp-code 1
set firewall family inet filter LoTest term tc3-icmp then count LoCount
set firewall family inet filter LoTest term tc3-icmp then accept
set firewall family inet filter LoTest term tc5-tcpSyn from source-address 10.1.1.7/32
set firewall family inet filter LoTest term tc5-tcpSyn from protocol tcp
set firewall family inet filter LoTest term tc5-tcpSyn from tcp-flags syn
set firewall family inet filter LoTest term tc5-tcpSyn then policer LoPolicer
set firewall family inet filter LoTest term tc5-tcpSyn then count LoCount
set firewall family inet filter LoTest term tc5-tcpSyn then accept
set firewall family inet filter LoTest term tc6-snmp from source-address 10.1.1.8/32
set firewall family inet filter LoTest term tc6-snmp from protocol udp
set firewall family inet filter LoTest term tc6-snmp from destination-port snmp
set firewall family inet filter LoTest term tc6-snmp then count LoCount
set firewall family inet filter LoTest term tc6-snmp then accept
```

```
set firewall family inet filter LoTest term tc6-ntp from source-address 10.1.1.8/32
set firewall family inet filter LoTest term tc6-ntp from protocol udp
set firewall family inet filter LoTest term tc6-ntp from destination-port ntp
set firewall family inet filter LoTest term tc6-ntp then count LoCount
set firewall family inet filter LoTest term tc6-ntp then accept
set firewall family inet filter LoTest term tc6-dns from source-address 10.1.1.8/32
set firewall family inet filter LoTest term tc6-dns from protocol udp
set firewall family inet filter LoTest term tc6-dns from destination-port domain
set firewall family inet filter LoTest term tc6-dns then count LoCount
set firewall family inet filter LoTest term tc6-dns then accept
set firewall family inet filter LoTest term tc8-ipOptions from source-address 10.1.1.10/32
set firewall family inet filter LoTest term tc8-ipOptions from ip-options router-alert
set firewall family inet filter LoTest term tc8-ipOptions then count LoCount
set firewall family inet filter LoTest term tc8-ipOptions then accept
set firewall family inet filter LoTest term tc9-icmp from source-address 10.1.1.11/32
set firewall family inet filter LoTest term tc9-icmp from protocol icmp
set firewall family inet filter LoTest term tc9-icmp from icmp-type 11
set firewall family inet filter LoTest term tc9-icmp from icmp-code 1
set firewall family inet filter LoTest term tc9-icmp then policer LoPolicer
set firewall family inet filter LoTest term tc9-icmp then count LoCount
set firewall family inet filter LoTest term tc9-icmp then accept
set firewall family inet filter LoTest term tc12-ospfv2 from source-address 10.1.1.13/32
set firewall family inet filter LoTest term tc12-ospfv2 from protocol ospf
set firewall family inet filter LoTest term tc12-ospfv2 then count LoCount
set firewall family inet filter LoTest term tc12-ospfv2 then accept
set firewall family inet filter LoTest term tc13-ssh from source-address 10.1.1.14/32
set firewall family inet filter LoTest term tc13-ssh from protocol tcp
set firewall family inet filter LoTest term tc13-ssh from destination-port ssh
set firewall family inet filter LoTest term tc13-ssh then count LoCount
set firewall family inet filter LoTest term tc13-ssh then discard
set firewall family inet filter LoTest term tc14-pl from source-address 10.1.1.15/32
set firewall family inet filter LoTest term tc14-pl from packet-length 4000-9000
set firewall family inet filter LoTest term tc14-pl from protocol ospf
set firewall family inet filter LoTest term tc14-pl then count LoCount
set firewall family inet filter LoTest term tc14-pl then accept
set firewall family inet filter LoTest term tc16-pl from source-address 10.1.1.17/32
set firewall family inet filter LoTest term tc16-pl from fragment-flags more-fragments
set firewall family inet filter LoTest term tc16-pl from protocol ospf
set firewall family inet filter LoTest term tc16-pl then count LoCount
set firewall family inet filter LoTest term tc16-pl then discard
set firewall family inet filter LoTest term tc17-ssh from source-address 10.1.1.18/32
set firewall family inet filter LoTest term tc17-ssh from destination-address 10.216.66.30/32
set firewall family inet filter LoTest term tc17-ssh from protocol tcp
```

```
set firewall family inet filter LoTest term tc17-ssh from destination-port ssh
set firewall family inet filter LoTest term tc17-ssh then count LoCount
set firewall family inet filter LoTest term tc17-ssh then accept
set firewall family inet filter LoTest term all then accept
set firewall family inet6 filter LoTest6 interface-specific
set firewall family inet6 filter LoTest6 term tc2-ospfv3 from source-address
2001:db8:4136:e378:8000:63bf:3fff:fdd2
set firewall family inet6 filter LoTest6 term tc2-ospfv3 from next-header ospf
set firewall family inet6 filter LoTest6 term tc2-ospfv3 then count LoCount6
set firewall family inet6 filter LoTest6 term tc2-ospfv3 then accept
set firewall family inet6 filter LoTest6 term tc2-bgp4plus from source-address
2001:db8:4136:e378:8000:63bf:3fff:fdd2
set firewall family inet6 filter LoTest6 term tc2-bgp4plus from next-header tcp
set firewall family inet6 filter LoTest6 term tc2-bgp4plus from destination-port bgp
set firewall family inet6 filter LoTest6 term tc2-bgp4plus then count LoCount6
set firewall family inet6 filter LoTest6 term tc2-bgp4plus then accept
set firewall family inet6 filter LoTest6 term tc4-icmpv6 from source-address
2001:db8:4136:e378:8000:63bf:3fff:fdd3
set firewall family inet6 filter LoTest6 term tc4-icmpv6 from next-header icmp6
set firewall family inet6 filter LoTest6 term tc4-icmpv6 from icmp-type 1
set firewall family inet6 filter LoTest6 term tc4-icmpv6 from icmp-code 0
set firewall family inet6 filter LoTest6 term tc4-icmpv6 then count LoCount6
set firewall family inet6 filter LoTest6 term tc4-icmpv6 then accept
set firewall family inet6 filter LoTest6 term tc7-snmp from next-header udp
set firewall family inet6 filter LoTest6 term tc7-snmp from destination-port snmp
set firewall family inet6 filter LoTest6 term tc7-snmp then count LoCount6
set firewall family inet6 filter LoTest6 term tc7-snmp then accept
set firewall family inet6 filter LoTest6 term tc7-ntp from next-header udp
set firewall family inet6 filter LoTest6 term tc7-ntp from destination-port ntp
set firewall family inet6 filter LoTest6 term tc7-ntp then count LoCount6
set firewall family inet6 filter LoTest6 term tc7-ntp then accept
set firewall family inet6 filter LoTest6 term tc7-dns from next-header udp
set firewall family inet6 filter LoTest6 term tc7-dns from destination-port domain
set firewall family inet6 filter LoTest6 term tc7-dns then count LoCount6
set firewall family inet6 filter LoTest6 term tc7-dns then accept
set firewall family inet6 filter LoTest6 term tc10-icmp from source-address
2001:db8:4136:e378:8000:63bf:3fff:fdd4
set firewall family inet6 filter LoTest6 term tc10-icmp from next-header icmp6
set firewall family inet6 filter LoTest6 term tc10-icmp from icmp-type 1
set firewall family inet6 filter LoTest6 term tc10-icmp from icmp-code 0
set firewall family inet6 filter LoTest6 term tc10-icmp then policer LoPolicer
set firewall family inet6 filter LoTest6 term tc10-icmp then count LoCount6
set firewall family inet6 filter LoTest6 term tc10-icmp then accept
```

```
set firewall family inet6 filter LoTest6 term all then accept
set firewall policer LoPolicer if-exceeding bandwidth-limit 22k
set firewall policer LoPolicer if-exceeding burst-size-limit 20k
set firewall policer LoPolicer then discard
```

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??? 3 VPN? ??? ????? ?? ??? ???????? ??? ?? ??

??? 3 VPN(VRF ??? ????)? ??, ??? ??????? ??? ??? ????? ??? ? VRF ??? ????? ??? ? ????. VRF ??? ?? ??? ??? ??????? ??? ??? ???? VRF ??? ????? ?? ??? ? ????.

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- ?? ?? ??? 3 VPN? ?? PE ????? ?? CE ???? ping? ? ????. ??? ??? *?: ??? 3 VPN ?? ??.*
- VRF ?? ?? ??? ??? ??????? ???? ???? ?? ?? ?? ?? ??(MTU) ??? ??? ????? ???. ??? ??? *VPN ??? ??? ?? ?? ?? MTU ?? ??? ???????*.

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□□ ACX □□□ □□□□ □□□ □□□(ACX1000, ACX2000, ACX4000 □ ACX5000)□ □□ □□ □□□ □□□ □□□□□ □□ □□□□ □ □□ □□□ □□ □□ □□□ □ □□□(VRF) □□□□□ □□□ □□□. □, □□□ □□□□□□□ □□ □□□ □□□□□ □□□ □□□□□□□ □□□□ □□□□ □□ □□□ □□□ □□□ □ □□□□.

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```
unit number {
    family inet {
        address address;
    }
}
```

□□ □□ □□□□ □ □□□□ □□□□ □ □□□□:

- [edit interfaces lo0]
- [edit logical-systems *logical-system-name* interfaces lo0]

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```
filter {
    input filter-name;
}
```

□□ □□ □□□□ □ □□□□ □□□□ □ □□□□:

- [edit interfaces lo0 unit *unit-number* family inet]

- [edit logical-systems *logical-system-name* interfaces lo0 unit *unit-number* family inet]

VRF □□□ □□□□□ □□ □□□ □□□□□(□□□ *n* □ □□□ □□□ □□)□ □□ lo0.*n* □□□ □□ □□ □□□□□.

```
interface lo0.n;
```

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- [edit routing-instances *routing-instance-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]

□: □□□ □□□ □□□□ □□□ □□ TCP □□□□ □□□□ □□ □□

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□□□ BGP □□□ □□□□ □□ □□□ □□□ □□□□ □□ □□□ □□ **plist_bgp179**□(□) □□□□□.

□□□ □□□ □□□ **filter_bgp179** □□ □□□ □□□ **plist_bgp179** □□ □□□ □□ □□ □□ 179□ □□□□□□□.

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```
set policy-options prefix-list plist_bgp179 apply-path "protocols bgp group <*> neighbor <*>"
set firewall family inet filter filter_bgp179 term 1 from source-address 0.0.0.0/0
set firewall family inet filter filter_bgp179 term 1 from source-prefix-list plist_bgp179 except
set firewall family inet filter filter_bgp179 term 1 from destination-port bgp
set firewall family inet filter filter_bgp179 term 1 then reject
set firewall family inet filter filter_bgp179 term 2 then accept
set interfaces lo0 unit 0 family inet filter input filter_bgp179
set interfaces lo0 unit 0 family inet address 127.0.0.1/32
```

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1. □ □□□ **protocols bgp group <*> neighbor <*>**BGP □□ □□□ □□□□ □□ □□□□ □□□□□ □□□ □□□ **bgp179** □□□□□.

```
[edit policy-options prefix-list plist_bgp179]
user@host# set apply-path " protocols bgp group <*> neighbor <*>"
```

2. □□□ BGP □□□ □□□ □□ □□□□ □□ 179□ □□ TCP □□ □□□ □□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter_bgp179]
user@host# set term term1 from source-address 0.0.0.0/0
user@host# set term term1 from source-prefix-list bgp179 except
user@host# set term term1 from destination-port bgp
user@host# set term term1 then reject
```

3. □□ □□□ □□□□ □□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter_bgp179]
user@host# set term term2 then accept
```

4. □□□ □□□□□□□ □□□ □□□ □□□□□.

```
[edit interfaces lo0 unit 0 family inet]
user@host# set filter input filter_bgp179
user@host# set address 127.0.0.1/32
```

□□

□□ □□□□ **show firewall**, **show interfaces** □ **show policy-options** □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□ □ □□□ □ □□ □□□ □□□□ □□□ □□□□□□□.

```
user@host# show firewall
family inet {
    filter filter_bgp179 {
        term 1 {
            from {
                source-address {
                    0.0.0.0/0;
                }
                source-prefix-list {
```

```
                    plist_bgp179 except;
                }
                destination-port bgp;
            }
            then {
                reject;
            }
        }
        term 2 {
            then {
                accept;
            }
        }
    }
}
```

```
user@host# show interfaces
lo0 {
    unit 0 {
        family inet {
            filter {
                input filter_bgp179;
            }
            address 127.0.0.1/32;
        }
    }
}
```

```
user@host# show policy-options
prefix-list plist_bgp179 {
    apply-path "protocols bgp group <*> neighbor <*>";
}
```

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??? ??? **filter_bgp179** ??? ??????? **lo0.0**IPv4 ?? ????? ??????? ??????.

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show interfaces statistics operational mode ??? ??????? **lo0.0**??? ????? ??? ??????**detail**. **Protocol inet** ?? ?? ??? ?? ??? ?? **Input Filters** ??? ?? ????? ??? ??????? ??? ??? ??? ??? ??? ??????.

```
[edit]
user@host> show interfaces statistics lo0.0 detail
  Logical interface lo0.0 (Index 321) (SNMP ifIndex 16) (Generation 130)
    Flags: SNMP-Traps Encapsulation: Unspecified
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                 0 bps
     Output bytes  :                   0                 0 bps
     Input  packets:                   0                 0 pps
     Output packets:                   0                 0 pps
```

```
    Protocol inet, MTU: Unlimited, Generation: 145, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Input Filters: filter_bgp179
      Addresses, Flags: Primary
        Destination: Unspecified, Local: 127.0.0.1, Broadcast: Unspecified, Generation: 138
```

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- ssh-term- ?? ??? 192.168.122.0/24 ? TCP ??? SSH? ???? ?? ??? ?????.

- bgp-term- □□ □□□ 10.2.1.0/24 □ TCP □□□ BGP□ □□□□ □□ □□□ □□□□□.
- discard-rest-term- □□ bgp-term□ □□ ssh-term □□□□ □□ □□ □□□ □□ □□□ □□ □□ □ □□□ □□ □□□□ □□□ □□ □□ □□□ □□ □□□.

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```
set firewall family inet filter protect-RE term ssh-term from source-address 192.168.122.0/24
set firewall family inet filter protect-RE term ssh-term from protocol tcp
set firewall family inet filter protect-RE term ssh-term from destination-port ssh
set firewall family inet filter protect-RE term ssh-term then accept
set firewall family inet filter protect-RE term bgp-term from source-address 10.2.1.0/24
set firewall family inet filter protect-RE term bgp-term from protocol tcp
set firewall family inet filter protect-RE term bgp-term from destination-port bgp
set firewall family inet filter protect-RE term bgp-term then accept
set firewall family inet filter protect-RE term discard-rest-term then log
set firewall family inet filter protect-RE term discard-rest-term then syslog
set firewall family inet filter protect-RE term discard-rest-term then discard
set interfaces lo0 unit 0 family inet filter input protect-RE
```

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1. □□ □□□ □□□ □□□ □□□□□.

```
[edit]
user@host# edit firewall family inet filter protect-RE
```

2. □ □□ □□ □□□ □□□□.

```
[edit firewall family inet filter protect-RE]
user@host# edit term ssh-term
```

3. □□□ □□ □□□□, □□ □□ □ □□ □□ □□ □□□ □□□□□.

```
[edit firewall family inet filter protect-RE term ssh-term]
user@host# set from protocol tcp destination-port ssh source-address 192.168.122.0/24
```

4. □□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter protect-RE term ssh-term]
user@host# set then accept
```

5. □ □□ □□ □□□ □□□□.

```
[edit firewall family inet filter protect-RE]
user@host# edit term bgp-term
```

6. □□□ □□ □□□□, □□ □□ □ □□ □□ □□ □□□ □□□□□.

```
[edit firewall family inet filter protect-RE term bgp-term]
user@host# set from protocol tcp destination-port bgp source-address 10.2.1.0/24
```

7. □□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter protect-RE term bgp-term]
user@host# set then accept
```

8. [illegible]

```
[edit firewall family inet filter protect-RE]
user@host# edit term discard-rest-term
```

9. [illegible]

```
[edit firewall family inet filter protect-RE term discard-rest]
user@host# set then log syslog discard
```

10. [illegible]

```
[edit]
user@host# set interfaces lo0 unit 0 family inet filter input protect-RE
```

[illegible]

[illegible] show firewallshow interfaces lo0 [illegible]. [illegible]

```
user@host# show firewall
family inet {
    filter protect-RE {
        term ssh-term {
            from {
                source-address {
                    192.168.122.0/24;
                }
                protocol tcp;
                destination-port ssh;
            }
            then accept;
        }
        term bgp-term {
            from {
                source-address {
                    10.2.1.0/24;
                }
                protocol tcp;
```

```
                destination-port bgp;
            }
            then accept;
        }
        term discard-rest-term {
            then {
                log;
                syslog;
                discard;
            }
        }
    }
}
```

```
user@host# show interfaces lo0
unit 0 {
    family inet {
        filter {
            input protect-RE;
        }
        address 127.0.0.1/32;
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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

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- ssh *host-name* □□□□□ 192.168.122.0/24 IP □□□□ □□□□□□ □□□□ □□□□□ □ □□ □□□□□ □□ □□□□□ SSH□ □□□□□ □□□□□□ □□□□□ □ □□□□ □□□□□□.
- show route summary □□□□ □□□□□ □□□□□□ □□□□ □□□□□ , Local, BGP□□ Static□□□□ □□□□□□ Direct□□ □□□□ □□□□□ □□ □□□□ □□□□ □□.

□□ □□

command-name

```
% ssh 192.168.249.71
%ssh host
user@host's password:
--- JUNOS 6.4-20040518.0 (JSERIES) #0: 2004-05-18 09:27:50 UTC
```

```
user@host>
```

command-name

```
user@host> show route summary
Router ID: 192.168.249.71

inet.0: 34 destinations, 34 routes (33 active, 0 holddown, 1 hidden)
              Direct:     10 routes,      9 active
               Local:      9 routes,      9 active
                 BGP:     10 routes,     10 active
              Static:      5 routes,      5 active
...
```

??

?? ??? ??????:

- SSH? ????? ?????? ?????? ????? ? ?????.
- ??? show route summary , Local, BGP, ?? Static??? ?????? Direct???? ?????.

?? ???? ???? ?? ?? ??

??

??? ????? ??? ??????. ???? ?? syslog ??? ?? log ?? ??, ??? ????? ??? ??? ?? ?? ??? ?? ??? ?????? ??????.

??

?? ????? show firewall log ??? ??????.

?? ??

command-name

```
user@host> show firewall log
Log :
```

```
Time      Filter    Action Interface     Protocol Src Addr      Dest Addr
15:11:02  pfe       D      ge-0/0/0.0    TCP      172.17.28.19  192.168.70.71
15:11:01  pfe       D      ge-0/0/0.0    TCP      172.17.28.19  192.168.70.71
15:11:01  pfe       D      ge-0/0/0.0    TCP      172.17.28.19  192.168.70.71
15:11:01  pfe       D      ge-0/0/0.0    TCP      172.17.28.19  192.168.70.71
...
```

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- □□ Time□□□ □□□□ □□□ □□□□□.
- □□□ Filter □□ pfe□□□.
- □□ Action□□□ □□□ □□□ □□□ □□ □□□ □□(A(□□), (□□), DR (□□))□ □□□□□.
- □□□□ Interface□□□ □□□ □□□□(□□) □□□□□□□ □□□ □□□□□.
- □□ Protocol□□□ IP □□□ □□ □□□□□ □□□ □□□□□.
- □□ Src Addr□□□ IP □□□ □□ □□ □□□ □□□ □□□□□.
- □□ Dest Addr□□□ IP □□□ □□ □□ □□□ □□□ □□□□□.

□□ □□

> show route summary(□□ □□ □□)
>
> *show firewall*
>
> *show firewall log*
>
> *show interfaces(□□□)*

□: Block Telnet □ SSH □□□□ □□ □□ □□

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- Telnet □□ □ SSH □□□ □□□ □□□ □□□ □□□□□□ □□ □□□ □□□ port telnet □ port ssh IPv4 □□ □□□ □□ protocol tcp□ □ □□□ □□□□ □□□.

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□□ 51 □□□ 1017□□ □ □□□ □□ □□□ □□□□□ □□□□ □□□□. □□□ □□□ R2 □□□□□ □□□□ □□□ □□ □□□□(DUT)□ □□□□. R1 □ R2 □□□□□ 192.168.1.0/30□ □□□□ □□□ □□□ □□□□□. □ □□□□□□ /32 □□□ □□□□ □□□□ 192.168.255.0/30 □□□□ □ □□□ □□□ □□□ □□□□. □ □□ □□□□ □□ □□□□□ □□□□□ □□□□ □□□□ □□ □□□ □□□ □□ □□□ □□ □□□□ □□□□□.

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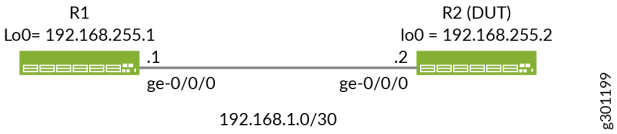

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□□: □□□ R1□ □□ □□□□□ □□□□ □□ □ □□ □□□ R2□ □□ Telnet □ SSH □□□□ □□□□□. SSH □□ Telnet□ □□□□ R2 □□□□□ □□ □□□□□ □□□ □□□ □ □□□ □□ □□□. □ □□□ □□□ □ □□ □□□□ □□□ □□ □□□□□. □□□ □ □, □□□ □□□ □ □□ □□□□ R1 □□□□□ □□□□ R2□ □□ SSH □□□ □□□ □ □□□□. □□, □□ □□□ □□□□ R2 □□□ □□ □□□□□ □ □□□□ □□□□ □□□ IP □□□□ □□□□ □□ □□□□□□□.

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CLI □□ □□

R1 □□□□□ □□ □□ □□

R1 □□□□□ □□□ □□□□□ □□□ □□ □□ □□□ □□□□ [edit] □□ □□□ CLI□ □□□□□ □□□. □□ □□□□ commit □(□) □□□□ □□ □□□ □ □□□□ □□□.

```
set system host-name R1
set system services ssh root-login allow
set interfaces ge-0/0/0 description "Link from R1 to R2"
set interfaces ge-0/0/0 unit 0 family inet address 192.168.1.1/30
```

```
set interfaces lo0 unit 0 family inet address 192.168.255.1/32
set routing-options static route 192.168.255.2/32 next-hop 192.168.1.2
```

R2 ????? ?? ?? ??

R2 ????? ??? ????? ??? ?? ?? ??? ????? [edit] ?? ??? CLI? ?????? ???. ?? ????? commit?(?) ????? ?? ??? ?? ??? ???.

?: ????? ?? ????? ??? ?? ? ?? ?? ??? ??? ? commit-confirmed?(?) ????? ?? ????????. *Junos OS ?? ??? ? ?? ??*

```
set system host-name R2
set system services ssh root-login allow
set system services telnet
set interfaces ge-0/0/0 description "Link from R2 to R1"
set interfaces ge-0/0/0 unit 0 family inet address 192.168.1.2/30
set interfaces lo0 unit 0 family inet filter input local_acl
set interfaces lo0 unit 0 family inet address 192.168.255.2/32
set firewall family inet filter local_acl term terminal_access from source-address 192.168.1.0/30
set firewall family inet filter local_acl term terminal_access from protocol tcp
set firewall family inet filter local_acl term terminal_access from port ssh
set firewall family inet filter local_acl term terminal_access from port telnet
set firewall family inet filter local_acl term terminal_access then accept
set firewall family inet filter local_acl term terminal_access_denied from protocol tcp
set firewall family inet filter local_acl term terminal_access_denied from port ssh
set firewall family inet filter local_acl term terminal_access_denied from port telnet
set firewall family inet filter local_acl term terminal_access_denied then log
set firewall family inet filter local_acl term terminal_access_denied then reject
set firewall family inet filter local_acl term tcp-estab from protocol tcp
set firewall family inet filter local_acl term tcp-estab from tcp-established
set firewall family inet filter local_acl term tcp-estab then accept
set firewall family inet filter local_acl term default-term then accept
set routing-options static route 192.168.255.1/32 next-hop 192.168.1.1
```

R1 ???? ??

??? ??

R1 ?????? ?????? ?? ??? ??????.

1. ??????? ??????.

```
[edit]
user@R1# set interfaces ge-0/0/0 description "Link from R1 to R2"
user@R1# set interfaces ge-0/0/0 unit 0 family inet address 192.168.1.1/30
user@R1# set interfaces lo0 unit 0 family inet address 192.168.255.1/32
```

2. R2 ?????? ???? ???? ?? ???? ???? ?? ???? ??????. Telnet ? SSH ???? ??????.

```
[edit]
user@R1# set system host-name R1
user@R1# set system services ssh root-login allow
user@R1# set system services telnet
user@R1# set routing-options static route 192.168.255.2/32 next-hop 192.168.1.2
```

R1 ??????? ?? ?? ? ??

??? ??

R1 ??????? ?? ??? ????? ?????? ?? ??? ????????.

1. show interfaces ?? ?? ??? ????? ?????? ??? ??????. ?? ??? ??? ??? ????? ??? ? ??? ??? ??? ????? ??? ?? ?????.

```
[edit]
user@R1# show interfaces
ge-0/0/0 {
    description "Link from R1 to R2";
    unit 0 {
        family inet {
            address 192.168.1.1/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 192.168.255.1/32;
        }
```

```
    }
}
```

2. R2 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] SSH [illegible] Telnet [illegible] [illegible] [illegible] [illegible]. show routing-options [illegible] show system services [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@R1# show routing-options
static {
    route 192.168.255.2/32 next-hop 192.168.1.2;
}
user@R1# show system services
ssh {
    root-login allow;
    }
telnet;
```

3. R1 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@R1# commit
```

R2 [illegible] [illegible]

[illegible] [illegible]

R2 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. Telnet [illegible] SSH [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. edit firewall family inet filter *local_acl* [illegible] [illegible].

```
[edit]
user@R2# edit firewall family inet filter local_acl
```

2. [illegible] [illegible] *terminal_access*[illegible]([illegible]) [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] Telnet [illegible] SSH[illegible] [illegible].

```
[edit firewall family inet filter local_acl]
user@R2# set term terminal_access from source-address 192.168.1.0/30
user@R2# set term terminal_access from protocol tcp
```

```
user@R2# set term terminal_access from port ssh
user@R2# set term terminal_access from port telnet
user@R2# set term terminal_access then accept
```

3. ?? ?? *terminal_access_denied*?(?) ??????. ? ???? *??* *??* ?? ????? SSH ? Telnet? ??????. ? ???? ???? ????? ? ?? ????? ?? ???? ?? ???? ICMP(Internet Control Message Protocol) ?? ?? ?? ???? ?? ????? ?? ??????. ?? ? ? ???? ?? ???? ???? "???? ?? ?? ??" ???? 1213? ???????.

   ?: discard ???? ????? ?? ?? ICMP ?? ????? ?? ????? ?? ???? ? ?????. ???? ???? "???? ?? ?? ??" ? ?? 828? ???????.

```
[edit firewall family inet filter local_acl]
user@R2# set term terminal_access_denied from protocol tcp
user@R2# set term terminal_access_denied from port ssh
user@R2# set term terminal_access_denied from port telnet
user@R2# set term terminal_access_denied then log
user@R2# set term terminal_access_denied then reject
user@R2# set term default-term then accept
```

4. ?? ??.

   ?? ?? *tcp-estab*?(?) ??????. ? ???? ????? ?? ?????? ????? ????? Juniper Mist Cloud? ?? ???? ??????(*tcp-established*?(?) ?? ?? ?? ?? **tcp-flags "(ack | rst)"**???. ?? ? ?? TCP ?? ???? ?? ???? TCP ???? ??????.).

```
[edit firewall family inet filter local_acl]
user@R2# set term tcp-estab from protocol tcp
user@R2# set term tcp-estab from tcp-established
user@R2# set term tcp-estab then accept
```

5. ?? ?? *default-term*?(?) ??????. ? ???? ?? ?? ????? ??????. Junos OS ???? ?? ???? ????? *??* ???? ?????. *default-term*?(?) ???? *??* ???? ?? ???? ??????? ???? ???? ?????????. ???? ????? ???? ?? ?? ?? ????? ??????.

   ?: ? ?????? ?? ?? ????? ?????? ?????? ??, ???? ???? ????? ? ?? ?????. ???? ???? ???? ?? ??????? ? ??????.

```
[edit firewall family inet filter local_acl]
user@R2# set term default-term then accept
```

6. ??? ??????? ???? ?? ???? ??? ??????.

```
[edit]
user@R2# set interfaces lo0 unit 0 family inet filter input local_acl
user@R2# set interfaces lo0 unit 0 family inet address 192.168.255.2/32
```

7. R1 ?????? ??? ??? ?? ??? ??, ge-0/0/0 ??????, ?? ??? ???? SSH ? Telnet? ?? ?? ???? ???????.

```
[edit]
user@R2# set system host-name R2
user@R2# set system services ssh root-login allow
user@R2# set system services telnet
user@R2# set interfaces ge-0/0/0 description "Link from R2 to R1"
user@R2# set interfaces ge-0/0/0 unit 0 family inet address 192.168.1.2/30
user@R2# set routing-options static route 192.168.255.1/32 next-hop 192.168.1.1
```

???? R2? ?? ?? ? ??

??? ??

R2 ??????? ?? ??? ???? ?????? ?? ??? ???????.

1. show firewall ?? ?? ??? ???? ??? ??? ??? ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ???????.

```
[edit]
user@R2# show firewall
family inet {
    filter local_acl {
        term terminal_access {
            from {
                source-address {
                    192.168.1.0/30;
                }
                protocol tcp;
                port [ssh telnet];
            }
            then accept;
        }
        term terminal_access_denied {
```

```
            from {
                protocol tcp;
                port [ssh telnet];
            }
            then {
                log;
                reject;
            }
        }
        term default-term {
            then accept;
        }
    }
}
```

2. show interfaces ?? ?? ???? ????? ?????? ?? ? ?? ????????? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ???? ????? ???? ????????.

```
[edit]
user@R2# show interfaces
ge-0/0/0 {
    description "Link from R2 to R1";
    unit 0 {
        family inet {
            address 192.168.1.2/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            filter {
                input local_acl;
            }
            address 192.168.255.2/32;
        }
    }
}
```

3. R1 [illegible] Telnet [illegible] SSH [illegible]. show routing-options [illegible] show system services [illegible].

```
[edit]
user@R2# show routing-options
static {
    route 192.168.255.1/32 next-hop 192.168.1.1;
}
user@R2# show system services
ssh {
    root-login allow;
    }
telnet;
```

4. R2 [illegible].

[illegible]: commit-confirmed[illegible] [illegible].

```
[edit]
user@R2# commit
```

[illegible]

in this section

- [illegible] | 1025
- [illegible] | 1026

Telnet [illegible] SSH [illegible].

□□□ □□ □□

□□

□□□□ 192.168.1.0/30 □□□□□ □□□ □ □□□ □□□ SSH □ Telnet□ □□□ □□□□□ □□□□□.

□□

1. □□□ □□ □□□□□ □□□ □□□ □□□□□.

```
user@R2> clear firewall log
```

2. 192.168.1.0/30 □□□ *□*IP □□□ □□□□□ □□□ □□ □□□ SSH□ □□□□ □□□□□ □□□□ □ □□□ □□□□□ ssh *192.168.255.2*□ □□ □□□□ □□□. □ □□□ □□□□□ □□□ □ □□□ □□ □□ □□□ □□ □□ □□□ □□□ □□ □□ □□□ □□□□ □□□ □□□. □□□ □□□□ □□ □ □□ SSH □□□□ *user*□ □□ SSH □□□ □□ □□□□□ □□□□ □□□□□.

> □: □□□□□ R1 □□□□□ □□□ □□□□ □ □□□□ □□ □□□□□□□ SSH □□□□ □□□□□. □□□□□, □ □□□□ R1 □□□ □□ ge-0/0/0 □□□□□□ □□□ 192.168.1.1 □□□□ □□□□□.

```
user@R1>ssh 192.168.255.2
Password:
Last login: Wed Aug 19 09:23:58 2020 from 192.168.1.1
--- JUNOS 20.2R1.10 Kernel 64-bit  JNPR-11.0-20200608.0016468_buil
user@R2>
```

3. SSH □□□ □□□□ R2 □□□□□ CLI□□ □□□□□□□□□.

```
user@R2> exit
logout
Connection to 192.168.255.2 closed.
user@R1>
```

4. 192.168.1.0/30□□□ *□*IP □□□ □□□□□, □□□ □□ □□□□ Telnet□ □□□□ □□□ □□ □□□□ □□□□ □ □□□ □□□□□ telnet *192.168.255.2* □□□ □□□□ □□□. □ □□□ □□□□□ □□□ □ □□□ □□ □□ □□□ □□ □□ □□□ □□□ □□ □□ □□□ □□□□ □□□ □□□.

```
user@host-A> telnet 192.168.255.2
Trying 192.168.255.2...
```

```
Connected to 192.168.255.2.
Escape character is '^]'.
login: user
Password:

--- JUNOS 20.2R1.10 Kernel 64-bit  JNPR-11.0-20200608.0016468_buil
user@R2>
```

5. R2 □□□□□ □□ Telnet □□□ □□□□ CLI□□ □□□□□□□□□.

```
user@R2:~ # exit
Connection closed by foreign host.

root@R1>
```

6. show firewall log □□□ □□□□ R2 □□□□□ □□ □□ □□(PIFE) □□□ □□ □□□ 192.168.1.0/30 □□□ □□ □□□ □□ □□ □□□ □□□□ □□ *□□□* □□□□□□□.

```
user@R2> show firewall log
```

□□ □ □□□ □□ □□

□□

□□□ □□□ 192.168.1.0/30 □□□□□ □□□□ *□□*SSH □ Telnet □□□□ □□□ □□□□□ □□□□□.

□□

1. □□□ □□ □□□□□ □□□ □□□ □□□□□.

```
user@R2> clear firewall log
```

2. R1 [illegible] SSH [illegible]. [illegible] 192.168.1.0/30 [illegible] *[illegible]* [illegible]. [illegible] SSH[illegible] *[illegible]* [illegible] ssh *192.168.255.2* source *192.168.255.1* [illegible].

```
user@R1 ssh 192.168.255.2 source 192.168.255.1
ssh: connect to host 192.168.255.2 port 22: Connection refused

root@R1>
```

[illegible] SSH [illegible]. [illegible] ICMP [illegible] SSH [illegible].

3. R1 [illegible] Telnet [illegible]. [illegible] 192.168.1.0/30 [illegible] *[illegible]* [illegible]. [illegible] Telnet[illegible] *[illegible]* [illegible] telnet *192.168.255.2* source *192.168.255.1* [illegible]. [illegible] PFE[illegible].

```
user@R1> telnet 192.168.255.2 source 192.168.255.1
Trying 192.168.255.2...
telnet: connect to address 192.168.255.2: Connection refused
telnet: Unable to connect to remote host
```

[illegible] Telnet [illegible]. [illegible] ICMP [illegible] Telnet [illegible].

4. R2 [illegible] 192.168.255.1 [illegible] show firewall log [illegible].

```
user@R2> show firewall log
Log :
Time      Filter  Action  Interface     Protocol    Src Addr        Dest Addr
15:17:11  pfe     R       ge-0/0/0.0    TCP         192.168.255.1   192.168.255.2
15:12:04  pfe     R       ge-0/0/0.0    TCP         192.168.255.1   192.168.255.2
```

[illegible] 192.168.255.1 [illegible] *terminal_access_denied* [illegible]. Action [illegible] R[illegible]([illegible]) [illegible]. [illegible], [illegible].

?: TFTP ???? ???? ?? ??

in this section

- ?? ?? | 1028
- ?? | 1028
- ?? | 1028
- ?? | 1031

?? ??

? ?? ???? ?? ???? ???? ??? ??? ??? ???? ????.

??

in this section

- ???? | 1028

????? Junos OS? ??? ??(DoS) ??? ?? ???? ??? ?? ?? ??? 0.0.0.0?? ?? ??? 255.255.255.255? DHCP(Dynamic Host Configuration Protocol) ?? BOOTP(Bootstrap Protocol) ??? ????? ?????. ? ?? ??? ????? RPF ???? ???. ???? ?? ????? ??? ??? ??? ???? ?????.

????

?? ???? ???? ?? ???? ?? ???? ? ???? ?? ???? ???? ??? ???? ?? RPF-check ??? ????? ??? ??? ? ????. ? ???? TFTP(Trivial File Transfer Protocol) ???? ???? TFTP ?? ?? ???? ?????.

??

in this section

- CLI ?? ?? | 1029

- [illegible] | 1029
- [illegible] | 1030
- [illegible] | 1030

[illegible]. CLI [illegible] "[illegible] CLI [illegible]" [illegible] 1787.

[illegible].

CLI [illegible]

[illegible], [illegible] [illegible], [illegible] [illegible].

```
set firewall family inet filter tftp_access_control term one from protocol udp
set firewall family inet filter tftp_access_control term one from port tftp
set firewall family inet filter tftp_access_control term one then log
set firewall family inet filter tftp_access_control term one then discard
set interfaces lo0 unit 0 family inet filter input tftp_access_control
set interfaces lo0 unit 0 family inet address 127.0.0.1/32
```

[illegible]

TFTP [illegible]:

1. [illegible] tftp_access_control[illegible].

```
[edit]
user@host# edit firewall family inet filter tftp_access_control
```

2. UDP [illegible] 69[illegible].

```
[edit firewall family inet filter tftp_access_control]
user@host# set term one from protocol udp
user@host# set term one from port tftp
```

3. [illegible].

```
[edit firewall family inet filter tftp_access_control]
user@host# set term one then log
user@host# set term one then discard
```

[illegible]

[illegible]

[illegible].

- ```
  [edit]
  user@host# set interfaces lo0 unit 0 family inet filter input tftp_access_control
  user@host# set interfaces lo0 unit 0 family inet address 127.0.0.1/32
  ```

[illegible]

[illegible]

[illegible].

1. [illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter tftp_access_control {
        term one {
            from {
                protocol udp;
                port tftp;
            }
            then {
                log;
                discard;
            }
        }
```
```

```
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
lo0 {
    unit 0 {
        family inet {
            filter {
                input tftp_access_control;
            }
            address 127.0.0.1/32;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

in this section

- ?? ? ??? ?? ?? | 1031

??? ???? ???? ??? ?????.

?? ? ??? ?? ??

??

??? ?? ??? ??? ??????? ?????.

??

??

1. ??? ?? ????? ??? ??? ?????.

```
user@myhost> clear firewall log
```

2. ?? ?????? ? ??? ?? ???? UDP ?? 69 ? ??? ????.

?? ??

?? ??? ?? ?? ?? ?? | 731

?: ??? ? ?? ??? ???? ?????? ?? ??? ??? ?? ?? | 1008

?: Block Telnet ? SSH ???? ?? ?? ?? | 1015

?: ?????? OSPF ??? ????? ?? ?? | 1127

?: ??? ???? DHCP ??? ????? ?? ?? | 1123

?: IPv6 TCP ???? ???? ??? ????? ?? ??

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- ?? ?? | 1032
- ?? | 1033
- ?? | 1033
- ?? | 1035

? ?? ???? ? ?? ???? ??? ?????? ?? ??? ??? ??? ???? ??? ?????.

?? ??

? ?? ????? ?? ???? ???? ??? ??? ??? ???? ????.

??

? ?????? ?? IPv6 TCP ???? ?? ??? ???? ??? ??????.

??

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- CLI ?? ?? | 1033
- ??? ??? ?? ?? | 1033
- ??? ??????? ??? ?? ?? | 1034
- ?? ?? ?? ? ?? | 1034

?? ?? ?? ???? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ??????? "?? ???? CLI ??? ??" ??? 1787.

CLI ?? ??

? ?? ??? ?????? ?? ??? ??? ??? ???? ? ??? ??? ?? ??? ?? ??? CLI? ??????? [edit] .

```
set firewall family inet6 filter tcp_filter term 1 from next-header tcp
set firewall family inet6 filter tcp_filter term 1 from tcp-flags syn
set firewall family inet6 filter tcp_filter term 1 then count tcp_syn_pkt
set firewall family inet6 filter tcp_filter term 1 then log
set firewall family inet6 filter tcp_filter term 1 then accept
set interfaces lo0 unit 0 family inet6 filter input tcp_filter
set interfaces lo0 unit 0 family inet6 address ::10.34.1.0/120
```

??? ??? ?? ??

??? ??

??? ??? ?????? ??? ??????.

1. IPv6 ??? ??? ??? **tcp_filter**??????.

```
[edit]
user@host# edit firewall family inet6 filter tcp_filter
```

2. ??? TCP ??? ?? ????? IPv6 ?? ??? ?? ??? TCP ??? ?? ??? ?????? ??????.

```
[edit firewall family inet6 filter tcp_filter]
user@host# set term 1 from next-header tcp
user@host# set term 1 from tcp-flags syn
```

3. ????? ???? ????? ?? ?? ???? ???? ????? ?????? ??????.

```
[edit firewall family inet6 filter tcp_filter]
user@host# set term 1 then count tcp_syn_pkt
user@host# set term 1 then log
user@host# set term 1 then accept
```

??? ???????? ???? ?? ??

??? ??

??? ???????? ???? ???? ?????? ???? ??????.

- ```
  [edit]
  user@host# set interfaces lo0 unit 0 family inet6 filter input tcp_filter
  user@host# set interfaces lo0 unit 0 family inet6 address ::10.34.1.0/120
  ```

?? ?? ?? ? ??

??? ??

?? ???? ???? ? ?????? ???? ??????.

1. ?? ?? ???? ????? ???? ???? ???? show firewall ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ????? ???? ???? ????.

```
[edit]
user@host# show firewall
family inet6 {
    filter tcp_filter {
        term 1 {
            from {
                next-header tcp;
```
```

```
                tcp-flags syn;
            }
            then {
                count tcp_syn_pkt;
                log;
                accept;
            }
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
lo0 {
    unit 0 {
        family inet6 {
            filter {
                input tcp_filter;
            }
            address ::10.34.1.0/120;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ????? ????? ?? ?? ??? **show firewall** ?????.

?? ??

□: TCP □ ICMP □□□□□□□ □□□□ □□ □□□ □□□ □□ □□ | 1044

□: □□□ BGP □□□ □□□□ □□□ □□ TCP □□□□ □□□□ □□ □□ | 1036

□: □□□ BGP □□□ □□□□ □□□ □□ TCP □□□□ □□□□ □□ □□

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- □□ | 1037
- □□ | 1042

□ □□ □□□ BGP □□□ □□□ □□ □□□□ □□ 179□ □□ □□ TCP □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□ □□□ □□□□□.

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□ □□□ □□□□ □□ □□□□ □□□ □□□ □□□ □□□ □□□□ □□□□.

□□

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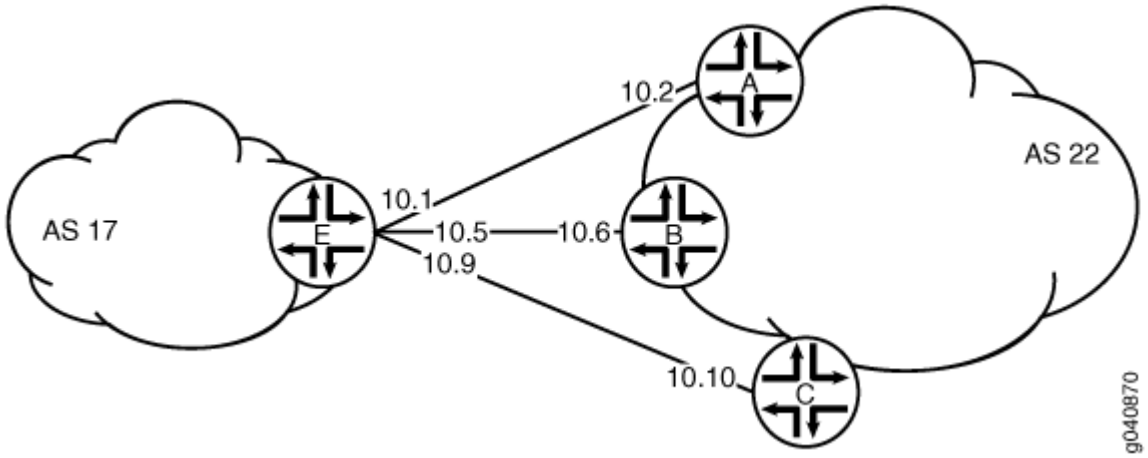
□ □□□□□ □□□ BGP □□□ □□□ □□ □□□□ □□ 179□ □□ □□ TCP □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□.

□□□□□□ □□□ □□□ **filter_bgp179** □□□□ A□ □□□□ B□ □□ □□□ □□□□□□□ □□ □□□ □□ □□ □□ 179□ □□□□□□□.

□□□□

□□ 52 □□□ 1037 □ □□□□ □□□□ □□□□□ □□□□□. □□□□ C□ □□□□ E□ TCP □□□ □□□□, □□□□ E□ □□ □□□ □□□□□. □ □□ □ □□□ E□ □□□ □□□□□.

□□ 52: BGP □□ □□□ □□ □□□□ □□□□



□□

in this section

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- □□□□ E □□ | 1038

CLI □□ □□

□ □□ □□□ □□□□□, □□ □□□ □□□□ □□□ □□□ □□ □□ □□ □□ □□□□□□□□ □□□□, □□□□ □□□ □□□□ □ □□□ □□ □□□ □□□ [edit] □ □ □□□□ □□□ CLI□ □□□ □□ □□□□.

□□□□ C

```
set interfaces ge-1/2/0 unit 10 description to-E
set interfaces ge-1/2/0 unit 10 family inet address 10.10.10.10/30
set protocols bgp group external-peers type external
set protocols bgp group external-peers peer-as 17
set protocols bgp group external-peers neighbor 10.10.10.9
set routing-options autonomous-system 22
```

????? E

```
set interfaces ge-1/2/0 unit 0 description to-A
set interfaces ge-1/2/0 unit 0 family inet address 10.10.10.1/30
set interfaces ge-1/2/1 unit 5 description to-B
set interfaces ge-1/2/1 unit 5 family inet address 10.10.10.5/30
set interfaces ge-1/0/0 unit 9 description to-C
set interfaces ge-1/0/0 unit 9 family inet address 10.10.10.9/30
set interfaces lo0 unit 2 family inet filter input filter_bgp179
set interfaces lo0 unit 2 family inet address 192.168.0.1/32
set protocols bgp group external-peers type external
set protocols bgp group external-peers peer-as 22
set protocols bgp group external-peers neighbor 10.10.10.2
set protocols bgp group external-peers neighbor 10.10.10.6
set protocols bgp group external-peers neighbor 10.10.10.10
set routing-options autonomous-system 17
set firewall family inet filter filter_bgp179 term 1 from source-address 10.10.10.2/32
set firewall family inet filter filter_bgp179 term 1 from source-address 10.10.10.6/32
set firewall family inet filter filter_bgp179 term 1 from destination-port bgp
set firewall family inet filter filter_bgp179 term 1 then accept
set firewall family inet filter filter_bgp179 term 2 then reject
```

????? E ??

??? ??

?? ?? ?? ????? ???? ???? ???? ??????. CLI ?? ?? ??? Junos OS CLI ???? ???? *?? ?????? CLI ???? ??*? ????????.

??? BGP ??? ??? ?? ????? ?? 179? ?? ?? TCP ?? ??? ????? ?? ??? ??? ??? ????? E? ?????? ??? ??????.

1. ??????? ??????.

```
user@E# set interfaces ge-1/2/0 unit 0 description to-A
user@E# set interfaces ge-1/2/0 unit 0 family inet address 10.10.10.1/30
user@E# set interfaces ge-1/2/1 unit 5 description to-B
user@E# set interfaces ge-1/2/1 unit 5 family inet address 10.10.10.5/30
user@E# set interfaces ge-1/0/0 unit 9 description to-C
user@E# set interfaces ge-1/0/0 unit 9 family inet address 10.10.10.9/30
```

2. BGP□ □□□□□.

```
[edit protocols bgp group external-peers]
user@E# set type external
user@E# set peer-as 22
user@E# set neighbor 10.10.10.2
user@E# set neighbor 10.10.10.6
user@E# set neighbor 10.10.10.10
```

3. AS(Autonomous System) □□□ □□□□□.

```
[edit routing-options]
user@E# set autonomous-system 17
```

4. □□□ BGP □□□□ □□ 179□ □□ TCP □□ □□□ □□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter_bgp179]
user@E# set term 1 from source-address 10.10.10.2/32
user@E# set term 1 from source-address 10.10.10.6/32
user@E# set term 1 from destination-port bgp
user@E# set term 1 then accept
```

5. □□ □□□ □□□ □□□□ □□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter_bgp179]
user@E# set term 2 then reject
```

6. □□□ □□□□□□□ □□□ □□□ □□□□□.

```
[edit interfaces lo0 unit 2 family inet]
user@E# set filter input filter_bgp179
user@E# set address 192.168.0.1/32
```

??

?? ????? **show firewall**, **show interfaces**, **show protocols** ? **show routing-options** ??? ????? ??? ??????. ?? ??? ??? ????? ????? ???? ? ?? ??? ????? ??? ???????.

```
user@E# show firewall
family inet {
    filter filter_bgp179 {
        term 1 {
            from {
                source-address {
                    10.10.10.2/32;
                    10.10.10.6/32;
                }
                destination-port bgp;
            }
            then accept;
        }
        term 2 {
            then {
                reject;
            }
        }
    }
}
```

```
user@E# show interfaces
lo0 {
    unit 2 {
        family inet {
            filter {
                input filter_bgp179;
            }
            address 192.168.0.1/32;
        }
    }
}
ge-1/2/0 {
    unit 0 {
        description to-A;
        family inet {
```

```
            address 10.10.10.1/30;
        }
    }
}
ge-1/2/1 {
    unit 5 {
        description to-B;
        family inet {
            address 10.10.10.5/30;
        }
    }
}
ge-1/0/0 {
    unit 9 {
        description to-C;
        family inet {
            address 10.10.10.9/30;
        }
    }
}
```

```
user@E# show protocols
bgp {
    group external-peers {
        type external;
        peer-as 22;
        neighbor 10.10.10.2;
        neighbor 10.10.10.6;
        neighbor 10.10.10.10;
    }
}
```

```
user@E# show routing-options
autonomous-system 17;
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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in this section

- ??? ??????? ?? | 1042
- TCP ?? ?? | 1042
- ??????? ???? ???? | 1043

??? ???? ???? ??? ??????.

??? ??????? ??

??

??? ??? show firewall filter ??? ???? ??? ??????.

??

```
user@E> show firewall filter filter_bgp179
Filter: filter_bgp179
```

TCP ?? ??

??

TCP ??? ??????.

??

?? ???? ???? C? ???? E?? ???? ?????? show system connections extensive .

□□□□ C□ □□□ TCP □□ □□ □□□ □□□□□. □□□□ E□ □□□ □□□□ A □ □□□□ B□□ □□□ □□□□□□ □□□□□.

```
user@C> show system connections extensive | match 10.10.10

tcp4       0      0  10.10.10.9.51872     10.10.10.10.179       SYN_SENT
```

```
user@E> show system connections extensive | match 10.10.10

tcp4       0      0  10.10.10.5.179        10.10.10.6.62096     ESTABLISHED
tcp4       0      0  10.10.10.6.62096      10.10.10.5.179       ESTABLISHED
tcp4       0      0  10.10.10.1.179        10.10.10.2.61506     ESTABLISHED
tcp4       0      0  10.10.10.2.61506      10.10.10.1.179       ESTABLISHED
```

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monitor traffic □□□ □□□□ TCP □□□ □□□□ □□□□□□ □□□□ TCP □□□ □□□□ □□ □□□□□□ □□□□ □□□□□.

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□□ □□□□ □□□□ E □□□□□□□ □□□□ B□, □□□□ E □□□□□□□ □□□□ C□ □□□ □□□□□ **monitor traffic** . □□ □□ □□□ □ □□ □□ □□ □□ □□(ack) □□□□ □□□□□□ □□□□□. □ □□ □□□□ **ack** □□□□ □□□□ □□□□.

```
user@E> monitor traffic size 1500 interface ge-1/2/1.5
19:02:49.700912 Out IP 10.10.10.5.bgp > 10.10.10.6.62096: P 3330573561:3330573580(19) ack
915601686 win 16384 <nop,nop,timestamp 1869518816 1869504850>: BGP, length: 19
19:02:49.801244  In IP 10.10.10.6.62096 > 10.10.10.5.bgp: . ack 19 win 16384 <nop,nop,timestamp
1869518916 1869518816>
19:03:03.323018  In IP 10.10.10.6.62096 > 10.10.10.5.bgp: P 1:20(19) ack 19 win 16384
<nop,nop,timestamp 1869532439 1869518816>: BGP, length: 19
19:03:03.422418 Out IP 10.10.10.5.bgp > 10.10.10.6.62096: . ack 20 win 16384 <nop,nop,timestamp
1869532539 1869532439>
19:03:17.220162 Out IP 10.10.10.5.bgp > 10.10.10.6.62096: P 19:38(19) ack 20 win 16384
<nop,nop,timestamp 1869546338 1869532439>: BGP, length: 19
```

```
19:03:17.320501  In IP 10.10.10.6.62096 > 10.10.10.5.bgp: . ack 38 win 16384 <nop,nop,timestamp
1869546438 1869546338>
```

```
user@E> monitor traffic size 1500 interface ge-1/0/0.9

18:54:20.175471 Out IP 10.10.10.9.61335 > 10.10.10.10.bgp: S 573929123:573929123(0) win 16384
<mss 1460,nop,wscale 0,nop,nop,timestamp 1869009240 0,sackOK,eol>
18:54:23.174422 Out IP 10.10.10.9.61335 > 10.10.10.10.bgp: S 573929123:573929123(0) win 16384
<mss 1460,nop,wscale 0,nop,nop,timestamp 1869012240 0,sackOK,eol>
18:54:26.374118 Out IP 10.10.10.9.61335 > 10.10.10.10.bgp: S 573929123:573929123(0) win 16384
<mss 1460,nop,wscale 0,nop,nop,timestamp 1869015440 0,sackOK,eol>
18:54:29.573799 Out IP 10.10.10.9.61335 > 10.10.10.10.bgp: S 573929123:573929123(0) win 16384
<mss 1460,sackOK,eol>
18:54:32.773493 Out IP 10.10.10.9.61335 > 10.10.10.10.bgp: S 573929123:573929123(0) win 16384
<mss 1460,sackOK,eol>
18:54:35.973185 Out IP 10.10.10.9.61335 > 10.10.10.10.bgp: S 573929123:573929123(0) win 16384
<mss 1460,sackOK,eol>
```

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□: TCP □ ICMP □□□□□□□ □□□□ □□ □□□ □□□ □□ □□ | 1044

□: IPv6 TCP □□□□ □□□□ □□□ □□□□□ □□ □□ | 1032

□: TCP □ ICMP □□□□□□ □□□□ □□ □□□ □□□ □□ □□

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- □□ | 1045
- □□ | 1046
- □□ | 1053

□ □□□□ TCP □ ICMP □□□ □□ □□□□□□ □□□□ □□ □□□ □□□ □□□ □□□ □□□ □□□□□.

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□ □□□□ TCP □ ICMP □□□ □□□□ □□□ □□□ □□□ protect-RE □□□□. □□□ □□□ □□□□ □□□□□.

- tcp-connection-policer—□ □□□□ TCP □□□□ 1,000,000bps(□□ □□ □)□ □□□□ □□ □□□ □□□ 15,000□□□□□□. □ □□ □ □□□ □□□□ □□□□ □□□□□.
- icmp-policer- □ □□□□ ICMP □□□□ 1,000,000bps□ □□□□ □□ □□□ □□□ 15,000□□□□□□. □ □□ □ □□□ □□□□ □□□□ □□□□□.

□□□ □□□ □ □□□ □□□ 32,000bps□□ 32,000,000,000bps□□□ □ □□□ □□□ □□ □□□ 1,500□□□□□ 100,000,000□□□□ □ □□□□□. □□□ □□□ □ □□ □□□ □□□□□. k(1,000), m(1,000,000) □ g(1,000,000,000).

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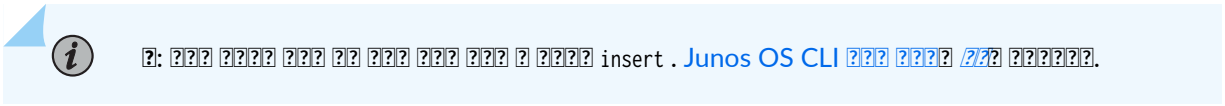
- tcp-connection-term- □□ □□□ 192.168.0.0/24 □□ 10.0.0.0/24□ □□ TCP □□□ □□□□□□□. □□□ □□□ □□□ □□□ □□□ □ trusted-addresses □□□□.

  □□□□ □□□□ □□□ tcp-established □□□□□tcp-established. □□ □□□ □□ □□ □□ □□tcp-flags “(ack | rst)”□ □□□□, □□ □ TCP □□□ □□□□□ TCP □□□ □ □□ □□□ □□□□ □□□□.

- icmp-term- ICMP □□ □□. □□ ICMP □□□ □□□□□ icmp-counter □□□□□.



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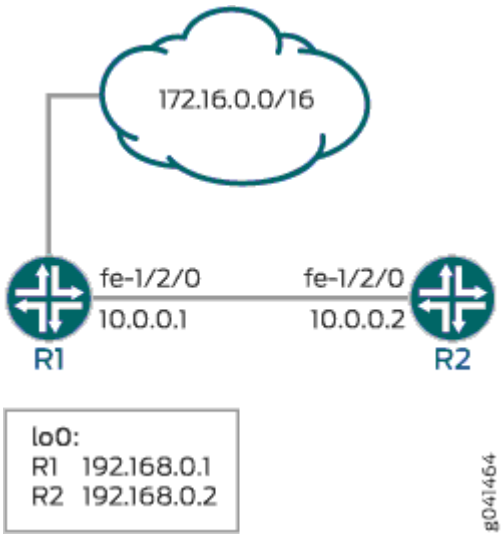
□□ 53 □□□ 1046□ □□ □□□□□ □□□□□.

□□ 53: TCP □ ICMP □□□□□□□ □□□□ □□ □□□ □□



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"CLI □□ □□" □□□ 1046□(□) □□ 53 □□□ 1046 □ □□ □□□□□ □□□ □□□□□.

□□ "No Link Title" □□□ 1048□ □□□□ R2□ □□□ □□□□□.

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CLI □□ □□

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□□□□ R1

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.1/30
set interfaces lo0 unit 0 family inet address 192.168.0.1/32 primary
set interfaces lo0 unit 0 family inet address 172.16.0.1/32
```

```
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext peer-as 200
set protocols bgp group ext neighbor 10.0.0.2
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options router-id 192.168.0.1
set routing-options autonomous-system 100
```

???? R2

```
set interfaces fe-1/2/0 unit 0 family inet address 10.0.0.2/30
set interfaces lo0 unit 0 family inet filter input protect-RE
set interfaces lo0 unit 0 family inet address 192.168.0.2/32 primary
set interfaces lo0 unit 0 family inet address 172.16.0.2/32
set protocols bgp group ext type external
set protocols bgp group ext export send-direct
set protocols bgp group ext neighbor 10.0.0.1 peer-as 100
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface fe-1/2/0.0
set policy-options prefix-list trusted-addresses 10.0.0.0/24
set policy-options prefix-list trusted-addresses 192.168.0.0/24
set policy-options policy-statement send-direct term 1 from protocol direct
set policy-options policy-statement send-direct term 1 then accept
set routing-options router-id 192.168.0.2
set routing-options autonomous-system 200
set firewall family inet filter protect-RE term tcp-connection-term from source-prefix-list
trusted-addresses
set firewall family inet filter protect-RE term tcp-connection-term from protocol tcp
set firewall family inet filter protect-RE term tcp-connection-term from tcp-established
set firewall family inet filter protect-RE term tcp-connection-term then policer tcp-connection-
policer
set firewall family inet filter protect-RE term tcp-connection-term then accept
set firewall family inet filter protect-RE term icmp-term from source-prefix-list trusted-
addresses
set firewall family inet filter protect-RE term icmp-term from protocol icmp
set firewall family inet filter protect-RE term icmp-term then policer icmp-policer
set firewall family inet filter protect-RE term icmp-term then count icmp-counter
set firewall family inet filter protect-RE term icmp-term then accept
set firewall policer tcp-connection-policer filter-specific
```

```
set firewall policer tcp-connection-policer if-exceeding bandwidth-limit 1m
set firewall policer tcp-connection-policer if-exceeding burst-size-limit 15k
set firewall policer tcp-connection-policer then discard
set firewall policer icmp-policer filter-specific
set firewall policer icmp-policer if-exceeding bandwidth-limit 1m
set firewall policer icmp-policer if-exceeding burst-size-limit 15k
set firewall policer icmp-policer then discard
```

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. CLI [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] "[illegible] [illegible] CLI [illegible] [illegible]" [illegible] 1787.

[illegible] [illegible] [illegible] [illegible] [illegible]:

1. [illegible] [illegible] [illegible].

```
[edit interfaces fe-1/2/0 unit 0 family inet ]
user@R2# set address 10.0.0.2/30
[edit interfaces lo0 unit 0 family inet]
user@R2# set address 192.168.0.2/32 primary
user@R2# set address 172.16.0.2/32
```

2. BGP [illegible] [illegible] [illegible].

```
[edit protocols bgp group ext]
user@R2# set type external
user@R2# set export send-direct
user@R2# set neighbor 10.0.0.1 peer-as 100
```

3. [illegible] [illegible](AS) [illegible] [illegible] [illegible] ID[illegible] [illegible].

```
[edit routing-options]
user@R2# set autonomous-system 200
user@R2# set router-id 192.168.0.2
```

4. OSPF□ □□□□□.

```
[edit protocols ospf area 0.0.0.0]
user@R2# set interface lo0.0 passive
user@R2# set interface fe-1/2/0.0
```

5. □□□ □ □□ □□ □□□ □□□□□.

```
[edit policy-options prefix-list trusted-addresses]
user@R2# set 10.0.0.0/24
user@R2# set 192.168.0.0/24
```

6. □□ □□□ □□□□ □□□ □□□□□.

```
[edit policy-options policy-statement send-direct term 1]
user@R2# set from protocol direct
user@R2# set then accept
```

7. TCP □□□□ □□□□□.

```
[edit firewall policer tcp-connection-policer]
user@R2# set filter-specific
user@R2# set if-exceeding bandwidth-limit 1m
user@R2# set if-exceeding burst-size-limit 15k
user@R2# set then discard
```

8. ICMP □□□□ □□□□□.

```
[edit firewall policer icmp-policer]
user@R2# set filter-specific
user@R2# set if-exceeding bandwidth-limit 1m
user@R2# set if-exceeding burst-size-limit 15k
user@R2# set then discard
```

9. TCP ?? ??? ??????.

```
[edit firewall family inet filter protect-RE term tcp-connection-term]
user@R2# set from source-prefix-list trusted-addresses
user@R2# set from protocol tcp
user@R2# set from tcp-established
user@R2# set then policer tcp-connection-policer
user@R2# set then accept
```

10. ICMP ?? ??? ??????.

```
[edit firewall family inet filter protect-RE term icmp-term]
user@R2# set from source-prefix-list trusted-addresses
user@R2# set from protocol icmp
user@R2# set then policer icmp-policer
user@R2# set then count icmp-counter
user@R2# set then accept
```

11. ??? ??????? ??? ??????.

```
[edit interfaces lo0 unit 0]
user@R2# set family inet filter input protect-RE
```

??

?? ????? , show protocols, show policy-options, show routing-options? show firewall ??? ????? show interfaces??? ? ?????. ?? ??? ??? ????? ????? ??? ? ?? ??? ????? ??? ???????.

```
user@R2# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            address 10.0.0.2/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
```

```
            filter {
                input protect-RE;
            }
            address 192.168.0.2/32 {
                primary;
            }
            address 172.16.0.2/32;
        }
    }
}
```

```
user@R2# show protocols
bgp {
    group ext {
        type external;
        export send-direct;
        neighbor 10.0.0.1 {
            peer-as 100;
        }
    }
}
ospf {
    area 0.0.0.0 {
        interface lo0.0 {
            passive;
        }
        interface fe-1/2/0.0;
    }
}
```

```
user@R2# show policy-options
prefix-list trusted-addresses {
    10.0.0.0/24;
    192.168.0.0/24;
}
policy-statement send-direct {
    term 1 {
        from protocol direct;
        then accept;
```

```
    }
}
```

```
user@R2# show routing-options
router-id 192.168.0.2;
autonomous-system 200;
```

```
user@R2# show firewall
family inet {
    filter protect-RE {
        term tcp-connection-term {
            from {
                source-prefix-list {
                    trusted-addresses;
                }
                protocol tcp;
                tcp-established;
            }
            then {
                policer tcp-connection-policer;
                accept;
            }
        }
        term icmp-term {
            from {
                source-prefix-list {
                    trusted-addresses;
                }
                protocol icmp;
            }
            then {
                policer icmp-policer;
                count icmp-counter;
                accept;
            }
        }
    }
}
policer tcp-connection-policer {
    filter-specific;
```

```
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 15k;
    }
    then discard;
}
policer icmp-policer {
    filter-specific;
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 15k;
    }
    then discard;
}
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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- □□□ □□□□ TCP □□□ □□□□ TCP □□ □□ □□ | 1054
- □□□ □□□□ TCP □□□ □□□□ □□□ □ □□ □□□ □□ □□ | 1056
- OSPF□ □□□□ TCP □□□ □□ □□ | 1057
- ICMP □□□ □□ □□ | 1058

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□: TCP □□□□ □□□□ □□ □□ □□ □□□ □□□ □ □□□□. □ □□□ □□□ □□□□ □□□□.

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□□ □□□□ show firewall □□□ □□□□□.

```
user@R2> show firewall
Filter: protect-RE
Counters:
Name                                                Bytes              Packets
icmp-counter                                            0                    0
Policers:
Name                                                Bytes              Packets
icmp-policer                                                                0
tcp-connection-policer                                                      0
```

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□□

□□□□□ □□□ □□□□ from tcp-established □□□□□ TCP □□□ □□□ □ □□□ □□□□□.

1. □□□□ R2□□ □□□□ R1□□ BGP □□□ □□□□□□ □□□□□.

   ```
   user@R2> show bgp summary | match down
   Groups: 1 Peers: 1 Down peers: 0
   ```

2. □□□□ R2□□ □□□□ R1□ □□□□□.

   ```
   user@R2> telnet 192.168.0.1
   Trying 192.168.0.1...
   Connected to R1.example.net.
   Escape character is '^]'.
   ```

```
R1 (ttyp4)

login:
```

3. ???? R1?? ???? R2? ??????.

```
user@R1> telnet 192.168.0.2
Trying 192.168.0.2...
telnet: connect to address 192.168.0.2: Operation timed out
telnet: Unable to connect to remote host
```

4. ???? R2?? ?? ??? ???????? from tcp-established .

```
[edit firewall family inet filter protect-RE term tcp-connection-term]
user@R2# deactivate from tcp-established
user@R2# commit
```

5. ???? R1?? ???? R2? ??? ?? ??????.

```
user@R1> telnet 192.168.0.1
Trying 192.168.0.2...
Connected to R2.example.net.
Escape character is '^]'.

R2 (ttyp4)

login:
```

??

?? ??? ??????:

- ???? BGP ??? ??????. from tcp-established ?? ??? BGP ?? ??? ???? ?? ??? ??????.
- ???? R2?? ???? R1? ??? ??? ? ????. ???? R1?? ??? ??? ??? ???? ?? ???? ??????.
- ???? R1?? ???? R2? ??? ? ????. ??? TCP? ?? ?????? ?????? ? ??? ??? ? ????. ?? ??? ??? ??? ?? ??? ?? from tcp-established . ? ?? ??? ???? R2?? ???? TCP ??? ??? ??????. ? ?? ??? ??????? ?? ??? ??????.

??? ????? TCP ??? ????? ??? ? ?? ??? ?? ??

??

?? ????? ????? ?????? ??????.

??

?????? ???? ? ?? ?? ?? ? ???? ????? IP ??? ????? ?? ???? ??? ? ???? ??????. ?? ??, ??? ? ?? ?? ???? ? ???? ?? ? ? ????? ???? ????? telnet ?????? ????????. ?? ???? ? ?? ?? ???? ????? ?? ???? ?????? ??????.

1. ????? R1?? ???? ? ?? ?? ???? ????? R2? ??????.

```
user@R1> telnet 172.16.0.2 source 172.16.0.1
Trying 172.16.0.2...
^C
```

2. ????? R2?? ???? ? ?? ???? ??? 172.16/16? ??????.

```
[edit policy-options prefix-list trusted-addresses]
user@R2# set 172.16.0.0/16
user@R2# commit
```

3. ????? R1?? ????? R2? ???? ?? ??????.

```
user@R1> telnet 172.16.0.2 source 172.16.0.1
Trying 172.16.0.2...
Connected to R2.example.net.
Escape character is '^]'.

R2 (ttyp4)

login:
```

??

?? ???? ??????:

- ????? R1?? ???? ? ?? ?? ???? ????? ????? R2? ???? ? ?????. 172.16/16 ????? ???? ? ?? ???? ???? ????? ?? ?? 172.16.0.1? ?? ???? ??????.

- OSPF □□ □□□ □□□□□□□□. OSPF□ TCP□ □□ □□□□□□ □□□□ □□□□. □□ □□□ □□□□□□ `from protocol tcp` □□□ OSPF □□ □□□ □□□□ □□□□.

OSPF□ □□□□ TCP □□□ □□ □□

□□

OSPF □□□□ □□□□ □□□□□□ □□□□□□.

□□

□□□□□ OSPF □□□ □□□ □ □□□ □□□□□.

1. □□□□ R1□□ OSPF □□□ □□□□□.

```
user@R1> show ospf neighbor
Address          Interface              State     ID               Pri  Dead
10.0.0.2         fe-1/2/0.0             Init      192.168.0.2      128    34
```

2. □□□□ R2□□ OSPF □□□ □□□□□.

```
user@R2> show ospf neighbor
```

3. □□□□ R2□□ □□ □□□ □□□□□ `from protocol tcp` .

```
[edit firewall family inet filter protect-RE term tcp-connection-term]
user@R2# deactivate from protocol
user@R2# commit
```

4. □□□□ R1□□ OSPF □□□ □□ □□□□□.

```
user@R1> show ospf neighbor
Address          Interface              State     ID               Pri  Dead
10.0.0.2         fe-1/2/0.0             Full      192.168.0.2      128    36
```

5. □□□□ R2□□ OSPF □□□ □□ □□□□□.

```
user@R2> show ospf neighbor
Address          Interface              State     ID               Pri  Dead
10.0.0.1         fe-1/2/0.0             Full      192.168.0.1      128    39
```

□□

□□ □□□ □□□□□:

- OSPF □□ □□□ □□□□□□□. OSPF□ TCP□ □□ □□□□□ □□□□ □□□□. `from protocol tcp` □□ □□□ □□□□□□ OSPF □□ □□ □ □□□□□.

ICMP □□□ □□ □□

□□

ICMP □□□ □□□□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □ □□ □□ □□□□ □□□ □□ ping □□□ □□□□□ □□□□□.

□□

1. □□ □□ □□□□ □□□ □□□ □□ □□□□□.

   TCP □□□ □□□ □□ □□□□□ 172.16/16 □□□ □ □□ □□ □□□ □□□□□.

```
[edit firewall family inet filter protect-RE term tcp-connection-term]
user@R2# activate from protocol
user@R2# activate from tcp-established

[edit policy-options prefix-list trusted-addresses]
user@R2# delete 172.16.0.0/16

user@R2# commit
```

2. □□□□ R1□□ □□□□ R2□ □□□ □□□□□□ ping□□□.

```
user@R1> ping 192.168.0.2 rapid count 600 size 2000
PING 192.168.0.2 (192.168.0.2): 2000 data bytes
!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!
!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!
```

```
!!!!!!!.!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!
!!!!.!!!!!!!!!.!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!
!!!.!!!!!!!!.!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!
!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.
!!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!
--- 192.168.0.2 ping statistics ---
600 packets transmitted, 536 packets received, 10% packet loss
pinground-trip min/avg/max/stddev = 2.976/3.405/42.380/2.293 ms
```

3. [illegible] R2[illegible] [illegible] [illegible] [illegible].

```
user@R2> show firewall

Filter: protect-RE
Counters:
Name                                                Bytes              Packets
icmp-counter                                      1180804                 1135
Policers:
Name                                                Bytes              Packets
icmp-policer                                                           66
tcp-connection-policer                                                  0
```

4. [illegible] R1[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] R2[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R1> ping 172.16.0.2 source 172.16.0.1

PING 172.16.0.2 (172.16.0.2): 56 data bytes
^C
--- 172.16.0.2 ping statistics ---
14 packets transmitted, 0 packets received, 100% packet loss
```

[illegible]

[illegible] [illegible] [illegible]:

- ping [illegible] 10%[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].
- ICMP [illegible] [illegible] [illegible] icmp-policer[illegible] [illegible].
- [illegible] R2[illegible] [illegible] ICMP [illegible] `ping 172.16.0.2 source 172.16.0.1` [illegible] [illegible].

?? ??

?: ??? ? ?? ??? ????? ?????? ?? ??? ??? ?? ?? | 1008

2? ??? ?? ?? | 1916

?: ?? ?? ?? ?? ??? ??? ?? ??

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- ?? | 1061
- ?? | 1064

? ????? ??? ????? ?? ?? ?? ? ?? ?? ?? ??? ????? ??? ??????. ?? ??? ?? ??????? ??? ??? ????? ?? ??? ?????? ? ??????.

??-??: ??? ??? ??? ??? ??? ??? ??? ????? ? ??? ? ?? ?? ?? ??? ? ??? ?????. ??? ??? ??? ????? ? ??? ?? ?? ??? ??????. Day One ?? : ??? ??? M, MX, T ??? ?? ??? ?? ??? ????????.

?? ??

? ?? ????? ?? ????? ????? ??? ??? ??? ????? ?????.

??

? ????? ??????? ??? ??? ????? ??? ??????(lo0.0)? ?? ??? ????? ??? ?? ????? ?? ?? ?? ?(pps) ?? ??? ??????.

??? ??? ?? ?? ??? ????? ???????:

1. ??? ?? ????? `policer` *policer-name* ????? `[edit firewall]` ?? ????? ??????.
2. ????? ?? ????? ????? ????? ?? ????? `policer` *policer-name* ????? ??????.

??? ?????? ??? ?? ?? `policer (input | output)` *policer-name* ?? ????? ??? ?? ?????.

??

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- CLI ?? ?? | 1061
- ??? ? ??? ??? ?? ?? | 1061
- ??? ??? ??????? ??? ??? ?? ?? | 1062
- ?? | 1063

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? *CLI ??? ???*?? ?? ????? CLI ??? ??? ???????.

CLI ?? ??

? ?? ??? ??????, ?? ??? ????? ??? ??? ?? ?? ?? ?? ????????? ?????, ????? ??? ????? ? ??? ?? ??? ??? [edit] ? ? ????? ??? CLI? ??? ?? ????.

```
set firewall policer police_pps if-exceeding-pps pps-limit 1k
set firewall policer police_pps if-exceeding-pps packet-burst 150
set firewall policer police_pps then discard
set firewall family inet filter my_pps_filter term term1 then policer police_pps
set interfaces lo0 unit 0 family inet filter input my_pps_filter
set interfaces lo0 unit 0 family inet address 127.0.0.1/32
```

??? ? ??? ??? ?? ??

??? ??

??? *police_pps* ? ??????? ??? ?? *my_pps_filter*??:

1. ??? ????? police_pps??????.

```
[edit firewall]
user@host# set policer police_pps if-exceeding-pps pps-limit 1k
user@host# set policer police_pps if-exceeding-pps packet-burst 150
user@host# set policer police_pps then discard
```

2. [illegible] my_pps_filter[illegible].

```
[edit]
user@host# edit firewall family inet filter my_pps_filter
```

3. [illegible] police_pps [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter my_pps_filter]
user@host# set term term1 then policer police_pps
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] my_pps_filter [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces lo0 unit 0
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces lo0 unit 0]
user@host# set family inet filter input my_pps_filter
```

3. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces lo0 unit 0]
user@host# set family inet address 127.0.0.1/32
```

□□

□□ □□ □□□ □□□□ □□□ □□□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ ? □□□ □□□ □□□ □□□□ □□□ □□ □□□□.

```
user@host# show firewall
family inet{
    filter my_pps_filter {
        term term1 {
            then policer police_pps;
        }
    }
}
policer police_pps {
    if-exceeding-pps {
        pps-limit 1k;
        packet-burst 150;
    }
    then discard;
}
```

□□ □□ □□□ □□□□ show interfaces lo0 □□□□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ ? □□□ □□□ □□□ □□□□ □□□ □□ □□□□.

```
user@host# show interfaces lo0
unit 0 {
    family inet {
        filter {
            input my_pps_filter;
        }
        address 127.0.0.1/32;
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□ □□□□□.

```
user@host# commit
```

??

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- ?? ?? ?? | 1064

?? ?? ??

??

??? ??? ?????? ?????? ?? ?? ??? show firewall filter my_pps_filter ?????.

?: ?? ??? ?? ?????? ??? ?? ???? ?? ping? ??? ?????. ?? pps-limit ? ??? ???? ?? ping ??? ?? ? 50 ??? packet-burst ? 10 ??? ????????.

??

```
user@host> show firewall filter my_pps_filter
Filter: my_pps_filter
Policers:
Name                                                Bytes              Packets
police_pps-term1                                     8704                   17
```

?? ??

?? ??? ?? ?? ?? ?? | 731

pps(Packets-Per-Second) ?? ??? ?? | 1826

if-exceeding-pps(???)

?: LAC ????? ?? DHCPv6 ? ICMPv6 ?? ????? ?????? ?? ??

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- ?? ?? | 1065
- ?? | 1065
- ?? | 1065

? ?? LAC?? ????? ????? ?? ?? ?? ?? ???? ?? DHCPv6 ? ICMPv6 ?? ???? ?? ????? ????? ?? ???? ???? ???? ????? ???? ??????.

?? ??

? ?? ????? ?? ????? ????? ???? ???? ???? ????? ?????.

??

LAC? ???? ????? ???? ???? ???? ? ????? ?? ???? ???? ? ?? ?? ???? ????? ?? ????? ???? ????? ???? ? ?????. LAC? ?? ?? ????? ? ?????? ???? ????? ??????? ????? ???? ????? ???? ??????. ?? ?? ???? ????? ????. ???? ????? ?? ?????? ?? ?? ? ????? ?? ???? ????? ?????. ?? ?? ?? ?? ?? ????? ????? ???? ????? RADIUS ?? ?? ?? ?? CLI ?? ?????? ????? ?????? ????????.

??? L2TP ????? ?? ???? ???? ? LAC?? ???? ????? ?? ???? ???? ????? ??????. ?????? ??? ?? ?? ???? ????? ??? DHCPv6 ? ICMPv6 ?? ???? ????? ? ????? ?? ???? ????? ?????.

Junos OS ??? 17.2R1?? ???? ?? ????? ????? ???? ????? ?? `inet6` ???? ???? ???? ? ?????. ?? ???? ?? ?? ???? `exclude-accounting` ????? ???? ?? ???? ??????.

??

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- ?? | 1069

CLI ?? ??

? ?? ??? ??????, ?? ??? ????? ??? ??? ?? ?? ?? ?? ????????? ?????, ????? ??? ????? ? ??? ?? ??? ??? **[edit]** ? ? ????? ??? CLI? ??? ?? ?????.

```
set access profile v6-exclude-idle session-options client-idle-timeout 10
set access profile v6-exclude-idle session-options client-idle-timeout-ingress-only

edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER
set interface-specific
set term EXCLUDE-ACCT-DHCP-INET6 from next-header udp
set term EXCLUDE-ACCT-DHCP-INET6 from source-port 546
set term EXCLUDE-ACCT-DHCP-INET6 from source-port 547
set term EXCLUDE-ACCT-DHCP-INET6 from destination-port 546
set term EXCLUDE-ACCT-DHCP-INET6 from destination-port 547
set term EXCLUDE-ACCT-DHCP-INET6 then count exclude-acct-dhcpv6
set term EXCLUDE-ACCT-DHCP-INET6 then exclude-accounting

set term EXCLUDE-ACCT-ICMP6 from next-header icmp6
set term EXCLUDE-ACCT-ICMP6 from icmp-type router-solicit
set term EXCLUDE-ACCT-ICMP6 from icmp-type neighbor-solicit
set term EXCLUDE-ACCT-ICMP6 from icmp-type neighbor-advertisement
set term EXCLUDE-ACCT-ICMP6 then count exclude-acct-icmpv6
set term EXCLUDE-ACCT-ICMP6 then exclude-accounting

set term default then accept

top
edit dynamic-profiles pppoe-dynamic-profile interfaces pp0 unit "$junos-interface-unit"
set family inet6 filter input EXCLUDE-ACCT-INET6-FILTER
set family inet6 filter output EXCLUDE-ACCT-INET6-FILTER
set actual-transit-statistics
```

?? ??

??? ??

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ???CLI ??? ????? ?? ????? *CLI* ??? ???????????.

??? ?????? ??? ??????.

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit access profile v6-exclude-idle]
user@host# set session-options client-idle-timeout 10
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit access profile v6-exclude-idle]
user@host# set session-options client-idle-timeout-ingress-only
```

3. [illegible] [illegible] DHCPv6 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   a. [illegible] [illegible] Next Header([illegible] [illegible]) [illegible] UDP(17)[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-DHCP-INET6 from next-header udp
```

   b. [illegible] [illegible] 546 [illegible] 547(DHCPv6)[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-DHCP-INET6 from source-port 546
user@host# set term EXCLUDE-ACCT-DHCP-INET6 from source-port 547
```

   c. DHCP [illegible] [illegible] 546 [illegible] 547(DHCPv6)[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-DHCP-INET6 from destination-port 546
user@host# set term EXCLUDE-ACCT-DHCP-INET6 from destination-port 547
```

   d. [illegible] DHCPv6 [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-DHCP-INET6 then count exclude-acct-dhcpv6
```

e. [illegible] DHCPv6 [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-DHCP-INET6 then exclude-accounting
```

4. [illegible] [illegible] ICMPv6 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

a. [illegible] [illegible] [illegible] [illegible] ICMPv6(58)[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-ICMP6 from next-header icmp6
```

b. ICMPv6 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-ICMP6 from icmp-type router-solicit
user@host# set term EXCLUDE-ACCT-ICMP6 from icmp-type neighbor-solicit
user@host# set term EXCLUDE-ACCT-ICMP6 from icmp-type neighbor-advertisement
```

c. [illegible] ICMPv6 [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-ICMP6 then count exclude-acct-icmpv6
```

d. [illegible] ICMPv6 [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term EXCLUDE-ACCT-DHCP-INET6 then exclude-accounting
```

5. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet6 filter EXCLUDE-ACCT-INET6-FILTER]
user@host# set term default then accept
```

6. [illegible] inet6 [illegible].

```
[edit dynamic-profiles pppoe-dynamic-profile interfaces pp0 unit "$junos-interface-unit"]
user@host# set family inet6 filter input EXCLUDE-ACCT-INET6-FILTER
user@host# set family inet6 filter output EXCLUDE-ACCT-INET6-FILTER
```

7. [illegible].

```
[edit dynamic-profiles pppoe-dynamic-profile interfaces pp0 unit "$junos-interface-unit"]
user@host# set actual-transit-statistics
```

[illegible]

[illegible] show access, show firewall [illegible] show dynamic-profiles [illegible].

```
user@host# show access
profile v6-exclude-idle {
    session-options {
        client-idle-timeout 10;
        client-idle-timeout-ingress-only;
    }
}
```

```
user@host# show firewall
family inet6 {
    filter EXCLUDE-ACCT-INET6-FILTER {
        interface-specific;
        term EXCLUDE-ACCT-DHCP-INET6 {
            from {
                next-header udp;
                 source-port [ 546 547 ];
                destination-port [ 546 547 ];
            }
            then {
                count exclude-acct-dhcpv6;
                exclude-accounting
            }
```

```
        }
        term EXCLUDE-ACCT-ICMP6 {
            from {
                next-header icmp6;
                 icmp-type [ router-solicit neighbor-solicit neighbor-advertisement ]
            }
            then {
                count exclude-acct-icmpv6;
                exclude-accounting;
            }
        }
        term default {
            then accept;
        }
    }
}
```

```
user@host# show dynamic-profiles
pppoe-dynamic-profile {
    interfaces {
        pp0 {
            unit "$junos-interface-unit" {
                actual-transit-statistics;
                family inet6 {
                    filter {
                        input EXCLUDE-ACCT-INET6-FILTER;
                        output EXCLUDE-ACCT-INET6-FILTER;
                    }
                }
            }
        }
    }
}
```

[illegible] commit[illegible] [illegible].

[illegible]

> *[illegible]*
>
> *[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]*

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```
[edit]
edit firewall family inet filter RE-protect
edit term dhcp-client-accept
set from source-address 0.0.0.0/32
set from destination-address 255.255.255.255/32
set from protocol udp
set from source-port 68
set from destination-port [67 68]
set then count dhcp-client-accept
set then accept
up
edit term dhcp-server-accept
set from protocol udp
set from source-port 67
set from source-port 68
set from destination-port 67
set from destination-port 68
set then count dhcp-server-accept
set then accept
top
```

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??? ???? ????? ?? DHCP ???? ???? ????? ??:

1. ??? ???? ?????? ??????.

```
[edit firewall]
user@host# edit family inet filter RE-protect
```

2. ??????? ?? ?? ??? ?????.

```
[edit firewall family inet filter RE-protect]
user@host# edit term dhcp-client-accept
```

3. DHCP ??? ?? ?? ??? ?????.

```
[edit firewall family inet filter RE-protect term dhcp-client-accept]
user@host# set from source-address 0.0.0.0/32
user@host# set from destination-address 255.255.255.255/32
user@host# set from protocol udp
user@host# set from source-port 67
user@host# set from source-port 68
user@host# set from destination-port 67
user@host# set from destination-port 68
```

4. ???? ??? ?? ??? ??? ?????.

```
[edit firewall family inet filter RE-protect term dhcp-client-accept]
user@host# set then count dhcp-client-accept
user@host# set then accept
```

5. ??? ?? ?? ??? ????.

```
[edit firewall family inet filter RE-protect]
user@host# edit term dhcp-server-accept
```

6. DHCP ??? ?? ?? ??? ?????.

```
[edit firewall family inet filter RE-protect term dhcp-server-accept]
user@host# set from protocol udp
user@host# set from source-port [67 68]
user@host# set from destination-port [67 68]
```

7. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter RE-protect term dhcp-server-accept]
user@host# set then count dhcp-client-accept
user@host# set then accept
```

[illegible]

[illegible] [illegible] show firewall [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter RE-protect {
        term dhcp-client-accept {
            from {
                source-address {
                    0.0.0.0/32;
                }
                destination-address {
                    255.255.255.255/32;
                }
                protocol udp;
                source-port 68;
                destination-port 67;
            }
            then {
                count dhcp-client-accept;
                accept;
            }
        }
        term dhcp-server-accept {
            from {
                protocol udp;
                source-port [ 67 68 ];
                 destination-port [ 67 68 ];
            }
            then {
                count dhcp-server-accept;
                accept;
            }
```

```
        }
    }
}
```

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DHCP □□ □□ □□

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DHCP □□□□ □□□ □□□□ □□□□ □□ □ □□□□ □□ □□□□□ □□□□□.

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□□ □□□□ show firewall family inet filter RE-protect □□□ □□□□□.

```
user@host> show firewall family inet filter RE-protect
Filter: RE-protect
Counters:
Name                                                Bytes              Packets
dhcp-client-accept                                    328                    1
dhcp-server-accept                                    574                    1

user@host> show firewall family inet filter RE-protect
Filter: RE-protect
Counters:
Name                                                Bytes              Packets
dhcp-client-accept                                    660                    2
dhcp-server-accept                                   1152                    2
```

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> DHCP ???? ???? ?? ?? ?? ?? ?? | **1071**
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> ???? ?????? Junos OS ???? ??, ???? ?? ? ???? ???? ???? ????
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> *??? DHCP ? ?? DHCP ?? ?? ??*
>
> *?? DHCP ???? ???? ??*

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□ □□□□ 192.168.2.0/24 □□□□□□ □□ □□□ □□ □□□□□ □□□ □□□□ □□□□ □□□□ □□□□ □□□ □□□ □□□ iqfilter1inet □□□ □□. □□ □□ □□□ ge-0/0/0.0 □□□ □□□□□□ □□ □□ □□□ □□□□□ iqfilter1 .

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- □□□ □□□ ge-0/0/0.0 □□□□□□ □□ □□ □□□ □□□□□.

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```
set firewall family inet filter iqfilter1 term t1 from address 192.168.2.0/24
set firewall family inet filter iqfilter1 term t1 then loss-priority low
set firewall family inet filter iqfilter1 term t1 then forwarding-class expedited-forwarding
set interfaces ge-0/0/0 unit 0 family inet ingress-queuing-filter iqfilter1
```

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□□□ □□□ iqfilter1□□□□ □□ □□□ □□□□□ ge-0/0/0 □□ 0□ □□□□□ □□□ □□□□□.

1. □□ iqfilter1□□□ □□□ □□□□.

   ```
   [edit firewall family inet]
   user@router# set  filter iqfilter1 term t1 from address 192.168.2.0/24
   user@router# set  filter iqfilter1 term t1 then loss-priority low
   user@router# set  filter iqfilter1 term t1 then forwarding-class expedited-forwarding
   ```

2. □□□ □□□□□□ □□□ □□□ □□□□□.

   ```
   [edit]
   user@router# set interfaces ge-0/0/0 unit 0 family inet ingress-queuing-filter iqfilter1
   ```

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□□ □□□□ □ show interfaces ge-0/0/0.0 □□□ □□□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@router# show firewall
 family inet {
    filter iqfilter1 {
        term t1 {
```

```
            from {
                address {
                    192.168.0.0/24;
                }
            }
            then {
                loss-priority low;
                forwarding-class expedited-forwarding;
            }
        }
    }
}
user@router# show interfaces ge-0/0/0.0
family inet {
    ingress-queuing-filter iqfilter1;
}
```

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```
user@router# commit
```

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□ □□□□ IPv6 TCP □□□□ □□□□□ □□□ □□□□□. □ □□□ □□□□ M □□□, MX □□□ □ T □□□ □□□ □□□□□□ IPv6 TCP □□□□ □□□ □ □□□□.

□□

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□□

□□□ □□

IPv6 TCP □□□□ □□□□□ □□□ □□□□□ □□□ □□□□□.

1. □□□ □□ □□□□ family □□ □□□□ □□□□ family□ □□□□□ `inet6` .

```
[edit]
user@host# edit firewall family inet6
```

2. □□ □□□ □□□ □□□ □□□□□.

```
[edit  firewall family inet6]
user@host# edit filter tcpfilt
```

3. □□□ □ □□ □□ □□□□□.

```
[edit firewall family inet6 filter tcpfilt]
user@host# edit term 1
```

4. [illegible]

```
[edit firewall family inet6 filter tcpfilt term 1]
user@host# set from next-header tcp tcp-flags syn
```

5. [illegible]

```
[edit firewall family inet6 filter tcpfilt term 1]
user@host# set then count tcp_syn_pkt log accept
```

6. [illegible]

```
[edit firewall family inet6 filter tcpfilt term 1]
user@host top

[edit]
user@host# commit
```

[illegible]

[illegible] show firewall filter tcpfilt .

[illegible]

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- [illegible] | 1084
- [illegible] | 1084
- [illegible] | 1084
- [illegible] | 1088

[illegible]

?? ??

? ?? ????? ?? ????? ????? ???? ???? ???? ????? ?????.

??

? ????? TCP ? UDP ???? ???? ?? IPv4 ???? ????? ???? ???? ???? ??????. TCP ? UDP ??? SSH ?? ?? Telnet ???? ???? ?? ??????. ?? ?? ???? ??????.

??

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- CLI ?? ?? | 1084
- ??? ???? ?? ?? | 1085
- ??? ??????? ???? ???? ?? ?? | 1086
- ?? ?? ?? ? ?? | 1086

?? ?? ?? ????? ???? ???? ???? ??????. CLI ???? ?? ???? ???? ? ???????? "?? ????? CLI ???? ??" ??? 1787.

CLI ?? ??

? ?? ???? ?????? ?? ?? ???? ???? ???? ?????, ? ???? ???? ??, ???? ?? ???? CLI? ??????? `[edit]`.

```
set firewall family inet filter filter1 term term1 from protocol-except tcp
set firewall family inet filter filter1 term term1 from protocol-except udp
set firewall family inet filter filter1 term term1 then accept
set firewall family inet filter filter1 term term2 from address 192.168.0.0/16
set firewall family inet filter filter1 term term2 then reject
set firewall family inet filter filter1 term term3 from destination-port ssh
set firewall family inet filter filter1 term term3 from destination-port telnet
set firewall family inet filter filter1 term term3 then accept
set firewall family inet filter filter1 term term4 then reject
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input filter1
```

[illegible]

[illegible]

[illegible] filter1[illegible]:

1. IPv4 [illegible]

```
[edit]
user@host# edit firewall family inet filter filter1
```

2. TCP [illegible] UDP [illegible]

```
[edit firewall family inet filter filter1]
user@host# set term term1 from protocol-except tcp
user@host# set term term1 from protocol-except udp
user@host# set term term1 then accept
```

3. [illegible] 192.168/16 [illegible].

```
[edit firewall family inet filter filter1]
user@host# set term term2 from address 192.168.0.0/16
user@host# set term term2 then reject
```

4. SSH [illegible] Telnet [illegible].

```
[edit firewall family inet filter filter1]
user@host# set term term3 from destination-port ssh
user@host# set term term3 from destination-port telnet
user@host# set term term3 then accept
```

5. [illegible].

```
[edit firewall family inet filter filter1]
user@host# set term term4 then reject
```

[illegible]

[illegible]

[illegible]:

1. [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input filter1
```

[illegible]

[illegible]

[illegible].

1. [illegible] show firewall [illegible]. [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter filter1 {
        term term1 {
            from {
                protocol-except [tcp udp];
            }
            then {
```

```
                accept;
            }
        }
        term term2 {
            from {
                address 192.168/16;
            }
            then {
                reject;
            }
        }
        term term3 {
            from {
                destination-port [ssh telnet];
            }
            then {
                accept;
            }
        }
        term term4 {
            then {
                reject;
            }
        }
    }
}
```

2. ?? ?? ???? ????? show interfaces ?????? ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ???? ????? ???? ?? ?????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input filter1;
            }
            address 10.1.2.3/30;
        }
```

```
    }
}
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] `show firewall` filter filter1 [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 731

[illegible]: IPv6 [illegible] [illegible] [illegible] [illegible] | 1081

[illegible]: [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1119

[illegible]: [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

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- [illegible] [illegible] | 1088
- [illegible] | 1089
- [illegible] | 1089
- [illegible] | 1093

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

??

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? ????? ?? ??? ??? ??? ????? 192.168.5.0/24? ??? ?? ??? ??????.

????

? ?? ????? ?? ?? address 192.168.5.0/24 except ?? ?? ? ??? ????? ????? ? ??? ??? ?? ??? ??????. ?? ???
address 0.0.0.0/0 ?? ?? ??? ?????, ??? ??? ??, ?? ? ??????.

? ?? ?????? ? ?? ??? ??? ?? ??(?, ??? ????? 192.168.5.0/24??)? ????? ????? ??????.

??

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- CLI ?? ?? | 1089
- ??? ??? ?? ?? | 1090
- ??? ??????? ??? ??? ?? ?? | 1091
- ?? ?? ?? ? ?? | 1091

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ??????? "?? ???? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ?????, ? ??? ??? ??, ?? ????? ??? CLI? ??????? [edit] .

```
set firewall family inet filter fire1 term 1 from address 192.168.5.0/24 except
set firewall family inet filter fire1 term 1 from address 0.0.0.0/0
set firewall family inet filter fire1 term 1 then count reject_pref1_1
set firewall family inet filter fire1 term 1 then log
```

```
set firewall family inet filter fire1 term 1 then reject
set firewall family inet filter fire1 term 2 then count reject_pref1_2
set firewall family inet filter fire1 term 2 then log
set firewall family inet filter fire1 term 2 then accept
set interfaces ge-0/0/1 unit 0 family inet filter input fire1
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
```

[illegible]

[illegible]

[illegible] fire1[illegible]:

1. [illegible] fire1[illegible].

   ```
   [edit]
   user@host# edit firewall family inet filter fire1
   ```

2. [illegible] 192.168.5.0/24 [illegible], [illegible].

   ```
   [edit firewall family inet filter fire1]
   user@host# set term 1 from address 192.168.5.0/24 except
   user@host# set term 1 from address 0.0.0.0/0
   user@host# set term 1 then count reject_pref1_1
   user@host# set term 1 then log
   user@host# set term 1 then reject
   ```

3. [illegible], [illegible] 192.168.5.0/24 [illegible].

   ```
   [edit firewall family inet filter fire1]
   user@host# set term 2 then count reject_pref1_2
   user@host# set term 2 then log
   user@host# set term 2 then accept
   ```

[illegible]

[illegible]

[illegible]:

1. [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input fire1
```

[illegible]

[illegible]

[illegible].

1. [illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter fire1 {
        term 1 {
            from {
                address {
                    192.168.5.0/24 except;
                    0.0.0.0/0;
```

```
                }
            }
            then {
                count reject_pref1_1;
                log;
                reject;
            }
        }
        term 2 {
            then {
                count reject_pref1_2;
                log;
                accept;
            }
        }
    }
}
```

2. [illegible] show interfaces [illegible]. [illegible].

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input fire1;
            }
            address 10.1.2.3/30;
        }
    }
}
```

3. [illegible].

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

□□

□□□ □□□ □□□□□ □□□□□ □□ □□ □□□ show firewall filter fire1 □□□□□. □□ □□□ □□□ □□□□ □□ □□□□ □□ □□□□ □□□ □□ □ □□ □□□□.

- show firewall counter reject_pref1_1
- show firewall counter reject_pref1_2
- show firewall log

□□ □□

□□ □□□ □□ □□ □□ □□ | 731
□: IP □□ □□□ □□□□□ □□ □□ | 1098
□: IP □□ □□□ □□□□□ □□□□□ □□ □□ | 1093

□: IP □□ □□□ □□□□□ □□□□□ □□ □□

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□ □□ □□□□ □□ □□□□ □□□□ □□□ □□□ □□□ □□□□ □□□□.

□□ □□□ □IP □□ □□ □□□□ □□□ □□ □□□ □□ □□ □□ discard □□ (□□□□) MX □□□ □□□□ 10□□□□ □□□ MPC(Modular Port Concentrator), 60□□□□ □□□ MPC, 60□□□□ □□ □□□ MPC □□ 60□□□□ □□□ Enhanced □□ MPC□□ □□□□□□ □□□□ □□ □ □□ □□□ □□□ count □ □□□□.

??

? ????? ?? ??? ??? ??? ????? IP ?? ?? ?????? ?? ?? ??? ????? ??? ????? ??????.

IP ?? ?? ??? IPv4 ?? ??? ??? ??????. ip-options ? ip-options-except ?? ??? ?? ?? ??? ??? ?? ? ??? ??? ????? ?????.

?: M ? T ??? ????? ??? ??? ?? ?? ? ?????? ??? ?? ip-options ??? ????? ? ?????. ??? ?? ??? ??? ????? show pfe statistics ip options PFE(?? ?? ??)?? ??? ?? ip-options ?????. ?? ??? pfe ?? ip ??? ???????.

??

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- CLI ?? ?? | 1094
- ??? ??? ?? ?? | 1095
- ??? ??????? ??? ??? ?? ?? | 1095
- ?? ?? ?? ? ?? | 1096

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ???????? "?? ????? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ???? ??????, ?? ?? ???? ???? ???? ?????, ? ???? ???? ??, ?? ????? ??? CLI? ???????? [edit] .

```
set firewall family inet filter block_ip_options term 10 from ip-options any
set firewall family inet filter block_ip_options term 10 then count option_any
set firewall family inet filter block_ip_options term 10 then discard
set firewall family inet filter block_ip_options term 999 then accept
set interfaces ge-0/0/1 unit 0 family inet filter input block_ip_options
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
```

[illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible]:

1. [illegible] [illegible] [illegible] block_ip_options[illegible].

```
[edit]
user@host# edit firewall family inet filter block_ip_options
```

2. IP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter block_ip_options]
user@host# set term 10 from ip-options any
user@host# set term 10 then count option_any
user@host# set term 10 then discard
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter block_ip_options]
user@host# set term 999 then accept
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]:

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. ??? ??????? ?????? ??? ??????.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. ??? ??????? ??? ??? ??? ??????.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input block_ip_options
```

?? ?? ?? ? ??

??? ??

?? ??? ??? ? ????? ??? ??????.

1. ?? ?? ??? ???? ??? ??? ??? show firewall ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show firewall
family inet {
    filter block_ip_options {
        term 10 {
            from {
                ip-options any;
            }
            then {
                count option_any;
                discard;
            }
        }
        term 999 {
            then accept;
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input block_ip_options;
            }
            address 10.1.2.3/30;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ????? ????? ?? ?? ??? show firewall filter block_ip_options ?????. ??? ?? ?? ??? ????? ??? ??? ????? show firewall count option_any .

?? ??

> ?? ??? ?? ?? ?? ?? | 731
>
> ?: ?? ? ??? ??? ????? ?? ?? | 1088
>
> ?: IP ?? ??? ????? ?? ?? | 1098

?: IP ?? ??? ?????? ?? ??

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- ?? | 1098
- ?? | 1104

?? ????? ?? ??? ??? ??? ????? ?? IP ?? ??? ????? ??? ??????.

?? ??

? ????? MX ??? ?????? 10????? ??? MPC(Modular Port Concentrator), 60???? ??? MPC, 60???? ?? ??? MPC ?? 60???? ??? Enhanced ?? MPC? ??????? ??????. ? ???????? ????? ?? ??? ????? ??? *??* ip-option ?? ? ??? ??? , log? syslog ? ?? ??? ??? count? ?? IPv4 ??? ??(?? ?? ??? ??)? discard ??? ? ?????.

? ?? ????? ?? ????? ????? ??? ??? ??? ????? ?????.

??

? ????? ?? ??? ??? ??? ????? IP ?? ??? ?????? ????? ?????? ?????. ?? ??? ?????? ??? ?? ????? ?? ??? ??????.

IP ?? ?? ??? IPv4 ?? ??? ??? ??????. ip-options ? ip-options-except ?? ??? ?? ?? ??? ??? ?? ? ??? ??? ????? ?????.

?: M ? T ??? ????? ??? ??? ?? ?? ? ?????? ??? ?? ip-options ??? ????? ? ?????. ??? ?? ??? ??? ????? show pfe statistics ip options PFE(?? ?? ??)?? ??? ?? ip-options ?????. ?? ??? pfe ?? ip ??? ???????.

??

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- CLI ?? ?? | 1099
- ??? ??? ?? ?? | 1100

- [illegible] | 1101
- [illegible] | 1102

[illegible] CLI [illegible] "[illegible] CLI [illegible]" [illegible] 1787.

[illegible].

CLI [illegible]

[illegible], [illegible] [illegible] [illegible], [illegible] [illegible] CLI[illegible] [illegible] [edit].

```
set firewall family inet filter ip_options_filter term match_strict_source from ip-options
strict-source-route
set firewall family inet filter ip_options_filter term match_strict_source then count
strict_source_route
set firewall family inet filter ip_options_filter term match_strict_source then log
set firewall family inet filter ip_options_filter term match_strict_source then accept
set firewall family inet filter ip_options_filter term match_loose_source from ip-options loose-
source-route
set firewall family inet filter ip_options_filter term match_loose_source then count
loose_source_route
set firewall family inet filter ip_options_filter term match_loose_source then log
set firewall family inet filter ip_options_filter term match_loose_source then accept
set firewall family inet filter ip_options_filter term match_record from ip-options record-route
set firewall family inet filter ip_options_filter term match_record then count record_route
set firewall family inet filter ip_options_filter term match_record then accept
set firewall family inet filter ip_options_filter term match_timestamp from ip-options timestamp
set firewall family inet filter ip_options_filter term match_timestamp then count timestamp
set firewall family inet filter ip_options_filter term match_timestamp then accept
set firewall family inet filter ip_options_filter term match_router_alert from ip-options router-
alert
set firewall family inet filter ip_options_filter term match_router_alert then count router_alert
set firewall family inet filter ip_options_filter term match_router_alert then accept
set firewall family inet filter ip_options_filter term match_all then accept
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input ip_options_filter
```

□□□ □□□ □□ □□

□□□ □□

□□□ □□□ □□ ip_option_filter□□ □□:

1. □□□ □□□ □□□ ip_option_filter□□□□□.

```
[edit]
user@host# edit firewall family inet filter ip_options_filter
```

2. IP □□ □□ □□□ □□□□ □□□ □□□, □□ □ □□□□ □ □□ □□□ strict_source_route □□□□□.

```
[edit firewall family inet filter ip_option_filter]
user@host# set term match_strict_source from ip-options strict_source_route
user@host# set term match_strict_source then count strict_source_route
user@host# set term match_strict_source then log
user@host# set term match_strict_source then accept
```

3. IP □□ □□ □□□ □□□□ □□□ □□□, □□ □ □□□□□ □□ □□□ loose-source-route □□□□□.

```
[edit firewall family inet filter ip_option_filter]
user@host# set term match_loose_source from ip-options loose-source-route
user@host# set term match_loose_source then count loose_source_route
user@host# set term match_loose_source then log
user@host# set term match_loose_source then accept
```

4. IP □□ □□ □□□ □□□□ □□□ □□□□□ □□□□□ □□ □□□ record-route □□□□□.

```
[edit firewall family inet filter ip_option_filter]
user@host# set term match_record from ip-options record-route
user@host# set term match_record then count record_route
user@host# set term match_record then accept
```

5. IP □□ □□ □□□ □□□□ □□□ □□□□□ □□□□□ □□ □□□ timestamp □□□□□.

```
[edit firewall family inet filter ip_option_filter]
user@host# set term match_timestamp from ip-options timestamp
```

```
user@host# set term match_timestamp then count timestamp
user@host# set term match_timestamp then accept
```

6. IP ?? ?? ??? ???? ??? ????? ????? ?? ??? router-alert ?????.

```
[edit firewall family inet filter ip_option_filter]
user@host# set term match_router_alert from ip-options router-alert
user@host# set term match_router_alert then count router_alert
user@host# set term match_router_alert then accept
```

7. ???? ????? ?? ??? ???? ??? ??? ?????.

```
[edit firewall family inet filter ip_option_filter]
user@host# set term match_all then accept
```

??? ??????? ??? ??? ?? ??

??? ??

??? ??????? ??? ??? ??? ??????:

1. ??? ??? ??? ??? ??? ??????? ?????.

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. ??? ??????? ????? ??? ?????.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. ??? ??????? ??? ??? ??? ?????.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input ip_options_filter
```

[illegible]

[illegible]

[illegible].

1. [illegible] show firewall [illegible]. [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter ip_options_filter {
        term match_strict_source {
            from {
                ip-options strict-source-route;
            }
            then {
                count strict_source_route;
                log;
                accept;
            }
        }
        term match_loose_source {
            from {
                ip-options loose-source-route;
            }
            then {
                count loose_source_route;
                log;
                accept;
            }
        }
        term match_record {
            from {
                ip-options record-route;
            }
            then {
                count record_route;
                accept;
            }
        }
```

```
        term match_timestamp {
            from {
                ip-options timestamp;
            }
            then {
                count timestamp;
                accept;
            }
        }
        term match_router_alert {
            from {
                ip-options router-alert;
            }
            then {
                count router_alert;
                accept;
            }
        }
        term match_all {
            then accept;
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input ip_option_filter;
            }
            address 10.1.2.3/30;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ????? ????? ?? ?? ??? show firewall filter ip_option_filter ?????. ?? ??? ??? ???? ?? ???? ?? ? ??? ??? ??? ?? ????.

- show firewall counter strict_source_route
- show firewall counter loose_source_route
- show firewall counter record_route
- show firewall counter timestamp
- show firewall counter router_alert
- show firewall log

?? ??

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?: ?? ? ??? ??? ????? ?? ?? | 1088
?: IP ?? ??? ???? ????? ?? ?? | 1093

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□□□□ □□ □□ □□□□ □□ □□□□ sampling □□□ □□□□ [edit forwarding-options] □□□□□.

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□: □□□ □□ □ □□□ □□ □□ □□□ □□ □□□□□□□ RPF(Reverse Path Forwarding)□ □□□□□ □□□ □□□ □□□ □□ □□ □□□ □□□ RPF□ □□ □□□ □□□ □□□□ □□□□. □□□ □□□ □□□□□ RPF □□ □□ □□□ □□□□□.

□□: MPC3 □□ MPC4□ □□ MX □□□ □□□□□ □□□ □□□ TWAMP(Two-Way Active Measurement Protocol) □□□ □□□□□ □□□ □□ □□ TWAMP □□□ □□ □□□ □ □□ □□□. □□ TWAMP □□□ MPC3 □□ MPC4□□ □□□□□ □□ RTT(Round Trip Time)□ □□ □□□ □ □□□□. □ □□□ MPC1 □□ MPC2 □□□ □□ □ □□□□ □□□□ □□□□.

□: QFX5130 □ QFX5700 □□□ □□□ □□□ □□ □□ □□□ □□□ □□□□ □□ □□□ □□ □□ □□ □□□□ □□□□□. □ □ □□, □□□ IPACL(Port ACL) □□□ IRACL(Routed ACL) □□□ □□□□□ □□□ □□□□□. □□ □□□ □□□ IRACL□ IPACL□□ □□ □□□ □□□□. □□□ IRACL □□□□ □□□□□. IRACL□ □□□ □□□ IPACL □□□□ □□□□ □.

□□□ □□□ □□ ACL□ □□ □□ □□(□□ □□ □□□ □□ □□ □□□)□□□.

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- CLI □□ □□ | 1106
- □□□ □□□ □□ □□ | 1106

- [illegible] | 1107
- [illegible] | 1107

[illegible] CLI [illegible] "[illegible] CLI [illegible]" [illegible] 1787.

[illegible].

CLI [illegible]

[illegible], [illegible] [illegible], [illegible] [illegible] CLI[illegible] [illegible] [edit].

```
set firewall family inet filter sam term all then count count_sam
set firewall family inet filter sam term all then sample
set interfaces at-2/0/0 unit 301 family inet address 10.1.2.3/30
set interfaces at-2/0/0 unit 301 family inet filter input sam
```

[illegible]

[illegible]

[illegible] sam[illegible]:

1. [illegible] sam[illegible].

```
[edit]
user@host# edit firewall family inet filter sam
```

2. [illegible].

```
[edit firewall family inet filter sam]
user@host# set term all then count count_sam
user@host# set term all then sample
```

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1. □□□ □□□ □□□ □□□ □□□ □□□□□□ □□□□□.

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. □□□ □□□□□□ □□□□□ □□□ □□□□□.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. □□□ □□□□□□ □□□ □□□ □□□ □□□□□.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input sam
```

> □: Junos OS□ □□□ □□ □□□□□ □□□□ □□□ □□□□□ □□□□. □□□ □□□□ □□□□□□ □□ □□ □□□□ □□ □□□□□ □ □□□□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□ □□□□ □□□□ □□□ □□□□□ □□□□.

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1. □□ □□ □□□ □□□□ □□□ □□□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
family inet {
    filter sam {
        term all {
```

```
            then {
                count count_sam;
                sample; # default action is accept
            }
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
interfaces {
    at-2/0/0 {
        unit 301 {
            family inet {
                filter {
                    input sam;
                }
                address 10.1.2.3/30;
            }
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

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- ?? ??? ?? | 1109
- ??? ?? ?? ?? ?? | 1109
- ??? ?? ???? | 1110

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□□

```
user@host> show firewall filter sam
Filter:
Counters:
Name              Bytes               Packets
sam
sam-1             98                  8028
```

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```
user@host> show firewall log
Time     Filter     A Interface       Pro Source address  Destination address
23:09:09 -          A at-2/0/0.301    TCP 10.2.0.25       10.211.211.1:80
23:09:07 -          A at-2/0/0.301    TCP 10.2.0.25       10.211.211.1:56
23:09:07 -          A at-2/0/0.301    ICM 10.2.0.25       10.211.211.1:49552
23:02:27 -          A at-2/0/0.301    TCP 10.2.0.25       10.211.211.1:56
23:02:25 -          A at-2/0/0.301    TCP 10.2.0.25       10.211.211.1:80
23:01:22 -          A at-2/0/0.301    ICM 10.2.2.101      10.211.211.1:23251
23:01:21 -          A at-2/0/0.301    ICM 10.2.2.101      10.211.211.1:16557
23:01:20 -          A at-2/0/0.301    ICM 10.2.2.101      10.211.211.1:29471
23:01:19 -          A at-2/0/0.301    ICM 10.2.2.101      10.211.211.1:26873
```

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- Time- □□□ □□□ □□□□□(□□□□□ □□□□ □□).
- Filter- □□ □□□□ □□□ filter □□□ □□□ [edit firewall] □□□□□. □□□(-) □□ □ pfe □□ □□□ □□ □□ □□□ □□ □□□□□□ □□ □□□. □□(□□□ □□)□ □□□ □□□ □□□ □□ □□□□□□ □□□□□.
- A- □□ □□:
  - A- □□(□□ □□ □□)
  - D- □□
  - R- □□
- Interface- □□□ □□□ □□□□□.

  □: □□□ then □□ □□□ □□□□□ □□□□ □□ □□□□.
- Pro- □□□ □□□□ □□ □□ □□□□□.
- Source address- □□□ □□ IP □□□□□.
- Destination address- □□□ □□ IP □□□□□.

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```
  wtmp.0.gz            Size: 15017, Last changed: Dec 19 13:15:54 wtmp.1.gz            Size:
493, Last changed: Nov 19 13:47:29
  wtmp.2.gz            Size: 57, Last changed: Oct 20 15:24:34
  |                    Pipe through a command
```

```
user@host> show log /var/tmp/sam
# Apr  7 15:48:50
```

```
Time                     Dest           Src Dest Src Proto TOS Pkt Intf  IP   TCP
                         addr          addr port port          len num frag flags
Apr 7 15:48:54 192.168.9.194 192.168.9.195   0    0   1   0x0  84  8   0x0   0x0
Apr 7 15:48:55 192.168.9.194 192.168.9.195   0    0   1   0x0  84  8   0x0   0x0
Apr 7 15:48:56 192.168.9.194 192.168.9.195   0    0   1   0x0  84  8   0x0   0x0
```

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□□ □□□ □□ □□ □□ □□ | 731

□: DSCP □□□ 0□□ □□□□ □□ □□ | 1111

□: DSCP □□□ 0□□ □□□□ □□ □□

in this section

- □□ □□ | 1111
- □□ | 1111
- □□ | 1112
- □□ | 1115

□ □□□□ DSCP(Differentiated Services Code Point)□ □□□□ □□ □□□ □□□ □□□ □□□□ □□□ □□□□□.

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□ □□□□ □□ □□□ □□□ □□□ □□□□ DSCP □□ □□□ □□□ □□□□□□. DSCP□ 2□ □□ □□□ □□□ □□□□ best-effort □□□□ DSCP □ □ □□□□□ 0. DSCP□ 3□ □□ □□□ □□□ □□□□ best-effort □□□□□.

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- CLI ?? ?? | 1112
- ??? ??? ?? ?? | 1112
- ??? ??????? ??? ??? ?? ?? | 1113
- ?? ?? ?? ? ?? | 1113

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ???????? "?? ????? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ???? ??????, ?? ?? ???? ???? ???? ?????, ? ???? ???? ??, ?? ????? ??? CLI? ???????? [edit] .

```
set firewall filter filter1 term 1 from dscp 2
set firewall filter filter1 term 1 then forwarding-class best-effort
set firewall filter filter1 term 1 then dscp 0
set firewall filter filter1 term 2 from dscp 3
set firewall filter filter1 term 2 then forwarding-class best-effort
set interfaces so-0/1/0 unit 0 family inet filter input filter1
```

??? ??? ?? ??

??? ??

??? ??? ?? filter1?? ??:

1. ?? ???? ??? ??? ??????.

```
[edit]
user@host# edit firewall filter filter1
```

2. DSCP□ □ 2□□□ □□□□□ □ □□ □□□ □□□□, DSCP 0□ □ □□□□, □□□ □□□ □□□□ □□□□□ best-effort .

```
[edit firewall filter filter1]
user@host# set term 1 from dscp 2
user@host# set term 1 then forwarding-class best-effort
user@host# set term 1 then dscp 0
```

3. DSCP 3 □ □ □□□ □□□□□ □□ □□□ □□□□ □□□ □□□ □□□□ best-effort □□□□□.

```
[edit firewall filter filter1]
user@host# set term 2 from dscp 3
user@host# set term 2 then forwarding-class best-effort
```

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VPN □□□ □ □□□(VRF) □□□□□ □□□□ □□□ □□□□□□□ □□□□□□□ □□□ □□□ □□□□□ □□□ □□□□□.

1. □□□ □□□ □□□ □□□ □□□ □□□□□□□ □□□□□.

```
[edit]
user@host# edit interfaces so-0/1/0 unit 0 family inet
```

2. □□□ □□□□□□□ □□□ □□□ □□□ □□□□□.

```
[ input filter1]
user@host# set filter input filter1
```

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1. □□ □□ □□□ □□□□ □□□ □□□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
filter filter1 {
    term term1 {
        from {
            dscp 2;
        }
        then {
            forwarding-class best-effort;
            dscp 0;
        }
    }
    term term2 {
        from {
            dscp 3;
        }
        then {
            forwarding-class best-effort;
        }
    }
}
```

2. □□ □□ □□□ □□□□ show interfaces □□□□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□ □□□□ □□□ □□ □□□□.

```
[edit]
user@host# show interfaces
so-0/1/0 {
    unit 0 {
        family inet {
            filter input filter1;
        }
    }
}
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

- `show class-of-service`- [illegible] [illegible] [illegible] [illegible] [illegible] CoS(Class of Service) [illegible] [illegible].
- `show class-of-service classifier type dscp`- IPv4 [illegible] [illegible] DSCP[illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 731

[illegible]: [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1104

[illegible]: DSCP [illegible] 0[illegible] [illegible] [illegible] [illegible]

in this section

- [illegible] [illegible] | 1115
- [illegible] | 1116
- [illegible] | 1116
- [illegible] | 1119

[illegible] DSCP(Differentiated Services Code Point)[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

??

? ????? ?? ??? ??? ??? ????? DSCP ?? ??? ??? ???????. DSCP? **2**? ?? ??? ??? ????? **best-effort** ???? DSCP? ? ?????? **0**. DSCP? **3**? ?? ??? ??? ????? **best-effort** ??????.

??

in this section

- CLI ?? ?? | **1116**
- ??? ??? ?? ?? | **1116**
- ??? ??????? ??? ??? ?? ?? | **1117**
- ?? ?? ?? ? ?? | **1118**

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ???????? "?? ???? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ???? ??????, ?? ?? ??? ??? ??? ?????, ? ??? ??? ??, ?? ????? ??? CLI? ???????? `[edit]`.

```
set firewall filter filter1 term 1 from dscp 2
set firewall filter filter1 term 1 then forwarding-class best-effort
set firewall filter filter1 term 1 then dscp 0
set firewall filter filter1 term 2 from dscp 3
set firewall filter filter1 term 2 then forwarding-class best-effort
set interfaces ge-0/1/0 unit 0 family inet filter input filter1
```

??? ??

??? ??? ?? filter1?? ??:

1. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit firewall filter filter1
```

2. DSCP[illegible] [illegible] 2[illegible] [illegible] [illegible] [illegible] [illegible], DSCP 0[illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] best-effort .

```
[edit firewall filter filter1]
user@host# set term 1 from dscp 2
user@host# set term 1 then forwarding-class best-effort
user@host# set term 1 then dscp 0
```

3. DSCP 3 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] best-effort [illegible].

```
[edit firewall filter filter1]
user@host# set term 2 from dscp 3
user@host# set term 2 then forwarding-class best-effort
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

VPN [illegible] [illegible] [illegible](VRF) [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces ge-0/1/0 unit 0 family inet
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[ input filter1]
user@host# set filter input filter1
```

?? ?? ?? ? ??

??? ??

?? ???? ???? ? ?????? ???? ??????.

1. ?? ?? ??? ????? ??? ??? ??? show firewall ??? ??????. ?? ???? ??? ??? ????? ??? ? ??? ??? ??? ????? ??? ???????.

```
[edit]
user@host# show firewall
filter filter1 {
    term term1 {
        from {
            dscp 2;
        }
        then {
            forwarding-class best-effort;
            dscp 0;
        }
    }
    term term2 {
        from {
            dscp 3;
        }
        then {
            forwarding-class best-effort;
        }
    }
}
```

2. ?? ?? ???? ????? show interfaces ?????? ???? ??????. ?? ???? ??? ??? ????? ??? ? ??? ??? ??? ????? ??? ?? ?????.

```
[edit]
user@host# show interfaces
ge-0/1/0 {
    unit 0 {
        family inet {
            filter input filter1;
        }
```

```
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ?????? ?????? ?? ?? ?? ??? ?????.

- **show class-of-service**- ????? ??? ???? ???? ?? CoS(Class of Service) ??? ?????.
- **show class-of-service classifier type dscp**- IPv4 ??? ?? DSCP? ???? ?????.

?? ??

> ?? ??? ?? ?? ?? ?? | 731
>
> ?: ??? ??? ??? ? ??????? ?? ?? | 1104

?: ?? ?? ? ???? ?????? ?? ??

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- ?? ?? | 1119
- ?? | 1120
- ?? | 1120
- ?? | 1123

? ???? ?? ??? ??? ??? ???? ?? ?? ? ?? ??? ?????? ??? ?????.

?? ??

? ?? ???? ?? ???? ???? ??? ??? ??? ???? ????.

??

? ????? ?? ??????? ???? ???? ????? OSPF ?? ?? ???? 10.108/16? ????? ?? ???? IPv4 ???? ?????? ????? ?? ?? ???? ? ? ICMP ????? ????? administratively-prohibited .

??

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- CLI ?? ?? | 1120
- IPv4 ???? ?? ?? | 1120
- ???? ??????? IPv4 ???? ?? ?? | 1122

?? ?? ?? ????? ???? ???? ???? ??????. CLI ???? ?? ???? ???? ? ??????? "?? ????? CLI ???? ??" ??? 1787.

? ?? ?????? ?? ???? ??????.

CLI ?? ??

? ?? ???? ??????, ?? ?? ???? ???? ???? ?????, ? ???? ???? ??, ?? ????? ???? CLI? ??????? [edit] .

```
set firewall family inet filter ospf_or_131 term protocol_match from protocol ospf
set firewall family inet filter ospf_or_131 term address-match from source-address 10.108.0.0/16
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input ospf_or_131
```

IPv4 ???? ?? ??

??? ??

IPv4 ???? ?? ?????:

1. IPv4 ???? ???? ???? ???????.

```
[edit]
user@host# edit firewall family inet filter ospf_or_131
```

2. OSPF □□□ □□□□ □ □□ □□□ □□□□□.

```
[edit firewall family inet filter ospf_or_131]
user@host# set term protocol_match from protocol ospf
```

□□□ □□□□ □□□ □□□□□ □□□□□. □ □□ □□ □□ □□□ □□ □□□ □ □□□ □□□□ □□ □□□ □□ □□□ □□□□□.

3. □□ □□□□ □□ IPv4 □□□□ □□□ □□□□□ □ □□ □□□ □□□□□.

```
[edit firewall family inet filter ospf_or_131]
user@host# set term address_match from source-address 10.108.0.0/16
```

□ □□□ □□□□ □□□ □□□□□ □□□□□. □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□□ □□ □□□ □□□□□ □□□□□.

□□

□□ □□ □□□ □□□□ □□□ □□□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□ □.

```
[edit]
user@host# show firewall
family inet {
    filter ospf_or_131 {
        term protocol_match {
            from {
                protocol ospf;
            }
        }
        term address_match {
            from {
                source-address {
                    10.108.0.0/16;
                }
            }
        }
    }
}
```

??? ??????? IPv4 ??? ?? ??

??? ??

??? ??????? ??? ??? ??? ??????:

1. ??? ??????? ??? ???????.

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. ??? ??????? IP ??? ??????.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. ??? ??????? IPv4 ??? ??? ??????.

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input ospf_or_131
```

??

?? ?? ??? ???? show interfaces ?????? ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input ospf_or_131;
            }
            address 10.1.2.3/30;
        }
    }
}
```

???? ??? ???? ?? ???? commit?(?) ??????.

□□

□□□ □□□ □□□□□ □□□□□ □□ □□ □□□ show firewall filter ospf_or_131 □□□□□.

□□ □□

□□ □□□ □□ □□ □□ □□ | 731

□: IPv6 □□□□ □□□□□ □□ □□ | 1081

□: □□ □ □□□□ □□□□ □□□□□ □□ □□ | 1083

□: □□□ □□□□ DHCP □□□ □□□□□ □□ □□

in this section

- □□ □□ | 1123
- □□ | 1123
- □□ | 1123
- □□ | 1126

□ □□ □□□ □ □□ □□□ □□□ □□□□□ □□ □□□ □□□ □□□ □□□□ □□□ □□□□□.

□□ □□

□ □□ MX □□□ □□□ □ EX □□□ □□□□□□ □□□□□.

□□

□ □□□□ □□ □□□ □□ □□□ 0.0.0.0255.255.255.255□ DHCP □□□ □□□□ □□(rpf_dhcp)□ □□□□.

□□

in this section

- CLI □□ □□ | 1124

- ??? ??? ?? ?? | 1124
- ??? ??????? ??? ?? ?? | 1125
- ?? ?? ?? ? ?? | 1125

?? ?? ?? ???? ??? ??? ??? ?????. CLI ??? ?? ??? ??? ? ??????? "?? ???? CLI ??? ??" ??? 1787.

CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ????, ? ??? ??? ??, ?? ???? ??? CLI? ??????? [edit] .

```
set firewall family inet filter rpf_dhcp term dhcp_term from source-address 0.0.0.0/32
set firewall family inet filter rpf_dhcp term dhcp_term from destination-address
255.255.255.255/32
set firewall family inet filter rpf_dhcp term dhcp_term then accept
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input sam
```

??? ??? ?? ??

??? ??

??? ??? ?? ????:

1. ??? ??? ??? rpf_dhcp?????.

```
[edit]
user@host# edit firewall family inet filter rpf_dhcp
```

2. ?? ?? ? 0.0.0.0 ?? ??? 255.255.255.255? ??? ?????? ??? ??????.

```
[edit firewall family inet filter rpf_dhcp]
user@host# set term dhcp_term from source-address 0.0.0.0/32
user@host# set term dhcp_term from destination-address 255.255.255.255/32
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter rpf_dhcp]
set term dhcp_term then accept
```

[illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] rpf_dhcp [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# set interfaces lo0 unit 0 family inet rpf-check fail-filter rpf_dhcp
```

2. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# set interfaces lo0 unit 0 family inet address 127.0.0.1/32
```

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] show firewall [illegible] [illegible]. [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter rpf_dhcp {
        term dhcp_term {
            from {
                source-address {
                    0.0.0.0/32;
                }
```

```
                destination-address {
                    255.255.255.255/32;
                }
            }
            then accept;
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
lo0 {
    unit 0 {
        family inet {
            filter {
                rpf-check {
                    fail-filter rpf_dhcp;
                    mode loose;
                }
            }
            address 127.0.0.1/32;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ????? ????? ?? ?? ??? show firewall ?????.

?? ??

?? ??? ?? ?? ?? ?? | 731

?: ??? ? ?? ??? ????? ?????? ?? ??? ??? ?? ?? | 1008

?: Block Telnet ? SSH ???? ?? ?? ?? | 1015

?: TFTP ???? ???? ?? ?? | 1028

?: ?????? OSPF ??? ?????? ?? ?? | 1127

?: ?????? OSPF ??? ?????? ?? ??

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- ?? ?? | 1127
- ?? | 1127
- ?? | 1127
- ?? | 1131

? ?? ???? ? ?? ??? ??? ?????? ?? ??? ??? ??? ???? ??? ??????.

?? ??

? ?? ????? ?? ???? ???? ??? ??? ??? ???? ????.

??

? ???? ??? 10.108.0.0/16? ???? OSPF ??? ???? ICMP ???? ?? **administratively-prohibited** ?? ?? ??? ? ??? ??? ??????

??

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- CLI ?? ?? | 1128
- ??? ??? ?? ?? | 1128

[illegible] [illegible] [illegible] [illegible] | 1129
[illegible] [illegible] [illegible] [illegible] | 1129

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. CLI [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] "[illegible] [illegible] CLI [illegible] [illegible]" [illegible] 1787.

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

CLI [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] CLI[illegible] [illegible] [illegible] [edit].

```
set firewall family inet filter ospf_filter term term1 from source-address 10.108.0.0/16
set firewall family inet filter ospf_filter term term1 from protocol ospf
set firewall family inet filter ospf_filter term term1 then accept
set firewall family inet filter ospf_filter term default-term then reject administratively-
prohibited
set interfaces lo0 unit 0 family inet address 10.1.2.3/30
set interfaces lo0 unit 0 family inet filter input ospf_filter
```

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] ospf_filter[illegible] [illegible]:

1. [illegible] [illegible].

```
[edit]
user@host# edit firewall family inet filter ospf_filter
```

2. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter ospf_filter]
user@host# set term term1 from source-address 10.108.0.0/16
user@host# set term term1 from protocol ospf
user@host# set term term1 then accept
```

3. ?? ?? ??? ???? ??? ????.

```
[edit firewall family inet filter ospf_filter]
user@host# set term default_term then reject administratively-prohibited
```

??? ??????? ??? ?? ??

??? ??

??? ??????? ??? ??? ????? ??? ????.

1. ??????? ????.

```
[edit]
user@host# edit interfaces lo0 unit 0 family inet
```

2. ??? ????? IP ??? ????.

```
[edit interfaces lo0 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. ??? ??? ????.

```
[edit interfaces lo0 unit 0 family inet]
user@host# set filter input ospf_filter
```

?? ?? ?? ? ??

??? ??

?? ??? ??? ? ????? ??? ????.

1. ?? ?? ??? ???? ??? ??? ??? show firewall ??? ????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show firewall
family inet {
```

```
    filter ospf_filter {
        term term1 {
            from {
                source-address {
                    10.108.0.0/16;
                }
                protocol ospf;
            }
            then {
                accept;
            }
        }
        term default_term {
            then {
                reject administratively-prohibited; # default reject action
            }
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
lo0 {
    unit 0 {
        family inet {
            filter {
                input ospf_filter;
            }
            address 10.1.2.3/30;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ???? ?????? ?????? ?? ?? ???? `show firewall` filter ospf_filter ??????.

?? ??

?? ???? ?? ?? ?? ?? | 731

?: ???? ? ?? ???? ????? ?????? ?? ???? ???? ?? ?? | 1008

?: Block Telnet ? SSH ????? ?? ?? ?? | 1015

?: TFTP ????? ????? ?? ?? | 1028

?: ???? ????? DHCP ???? ?????? ?? ?? | 1123

?: ??????? ????? ?? ?? ???? ???? ?? ??

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- ?? | 1131
- ?? | 1132
- ?? | 1137

? ?? ?? ???? ????? ?? ???? ???? ???? ????? ???? ??????.

?? ??

??????? ???? ???? ????? ?? ????? ???? ???? ???? ???? ????? ?????.

??

in this section

- ????? | 1132

□ □□□□ 10.2.1.0/24□□ □□□□ BGP □□□ □□□ □□□□ □□□ □□□□ □□□ □□□ □□□ fragment-RE □□□□□. □ □□□ □□□ □□ □□□ □□ □□□ □□□□ □□□□.

- not-from-prefix-term--10.2.1.0/24□ □□□ □□ □□□ □□□□ □□□ □□□ □□ □□□ 10.2.1.0/24□ □□□□ □□□□□ □□□.
- small-offset-term- □□□ □□□ □□ □□□ □□□ □□ □□□ □□□ □ □□□ □□(1-5) □□□ □□□ □□□□. □□ □ □□□ □□□ □□□ □□□ □□ □□□ □□□□ □□□□□.
- not-fragmented-term- BGP □□□□□ □□□□ □□ □□□ □□ □□□□□ □□ TCP □□□ □□□□□. MF □□□□ □□□□ □□ □□□□□ □□□ □ 0□ □□ □□□ □□□□□□□□ □□ □□□ □□□□□.
- first-fragment-term- BGP □□□□□ □□□□ □□ □□□ □□ □□□□ TCP □□□ □ □□ □□□ □□□□□.
- fragment-term- □ □□ small-offset-term□□□□ □□ □□ □□□ □□□□□□. (□□ □□ 6–8191). □□□ □□ first-fragment-term □ □□ □ □□ □□□□□□ □□□□ □□□ □□□ □□□□□□ □□ □□□□□ □□ □□□□□□□.

□□ □□ □□□□ 1□□ 8191□□ □□□□□.

□: □□□ □□□□ □□□ □□ □□□ □□□ □□□ □ □□□□ insert . □□□ □□□ Junos OS CLI □□□ □□□□ "□□"□ □□□ □□□.

□□□□

□□

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- □□ | 1133

CLI □□ □□

□ □□ □□□ □□□□□, □□ □□□ □□□□ □□□ □□□ □□ □□ □□ □□ □□□□□□□ □□□□, □□□□ □□□ □□□□ □ □□□ □□ □□□ □□□ [edit] □ □ □□□□ □□□ CLI□ □□□ □□ □□□□.

```
set firewall family inet filter fragment-RE term not-from-prefix-term from source-address
0.0.0.0/0
set firewall family inet filter fragment-RE term not-from-prefix-term from source-address
10.2.1.0/24 except
```

```
set firewall family inet filter fragment-RE term not-from-prefix-term then discard
set firewall family inet filter fragment-RE term small-offset-term from fragment-offset 1-5
set firewall family inet filter fragment-RE term small-offset-term then syslog
set firewall family inet filter fragment-RE term small-offset-term then discard
set firewall family inet filter fragment-RE term not-fragmented-term from fragment-offset 0
set firewall family inet filter fragment-RE term not-fragmented-term from fragment-flags "!more-
fragments"
set firewall family inet filter fragment-RE term not-fragmented-term from protocol tcp
set firewall family inet filter fragment-RE term not-fragmented-term from destination-port bgp
set firewall family inet filter fragment-RE term not-fragmented-term then accept
set firewall family inet filter fragment-RE term first-fragment-term from first-fragment
set firewall family inet filter fragment-RE term first-fragment-term from protocol tcp
set firewall family inet filter fragment-RE term first-fragment-term from destination-port bgp
set firewall family inet filter fragment-RE term first-fragment-term then accept
set firewall family inet filter fragment-RE term fragment-term from fragment-offset 6-8191
set firewall family inet filter fragment-RE term fragment-term then accept
```

[illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] Junos OS CLI [illegible] [illegible] [illegible]"[illegible] [illegible] CLI [illegible] [illegible]" [illegible] 1787.

[illegible] [illegible] [illegible] [illegible]:

1. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit firewall family inet filter fragment-RE
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter fragment-RE ]
user@host# set term not-from-prefix-term from source-address 0.0.0.0/0
user@host# set term not-from-prefix-term from source-address 10.2.1.0/24 except
user@host# set term not-from-prefix-term then discard
```

3. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter fragment-RE]
user@host# edit term small-offset-term
```

4. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter fragment-RE term small-offset-term]
user@host# set from fragment-offset 1-5
```

5. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter fragment-RE term small-offset-term]
user@host# set then syslog discard
```

6. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit firewall family inet filter fragment-RE term not-fragmented-term
```

7. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter fragment-RE term not-fragmented-term]
user@host# set from fragment-flags "!more-fragments" fragment-offset 0 protocol tcp
destination-port bgp
```

8. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter fragment-RE term not-fragmented-term]
user@host# set then accept
```

9. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit firewall family inet filter fragment-RE term first-fragment-term
```

10. [illegible]

```
[edit firewall family inet filter fragment-RE term first-fragment-term]
user@host# set from first-fragment protocol tcp destination-port bgp
```

11. [illegible]

```
[edit firewall family inet filter fragment-RE term first-fragment-term]
user@host# set then accept
```

12. [illegible]

```
[edit]
user@host# edit firewall family inet filter fragment-RE term fragment-term
```

13. [illegible]

```
[edit firewall family inet filter fragment-RE term fragment-term]
user@host# set from fragment-offset 6-8191
```

14. [illegible]

```
[edit firewall family inet filter fragment-RE term fragment-term]
user@host# set then accept
```

[illegible]

[illegible] show firewall [illegible]. [illegible]

```
user@host# show firewall
family inet {
    filter fragment-RE {
        term not-from-prefix-term {
            from {
                source-address {
                    0.0.0.0/0;
                    10.2.1.0/24 except;
```

```
                }
            }
            then discard;
        }
        term small-offset-term {
            from {
                fragment-offset 1-5;
            }
            then {
                syslog;
                discard;
            }
        }
        term not-fragmented-term {
            from {
                fragment-offset 0;
                fragment-flags "!more-fragments";
                protocol tcp;
                destination-port bgp;
            }
            then accept;
        }
        term first-fragment-term {
            from {
                first-fragment;
                protocol tcp;
                destination-port bgp;
            }
            then accept;
        }
        term fragment-term {
            from {
                fragment-offset 6-8191;
            }
            then accept;
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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?? ???? show firewall ??? ??????.

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?? ?? ???? ?? 10.2.1.0/24? ??? ??? ??? ?? ?????? ??? ?? ??? ?????? ??????.

□□ □□

show route summary(□□ □□ □□)

IPv4 □□ □□□□ □□□□□ □□□□□ □□□ □□ □□

□ □□□□□ □□ □□□ □□□ dont-fragment (set | clear) □□□ □□□□ IPv4 □□ □□□□ □□□□□ □□ □□□□ □□□□ □□□ □□ □□□□□.
□□□ □□□ MX □□□ □□□□ MPC□□□ □□□□□.

□□ □□□□□□□□ □□□ □□□ □□□□ Don't Fragment □□□□ 1□ □□□□□ 0□□ □□□ IPv4 □□□ □□□□ □ □□□□. □ □□□□ □□ □□□ □ □□□ □□□□ □□□□□. □□□□ □□□□ □□ □□ □□□□ □□□□□.

IPv4 □□□ □□□□□ □□ □□□□□,

- Don't Fragment □□□□ 1□ □□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter dfSet]
user@host# set term t1 then dont-fragment set
```

IPv4 □□□ □□□□ □□□□□ □□□ □□□□□.

- Don't Fragment □□□□ 0□□ □□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter dfClear]
user@host# set term t1 then dont-fragment clear
```

□□ □□□□ dfSet □□□ □□□ □□□□ □□□ □□□□ □□□□ □□□□ □□ □□□□□ □□ □□□□ □□□□□. dfClear □□□ □□□ □□□□□ □□ □□□ □□□□□ □□□□ □□□□□ □□□□□ □□ □□□□ □□□□□.

```
[edit firewall family inet]
user@host# edit filter dfSet
user@host# set term t1 from fragment-flags is-fragment
user@host# set term t1 then dont-fragment set
user@host# up
user@host# edit filter dfClear
user@host# set term t1 from fragment-flags dont-fragment
user@host# set term t1 then dont-fragment clear
```

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IPv4 ???? ???? ??? ??? | 894

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Mobility Extension ???? ??? ??? IPv6 ???? ?????? ???? ??? ???

? ?????? ???? ???? ????? ????? ??? ???? ???? IPv6 ???? ????? ???? ??? ??????. ? ???? MX ???? ????? MPC??? ??????.

???? ???? ??? ?????:

1. ??? ???? ???? ???? ??????.

```
[edit]
user@host# edit firewall family inet6 filter filter-name
```

? ??? ??? ??? ???? ?????.

```
[edit]
user@host# edit firewall family inet6 filter drop-mobility
```

2. ????? ??? ???? ????? ??? ????? ?????? ???? ??????.

```
[edit firewall family inet6 filter drop-mobility]
user@host# set term term1 from extension-header mobility
user@host# set term term1 then discard
```

3. ??? ??? ????? ?????? ???? ??????.

```
[edit firewall family inet6 filter drop-mobility]
user@host# set term term2 then accept
```

4. □□□ □□□□□□ □□□ □□□ □□□□□.

```
[edit interfaces ge-1/2/10 unit 0 family inet6]
user@host# set filter input drop-mobility
```

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□□ □□□ □□ □□ □□ □□ | 731

IPv6 □□□□ □□ □□□ □□ □□ □□ | 911

□: IPv6 □□ □□ □□ IP □□□ □□□□ □□ □□ □□

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□ □□□□ □□□□□□ □□ inet6 □□ IPv6 □□□ □□□□□ □□□ □□□ □□□□ □□□ □□□□□.

□□ □□

□ □□□ Junos OS □□□ 19.1R1□ □□□ EX4300 □ QFX5100□□ □□□□ □□□ □□ □□□□□. □ □□ □□□□ □□ □□□□ □□□□ □□ □ □□□ □□□ □□□□ □□□□.

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□ □□□□ □□□□□□ □□ □□□□ inet6 IPv6 □□ □ □□ □□□ □□□□ □□□□ □□□ □□□ □□□□□. □□□ □□ □□□□ □□□□ □□□□□ □□ □□ srcip6-only □□□ □□□□ srcip6-and-destip6 □ □□□□ set system packet-forwarding-options eracl-ip6-match □□□. □□ □□□ □□□ □ □□ □□ □□(PFE)□ □□ □□□□ □□□.

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- CLI ?? ?? | 1141
- IPv6 ?? ???? ?? ??? ??? | 1141
- ?? ?????? ??? ?? ?? | 1143
- ?? ?? ?? ? ?? | 1143

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CLI ?? ??

? ?? ??? ?????? ?? ??? ??? ??? ???? ? ??? ??? ?? ??? ?? ??? CLI? ??????? [edit] .

```
set system packet-forwarding-options eracl-ip6-match srcip6-and-destip6
set firewall family inet6 filter ipv6_filter term t1 from source-address 3001::10/64
set firewall family inet6 filter ipv6_filter term t1 from destination-address 2001::10/64
set interfaces ge-0/0/0 unit 0 family inet6 filter output ipv6_filter
```

IPv6 ?? ???? ?? ??? ???

??? ??

?? ????????? IPv6 ??? inet6 ? ?? ??? ??? ?????? ??? ??????.

1. IPv6 ?? ?? IPv6 ?? ? ?? IP ???? ?????? ?? ?? ?? ??? ???????. ? ???? ?? ? ?? IP ?? ??? ?? ?????? ????
   ?.

   ```
   [edit]
   user@host# set system packet-forwarding-options eracl-ip6-match srcip6-and-destip6
   ```

2. IPv6 □□□ □□□ □□□ □□□□□□□ □□ □□□□ □□ □□□ □□□ □□□□ □□□ □□ □□□□□.

```
[edit]
user@host# delete interfaces ge-0/0/0 unit 0 family inet6 filter output tcp_filter.
```

3. □□ □□ □□□ □□□ □□ PFE□ □□□□□ □□ □□□□ IPv6 □□□ □□ PFE□ □□ packet-forwarding-options □□ □□□□.

   - EX4300□ □□ □□□ □□□□□.

     ```
     user@host# commit
     user@host# run request restart pfe-manager
     ```

   - EX4300 Virtual Chassis□ □□ □□□ □□□□□.

     ```
     user@host# commit
     user@host# run request system reboot all-members
     ```

   - QFX5100 □□ □□□□ □□□□□□.

     ```
     user@host# commit
     user@host# run request system reboot
     ```

4. □□ tcp_filterIPv6 □□□ □□□ □□□□.

```
[edit]
user@host# edit firewall family inet6 filter tcp_filter
```

5. □□□□ □□□ □□ □□□ □□□□ □□□ □□ □□ IPv6 □□ □□ □□ □□□ □□□ □□□□□□.

```
[edit firewall family inet6 filter tcp_filter]
user@host# set term t1 from source-address 3001::10/64
user@host# set term t1 from destination-address 2001::10/64
```

6. [illegible] PFE[illegible].

```
[edit firewall family inet6 filter tcp_filter]
user@host# set term t1 then count egress_ipv6-packets
user@host# set term t1 then log
user@host# set term t1 then accept
```

[illegible]

[illegible]

[illegible] inet6 [illegible].

- user@host# **set interfaces ge-0/0/0 unit 0 family inet6 filter output tcp_filter**

[illegible]

[illegible]

[illegible].

1. [illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
family inet6 {
    filter tcp_filter {
        term t1 {
            from {
                source-address 3001::10/64;
                destination-address 2001::10/64;
            }
            then {
                count egress_ipv6-packets;
                log;
                accept;
            }
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
    unit 0 {
        family inet6 {
            filter {
                output tcp_filter;
            }
             source-address 3001::10/64;
             destination-address 2001::10/64;
        }
    }
}
```

3. ???? ??? ??? ?? ??? ?????.

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

?? ??

> *eracl-ip6-??*
>
> ?? ??? ?? ?? ?? ?? | 731

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- ?? | 1145
- ?? | 1145

- [illegible] | 1148

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] class1[illegible] .

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]:

- [illegible] [illegible] policer *policer-name* [illegible] [illegible] [illegible] [illegible] [illegible].
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] policer *policer-name* [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] policer (input | output) *policer-template-name* [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

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- CLI [illegible] [illegible] | 1146
- [illegible] [illegible] [illegible] [illegible] | 1146
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1147
- [illegible] [illegible] [illegible] [illegible] [illegible] | 1147

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. CLI [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] "[illegible] [illegible] CLI [illegible] [illegible]" [illegible] 1787.

CLI ?? ??

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```
set firewall policer police_class1 if-exceeding bandwidth-limit 25m
set firewall policer police_class1 if-exceeding burst-size-limit 25m
set firewall policer police_class1 then discard
set firewall filter rl_dclass1 term term1 from destination-class class1
set firewall filter rl_dclass1 term term1 then policer police_class1
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.1/30
set interfaces ge-0/0/1 unit 0 family inet filter input rl_dclass1
```

??? ??? ?? ??

??? ??

?? ????? class1?? policer police_class1 ? ????? ?? ???? ??? ??? rl_dclass1 ??????:

1. ???? ????? police_class1????? .

   ```
   [edit]
   user@host# edit firewall policer police_class1
   ```

2. ???? ????? police_class1??????.

   ```
   [edit firewall policer police_class1]
   user@host# set if-exceeding bandwidth-limit 25m
   user@host# set if-exceeding burst-size-limit 25m
   user@host# set then discard
   ```

3. ???? ???? ??? rl_dclass1??????.

   ```
   [edit]
   user@host# edit firewall filter rl_dclass1
   ```

4. [illegible] police_class1 [illegible] class1[illegible].

```
[edit firewall filter rl_dclass1]
user@host# set term term1 from destination-class class1
user@host# set term term1 then policer police_class1
```

[illegible]

[illegible]

[illegible] rl_dclass1 [illegible].

1. [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.1/30
```

3. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input rl_dclass1
```

[illegible]

[illegible]

[illegible].

1. [illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
```

```
policer police_class1 {
    if-exceeding {
        bandwidth-limit 25m;
        burst-size-limit 25m;
    }
    then discard;
}
filter rl_dclass1 {
    term term1 {
        from {
            destination-class class1;
        }
        then policer police_class1;
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input rl_dclass1;
            }
            address 10.1.2.1/30;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ????? ????? ?? ?? ??? show class-of-service ge-0/0/1 ?????.

?? ??

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?????? ???? ??? ?? ??? ?? | 1297

?: ?????? ???? ??? ?? ??? | 1283

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- ??? ???? ??? ???? ???? ??? ?? ?? | 1157
- ??? ???? ???? ???? ??? ???? ?? | 1159
- ?: ?? ?? ?? ?? | 1166
- ?: ??? ????? ?? ?? ?? ?? | 1172
- ?: ICMP ?????? ??? ???? ???? ?? ??? ??? ?? ?? | 1185
- ?: ICMP ?????? ??? ???? ???? ?? ??? ??? ?? ?? | 1191
- ??? ???? ?? ???? ?? ??? ?? ? | 1196
- ??? ???? ??? ??? ?? ???? ?? ?? | 1199
- ??? ????? ?? ?? ?? ?? | 1205
- ACX ??? ???? ??? ????? ?? ??? ??? ?? | 1206
- ??? ??? ?? ?? | 1207

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- ??? ???? ??? ??? ?? ??? | 1151

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Junos OS? ????? ?? ??? ??? ?? ????? ????? ??? ??? ????? ?? ??? ?????? ??? ? ?????. ??? ????? ??? ??? ?? ? ??? ?? ????? ??? ?? ??? ????? ??? ??? ????? ?? ??? ?? ????? ??? ?????? ????? ??? ??????.

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??? ????? ??? ??? ?? ???

??? ?????? ??? ??? ??? ????? ?? ?? show ?? ? ??? ?? SNMP ?? ?? ???(MIB) ??? ?? ??? ????? __logical-system-name/ ??????. ?? ??, ??? ??? ??? ??? ??? ??? ls1 ????? ? ?????? __ls1/ .

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??? ????? ?? ????? ?? ??? ?? ? | 1196

??? ????? ??? ??? ?? ????? ?? ?? | 1199

?: ICMP ??????? ??? ????? ????? ?? ??? ??? ?? ?? | 1185

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- ??? ????? ??? ?? ????? ??? | 1153
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- ??? ???? ??? ?? ?? | 1154
- ??? ?????? ??? ??? ???? ?? ??? ?? | 1154

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??? ?????? */???/* */???/* ?????? ?? ???? , service-filter?? simple-filter ???? [edit logical-systems *logical-system-name* firewall family *family-name*] ??????filter.

```
[edit]
logical systems {
    logical-system-name {
        firewall {
            family family-name {
                filter filter-name {
                    interface-specific;
                    physical-interface-filter;
                    term term-name {
                        filter filter-name;
                        from {
                            match-conditions;
                        }
                        then {
                            actions;
                        }
                    }
                }
                service-filter filter-name { # For 'family inet' or 'family inet6' only.
                    term term-name {
                        from {
                            match-conditions;
                        }
                        then {
                            actions;
                        }
                    }
                }
                simple-filter filter-name { # For 'family inet' only.
                    term term-name {
```

```
                        from {
                            match-conditions;
                        }
                        then {
                            actions;
                        }
                    }
                }
            }
        }
    }
}
```

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- ?? ?? ??? ??? ?? - ??? ?????? ?? ??? ??? ???? ? ????. ???? ???, IPv4, IPv6, MPLS, MPLS ?? IPv4 ?? IPv6, VPLS, ??? 2 ?? ?? ?? ? ??? 2 ???.
- ??? ?? - ??? ?????? IPv4 ? IPv6 ???? ???? ? ????.
- ?? ?? - ??? ??????? IPv4 ???? ???? ? ????.

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??? ?????? ??? ??? ???? ?? ??? ??

??? ???? ??? ??? ?????? , service-filter *service-filter-name*?? simple-filter *simple-filter-name* ???? ??? */???/ /??/ /??????/* ?????filter *filter-name*.

?? ??? ?? ??? ? ?? ?? ??? ??????.

```
[edit]
logical-systems logical-system-name {
    interfaces {
        interface-name {
            unit logical-unit-number {
                family family-name {
                    filter {
                        group group-name;
                        input filter-name;
                        input-list [ filter-names ];
                        output filter-name;
                        output-list [ filter-names ]
                    }
                    rpf-check { # For 'family inet' or 'family inet6' only.
                        fail-filter filter-name;
                        mode loose;
                    }
                    service { # For 'family inet' or 'family inet6' only.
                        input {
                            service-set service-set-name <service-filter service-filter-name>;
                            post-service-filter service-filter-name;
                        }
                        output {
                            service-set service-set-name <service-filter service-filter-name>;
                        }
                    }
                    simple-filter { # For 'family inet' only.
                        input simple-filter-name;
                    }
                }
            }
```

```
        }
    }
}
```

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??? ???? ??? ???? ???? ??? ?? ?? | 1157
??? ???? ???? ???? ??? ???? ?? | 1159
?: ICMP ??????? ??? ???? ???? ?? ??? ??? ?? ?? | 1185
??? ???? ?? ???? ?? ??? ?? ? | 1196
??? ???? ??? ??? ?? ???? ?? ?? | 1199

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- ??? ???? ?? ??? ?? ??? ?? | 1156

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??? ???? ??? */???/???* ?? ??(?: ??? ?? ??? ??)? ???? ??, ?? ?? ??? ??? ??? ???? ??? ??? firewall ?????? ???. ?? ??, ??? ?? ??? ???? ???? ?? ??? ??? ???? ??? [edit logical-systems *logical-system-name* firewall] ? ? ???? ????? ???.

? ??? ??? ???? ?? ??? ??? ?? ????? ??? ???? ?? ??? ????? ???? ??? ??? ???? ?????.

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? ??? ??? ??? filter1 ???? pol1?????. ? pol1 ? ? filter1 ??? ??? ?? ??? ??????. ? ??? ??????. ?(?) ?? ??? ?? ??? ????? ????? pol1 ??? ????? ??? ?????.

```
[edit]
logical systems {
    ls-A {
        firewall {
            policer pol1 {
                if-exceeding {
                    bandwidth-limit 401k;
                    burst-size-limit 50k;
                }
                then discard;
            }
            filter filter1 {
                term one {
                    from {
                        source-address 12.1.0.0/16;
                    }
                    then {
                        reject host-unknown;
                    }
                }
                term two {
                    from {
                        source-address 12.2.0.0/16;
                    }
                    then policer pol1;
                }
            }
        }
    }
}
```

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[illegible] | 1159

[illegible]

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- [illegible] | 1157
- [illegible] | 1157

[illegible]

[illegible]. [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [edit logical-systems *logical-system-name*] [illegible].

[illegible]

[illegible] *[illegible]* [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] inetsf1 [illegible] [illegible] [illegible] *[illegible]* fe-0/3/2.0 [illegible] fred [illegible] [illegible] IPv4 [illegible] [illegible].

- [illegible] inetsf1 [illegible] ls-B [illegible] [illegible] [illegible] [illegible] prefix1.
- [illegible] fred [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] fred [illegible] [edit services] [illegible].

[illegible] [illegible] [illegible] [illegible]. [illegible] [edit logical-systems logical-system *logical-system-name*] [illegible] [illegible] [illegible] [illegible] *[illegible]* [illegible] [illegible].

```
[edit]
logical-systems {
    ls-B {
        interfaces {
            fe-0/3/2 {
                unit 0 {
                    family inet {
                        service {
                            input {
```

```
                            service-set fred service-filter inetsf1;
                        }
                    }
                }
            }
        }
        policy-options {
            prefix-list prefix1 {
                1.1.0.0/16;
                1.2.0.0/16;
                1.3.0.0/16;
            }
        }
        firewall { # Under logical-system 'ls-B'.
            family inet {
                filter filter1 {
                    term one {
                        from {
                            source-address {
                                12.1.0.0/16;
                            }
                        }
                        then {
                            reject host-unknown;
                        }
                    }
                    term two {
                        from {
                            source-address {
                                12.2.0.0/16;
                            }
                        }
                        then policer pol1;
                    }
                }
                service-filter inetsf1 {
                    term term1 {
                        from {
                            source-prefix-list {
                                prefix1;
                            }
                        }
```

```
                        then count prefix1;
                    }
                }
            }
            policer pol1 {
                if-exceeding {
                    bandwidth-limit 401k;
                    burst-size-limit 50k;
                }
                then discard;
            }
        }
    }
} # End of logical systems configuration.
services { # Main services hierarchy level.
    service-set fred {
        max-flows 100;
        interface-service {
            service-interface sp-1/2/0.0;
        }
    }
}
```

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[illegible] | 1162
[illegible] | 1164

[illegible]

[illegible] *[illegible]* [illegible], [illegible] [illegible] [illegible].

- [illegible] [illegible] [edit logical-systems *logical-system-name* firewall] . *[illegible]* [illegible] [edit firewall] [illegible].
- [illegible] [illegible] [illegible] [edit firewall] [illegible].

[illegible]

[illegible] [illegible] *[illegible]* fe-0/3/2.0 [illegible].

- [illegible] filter1 [illegible] ls-C.
- [illegible] fred [illegible].

[illegible] filter1[illegible] [illegible] ls-C [illegible] [edit logical systems ls-C firewall] [illegible]. [illegible] [illegible] fred [illegible] fe-0/3/2.0 [illegible].

```
[edit]
logical-systems {
    ls-C {
        interfaces {
            fe-0/3/2 {
                unit 0 {
                    family inet {
                        filter {
                            input-list [ filter1 fred ];
                        }
                    }
                }
            }
        }
```

```
        firewall { # Under logical system 'ls-C'.
            family inet {
                filter filter1 {
                    term one {
                        from {
                            source-address 12.1.0.0/16;
                        }
                        then {
                            reject host-unknown;
                        }
                    }
                    term two {
                        from {
                            source-address 12.2.0.0/16;
                        }
                        then policer pol1;
                    }
                }
            }
            policer pol1 {
                if-exceeding {
                    bandwidth-limit 401k;
                    burst-size-limit 50k;
                }
                then discard;
            }
        }
    }
} # End of logical systems
firewall { # Under the main firewall hierarchy level
    family inet {
        filter fred {
            term one {
                from {
                    source-address 11.1.0.0/16;
                }
                then {
                    log;
                    reject host-unknown;
                }
            }
        }
```

```
    }
} # End of main firewall configurations.
```

[illegible]

[illegible] 2[illegible] [illegible] filter1 [illegible] fred [illegible] ls-C[illegible] [illegible] fe-0/3/2.0 [illegible].

- [illegible] filter1 [illegible] ls-C.
- [illegible] fred [illegible] ls-C [illegible].

[illegible] ls-C [illegible] [edit logical systems ls-C firewall] [illegible] [illegible]. [illegible], [illegible] filter1 [illegible] fe-0/3/2.0 [illegible] fred [illegible] ls-C[illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
logical-systems {
    ls-C {
        interfaces {
            fe-0/3/2 {
                unit 0 {
                    family inet {
                        filter {
                            input-list [ filter1 fred ];
                        }
                    }
                }
            }
        }
        firewall { # Under logical system 'ls-C'.
            family inet {
                filter filter1 {
                    term one {
                        from {
                            source-address 12.1.0.0/16;
                        }
                        then {
                            reject host-unknown;
                        }
                    }
                    term two {
```

```
                        from {
                            source-address 12.2.0.0/16;
                        }
                        then policer pol1;
                    }
                }
                filter fred { # This 'fred' is in 'ls-C'.
                    term one {
                        from {
                            source-address 10.1.0.0/16;
                        }
                        then {
                            log;
                            reject host-unknown;
                        }
                    }
                }
            }
            policer pol1 {
                if-exceeding {
                    bandwidth-limit 401k;
                    burst-size-limit 50k;
                }
                then discard;
            }
        }
    }
} # End of logical systems configurations.
firewall { # Main firewall filter hierarchy level
    family inet {
        filter fred {
            term one {
                from {
                    source-address 11.1.0.0/16;
                }
                then {
                    log;
                    reject host-unknown;
                }
            }
        }
```

```
    }
} # End of main firewall configurations.
```

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- ??? filter1 ?? ??? ??? ???? ????.
- ??? fred ?? ??? ??? ???? ????.

?(?) ??? ?? ?? ???? ?? ??? ls-C ?? ????? ??????? ?? ??? ???? [edit firewall] ??? ??? ?? ??? ?????. ????? ?, ??? ?????? ? ?? fe-0/3/2.0filter1 ??? fred ?? ??? ??? ??? ??? ??? ??? ?????.

```
[edit]
logical-systems {
    ls-C {
        interfaces {
            fe-0/3/2 {
                unit 0 {
                    family inet {
                        filter {
                            input-list [ filter1 fred ];
                        }
                    }
                }
            }
        }
    }
} # End of logical systems configurations.
firewall { # Main firewall hierarchy level.
    family inet {
        filter filter1 {
            term one {
                from {
                    source-address 12.1.0.0/16;
                }
                then {
                    reject host-unknown;
                }
```

```
            }
            term two {
                from {
                    source-address 12.2.0.0/16;
                }
                then policer pol1;
            }
        }
        filter fred {
            term one {
                from {
                    source-address 11.1.0.0/16;
                }
                then {
                    log;
                    reject host-unknown;
                }
            }
        }
    }
    policer pol1 {
        if-exceeding {
            bandwidth-limit 701k;
            burst-size-limit 70k;
        }
        then discard;
    }
} # End of main firewall configurations.
```

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PBR(?? ?? ???)???? ?? ?? ?? ???(FBF)? ??? 3 ?? ??? 4 ?? ??? ???? IP ???? ?? ??????? ?????? ?????? ??? ??? ??????.

FBF? ???? ??? ?? ??? ???? ?? ???? ???? ?? ???? ?? ?? ???? ??? ??? ?????? ???? ???? ??????. ?? ?? ???? ? ???? ?? ???? ???? ?????? ???? ???? ?????? ???? ???? ???? RIB ???? ?? ??????.

?? ???? ?? ?? ?? IP ??, ?? ?? ?? ??, IP ????, DSCP ?, TCP ???, ICMP ?? ? ?? ???? ???? ? ????.

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- MX ??? 5G ???? ??? ???? ??? ??? ??? ??? ?????? ??? ? ????.
- ??? ??? ??? ??? ??????? ???? Junos OS ??? 13.3 ??.

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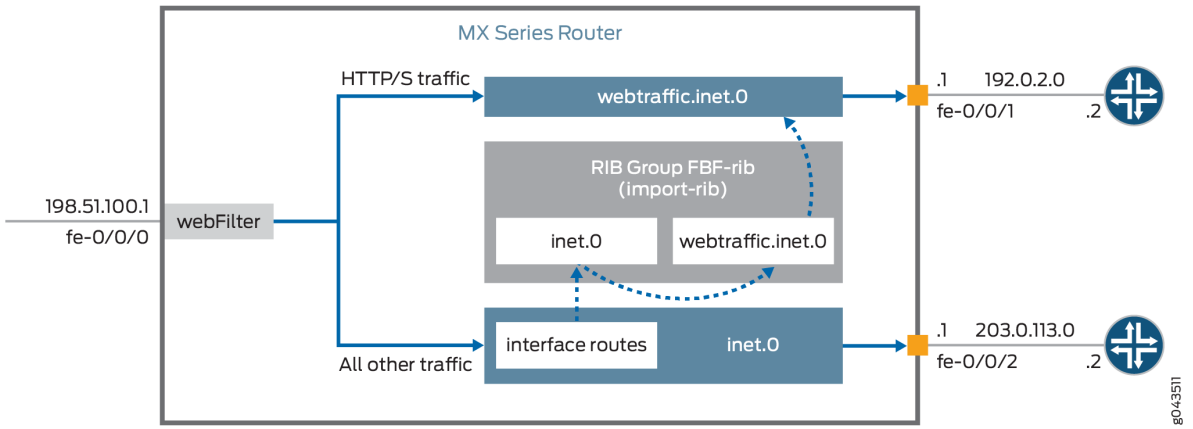
□□ 54: □□□ □□□□□□ □□ □□ □□ □□



□□ **webFilter** □□□ □□□ □□ □□□□□□ □□□□ □□□□ **fe-0/0/0**. □□□□□□□ □□ □□□□ □□□ □□□ □□□ □□ □□□ □□ □□□□, □ □□□ HTTP □ HTTPS □□□□ □□ **webtraffic**□□□ □□□□□□ □□□□□. □ □□□□ □□□□□ □□ □ □□ □□□ □□□□□□. □□, □□ □□□ □□□□ **webtraffic.inet.0**□□□□, □□, □□ □□□ □□ □□ □□□□, □□, □□□□ □□ □(□□□□ □□□□□□ **fe-0/0/1**192.0.2.2)□□ □□□□ □□ □ □□□□ □□□ □ □□□□.

□□□ □□ **then accept**□ □□ 2□ □□□□ □□ □□ □□□□ □□ □□□ □□□□□ □□□□□. □□ □□ 203.0.113.2□ □□ □□□ □□□□ □ □□□ □ □ □□ **fe-0/0/2**□□□□□ □□□□□ □□□. □□□ □□□ □□□ □□□ **inet.0**□ □□□□ □□□□□.

FBF □□□ □□□(□□□) □□□ □ □□□ □□ □□□ □ □□□ □□□□ □□□□. RIB □□(**FBF-rib** □ □□□□)□ □ **inet.0** □□□□□ □□□ □ □□□ □ □□□ **webtraffic.inet.0**□□□.

□□ □□ □□ □□ □□ □□ □□□□□ □□□ □□ □□ □□ □□□ □□□□□□.

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□ □□ □□□ □□□□□, □□ □□□ □□□□ □□□ □□□ □□ □□ □□ □□ □□□□□□□ □□□□, □□□□ □□□ □□□□ □ □□□ □□ □□□ □□□ [edit] □ □ □□□□ □□□ CLI□ □□□ □□ □□□□.

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```
set interfaces fe-0/0/0 unit 0 family inet address 198.51.100.1/24
set interfaces fe-0/0/0 unit 0 family inet filter input webFilter
set interfaces fe-0/0/1 unit 0 family inet address 192.0.2.1/24
set interfaces fe-0/0/2 unit 0 family inet address 203.0.113.1/24
set firewall family inet filter webFilter term 1 from destination-port http
set firewall family inet filter webFilter term 1 from destination-port https
set firewall family inet filter webFilter term 1 then routing-instance webtraffic
set firewall family inet filter webFilter term 2 then accept
set routing-instances webtraffic routing-options static route 0.0.0.0/0 next-hop 192.0.2.2
set routing-instances webtraffic instance-type forwarding
set routing-options static route 0.0.0.0/0 next-hop 203.0.113.2
set routing-options rib-groups FBF-rib import-rib inet.0
set routing-options rib-groups FBF-rib import-rib webtraffic.inet.0
set routing-options interface-routes rib-group inet FBF-rib
```

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1. □□□□ □□□□□□ □□□□ □□□ □□□ □□□□□ **webFilter** .

   ```
   [edit interfaces fe-0/0/0 unit 0 family inet]
   user@device# set filter input webFilter
   user@device# set address 198.51.100.1/24
   ```

2. □ □□□□ □□ □□ □□□□ □□ □□□□□ □□□□□□ □□□□□.

   ```
   [edit interfaces]
   user@device# set fe-0/0/1 unit 0 family inet address 192.0.2.1/24
   user@device# set fe-0/0/2 unit 0 family inet address 203.0.113.1/24
   ```

3. □ □□□□ □□□ □□□□□ **webtraffic** □□□□ □□ □□ □□□□ □ □□□□□ **203.0.113.1**□□□ □□□ □□□□□.

   ```
   [edit firewall family inet filter webFilter]
   user@device# set term 1 from destination-port http
   ```

```
user@device# set term 1 from destination-port https
user@device# set term 1 then routing-instance webtraffic
user@device# set term 2 then accept
```

4. [illegible]: [illegible]>

```
[edit interfaces fe-0/0/0 unit 0 family inet]
user@device# set firewall family inet filter webFilter term 1 then count webtraffic-count
```

5. webtraffic [illegible] fe-0/0/1[illegible].

```
[edit routing-instances webtraffic]
user@device# set routing-options static route 0.0.0.0/0 next-hop 192.0.2.2
user@device# set instance-type forwarding
```

6. inet.0).

```
[edit routing-options]
user@device# set static route 0.0.0.0/0 next-hop 203.0.113.2
```

7. FBF-ribRIB webtraffic.inet.0 inet.0 [illegible].

```
[edit routing-options]
user@device# set rib-groups FBF-rib import-rib inet.0
user@device# set rib-groups FBF-rib import-rib webtraffic.inet.0
```

8. [illegible].

```
[edit routing-options]
user@device# set interface-routes rib-group inet FBF-rib
```

[illegible]

[illegible] , show routing-instances, show routing-options show interfaces, [illegible] show firewall[illegible].

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

```
user@device# show interfaces fe-0/0/0
unit 0 {
    family inet {
        filter {
            input webFilter;
        }
        address 198.51.100.1/24;
    }
}
user@device# show interfaces fe-0/0/1
unit 0 {
    family inet {
        address 192.0.2.1/24;
    }
}
user@device# show interfaces fe-0/0/2
unit 0 {
    family inet {
        address 203.0.113.1/24;
    }
}
user@device# show firewall
family inet {
    filter webFilter {
        term 1 {
            from {
                destination-port [ http https ];
            }
            then {
                routing-instance webtraffic;
            }
        }
        term 2 {
            then accept;
        }
```

```
    }
}
```

```
user@device# show routing-options
interface-routes {
    rib-group inet FBF-rib;
}
static {
    route 0.0.0.0/0 next-hop 203.0.113.2;
}
rib-groups {
    FBF-rib {
        import-rib [ inet.0 webtraffic.inet.0 ];
    }
}
```

```
user@device# show routing-instances
webtraffic {
    instance-type forwarding;
    routing-options {
        static {
            route 0.0.0.0/0 next-hop 192.0.2.2;
        }
    }
}
```

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- □□□ □□□□ □□□ □□□□ □□ [edit routing-instances] □ □□□□ □□□ □□ [edit logical-systems *logical-system-name* routing-instances] □□ □□□□ □□□□ □□□ □□□□□ □□□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit]
routing-instances {
    routing-table-name1 {
        instance-type forwarding;
        routing-options {
            static {
                route 0.0.0.0/0 nexthop 10.0.0.1;
            }
        }
    }
    routing-table-name2 {
        instance-type forwarding;
        routing-options {
            static {
                route 0.0.0.0/0 nexthop 10.0.0.2;
            }
        }
    }
}
```

- □□ □□ □□□(FBF)□ □□□□ □□□ □□□ □□□□□ □□ □□□ □□□□□ inet.0□□□□□ □□□ □□□□ □□□ □□□ □□□ □□□□□. □□□ □ □ □□ □□□ □□□□□ □□□ □□□ □□ □□□□□□□ □□ □□□ □□ □□□ □□□□□. □□ [edit logical-systems *logical-system-name* routing-options] □□ □□□□ □□□ □□□ □□□ [edit routing-options] □□□□.

> □: □(□) □□□□□ □□□ □□□ □□□ □□□□ □ □□□ □□□□□ inet.0 . □□ □□□□□ inet.0 □□□□ □□□ □□□□□ □□□ □ □ □□□ □□□□□ □□□□ □□□□.

□ □□ □□□ □□ □□□ □□□□ □□ □□□□ □□□ SP 1 □□ SP 2□ □□ □ □□□□ □□□ □□ □□□ □□□□□.

□□□ SP 1 □□□□ □□□ □□ □□□ □□ □□ sp1-route-table.inet.0 □□□ □□□□ □□□□ □□ □□ □□□ □□□□□. □□□ SP 2 □□□□ □ □□ □□ □□□ □□ □□ sp2-route-table.inet.0 □□□ □□□□ □□□□ □□ □□ □□□ □□□□□. □□□ □□□ □□ □ □□□ □□□□ □□□ □□□ □ □□ □□□□ □□ inet.0 □□□ □□□□ □□□□ □□ □□ □□□ □□□□□.

[illegible]

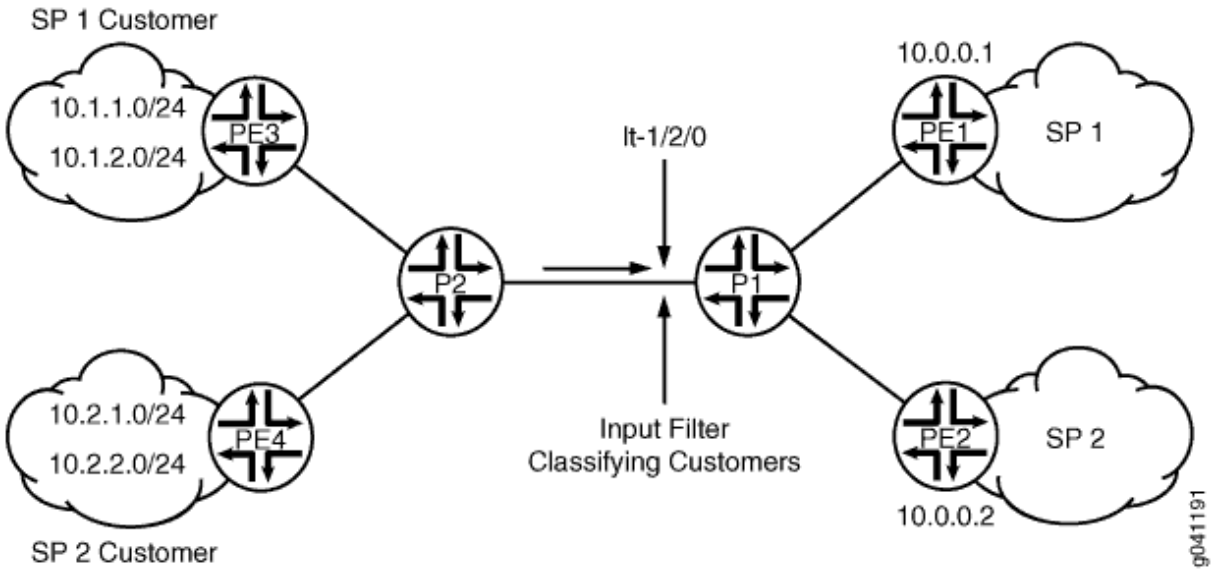
```
[edit firewall filter filter-name term term-name]
user@host# set then logical-system logical-system-name routing-instance routing-instance-name
```

[illegible]

[illegible] 55 [illegible] 1174 [illegible] [illegible] [illegible].

[illegible] P1[illegible] [illegible] [illegible] PE3 [illegible] PE4[illegible] [illegible] [illegible]. [illegible] 10.1.1.0/24 [illegible] 10.1.2.0/24 [illegible] [illegible] [illegible] PE1[illegible] [illegible]. 10.2.1.0/24 [illegible] 10.2.2.0/24 [illegible] [illegible] [illegible] PE2[illegible] [illegible].

[illegible] 55: [illegible] [illegible]



[illegible] [illegible] [illegible] [illegible] [illegible] OSPF[illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] "CLI [illegible] [illegible]" [illegible] 1175 [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] "[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] " [illegible] 1177 [illegible] "[illegible] [illegible] P1[illegible] [illegible] [illegible] [illegible]" [illegible] 1178 [illegible] [illegible] [illegible] [illegible] [illegible] P1[illegible] [illegible] [illegible] [illegible] [illegible].

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- CLI ?? ?? | 1175
- ?? ????? ??? ?? ?? | 1177
- ??? ??? P1?? ??? ???? ?? | 1178
- ?? | 1180

CLI ?? ??

? ?? ??? ??????, ?? ??? ???? ??? ??? ?? ?? ?? ?? ???????? ????, ???? ??? ???? ? ??? ?? ??? ??? **[edit]** ? ? ???? ??? CLI? ??? ?? ????.

```
set firewall filter classify-customers term sp1-customers from source-address 10.1.1.0/24
set firewall filter classify-customers term sp1-customers from source-address 10.1.2.0/24
set firewall filter classify-customers term sp1-customers then log
set firewall filter classify-customers term sp1-customers then logical-system P1 routing-
instance sp1-route-table
set firewall filter classify-customers term sp2-customers from source-address 10.2.1.0/24
set firewall filter classify-customers term sp2-customers from source-address 10.2.2.0/24
set firewall filter classify-customers term sp2-customers then log
set firewall filter classify-customers term sp2-customers then logical-system P1 routing-
instance sp2-route-table
set firewall filter classify-customers term default then accept
set logical-systems P1 interfaces lt-1/2/0 unit 10 encapsulation ethernet
set logical-systems P1 interfaces lt-1/2/0 unit 10 peer-unit 9
set logical-systems P1 interfaces lt-1/2/0 unit 10 family inet filter input classify-customers
set logical-systems P1 interfaces lt-1/2/0 unit 10 family inet address 172.16.0.10/30
set logical-systems P1 interfaces lt-1/2/0 unit 13 encapsulation ethernet
set logical-systems P1 interfaces lt-1/2/0 unit 13 peer-unit 14
set logical-systems P1 interfaces lt-1/2/0 unit 13 family inet address 172.16.0.13/30
set logical-systems P1 interfaces lt-1/2/0 unit 17 encapsulation ethernet
set logical-systems P1 interfaces lt-1/2/0 unit 17 peer-unit 18
set logical-systems P1 interfaces lt-1/2/0 unit 17 family inet address 172.16.0.17/30
set logical-systems P1 protocols ospf rib-group fbf-group
set logical-systems P1 protocols ospf area 0.0.0.0 interface all
set logical-systems P1 protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

```
set logical-systems P1 routing-instances sp1-route-table instance-type forwarding
set logical-systems P1 routing-instances sp1-route-table routing-options static route 0.0.0.0/0
next-hop 172.16.0.13
set logical-systems P1 routing-instances sp2-route-table instance-type forwarding
set logical-systems P1 routing-instances sp2-route-table routing-options static route 0.0.0.0/0
next-hop 172.16.0.17
set logical-systems P1 routing-options rib-groups fbf-group import-rib inet.0
set logical-systems P1 routing-options rib-groups fbf-group import-rib sp1-route-table.inet.0
set logical-systems P1 routing-options rib-groups fbf-group import-rib sp2-route-table.inet.0
set logical-systems P2 interfaces lt-1/2/0 unit 2 encapsulation ethernet
set logical-systems P2 interfaces lt-1/2/0 unit 2 peer-unit 1
set logical-systems P2 interfaces lt-1/2/0 unit 2 family inet address 172.16.0.2/30
set logical-systems P2 interfaces lt-1/2/0 unit 6 encapsulation ethernet
set logical-systems P2 interfaces lt-1/2/0 unit 6 peer-unit 5
set logical-systems P2 interfaces lt-1/2/0 unit 6 family inet address 172.16.0.6/30
set logical-systems P2 interfaces lt-1/2/0 unit 9 encapsulation ethernet
set logical-systems P2 interfaces lt-1/2/0 unit 9 peer-unit 10
set logical-systems P2 interfaces lt-1/2/0 unit 9 family inet address 172.16.0.9/30
set logical-systems P2 protocols ospf area 0.0.0.0 interface all
set logical-systems P2 protocols ospf area 0.0.0.0 interface fxp0.0 disable
set logical-systems PE1 interfaces lt-1/2/0 unit 14 encapsulation ethernet
set logical-systems PE1 interfaces lt-1/2/0 unit 14 peer-unit 13
set logical-systems PE1 interfaces lt-1/2/0 unit 14 family inet address 172.16.0.14/30
set logical-systems PE1 interfaces lo0 unit 3 family inet address 172.16.1.1/32
set logical-systems PE1 protocols ospf area 0.0.0.0 interface all
set logical-systems PE1 protocols ospf area 0.0.0.0 interface fxp0.0 disable
set logical-systems PE2 interfaces lt-1/2/0 unit 18 encapsulation ethernet
set logical-systems PE2 interfaces lt-1/2/0 unit 18 peer-unit 17
set logical-systems PE2 interfaces lt-1/2/0 unit 18 family inet address 172.16.0.18/30
set logical-systems PE2 interfaces lo0 unit 4 family inet address 172.16.2.2/32
set logical-systems PE2 protocols ospf area 0.0.0.0 interface all
set logical-systems PE2 protocols ospf area 0.0.0.0 interface fxp0.0 disable
set logical-systems PE3 interfaces lt-1/2/0 unit 1 encapsulation ethernet
set logical-systems PE3 interfaces lt-1/2/0 unit 1 peer-unit 2
set logical-systems PE3 interfaces lt-1/2/0 unit 1 family inet address 172.16.0.1/30
set logical-systems PE3 interfaces lo0 unit 1 family inet address 10.1.1.1/32
set logical-systems PE3 interfaces lo0 unit 1 family inet address 10.1.2.1/32
set logical-systems PE3 protocols ospf area 0.0.0.0 interface all
set logical-systems PE3 protocols ospf area 0.0.0.0 interface fxp0.0 disable
set logical-systems PE4 interfaces lt-1/2/0 unit 5 encapsulation ethernet
set logical-systems PE4 interfaces lt-1/2/0 unit 5 peer-unit 6
set logical-systems PE4 interfaces lt-1/2/0 unit 5 family inet address 172.16.0.5/30
set logical-systems PE4 interfaces lo0 unit 2 family inet address 10.2.1.1/32
```

```
set logical-systems PE4 interfaces lo0 unit 2 family inet address 10.2.2.1/32
set logical-systems PE4 protocols ospf area 0.0.0.0 interface all
set logical-systems PE4 protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

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??? ??

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? *CLI ???? ????*?? ?? ????? CLI ??? ??? ???????.

?? ?????? ??? ??? ?????? ??? ??????.

1. SP1 ??? ?? ?? ??? ??????.

   ```
   [edit firewall filter classify-customers term sp1-customers]
   user@host# set from source-address 10.1.1.0/24
   user@host# set from source-address 10.1.2.0/24
   ```

2. ??? ?? ??? ??? ??? ? ???? ??? ??????.

   ??? ??? ??? ???? ?? ?? ??? ??????. ??? ??? P1? sp1-route-table.inet.0 ??? ???? ??? ???????.

   ```
   [edit firewall filter classify-customers term sp1-customers]
   user@host# set then log
   user@host# set then logical-system P1 routing-instance sp1-route-table
   ```

3. SP2 ??? ?? ?? ??? ??????.

   ```
   [edit firewall filter classify-customers term sp2-customers]
   user@host# set from source-address 10.2.1.0/24
   user@host# set from source-address 10.2.2.0/24
   ```

4. ??? ?? ??? ??? ??? ? ???? ??? ??????.

   ??? ??? ??? ???? ?? ?? ??? ??????. ??? ??? P1? sp2-route-table.inet.0 ??? ???? ??? ???????.

   ```
   [edit firewall filter classify-customers term sp2-customers]
   user@host# set then log
   user@host# set then logical-system P1 routing-instance sp2-route-table
   ```

5. ?? ?? ????? ??? ??? ? ??? ??? ??????.

   ??? ?? ??? ?? IPv4 ?????? ??? ????? inet.0? ????? ????? ???????.

```
[edit firewall filter classify-customers term default]
user@host# set then accept
```

??? ??? P1?? ??? ????? ??

??? ??

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? *CLI ???? ????*?? ?? ????? CLI ??? ??? ???????.

??? ?????? ??? ?????? ?????? ??? ??????.

1. ??? ?????? ??????? ??????.

```
[edit logical-systems P1 interfaces lt-1/2/0]
user@host# set unit 10 encapsulation ethernet
user@host# set unit 10 peer-unit 9
user@host# set unit 10 family inet address 172.16.0.10/30
user@host# set unit 13 encapsulation ethernet
user@host# set unit 13 peer-unit 14
user@host# set unit 13 family inet address 172.16.0.13/30
user@host# set unit 17 encapsulation ethernet
user@host# set unit 17 peer-unit 18
user@host# set unit 17 family inet address 172.16.0.17/30
```

2. ??? ??? ??? ?????? lt-1/2/0.10? ?? ?? ??? ?????? `classify-customers` .

```
[edit logical-systems P1 interfaces lt-1/2/0]
user@host# set unit 10 family inet filter input classify-customers
```

3. ??? ????? ?? ?? ????? ????? ??? ??????.

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```
[edit  logical-systems P1 protocols ospf area 0.0.0.0]
user@host# set interface all
user@host# set interface fxp0.0 disable
```

4. □□□ □□□□□ □□□□□.

□□□ □□□ □□□□□ □□□ □□□□ □□□□□ classify-customers .

□□□ □□□□ □□□ □□□□□□□ □□□□□ □□□□ □□ □□ □□ □□□□ □□□□□. □□ □□□□□□□ □□ □□□□(□ □□ □□□ □□□ P1)□ □□□□.

```
[edit logical-systems P1 routing-instances]
user@host# set sp1-route-table instance-type forwarding
user@host# set sp2-route-table instance-type forwarding
```

5. □□□ □□□□□ □□□ □□□ □□ □□□ □□ □□□ □□□□□.

```
[edit logical-systems P1 routing-instances]
user@host# set sp1-route-table routing-options static route 0.0.0.0/0 next-hop 172.16.0.13
user@host# set sp2-route-table routing-options static route 0.0.0.0/0 next-hop 172.16.0.17
```

6. □□□ □□□□ □□□□□ □□□ □□□ □□□ □□□□□.

□ □□ □□□ □□□□ inet.0□ □□ □□□ □□□□□ □□ □□□ □□□□ □□ □□□ □□□□□□.

□□ □□□ □□□□ □□□ □□□ □□□ □□ □□□(□ □□ IPv4)□ □□□□□.

```
[edit logical-systems P1 routing-options]
user@host# set rib-groups fbf-group import-rib inet.0
user@host# set rib-groups fbf-group import-rib sp1-route-table.inet.0
user@host# set rib-groups fbf-group import-rib sp2-route-table.inet.0
```

7. OSPF□ □□□ □□□ □□□ □□□□□.

□□ □□ OSPF □□□ □□□ □□ □□□ □□□□ □□□□□.

```
[edit logical-systems P1 protocols ospf]
user@host# set rib-group fbf-group
```

8. ????? ???? ????? ?? ???? ??????.

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

??

? show logical-systems P1 ???? ????? show firewall ???? ??????.

```
user@host# show firewall
filter classify-customers {
    term sp1-customers {
        from {
            source-address {
                10.1.1.0/24;
                10.1.2.0/24;
            }
        }
        then {
            log;
            logical-system P1 routing-instance sp1-route-table;
        }
    }
    term sp2-customers {
        from {
            source-address {
                10.2.1.0/24;
                10.2.2.0/24;
            }
        }
        then {
            log;
            logical-system P1 routing-instance sp2-route-table;
        }
    }
    term default {
        then accept;
```

```
    }
}
```

```
user@host# show logical-systems P1
interfaces {
    lt-1/2/0 {
        unit 10 {
            encapsulation ethernet;
            peer-unit 9;
            family inet {
                filter {
                    input classify-customers;
                }
                address 172.16.0.10/30;
            }
        }
        unit 13 {
            encapsulation ethernet;
            peer-unit 14;
            family inet {
                address 172.16.0.13/30;
            }
        }
        unit 17 {
            encapsulation ethernet;
            peer-unit 18;
            family inet {
                address 172.16.0.17/30;
            }
        }
    }
}
protocols {
    ospf {
        rib-group fbf-group;
        area 0.0.0.0 {
            interface all;
            interface fxp0.0 {
                disable;
            }
        }
```

```
    }
}
routing-instances {
    sp1-route-table {
        instance-type forwarding;
        routing-options {
            static {
                route 0.0.0.0/0 next-hop 172.16.0.13;
            }
        }
    }
    sp2-route-table {
        instance-type forwarding;
        routing-options {
            static {
                route 0.0.0.0/0 next-hop 172.16.0.17;
            }
        }
    }
}
routing-options {
    rib-groups {
        fbf-group {
            import-rib [ inet.0 sp1-route-table.inet.0 sp2-route-table.inet.0 ];
        }
    }
}
```

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- ??? ?? ??? Ping | **1183**
- ??? ?? ?? | **1184**

??? ???? ???? ??? ??????.

??? ?? ??? Ping

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??? ??? ?????? ?? ?????? ?? ?? ICMP ??? ????.

??

1. ??? ??? PE3? ???????.

```
user@host> set cli logical-system PE3
Logical system: PE3
```

2. ping ??? ???? ??? ??? PE1?? lo0.3 ??????? ping???.

   ? ??????? ??? ??? 172.16.1.1???.

   ??? ??? PE3? lo0.1 ??????? ??? ??? ?? ?? 10.1.2.1? ??????.

```
user@host:PE3> ping 172.16.1.1 source 10.1.2.1
PING 172.16.1.1 (172.16.1.1): 56 data bytes
64 bytes from 172.16.1.1: icmp_seq=0 ttl=62 time=1.444 ms
64 bytes from 172.16.1.1: icmp_seq=1 ttl=62 time=2.094 ms
^C
--- 172.16.1.1 ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max/stddev = 1.444/1.769/2.094/0.325 ms
```

3. ??? ??? PE4? ???????.

```
user@host:PE3> set cli logical-system PE4
Logical system: PE4
```

4. ping ??? ???? ??? ??? PE2?? lo0.4 ??????? ping???.

   ? ??????? ??? ??? 172.16.2.2???.

□□ □□ 10.2.1.1□ □□□□□. □ □□□ □□□ □□□ PE4□ lo0.2 □□□□□□ □□□ □□□□□.

```
user@host:PE4> ping 172.16.2.2 source 10.2.1.1
PING 172.16.2.2 (172.16.2.2): 56 data bytes
64 bytes from 172.16.2.2: icmp_seq=0 ttl=62 time=1.473 ms
64 bytes from 172.16.2.2: icmp_seq=1 ttl=62 time=1.407 ms
^C
--- 172.16.2.2 ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max/stddev = 1.407/1.440/1.473/0.033 ms
```

□□

□□□ ping□ □□□ □□□ □□ □□□ □□□□□□.

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□□□ □□ □□□ □□□□□ □□□□□.

□□

1. □□□ □□□ P1□ □□□□□□.

```
user@host> set cli logical-system P1
Logical system: P1
```

2. show firewall log □□□ □□□ P1□□ □□□ □□□□□.

```
user@host:P1> show firewall log
Log :
Time      Filter    Action Interface     Protocol        Src Addr           Dest Addr
13:52:20  pfe       A      lt-1/2/0.10   ICMP            10.2.1.1           172.16.2.2
13:52:19  pfe       A      lt-1/2/0.10   ICMP            10.2.1.1           172.16.2.2
13:51:53  pfe       A      lt-1/2/0.10   ICMP            10.1.2.1           172.16.1.1
13:51:52  pfe       A      lt-1/2/0.10   ICMP            10.1.2.1           172.16.1.1
```

?: ICMP ??????? ???? ????? ????? ?? ???? ???? ?? ??

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- ?? ?? | 1185
- ?? | 1185
- ?? | 1186
- ?? | 1189

? ?? ???? ?????? ICMP ???? ?? ??????? ????? ?? ???? ???? ???? ????? ???? ??????.

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- ????? | 1186

? ????? ICMP ???? ???? ????? protect-RE?? ?? ???? ???? ???? ??????. ICMP `icmp-policer` ???? ???? ???? 1,000,000bps? ????? ???? ???? 15,000????? ??????. ???? ???? ????? ???? ??????.

????? ?? `icmp-term`?? ???? ???? ??????.

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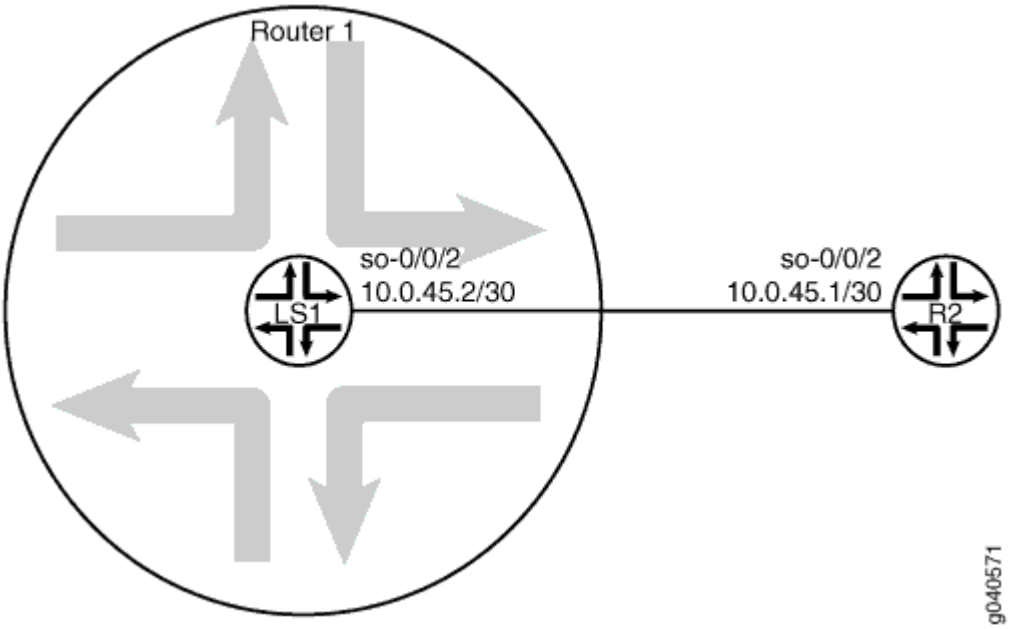
□□ 56 □□□ 1186 □ □□□□ □□□□ □□□□□ □□□□□.

□□ 56: □□□ □□□□ □□ □□□ □□□



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- CLI □□ □□ | 1187
- □□ | 1187
- □□ | 1188

CLI □□ □□

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```
set logical-systems LS1 interfaces so-0/0/2 unit 0 family inet policer input icmp-policer
set logical-systems LS1 interfaces so-0/0/2 unit 0 family inet address 10.0.45.2/30
set logical-systems LS1 firewall family inet filter protect-RE term icmp-term from protocol icmp
set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then policer icmp-
policer
set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then accept
set logical-systems LS1 firewall policer icmp-policer if-exceeding bandwidth-limit 1m
set logical-systems LS1 firewall policer icmp-policer if-exceeding burst-size-limit 15k
set logical-systems LS1 firewall policer icmp-policer then discard
```

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□□□ □□□□□ ICMP □□□ □□□ □□□□□:

1. □□□ □□□□□ □□□□□□ □□□□□.

```
[edit]
user@host# set logical-systems LS1 interfaces so-0/0/2 unit 0 family inet address
10.0.45.2/30
```

2. □□□□□□□ □□□ ICMP □□□ □□□□□ □□□□□□.

```
[edit]
user@host# set logical-systems LS1 firewall family inet filter protect-RE term icmp-term from
protocol icmp
user@host# set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then
accept
```

3. ???? ??????.

```
[edit]
user@host# set logical-systems LS1 firewall policer icmp-policer if-exceeding bandwidth-limit
1m
user@host# set logical-systems LS1 firewall policer icmp-policer if-exceeding burst-size-
limit 15k
user@host# set logical-systems LS1 firewall policer icmp-policer then discard
```

4. ?? ??? ???? ??????.

```
[edit]
user@host# set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then
policer icmp-policer
```

5. ??? ??? ??????? ???? ??????.

```
[edit]
user@host# set logical-systems LS1 interfaces so-0/0/2 unit 0 family inet policer input icmp-
policer
```

6. ???? ??? ???? ?? ??? ??????.

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

??

??? ???? show logical-systems LS1 ??? ??????.

```
user@host# show logical-systems LS1
interfaces {
    so-0/0/2 {
        unit 0 {
            family inet {
                policer {
                    input icmp-policer;
                }
```

```
                address 10.0.45.2/30;
            }
        }
    }
}
firewall {
    family inet {
        filter protect-RE {
            term icmp-term {
                from {
                    protocol icmp;
                }
                then {
                    policer icmp-policer;
                    accept;
                }
            }
        }
    }
    policer icmp-policer {
        if-exceeding {
            bandwidth-limit 1m;
            burst-size-limit 15k;
        }
        then discard;
    }
}
```

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in this section

- ??? ???? ?? ? ping? ????? ?? | 1190

??? ???? ???? ??? ?????.

□□□ □□□□ □□ □ ping□ □□□□□ □□

□□

□□□ □□□ □□□□□□ ICMP □□ DoS □□□□□□ □□□□□ □□□□□.

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□□□ □□□□ □□□ □□□□ □□□□□ □□□ □□□□□ ping .

```
user@R2> ping 10.0.45.2
PING 10.0.45.2 (10.0.45.2): 56 data bytes
64 bytes from 10.0.45.2: icmp_seq=0 ttl=64 time=1.316 ms
64 bytes from 10.0.45.2: icmp_seq=1 ttl=64 time=1.277 ms
64 bytes from 10.0.45.2: icmp_seq=2 ttl=64 time=1.269 ms
```

```
user@R2> ping 10.0.45.2 size 20000
PING 10.0.45.2 (10.0.45.2): 20000 data bytes
^C
--- 10.0.45.2 ping statistics ---
4 packets transmitted, 0 packets received, 100% packet loss
```

□□

□□ ping□ □□□ □□□ □□□□□. □□ □□□ □□□□ ping □□□ □□□ □□□ □□□□□.

□□ □□

> □: □□□ □□□□ □□□□□ □□

?: ICMP ??????? ???? ????? ????? ?? ???? ???? ?? ??

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- ?? ?? | 1191
- ?? | 1191
- ?? | 1192
- ?? | 1195

? ?? ??? ?????? ICMP ??? ?? ??????? ????? ?? ??? ??? ??? ????? ??? ??????.

?? ??

? ????? ????? ????? ??? ??? ??? ????? ????.

??

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- ???? | 1191

? ????? ICMP ??? ??? ????? protect-RE?? ?? ??? ??? ??? ??????. ICMP **icmp-policer** ??? ??? ??? 1,000,000bps? ????? ??? ??? 15,000????? ??????. ??? ??? ????? ??? ??????.

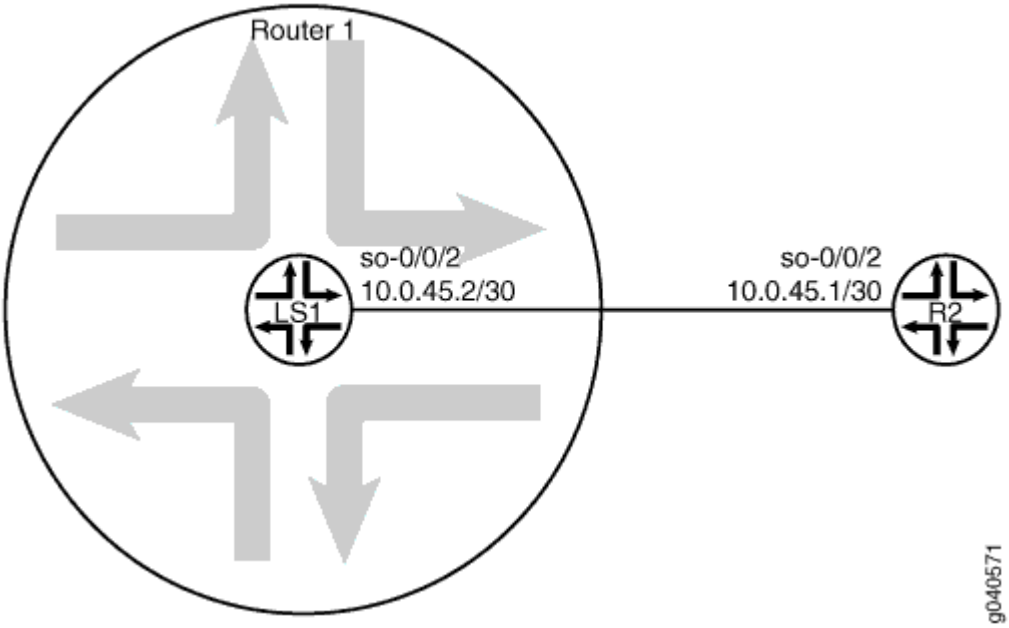
???? ?? **icmp-term**?? ??? ??? ??????.

? ????? ?? ??? ??? ?????? ??? ????? ??? ??????? ping? ??????. ??? ????? ICMP ??? ?? 1Mbps(??? ??)? ???? ???? ?? ?? ??????. ??? ????? ? ??? ??? ? ?? ICMP ??? ??????. ?? `burst-size-limit` ?? 15Kbps? ??? ????? ?? ???. ????? ? ??? ????? ?? ??? ??????. ??? ??? ?????? ICMP ??? ?? ??????.

????

?? 57 ??? 1192 ? ????? ????? ?????? ??????.

□□ 57: □□□ □□□□ □□ □□□ □□□



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in this section

- CLI □□ □□ | 1192
- □□ | 1193
- □□ | 1194

CLI □□ □□

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```
set logical-systems LS1 interfaces ge-0/0/2 unit 0 family inet policer input icmp-policer
set logical-systems LS1 interfaces ge-0/0/2 unit 0 family inet address 10.0.45.2/30
set logical-systems LS1 firewall family inet filter protect-RE term icmp-term from protocol icmp
set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then policer icmp-
policer
set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then accept
```

```
set logical-systems LS1 firewall policer icmp-policer if-exceeding bandwidth-limit 1m
set logical-systems LS1 firewall policer icmp-policer if-exceeding burst-size-limit 15k
set logical-systems LS1 firewall policer icmp-policer then discard
```

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□□□ □□□□□ ICMP □□□ □□□ □□□□□:

1. □□□ □□□□□ □□□□□□ □□□□□.

```
[edit]
user@host# set logical-systems LS1 interfaces ge-0/0/2 unit 0 family inet address
10.0.45.2/30
```

2. □□□□□□□ □□□ ICMP □□□ □□□□□ □□□□□□.

```
[edit]
user@host# set logical-systems LS1 firewall family inet filter protect-RE term icmp-term from
protocol icmp
user@host# set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then
accept
```

3. □□□□ □□□□□.

```
[edit]
user@host# set logical-systems LS1 firewall policer icmp-policer if-exceeding bandwidth-limit
1m
user@host# set logical-systems LS1 firewall policer icmp-policer if-exceeding burst-size-
limit 15k
user@host# set logical-systems LS1 firewall policer icmp-policer then discard
```

4. ?? ??? ???? ?????.

```
[edit]
user@host# set logical-systems LS1 firewall family inet filter protect-RE term icmp-term then
policer icmp-policer
```

5. ??? ??? ??????? ???? ?????.

```
[edit]
user@host# set logical-systems LS1 interfaces ge-0/0/2 unit 0 family inet policer input icmp-
policer
```

6. ???? ??? ???? ?? ??? ?????.

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

??

??? ???? show logical-systems LS1 ??? ?????.

```
user@host# show logical-systems LS1
interfaces {
    ge-0/0/2 {
        unit 0 {
            family inet {
                policer {
                    input icmp-policer;
                }
                address 10.0.45.2/30;
            }
        }
    }
}
firewall {
    family inet {
        filter protect-RE {
            term icmp-term {
                from {
```

```
                    protocol icmp;
                }
                then {
                    policer icmp-policer;
                    accept;
                }
            }
        }
    }
    policer icmp-policer {
        if-exceeding {
            bandwidth-limit 1m;
            burst-size-limit 15k;
        }
        then discard;
    }
}
```

??

in this section

- ??? ???? ?? ? ping? ????? ?? | 1195

??? ???? ???? ??? ?????.

??? ???? ?? ? ping? ????? ??

??

??? ??? ??????? ICMP ?? DoS ??????? ????? ?????.

??

??? ???? ??? ???? ????? ??? ????? ping .

```
user@R2> ping 10.0.45.2
PING 10.0.45.2 (10.0.45.2): 56 data bytes
```

```
64 bytes from 10.0.45.2: icmp_seq=0 ttl=64 time=1.316 ms
64 bytes from 10.0.45.2: icmp_seq=1 ttl=64 time=1.277 ms
64 bytes from 10.0.45.2: icmp_seq=2 ttl=64 time=1.269 ms
```

```
user@R2> ping 10.0.45.2 size 20000
PING 10.0.45.2 (10.0.45.2): 20000 data bytes
^C
--- 10.0.45.2 ping statistics ---
4 packets transmitted, 0 packets received, 100% packet loss
```

??

?? ping? ??? ??? ??????. ?? ??? ????? ping ??? ??? ??? ??????.

?? ??

> ?: ???? ????? ?????? ??

??? ????? ?? ????? ?? ??? ?? ?

? 76 ??? 1197 ?(?) ?? ?????? [edit firewall] ?????? ?? ?????? [edit logical-systems *logical-system-name* firewall] ????? ?? ?? ??????.

□ 76: □□□ □□□□ □□ □□□□ □□ □□□ □

□□□	□	□□

accounting-profile	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter myfilter {
	accounting-profile fw-profile;
	...
	term accept-all {
	then {
	count counter1;
	accept;
	}
	}
	}
	}
	}
	}
	}
		□ □□□□ accounting-profile □□ □□□ fw-profile □ □□ □□□ [edit accounting-options] □□□□□ □□□□ □□□□ □□□□.

hierarchical-policer	[edit]
	logical-systems {
	lr1 {
	firewall {
	hierarchical-policer {
	...
	}
	}
	}
	}
		□ □□□ hierarchical policer □□□□ □□□ □□□□□□ □□□□ □□ □□□ □□ □□□ □□□ □□□.

□ 76: □□□ □□□□ □□ □□□□ □□ □□□ □ *(Continued)*

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load-balance-group	[edit]
	logical-systems {
	ls1 {
	firewall {
	load-balance-group lb-group {
	next-hop-group nh-group;
	}
	}
	}
	}
		□ □□□ □□ □□ □□(□□ □□[edit logical-systems *logical-system-name* firewall])□□ [edit forwarding-options next-hop-group] □□□□□ □□ □□□ next-hop-group nh-group □□□□ □□□□.
		
		□□ □□ forwarding-options dhcp-relay □ □□ □□□□ □□ □□□□ □□□ □□ □□□□□.

virtual-channel	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter foo {
	term one {
	from {
	source-address
	10.1.0.0/16;
	}
	then {
	virtual-channel
	sammy;
	}
	}
	}
	}
	}
	}
	}
		□□ □□ sammy □ □□ □□□□ □□□ [edit class-of-service] □□□ □□□□ □□□ □□□□ □□ □□□ □□□ □□□□ □□ □□□ □ □□□ □□□□ □ □□□.
		
		□:
		
		□□□□ virtual-channel □□□ □□□ □□ □ □□ □□□□ □□□ □□ J □□□ □□□□□□□□ □□□ □□.

□□ □□

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??? ????? ??? ??? ?? ????? ?? ?? | 1199
??? ??? ??
??? ?????? ?? Junos OS ??? ??? ??? ???
??? ??? ?? ? ?? ??
??? ?????? ?? Junos OS ??? ??? ??? ???

??? ????? ??? ??? ?? ????? ?? ??

? 77 ??? 1199 ??? ?? ?????? [edit firewall] ?????? ?? ?????? ????? ?? ??? ?? ??? ?? [edit logical-systems *logical-system-name* firewall] ??????.

? 77: ??? ????? ??? ??? ?? ????? ?? ??

??? ?? ??	?	??
??? ?????? ????? ?? ?? ??		

logical-system	[edit]
	logical-systems {
	    ls1 {
	        firewall {
	            family inet {
	                filter foo {
	                    term one {
	                        from {
	                            source-address
	10.1.0.0/16;
	                        }
	                        then {
	                            logical-system
	fred;
	                        }
	                    }
	                }
	            }
	        }
	    }
	}
		logical-system ? ??? ?? ??? ??? ???
		??? ??? ????? ??fred?? ??? ? ??? ?
		???? ?????.

□ 77: □□□ □□□□ □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

□□□ □□ □□	□	□□
□□□ □□□□□ □□□□ □□ □□□ □□		

ipsec-sa	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter foo {
	term one {
	from {
	source-address
	10.1.0.0/16;
	}
	then {
	ipsec-sa barney;
	}
	}
	}
	}
	}
	}
	}
		ipsec-sa □□ □□□□ □□ □□□ □□□ □□□ □□ □ □□ □□□ □□barney□□ □□□ □ □□□ □□□□ □□□□.

□ 77: □□□ □□□□ □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

□□□ □□ □□	□	□□

next-hop-group	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter foo {
	term one {
	from {
	source-address
	10.1.0.0/16;
	}
	then {
	next-hop-group
	fred;
	}
	}
	}
	}
	}
	}
	}
		next-hop-group □ □□□ □□ □□□□ □□□ [edit forwarding-options next-hop-group] □□□ □□fred□□ □□□ □ □□□ □□□□ □□□□.

□ 77: □□□ □□□□ □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

□□□ □□ □□	□	□□

port-mirror	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter foo {
	term one {
	from {
	source-address
	10.1.0.0/16;
	}
	then {
	port-mirror;
	}
	}
	}
	}
	}
	}
	}
		port-mirror □□□ □□ □□□□ □□□ [edit forwarding-options port-mirroring] □□□ □□□□ □□□ □ □□□ □□□□ □□□□.

□ 77: □□□ □□□□ □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

□□□ □□ □□	□	□□

sample	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter foo {
	term one {
	from {
	source-address
	10.1.0.0/16;
	}
	then {
	sample;
	}
	}
	}
	}
	}
	}
	}
		□ □□□ sample □□□ □□□ □□□ [edit forwarding-options] □□□ □□□ □□ □□□ □□. sample □□□ □□□ □□□□ □□□□.

□ 77: □□□ □□□□ □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

□□□ □□ □□	□	□□

syslog	[edit]
	logical-systems {
	ls1 {
	firewall {
	family inet {
	filter icmp-syslog {
	term icmp-match {
	from {
	address {
	
	192.168.207.222/32;
	}
	protocol icmp;
	}
	then {
	count packets;
	syslog;
	accept;
	}
	}
	term default {
	then accept;
	}
	}
	}
	}
	}
	}
		□ □□□□ □□□ □□□ □□□ □ □□ icmp-syslog □□□ □□□□□ □□ □□□ □□□system syslog file *filename*)firewall □□ □□ □□□ □□ □.
		
		□ □□□ □□□ □□□ □□□ syslog □□□ □□□ □ □□□ □□□ □□ □□□□ □□□□ □□□□.

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- ??? ??? ?? ??? ??? routing-instance *routing-instance-name* ?? ??? ??? ????? ?? ??? ??? ? ?????.
  - count *counter-name*
  - discard
  - forwarding-class *class-name*
  - log
  - loss-priority (high | medium-high | low)
  - policer *policer-name*
  - port-mirror
  - reject *message-type*
  - syslog
  - three-color-policer (single-rate | two-rate) *policer-name*
- ?? ????? fragment-flags *number* ?? ??? ??? ? ?????.
- ?? ?? ??? ??????? ??? ??? ? ?????.
- ??? ?????? ?? ????? ??? ??? ? ?????.
- IPv6 ?? ?? ????? ?? L4 ??? ????? ?????.
  - ?? ??
  - ??? ??
  - ICMP?

- icmp □□

□ VRF□□ □□ VRF□ □□ □□□ □□□ □ □□□ VRF□□ □□□ □□□ □□□□□ □□□ □□□ □□ □□□□.

□□□□ □□ □□□ □□□□ □□ 64□□□, □□ □□□□ □□ □□ □□□ □□ □□□□□. □□ □□□(□□ VRF)□□ □□ □□□ □□ □□ □□□ □□ □□□□ □□ □□.

□: □□ MAC □□ □□□ □□ □□ □□□□□ □□ □□□ □□ □□□ □□ MAC □□ □□□ □□□ □□ □□□□□□ □□ □□ □□□□ □□□□ □□□□.

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ACX □□□ □□□□ □□□ □□□□□ □□ □□□ □□□ □□

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□□□ □□□□□ □□□ □□□ □□□ □□□□ □□□ □□ □□□ □□□□□.

- □□□ □□□ □ □□□ □□□ □□□□□ □□□ □ □□□□.
- □ [edit routing-instances *instance-name* forwarding-options family <inet | inet6> filter input *filter-name*] □□ □□ □□□□ [edit interfaces *interface-name* family <inet | inet6> filter input *filter-name*] □□□ □□□ □□□ □ □□□□.
- □□□□□□ □□ □□ □□□ □□□□□ □□□ □□□ □ □□□□.
- □□□ □□□□□ □□ □□□□ □□□ □□□ □ □□□□.

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```
[edit]
firewall {
    family family-name {
        filter filter-name {
            term term-name {
                from {
                    match-conditions;
                }
                then {
                    action;
                    action-modifiers;
                }
            }
        }
    }
}
```

family-name ? ?? ?? ??????. IPv4(**inet**), IPv6(**inet6**), ??? 2 ???(**bridge**) ?? MPLS(**mpls**).

term-name ? ?? ?? ? ???? ????? ??? ??????.

match-conditions ? ???? ??? ????? ??????. ?? ?? ?? ????? ?? ?? ?????? IP ??????. ?? ????? ?? ???? ??? ? ???? ?.

action ???? ?? ??? ??? ?? ????? ??? ??????. ?? ??, ?? ?????? GPRS ?? ??(GGSN)? ?? ??? ??? ?????, ?? ??? ?????? ??? ?????, ?? ??? ????? ?????? ??; ?? ??? ????? ??; ???? ????? ?? ????? ??????.

action-modifiers □□ □□□ □□□ □ GGSN□ □□□ □□□□□ □□□□ □ □□ □□□□ □□□□□. □□ □□, □□□ □□□□ □□□ □□□□□.

□□□ □□□□ □□□□□ □□ □□□□ □□ [edit routing-instances *instance-name*] □ **forwarding** □□ □□□□ □□□□□instance-type.

```
[edit]
routing-instances instance-name {
    instance-type forwarding;
}
```

□□□ □□□ □□□ VPN □□□ □ □□□(VRF) □□□□ □□□□□ □□ □□□□ □ input □□ □□□□□**filter**.[edit routing-instance *instance-name* forwarding-options family *family-name*]

```
[edit routing-instances instance-name]
instance-type forwarding;
forwarding-options {
    family family-name {
        filter {
            input filter-name;
        }
    }
}
```

□□□ □□□ □□□ □□□ □□□□ □□□□□ □□ □□□□ □ input □□ [edit forwarding-options family *family-name*] □□□□□**filter**.

```
[edit forwarding-options family family-name]
filter {
    input filter-name;
}
```

□□ □□□ □□□□□ □□□□ □□ □□ □□□ □□□ **inet.0**□ □□□ □□□ □□□ □□□□□ □□ □□□□ □ input □□ [edit forwarding-options family inet] □□□□□**filter**.

```
[edit forwarding-options family inet]
filter {
    input filter-name;
}
```

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>
> ?? ??? ?? ?? ?? | 768
>
> *??? ??? ?? ??*

chapter label in part18

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in this chapter

- ??? ??? ?? ?? ?? | 1210
- ??? ?? ?? | 1211
- ??? ??? ?? ??? ???? ??? ?? | 1211
- ??? ?? ?? ?? | 1213
- ?: ??? ??? ?? ?? ?? ?? | 1217
- ?: ??? ?? ??? ?? ?? ?? | 1224

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- ??? ???? ???? ?? ???? ?? ? ? ??? ??? ?.
- ???? ???? ???? ? ???? ?? ??

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> ?: ??? ??? ?? ?? ?? ?? | 1217

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Junos OS? ??? ?? ???(*syslog ?????* ?)? ???? ??????? ???? *??? ????* ??????. ???? ???? ??, ?? ? ?? ??, ? ?? ??? ??? ? ?? ?? ???? ?????. ? ??? ?? ?????? UNIX syslogd ?????? ??????.

? Junos OS ??? ?? ???? ??? ???? ???? ?? ?????? ?? ??? ???? *??????* ??? ??? ????. ??? ??? ??? ??? ??? ??? ?????? ?????? ?? ?????? ??? ???? ?? ?? ??? ??(?: ?? ??)? ??? ????. ?? ? ??? ?? ?????? ??? ???? ??? (?? ???) ??? ??? ??? ??? ?????? ???? *?????* ?? ??????. ???? ??? ???? ?? ??? *??* *??*?? ???. syslog ???? ?? ? ???? ???? Junos OS *??????* ???? ??? ?? ?? ??? ???? ??????.

?????? ??? info ? ?????? ? ??? syslog ???? ?? ??? ?? ?????? /var/log ?? ??? ?? ??? messages ??????. ??? ??? ? ???? ?? ?? ? ??? ??? ???? ?? ?? ???? ?? [edit system syslog] ??? ? ????.

?? syslog ?? ?? ??? ??? ??, ??? ???? ???? ?? ??? ?? ?? ?? ??? ??? ?? ??????? syslog ??? ?????? ??? ? ? ???. ?? ?? syslog ?? ?? ??? ??? ?? ??? ???? syslog ???? ?? ??? ?????? syslog ??? ?????? ??? ? ????. ?? ??? syslog ???? ?? ? ??? ???? ???? ??? ??, ???(?? ???) ??, ?? ???? ?? ??? ??? syslog ???? ? ? ????.

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?? syslog ???? ?? firewall syslog ??? ??? ??? ? ?? ???? ?? [edit system syslog] ???? ??? ??? ?? ?? ??? ?? ??? firewall . ??? ?? ??? ???? ??? ? firewall ???? ??? ??????.

???? DFWD_ ?? ??? ?? ???? Junos OS ??? ??? ??? ? ?????? ???? ??? ????(dfwd)? ?? ??????. ???? PFE_FW_ ?? ??? ?? ???? ?? ?? ??? ???? ?? ?? ?? ??????? ??? ??? ??? ?? ???????. ??? ??? ??? ?? ????? ??????.

? 78 ??? 1212 ? ??? ?? firewall ??? ? ?? ??? ?? ??? ??????.

□ 78: □□□ □□□ □□ Syslog □□□ □□

□□□	□□	[edit system syslog]□ □□ □

□□	□ □□□ □□□□ syslog □□□□ □□ □□□ □□ □□□ □□□□ firewall □□□□.
	
	□□□ □□□ □□□□ □□□□ □ □□□ □□□□□ □□ □□ □□□□□□ explicit-priority .
	
	UNIX □□□ □□ □□□ □□□□ □□ □□ □□ □□ □ □□□ □□□□□ □□ □□□□□ structured-data . structured-data □□□□ □□□□ □ □□ □□□ □□□□ □□□ □□□□ □□ □□□ (explicit-priority□□ □□□ □□□ □ time-format □□ □□□ [edit system syslog file *filename*] □□□)□ □□□□□ [edit system syslog].
		file *filename* {
		  firewall *severity*;
		  allow-duplicates;
		  archive *archive-options*;
		  explicit-priority;
		  structured-data;
		}
		allow-duplicates;
		archive *archive-options*;
		time-format (*option*);

□□□ □□	□ □□□ □□□□ syslog □□□□ □□□ firewall □ □□□ □□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□□ □□□□ □□ □□□□ □ □ □□□□□ * .	**user** (*username* | *****) {
		  firewall *severity*;
		}
		time-format (*option*);

□□□(□□ □□□) □□	□ □□□ □□□□ syslog □□□□ □□□ **firewall** □ □□□(□□ □□□) □□□ □□□□□.	**console** {
		  firewall *severity*;
		}
		time-format (*option*);

□□ □□□ □□ □□ □□□ □□	□ □□□ □□□□ syslog □□□□ □□□ firewall □ □□□ □□ □□□ □□ □□ □□□ □ □□ □□□□□.
	
	syslog □□□□ □□ □□□(local3)□□ □□ firewall □□ □□ □□ □□ □□□ □□□□□□ □ □ □□□□□facility-override firewall.
	
	□□□ □□□ □□□□ □□□□ □ □□□ □□□□□ □□ □□ □□□□□□ explicit-priority .
		host (*hostname* | **other-routing-engine**) {
		  firewall *severity*;
		  allow-duplicates;
		  archive *archive-options*;
		  facility-override firewall;
		  explicit-priority;
		}
		allow-duplicates; # All destinations
		archive *archive-options*;
		time-format (*option*);

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Sep 07 08:00:10
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- time-format year;
- time-format millisecond;
- time-format year millisecond;

□□ □□□□□ □□□(401)□ □□(2010)□ □□ □□□□ □□□□□□ □□□ □□ □□□.

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Sep 07 08:00:10.401.2010
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Junos OS □□□ □□ □□ □ □□□ □□□ □□

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IPv4 □ IPv6 □□□ □□□ □□, □□ **log** □□□ □□□□ **syslog** □□□□ □□ □□□ □□□ □□ □□ syslog□ □□□□□ □□□ □□□ □ □□□□. □ □ □ □□ □□□□ □□□ □□□□□□. □□□ □□□□□ □□□□□, □□ □□□ □□ □□ □□ □□□ □□□□ □□□ □ □ □□□□ □□□□□. □□ Syslog□ □□□□ □□□□□ □□ syslog □□□ □□□ □ □□□□. □ □□ □□ □□ □□□ □□□ □□□□□(□□ □□□ □□□□ □□). □□□ □□ □ □□ □□□ □□ **syslog** □□ □ □□□□ **log** □□□□.

□: **syslog** □ **log** □□ □□ □□□□□□ □□□ CPU □/□□ □□□ □□□ □□□ □ □□□□. □□□□ □□□ □□ syslog □□□ □ □□□ □□□□□□ □□□□□□ □□□□ □□□ □□□ □□ □□□□□.

Syslog

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□□ **syslog** □□□ □□□ □□□ 172.27.1.1□ □□ □□□ □□□□ □□ □□□□□ "firewall"□□□ □□□ □□□□ □□ □□□□□.

```
host@device-RE0# show system syslog
host 172.27.1.1 {
    firewall any;
}
<...>
file firewall {
    firewall any;
}
```

□□□ □□□ □□□ □□□ □□□□□ show syslog message .

□□□ □□□ □□ □□□ □□□ □□□ □□ file show /var/log/*filename* □□□ □□□□□show log *filename*.

□□□ □□ □□ □□□ □□□□ □□□ □□□□□ clear log *filename* . □□ □□ □□□ □□ □□ □□□□ □□□□ □□□ □□ □□□ □□□□ □□□ □□□ all □ □□□□.

□□ □□ □□□ □□□ □□□□.

```
firewall {
    family {
        filter filter-name {
            from {
                match-conditions;
            }
            then {
                ...
                syslog;
                terminating-action;
            }
        }
```

```
    }
}
```

□□

□ **log** □□□ □□ □□□ □□□ □□□. □□ □□□ □□□ □□□ □□□□ □□ □□□ □□□□. □□ □□□ □□□ □□ □□ □ □□□ □□ □□□ □□□ □□□□□ □□ □□□□ □□□□ □□□□. □□□□ □□ PFE□ □□ □□□ □□□ □□□ □□□□□.

□□ □□ □□□ □□□ □□□□.

```
firewall {
    family {
        filter filter-name {
            from {
                match-conditions;
            }
            then {
                ...
                log;
                terminating-action;
            }
        }
    }
}
```

□□□ □□□ □□□ □□□□□ show firewall log .

□□ □□ □□

□□□ syslog □ □□ □□□ □□□□□ □□□□ □□□ □□□ □□□□□.

```
user@host> show log messages_firewall_any

Mar 20 08:08:45 hostname feb FW: ge-1/1/0.0 A icmp 192.168.207.222 192.168.207.223  0  0 (1
packets)
```

□□□ □□□ □□□□ □□□□.

- Date and Time- □□□ □□□ □□ □ □□□□□(□□□□□ □□□□ □□).

  Hostname- □□□ □□□ □□□□□ □□□□□.

  Interface- □□□ □□□ □□□ □□□□□□□□□.

- □□ □□. □□ □□□□ A□□□.
  - A- □□(□□ □□ □□)
  - D- □□
  - R- □□
- Protocol- □□ □□□□. □□ □□ □□□ □ □□□, □□ □ □□□ □□□ □□□ □□ □□□□. □□ □□□ □□□□□ ICMP□□ ICMP □□ □ □□□ □ □□ □ □□□□.
- Source address- □□□ □□ IP □□□□□.
- Destination address- □□□ □□ IP □□□□□.
- Source port- □□□ □□ □□□□□(TCP □ UDP □□□ □□). □□ □□□ □□□ 0□□□.
- Destination port- □□□ □□ □□□□□(TCP □ UDP □□□ □□). □□ □□□ □□□ 0□□□.
- Packets in sample interval- □ □□□□ □□ □□(□ 1□)□□ □□□□ □□□ □□□ □□□□□□ □□□□□. □□□ □ □□ □□□ □□□□ □□□ □□ □ □□□□ □□□ □□□□ □ □□ □□□ □□□□□.

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> □□□ □□□ □□ □□□ □□□□ □□□ □□ | **1211**
>
> □: □□□ □□ □□□ □□ □□ □□ | **1224**
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> □□□ □□ □□□
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??? ?? ?? ????? ?(?) ??? family any?? ??? ??? ?? ??????.

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- ???? | 1217

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????

??? ?? ?? ???? filter_acctg_profile ? ??? 60??? ????? ???? ???? /var/log/ff_accounting_file????? ??????. , , ? counter3?? ???counter1counter2? ?? ???? ??????.

IPv4 my_firewall_filter ???? ???? ? ?? ?? ?? ???? ?? ????? ???????. ???? ?? ??????? ge-0/0/1.0??????.

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?? ?? ?? ???? ??? ??? ??? ?????. CLI ??? ?? ??? ??? ? ???????? "?? ???? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ????, ? ??? ??? ??, ?? ???? ??? CLI? ???????? `[edit]`.

```
set accounting-options file ff_accounting_file files 10
set accounting-options file ff_accounting_file transfer-interval 10
set accounting-options filter-profile filter_acctg_profile file ff_accounting_file
set accounting-options filter-profile filter_acctg_profile interval 60
set accounting-options filter-profile filter_acctg_profile counters counter1
set accounting-options filter-profile filter_acctg_profile counters counter2
set accounting-options filter-profile filter_acctg_profile counters counter3
set firewall family inet filter my_firewall_filter accounting-profile filter_acctg_profile
set firewall family inet filter my_firewall_filter term term1 from protocol ospf
set firewall family inet filter my_firewall_filter term term1 then count counter1
set firewall family inet filter my_firewall_filter term term1 then discard
set firewall family inet filter my_firewall_filter term term2 from source-address 10.108.0.0/16
set firewall family inet filter my_firewall_filter term term2 then count counter2
set firewall family inet filter my_firewall_filter term term2 then discard
set firewall family inet filter my_firewall_filter term accept-all then count counter3
set firewall family inet filter my_firewall_filter term accept-all then accept
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input my_firewall_filter
```

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1. □□ □□□□ □□□ □□ □□□ □□□□.

```
[edit]
user@host# edit accounting-options file ff_accounting_file files 10
edit accounting-options file ff_accounting_file transfer-interval 10
```

2. □□ □□□□ filter_acctg_profile□□□□ .

```
[edit]
user@host# edit accounting-options filter-profile filter_acctg_profile
```

3. 60□□□ □□ □ □□□ □ □□□ /var/log/ff_accounting_file □□□ □ □□□□ □□□ □□□□□ □□ □□□□ □□□□□.

```
[edit accounting-options filter-profile filter_acctg_profile]
user@host# set file ff_accounting_file
user@host# set interval 60
```

4. 3□□ □□□□ □□ □□ □□□ □□(□□ □ □□□ □)□ □□□□□ □□ □□□□ □□□□□.

```
[edit accounting-options filter-profile filter_acctg_profile]
user@host# set counters counter1
user@host# set counters counter2
user@host# set counters counter3
```

□□□□ □□□□ □□□□ □□□ □□ □□

□□□ □□

□□□□ □□□□ □□□□ □□□ □□□ □□□□□ □□□ □□□□□.

1. ??? ??? my_firewall_filter????.

```
[edit]
user@host# edit firewall family inet filter my_firewall_filter
```

2. ??? ??? filter-accounting ???? filter_acctg_profile ?????.

```
[edit firewall family inet filter my_firewall_filter]
user@host# set accounting-profile filter_acctg_profile
```

3. ? ?? ?? ?? ? ???? ?????.

```
[edit firewall family inet filter my_firewall_filter]
user@host# set term term1 from protocol ospf
user@host# set term term1 then count counter1
user@host# set term term1 then discard
```

4. ? ?? ?? ?? ? ???? ?????.

```
[edit firewall family inet filter my_firewall_filter]
user@host# set term term2 from source-address 10.108.0.0/16
user@host# set term term2 then count counter2
user@host# set term term2 then discard
```

5. ? ?? ?? ?? ? ???? ?????.

```
[edit firewall family inet filter my_firewall_filter]
user@host# set term accept-all then count counter3
user@host# set term accept-all then accept
```

??????? ??? ?? ??

??? ??

??? ??? ??? ??????? ?????? ??? ?????.

1. [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input my_firewall_filter
```

[illegible]

[illegible]

[illegible]:

1. [illegible] show accounting-options [illegible].

```
[edit]
user@host# show accounting-options
file ff_accounting_file {
    files 10;
    transfer-interval 10;
}
filter-profile filter_acctg_profile {
    file ff_accounting_file;
    interval 60;
    counters {
        counter1;
        counter2;
        counter3;
```

```
    }
}
```

2. [illegible] show firewall [illegible]. [illegible]

```
[edit]
user@host# show firewall
family inet {
    filter my_firewall_filter {
        accounting-profile filter_acctg_profile;
        term term1 {
            from {
                protocol ospf;
            }
            then {
                count counter1;
                discard;
            }
        }
        term term2 {
            from {
                source-address {
                    10.108.0.0/16;
                }
            }
            then {
                count counter2;
                discard;
            }
        }
        term accept-all {
            then {
                count counter3;
                accept;
            }
        }
    }
}
```

3. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input my_firewall_filter;
            }
            address 10.1.2.3/30;
        }
    }
}
```

???? ??? ?? ??? ?????

??? ??

???? ??? ?? ??? ????? ??? ?????.

1. ?? ?? ???? ??? ???? clear firewall all ?? ??? ??? ?? ??? ????.

   ? ??? ??? ???? ???? ??? ??? ??? ?????.

```
[edit]
user@host> clear firewall filter my_firewall_filter
```

2. ?? ??? ?????.

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

??

??? ??? ??????? ??????? ????? ?? extensive ?? ??? ?? detail ??? ?????show interfaces.

□ □□ □□□□ □□□ □□□□□□ □□□□□ □□□ □□□□□ show firewall filter my_firewall_filter .

```
user@host> show firewall filter my_firewall_filter

Filter: my_firewall_filter
Counters:
Name                                                Bytes              Packets
counter1                                                0                    0
counter2                                                0                    0
counter3                                                0                    0
```

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□□

□ □□□□ □□ □□ □□□□ □□ 192.168.207.222 ICMP □□□ □□□□ □□□□ □□□ □□□ □□□□□.

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?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ??????? "?? ????? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ???? ??????, ?? ?? ???? ???? ???? ?????, ? ???? ???? ??, ?? ????? ??? CLI? ??????? [edit] .

```
set system syslog file messages_firewall_any firewall any
set system syslog file messages_firewall_any archive no-world-readable
set firewall family inet filter icmp_syslog term icmp_match from address 192.168.207.222/32
set firewall family inet filter icmp_syslog term icmp_match from protocol icmp
set firewall family inet filter icmp_syslog term icmp_match then count packets
set firewall family inet filter icmp_syslog term icmp_match then syslog
set firewall family inet filter icmp_syslog term icmp_match then accept
set firewall family inet filter icmp_syslog term default_term then accept
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input icmp_syslog
```

??? ??? ?? syslog ??? ?? ??

??? ??

??? ?? firewall syslog ??? ??? ?????? ??? ??????.

1. [illegible] [illegible] firewall [illegible] [illegible] syslog [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@host# set system syslog file messages_firewall_any firewall any
```

2. [illegible] firewall [illegible] [illegible] syslog [illegible] [illegible] [illegible] [illegible] [illegible] Junos OS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@host# set system syslog file messages_firewall_any archive no-world-readable
```

[illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] ICMP [illegible] 192.168.207.222 [illegible] [illegible] [illegible] [illegible] icmp_syslog [illegible],

1. [illegible] [illegible] icmp_syslog[illegible].

```
[edit]
user@host# edit firewall family inet filter icmp_syslog
```

2. ICMP [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter icmp_syslog]
user@host# set term icmp_match from address 192.168.207.222/32
user@host# set term icmp_match from protocol icmp
```

3. [illegible] [illegible] [illegible], [illegible], [illegible].

```
[edit firewall family inet filter icmp_syslog]
user@host# set term icmp_match then count packets
user@host# set term icmp_match then syslog
user@host# set term icmp_match then accept
```

4. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter icmp_syslog]
user@host# set term default_term then accept
```

[illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input icmp_syslog
```

[illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] show system [illegible] [illegible] firewall syslog [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show system
syslog {
    file messages_firewall_any {
        firewall any;
        archive no-world-readable;
    }
}
```

2. ?? ?? ??? ???? ??? ??? show firewall ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ??? ???.

```
[edit]
user@host# show firewall
family inet {
    filter icmp_syslog {
        term icmp_match {
            from {
                address {
                    192.168.207.222/32;
                }
                protocol icmp;
            }
            then {
                count packets;
                syslog;
                accept;
            }
        }
        term default_term {
            then accept;
        }
    }
}
```

3. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input icmp_syslog;
            }
            address 10.1.2.3/30;
        }
```

```
    }
}
```

4. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ?????? ?????? ?? ??? ??????.show log filter

```
user@host> show log messages_firewall_any
Mar 20 08:03:11 hostname feb FW: so-0/1/0.0   A icmp 192.168.207.222
192.168.207.223      0     0 (1 packets)
```

? ?? ???? ?? ??? ???? ????.

- Date and Time- ??? ??? ?? ? ??????(?????? ???? ??).
- ?? ??:
  - A- ??(?? ?? ??)
  - D- ??
  - R- ??
- Protocol- ??? ???? ?? ?? ??????.
- Source address- ??? ?? IP ??????.
- Destination address- ??? ?? IP ??????.

?: ?????? ICMP? ?? ICMP ?? ? ??? ??????. ?? ?? ?????? ?? ?? ? ?? ??? ??????.

□□□ □ □□(□□ 0)□ □□ □□ □ □□ TCP/UDP □□□□ TCP □□ UDP □□□ □□□□ □□□□□. □ □□ □□□□ □ 1□ □□□□ □ □□□ □□ □ □□ □□□ □□□□□□ □□□□□. □□□ □ □□ □□□□ □□□ □□ □□□ □ □□ □□□ □□□□□ □□□ □□□□ □□□ □□□ □□□ □□□□□.

```
user@host> show log messages_firewall_any
Mar 20 08:08:45 hostname feb FW: so-0/1/0.0   A icmp 192.168.207.222
192.168.207.223     0     0 (515 packets)
```

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□□□ □□ □□ □□ | 1213

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- ?? ??? ??? ?? ?? ??? ?? ?? | 1263
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- ?? ??? ??? ???? ???? ?? ?? | 1268
- ?: ?? ??? ?? ?? ?? | 1270
- ?: ?? ??? ??? ?? ?? ?? | 1277
- ?: ????? ???? ??? ?? ??? | 1283

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??? ??? ????? ?? ??? ??? 3 ??????? ???? ???. ?? ???? ?? ???? ??? ??????? ??? ? ???? ?????filter.[edit interfaces]

```
[edit interfaces]
user@switch# set interface-name unit logical-unit-number family (inet | inet6) filter (input | output) filter-name
```

input ??? ???????? ??? ??? ? ??? ??? ??? ??????. ??? ??????? ??? ?? ??? ??? ???? ??? ????? ??? ????.

output ??? ??? ??????? ?? ? ??? ??? ??????.

?: ??? ??????? ??? ? ??? ??? ??? ? ??? ?? ??? ???? ?? ??????. ??? ??????? lo0??? ??? ? ? ? ???? apply-groups ?? ????. ???? ?? ??? ? ?? ??? ??????? ??? lo0 ?? ??? ???????? ???? ?? ???.

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??? ?? ??

??? ?? ?? ??:

1. ??? ?? ??, ?? ??, ?? ?? ? ?? ???? ?? ??(?: ?? ?? ??? ???? ??? ??)? ??????.

```
[edit]
user@switch# set firewall family (inet | inet6) filter ingress-port-filter term t1 from
source-address 192.0.2.14
```

IPv4 ?? inet6 IPv6? ??? ?? ??? inet ??????.

?? ? ?? ??? ??, ?? ? ???(-)? ??? ? ??? ?? 64? ??? ? ????. ? ?? ??? ???? ???. ??? ?? ??? ??? ??? ? ?? ? ? ?? ??? ?? ??? ???? ???.

2. □□ □□ □□□ □□□□□. □□ □□, □□ □□ □□□ □□□□ □□□□ □□□□□.

```
[edit firewall family inet filter ingress-port-filter term t1 from]
user@switch# set source-port 80
```

□□□ from □□□ □□ □□□ □□ □□□ □□□ □ □□□□. □□□□□ □□□ □□□ □□ □□□ □□□□ □□□. □□ from □□ □□□□□ □□□ □□□ □□ □□ □ □ □□□□. from □□ □□□□ □□ □□□ □□□□ □□□ □□□□□.

3. □□□ □□□ □□ □□□□□□ □□□□ □ □□□□□□ □□□ □□□□ □ □ □□□ □□□ □□□ □□□□□.interface-specific

```
[edit firewall family inet filter ingress-port-filter]
user@switch# set interface-specific
```

4. □ □□□ □□ □□□□ □□□ □□ □□□ □□ □□□ □□□ □□ □□□ □□□ □□□□□. □□ □ □□ □□□□ □□□ □ □□□□.

- □□ □□, □□ □□□ □□□ □□□□ □□□ □□□□ □□ □□ □□□ □□□□ □□□ □□□ □□□□.

```
[edit firewall family inet filter ingress-port-filter term t1 then]
user@switch# set discard
```

□□□ □□□ □□(accept, , discardreject, routing-instance□□)□ □□□ □ □□□□vlan.

- □□ □□, □□□ □□□ □□□□ □□□□□ □□□□ □□ □□ □□□□ □□□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit firewall family inet filter ingress-port-filter term t1 then]
user@switch# set count counter-one
user@switch# set loss-priority high
```

then □□ □□□□□ □□□ □□□□ □□□ from □□ □□ □□□ □□□□ □□□ □□□□□. □□□ □□□ then □□□ □□ □□□□□ □□□□ □□□. □□□ □□ □□□□ □□□ □ □□□ □□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□ □□ □□□ □□□□□ from □□ □□ □□□ □□□□ □□□.

□: □□□ □□ □□□ □□□ □□□□□lo0□ □□□□ □□□ □□□□ □□ □□□□□.

□: □□ □□, □□ □ □□ □□□□ □□ □□□ □ □□□□□□ □□□ □□ □□ □□ □ □□(EX4100, EX4100-F, EX4100-H, EX4400, EX4600, EX4650, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210). OCX1100 □□□□□□ IPv4 □ IPv6 □□□□□□ □□□ □□ □□□ □□□ □ □□□□.

??? ??? ??? 3(???) ??????? ???? ??

??? 3 ??????? ??? ??? ?????? ??? ??????.

1. ??? ??? ?????? ???? ??? ??? ?? ?? ?? ??? ??????.

```
[edit]
user@switch# set interfaces xe-0/0/1 description "filter to count and monitor traffic on
layer 3 interface"
```

2. ??? ??? ???? ??? 3 ??????? ?????? ??? ??? ???? ? ????.

   - ??? ??? ???? ??? 3 ??????? ???? ??? ?????? ??:

   ```
   [edit]
   user@switch# set interfaces xe-0/0/1 unit 0 family inet filter input ingress-router-filter
   ```

   - ??? ??? ???? ??? 3 ??????? ??? ??? ?????? ??:

   ```
   [edit]
   user@switch# set interfaces xe-0/0/2 unit 0 family inet filter output egress-router-filter
   ```

   ?: ??? ??(?? ?? ??)? ?? ??????? ??? ??? ??? ? ????.

?? ??

??? ?? ??(OCX ???) | 791

??? ?? ??? ???? | 774

?? ??? ????

Multifield Classifier Example: ???? ?? ??

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??? ??? ? PLP ??

Junos OS ??? ??(CoS) ??? ???? ? ??? ??? ???, ?? ?? ????(PLP) ?? ?? ? ?? ???? ?? ???? ??? ? ????.

- ??? ??? ???? ?? ? ??? ?? ???? ????, ???? ??? ?? ????? ?? ?? ???? ???????.
- ??? PLP? ???? ? ??? ??? ??? ?? ??? ???? ? ??? ????. CoS RED(Random Early Detection) ????? ?? ? ? ??, ?? ??? ?? ?? ? ?? PLP? ???? ?? ???? ??? ???? ?? ??? ?? ??? ?????.

?? ?? ?? ? BA ??

Junos OS? ? ?? ???? ??? ?? ??? ?????. BA(Behavior Aggregate) ?? ? ???? ??:

- BA ?? ?? CoS ? ??? ??? CoS ??? ???? IP ?? ??? *CoS ??*???? ??? ??? ??? ?? PLP? ???? ?? ?? ??? ?? ??. BA ?? ???? ???? CoS ?? DSCP(Differentiated Services Code Point) ?, DSCP IPv6 ?, IP ?? ?? ?, MPLS EXP ?? ? IEEE 802.1p ?? ? ????. ?? ???? IP ?? ?? ?? ???? ???.

- ????? ??? ?? ??? *???? ??* ???? ????? DSCP ?(IPv4? ??), IP ?? ?? ?, MPLS EXP ??? ????? IP ?? ??? *?? ????* ????? ??????? ?????? ??? ? ??? ?? ??? ??? ?? PLP? ????? ?? ?? ??? ?????. ? IEEE 802.1p ??. ?? ?? ??? ?????? IP ?? ??, IP ????? ?? ?? ?? UDP ?? TCP ?? ?? ??? ?? ????? ??????. CoS ?? ?? ?? ??? ??? ????? ? ?? ????? ? ? BA ?? ?? ????? ??? ??????.

  ?? ?? ??? ????? ??? ?? ??? ?? then ??? ?? `loss-priority (high | medium-high | medium-low | low)` ??? ??? ? ??? `forwarding-class` *`class-name`* ????? ??? ?? ?? ?? ??? ??? ? ?????.

> ?: ??? BA ??? ?? ??? ??? ?? ?? `forwarding-class` ? ? ?? ????? ? ????? `loss-priority`.

> ?: QFX5k?? ????? ????? ?? ??? ???:
>
> - BUM ????? MF ????? ?? ?????? ????? ??? ????? ?? ??? MCQ9? ??????. Junos ??? 21.4R3 , 22.1R3 ? Junos ??? ?? 22.2??? ??? ??? MCQ8? ??????.
> - ?????? ????? MF ????? ?? ?????? ????? ??? ????? ?? ??? MCQ9? ????? ??? 19.1R3??? best-effort ????? ??????.

????? ?? ????? ?? ?? ??

?? ??? ?? ????? ??? ????? ?? ??? ?? ??? ?? ?? 2? ????? ????? ??? ??? ????? `policer` ?? ??? ?? ?? ?? ??? ?? ? ? ?????.

????? ?? ??? ?????? ????? ??? ??? ??, ??? ?????? ??? ????? ??? ????? ??? ??? ????? ??? ??????. ?? ?? ??? ? ??? ????? ?? ??? ?????? PLP? `low` ??????. ????? ?? ? ????? ??? ????? ?????? ??? ??? ?? ??? ??? ??? ??? ??? ??, ??? ??? ??? ????? ??????, ??? PLP ????? ??????, ? ?? ??? ? ?????.

> ?: ????? ??? ????? ??? ??? ????? ??? *???? ??????* ? ??? ??? ??? ????? ?? ????? ??? ?? ??? ?? ? ????? ???.
>
> ?? ?? ??? ?? ??? ????? ? ?????.
>
> - ??? ?? ??? ??? ?? PLP? ????? ????? ??(??? ???, PLP ?? ? ?? ????? ????? ??? ??)? ????? ??? ??? ??????. ??? ??????? ??? ??? ??? ??????.
> - ?? ??? ????? ?? ?? ??(??? ???, PLP ?? ? ? ??)?? ??? ??? ?????? ????? ?? ?? 2? ????? ?? ???. ??? ??? ????? ??? ??? ??????? ????? ????? ?????? ????? ??????.
>
> ????? ??? ??? ??? ?? ?? ????? ?? ??? ????? ?? ??????. ?, ??? ??? ?? ??? ????? ??? ??? ??? ?? ?? ? ? ?? ??? ?? ??? ?? ??????. ??????, ??? ?? ??? ??? ??? ????? ?? ?? ??? ?? ??? ??? ?? ????? ?? ??? `forwarding-classloss-priority` ?? ? ?? ????? ??? ???.

SEE ALSO

- [illegible] | 817
- [illegible] Junos OS [illegible], [illegible] [illegible] [illegible] [illegible] [illegible]
- [illegible] [illegible] [illegible] [illegible] | 1819
- [illegible] [illegible] [illegible] | 1916
- *[illegible] [illegible] [illegible] [illegible] [illegible] Junos OS CoS [illegible]*
- *[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]*
- *[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]*
- *[illegible] [illegible]*
- RED [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

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- [illegible] | 1238

[illegible]

`loss-priority` *[illegible]* [illegible] [illegible] [illegible] [illegible].

- EX [illegible]
- Enhanced CFEB(CFEB-E)[illegible] [illegible] M7i [illegible] M10i [illegible]
- M120 [illegible] M320 [illegible]
- MX [illegible]
- Enhanced II FPC(Flexible PIC Concentrator)[illegible] [illegible] T [illegible]
- PTX [illegible]

CoS [illegible]

`loss-priority` [illegible] [illegible] RFC 2698[illegible] [illegible] CoS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

- M320 □□□□□□□ CoS □□ □□ □□□ □□□□□ □□ □ □□□ □□ □□□ □□□□ loss-priority □□□ □□□ □ □□□□.
- □□□ □□ □□□ □□□□ loss-priority □□ □□□ □□□□□, CoS □□ □□ □□□ □□□□□ □□ □ □□□ □□ □□□ medium-lowmedium-high □□□ loss-priority □ □□□□.

CoS □□ □□ □□□ □□□□□□□ □□ □□□□ □□ [edit class-of-service] □□□□□tri-color.

□□

□□□ □□□ □□ □□□ loss-priority □□ □ three-color-policer nonterminating □□□ □□□ □ □□□□. □ □ □□ □ □□ □□□ □□ □□ □□□□.

□: PTX □□□ □□□□□□ □□□ □□□□ □□□ □□□□ policer □□, , □ loss-priority □□□ □□□□ forwarding-class □□□ □□□□ □□□ □□□. "PTX □□□ □□ □□ □□□□ T □□□ □□□□ □□□□ □□□ □ □□□ □□□" □□□ 1727□(□) □□ □□□.

SEE ALSO

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2□ □□□ □□ □□ | 1916

□□

M □□□ □□□□ □□□□ □□ □□ □□

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□□: □□ □□ □□□□ □□□□ □□ □□

M □□□ □□□(M120 □□□ □□)□□□ □□□ IPv4 □□ □□□□□□□ □□□ □□ □□□ □□□ □□ □□□ □□□□ □□ □□ □□□ □□ □□□ □□□ □ □□ □□.

□□ □□, □□ □□□□ □□ ingress □□□ □□□□ □□ IPv4 □□□ expedited-forwarding □□□□ □□□□□. □□ egress □ □□□ □□□ ingress □□□□ □□□ expedited-forwarding □□ □□□ □□□□□. □ □□□ □□□□ M □□□ □□□□□ □□□□ □□□□. M120 □□□, MX □□□ □□□, T □□□ □□□□ □□□ □□ □□ □□□ □□□□□ □□□□□.

```
[edit]
user@host # show firewall
family inet {
    filter ingress {
        term 1 {
            then {
                forwarding-class expedited-forwarding;
                accept;
            }
        }
        term 2 {
            then accept;
        }
    }
    filter egress {
        term 1 {
            from {
                forwarding-class expedited-forwarding;
            }
            then count ef;
        }
        term 2 {
            then accept;
        }
    }
}

[edit]
user@host# show interfaces
ge-1/2/0 {
    unit 0 {
        family inet {
            filter {
                input ingress;
                output egress;
            }
        }
```

```
    }
}
```

?? ??: ?? ??? ?? ?? ??

?? ???? ?? ??? ?? ??? ??? ? ????.

```
user@host # show firewall
family inet {
    filter ingress {
        term 1 {
            then {
                forwarding-class expedited-forwarding;
                accept;
                count ef;
            }
        }
        term 2 {
            then accept;
        }
    }
}

[edit]
user@host# show interfaces
ge-1/2/0 {
    unit 0 {
        family inet {
            filter {
                input ingress;
            }
        }
    }
}
```

SEE ALSO

2? ??? ?? ?? | 1916

□: □□□□ □□ □□

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□ □□□□ □□□ □□ □□□ □ □□ □□□ □□ □□□□ □□□□ IPv4 □□□□ □□□□ □□□ □□□□ □□□ □□□□□.

□□ □□

□□□□ □□ □□□ □□□ □□ □□□ □□□ □□□ □□□□□ □□□□□□.

1. □□□ □□ □□□ loss-priority □□□□□ □□□□□ □□ 4□□ □ □□□ □□□ □ □□□ □□□.

   a. □□□ □□ □□□ □□□ loss-priority □ □□□□ □□ □□□ □□□ □ □□□ □□□ □□□□□□□ ge-1/2/0.0 □ □□ □□□□□□.

      - MX □□□ □□□
      - M120 □□ M320 □□□
      - Enhanced CFEB(CFEB-E)□ □□□ M7i □□ M10i □□□
      - Enhanced II FPC(Flexible PIC Concentrator)□ □□□ T □□□ □□□

   b. □□□ □□ □□□ □□ medium-high□ medium-low □□□□□ loss-priority CoS □□ □□ □□□ □□□□□ □□□ □□□. CoS □□ □□ □ □□ □□□□□□ □□ □□□□ □□ [edit class-of-service] □□□□□tri-color.

2. expedited-forwarding □ assured-forwarding □□□ □□□□ □□ □□□ □□□□□□□ ge-1/2/0□□□□□ □□□.

   a. □□ □□□ □□□□ □□ □□□□ □□□□□□ □□□□□.

      - expedited-forwarding
      - assured-forwarding

      □□□ □□□ □□□ □□ □□□□ □□□□□ [edit class-of-service forwarding-classes queue *queue-number*].

      □: □□□ □□□ □□□□ □ □□ □□ □□ □□□□ □□□□ □□□ □□□ □ □□□□.

b. ??? ???? ??? ?? ???? ????? ???? ??? ?????. ????? ???? ??? ????? ???? ?, ?? ??? ?? ??? ??? ?? ? ??, ???? ?? ?? ? ???? ??? RED(Random Early Detection) ?? ????? ?????.

- ?? ??? ????? [edit class-of-service schedulers] ?? ???? ?????.
- ?? ??? ????? ?? ???? ???? ???? ?? ?? ??? ???? [edit class-of-service scheduler-maps *map-name*] ? ????.

c. output-queue ????? ??? ??????? ge-1/2/0??????? ?????.

???? ?? ?? ???? ??? ??????? [edit class-of-service interfaces ge-1/2/0 scheduler-map *map-name*] ?????.

??

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? ???? ?? ??? ??? ?? ??? ??? ???? ???? ? ?? ??? ?? ???? ???? ??? ??????? ?? IPv4 ???? ???? ??? ???? ?. ?? ?? ???? ?? ???? ?? ????? low ????? ??? ??? ???????. ? ???? ?? ??? ???? ??? ????. ???? ???? ??? ?? ? ?? ???(expedited-forwarding ?? assured-forwarding)? ???? ?? ?? ????? ??? ?? ?????.

?: ?? ?? 2? ???? ?? ????? ????? ??? ? ?? ???? ??? ???? low ??? ?????.

????

? ???? ??? ??????? ge-1/2/0.0IPv4 ???? ???? ??? ?????. ?? ??? IPv4 ??? ??? ?? mfc-filter ? 2?? ?? ?? 2? ??? ef-policer ? af-policer.

IPv4 ?? ??? ??? ??? mfc-filter ??? ?? ? ?? ?? ??? ?????.

- isp1-customers- ? ?? ?? ??? ?? ??? 10.1.1.0/24 ?? 10.1.2.0/24? ??? ?????. ???? ??? ??? ???? ?? expedited-forwarding ?? ?? ????? low ?????.
- isp2-customers- ? ?? ?? ??? ?? ??? 10.1.3.0/24 ?? 10.1.4.0/24? ??? ?????. ???? ??? ??? ?? 50KB? ?? ? ??? ?? 300Kbps? ??? ???? ??? ??? ???? ???? ????? ef-policer. ? ???? ??? ???? ??? ??? ???? ?? expedited-forwarding ???? ?? ?? ??? high ????? ?????.
- other-customers- ? ???? ??? ?? ??? ?? ?? ??? af-policer300Kbps? ??? ?? ? 50KB? ??? ?? ??(? ??? ef-policer?? ??? ??? ??)?? ??? ??? ???? ???? ?????. ? ???? ??? ???? ??? ??? ???? ?? assured-forwarding ???? ?? ?? ??? medium-high ????? ?????.

??

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?? ?? ?? ???? ??? ??? ??? ?????. CLI ??? ?? ??? ??? ? ??????? "?? ???? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ?????.

CLI ?? ??

? ?? ??? ??????, ?? ?? ???? ??? ??? ????, ? ???? ??? ??, ?? ???? ??? CLI? ??????? [edit] .

```
set firewall policer ef-policer if-exceeding bandwidth-limit 300k
set firewall policer ef-policer if-exceeding burst-size-limit 50k
set firewall policer ef-policer then loss-priority high
set firewall policer ef-policer then forwarding-class expedited-forwarding
set firewall policer af-policer if-exceeding bandwidth-limit 300k
set firewall policer af-policer if-exceeding burst-size-limit 50k
set firewall policer af-policer then loss-priority high
set firewall policer af-policer then forwarding-class assured-forwarding
set firewall family inet filter mfc-filter term isp1-customers from source-address 10.1.1.0/24
set firewall family inet filter mfc-filter term isp1-customers from source-address 10.1.2.0/24
set firewall family inet filter mfc-filter term isp1-customers then loss-priority low
set firewall family inet filter mfc-filter term isp1-customers then forwarding-class expedited-
forwarding
set firewall family inet filter mfc-filter term isp2-customers from source-address 10.1.3.0/24
set firewall family inet filter mfc-filter term isp2-customers from source-address 10.1.4.0/24
set firewall family inet filter mfc-filter term isp2-customers then policer ef-policer
set firewall family inet filter mfc-filter term other-customers then policer af-policer
set interfaces ge-1/2/0 unit 0 family inet address 192.168.1.1/24
set interfaces ge-1/2/0 unit 0 family inet filter input mfc-filter
```

[illegible]

[illegible]

[illegible].

1. [illegible].

```
[edit]
user@host# edit firewall policer ef-policer

[edit firewall policer ef-policer]
user@host# set if-exceeding bandwidth-limit 300k
user@host# set if-exceeding burst-size-limit 50k
user@host# set then loss-priority high
user@host# set then forwarding-class expedited-forwarding
```

2. [illegible].

```
[edit firewall policer ef-policer]
user@host# up

[edit firewall]
user@host# edit policer af-policer

[edit firewall policer af-policer]
user@host# set if-exceeding bandwidth-limit 300k
user@host# set if-exceeding burst-size-limit 50k
user@host# set then loss-priority high
user@host# set then forwarding-class assured-forwarding
```

[illegible]

[illegible] `show firewall` [illegible].

```
[edit]
user@host# show firewall
policer af-policer {
    if-exceeding {
        bandwidth-limit 300k;
```

```
        burst-size-limit 50k;
    }
    then {
        loss-priority high;
        forwarding-class assured-forwarding;
    }
}
policer ef-policer {
    if-exceeding {
        bandwidth-limit 300k;
        burst-size-limit 50k;
    }
    then {
        loss-priority high;
        forwarding-class expedited-forwarding;
    }
}
```

[illegible]

[illegible]

[illegible],

1. IPv4 [illegible].

```
[edit]
user@host# edit firewall family inet filter mfc-filter
```

2. [illegible].

```
[edit firewall family inet filter mfc-filter]
user@host# set term isp1-customers from source-address 10.1.1.0/24
user@host# set term isp1-customers from source-address 10.1.2.0/24
user@host# set term isp1-customers then loss-priority low
user@host# set term isp1-customers then forwarding-class expedited-forwarding
```

3. [illegible]

```
[edit firewall family inet filter mfc-filter]
user@host# set term isp2-customers from source-address 10.1.3.0/24
user@host# set term isp2-customers from source-address 10.1.4.0/24
user@host# set term isp2-customers then policer ef-policer
```

4. [illegible]

```
[edit firewall family inet filter mfc-filter]
user@host# set term other-customers then policer af-policer
```

[illegible]

[illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter mfc-filter {
        term isp1-customers {
            from {
                source-address 10.1.1.0/24;
                source-address 10.1.2.0/24;
            }
            then {
                loss-priority low;
                forwarding-class expedited-forwarding;
            }
        }
        term isp2-customers {
            from {
                source-address 10.1.3.0/24;
                source-address 10.1.4.0/24;
            }
            then {
                policer ef-policer;
            }
        }
        term other-customers {
```

```
            then {
                policer af-policer;
            }
        }
    }
}
policer af-policer {
    if-exceeding {
        bandwidth-limit 300k;
        burst-size-limit 50k;
    }
    then discard;
}
policer ef-policer {
    if-exceeding {
        bandwidth-limit 200k;
        burst-size-limit 50k;
    }
    then {
        loss-priority high;
        forwarding-class expedited-forwarding;
    }
}
```

[illegible]

[illegible]

[illegible]:

1. [illegible] IPv4 [illegible].

```
[edit]
user@host# edit interfaces ge-1/2/0 unit 0 family inet
```

2. [illegible] IP [illegible].

```
[edit interfaces ge-1/2/0 unit 0 family inet ]
user@host# set address 192.168.1.1/24
```

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```
[edit interfaces ge-1/2/0 unit 0 family inet ]
user@host# set filter input mfc-filter
```

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```
[edit]
user@host# show interfaces
ge-1/2/0 {
    unit 0 {
        family inet {
            filter {
                input mfc-filter;
            }
            address 192.168.1.1/24;
        }
    }
}
```

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??? ??????? ??? show firewall ??? ?? ?? ?? ??? ??????.

```
user@host> show firewall filter rate-limit-in
Filter: rate-limit-in
Policers:
Name                                                Packets
ef-policer-isp2-customers                             32863
af-policer-other-customers                             3870
```

?? ???? ??? ?? rate-limit-in? ?? ??? ???? ?? ??? ???? ?? ?? ??????.

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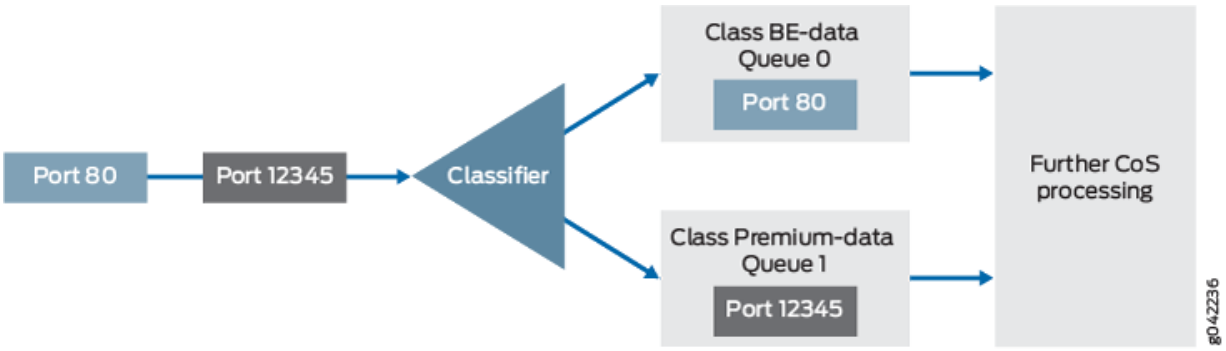
?? 58: TCP ?? ?? ?? ?? ?? ???



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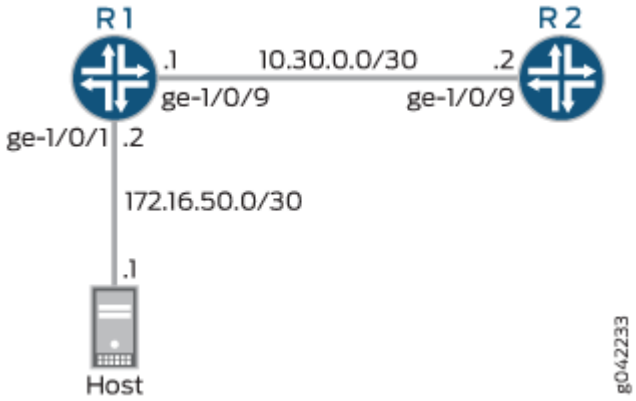
?? 59 ??? 1251? ?? ?????? ??????.

?? 59: ?? ?? ???? ?????



"CLI ?? ??" ??? 1252 ?(?) ? ?? ?? 59 ??? 1251?? ???? ????? ?????? ???? ??????.

"???? ??" ??? 1253 ?(?) ????? R1? ???? ??????.

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□□□□ R1

```
set interfaces ge-1/0/1 description to-host
set interfaces ge-1/0/1 unit 0 family inet filter input mf-classifier
set interfaces ge-1/0/1 unit 0 family inet address 172.16.50.2/30
set interfaces ge-1/0/9 description to-R2
set interfaces ge-1/0/9 unit 0 family inet address 10.30.0.1/30
set class-of-service forwarding-classes class BE-data queue-num 0
set class-of-service forwarding-classes class Premium-data queue-num 1
set class-of-service forwarding-classes class Voice queue-num 2
set class-of-service forwarding-classes class NC queue-num 3
set firewall family inet filter mf-classifier term BE-data from protocol tcp
set firewall family inet filter mf-classifier term BE-data from port 80
set firewall family inet filter mf-classifier term BE-data then forwarding-class BE-data
set firewall family inet filter mf-classifier term Premium-data from protocol tcp
set firewall family inet filter mf-classifier term Premium-data from port 12345
set firewall family inet filter mf-classifier term Premium-data then forwarding-class Premium-
data
set firewall family inet filter mf-classifier term accept-all-else then accept
```

□□□□ R2

```
set interfaces ge-1/0/9 description to-R1
set interfaces ge-1/0/9 unit 0 family inet address 10.30.0.2/30
```

??? ??

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???? R1 ??

1. ????? ??????? ??????.

```
[edit interfaces]
user@R1# set ge-1/0/1 description to-host
user@R1# set ge-1/0/1 unit 0 family inet address 172.16.50.2/30
user@R1# set ge-1/0/9 description to-R2
user@R1# set ge-1/0/9 unit 0 family inet address 10.30.0.1/30
```

2. ??? ?? ??? ??? ? ?? ??? ??? ??????.

```
[edit class-of-service forwarding-classes]
user@R1# set BE-data queue-num 0
user@R1# set Premium-data queue-num 1
user@R1# set Voice queue-num 2
user@R1# set NC queue-num 3
```

3. ?? ??? 80(HTTP ???)? TCP ????? ??? 0? ??? BE-??? ??? ????? ????? ??? ?? ??? ??????.

```
[edit firewall family inet filter mf-classifier]
user@R1# set term BE-data from protocol tcp
user@R1# set term BE-data from port 80
user@R1# set term BE-data then forwarding-class BE-data
```

4. ?? ??? 12345? TCP ????? ??? 1? ??? ????? ??? ??? ????? ????? ??? ?? ??? ??????.

```
[edit firewall family inet filter mf-classifier]
user@R1# set term Premium-data from protocol tcp
user@R1# set term Premium-data from port 12345
user@R1# set term Premium-data then forwarding-class Premium-data
```

5. ??? ?? ??? ?? ?? ????? ????? ?? ??? ??????.

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```
[edit firewall family inet filter mf-classifier]
user@R1# set term accept-all-else then accept
```

6. □□□ □□□ ge-1/0/1 □□□□□□ □□ □□□ □□□□□.

```
[edit interfaces]
user@R1# set ge-1/0/1 unit 0 family inet filter input mf-classifier
```

□□

□□ □□□□ , show class-of-service, show firewall □□□ □□□□ show interfaces□□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□□.

```
user@R1# show interfaces
ge-1/0/1 {
    description to-host;
    unit 0 {
        family inet {
            filter {
                input mf-classifier;
            }
            address 172.16.50.2/30;
        }
    }
}
ge-1/0/9 {
    description to-R2;
    unit 0 {
        family inet {
            address 10.30.0.1/30;
        }
    }
}
```

```
user@R1# show class-of-service
forwarding-classes {
```

```
    class BE-data queue-num 0;
    class Premium-data queue-num 1;
    class Voice queue-num 2;
    class NC queue-num 3;
}
```

```
user@R1# show firewall
family inet {
    filter mf-classifier {
        term BE-data {
            from {
                protocol tcp;
                port 80;
            }
            then forwarding-class BE-data;
        }
        term Premium-data {
            from {
                protocol tcp;
                port 12345;
            }
            then forwarding-class Premium-data;
        }
        term accept-all-else {
            then accept;
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

- CoS □□ □□ | **1256**
- TCP □□□□ □□□□□ □□ □ □□□ □□ □□□□ | **1256**

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CoS □□ □□

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□□□□□ R1□□ □□□ □□□□□□ show class-of-service forwardng-classes .

```
user@R1> show class-of-service forwarding-class

Forwarding class                        ID      Queue  Restricted queue  Fabric priority
Policing priority   SPU priority
  BE-data                               0       0          0             low
normal              low
  Premium-data                          1       1          1             low
normal              low
  Voice                                 2       2          2             low
normal              low
  NC                                    3       3          3             low
normal              low
```

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TCP □□□□□ □□□□□□ □□ □ □□□□ □□ □□□□□

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1. □□□□ R1□ □□ □□□□□□□□ □□□□□ □□□ □□□□□.

```
user@R1> clear interfaces statistics ge-1/0/9
```

2. □□□ □□□□ □□□□ 50 TCP □□ 80 □□□ □□□□ R2 □□ □□ □□□□□ □□□□□ □□□□□.

3. □□□□ R1□□ □□□ □□□□ □□□□□.

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```
user@R1> show interfaces extensive ge-1/0/9 | find "Queue counters"

  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0                           50                  50                   0
    1                            0                  57                   0
    2                            0                   0                   0
    3                            0                   0                   0
```

4. □□□ □□□□ □□□□ 50□□ TCP □□ 12345 □□□ □□□□ R2 □□ □□ □□□□□ □□□□□ □□□□□.

```
[root@host]#  hping 172.16.60.1  -c 50 -s 12345  -k
```

5. □□□□ R1□□ □□□ □□□□ □□□□□.

```
user@R1> show interfaces extensive ge-1/0/9 | find "Queue counters"

  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0                           50                  50                   0
    1                           50                  57                   0
    2                            0                   0                   0
    3                            0                   0                   0
```

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SEE ALSO

[illegible]: 2[illegible] 3[illegible] [illegible] | 2028

[illegible]

[illegible] | 817
[illegible] | 1819
2[illegible] | 1916
[illegible] | 1826
[illegible] Junos OS CoS [illegible]
[illegible]
[illegible]
[illegible]
RED [illegible]
[illegible]

MPC[illegible] MX [illegible]

Junos OS [illegible] 16.1[illegible]. [illegible]. [illegible]. [illegible] CoS(Class-of-service) [illegible].

[illegible]. [illegible]. [illegible](BA)[illegible]. [illegible]. CoS [illegible].

> [illegible]: [illegible] `ingress-and-egress` [illegible] `[edit chassis fpc` *`fpc-id`* `pic` *`pic-id`* `traffic-manager mode]`.

`ingress-queuing-filter` [illegible]`[edit interfaces` *`interface-name`* `unit` *`unit-number`* `family` *`family-name`*`]`. [illegible].`ingress-queuing-filter`

- `bridge`
- `ccc`

- inet
- inet6
- mpls
- vpls

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release heading in release-history	desc heading in release-history
16.1	Junos OS □□□ 16.1□□ □□ □□□ □□ □□□□ □□□□ □□ □□□ □□□ □□□□ □□□ □□□ □□□ □□ □□□□□.

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□□□□ □□□□ □□□ □□□ □□□□ EX □□□ □□□□□ □□, VLAN □□ □□□ 3 □□□□□□□ □□□□ □□□ □□□ □ □□□□.

□□□ □□ □□□□ □□□□ □□□□ □□□□ □□□□□ □□□ □□□ □□ □□□ □□□□ □□ □□ □□□□(PLP)□ □□□ □ □□□□. □□□□□ □□□□ □□ □□ □ □□□□ □□□ 0□ **best-effort** □□□ □□□□ □□□□□.

□□□ □□ □□ □□□ □□□□ □□□ □ □□□□.

□□□ □□□	□
□□□ □□	0
□□□ □□□	1

(Continued)

□□□ □□□	□
□□ □□	5
□□□□ □□	7

□□□ □□□□ □□ □□ □□□□ □□□□□:

1. □□ □□□□ □□ [edit firewall] □ □□□ □□□ □□ □□□ □□□□□. □□ □□ □□□ □□□□.

```
[edit firewall]
user@switch# set family ethernet-switching
user@switch# set family ethernet-switching filter ingress-filter
```

2. □ loss-priority □□ □□□□ □□□□ □□□ □□□ forwarding-class □□□□ □□□□□. □□□ □□□□ □□□ □ □□ □□ □□□□□ □□□□ □□□. □□ □□, □□□ □ □□□ □□ □□ □□ □□ □□□ □□□□ □□□ □□□□ □□ □□ □□□□□ □□□□□.

   - □ □□□ voice-traffic □ □□□ □□□□ □□□ □□□ expedited-forwarding □ □□ □□ □□□□low□ □□□□□.voice-vlan

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term voice-traffic from vlan-id voice-vlan
user@switch# set term voice-traffic then forwarding-class expedited-forwarding
user@switch# set term voice-traffic then loss-priority low
```

   - □ □□□ data-traffic □ □□ □□□ □□□□□ □□□ □□□ assured-forwarding □ □□ □□ □□□□low□ □□□□□.employee-vlan

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term data-traffic from vlan-id employee-vlan
user@switch# set term data-traffic then forwarding-class assured-forwarding
user@switch# set term data-traffic then loss-priority low
```

   - □□□□ □□ □□□ □□□ □□□ □□□□ □□□ □□□□ □ □ □□□□ □□□ □□□□ □□□ □□□ □□□□ □□ □□□□. □□ □□□ network-traffic□(□) □□□ □□□ network-control □ □□ □□ □□□□ low□ □□□□□.

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term network-traffic from precedence net-control
```

```
user@switch# set term network-traffic then forwarding-class network
user@switch# set term network-traffic then loss-priority low
```

- ??? ??? **accept-traffic** ?? ??? ???? ?? ?? ??? ???? ??? ??? **best-effort** ? ?? ?? ?? ??? **low**????.

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term accept-traffic from precedence net-control
user@switch# set term accept-traffic then forwarding-class best-effort
user@switch# set term accept-traffic then loss-priority low
```

3. ??? **ingress-filter** ??, VLAN ?? ??? 3 ??????? ?????. ?? ??? ?? ??? ??? "??? ?? ??(CLI ??)" ??? 1567? ???????.

?? ??

> ?: EX ??? ?????? ??, VLAN, ??? ???? ??? ?? ???? | **1578**
>
> ??? ??? ?????? ?? | **1765**
>
> ??? ?? ??? ???? | **1766**
>
> *CoS ??? ??(CLI ??)*
>
> *CoS ??? ??(J-Web ??)*
>
> ??? ?? ??(CLI ??) | **1567**

??? ??? ?? ??? ?? ??

in this section

- ?? ??: ??? ??? ?? ?? ??? | **1262**
- ???: ??? ??? ?? ?? ?? ?? | **1262**
- ??? ??? ?? ?? | **1262**
- ??? ?? ??? ??????? ??? ??? ?? ?? | **1262**

?? ??: ??? ??? ?? ?? ???

?????? ?? ?? ?? ?? ?? ? ?? ??????? ?? *???* *???* ??????. ??? ? ?? ??? ???(?? ???)? ???, ??? ?? ?? ??????? ? ?? ????? ?????? ?? ? ?????. ???? ??? ?????? ???? ?? ?? ??????? ??? ????? ?? ?? ?? ??????? ????? ???? ???? ??? ? ?? ????? ??????.

????? ????? ?? ?? ???? ??? ???? ????? "??" ???? ?? ??????? ????? ?????. ???? ??? ??? ?? ??? ??? ????? ? ???(? ? ???) ??????? ???? ???? ???? ? ???? ??? ?? ?? ???(?? ???) ??????? ?? ???? ???? ?? ?????. Junos OS ?? ??????? ?? ???(?? ???) ??????? ?? ?? ?? ???? ???? ????????? ????? ?? ? ?? ??? ??????. ? ?? ???? ?? ???? ?? ?? ?? ?? ? ? ????? ????? ?????. ?? ???? ?? ?? ???? ???? ???? ?? ???? ?? ???? ??? ???? ????? ?????.

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?? ???? ???? ????? ?? ???? ???? ????? ???? ?? ?? ????? ???? ?? ???? ???? ???? ???? ???? *??* ?? ? ???? ?? ???? ???? ?? ???? ?? ???? ???? ????? ?????. Junos OS? ?? ???? ?? ???? ????? ????? ????? ??????? ????? ???? ??????. ?? ??????? ? ????? ???? ???? ????? ?? ?? ???? ???? ???? ????? ???.

?: ?? ??(???? ?? ?? ??)? ????? ???? ???? ???? ????? ?? ???? ???? ? ???? ?? ???? ??????.

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? ???(?? ???) ??????? ?? ???? ???? ???? ?????? ???? ?? ?? ?? ???? ???? ??????? ?? ???? ???? ????? ???.

- ?? ??????? ????? ? ?? ???? ?? ???? ?? ?? ???? ???? ???? ???? ???? ???? ??????.
- ? ???(?? ???) ??????? ?? ???? ????? ???? ???? ???? ??????.
  - ?? ??????? ???? ?? ???? ??????.
  - ????? ???? ???? filter ????? ???? ???? ?? ???? ????? ?? ???? ??????.

??? ?? ???? ??????? ???? ???? ?? ??

??? ???? ???? ????? ?? ????? ?? ???? ???? ????? ?? ???? ?????. ? ??????? ?? ???? ?? filter ?? output ?(?? ? ?)? ? ???? input ???? ?? ???? ???? ???? ? ?????.

??????? ???? ???? ???? ????? ?? ???? ?? ? ??????? ???? ???? ???? ???? ?? ???? ?? ?? filter ?? ???? ????? *??* *???* *??* *???* ?? ??????.

?: ?? ?? ? ???? ????? ?? ?? ???? ?? ????? ?????. ????? ?? ?? ???? vty ???? ????? ?? ?? ?????? show jexpr dfw filter-types.

?? ??

?? ??? ???? ?? ?? ???? ?? ?? | 1263

?: ?? ???? ???? ?? ?? ?? | 1277

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in this section

- ??? ???? ?? ???? ?? ? ?? | 1263
- ?? ?? ?? ? ?? ?? ?? | 1264
- ??? ????? ????? ?? ?? | 1264
- ?? ???? ?? ?? ? | 1264
- ?? ?? ?? | 1264

??? ???? ?? ???? ?? ? ??

?? ???? ???? ?????? ?? ???? ?? ???? ?????? filter *filter-name* .

```
firewall firewall-name {
    family family-name {
        filter filter-name {
            term term-name {
                filter filter-name;
            }
        }
    }
}
```

?? ?? ?? ? ???? ???? ???? ???? ? ?????.

- [edit]
- [edit logical-systems *logical-system-name*]

□□ □□ □□ □ □□ □□ □□

□□ □□□ □□□ □□□□ □□ □□ □□ □□□ □□□□ *□□□ □□* □□□ □□□ □ □□□□. □□□ □□ □□□ □□ □□□□ filter □□□ □□ then □□ from □□□ □ □□□□.

□□ □□, □□□ □□□ □□ □□ term term1 □ □ *□□□ □□□□*.

```
[edit]
firewall {
    family inet {
        filter filter_1 {
            term term1 {
                filter filter_2;
                from {
                    source-address 172.16.1.1/32;
                }
                then {
                    accept;
                }
            }
        }
    }
}
```

□□□ □□ □□□ □□□ term term1 □□□□ □□ filter filter_2 □□□ □ then □□□□ □□ from □□□□ □□□.

□□□ □□□□ □□□□ □□ □□

□□□ □□□ □□□ □□□ □□□ □□□ □□□□□. □□□ □□□ □□ □□□□□ □□□ □□ □□ □□ □□□ □□□ □ □□□□.

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□□ □□□ □□□□ □□□ □ □□ 256□□ □□□ □ □□□□.

□□ □□ □□

Junos OS□ □□ □□□ □□□ □□ □□□ □□□□□. □□filter_2□□ □□ filter_1 □ □□filter_1□□ □□□ □□□□ □□□ □□□ □ □□□□.

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??? ??? ?? ??? ?? ?? | 1261

?: ?? ??? ??? ?? ?? ?? | 1277

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in this section

- ?? ??: ??? ??? ?? ?? ??? | 1265
- ???: ??? ?? ?? ?? | 1265
- ?? ??? ?? ?? ?? ?? | 1266
- ??? ??????? ?? ?? ?? | 1266
- ?? ??? ?? ??????? ?? | 1266
- ???? ??? ?? ?? ?? ?? ??? ??? ?? ?? ??? ??? ???? ?? | 1267
- ??? ???? ??? ??? IP ??? ??? ??? ?? ?? ??? ??? ???? ?? | 1268

? ????? ??? ??? ??? ????.

?? ??: ??? ??? ?? ?? ???

????? ?? ?? ?? ?? ?? ? ?? ??????? ?? *???? ????* ?????. ??? ?????? ?? ??????? ??? ???? ? ?? ??? ???? ?? ? ????. ??? ?????? ??? ?? ?? ??????? ??? ???? ?? ?? ?? ??????? ???? ??? ??? ??? ? ?? ???? ??????.

????? ????? ?? ??? ??? ????? "??" ??? ?? ??????? ???? ????. ??? ??? ?? ??? ??? ???? ?? ??? ??? ??????. ?? ?? ??? ??????? ?? ??? ??? ??? ????? ?? ??????? ??? ??? ??? ? ????. ??? ????? ?? ??? ????? ??? ??? ?? ??? ??? ? ????.

Junos ?? ???? ?? ??? ??????? ?? ?? ?? ??? ??? ???????? ???? ?? ? ?? ??? ??????. ? ?? ??? ?? ??? ?? ?? ?? ?? ?? ????? ????? ?????. ?? ???? ?? ???? ???? ?? ???? ??? ??? ???? ????. ?: ?? ??? ?? ?? ?? ? ?: ?? ??? ?? ? ?? ?? ??.

???: ??? ?? ?? ??

?? ??? ??? ????? ?? ??? ??? ????? ??? ?? ?? ??? ??? ?? ??? ??? ??? ?? ? ??????? ??? ??? ?? *????* ???? ? ???. Junos OS? ??? ???? ????? ??? ???? ??????? ???? ??? ??????.

?? ??? ?? ?? ?? ??

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- **Unique filters**- ?? ??????? ??? ? ?? ??? ?? ??? ?? ?? ??????? ?? ??? ??? ???? ??? ??? ??? ??????.
- **Shared filters**- ? ? ??? ???????? ???? ? ?? ??? ?? ??? ?? ?? ??? ??? ???? ??? ??? ??? ???? ?? ????.

> ?: ?? ??? ???? ?? ?? ??? ??? ?????? ??? ? ???? ??? ??, ??? ???? ??? ?? ??????? ??? ?? ?? ??? ???? ??? ????.

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??????? ??? ?? ??? ?????? ?? ??????? ?? ??? ?? ??? ???? ??? ???? ???. ? ??????? ?? ??? ?? `filter` ?? `output-list` ???(?? ? ?)? ???? `input-list` ?? ??? ??? ???? ??? ? ????.

- ??????? ??? ???? ??? ??? ???? ?? ??? ??????.
- ??????? ??? ??? ??? ???? ??? ??????.

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?? ??? ?????? ??? ???? ??? ??? ?? ??? */???????* */??* */????*.

> ?: ????? ??? ?? ??? ???? ?? ??? ??? ??? ???????? ??????? ??? ???? ??? ?? ??? ??????? ? ? ????. ?? ????? ?? ??? ??? ???????? ??? ?? ???? ?? ??????? ??? ??? ??? ?? ?????? ???? ?. ??? ?? ??? ??? ??? ?? ??? ?? ???? ????? ??? ? ??????? ??? ??????.

??????? ??? ??? ?? ??? ?? ?????? ?? ?? ?? ?? ??? ?? '-i', ?? ?? ??? ?? '-o'? ??????.

- **Input filter list name**—?? ??, ?? ???? `input-list` ?? ??? */??* */???????* `ge-1/3/0.0` ???? ?? Junos OS? ??? ? ? ??? ??????.

```
ge-1/3/0.0-inet-i
```

- **Output filter list name**—?? ??, ?? ???? `output-list` ?? ??????? `fe-0/1/2.0`?? ??? ???? ?? Junos OS? ??? ?? ??? ??????.

```
fe-0/1/2.0-inet-o
```

?: Junos OS Evolved? ?? ?? ??? Junos OS? ??????. ?? ??, ??? inet ????? ????? ?? ??? ??? **ge-1/3/0/0-inet-i** ? **fe-0/1/2.0-inet-o**???.

??? ?? ??? ????? Junos OS *?? ?? ???* ??? ? ??????? ?? ?? ??? ??? ? ?????.

????? ??? ?? ?? ?? ?? ??? ??? ?? ?? ??? ??? ????? ??

?????? ?? ??? ?????? ??? ?????? ??? ??? ??? ? ?? ????? ????? ??? ??? ?? ??? ?????? ??????.

? 79 ??? 1267 ??? ?? ??? ????? ??? ?? ?? ? `next term` ??? ?????? ??? ?? ??? ????? ??? ??????. `next term` ? ? ?? ?? ??? ??? ??? ??? ??? *?? ??* ??????.

? 79: ??? ?? ?? ??

????? ??? ??? ??? ?? ??		?? ??	?? ??? ??
??	?? ??		
?	—	????? ??? ?? ??(?: discard)? `next term` ?????? ??? ????? ??? ?	?????? ?? ??? ??????. ??? ?? ??? ??? ?? ??? ?? ? ????? ? ????? ?????.
—	?	????? ????? ??? ?? `next term` ? ?? ?? ??? ????? ?????.	?????? ????? ?? ??? ??? ?? ??? ??? ?? ?? ?? ?? ? ?? ??? ?? ??? ??????. ?: Junos OS Evolved?? `next term`? ??? ??? ? ?? ??? ? ?????. `next term`? ????? ??????? ??? ? ? ??? ?? ?? ?? ??? ????? ?????.
—	—	????? ????? ????? ?? ??? ????? ????? `next term` .	?????? ????? ?? ?? ??? ??? ?? ?????? ??? ??????. `accept` ??? ?? ????? ??? ??? ?? ??? ??? ?? ??? ??? ????? ? ????? ?????.

?? ??? ?? ??? ??? ? ?????? "??? ?? ?? ??" ??? 828.

?: ??? ??? ?? ????? ?? ????? ??? ??? `next term` ? ?????.

??? ???? ??? ??? IP ??? ??? ??? ?? ?? ??? ??? ???? ??

???? ???() ??? ?? ? ???? ??(family anyfamily inet??family inet6) ??? ??? ??? ??? ?? ????????? ???? ??? ?? ? ??? ?? ??????.

? ?? ??? ?? ??? ? ?? ??? ??? ?????? ??? ??????.

- ? ?? ??? ??? ???? accept ???? ? ?? ??? ??? ???? ????.
- ? ?? ??? ??? ???? ?? ?? ????(*???* discard ??) ? ?? ??? ??? ??????.
- ? ?? ??? *???* discard ??? ???? ???? ? ?? ??? ??? ???? ????.

PTX10003 ???? ?? ???? ???? ??? ??? ?? ??? ??? ???? ????.

?? ??

> ?? ??? ??? ??? ???? ?? | 744
>
> ?? ??? ??? ???? ???? ?? ?? | 1268
>
> ?: ?? ??? ?? ?? ?? | 1270

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in this section

- ?? ??? ?? ??? ???? ?? ? ?? | 1268
- ??? ?? ??? ??????? ?? ?? ?? ?? ? ?? ?? | 1269
- ???? ???? ?? ?? | 1269
- MPLS ?? ??? 2 CCC ???? ?? ?? ?? ??? ?? ?? ?? | 1270

?? ??? ?? ??? ???? ?? ? ??

???(?? ???) *??? ???????* ?? ?? ?? ??? ?? ??? ????? ???? ???? input *filter-name*filter ?? ??? ??? ?? output *filter-name* ?? ??????.

□□□(□□ □□□) □□ □□□□□□□ □□ □□ □□ □□□ □□ □□ □□□ □□□□□ □□□□ □□□□ filter □□ □□□ □□□ □□ output-list [*filter-names*] □□ □□□□□input-list [*filter-names*].

```
interfaces {
    interface-name {
        unit logical-unit-number {
            family family-name {
                filter {
                    ...filter-options...
                    input-list [ filter-names ];
                    output-list [ filter-names ];
                }
            }
        }
    }
}
```

□□ □□ □□ □ □□□□ □□□□□ □□□ □□□ □ □□□□.

- [edit]
- [edit logical-systems *logical-system-name*]

□: (PTX10003) □□□□ □□□ □□(lo0) □□ □□ □□□□□□□ □□ □□□□ □□□□ output-list □□□□.

□□□ □□ □□□ □□□□□□ □□ □□ □□ □□ □ □□ □□

□□□ □□ □□□ □□□□ □□□ □ □□□ □□ □□ □□□ □□□□□.

- □□ □□ □□□ □□ □□ 16□□ □□□ □□□ □□□ □ □□□□.
- □□ □□ □□□ □□ □□ 16□□ □□□ □□□ □□□ □ □□□□.

□□□□ □□□□ □□ □□

□□□(□□ □□□) □□□□□□ □□□ □□ □□□ □□ □□□ □□ □□□ □□□ □□□ □□□□□. □□□ □□ □□ □□ □□□ □□□ □□□ □□□(□□ □□□) □□□ □□□ □□□ □ □□□□.

MPLS □□ □□□ 2 CCC □□□□ □□ □□ □□ □□□ □□ □□ □□

□: □□□ □□□ PTX10003 □□□□□ □□□□ □□□□. □□□□ IPv4 □□ IPv6 (inet)(inet6) □□□□ □□ □□ □□ □□ □ □□□□□.

MPLS □□□(family mpls) □□ □□□ 2 □□ □□ □□ □□□(family ccc)□ □□□□ □□□ □□□ □□□ □ □□□ □□□ □□ □□□□□□ □□ □ output-list [*filter-names*] □□ □□□ input-list [*filter-names*] □ □□□□.

- □□ □ □□ □□□(fxp) □□□□□
- □□□(lo0) □□□□□
- USB □□(umd) □□□□□

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> □□□□ □□□ □□ □□□ □□ □□ | 1265
>
> □: □□ □□□ □□ □□ □□ | 1270

□: □□ □□□ □□ □□ □□

in this section

- □□ □□ | 1270
- □□ | 1271
- □□ | 1272
- □□ | 1276

□ □□□□ □□ □□□ □□ □□□ □□□□ □□□ □□ □□□.

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- □□□ □□ □□□□ □□□□ PIC, DPC □□ MPC□ □□□□ □□ □□□ □□ □□□ □□□ □□□□□□.

- ??????? ?? ???? ???????.
- IP ?? 4(IPv4) ????(family inet)? ?????? ??? ??????? ???? ?????? ??? ??? ??????? ???????. ? ?? IP ?? 172.16.1.2/30?? ??? ??? ??????? ge-1/3/0.0 ??????.

  ?: ??? ??? ?? ? ?? ?? ???? ??? ??????? ge-1/3/0.0?? IP ?? ??? ??????.

- ???? ??????? ??? ???, ?? ? ?? IPv4 ???? ??? ??????? ge-1/3/0.0?? ??? ??? ???????.
- ? ??? ?? ???? ??? ??????? ge-1/3/0.0??? ?? ???? ???? ? ??? ???????.

?: ??? ?????? ???/??? ?? ??? ?? ???? ????.

??

in this section

- ???? | 1271

? ???? ? ?? IPv4 ??? ??? ???? ??? ???? ? ??? ??? ??? ??????? ?? ??????.

????

? ?? ??? ?????? ge-1/3/0.0?? *??? ??? ???*? ?? ??? ??? ??????. ? ???? IPv4 ??? ???? TCP ??? ?? ?? ???? ??? ???? ?? ??? ???? ????.destination port

- FTP ?? ??()?? ???? ??? filter_FTP ??????.21
- SSH ?? ??(22)?? ??? filter_SSH ??????.
- Telnet ?? ??()? ?? filter_Telnet ?? ??????23.

???? ??? ?? ??? ??? ???? ??? ??? ??????.

?: Junos OS? ?? ??? ??? ???? ???? ??? ??? ??????. ? ??? ?????? ?? ??? ??? ??? ?????? ? ?? ???? ????.

?? ??? ????(?? ? ??input) ?? ?? ??? ??(?? output-list ? ??) ?? ??????? ???? ? ????input-list.output ??? ??? ??? ?? ????? ????? ? ?? ?? ?? "???" ???? ??? ????? ?????.

??

in this section

- CLI ?? ?? | 1272
- ?? IPv4 ??? ?? ?? | 1273
- ??? ?? ?????? ?? ?? ? ?? ???? ????? | 1274
- ?? ?? ?? ? ?? | 1274

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ???????? "?? ????? CLI ??? ??" ??? 1787.

CLI ?? ??

? ?? ??? ?????? ?? ??? ??? ??? ????? ? ??? ??? ?? ??? ?? ??? CLI? ???????? `[edit]`.

```
set firewall family inet filter filter_FTP term 0 from protocol tcp
set firewall family inet filter filter_FTP term 0 from destination-port 21
set firewall family inet filter filter_FTP term 0 then count pkts_FTP
set firewall family inet filter filter_FTP term 0 then accept
set firewall family inet filter filter_SSH term 0 from protocol tcp
set firewall family inet filter filter_SSH term 0 from destination-port 22
set firewall family inet filter filter_SSH term 0 then count pkts_SSH
set firewall family inet filter filter_SSH term 0 then accept
set firewall family inet filter filter_Telnet term 0 from protocol tcp
set firewall family inet filter filter_Telnet term 0 from destination-port 23
set firewall family inet filter filter_Telnet term 0 then count pkts_Telnet
set firewall family inet filter filter_Telnet term 0 then accept
set firewall family inet filter filter_discard term 1 then count pkts_discarded
set firewall family inet filter filter_discard term 1 then discard
set interfaces ge-1/3/0 unit 0 family inet address 172.16.1.2/30
set interfaces ge-1/3/0 unit 0 family inet filter input-list filter_FTP
set interfaces ge-1/3/0 unit 0 family inet filter input-list filter_SSH
set interfaces ge-1/3/0 unit 0 family inet filter input-list filter_Telnet
set interfaces ge-1/3/0 unit 0 family inet filter input-list filter_discard
```

□□ IPv4 □□□ □□ □□

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IPv4 □□□ □□□ □□□□□ □□□ □□□□□.

1. CLI□□ IPv4 □□□ □□□ □□□□ □□ □□□□ □□□□□.

```
[edit]
user@host# edit firewall family inet
```

2. □□ 21□ □□ □□□ □□□□□ □□□□□ □ □□ □□□ □□□ □□□□□.

```
[edit firewall family inet]
user@host# set filter filter_FTP term 0 from protocol tcp
user@host# set filter filter_FTP term 0 from destination-port 21
user@host# set filter filter_FTP term 0 then count pkts_FTP
user@host# set filter filter_FTP term 0 then accept
```

3. □□ 22□ □□ □□□ □□□□□ □□□□□ □ □□ □□□ □□□ □□□□□.

```
[edit firewall family inet]
user@host# set filter filter_SSH term 0 from protocol tcp
user@host# set filter filter_SSH term 0 from destination-port 22
user@host# set filter filter_SSH term 0 then count pkt_SSH
user@host# set filter filter_SSH term 0 then accept
```

4. □□ 23□□ □□□ □□□□□ □□□□□ □ □□ □□□ □□□ □□□□□.

```
[edit firewall family inet]
user@host# set filter filter_Telnet term 0 from protocol tcp
user@host# set filter filter_Telnet term 0 from destination-port 23
user@host# set filter filter_Telnet term 0 then count pkts_Telnet
user@host# set filter filter_Telnet term 0 then accept
```

5. [illegible].

```
[edit firewall family inet]
user@host# set filter filter_discard term 1 then count pkts_discarded
user@host# set filter filter_discard term 1 then discard
```

[illegible]

[illegible]

6[illegible] IPv4 [illegible].

1. [illegible] `ge-1/3/0.0`IPv4 [illegible] CLI[illegible].

```
[edit]
user@host# edit interfaces ge-1/3/0 unit 0 family inet
```

2. [illegible] IPv4 [illegible].

```
[edit interfaces ge-1/3/0 unit 0 family inet]
user@host# set address 172.16.1.2/30
```

3. [illegible].

```
[edit interfaces ge-1/3/0 unit 0 family inet]
user@host# set filter input-list [ filter_FTP filter_SSH filter_Telnet filter_discard ]
```

[illegible]

[illegible]

[illegible].

1. [illegible] `show firewall` [illegible]. [illegible].

```
[edit]
user@host# show firewall
```

```
family inet {
    filter filter_FTP {
        term 0 {
            from {
                protocol tcp;
                destination-port 21;
            }
            then {
                count pkts_FTP;
                accept;
            }
        }
    }
    filter filter_SSH {
        term 0 {
            from {
                protocol tcp;
                destination-port 22;
            }
            then {
                count pkts_SSH;
                accept;
            }
        }
    }
    filter filter_Telnet {
        term 0 {
            from {
                protocol tcp;
                destination-port 23;
            }
            then {
                count pkts_Telnet;
                accept;
            }
        }
    }
    filter filter_discard {
        term 1 {
            then {
                count pkts_discarded;
                discard;
            }
```

```
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-1/3/0 {
    unit 0 {
        family inet {
            filter {
                input-list [ filter_FTP filter_SSH filter_Telnet filter_discard ];
            }
            address 172.16.1.2/30;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

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- FTP, SSH ?? Telnet ??? ???? ?? ???? ???? ??? ????? ?? | 1277

??? ???? ???? ??? ?????.

FTP, SSH ?? Telnet ??? ????? ?? ????? ????? ??? ?????? ??

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??? ???????? ?? ? ?? ???? ?? ?????? ???? ??????.

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?? ???? ? ?? ???? ?? ?????? ??????:

1. ? ????(?? ????)? ???? ???????? ge-1/3/0.0???? ?? ?????? ???? ?? ?? ???? 21? ???? ????. ???? ?????? ???.
2. ? ????(?? ????)? ???? ???????? ge-1/3/0.0???? ?? ?????? ???? ?? ?? ???? 22? ???? ????. ???? ?????? ???.
3. ? ????(?? ????)? ???? ???????? ge-1/3/0.0???? ?? ?????? ???? ?? ?? ???? 23? ???? ????. ???? ?????? ???.
4. ? ????(?? ????)? ???? ???????? ge-1/3/0.0???? ?? ?????? ?? ?? ???? 21, 22 ?? 23 ////???? ????. ???? ????? ?? ?.
5. ? ge-1/3/0.0 ???? ???? ?? ???? ?? ???? ???? ?????? ?? ?? ???? ?????? `show firewall filter ge-1/3/0.0-inet-i` . ? ? ???? ?? ????? ???? ?? ???? ????? ???? ? ?? ?? ??????.
   - pkts_FTP-ge-1/3/0.0-inet-i
   - pkts_SSH-ge-1/3/0.0-inet-i
   - pkts_Telnet-ge-1/3/0.0-inet-i
   - pkts_discard-ge-1/3/0.0-inet-i

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□□□□

common_filter □□□ □□□ UDP □□ □□ □□ □□ □□ □□□ □ 69□□□ □□□□□. □ □□ □□ □□□ □□□ filter1filter2□ common_filter □□ .

□□

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CLI □□ □□

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```
set firewall family inet filter common_filter term common_term from protocol udp
set firewall family inet filter common_filter term common_term from port tftp
set firewall family inet filter common_filter term common_term then discard
set firewall family inet filter filter1 term term1 filter common_filter
set firewall family inet filter filter1 term term2 from address 192.168.0.0/16
set firewall family inet filter filter1 term term2 then reject
set firewall family inet filter filter2 term term1 filter common_filter
set firewall family inet filter filter2 term term2 from protocol udp
set firewall family inet filter filter2 term term2 from port bootps
set firewall family inet filter filter2 term term2 then accept
set interfaces ge-0/0/0 unit 0 family inet address 10.1.0.1/24
set interfaces ge-0/0/0 unit 0 family inet filter input filter1
set interfaces ge-0/0/3 unit 0 family inet address 10.1.3.1/24
set interfaces ge-0/0/3 unit 0 family inet filter input filter2
```

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1. CLI□□ IPv4 □□□ □□□ □□□□ □□ □□□□ □□□□.

```
[edit]
user@host# edit firewall family inet
```

2. □□ □□ □□□□ □□□ □□ □□□ □□□□□.

```
[edit firewall family inet]
user@host# set filter common_filter term common_term from protocol udp
user@host# set filter common_filter term common_term from port tftp
user@host# set filter common_filter term common_term then discard
```

3. ?? ??? ???? ??? ?????.

```
[edit firewall family inet]
user@host# set filter filter1 term term1 filter common_filter
user@host# set filter filter1 term term2 from address 192.168.0.0/16
user@host# set filter filter1 term term2 then reject
```

4. ?? ??? ???? ? ?? ??? ?????.

```
[edit firewall family inet]
user@host# set filter filter2 term term1 filter common_filter
user@host# set filter filter2 term term2 from protocol udp
user@host# set filter filter2 term term2 from port bootps
user@host# set filter filter2 term term2 then accept
```

??????? ??? ??? ?? ?? ??

??? ??

??? ???????? ??? ??? ??? ?? ?????? ??? ??????.

1. ? ?? ?? ??? ??? ?????? ??? ??????.

```
[edit]
user@host# set interfaces ge-0/0/0 unit 0 family inet address 10.1.0.1/24
user@host# set interfaces ge-0/0/0 unit 0 family inet filter input filter1
```

2. ? ?? ?? ??? ??? ?????? ??? ??????.

```
[edit]
user@host# set interfaces ge-0/0/3 unit 0 family inet address 10.1.3.1/24
user@host# set interfaces ge-0/0/3 unit 0 family inet filter input filter2
```

?? ?? ?? ? ??

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?? ??? ??? ? ?????? ??? ??????.

1. ?? ?? ??? ???? ??? ??? show firewall ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ??? ???.

```
[edit]
user@host# show firewall
family inet {
    filter common_filter {
        term common_term {
            from {
                protocol udp;
                port tftp;
            }
            then {
                discard;
            }
        }
    }
    filter filter1 {
        term term1 {
            filter common_filter;
        }
        term term2 {
            from {
                address 192.168/16;
            }
            then {
                reject;
            }
        }
    }
    filter filter2 {
        term term1 {
            filter common_filter;
        }
        term term2 {
            from {
                protocol udp;
                port bootps;
            }
            then {
                accept;
            }
```

```
        }
    }
}
```

2. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/0 {
    unit 0 {
        family inet {
            filter {
                input filter1;
            }
            address 10.1.0.1/24;
        }
    }
}
ge-0/0/3 {
    unit 0 {
        family inet {
            filter {
                input filter2;
            }
            address 10.1.3.1/24;
        }
    }
}
```

3. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ????? ????? ? show firewall filter filter2 ?? ?? ??? ?????show firewall filter filter1.

?? ??

??? ??? ?? ??? ?? ?? | 1261

?? ??? ??? ?? ?? ??? ?? ?? | 1263

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????

??? ??? L2_filter ????? ?? ????????? ????? ????? ??? ????? ?? ??? ??? ? ?????.

- fe-0/0/0.0

- fe-1/0/0.0
- fe-1/1/0.0

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□□, □□ fe-0/0/0.0□□□ □□□□ □□□ □□□□ □□, □□□ □□ □□ t1 □ policer□ p1□□□□□.

□□ □□ □□□ □□□□□□□ □□□□ □□□□ □□□ □□□□ □□, □□□ □□ □□ t2 □ policer□ p2□□□□□. □□ □□ □□□ □□□□□□ □□□ □□□□□ □□□ □□□□□ □□ □□□□ □□ [edit firewall] □□□□□interface-set *interface-set-name interface-name*. □□□ □□□ □□□□□ □□ □ □□□□ □□□□□□ □□□□ □□ □□ □□□ □□□□□ □□ □□ □□□ □□□□ □□□ interface-set □□□□□.

□□□□□, □□ □□□□ □□□ □□□□ □□, □□□ □□ □□ t3 □ policer□ p3□□□□□.

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```
set interfaces fe-0/0/0 unit 0 family inet address 10.1.1.1/30
set interfaces fe-1/0/0 unit 0 family inet address 10.2.2.1/30
set interfaces fe-1/1/0 unit 0 family inet address 10.4.4.1/30
set firewall policer p1 if-exceeding bandwidth-limit 5m
set firewall policer p1 if-exceeding burst-size-limit 10m
set firewall policer p1 then discard
set firewall policer p2 if-exceeding bandwidth-limit 40m
set firewall policer p2 if-exceeding burst-size-limit 100m
```

```
set firewall policer p2 then discard
set firewall policer p3 if-exceeding bandwidth-limit 600m
set firewall policer p3 if-exceeding burst-size-limit 1g
set firewall policer p3 then discard
set firewall interface-set ifset fe-*
set firewall family any filter L2_filter term t1 from interface fe-0/0/0.0
set firewall family any filter L2_filter term t1 then count c1
set firewall family any filter L2_filter term t1 then policer p1
set firewall family any filter L2_filter term t2 from interface-set ifset
set firewall family any filter L2_filter term t2 then count c2
set firewall family any filter L2_filter term t2 then policer p2
set firewall family any filter L2_filter term t3 then count c3
set firewall family any filter L2_filter term t3 then policer p3
set interfaces lo0 unit 0 family inet address 172.16.1.157/30
set interfaces lo0 unit 0 family inet address 172.16.1.157/30
set interfaces lo0 unit 0 filter input L2_filter
```

[illegible]

[illegible]

[illegible].

1. [illegible].

```
[edit]
user@host# set interfaces fe-0/0/0 unit 0 family inet address 10.1.1.1/30
```

2. [illegible].

```
[edit ]
user@host# set interfaces fe-1/0/0 unit 0 family inet address 10.2.2.1/30
user@host# set interfaces fe-1/1/0 unit 0 family inet address 10.4.4.1/30
```

3. [illegible].

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

□□

□□ □□ □□□ □□□□ show interfaces □□□(□□ □□□) □□ □□□□□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□ □ □□□ □□□□□□.

```
[edit]
user@host# show interfaces
fe-0/0/0 {
    unit 0 {
        family inet {
            address 10.1.1.1/30;
        }
    }
}
fe-1/0/0 {
    unit 0 {
        family inet {
            address 10.2.2.1/30;
        }
    }
}
fe-1/1/0 {
    unit 0 {
        family inet {
            address 10.4.4.1/30;
        }
    }
}
```

□□□ □□□□ □□□□□□ □□□□ □□□□ □□□ □□□□ □□□ □□□□ □□ □□□ □□□ □□ □□

□□□ □□

□□□(p1, p2, □ p3)□ □□□□ □□□ □□□□ □□□□□□ □□□□ □□□□ □□□ □□□□ □□□ □□□□ □□ □□□ □□□ L2_filter □ □□□□□,

1. □□□ □□ □□□□□.

```
[edit]
user@host# edit firewall
```

2. bps□ 5m □□□ □□ □□ □□□□ 10m □□□ □□□ □□□□ □□□□ □□□□□ □□□□ p1 □□□□□.

```
[edit firewall]
user@host# set policer p1 if-exceeding bandwidth-limit 5m
user@host# set policer p1 if-exceeding burst-size-limit 10m
user@host# set policer p1 then discard
```

3. bps□ 40m □□□ □□ □□ □□□□ 100m □□□ □□□ □□□□ □□□□ □□□□□ □□□□ p2 □□□□□.

```
[edit firewall]
user@host# set policer p2 if-exceeding bandwidth-limit 40m
user@host# set policer p2 if-exceeding burst-size-limit 100m
user@host# set policer p2 then discard
```

4. bps□ 600m □□□ □□ □□ □□□□ 1g □□□ □□□ □□□□ □□□□ □□□□□ □□□□ p3 □□□□□.

```
[edit firewall]
user@host# set policer p3 if-exceeding bandwidth-limit 600m
user@host# set policer p3 if-exceeding burst-size-limit 1g
user@host# set policer p3 then discard
```

5. □□□□□ □□□ ifset □□□□ □□ □□ □□□ □□□□□ □□□□ □□□□□.

```
[edit firewall]
user@host# set interface-set ifset fe-*
```

6. □□□ □□□ □□□ L2_filter□□□□□.

```
[edit firewall]
user@host# edit family any filter L2_filter
```

7. □□□□□□□ fe-0/0/0.0 □□□ IPv4, IPv6 □□ MPLS □□□ □□□□□ □□ □□ t1 □ □□□□ □□□□ p1 □□□□ □□ □□□□ □□□ □□□ □□.

```
[edit firewall family any filter L2_filter]
user@host# set term t1 from interface fe-0/0/0.0
```

```
user@host# set term t1 then count c1
user@host# set term t1 then policer p1
```

8. [illegible] ifset [illegible] t2 [illegible] p2 [illegible].

```
[edit firewall family any filter L2_filter]
user@host# set term t2 from interface-set ifset
user@host# set term t2 then count c2
user@host# set term t2 then policer p2
```

9. [illegible] p3 [illegible] t3[illegible].

```
[edit firewall family any filter L2_filter]
user@host# set term t3 then count c3
user@host# set term t3 then policer p3
```

10. [illegible].

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

[illegible]

[illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
family any {
    filter L2_filter {
        term t1 {
            from {
                interface fe-0/0/0.0;
            }
            then {
                policer p1;
                count c1;
            }
```

```
        }
        term t2 {
            from {
                interface-set ifset;
            }
            then {
                policer p2;
                count c2;
            }
        }
        term t3 {
            then {
                policer p3;
                count c3;
            }
        }
    }
}
policer p1 {
    if-exceeding {
        bandwidth-limit 5m;
        burst-size-limit 10m;
    }
    then discard;
}
policer p2 {
    if-exceeding {
        bandwidth-limit 40m;
        burst-size-limit 100m;
    }
    then discard;
}
policer p3 {
    if-exceeding {
        bandwidth-limit 600m;
        burst-size-limit 1g;
    }
    then discard;
}
interface-set ifset {
    fe-*;
}
```

[illegible]

[illegible]

[illegible]:

1. [illegible]

```
[edit]
user@host# set interfaces lo0 unit 0 family inet address 172.16.1.157/30
user@host# set interfaces lo0 unit 0 filter input L2_filter
```

2. [illegible]

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

[illegible]

[illegible] show interfaces [illegible]. [illegible]

```
user@host# show interfaces
fe-0/0/0 {
    ...
}
fe-1/0/0 {
    ...
}
fe-1/1/0 {
    ...
}
lo0 {
    unit 0 {
        filter {
            input L2_filter;
        }
        family inet {
            address 172.16.1.157/30;
        }
```

```
    }
}
```

??

??? ???? ?????? ?????? ?? ?? ???? show firewall filter L2_filter ???? ???? ???? ???? 3?? ?? ???? ???? ????????.

?? ??

> ?? ???? ?? ?? ?? ?? | 731
>
> ?????? ????? ???? ?? ???? ?? | 1297

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- ??????? ??? ?? ??? | 1293
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??????? ??? ?? ??????

T ???, M120, M320, MX ??? ??? ? EX ??? ?????? Junos OS? ??? ???? ? ??????? ?? ??? ??? ??????? ??? ?? ???? ?????? ? ? ????. ??? ??? ??????? ??????? ???? ?? ?? ??? ?? ??????? ???? ?? ??? ??? ?? **count** ?? ?? **policer** ??? ?? ??????? ??? ??? ???? ? ?? ??????? ?????? ??? ??? ???? ??????.

?? ??? ?? ???? `interface-specific` ??? ??? ? ??? ???? ? ????.

□: T □□□, M120, M320, MX □□□ □□□ □ EX □□□ □□□□□ □□□□□□ □□ □□ □□ □□ □□□ □□□□□.

□□□□□□ □□□ □□□□ M120 □ M320 □□□ □□□ M □□□ □□□□□□ □□□□ □□□□. M120 □□ M320 □□□□ □□ M □□□ □□□□ □□ □□□□□□ □□□ □□□ □□□□ □□, □□□ □□ □□□□□□ □□□□□ □□□ □□□□ □□ □□ □□□□□.

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Junos OS□ □□□ □□□□□□ □□ □□□ □□□ □□ □□□□□ □□□□ □□□□□ □□□□□□□ □□□ □□□□□. □□□ □□ □□□□□ □□□ □□ □□□ □□ □ □□□ □□ □□ □□□('-'), □□ □□□□□ □□, □□ □□ □□□□□ □□ '', □□ □□ □□□□□ □□ '**-i-o**'□ □□□□□.

- **Input filter instance name**—□□ □□, □□□□□□ □□□ □□□ **filter_s_tcp** □□□ □□□□□□ **at-1/1/1.0**□□□ □□□□ Junos OS□ □□□ □□ □□□ □□ □□□□ □□□□□□ □□ □□□□□ □□□□□□□□.

```
filter_s_tcp-at-1/1/1.0-i
```

- **Output filter instance name**—□□ □□, □□□ □□□□□□ **ge-2/2/2.2**□□□ □□□□□□ □□□ □□□ **filter_s_tcp** □□□□ □□, Junos OS□ □□□ □□ □□□ □□ □□□□ □□□□□□ □□ □□□□□ □□□□□□□□.

```
count_s_tcp-ge-2/2/2.2-o
```

□□□ □□□ □□ □□□ □□□□ Junos OS □□ □□ □□□ □□□ □ □□ □□□□□ □□□□□□ □□□ □□□ □ □□□□.

□: □□□□□□ □□□□□ □□□□ □□□□ □□□ □□□ □□□ □□ □□ □□□ *52□□□□*□ □□□□ □□ □□□□. □□□ □□ □□□ □□ □ *64□□□*□ □□□□ □□□□□. □□□ □□ □□ □□□□ □□□ □ □□ □□□ □□□□ □□ □□□□□ □□□□□□ □□□□ □□□ □□□ □ □□□□.

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□□□□□□ □□□ □□ □□□□ □□□ □□ □□□ □□□ □□□ □□ □□ □□□('-'), □□ □□□□□ □□, □□ □□ □□□□□ □□ '**-i**' □□ □□ □□ □□□□□ □□ '**-o**'□ □□□□□.

- **Interface-specific input filter counter name-** ?? ??, ??????? ???? ???? ?? ?? ???? **count_tcp** ? ?????? ???? ??????. ???? ?? ??????? **at-1/1/1.0**??? ????? ??, Junos OS? ???? ?? ???? ?? ???? ???? ??????.

```
count_tcp-at-1/1/1.0-i
```

- **Interface-specific output filter counter name-** ?? ??, ??????? ???? ???? ?? ?? ???? **count_udp** ? ?????? ? ?? ??????. ???? ???? ??????? **ge-2/2/2.2**???? ????? ??, Junos OS? ???? ?? ???? ?? ???? ???? ??????.

```
count_udp-ge-2/2/2.2-o
```

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[illegible]

T [illegible], M120, M320 [illegible] MX [illegible] Junos OS[illegible] *[illegible]* [illegible] count [illegible] policer [illegible].

[illegible] interface-specific [illegible].

> [illegible]: T [illegible], M120, M320 [illegible] MX [illegible].

[illegible] M120 [illegible] M320 [illegible] M [illegible]. M120 [illegible] M320 [illegible] M [illegible], [illegible].

[illegible]. [illegible].

> [illegible]: [illegible].

[illegible]

Junos OS[illegible] *[illegible]* [illegible]. [illegible]('-'), [illegible], [illegible] '', [illegible] '-i-o'[illegible].

- **Input filter instance name**—[illegible], [illegible] filter_s_tcp [illegible] at-1/1/1.0[illegible] Junos OS[illegible].

```
filter_s_tcp-at-1/1/1.0-i
```

- **Output filter instance name**—[illegible], [illegible] so-2/2/2.2[illegible] filter_s_tcp [illegible], Junos OS[illegible].

```
count_s_tcp-so-2/2/2.2-o
```

[illegible] Junos OS *[illegible]* [illegible].

> [illegible]: [illegible] *52[illegible]* [illegible]. [illegible] *64[illegible]* [illegible].

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count *counter-name* non-terminating ??? ???? ??????.

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? '-o'? ??????.

- **Interface-specific input filter counter name**- ?? ??, ??????? ??? ??? ?? ?? ??? count_tcp ? ?????? ??? ?
  ????. ??? ?? ??????? at-1/1/1.0??? ???? ??, Junos OS? ??? ?? ??? ?? ??? ??? ??????.

  ```
  count_tcp-at-1/1/1.0-i
  ```

- **Interface-specific output filter counter name**- ?? ??, ??????? ??? ??? ?? ?? ??? count_udp ? ?????? ???
  ?????. ??? ??? ??????? so-2/2/2.2??? ???? ??, Junos OS? ??? ?? ??? ?? ??? ??? ??????.

  ```
  count_udp-so-2/2/2.2-o
  ```

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?? ??? ?? ???? ?????? ??? ? ??????? ??? ??????. non-terminating ??? ???? ??? ?? ??? policer *policer-name*
??????? ???? ??????.

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??? */?/?/?/?* */?/* ?? ?????? ?? ??? ?? ??? ??? ??? ???? */?/?/* */?/* ??? ??? ? ????. ?????? ??? ??? ?? ??? ?? ??
??? ??? ??????? ??????. ?????? ??? ????????? ??? ??? ?? ??? ??? ??? ??????.

?: EX9200 ???? */?/?/?/?/* */?/?/* ???? ????. ?? ???? interface-set configuration ??? ??????.

?? ??????? ??? ??? ?? IPv4, IPv6, VPLS(Virtual Private LAN Service), CCC(Layer 2 Circuit Cross-Connection) ? ??? 2 ??? ???? ?? ????? ???? ??? ??? ???? ? ????. ??? ??? ??, IPv4 ?? IPv6 ???? ?? ?? ??? ???? ??? ??? ???? ? ????.

?: ??? ***?????? ???*** ?? ???? ???? ???? ????? ???? ?? ???? ???? ?? ????. ??? ??? "?????? ????? ??? ?? ???? ??" ??? 1297? ???????.

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??? ***?????? ???*** ?? ???? ???? ???? ????? ?? ??? ***???*** ***??*** ??? ??? ? ????. ?????? ??? ? ? ??? ??? ?? ??? ?????? ? ?? ?????? ?? ????? ???????. ????? ???, IPv4, IPv6, MPLS, VPLS ?? ??? ????? ?? ??? ???????? ???? ???? ??? ? ? ????.

?: ?? ?? ???? ???? ?? ?? ?? ???? ***?????? ???*** ?? ??? ???? ??? ????? ??? ?? ??? ??? ?? ????. ? ?? ??? "?????? ?? ????? ???? ?? ???? ??" ??? 1296? ???????.

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□□□□□□ □□□□□□□ □□□ □□□ T □□□, M120, M320 □ MX □□□ □□□□□□ □□□□□.

□ □□ □□□□ □□ □□□□ □□□□ □□□ □□□ □□□ □□□□ □□□□.

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□ □□□□ □□□ □□□□ □□ □□ □□ □□□ IP □□□□ □□ □□□ □□ □□□ □□□ □□□ □□□□□ □□□□ □□□□□□□ □□□□□□□ □□□ □□□ □□□□□.

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□□□□□□ □□□□□□□ □□□ □□□ filter_s_tcp □□□□ □□□□ 10.0.0.0/12 IP □□ □□ □□ □□□ □□ IP □□□□ □□ □□□ (□□ □□ □6)□□ □□□ □□□ □□□□□ □□□□□ tcp .

□□□ □□ □□□ count_s_tcp□ □□□ □□□.

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- at-1/1/1.0 □□
- so-2/2/2.2 □□

□ □ □□□□□□ □□□ □□□□ □□□ □ □□□□□ □□□□□. filter_s_tcp-at-1/1/1.0-i □ filter_s_tcp-so-2/2/2.2-o, □□.

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CLI ?? ??

? ?? ??? ?????? ?? ??? ??? ??? ???? ? ??? ??? ?? ??? ?? ??? CLI? ??????? [edit] .

```
set firewall family inet filter filter_s_tcp interface-specific
set firewall family inet filter filter_s_tcp term 1 from address 10.0.0.0/12
set firewall family inet filter filter_s_tcp term 1 from protocol tcp
set firewall family inet filter filter_s_tcp term 1 then count count_s_tcp
set firewall family inet filter filter_s_tcp term 1 then accept
set interfaces at-1/1/1 unit 0 family inet filter input filter_s_tcp
set interfaces so-2/2/2 unit 2 family inet filter filter_s_tcp
```

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??? ??

?????? ??? ?? ?? ??:

1. IPv4 ??? ??? filter_s_tcp????.

```
[edit]
user@host# edit firewall family inet filter filter_s_tcp
```

2. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter filter_s_tcp]
user@host# set interface-specific
```

3. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter filter_s_tcp]
user@host# set term 1 from address 10.0.0.0/12
user@host# set term 1 from protocol tcp
```

4. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter filter_s_tcp]
user@host# set term 1 then count count_s_tcp
user@host# set term 1 then accept
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] at-1/1/1.0 [illegible] filter_s_tcp [illegible] so-2/2/2.2[illegible] [illegible].

1. [illegible] [illegible] at-1/1/1.0[illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# set interfaces at-1/1/1 unit 0 family inet filter input filter_s_tcp
```

2. [illegible] [illegible] so-2/2/2.2[illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# set interfaces so-2/2/2 unit 2 family inet filter filter_s_tcp
```

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?? ???? ??????:

1. ?? ?? ??? ????? ??? ??? ??? show firewall ??? ??????. ?? ??? ??? ??? ????? ??? ? ??? ??? ??? ????? ??? ???????.

```
[edit]
user@host# show firewall
family inet {
    filter filter_s_tcp {
        interface-specific;
        term 1 {
            from {
                address {
                    10.0.0.0/12;
                }
                protocol tcp;
            }
            then {
                count count_s_tcp;
                accept;
            }
        }
    }
}
```

2. ?? ?? ??? ????? show interfaces ?????? ??? ??????. ?? ??? ??? ??? ????? ??? ? ??? ??? ??? ????? ??? ?? ????.

```
[edit]
user@host# show interfaces
at-1/1/1 {
    unit 0
        family inet {
            filter {
                input filter_s_tcp;
            }
        }
```

```
    ]
}
so-2/2/2 {
    unit 2
        family inet {
            filter {
                output filter_s_tcp;
            }
        }
    }
}
```

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] [illegible] clear firewall all [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host> clear firewall filter filter_s_tcp-at-1/1/1.0-i
user@host> clear firewall filter filter_s_tcp-so-2/2/2.2-o
```

2. [illegible] [illegible] [illegible] [illegible] [illegible].

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

[illegible] [illegible]

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- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1303
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1304

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□□

□□ extensive □□ □□□ show interfacesdetail □□□ □□□□□.

1. □□□ □ □□ at-1/1/1.0□□□ □□□□□□ □□□□□.

```
user@host> show interfaces at-1/1/1 detail
Physical interface: at-1/1/1, Enabled, Physical link is Up
  Interface index: 300, SNMP ifIndex: 194, Generation: 183

...
  Logical interface at-1/1/1.0 (Index 64) (SNMP ifIndex 204) (Generation 5)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-SNAP
...
    Protocol inet, MTU: 4470, Generation: 13, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Input Filters: filter_s_tcp-at-1/1/1.0-i,,,,,
```

2. □□□ □ □□ so-2/2/2.2□ □□□□□□ □□□□□.

```
user@host> show interfaces so-2/2/2 detail
Physical interface: so-2/2/2, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 502, Generation: 132

...
  Logical interface so-2/2/2.2 (Index 70) (SNMP ifIndex 536) (Generation 135)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP

...
    Protocol inet, MTU: 4470, Generation: 146, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Output Filters: filter_s_tcp-so-2/2/2.2-o,,,,,
```

[illegible]

[illegible]

[illegible] count_s_tcp [illegible].

[illegible]

show firewall [illegible].

```
user@host> show firewall filter filter_s_tcp
Filter: filter_s_tcp
Counters:
Name                                Bytes              Packets
count_s_tcp-at-1/1/1.0-i              420                    5
count_s_tcp-so-2/2/2.2-o             8888                  101
```

[illegible]

[illegible] | 1294

[illegible]: [illegible]

in this section

- [illegible] | 1305
- [illegible] | 1305
- [illegible] | 1306
- [illegible] | 1311

[illegible]. Junos OS[illegible]. [illegible]. [illegible].

?? ??

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- ??? ?????? ?? ??????? ?? ??? ?? ?????? ?? ??? ? ?? ??? ????? ??? ?? ???
- Junos OS ??? 7.4 ??

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? ????? ?????? ??? ????? ? ?? ??? ?? ??? ??????? ??????. ?? ? ?? ??? ??? ??? ??? ??????. ?? term1?, ??? ?? ?????? ????? ??? ??? ??? ????? ICMP ????? ??? ????? ??? ????????. ??? ??? ????? ??? ??????, ?????, ??????. ? ? term2? ??? ICMP ????? ??? ????? ??? ??????. ??? ??? ????? ?? ??? ??????, ?????, ??????. ?? term3? ??? ?? ?? ??? ??????.

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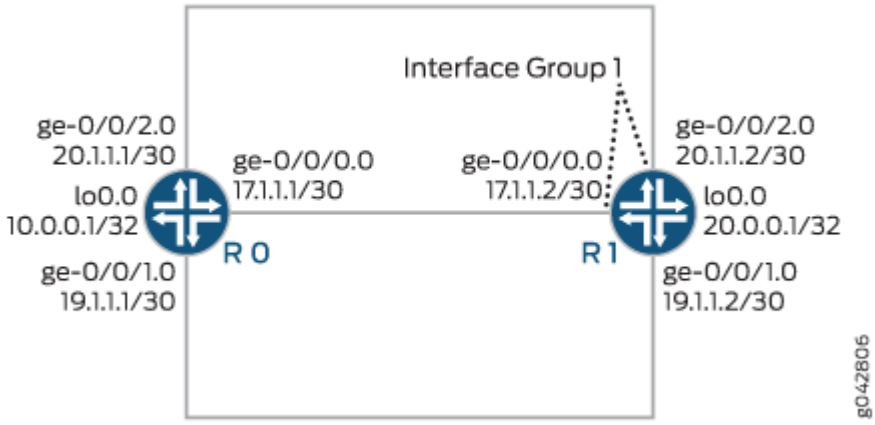
?? 60: ?????? ????? ?? ??? ??? ?? ??



CLI Quick Configuration(?? ???????)? ? ?? 60 ??? 1305?? ?????? ?? ????????? ??????. ??? ?? ?????? ????? R1? ??? ??????.

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- CLI ?? ?? | 1306
- ????? ???? ?? ??? ???? ?? ?? ? ?? | 1307
- ?? | 1309

CLI ?? ??

? ?? ???? ??????, ?? ???? ????? ???? ???? ?? ?? ?? ?? ????????? ????, ???? ???? ????? ? ???? ?? ???? ???? [edit] ? ? ????? ???? CLI? ???? ?? ?? ??, ?? ????? commit?(?) ??????.

???? R0

```
set interfaces ge-0/0/0 unit 0 family inet address 172.16.17.1/30
set interfaces ge-0/0/1 unit 0 family inet address 172.16.19.1/30
set interfaces ge-0/0/2 unit 0 family inet address 20.1.1.1/30
set interfaces lo0 unit 0 family inet address 10.0.0.1/32
```

???? R1

```
set firewall family inet filter filter_if_group term term1 from interface-group 1
set firewall family inet filter filter_if_group term term1 from protocol icmp
set firewall family inet filter filter_if_group term term1 then count if_group_counter1
set firewall family inet filter filter_if_group term term1 then log
set firewall family inet filter filter_if_group term term1 then reject
set firewall family inet filter filter_if_group term term2 from protocol icmp
set firewall family inet filter filter_if_group term term2 then count if_group_counter2
set firewall family inet filter filter_if_group term term2 then log
set firewall family inet filter filter_if_group term term2 then accept
set firewall family inet filter filter_if_group term term3 then count default
set interfaces ge-0/0/0 unit 0 family inet filter group 1
set interfaces ge-0/0/0 unit 0 family inet address 172.16.17.2/30
set interfaces ge-0/0/1 unit 0 family inet address 172.16.19.2/30
set interfaces ge-0/0/2 unit 0 family inet filter group 1
set interfaces ge-0/0/2 unit 0 family inet address 20.1.1.2/30
```

```
set interfaces lo0 unit 0 family inet address 20.0.0.1/32
set forwarding-options family inet filter input filter_if_group
```

□□□□□ □□□□ □□ □□□ □□□ □□ □□ □ □□

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□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□□ □□ □□□ CLI □□□ □□□□ □(□) □□□□□□"□□ □□□□ CLI □□□ □□" □□□ 1787.

□□□□□ □□□□ □□□ □□□ □□□ filter_if_group □□□□□ □□□ □□□□□.

1. □□□ □□□ □□□ filter_if_group□□□□□.

```
[edit firewall]
user@R1# edit family inet filter filter_if_group
```

2. □□□□□□ □□□□ □□□□□ □□ 1□ □ □□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R1# set ge-0/0/0 unit 0 family inet filter group 1
user@R1# set ge-0/0/0 unit 0 family inet address 172.16.17.2/30
user@R1# set ge 0/0/1 unit 0 family inet address 172.16.19.2/30
user@R1# set ge-0/0/2 unit 0 family inet filter group 1
user@R1# set ge-0/0/2 unit 0 family inet address 20.1.1.2/30
user@R1# set lo0 unit 0 family inet address 20.0.0.1/32
```

3. □□□□□ □□ 1 □ ICMP □□□□□□ □□□ □□□ □□□□□□ □□ term1 □ □□□□□.

```
[edit firewall]
user@R1# set family inet filter filter_if_group term term1 from interface-group 1
user@R1# set family inet filter filter_if_group term term1 from protocol icmp
```

4. □□□□ □□ □□□ □□□, □□ □ □□□□□ □□ term1 □ □□□□□.

```
[edit firewall]
user@R1# set family inet filter filter_if_group term term1 then count if_group_counter1
```

```
user@R1# set family inet filter filter_if_group term term1 then log
user@R1# set family inet filter filter_if_group term term1 then reject
```

5. ICMP [illegible] term2 [illegible].

```
[edit firewall]
user@R1# set family inet filter filter_if_group term term2 from protocol icmp
```

6. [illegible] term2 [illegible].

```
[edit firewall]
user@R1# set family inet filter filter_if_group term term2 then count if_group_counter2
user@R1# set family inet filter filter_if_group term term2 then log
user@R1# set family inet filter filter_if_group term term2 then accept
```

7. [illegible] term3 [illegible].

```
[edit firewall]
user@R1# set family inet filter filter_if_group term term3 then count default
```

8. [illegible].

```
[edit]
user@R1# set forwarding-options family inet filter input filter_if_group
```

9. [illegible].

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

□□

□□ □□□□ , show firewall□ show forwarding-options □□□ □□□□ show interfaces□□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □ □□ □ □□ □□□ □□□□ □□□ □□□□□□□.

```
[edit]
user@R1# show interfaces
ge-0/0/0 {
    unit 0 {
        family inet {
            filter {
                group 1;
            }
            address 172.16.17.2/30;
        }
    }
}
ge-0/0/1 {
    unit 0 {
        family inet {
            address 172.16.19.2/30;
        }
    }
}
ge-0/0/2 {
    unit 0 {
        family inet {
            filter {
                group 1;
            }
            address 20.1.1.2/30;
        }
    }
}
lo0 {
    unit 0 {
        family inet {
            address 20.0.0.1/32;
        }
```

```
    }
}
```

```
[edit]
user@R1# show firewall
family inet {
    filter filter_if_group {
        term term1 {
            from {
                interface-group 1;
                protocol icmp;
            }
            then {
                count if_group_counter1;
                log;
                reject;
            }
        }
        term term2 {
            from {
                protocol icmp;
            }
            then {
                count if_group_counter2;
                log;
                accept;
            }
        }
        term term3 {
            then count default;
        }
    }
}
```

```
[edit]
user@R1# show forwarding-options
family inet {
    filter {
        input filter_if_group;
```

```
    }
}
```

??

in this section

- ????? ?? ?? | 1311
- ??? ??? ?? ?? ?? | 1312

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??????? ????? ??????? ??????.

??

??????? ??? ?????? ?? ?? ??? show interfaces terse ?????.

???? R0

```
user@R0> show interfaces terse
Interface               Admin Link Proto    Local                 Remote
ge-0/0/0                up    up
ge-0/0/0.0              up    up   inet     172.16.17.1/30
                                  multiservice
ge-0/0/1                up    up
ge-0/0/1.0              up    up   inet     172.16.19.1/30
                                  multiservice
ge-0/0/2                up    up
ge-0/0/2.0              up    up   inet     20.1.1.1/30
                                  multiservice
lo0                     up    up
lo0.0                   up    up   inet     10.0.0.1            --> 0/0
```

???? R1

```
user@R1> show interfaces terse
Interface               Admin Link Proto    Local                 Remote
ge-0/0/0                up    up
ge-0/0/0.0              up    up   inet     172.16.17.2/30
                                  multiservice
...
ge-0/0/1                up    up
ge-0/0/1.0              up    up   inet     172.16.19.2/30
                                  multiservice
ge-0/0/2                up    up
ge-0/0/2.0              up    up   inet     20.1.1.2/30
                                  multiservice
...
```

??

???? R0 ? R1? ?? ??????? ?????? ????? ???? ?? ?????. ????? R1? ?????? ??? 1 ge-0/0/0.0 ? ge-0/0/2.0? ? ?? ???? ??????.

??? ???? ?? ?? ??

??

??? ?? ?? ???? ????? ??????? ??????.

??

- ??? ?? ????? ?????? ?? ?? ??? `show firewall filter filter_if_group` ??????.

```
user@R1> show firewall filter filter_if_group

Filter: filter_if_group
Counters:
Name                                                Bytes              Packets
default                                            192975                 3396
if_group_counter1                                    2520                   30
if_group_counter2                                    2604                   41
```

- [illegible] `show firewall log` [illegible].

```
user@R1> show firewall log
Log :
Time      Filter    Action Interface     Protocol        Src Addr
Dest Addr
22:27:33  pfe       A      lo0.0         ICMP            20.1.1.2
20.1.1.1
22:27:33  pfe       R      ge-0/0/2.0    ICMP            20.1.1.1
20.1.1.2
22:27:32  pfe       A      lo0.0         ICMP            20.1.1.2
20.1.1.1
22:27:32  pfe       R      ge-0/0/2.0    ICMP            20.1.1.1
20.1.1.2
22:27:31  pfe       A      lo0.0         ICMP            20.1.1.2
20.1.1.1
22:27:31  pfe       R      ge-0/0/2.0    ICMP            20.1.1.1
20.1.1.2
22:27:30  pfe       A      lo0.0         ICMP            20.1.1.2
20.1.1.1
22:27:30  pfe       R      ge-0/0/2.0    ICMP            20.1.1.1
20.1.1.2
22:27:29  pfe       A      lo0.0         ICMP            20.1.1.2
20.1.1.1
22:27:29  pfe       A      lo0.0         ICMP            20.1.1.2
20.1.1.1
22:27:29  pfe       R      ge-0/0/2.0    ICMP            20.1.1.1
20.1.1.2
22:27:21  pfe       A      ge-0/0/1.0    ICMP            172.16.19.1
172.16.19.2
22:27:20  pfe       A      ge-0/0/1.0    ICMP            172.16.19.1
172.16.19.2
22:27:19  pfe       A      ge-0/0/1.0    ICMP            172.16.19.1
172.16.19.2
22:27:18  pfe       A      ge-0/0/1.0    ICMP            172.16.19.1
172.16.19.2
22:27:04  pfe       A      lo0.0         ICMP            172.16.17.2
172.16.17.1
22:27:04  pfe       R      ge-0/0/0.0    ICMP            172.16.17.1
172.16.17.2
22:27:04  pfe       A      lo0.0         ICMP            172.16.17.2
172.16.17.1
```

```
22:27:04  pfe       R      ge-0/0/0.0    ICMP            172.16.17.1
172.16.17.2
22:27:02  pfe       A      lo0.0         ICMP            172.16.17.2
172.16.17.1
22:27:02  pfe       R      ge-0/0/0.0    ICMP            172.16.17.1
172.16.17.2
22:27:01  pfe       A      lo0.0         ICMP            172.16.17.2
172.16.17.1
22:27:01  pfe       R      ge-0/0/0.0    ICMP            172.16.17.1
172.16.17.2
22:27:00  pfe       A      lo0.0         ICMP            172.16.17.2
172.16.17.1
22:27:00  pfe       R      ge-0/0/0.0    ICMP            172.16.17.1
172.16.17.2
22:24:48  filter_if_group A fxp0.0       ICMP            10.92.16.2
10.92.26.176
```

- ??? ??? ???? R1? ????? ???? 1 ??????? ??? ???? R0? ping *<address>* CLI?? ?? ?? ??? ?????.

```
user@R0> ping 172.16.17.2
PING 172.16.17.2 (172.16.17.2): 56 data bytes
36 bytes from 172.16.17.2: Communication prohibited by filter
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f46b   0 0000  40  01 6239 172.16.17.1  172.16.17.2

36 bytes from 172.16.17.2: Communication prohibited by filter
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f479   0 0000  40  01 622b 172.16.17.1  172.16.17.2

36 bytes from 172.16.17.2: Communication prohibited by filter
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f487   0 0000  40  01 621d 172.16.17.1  172.16.17.2
```

```
user@R0> ping 20.1.1.2
PING 20.1.1.2 (20.1.1.2): 56 data bytes
36 bytes from 20.1.1.2: Communication prohibited by filter
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f5bd   0 0000  40  01 5ae7 20.1.1.1  20.1.1.2

36 bytes from 20.1.1.2: Communication prohibited by filter
```

```
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f5cd   0 0000  40  01 5ad7 20.1.1.1  20.1.1.2

36 bytes from 20.1.1.2: Communication prohibited by filter
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f5d9   0 0000  40  01 5acb 20.1.1.1  20.1.1.2

36 bytes from 20.1.1.2: Communication prohibited by filter
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 f5f6   0 0000  40  01 5aae 20.1.1.1  20.1.1.2
```

- [illegible] [illegible] [illegible] [illegible] 1[illegible] [illegible] [illegible] [illegible] [illegible] R0[illegible] CLI[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ping *<address>*.

```
user@R0> ping 172.16.19.2
PING 172.16.19.2 (172.16.19.2): 56 data bytes
64 bytes from 172.16.19.2: icmp_seq=0 ttl=64 time=8.689 ms
64 bytes from 172.16.19.2: icmp_seq=1 ttl=64 time=4.076 ms
64 bytes from 172.16.19.2: icmp_seq=2 ttl=64 time=8.501 ms
64 bytes from 172.16.19.2: icmp_seq=3 ttl=64 time=3.954 ms
...
```

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] 1[illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] term1 [illegible] [illegible] [illegible] [illegible] [illegible] 1 [illegible] [illegible] ICMP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible]. [illegible] term2 [illegible] [illegible] ICMP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible]. [illegible] term3 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

chapter label in part21

IP ??????? ?? ?? ???? ??

in this chapter

- IPv4 ????? ???? ?? ?? ???? ?? | 1316
- IPv4 ?????? ???? ?? ?? L2TP ???? ?? | 1318
- IPv4 ??????? ?? ?? ????? ????? ?????? | 1321
- IPv4 ??????? ?? ?? ????? ?? ?? | 1323
- ?: ?? ?? ????? ????? IPv4? ?? IPv6 ???? ?? | 1328

IPv4 ????? ???? ?? ?? ???? ??

in this section

- IPv4 ????? ???? ?? ?? ???? ?? | 1316
- IPv4 ??????? ?? ?? ????? ?? | 1317
- ??? ???? ??? ??? ? ?? ??????? ???? ??? | 1318

IPv4 ????? ???? ?? ?? ???? ??

?? ??? ??? GRE(Generic Routing Encapsulation)? ?? ????? ???? ?????? ?? ????? ???? ?????? ?????? ?? ??? ? ?? ?? ????? ?? ?????? ????? ?????. ???? ? ??????? ??? 3 ???? ??????? ????, ???? ?? ?? ????? ?? ?????? ????? ???? ?.

GRE ????? ?? *???? ??* ????? ??????. ?? ???? ????? ? ?? ?? ????? ???? ?? ?????. MX ??? ????? ?? ? ???? ???? ???? ??? ??????.

MX ??? 5G ????? ??? ????? ??, ???? ??? GRE ????? ??? ? ?? ???? ??? ?????? ??(PIC) ?? MPC3E MPC(Modular Port Concentrator)? ?? ??????? ???? ???? ?????. ?? MIC(Modular Interface Card) ?? MPC?

PFE? GRE ????? ???? ? ???? ???? ????? ?? ??????? ?? ????? ??????. ???? ? ?? MX ???? ????? ?????? ??(PE) ????? ????? ? ?? ???? ??????? ?? ??(CE) ????? ?? ???? ???? ? ?????.

PTX ??? ????? ??, ?? ?? GRE ????? ?????? ????? ????? ? `enhanced-mode` ????? ???. PTX? ?? ?? ????? ?? ??? ?? ? ? ??????? `tunnel-end-point` .

?? PE ????? ?? ???? ??

?? PE ?????? ???? GRE ???? ????? ?? ???? ??????. MIC ?? MPC ?? *???? ????????* ?? MX ???? ????? ?? ???? ???? ???? ??????. ???? ?? ???? ?? ???? ????? ????? ???? ????? ??????. ???? ??????? IPv4 ???? GRE ???? ????? ???? ???? ?? ?? GRE ???? ?? ?? ???? ??????.

?? PE ????? ?? ???? ??

?? PE ?????? ???? ?? ???? ???? ????? ?? ???? ???? ?? MIC ?? MPC ???? ??????? ???? ??????. ???? ???? GRE ????? ???? ???? ???? ??????. ???? ???? ?? GRE ???? ???? ?? ?? ????? ???? ?? ?? ?????? ?? ????? ??????. ???? ???? ???? ?? ???? ????? ??, ?? ???? ?? ???? ?? ?? ?? ????? ????? ??????.

IPv4 ??????? ?? ?? ????? ??

IPv4 ?????? ?? ?? ???? ???????. ?? ???? ????? ?? ??????? ????? ?????.

???? ????

?? ?? GRE ???? ?????? ?? ? ?? ??????? *??* (?? PE ????? ?? PE ???? ??)? ?? ???? ???? ??????. ?? PE ????? ?? ?? ?? ???? ???? ???? ??????. ?? PE ????? ?? ????? ???? ?? ???? ???? ??????.

???? ????

??? GRE ????? ?? ???? PE ???? ?? ???? ? ???? ?? ????? ? ?? ???? ????? ????.

?? ???? ?????

?? ?? GRE IPv4 ???? ?????? ?? ?????? ?? ???? ?????? ???? ? ?????. ?? ?? ???? ? ???? ?? ???? ???? ?? ?????? ? ?? ????? ???? ???????? ?? PFE?? ??????. ? ???? ?? ?? ???????? ????? GRE ????? ?? PFE ????? ?? ?????? ???? ? ???? ?. ???? ????? ???? ???? ?? ?? ?? ???? ? ?????.

PFE? ???? ??(RE) ???? ?? ????? ???? ???? ???? ????? ????? ?? ? ?? ?????? ?? ???? ????? ???? ????? ?? *???? ????* ?? ??????.

??? RE? *???? ????* ?? ????? ???? ??, ????? ?? ???? ????, ???? ????? ?????, ???? ?????? ?? ? ?? ?? ?? ?? ???? ????? ?. Junos OS ?????? ???? ????? ???? ????? ???? ???? ????? ???? ???? ????? ??????. ?? ?? ???? PFE? GRE ???? ? ???? ?? ?????? ???? ? ?? ???? ?????? ??????.

□□□ □□□□ □□□□ □□□□ □□□□ □ □□□□ □□□□ □□□□ □□□□□□□□□□ GRE □□□ □ □□□□ □□ □□□□ □□ □□□□ □□□□□ □□□□□.

□□ GRE □□□□ □□ □□□□□ □□

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14.2	Junos OS □□□ 14.2 □ □□ □□□□□ □□□ □□ □□□ □□□ L2TP □□□ □□ □□□□ □□□ □□□ □□□ 2 □□□□□ □□□ □□□□ □□ □□□.

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참: 참 참 GRE(Generic Routing Encapsulation) 참참참 참참참 참참참 참 enhanced-mode참참 참참참 PTX 참참 참참참 참참참. 참참 참참 enhanced-mode참 참참참참.

MX240, MX480, MX960, MX2010 참 MX2020 참참참 참참참

MX240, MX480, MX960, MX2010 참 MX2020 참참참 IPv4 참참참 참 *참참참 참참* 참참 참참 참참 참참참 참 참 참참 참참 참참 참 참참 참참참참 참참참.

- 참 참 참 참참 참참 참 MPC참 참참 참참참 MIC참 참.
- 4참 참 참참 참참 참 MIC참 참 참참 참 참 참 참 MPC참 16참 10참참참 참참 MPC(MPC-3D-16XGE-SFPP)참 참.

참참 참참 참참참참 참, Trio 참 참 참 참 참 참참참 *참참 참참참* 참참참 참참 참참참참 참참 참참 참참 참 참참 참 참참참 참참 참 참 참 참참 참참참.

MPC참 참 참참 참참 MX 참참 MPC 참 참 MX 참참 참참참 참참참 MPC참 참참참참. MIC참 참 참참 참참 MX 참참 MIC 참 참 MX 참참 참참참 참참참 MIC참 참참참참.

MX5, MX10, MX40 참 MX80 참참참 참참참

MX 참참 참참참 참참 참참(MX5, MX10, MX40 참 MX80 참참)참 IPv4 참참참 참 참참 참 참참 참 MIC참 참 참 참참 참참 참 참참 참참참 MIC참 참참 참참 참참 참참참 참 참 참참 참참참참 참참참.

- 참참(MX80) 참 참참(MX80-48T) 참참 참참참 MX80 참참참 4참 10참참참 참참 MIC참 참참참 참참참. 참참 참참참 MIC참 참 2참 참 참참 참참참. 참 참참참 2참 참 참참참 MIC 참 참 48참 참 참참 참참(10/100/1000Base-T) RJ-45 참참 참참참.
- MX40 참참참참 4참 참 10참참참 참참 MIC 참 참 참 2참 참참참참. 참참 MX80참 참참참 2참 참 참참참 MIC 참참 참참참 2참 참참 참 참 참 참참 MIC참 참참참.
- MX5 참 MX10 참참참 SFP참 참 참 참참참 20참 참참참 참참 MIC참 참 참참참 참참, 4참 참 10참참참 참참 MIC 참 참 참 참 참참 참참참 참참참. MX10참 참 참참참 참 참참참 MIC참 참참참 MX5참 참 참 참참참 MIC참 참참참.

참참 참참 MX5, MX10, MX40 참 MX80 참참 참참참 참 참참 참참참.

MX 참참 참참참 참참참 참참 참참참 참참, 참 참 참 참참 참참 참참 참참 참참참 *참참 참참*참참참. 참참 참참참 참 참 참참 참 참 참 참참참 참참 참 참 참 참 참참 참참, 참 참 참 참참참 참 참참 참참참.

IPv4 참참참참 참 참 참참참 참 CLI 참 참

IPv4 참참참참 참 참 참참참 참참참 참 참참참참 참참 참 참참 참 참참 참참 참참참 참참 참참참 참, 참참 참참참 참참참참 참참 참참참 참참참 syslog 참 참참참 참참.

IPv4 □□□□ □□□ □□ □□ □□□ □□ | 1316
IPv4 □□□□□□ □□ □□ □□□□ □□ □□ | 1323
□□□ □□ □□ □□ | 828
□□ □□□□□
□: □□ □□ □□□□ □□□□ IPv4□ □□ IPv6 □□□ □□ | 1328

IPv4 □□□□□□ □□ □□ □□□□ □□ □□

in this section

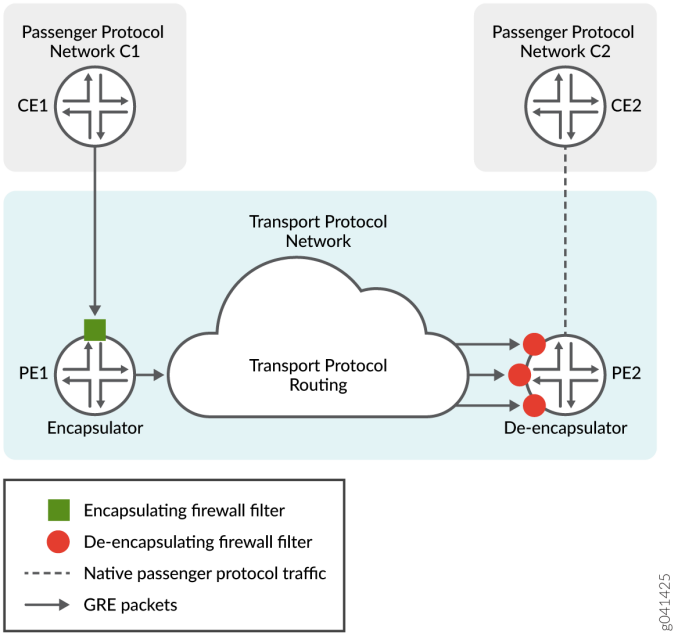
- IPv4 □□□□ □□□ □□ □□ □□□ □□□□ | 1323
- □□□□ □□□ □□□□ □□□ □□ | 1324
- □□ PE □□□□ □□ | 1325
- □□ PE □□□□ □□ | 1325
- IPv4 □□□□□□ □□ □□ □□□□ □□ GRE □□□□ □□ | 1326

IPv4 □□□□ □□□ □□ □□ □□□ □□□□

□: □□ □□ GRE(Generic Routing Encapsulation) □□□□ □□□□ □□□□ □ enhanced-mode□□□ □□□□ PTX □□□ □□□□□ □□□□□. □□□ □□□ enhanced-mode□ □□□□□□.

□□ 61 □□□ 1324 □(□) □□□ □□□□□ IPv4 □□□□□ □□ □□ □□□□ C2□ □□□□ □□ □□□□ C1□□ □□ □□□□ □□□ □□□ □□□□□.

□□ 61: IPv4 □□□□□ □□ □□□ □□ □□ □□



□ □□□□ □□□ C1□ C2□ □□ □□□ □□□ □□ □□□ □□□□□□□. IPv4 □□ □□□□□ □□□ □□□ □□□□ □□ □□□□□ □□ PE1□□ PE2□ □□ □□□ GRE(Generic Routing Encapsulation) □□□ □□□□□. PE1□□ PE2□□ GRE □□□ IPv4 □□ □□□□□ □□ C1□□ C2□□□ □□□ □□□ □□□□□.

□□□ □□ GRE □□ □□□

PE2□ PE1□□ □□□□ □ □□ □□ □□□□ □□□ □□ □□□□. PE1□□ PE2□□ □□□ □□□ □□□ □□□□ □□□□ □□□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□□□□ □□ □□□ □ □□□□.

PE2□□ C2□ □□ □□□□ □□ □□□

□□□□□ PE2□ □□ □□□ □□□□□ □□□ □□□□□ □□(□□ □□)□ □□□□ □□□ □□□□□. □□□□, □□□ □□ □□□ □□ □□ □□□ □□ □□□ □□□ □ □□□□ □□□□ □□□ □□ □□ □□□□□ □□□□□ □□□ □ □□□□. C2□ □□□ □□ □□□ □□□ □□□□□□ □□ □□□ □□□□ □□□ □□ RIB(Routing Information Base) □□ □□□ □□□□ □□ □□□ □□ □□□ □□□□□. RIB □□□ □□ □□□ □□□□ □□□ □□(□□□□ □□□ □ □, □□□ □□□ □□□□ □□ □□□□ □□ □□ □□, □□□ □□□ □□ □□)□ □□□ □□□□□.

□□□□ □□□ □□□□ □□□ □□

IPv4 □□□□□ □□ □□ □□ □□□□□ □□□□ □□ □□□□□ □□□ □□ □□□ □□□□□.

passenger protocol GRE ??? ??? ??????? ???? ???? ??(IPv4, IPv6 ?? MPLS)???. ?? ????? ?? ????? ????? ??? *?????* *?????*.

encapsulation protocol ?? GRE ??? ?? ????? ?? ???? ????? ?? ??? ? ??? ?? ???? ??? ????? ? ???? GRE(??? ? ?? ????) ?????.

transport protocol GRE ??? ?? ?? ???? ??? ????? ??????? ???? ???? ??(IPv4)???. ?? ????? *??* *?????*???? ???.

?? PE ???? ??

IPv4 ????? ?? ?? ?? ????? ?? PE ???? ??? ?? ??? ?????.

encapsulator ?? ???? ?? ??????? ??? ????, ? ????? GRE(Encapsulation Protocol) ??? ?? ????(IPv4) ??? ????, ?? GRE ??? GRE ??? ???? PE ???????. ? ?? ??? *??* *??*??? ???.

encapsulating interface ??????? ??? *???* *??????*?? MIC ?? MPC?? ????? ?? ?? ??????? ??? ??????? ??? ??????. ??? ??????? CE ????? ?? ???? ??? ??????. ??? ??? "IPv4 ??????? ?? ?? ???? ???? ???? ??" ??? 1321 ???????.

encapsulation filter ??? ????, ??? ??????? ??? ???? *???* *??*. ??? ?? ??? ?? ?? ??? ??? ?? ???? ??? ???? ? ??? ??? ????? ?? GRE ??? ????? ???.

tunnel source interface ??? ???? ?? ??? ?? ?? ?? ??????? ??? ??????.

tunnel template ??? ???? ??? ??? ???? ??? CLI ??:

- ?? ???? ???(IPv4).
- ??? ??? ?? ?? ?? *??*??????? IP ?? ?? ?? ??????.
- ??? ???(?? PE ???)?? ??? ??? *??* ??????? IP ?? ?? ?? ??????.
- ??? ????(GRE).

?? PE ???? ??

IPv4 ???? ??? ?? ?? ????? ?? PE ???? ??? ?? ??? ?????.

de-encapsulator ?? ?? GRE ??? ?? ???? GRE ??? ????, ?? ???? ??? GRE ??? ????, ?? ???? ???? ??? ? ? ???? CE ???? ???? PE ???. ??? ?? ??? *???* *??* *??* *??????* ?? *??* *??*??? ??? ????.

de-encapsulating interfaces

□□□ □□□□ GRE □□□□ GRE □□□ □□□ □ □□ □□ □□ □□ □□□□□□□ □□□ □□ □□□ □□ □□□□□ □□ □□ □□□ □□□□□. □□ □□□ □□□□□□ MIC □□ MPC□□ □□□□□□□ □□□. □□□ □□□ "IPv4 □□□□□□ □□ □□ □□□□ □ □□□ □□□□□□□" □□□ 1321 □□□□□□.

de-encapsulation filter

□□□ □□□□□ □□ □□ □□□ □□□□ GRE □□□ □□□ □□□ □□ □□ □□ □□□□ □□□ □□ □□□□ CE □□□□ □□□□ □ □□ □□□ □□□□□.

□□ GRE □□□ □□ □□□□ GRE □□□ □□□ □□ □□□ □□ □□ □□ □□□□□□ □□□ □□ □□□ □□□ □ □□□□. □□□ □□□ □□□ □□ □□□ □□□ □□ □□ □□ □□□□□□ □□□ □□□ □□ □□□ □□□ □□□□ □□□.

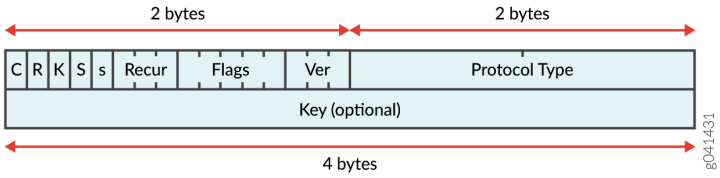
IPv4 □□□□□□ □□ □□ □□□□ □□ GRE □□□□ □□

IPv4 □□□□ □□□ □□ □□ □□□□□ □□□ □□□□□□ *RFC 1701 □□ □□□□*□□ □□□ □□ □□□□□□ *RFC 1701 □□ □□□□□□*. □ □□□□ □□□ □□ □□□ □□□ 1994□ 10□ □□ RFC 1701, *GRE(Generic Routing Encapsulation)*□ □□ □□ RFC 2784, *GRE(Generic Routing Encapsulation),* 2000□ 3□□ □□□□ GRE □□ □□□ □□□□□.

□□ □□□ □□

□□ □□ □□□□ □□ □□ □□□□ □□□ □□ □□ □□□□□□. IPv4 □□□□□□□ □□ □□ □□□□ □□ □□ 20□□□□ IPv4 □□□ □□□□ 24□□□ □□ 28□□□□ □□□□□ □□□□□. □□ 62 □□□ 1326 □(□) GRE □□□ IPv4 □□□ □□□ □□ □□□□ □□(GRE □□□□)□ □□□ □□□□□.

□□ 62: IPv4 □□□□□□ □□ □□ □□□□ □□ □□□ □□

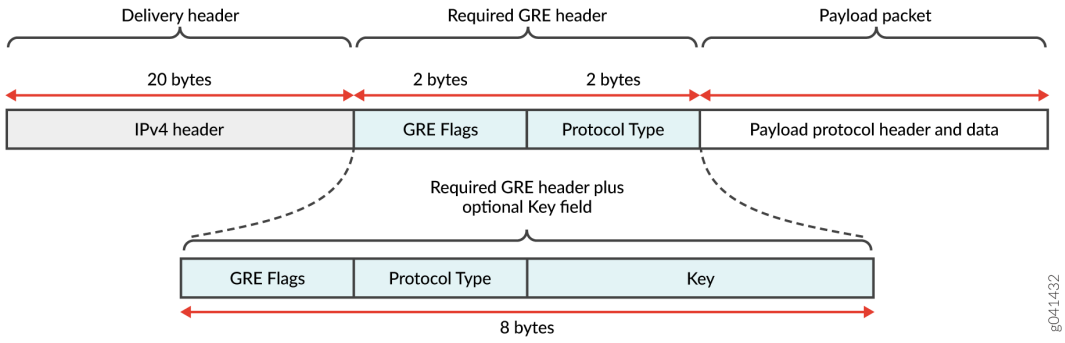


RFC 1701□ □□□ □□ □□, 5□□ GRE □□□ □□□ □□ GRE □□□ □□□ □□(□□□, □□□, □, □□□ □□ □ □□□)□ □□□□ □□□ □□□ □□ □□□. 5□□ □□□ □□ □ □□ □□ GRE IPv4 □□□□ □ □□□ □□□□□.

GRE □□ □□

□□ 63 □□□ 1327 □□□ IPv4 □□□□□□ □□ □□ □□□□ □□□□ □□ □□ GRE □□□ □□□ □□ □□, □□ 0□ □□□ □□□□ □□ 15□ □□□ □□□□□.

?? 63: IPv4 ??????? ?? ?? ????? ?? GRE ?? ??



?? ? ???? ? ???? ?? GRE ????? ??????? ? 80 ??? 1327.

2-?? ????? ?? ????? IPv4 ?????? ?? EtherType ?? ????? ?? 0x0800 ?? ??????.

4-?? ? ???? ? ?? ???? 1? ???? ????? ??????. Key ???? ???? ???? ???? ???? ? ?? ??????. GRE ?? ????? ?? ????? ?? ? ?? ??????? ?? ?? ???? Key Present ???? ????? GRE ???? Key? ??????.

? 80: IPv4 ??????? ?? ?? ????? ?? GRE ???? ?

?? ???? ? ?? ??		?? ?? GRE ????? ?? ?? ?	
0	**C**= ???? ??	**0**	???? ???? ????? ?????.
1	**R**= ???? ??	**0**	???(Offset) ? ???(Routing) ???? ????? ?????.
2	**K**= ? ??	**0** ?? **1**	???? ?? ?? **1** ? ???? ?? ? ??????**0**.
3	**S**= ???? ?? ??	**0**	???? ?? ???? ????? ?????.
4	**s**= ???? ?? ??	**0**	?? ???? ???? ???? ?? ???? ?????.
5 - 7	**Recur**= ?? ?? ??	**000**	?? ????? ????? ?????.
8 - 12	**Flags**= ???? ??	**0000** **0**	??.

□ 80: IPv4 □□□□□□□ □□ □□ □□□□ □□ GRE □□□ □ *(Continued)*

□□ □□□ □ □□ □□		□□ □□ GRE □□□□ □□ □□ □	
13 - 15	**Ver**= □□ □□	**000**	□□.

□□ □□ □□□ □ □□□ GRE IPv4 □□□ □□ □□□□ □□□ □ □□□□□ GRE □□□ □□ □ □□□ 0x0000□ □□□□□. □□ □□ □□□ □□ □□□ □ □□ GRE IPv4 □□□ □□ □□□□ □□□ □ □□□□□ GRE □□□ □□ □ □□□ 0x2000□ □□□□□.

□□ □□

IPv4 □□□□ □□□ □□ □□ □□□ □□ | **1316**

IPv4 □□□□□□ □□ □□ □□□□ □□□□ □□□□□ | **1321**

□□□ □□ □□ □□ | **828**

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□: □□ □□ □□□□ □□□□ IPv4□ □□ IPv6 □□□ □□ | **1328**

□: □□ □□ □□□□ □□□□ IPv4□ □□ IPv6 □□□ □□

in this section

- □□ □□ | **1329**
- □□ | **1330**
- □□ | **1333**
- □□ | **1343**

□ □□ IPv4 □□ □□□□□ □□ IPv6 □□□□□ □□ □□□□ □□□□ □□ □□□ GRE(Generic Routing Encapsulation) □□□ □□□□ □ □□ □□□□□. □□□ IPv6 □□□□ 2□□ □□□□ □□□ □□□□ □□ IPv4 □ IPv6 □□□ □□ □□□□ □□□ □ □□ □□□□□□ MX □□□ 5G □□ □□ □□□ □□□ 2□□ □□□□□. □ □□□□□ □□ □□□ □□□ □□□□□ □□(PIC) □□ MPC3E MPC(Modular Port Concentrator)□ □□ □□□□□□ □□□ □□□ □□□□. □□ 2□□ MX □□□ □□□□ MIC(Modular Interface Card) □□ MPC□□ □□□□□ □□□ □□□ □ □□□□□ □□□ □□□ □□□□□.

?: ?? ?? GRE ????? ????? ????? ? ???? ????? PTX ??? ?????? enhanced-mode?????. ???? ??? enhanced-mode? ???????.

?? ??

? ????? ???? ?? ???? ????? ????? ? Junos OS ??????? ??????.

- ?? ????? - Junos OS ??? 12.3R2 ??? ????? IPv4 ?????.
- PE ???—?????? ??(PE) ????? ??? MX80 ??? 2?? IPv4 ?????? ? ??????? ?? ??????? ???? ???? ???? ? ?? ??? IPv6 ?????? ??????.
- ??? ??????—????(?? PE ???)?? ?? 10????? ??? MIC? ???? ???? ???? ???? ??????.
- ??? ?? ?????? - ??? ???(?? PE ???)?? ?? 10????? ??? MIC? 3? ???? ???? ???? ???? ??????.

? ???? ????? ?? ???? ??????.

1. ? PE ?????? ?? ?? ???? ????? **show chassis fpc pic-status** ?? ?? GRE IPv4 ????? ????? ???? ?? ???? ???? ?? ?? ?? ????? `interfaces` ???? ? ???? ?? ??????? ??????.
   - ??? ???? PE1?? ????? ?? ???? */???/ /???/ /???????/*??????.
   - ??? ????? PE2?? ????? ?? ???? *3/?/ /???/ /?/ /???????/*??????.
2. ??? ????? ??? ?????? ??? ???? ????? ?? ????? ??? ?? IPv4 ??? ?????? ?????? ???? ??????.

   ??? ????? ?? ???? ????? ?????? ?? ?? ?? ?? ?? ?????? ????? ???? ???? ??????. ???? ???? ?? ? ???? ????? ???? ? ??? ???????.
3. PE1?? PE2 IPv4 ???? ???? *ping* ?? ???? ??????? ???? ????? ???? ? ???? ??????.
4. PE2?? CE2 ??? IPv6 ???? ???? *ping* ?? ???? ?????? ?? ?? ?? ????? ???? ? ???? ??????.

   PE2?? CE2?? IPv6 ???? ???? ???? ????? ????? ???? ?? ?? ?? ?? ?? ?? ?? ?? ?????? ?? ???? ? ?????.
   - ?????? PE2? ?? ???? ?????? ???? ?????? ??(?? ??)? ????? ???? ??????.
   - ?????, ???? ?? ???? ?? ?? ???? ?? ???? ????? ????? ????? ???? ?? ?? ?????? ?????? ???? ? ?????. ? ?? ???? ? ? ?????? ???? ?????? **blue**PE2?? C1?? ?? ???? ????? ?? ???? ????? ??????. RIB(Routing Information Base) ??? **blue_group** ????? ? **inet6.0** ?? ???? ? **blue.inet6.0**?????? ???? ?? PE2 ??????? ?? ???? ???? ? ???? ???? ???? ???? ??????.

??

in this section

- ???? | 1330

? ????? ??? PE1?? ??? PE2? ??? ?? ?? GRE IPv4 ??? ???? IPv6 ???? C1?? IPv6 ???? C2? ??? ??? ????? ?.

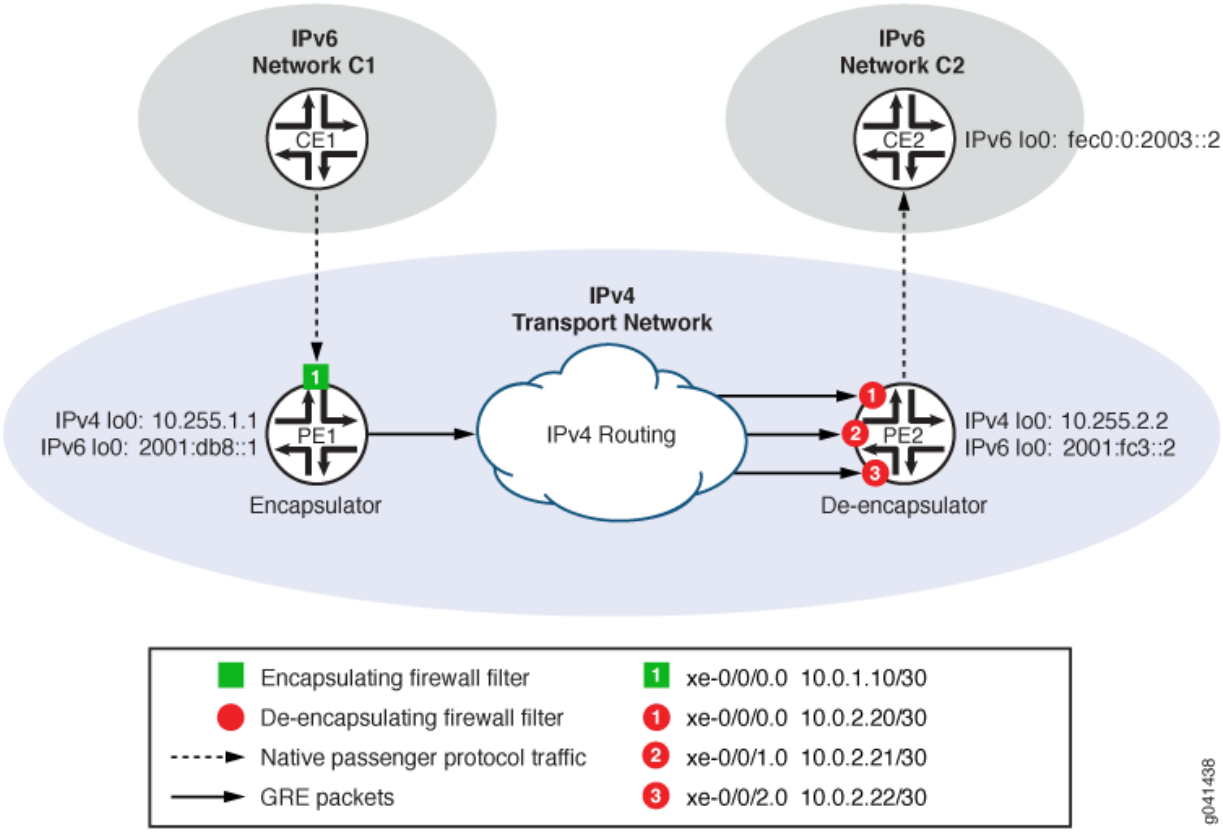
?: *????* ?? GRE ????? ?????? ?????? ? ?? ??? ????? ???.

? ?? ??? ?????, ?? ??? ????? ??? ??(????? ??? ??, ???? ??? ????? ??? ????? ??? ?? ??, ??? ??? ?? ??)? ??? ? ??? RIB ??? ??? ? ?????.

????

?? 64 ??? 1331 ?(?) ?? ?????? ?? PE1?? PE2? ?? ?? ?? ??? ????? IPv4 ?? ?????? ?? ????? C1?? ???? C2? ??? IPv6 ????? ??? ??????.

□□ 64: IPv4 □□□□□□ PE1□□ PE2□□ □□ □□ □□



□ 81 □□□ 1331 □(□) □□□ □□□□□ □□□ PE1□ □□□ □□□□□. □ 82 □□□ 1332 □(□) □□□ □□□□□ □□□ PE2□ □□□ □□□□□.

□ 81: PE1□ □□□ □□ □□ □□

□□ □□	CLI □□		□□
□□□ □□	□□ □□: IPv4 □□□: IPv6 □□□:	PE1 10.255.1.1 2001:db8::1	□□ PE □□□□ □□□ MX80 □□□. PE1□ IPv4 □□□□, □□ □□ □□□ CE1□ IPv6 □□ □□□□ C1□ □□□□□.
□□□ □□□□□	□□□□□ □□: IPv4 □□: IPv6 □□:	xe-0/0/0.0 10.0.1.10/30 ::10.34.1.10/120	10□□□□ □□□ MIC□□ □□□□□ □□ □□ □□□ □□□□□. CE1□ □ □ □□□ □□□□□ □□□□ IPv6 □□ □□□□ C2□ □□□□□□ □□ □□□ □ □□□ □ □□□□□ IPv6 □□□□ □□□□□.

□ 81: PE1□ □□□ □□ □□ □□ *(Continued)*

□□ □□	CLI □□		□□
□□□ □□	□□ □□:	gre_encap_1	IPv6 □□□ □□□, □ □□□□ □□ □□ □□ □□□ □□□ □□ □□□ □□□□ □□□□ □□□ □□□□□□. □□□□ GRE □□□ □□□□, IPv4 □□ □□□ □□□ □□, GRE IPv4 □□□ □□ □□ GRE □□□ □□□□ □□□ □□□ □□.
□□ □□ □□□□□	□□□□□ □□: IPv4 □□:	xe-0/0/2.0 10.0.1.12	□□□ □□ □□ □□ □□ □□□□□.
GRE □□ □□□	□□ □□:	tunnel_1	IPv4()□□ □□□□ □□□ □□□□□ □□□□ □□□ PE1(10.255.1.1) □□ □□□ PE2(10.255.2.2)□□ GRE IPv4gre □□□ □□□□□.

□ 82: PE2□ □□□ □□ □□ □□

□□ □□	CLI □□		□□
□□□ □□	□□ □□: IPv4 □□□: IPv6 □□□:	PE2 10.255.2.2 2001:fc3::2	MX80 □□□□ GRE IPv4 □□□ □□ □□ □□□ PE1□□ □□□ GRE □□□ □□□□ □□ □□ PE □□□□ □□□□□.
□□□ □□ □□□□□	□□□□□ □□: IPv4 □□: □□□□□ □□: IPv4 □□: □□□□□ □□: IPv4 □□:	xe-0/0/0.0 10.0.2.24/30 xe-0/0/1.0 10.0.2.21/30 xe-0/0/2.0 10.0.2.22/30	10□□□□ □□□ MIC□□ □□□□□ □□ □□ □□ □□□ □□□□□. □□□□ □□ PE1□□ GRE IPv4 □□□ □□ □□□□ GRE □□□ □□□□□.
□□□ □□ □□	□□ □□:	gre_decap_1	GRE □□□ **decapsulate** □□□ □□□□ IPv4 □□□ □□□□□. □□ □ □□ □□ □□ □□□ □□□□ □□□ □□□□ □□□□□ □□□. □□□ □□□ □□ GRE □□□ □□□ □□ □□ □□□ □□□□□ □□ □□□ □□ □□ □□ IPv6 □□□□ □□□ □□ IPv6 □□□□□ □□ □□□□ □□□□ □□ □ □□□□□.

□ 82: PE2□ □□□ □□ □□ □□ *(Continued)*

□□ □□	CLI □□		□□
□□ □□ □□□□□	□□□□□ □□: IPv4 □□: IPv6 □□:	xe-0/0/3.0 10.0.2.23/30 ::20.34.2.23/120	□□□□ □□□ □□□ IPv6 □□□ □□ IPv6 □□□□ C2□ □□□□ □□ □□ □□□□□.

□□

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- CLI □□ □□ | **1333**
- IPv6 □□□ □□□□□□ PE1 □□ | **1334**
- GRE □□□ □□□ □□□ □□ PE2 □□ | **1337**
- □□□: □□ □□□ □□□□ PE2 □□ | **1341**

□□ □□□□□□ □□□□ □□ PE1□□ PE2□ □□ □□ □□□ □□□□ IPv4 □□ □□□□□ □□ CE1□□ CE2□ IPv6 □□□ □□□□□ □□ □□□ □ □□□□.

CLI □□ □□

□ □□ □□□ □□□□□, □□ □□□ □□□□ □□□ □□□ □□ □□ □□ □□ □□□□□□□□ □□□□, □□□□ □□□ □□□□ □ □□□ □□ □□□ □□□ [edit] □ □ □□□□ □□□ CLI□ □□□ □□ □□□□.

IPv6 □□□ □□□□□□ PE1 □□

```
set interfaces lo0 unit 0 family inet address 10.255.1.1
set interfaces lo0 unit 0 family inet6 address 2001:db8::1
set interfaces xe-0/0/0 unit 0 family inet address 10.0.1.10/30
set interfaces xe-0/0/0 unit 0 family inet6 address 2001::10.34.1.10/120
set interfaces xe-0/0/0 unit 0 family inet6 filter input gre_encap_1
set interfaces xe-0/0/2 unit 0 family inet address 10.0.1.12/30
set firewall family inet6 filter gre_encap_1 term t1 then count c_gre_encap_1
set firewall family inet6 filter gre_encap_1 term t1 then encapsulate tunnel_1
set firewall tunnel-end-point tunnel_1 ipv4 source-address 10.255.1.1
```

```
set firewall tunnel-end-point tunnel_1 ipv4 destination-address 10.255.2.2
set firewall tunnel-end-point tunnel_1 gre
```

GRE ??? ??? ??? ?? PE2 ??

```
set interfaces lo0 unit 0 family inet address 10.255.2.2
set interfaces lo0 unit 0 family inet6 address 2001:fc3::2
set interfaces xe-0/0/0 unit 0 family inet address 10.0.2.20/30
set interfaces xe-0/0/1 unit 0 family inet address 10.0.2.21/30
set interfaces xe-0/0/2 unit 0 family inet address 10.0.2.22/30
set interfaces xe-0/0/3 unit 0 family inet address 10.0.2.23/30
set interfaces xe-0/0/3 unit 0 family inet6 address ::20.34.2.23/120
set forwarding-options family inet filter input gre_decap_1
set firewall family inet filter gre_decap_1 term t1 from source-address 10.255.1.1/32
set firewall family inet filter gre_decap_1 term t1 from destination-address 10.255.2.2/32
set firewall family inet filter gre_decap_1 term t1 then count c_gre_decap_1
set firewall family inet filter gre_decap_1 term t1 then decapsulate gre
```

???: ?? ??? ???? PE2 ??

```
set routing-instances blue instance-type forwarding
set routing-instances blue routing-options rib blue.inet6.0 static route 0::/0 next-hop
fec0:0:2003::2
set routing-options passive
set routing-options rib inet6.0
set routing-options rib-groups blue_group import-rib inet6.0
set routing-options rib-groups blue_group import-rib blue.inet6.0
set routing-options interface-routes rib-group inet6 blue_group
set firewall family inet filter gre_decap_1 term t1 then decapsulate gre routing-instance blue
```

IPv6 ??? ??????? PE1 ??

??? ??

CE1?? ???? IPv6 ??? ??????? ??? PE1? ?????:

1. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE1# set interfaces lo0 unit 0 family inet address 10.255.1.1
user@PE1# set interfaces lo0 unit 0 family inet6 address 2001:db8::1
```

2. [illegible] [illegible] IPv4 [illegible] IPv6 [illegible] [illegible] [illegible] [illegible] IPv6 [illegible] [illegible].

```
[edit]
user@PE1# set interfaces xe-0/0/0 unit 0 family inet address 10.0.1.10/30
user@PE1# set interfaces xe-0/0/0 unit 0 family inet6 address ::10.34.1.10/120
user@PE1# set interfaces xe-0/0/0 unit 0 family inet6 filter input gre_encap_1
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE2# set interfaces xe-0/0/2 unit 0 family inet address 10.0.1.12/30
```

4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] IPv6 [illegible] [illegible] [illegible].

```
[edit]
user@PE1# set firewall family inet6 filter gre_encap_1 term t1 then count c_gre_encap_1
user@PE1# set firewall family inet6 filter gre_encap_1 term t1 then encapsulate tunnel_1
```

[illegible]: [illegible] [illegible] [illegible] **encapsulate***[illegible]* [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

5. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] IP [illegible] [illegible] tunnel_1[illegible] GRE IPv4 [illegible] [illegible] [illegible].

```
[edit]
user@PE1# set firewall tunnel-end-point tunnel_1 ipv4 source-address 10.255.1.1
user@PE1# set firewall tunnel-end-point tunnel_1 ipv4 destination-address 10.255.2.2
user@PE1# set firewall tunnel-end-point tunnel_1 gre
```

□: GRE □□□ **key *number*** □□□□ □ □□□ □□□□ □□□□ □□ 10.0.1.10(PE1□ □□ □□ □□□□□)□□ 10.0.2.20 – 10.0.2.22(PE2□ □□□ □□ □□□□□)□□ □□ □□ □□ □□□□ □□□□ □ □□□□.

6. □□□□ □□□ □□□□ □□ □□□ □□□□□.

```
[edit ]
user@PE1# commit
```

□□

□□ □□□□ show firewall □ show interfaces □□□ □□□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□ □□□□□.

□□□ PE1

□□□ □□□□ □□□ □□ □ □□ □□□□ □□□□□.

```
user@PE2# show firewall
family inet6 {
    filter gre_encap_1 {
        term t1 {
            then {
                count c_gre_encap_1;
                encapsulate tunnel_1;
            }
        }
    }
}
tunnel-end-point tunnel_1 {
    ipv4 {
        source-address 10.255.1.1;
        destination-address 10.255.2.2;
    }
    gre;
}
```

□□□ PE1

□□□ □□□□ □□□□□□ □□□□□.

```
user@PE1# show interfaces
lo0 {
    unit 0 {
        family inet {
            address 10.255.1.1;
        }
        family inet6 {
            address 2001:db8::1;
        }
    }
}
xe-0/0/0 {
    unit 0 {
        family inet {
            address 10.0.1.10/30;
        }
        family inet6 {
            address ::10.34.1.10/120;
            filter input gre_encap_1;
        }
    }
}
xe-0/0/2 {
    unit 0 {
        family inet {
            address 10.0.1.12/30;
        }
    }
}
```

GRE □□□ □□□ □□□ □□ PE2 □□

□□□ □□

IPv4 □□□□ □□□□ GRE □□□ □□□□ □□□□□ □□□ PE2□ □□□□□:

1. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE2# set interfaces lo0 unit 0 family inet address 10.255.2.2
user@PE2# set interfaces lo0 unit 0 family inet6 address 2001:fc3::2
```

2. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE2# set interfaces xe-0/0/0 unit 0 family inet address 10.0.2.20/30
user@PE2# set interfaces xe-0/0/1 unit 0 family inet address 10.0.2.21/30
user@PE2# set interfaces xe-0/0/2 unit 0 family inet address 10.0.2.22/30
```

3. CE2[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE2# set interfaces xe-0/0/3 unit 0 family inet address 10.0.2.23/30
user@PE2# set interfaces xe-0/0/3 unit 0 family inet6 address ::20.34.2.23/120
```

4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE2# set forwarding-options family inet filter input gre_decap_1
```

5. IPv4 [illegible] **gre_decap_1**[illegible].

   [illegible] [illegible] [illegible] GRE [illegible] [illegible] IPv4 [illegible] [illegible].

```
[edit]
user@PE2# set firewall family inet filter gre_decap_1
```

6. [illegible] PE1[illegible] [illegible] [illegible] **tunnel_1** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] **t1** [illegible] [illegible]. [illegible] [illegible] PE1(IPv4 [illegible] [illegible] 10.255.1.1[illegible] [illegible])[illegible] [illegible] PE2(IPv4 [illegible] [illegible] 10.255.2.2[illegible] [illegible])[illegible] [illegible] [illegible].

```
[edit firewall family inet filter gre_decap_1]
user@PE2# set term t1 from source-address 10.255.1.1
user@PE2# set  term t1 from destination-address 10.255.2.2
```

7. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] **t1** [illegible] [illegible].

```
[edit firewall family inet filter gre_decap_1]
user@PE2# set term t1 then count c_gre_decap_1
user@PE2# set term t1 then decapsulate gre
```

[illegible] [illegible] [illegible] [illegible] **decapsulate** [illegible] [illegible] [illegible] **blue** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] RIB [illegible] **blue_group** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

8. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@PE2# commit
```

[illegible]

[illegible] [illegible] `show firewall`, `show forwarding-options` [illegible] `show interfaces` [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] PE2

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@PE2# show firewall
family inet {
    filter gre_decap_1 {
        term t1 {
            from {
                source-address 10.255.1.1;
                destination-address 10.255.2.2;
            }
            then {
                count c_gre_decap_1;
                decapsulate gre routing-instance blue;
            }
        }
    }
}
```

□: □□□ □□ □□ □□□ **decapsulate** □□□ □□□□□ □□ **blue** □□ □□ □□□ □□□□□ □□□□ □□ RIB □□□ **blue_group** □□ □□□□ □□ □□ □□□ □□□□□ □□□□□.

□□□ PE2

□□□ □□□□□ □□ □□(□□□ □□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □□)□ □□□□□.

```
user@PE2# show forwarding-options
forwarding-options {
    family inet {
        filter {
            input gre_decap_1;
        }
    }
}
```

□□□ PE2

□□□ □□□□□ □□□□□□ □□□□□.

```
user@PE2# show interfaces
lo0 {
    unit 0 {
        family inet {
            address 10.255.2.2;
        }
        family inet6 {
            address 2001:fc3::2;
        }
    }
}
xe-0/0/0 {
    unit 0 {
        family inet {
            address 10.0.2.20/30;
            filter input gre_decap_1;
        }
    }
}
xe-0/0/1 {
```

```
    unit 0 {
        family inet {
            address 10.0.2.21/30;
            filter input gre_decap_1;
        }
    }
}
xe-0/0/2 {
    unit 0 {
        family inet {
            address 10.0.2.22/30;
            filter input gre_decap_1;
        }
    }
}
xe-0/0/3 {
    unit 0 {
        family inet {
            address 10.0.2.23/30;
        }
        family inet6 {
            address ::20.34.2.23/120;
        }
    }
}
```

???: ?? ??? ???? PE2 ??

??? ??

?? ??? ???? ??? PE2? ????? ??? ?????.

1. ??? ?????? **blue????** CE2? ?? ??? ??????.

   ```
   [edit ]
   user@PE2# set routing-instances blue instance-type forwarding
   user@PE2# set routing-options rib blue.inet6.0 static route 0::/0 next-
   hop fec0:0:2003::2
   ```

   Junos OS ??????? ???? ??? ??? ??? ??? ???? ??? ???? **blue.inet6.0** ?????.

2. [illegible].

```
[edit ]
user@PE2# set routing-options passive
```

3. [illegible] RIB [illegible].

```
[edit ]
user@PE2# set routing-options rib inet6.0
```

4. RIB [illegible] **blue_group**[illegible].

```
[edit ]
user@PE2# set routing-options rib-groups blue_group import-rib inet6.0
user@PE2# set routing-options rib-groups blue_group import-rib blue.inet6.0
```

[illegible] **import-rib** [illegible].

5. [illegible] RIB [illegible].

```
[edit ]
user@PE2# set routing-options interface-routes rib-group inet6 blue_group
```

6. [illegible].

```
[edit ]
user@PE2# commit
```

[illegible]

[illegible], `show routing-instances`[illegible] `show routing-options`[illegible] `show firewall`[illegible]. [illegible].

[illegible] PE2

□□□ PE2□□ □□ □□□ □□□□ □□□ □□ □□□ □□□□ □□□ □□□□□.

```
user@PE2# show routing-instances
blue {
    instance-type forwarding;
    routing-options {
        static route 0::/0 next-hop fec0:0:2003::2;
    }
}
```

□□□ PE2

□□□ PE2□□ □□ □□□ □□□□ □□□ □□ RIB □□ □ □□ □□□ □□□ □□□□□.

```
user@PE2# show routing-options
interface-routes {
    rib-group blue_group;
}
passive;
rib inet6.0;
rib-groups {
    blue_group {
        import-rib [ inet6.0 blue.inet6.0 ];
    }
}
```

□□

in this section

- □□□ □□ □□ | 1344
- PE1□□ □□□ □□ | 1345
- PE2□□ □□□ □□ □□ | 1346

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[illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible] [illegible] [illegible] [illegible].

1. ([illegible]) PE2[illegible] [illegible] [illegible] **blue** [illegible] [illegible] [illegible] [illegible] **show route instance** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@PE2> show route instance blue summary
Instance             Type
         Primary RIB                                    Active/holddown/hidden
blue                 forwarding
         blue.inet6.0                                   2/0/0
```

2. ([illegible]) PE2[illegible] [illegible] [illegible] **blue** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] **show route table**

```
user@PE2> show route table blue.inet6.0

blue.inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

2001:db8::192:168:239:17/128
                   *[Direct/0] 00:02:26
                    > via lo0.0
fe80::2a0:a50f:fc64:e032/128
                   *[Direct/0] 00:02:26
                    > via lo0.0
```

3. ([illegible]) [illegible] [illegible] [illegible] [illegible] [illegible] PE2 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] **show route forwarding-table** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@PE2> show route forwarding-table blue
Routing table: blue.inet
Internet:
```

```
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   689     1
0.0.0.0/32         perm     0                    dscd   687     1
172.16.233.0/4        perm     0                    mdsc   688     1
172.16.233.1/32       perm     0 172.16.233.1          mcst   684     1
255.255.255.255/32 perm     0                    bcst   685     1

Routing table: blue.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   695     1

Routing table: blue.inet6
Internet6:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   701     1
::/128             perm     0                    dscd   699     1
2001:db8::192:168:239:17/128
                   user     0                    rtbl     2     3
fe80::2a0:a50f:fc64:e032/128
                   user     0                    rtbl     2     3
ff00::/8           perm     0                    mdsc   700     1
ff02::1/128        perm     0 ff02::1            mcst   697     1
```

PE1□□ □□□ □□

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1. □□ □□ □□□ **show interfaces filters** □□□□ □□□ □□□ □□□ □□□ □□□□□□□ □□□ □□□□□□□ □□□□□.

```
user@PE1> show interfaces filters xe-0/0/0.0
Interface        Admin  Link  Proto  Input Filter        Output Filter
xe-0/0/0.0       up     down  inet6  gre_encap_1
```

2. ?? ?? ??? **show interfaces** ???? ??? ??????? ??? ???? ??? ?????.

```
user@PE1> show interfaces xe-0/0/0.0 detail | filter "Ingress traffic"
...
Physical interface: xe-0/0/0, Enabled, Physical link is Up
...
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :           6970299398                   0 bps
   Input  packets:             81049992                   0 pps
   Drop   bytes  :                    0                   0 bps
   Drop   packets:                    0                   0 pps
...
```

3. ?? ?? ??? **show firewall filter** ???? ?? ?? ???? ???? ??? ??? ??????? ??????.

```
user@PE1> show firewall filter gre_encap_1
Filter: gre_encap_1
Counters:
Name                              Bytes             Packets
c_gre_encap_1              6970299398            81049992
```

??

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PE2?? ??? ?? ??

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PE2?? ??? ?? ??????? ??????.

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1. PE1□□ □□ □□ □□□ □□□□ **ping** PE2□ □□□ □ □□□ □□□□□.

```
user@PE1> ping 10.255.2.2
PING 10.255.2.2 (10.255.2.2): 56 data bytes
64 bytes from 10.255.2.2: icmp_seq=0 ttl=64 time=0.576 ms
64 bytes from 10.255.2.2: icmp_seq=1 ttl=64 time=0.269 ms
^C [abort]
```

2. PE2□□ □□ □□ □□□ □□□□ **show interfaces filter** □□□ □□ □□□ □□□ □□□ □□ □□□□□ □□□ □□□□□□ □□□□□.

```
user@PE2> show interfaces filter | match xe-
Interface        Admin  Link  Proto  Input Filter        Output Filter
xe-0/0/0.0       up     down  inet   gre_decap_1
xe-0/0/1.0       up     down  inet   gre_decap_1
xe-0/0/2.0       up     down  inet   gre_decap_1
```

3. PE2□□ □□ □□ □□□ □□□□ **show interfaces** □□□ □□ □□□□□□ □□□ □□□□ □□□ □□□□□.

```
user@PE2> show interfaces xe-0/0/0.0 detail | filter ”Ingress traffic”
Physical interface: xe-0/0/0, Enabled, Physical link is Up
 ...
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :           6970299398                   0 bps
   Input  packets:             81049992                   0 pps
   Drop   bytes  :                    0                   0 bps
   Drop   packets:                    0                   0 pps
 ...


user@PE2> show interfaces xe-0/0/1.0 detail | filter ”Ingress traffic”
Physical interface: xe-0/0/2, Enabled, Physical link is Up
 ...


user@PE2> show interfaces xe-0/0/2.0 detail | filter ”Ingress traffic”
Physical interface: xe-0/0/2, Enabled, Physical link is Up
 ...
```

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4. PE2□□ □□ □□ □□□ □□□□ **show firewall filter** □□ GRE □□□□ □□□ □□ □□□ □□□□□□ □□□□□.

```
user@PE2> show firewall filter gre_decap_1

Filter: gre_decap_1
Counters:
Name                                                Bytes              Packets
c_gre_decap_1                                  6970299398             81049992
```

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- PE2□ PE1□□ □□□ □ □□□□.
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- □□□ □□ □□□□□□□ □□□ GRE □□□ □□□ □□ □□□ □□ □□□ □□□□□□.

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□□ fpc □□

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show interfaces(□□□□□ □□□)

show interfaces

show route forwarding-table

IPv4, IPv6 □ MPLS □□□ □□□□□ □□ Junos OS □□

chapter label in part22

per-logical-interface-firewall

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- □□ □□ | 1349
- □□ | 1350
- □□ □□ | 1351
- □□□ □□ □□ | 1351
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```
per-logical-interface-firewall
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```
[edit chassis]
```

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```
firewall {
    family ethernet-switching {
        filter <filter-name> {
            term <rule-name> {
                from {
                    source-mac-address {
                        <mac-address>;
                    }
                }
                then {
                    count <count>;
                    policer <policer>;
                }
            }
        }
    }
    policer <policer-name> {
        if-exceeding {
            bandwidth-limit <bandwidth-limit>;
            burst-size-limit <burst-size-limit>;
        }
        then discard;
    }
}
interfaces {
    <interface-name> {
        flexible-vlan-tagging;
        encapsulation flexible-ethernet-services;
        unit <interface-unit-number> {
            vlan-id <vlan-id>;
            family ethernet-switching {
                filter {
                    input <filter-name>;
                }
            }
```

```
        }
    }
vlan {
    <vlan name> {
    interface <interface - name>
}
}
```

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- per-logical-interface-firewall ??????? ????? ??? ????????? ????? ????.
- ??? ??????? ??????? ??? ??????? ??? ??? ??????? ??? ????? ????? ????.
- per-logical-interface-firewall scope? ? VxLAN ??????? ??????.
- ? ????? per-logical-interfacefirewallifd? ifls?? ??? IPv6 ??? ??????? ???.
- ??????? ??? IPv6 ?? ??? ?? ????? ????.
- ?? VLAN? ??? IFL? IPv6 ??? ????? ??? ??? ?? ? ????.

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Junos OS ??? 22.2R1(QFX5110, QFX5120-32C, QFX5120-48T, QFX5120-48Y, QFX5120-48YM, QFX5200 ? QFX5210)? ??? ?

chapter label in part23

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- ?: ??? ?? ?? ? ?? | 1361
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- ??? ?? ? ?? ?? | 1378
- ??? ?? ?? ?? | 1379

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- ??? ?? ??? ???? ?? ?? ????? ?? ??? ???? count *counter-name* ?? ??? ?????.
- ??? ??? ?? ???? ????? show firewall filter *filter-name* <counter *counter-name*> *??? ??? ????* ???? ??? ?? ??? ?? *filter-name* .

```
__service-service-set-name:service-filter-name
```

?? ??, ?? out_counter ???? ??? out_filter ??? ??? ???? ?? ??? ??? *???? ???????* ???? ??? ??nat_set? ??? ?? ????? ?? ??? ????? ????? ??? ?????. ? ??????? ?? ?? ??? ???? show firewall ???? ???? ??? ??? ????.

```
[edit]
user@host> show firewall filter __service-nat_set:out_filter counter out_counter
```

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- [?? ??? ??? ??? ??] | 1354
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- [??? ???? ?? ??? ?? ??] | 1355
- [??? ?? ?? ??] | 1355

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```
term explicit_skip {
    then skip;
}
```

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- ???? ?? ?? | 1356
- ???? ?? ?? | 1356
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□□□ □□□ □□□□□ □□ □□□□ □□□□ [edit firewall family (inet | inet6)] □□□□□service-filter *service-filter-name*.

```
[edit]
firewall {
    family (inet | inet6) {
        service-filter service-filter-name {
            term term-name {
                from {
                    match-conditions;
                }
                then {
                    actions;
                }
            }
        }
    }
}
```

□□□ service-filter *service-filter-name* □□□□ □□ □□ □ □□□□ □□□ □□□□ □□□ □□ □□ □ □□ □□ □□□□ □□□□.

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IPv4 □□□() □ IPv6 □□□(family inetfamily inet6)□ □□□□□□□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □□□□ □□□ □□□ □□ □□□□ □□□□.

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family inet □□ family inet6 □ □□□ □□□ □□□ □□□□ □□□ □□□□ □□ □□□ service-filter *service-filter-name* □ □□□□. □□ □□□ □□, □□ □ □□□(-)□ □□□ □ □□□ □□ 64□ □□□□□. □□□ □□□ □□□□□ □□ □□□ □□□(" ")□ □□□□.

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service-filter *service-filter-name* □ □□□ □□ □□□□ term *term-name* □□ □□□ □□□□ □□□ □□□ □ □□□□.

- *□□□□ □□□□* □□ □□□ □□□ □□□□ □□□.
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- □□□ □□ □□ □□□ □□□ □□□□ □□□ □□□□□. □□□ □□ □□□ □□□ □□□□ □□□□□. □□□□□ □ □□□ □□ □□ □□□ □□ □□□□□. □□ □□ □□□ `insert` □□□□ □□□ □□□ □□□ □□□□ □ □□□□.

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□□ □□(address, destination-address, □□ source-address □□ □□)□□ IPv6 □□□ □□□□ □□ RFC 4291, *IP □□ 6 □□ □□ □□□ □□* □□□ □□□ □□ □□□ □□□□□. IPv6 □□□ □□ □□□ □□□ □□□ □□□□□ Junos OS □□□ □□□□ □□□□□□ "IPv6 □□"□ □□□□□□.

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- service
- skip

> □: □□□ □□□ □□□ □□□ □□□□□.

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- count *counter-name*
- log
- port-mirror
- sample

□□□ □□□ □□□ □□□□ **next** □□□□.

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[illegible] | 1361

[illegible]

in this section

- [illegible] | 1358
- [illegible] | 1359
- [illegible] | 1359
- [illegible] | 1360
- [illegible] | 1360

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible] IPv4 [illegible] IPv6 [illegible] [illegible].

- M [illegible] T [illegible] Adaptive Services(AS) PIC
- M [illegible] T [illegible] (MS) PIC
- MX [illegible] EX [illegible] MS DPC
- MX [illegible] MS MPC AND MIC

M [illegible]

[illegible] em0 [illegible] fxp0 [illegible] M [illegible].

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??? ?? ?? ?? ??? ??? ?? ????? ?? IPv4 ?? IPv6 ???? ?? ???? ???? ? ????. ?? ???? ?????? ??? ??? ?? ??? ??? ?????? ?? ?? ???? ???? ???? ??????.

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```
[edit]
interfaces {
    interface-name {
        unit unit-number {
            family (inet | inet6) {
                service {
                    input {
                        service-set service-set-name service-filter service-filter-name;
                        post-service-filter service-filter-name;
                    }
                    output {
                        service-set service-set-name service-filter service-filter-name;
                    }
                }
            }
        }
    }
}
```

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??? ??? ??????? ??? ??? ??? ????? ???????? ?? ????? ?? [edit services] ????? service-set *service-set-name*?????? ?? ???? ???? ??????.

??? ??? ??????? ?? ? ??? ?????? ??? ??? ?????? ?? ?? ????? ? service-set *service-set-name* (?) ??????.

- [edit interfaces *interface-name* unit *unit-number* input]
- [edit interfaces *interface-name* unit *unit-number* output]

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??? ??? PIC? ??? ?? ??? ?? ?? ????? ?? PIC? ?????? ??? ?? ?? ??? ??????. ?? ?? ? ?????? NAT(???? ?? ?)? ????? ?? ?????? dNAT(?? NAT)? ?????? ?? ??? ??? ??? ? ?????.

??? ??? ?? ??? ???? ?? ??? ???

?? ?? ?? ??? ??? ?? ??? ???? ?? IPv4 ?? IPv6 ???? ??????? ?? ?????? ? ??? ? service-set *service-set-name* service-filter *service-filter-name* (?) ??????.

- [edit interfaces *interface-name* unit *unit-number* family (inet | inet6) service input]
- [edit interfaces *interface-name* unit *unit-number* family (inet | inet6) service output]

service-set-name? ??, ?? ???? ??? [edit services service-set] ??? ??? ??????.

??? ??? ???? ??? ??? ?? ?????? ??? ?????? ?? ?????? ??? ???? ?? ??? ??? ? DCU(?? ??? ??)? ?? ??? ?? ??????.

??? ??? ?? ??? ???? ?? ???? ?? ?????? ???? ?????? ? ?? ?? ??? ??????.

- ??????? ?? ? ?? ?? ??? ??? ??? ??????.
- ??? service-filter ?? ?? ???? ???? service-set ??, Junos OS? ?? ??? true?? ???? ???? ??? ??? ??? ?? ???.
- ??? ??? ??? ??? ???? ??? ???? ??????.

??????? ? ??? ? ??? ??? ?? ??? ??? ? ?????. ?? ??? ??????.

- ?? ??? ??? ???? ?? ???(?? ???) ??????? ??? ???? ???? ??????. ???? ??? ???? ???? ??? ?? ? ?? ??? ? ?? ???? ?? ??? ??????.
- ??????? ?? 6?? ??? ??? ??? ? ?????.
- ??????? ?? ??? ??? ??? ? ??? ??? ???? ??????? ???? ???.

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IPv4 ?? IPv6 ?? ??? ??? ??? ????, ??? ??? ??? ? ??? ??????? ???? IPv4 ?? IPv6 ???? ??? ??? ??? ? ???? ?. ??? ???? ??? ??? ?????? ?? ???? ?? [edit interfaces *interface-name* unit *unit-number* family (inet | inet6) service input] ??????post-service-filter *service-filter-name*.

?? ??

??? ?? ?? | 1352
??? ??? ??? ???? ?? | 1354
??? ?? ?? ?? | 1355
?: ??? ?? ?? ? ?? | 1361

> *??? ??? ? ????? ????? ??*
>
> *??? ??????? ??? ??? ?? ??*
>
> *??? ?? ??*

?: ??? ?? ?? ? ??

in this section

- ?? ?? | 1361
- ?? | 1362
- ?? | 1362
- ?? | 1366

? ????? ???? ???? ????? ????? ???? ?? ????.

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? ?? ?? ????? ?? ?? ? ????? ???? ???????? `xe-0/1/0.0` ??????.

- M ??? ?? T ???? ????? Adaptive Services(AS) PIC
- M ??? ?? T ???? ????? ??????(MS) PIC
- MX ???? ????? ??????(MS) DPC
- EX ???? ????

????? ?? ???? ???? ??????.

- ????? ????(?? ???)? PIC ?? DPC? ????? ?? ???(?? ???) ???? ????????.
- ???????? ?? ????? ????? ????? ???????? ???? IPv4 ????? ???? ???????? `xe-0/1/0.0`?? ????? ????????.
- ???? ?? ? ?? ???? ???? ???????? ????? ?? ?? ????? ???? ???? `vrf_svcs` ????????.

???? ?? ???? ?? ???? *???? ??????? ???? ???? ?? ????* ????????.

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in this section

- ???? | 1362

? ????? IPv4 ???? ?? ? ?? ???? ???? ???? ??????. ?? ???? ?? 1?, ?? ???? ?? ?? 1?, ?? ???? ?? 1?. ???? ???? ???? ? ? ?? ???? ???? ???? ? ?????. ?? ??: *??? ??????? ??? ??? ?? ??*

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?? ???? ?? ? ?? ???? ?? ???? ?? ??????? xe-0/1/0.0?? ????? ?????, ?? ???? ???? ???? ?? ??????? ?? ????? ??????.

- ?? ???? ???? ?? ????? ?? IPv4 ???? ???? - ???? ??????xe-0/1/0.0???? ???? ??vrf_svcs? ???? ?????? ????? ????? ? ? ????? ?? ???? ???? in_filter_presvc ????? IPv4 ?? ????? ???????. in_filter_presvc ???? ???? ICMP ?? 179?? ???? ???? ?????, ???? ???? ???? ??vrf_svcs? ???? ?? ????? ????, ?? ?? ???? ??????.

- ?? ???? ???? ???? ? IPv4 ???? ???? - ?? ?????? xe-0/1/0.0?? ???? ???? in_filter_postsvc ????? ?? ???? ?? in_filter_presvc ? ???? ? ???? ??????? ????? ????? ???????. in_filter_postsvc ???? ???? ICMP ?? 179?? ?? ?? ?? ???? ?? ??????.

- ?? ???? ???? ?? ????? ?? IPv4 ???? ???? - ???? ??????xe-0/1/0.0???? ???? ??vrf_svcs? ???? ?????? ????? ????? ? ? ????? ?? ???? ???? out_filter_presvc ????? IPv4 ?? ????? ???????. out_filter_presvc ???? ???? TCP ?? 179? ???? ???? ???? ?? ???? ???? ??vrf_svcs? ???? ?? ????? ?????.

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in this section

- CLI ?? ?? | 1363
- ? ?? ???? ?? ?? | 1363
- ? ?? ???? ?? ?? | 1365

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CLI □□ □□

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```
set firewall family inet service-filter in_filter_presvc term t1 from protocol tcp
set firewall family inet service-filter in_filter_presvc term t1 from source-port bgp
set firewall family inet service-filter in_filter_presvc term t1 then count svc_in_pkts
set firewall family inet service-filter in_filter_presvc term t1 then service
set firewall family inet service-filter in_filter_postsvc term t2 from protocol tcp
set firewall family inet service-filter in_filter_postsvc term t2 from source-port bgp
set firewall family inet service-filter in_filter_postsvc term t2 then count svc_in_pkts_rtn
set firewall family inet service-filter in_filter_postsvc term t2 then skip
set firewall family inet service-filter out_filter_presvc term t3 from protocol icmp
set firewall family inet service-filter out_filter_presvc term t3 from destination-port bgp
set firewall family inet service-filter out_filter_presvc term t3 then count svc_out_pkts
set firewall family inet service-filter out_filter_presvc term t3 then service
set interfaces xe-0/1/0 unit 0 family inet service input service-set vrf_svcs service-filter
in_filter_presvc
set interfaces xe-0/1/0 unit 0 family inet service input post-service-filter in_filter_postsvc
set interfaces xe-0/1/0 unit 0 family inet service output service-set vrf_svcs service-filter
out_filter_presvc
```

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1. □□ □□□ □□□ □□□□□.

```
[edit]
user@host# edit firewall family inet service-filter in_filter_presvc

[edit firewall family inet service-filter in_filter_presvc]
user@host# set term t1 from protocol tcp
user@host# set term t1 from source-port bgp
user@host# set term t1 then count svc_in_pkts
user@host# set term t1 then service
```

2. ?? ??? ?? ??? ?????.

```
[edit]
user@host# edit firewall family inet service-filter in_filter_postsvc

[edit firewall family inet service-filter in_filter_postsvc]
user@host# set term t2 from protocol tcp
user@host# set term t2 from source-port bgp
user@host# set term t2 then count svc_in_pkts_rtn
user@host# set term t2 then skip
```

3. ?? ??? ??? ?????.

```
[edit]
user@host# edit firewall family inet service-filter out_filter_presvc

[edit firewall family inet service-filter out_filter_presvc]
user@host# set term t3 from protocol icmp
user@host# set term t3 from destination-port bgp
user@host# set term t3 then count svc_out_pkts
user@host# set term t3 then service
```

??

?? ?? ??? ????? ?? ? ?? ??? ??? ?? ??? ?? ??? show firewall ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ?? ? ????? ??? ????????.

```
[edit]
user@host# show firewall
family inet {
    service-filter in_filter_presvc {
        term t1 {
            from {
                protocol tcp;
                source-port bgp;
            }
            then {
                count svc_in_pkts;
                service;
            }
```

```
        }
    }
    service-filter in_filter_postsvc {
        term t2 {
            from {
                protocol tcp;
                source-port bgp;
            }
            then {
                count svc_in_pkts_rtn;
                skip;
            }
        }
    }
    service-filter out_filter_presvc {
        term t3 {
            from {
                protocol icmp;
                destination-port bgp;
            }
            then {
                count svc_out_pkts;
                service;
            }
        }
    }
}
```

[illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] xe-0/1/0.0IPv4 [illegible] [illegible].

```
[edit]
user@host# edit interfaces xe-0/1/0 unit 0 family inet
```

2. [illegible]

```
[edit interfaces xe-0/1/0 unit 0 family inet]
user@host# set service input service-set vrf_svcs service-filter in_filter_presvc
user@host# set service input post-service-filter in_filter_postsvc
user@host# set service output service-set vrf_svcs service-filter out_filter_presvc
```

[illegible]

[illegible] show interfaces [illegible]. [illegible]

```
[edit]
user@host# show interfaces
xe-0/1/0 {
    unit 0 {
        family inet {
            service {
                input {
                    service-set vrf_svcs service-filter in_filter_presvc;
                    post-service-filter in_filter_postsvc;
                }
                output {
                    service-set vrf_svcs service-filter out_filter_presvc;
                }
            }
        }
    }
}
```

[illegible]

[illegible]

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- [illegible] | 1367
- [illegible] | 1367

- ?? ??? ?? ?? ????? ???? ??????? ?? | 1367

??? ???? ???? ??? ?????.

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TCP ?? 179?? ??? ???? ??? ??? ??vrf_svcs? ??? *??* ????? ???? ?? ??????? ?????.

??

??? ??vrf_svcs? ??? *??* ????? ???? ?? ??? ?? ?? ?????.

```
[edit]
user@host> show firewall filter in_filter_presvc-vrf_svcs counter svc_in_pkts
```

?? ??? ?? ? ???? ???? ??????? ??

??

TCP ?? 179?? ??? ???? ??? ??? ??vrf_svcs? ??? *??* ???? ?? ???? ????? ?????.

??

??? ??vrf_svcs? ??? *??* ???? ?? ???? ??? ?? ?? ?????.

```
[edit]
user@host> show firewall filter in_filter_postsvc-vrf_svcs counter svc_in_pkts_rtn
```

?? ??? ?? ?? ????? ???? ??????? ??

??

ICMP ?? 179? ??? ????? ??? ??? ??vrf_svcs? ??? *??* ????? ???? ?? ??????? ?????.

□□

□□□ □□vrf_svcs□ □□□ *□/□* □□□□□ □□□ □□ □□ □□ □□ □□□□□.

```
[edit]
user@host> show firewall filter out_filter_presvc-vrf_svcs counter svc_out_pkts
```

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□□□ □□ □□ | 1352

□□□ □□□ □□□ □□□□ □□ | 1354

□□□ □□ □□ □□ | 1355

□□□ □□ □□ □□ | 1358

IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□

□□□ □□□ IPv4 □ IPv6 □□□□ □□ □□ □□□ □□□ □□ □□ □□□ □□ □□□ □□□□□. □ 83 □□□ 1368 □(□) □□□ □□ □□ □□□ □□□□ □.

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□

□□ □□	□□	□□□□ □□□
address *address*	IP □□ □□ □□ □□ □□□ □□□□□□.	• family inet • family inet6
address *address* except	IP □□ □□ □□ □□ □□□ □□□□□ □□□□.	• family inet • family inet6

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□	□□□□ □□□
ah-spi *spi-value*	(M120 □ M320□ □□□ M □□□ □□□) IPsec □□ □□(AH) SPI(□□ □□ □□ □□□) □□ □□□ □□.	• family inet
ah-spi-except *spi-value*	(M120 □ M320□ □□□ M □□□ □□□) IPsec AH SPI □□ □□□□□ □□□□.	• family inet
destination-address *address*	IP □□ □□ □□□ □□□□□□□. □□□ □□□ address □ destination-address □□ □□□ □□ □□□ □ □□□□.	• family inet • family inet6
destination-address *address* except	IP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ address □ destination-address □□ □□□ □□ □□□ □ □□□□.	• family inet • family inet6

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□. IPv4 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. IPv6 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).	• family inet • family inet6
destination-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ □□ □□□ □□□□□□ destination-port .	• family inet • family inet6
destination-prefix-list *name*	□□ □□□ □□□ □□□□□□. □□□ □□□] □□ □□□□ □□□□□ [edit policy-options prefix-list *prefix-list-name*.	• family inet • family inet6

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□
esp-spi *value*	IPsec ESP(Encapsulating Security Payload) SPI □□ □□□□□□□. □□ □ □□ □ □□□ □ □□□□. 16□□, 2□□ □□ 10□□ □□□□ □□□ *value* □ □□□□. 16□□ □□□□ □□ □□□□□ □□□ □ 0x□(□) □□□□□ □□□. 2□□ □□□□ □□ □□□□□ □□□□ b□(□) □□□□□ □□□.	• family inet • family inet6
esp-spi-except *value*	IPsec ESP SPI □ □□ □ □□□ □□□□□ □□□□. □□□ □□□ esp-spi □□ □□□ □□□□□□□.	• family inet • family inet6
first-fragment	□□□ □□□□ □□□ □ □□ □□□ □□ □□□□□□□. □□□ □□□□ □□□ □□□ □□□ □□ □□□□□ □□□□. □ □□□ □□□ □ □□ □□□ 0□ □□ □□□ □□ □□□□. □ □□ □□□ □□ □□ □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□□ □□□ □ □□□□. first-fragment □ is-fragment.	• family inet
forwarding-class	□□ □□□ □□ □□□ □□□ □ □□ □□□ □□□□□□. • assured-forwarding • best-effort • expedited-forwarding • network-control • *user-defined-name* □□□ □□□ □ □□□ □□ □□ □□ □□ □□□ *□□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□*□ □□□□□ □.	• family inet • family inet6

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□
forwarding-class-except	□□□ □□ □□□ □□ □□□ □□□ □ □□ □□□ □□□□□ □□□□. • assured-forwarding • best-effort • expedited-forwarding • network-control • *user-defined-name*	• family inet • family inet6
fragment-flags *number*	(□□ □□) IP □□□ 3□□ IP □□□ □□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). dont-fragment(0x4), more-fragments(0x2) □□ reserved(0x8).	• family inet
fragment-offset *number*	IP □□□ 13□□ □□ □□□ □□□ □□□□□□. □ □□ □□□ □□□ □□ □□ □□□□□ □□□□ □□□(8□□□ □□)□□□. □□ □, □ □□ □□ □ □□□ □□□□□. 0□ □□□ □□ □□□□ □□□ □ □□ □□□ □□□□□. first-fragment □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□ □ □□(first-fragment □ is-fragment)□ □□□ □ □□□.	• family inet
fragment-offset-except *number*	13□□ □□ □□□ □□□ □□□□□ □□□.	• family inet
interface-group *group-number*	□□□ □□□ □□□□□ □□(□□ □□□ □□□ □□□□□ □□)□ □□□□□□. □ □□ *group-number*□□ □□□ 255□□ 0 □□□□□. □□□□□ □□ □□□ □□ □□□ □□□ □(□) □□□□□□ "□□□□□ □□ □□□□ □□□ □□ □□□ □□" □□□ 1296.	• family inet • family inet6

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□
interface-group-except *group-number*	□□□ □□□ □□□□□ □□□ □□□□□ □□□□. □□□ □□□ □□ □□□ □□□□□□ interface-group .	• family inet • family inet6
ip-options *values*	□□□□ □□, 8□□ IP □□ □□□ □□□ □ □□ □ □□□ □□□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). loose-source-route(131), record-route (7), router-alert (148), security (130), stream-id (136), strict-source-route (137) □□ timestamp (68). IP □□□ □□ */?/?* □□ □□□□□□ □□□ □□□ any□(□) □□□□ □□□. */?/?* □□ □□□□□□ □□□ □□ □ □ □([□])□ □□□□ □□□. □□ */?/?* □□□□□□ □ □□ [*value1-value2*]□(□) □□□□ □□□. □□ □□, □□ □□ ip-options [0-147]□(□) loose-source-route, record-route □□ security □ □□ 0~147 □□□ □□ □□ □□□□ IP □□ □□□ □□□□□□. □□□ □ □□ □□□ router-alert □(148)□ □□□□ IP □□ □□□ □□□□ □□□□. □□□□ □□□□□□ □□, □□ □□□ */?/?* IP □□ □(□□□ any□)□ □□ □□ □□ □□□□ □□ ip-option□ □□ □□ □□□ □□□ □□□□ □□□□ □□□ □□ □□□ IP □□ □□□ □□□ □ □□□□. • □□ □□□ □□ IP □□ □□ □□ □□ ip-option□□ □□□□ □□□ □□ □□□ □□, □□□ □□□ discard□□ □□□ □□□□ */?/?* count, log□□ syslog□ □□ □□□ □□□ □ □□□□. □ □□□ □□□(□□ □□□)□ □□ □□□□□□ □□□ □□□ □□ □□□ □□ □□□ □□□□□□. • □□□ □□ □□□ □□□ □□ □□□ □□□ □□□ □□□□□. □□ □□□□ □□□ □□ □□ □□(□□□□□□ □ □ □□□ □□□□ □□)□□ □□□□□ □□□□□ ip-options any □□ □□□ □□□□ □□□. MX □□□ □□□ □ EX □□□ □□□□ 10□□□□ □□□ MPC(Modular Port Concentrator), 60□□□□ □□□ MPC, 60□□□□ □□ □□□ MPC, 60□□□□ □□□ Enhanced □□ MPC□ IPv4 □□ □□□ IP □□ □□□ □□□ □ □□□□. □ □□□ EX □□□ □□□□□□ □□□□□. □□□ MPC□ □□□ □□□□□ □□, ip-options □□ □□□ □□□□ □□□□ */?/?* □□□ □□□ □□ □□ □□ □□□□ □□□ □□.	family inet
ip-options-except *values*	IP □□ □□□ □□□ □ □□ □ □□□ □□□□□ □□□□. *values* □□□ □□ □□□ □□□ ip-options □□ □□□ □□□□□□.	• family inet

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ ***(Continued)***

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is-fragment	□□□ □□□□ □□□ □□ □□□ □□ □□□□□□□. □□□□ □□□ □ □□ □□□ □□□□□ □□□□. □ □□ □□□ □□ □□ □□ □□ fragment-offset 0 except □□□ □□□□□. □: □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□(first-fragment □ is-fragment)□ □□□ □ □□□□.	• family inet
loss-priority	□□□ □□ □□□ □□ □□ □□□□(PLP) □□ □ □□ □□□ □□□□□□□. • low • medium-low • medium-high • high PLP□ □□□□□ RED(Random Early Discard) □□□□□ □□ □□□□ □□ □□ □□ □□ □□□ □ □□□□. PLP□ □□ □□□ □□□ *□□□ □□□ □□□ □□ □□ □□ □□ □□□ □□□□ □□ □□*□ *□□ □□ □□ □□□ □□□□ □□□ □□□ □□ □□ □□□* □□□□□□.	• family inet • family inet6
loss-priority-except	□□□ □□ □□□ □□ □□ □□□□(PLP) □□ □ □□ □□□ □□□□□ □□□□. • low • medium-low • medium-high • high	• family inet • family inet6

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□
port *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ destination-port □□ □□ □□ source-port □□ □□□ □□ □ □ □□□□. IPv4 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ protocol udp □□ protoco tcp □□ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□.	• family inet • family inet6
port-except *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□ □□□□. □□□ □□□ port □□ □□□ □□□□□□.	• family inet • family inet6
prefix-list *prefix-list-name*	□□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□□□. □□□ □□□ [edit policy-options prefix-list *prefix-list-name*] □□ □□□ □□□□ □□□□.	• family inet • family inet6
protocol *number*	IP □□□□ □□ □□□ □□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstopts (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), ospf (89), pim (103), rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112).	• family inet
protocol-except *number*	IP □□□□ □□ □□□ □□□□□ □□□□. □□□ □□□ protocol □□ □□□ □□□□□□.	• family inet

□ 83: IPv4 □□ IPv6 □□□□ □□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□
source-address *address*	IP □□ □□□ □□□□□□. □□□ □□□ address □ source-address □□ □□□ □□ □□□ □ □□□□.	• family inet • family inet6
source-address *address* except	IP □□ □□□ □□□□□ □□□□. □□□ □□□ address □ source-address □□ □□□ □□ □□□ □ □□□□.	• family inet • family inet6
source-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□. IPv4 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. IPv6 □□□□ □□ □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □□ □ □□, destination-port *number* □□ □□□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.	• family inet • family inet6
source-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ source-port □□ □□□ □□□□□□.	• family inet • family inet6
source-prefix-list *name*	□□□ □□□□ □□ □□□□ □□□□□□. [edit policy-options prefix-list *prefix-list-name* □□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□.	• family inet • family inet6

표 83: IPv4 및 IPv6 패킷 헤더 필드 일치 조건 *(Continued)*

일치 조건	설명	패킷 헤더
tcp-flags *value*	TCP 헤더 8비트 TCP 플래그 필드 중 하나 이상 6개의 플래그. 필드 값 이름 또는 숫자 값 16진수 값 중 하나. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP 헤더, SYN 플래그 설정 여부 확인 필터, ACK 플래그 설정 여부 확인 필터 및 설정 플래그 필터. 필드 값 이름 또는 숫자 값 16진수 값 중 하나. 헤더 필드 값 tcp-established 및 tcp-initial 필드 헤더. IPv4 패킷 및 헤더 필드 일치, 헤더 필드 값 protocol tcp 및 TCP 헤더 필드 패킷 필터 패킷 필터. IPv6 패킷 및 헤더 필드 일치, 헤더 필드 값 next-header tcp 및 TCP 패킷 패킷 필터 패킷 필터.	• family inet • family inet6

참고: 주소 일치(address, destination-address, 및 source-address 필드 일치)는 IPv6 헤더 패킷 및 RFC 4291, *IP 버전 6 주소 지정 아키텍처* 헤더 필드 값 및 헤더 필드. IPv6 헤더 및 헤더 필드 값 Junos OS 헤더 패킷 필터링 "IPv6 주소"를 필터링.

관련 항목

- 헤더 필드 값 | 1352
- 헤더 필드 값 필드 | 1355
- 참고: 헤더 필드 및 필드 | 1361
- 헤더 필드 값 필드 | 1379

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□ 84 □□□ 1378 □□□ □□□ □□ □□□ □□□ □ □□ □□□□ □□ □□□ □□ □□□□□.

□ 84: □□□ □□□ □□ □□□ □□

Nonterminating Action(□□□□ □□ □□)	□□	□□□□ □□□
count *counter-name*	□□□ □□□□ □□□ □□□□□.	• inet • inet6
log	□□ □□ □□ □□ □□□ □□ □□ □□□ □□□□□. □□□ □□□□□(CLI)□□ show firewall log □□□ □□ □□ □ □□□ □□□□ □ □□□□.	• inet • inet6
port-mirror	□□□ □□□□ □□□□ □□□ □□ □□□□□□. M120 □□□, Enhanced III FPC□ □□□ M320 □□□, MX □□□ □□□ □ EX □□□ □□□□□□ □□□□□.	• inet • inet6
sample	□□□ □□□□□□.	• inet • inet6

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IPv4 ?? IPv6 ????? ?? ???? ?? ?? ?? | 1368
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service	??? ??? ??? ?????.	• inet • inet6
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IPv4 ?? IPv6 ????? ?? ???? ?? ?? ?? | 1368
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- ??? ???? ?? ?? ?? ?? | 1381
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? ?? ??? ??? *???*discard ??? ???, ?? ?? ?? ?? explicit_discard ? ?? ??? ?? ??? ???? ?? ????.

```
term explicit_discard {
    then discard;
}
```

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- ?? ?? ? ?? ?? | 1386

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?? ??? ????? ?? ???? ?? [edit firewall family inet] ?????simple-filter *simple-filter-name*.

```
[edit]
firewall {
    family inet {
        simple-filter simple-filter-name {
            term term-name {
                from {
                    match-conditions;
                }
                then {
                    actions;
                }
            }
        }
    }
}
```

??? simple-filter *simple-filter-name* ???? ?? ?? ? ???? ??? ???? ??? ?? ?? ? ?? ?? ???? ????.

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IPv4 ???(family inet)? ??????? ?? ??? ??? ? ????. ?? ??? ?? ???? ?? ???? ???? ????.

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family inet ? ??? ?? ???? simple-filter *simple-filter-name* ?? ??? ??? ??? ??? ? ????. ?? ??? ??, ?? ? ???(-)? ??? ? ??? ?? 64? ??????. ??? ??? ?????? ?? ??? ???(" ")? ????.

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simple-filter *simple-filter-name* ? ??? ?? ???? term *term-name* ?? ??? ???? ??? ??? ? ????.

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- ??? ?? ??? ? ??? ?? ??? ??? ???? ???. ?? ??? ??, ?? ? ???(-)? ??? ? ??? ?? 64??? ??????. ??? ??? ?? ??? ?? ??? ???(" ")? ????.
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□□ □□□ □□□ □□□□ next term□□□□.

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□□ □□ □□□ □□ □□□ □□□ □□□ □□ □□□□ IPv4 □□ □□□ □□ □□□ □□□□□.

□□ □□ □□□ □□□ □□□ □□ □□ □□□□ □□□ □□ □□ □□□ □□□□□.

- □□□ □□ DPC□ □□ MX □□□ □□□□ EX □□□ □□□□□□ □□ □□□ □□ □□□ □□□□ forwarding- class□□□□.
- □□ □□□ □ □□ □□□ □□ □□□ source-address □□□□ □□□ destination-address □□□□ □□□□□. □□ □□□□ □□□□ □□ □□□ □□ □□ □□□□□.
- □□ □□□ □□ □□□□ □□ □□ □□□ □□ □□□ □□□□ *□□□□*. □□ □□□ □□□□ □□ □□□ □□□ □□□□□.
- □□ □□□ □□ □□ □□ □□□□ exception □□ protocol-except □□ □□ □□□ □□□□ *□□□□*.
- □□ □□□ □ □□ source-port □ □□□ destination-port □□ □□□ □□□□□. □□ □□, □□ destination-port 600-700□ □□□ source-port 400-500 □ □□□□.
- □□ □□□ □□□□ □□ □□□ □□ □□□□ *□□□□*.

□ 86 □□□ 1384 □□ □□ □□ □□□ □□□□□.

□ 86: □□ □□ □□ □□

□□ □□	□□
destination-address *destination-address*	IP □□ □□□ □□□□□□.

□ 86: □□ □□ □□ □□ *(Continued)*

□□ □□	□□
destination-port *number*	TCP □□ UDP □□ □□. □ □□ □□□ □□□□ □□, □□□□ □□ □□ □□□□□ □□□□□ □□ □□□□ □□□□ protocol □□ □□□□. □□ □ □□ □□ □□□ □□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□). 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), 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), mobilip-mn (435), msdp (639), netbios-dgm (138), netbios-ns (137), netbios-ssn (139), nfsd (2049), (119), ntalknntp (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), telnet (23), tftp (69), timed (525), who (513), □□ xdmcp (177).
forwarding-class *class*	□□ □□□ □□□□ □□□□□□. assured-forwarding, best-effort, expedited-forwarding □□ network-control□(□) □□□□□. □□□ □□□ □ □□□ □□ □□ □□ □□ □□□ *□□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□□□*□ □□□□□□.
protocol *number*	IP □□□□ □□□□□. □□ □ □□ □□ □□□ □□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstopts (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), ospf (89), pim (103), rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112).
source-address *ip-source-address*	IP □□ □□□ □□□□□□.
source-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□, □□□□ □□ □□ □□□□□ □□□□□ □□ □□□□ □□□□ protocol □□ □□□□. □□ □□ □□ □ destination-port□□□ □□□ □□ □ □□□ □□□ □ □□□□.

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?? ??? , reject, ? discard?? accept????? ?? ??? ?? ??? ???? *?????*. ?? ???? ???? ???? ?? ???? ??????.

?? ???? ???? ???? next.*?????*.

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- forwarding-class (*forwarding-class* | assured-forwarding |best-effort | expedited-forwarding | network-control)

  ?: ??? ?? DPC? ?? MX ???? ???? ? EX ???? ??????? ???? ???? ?? ???? from ???? ????.

- loss-priority (high | low | medium-high | medium-low)

?? ???? ???? ?? ?? ??(?: ???? ??, ?? ???? ?? ?? ??, ?? ???? ???? ?? ???? ?? ???? ???? ?? ???? ?? ??)? ???? ??? ???? ????.

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?? ?? ??? ?? ??? ??

?? ???? ?? ???? simple-filter input *simple-filter-name*??? ???????? IPv4 ?? ???? [edit interfaces *interface-name* unit *unit-number* family inet] ??? ??? ??? ? ????.

```
[edit]
interfaces {
    interface-name {
        unit logical-unit-number {
            family inet {
                simple-filter {
                    input filter-name;
                }
            }
        }
    }
}
```

?? ?? ??? ?? ?? ??

?? ????????? ??? ??? ????????? ?? IPv4 ???? ??? ??? ??? ? ????.

- M120, M320 ?? T ??? ???? ??? ???? ??? ??? ??(IQ2) PIC
- MX ??? ??? ? EX ??? ???? ??? ??? EQ DPC(Queuing Dense Port Concentrators).

?? ?? ??? ??? ?? ?? ??? ??? ????.

- ?? ??? Enhanced Queuing MPC ??????? ???? MPC(Modular Port Concentrator) ???????? ???? ????.
- ?? ??? ??? ???????? ?? ??? ???? ????.
- ????? family inet ?? ??? ??? ? ????. ?? ???? ???? ???? ????.
- ?? ????? ?? ??? ??? ? ????. ?? ???? ???? ????.
- ???? ??? ??????? ??? ?? ??? ??? ? ????. ?? ??? ???? ????.

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- M120, M320 □□ T □□□ □□□□ □□□ □□□□ □□□ □□□ □□(IQ2) PIC 1□
- MX □□□ □□□ □□ EX □□□ □□□□ □□□ EQ DPC(Enhanced Queuing Dense Port Concentrator) 1□

□□□□ □□ □□□ □□□ □□□□□.

- □□□□ □□□(□□ □□□)□ PIC □□ DPC□ □□□□ □□ □□□(□□ □□□) □□□ □□□□□□.
- □□□□□□□ □□ □□□□ □□□□ □□□□ □□□□□□□ □□□□ □□ IPv4 □□□□ □□□ □□□□□ ge-0/0/1.0□ □□□ □□□ □□□□□□.

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□ □□ □□□ □□ □□□ 172.16.1.1□□ TCP □□□□ □□ □□ □□ □□□ □□ □□□□, □□ □□□ 172.16.4.0/8 □□□ HTTP(□) □□□□ □□ □□ □□ □□□ □□□□ □□□□, □□ □□□ 172.16.6.6□□ □□ □□□□ □□ □□ □□ □□□ □□□□ □□□□□.

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□□ □□□ □□□□□□□ ge-0/0/1.0□□ □□(□□□□ □□□ □□□□ □□ □□ □□□ □□ □□ □□□ 6.6.6.6□□□□ □□)□ □□□□□.

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□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□□ □□ □□□ □□□ □ □□□□□□ "□□ □□□□ CLI □□□ □□" □□□ 1787.

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□ □□ □□□ □□□□□ □□ □□□ □□□ □□□ □□□□ □ □□□ □□□ □□ □□□ □□ □□□ CLI□ □□□□□□ [edit].

```
set firewall family inet simple-filter sf_classify_1 term 1 from source-address 172.16.1.1/32
set firewall family inet simple-filter sf_classify_1 term 1 from protocol tcp
set firewall family inet simple-filter sf_classify_1 term 1 then loss-priority low
set firewall family inet simple-filter sf_classify_1 term 2 from source-address 172.16.4.0/8
set firewall family inet simple-filter sf_classify_1 term 2 from protocol tcp
set firewall family inet simple-filter sf_classify_1 term 2 from source-port http
set firewall family inet simple-filter sf_classify_1 term 2 then loss-priority high
set firewall family inet simple-filter sf_classify_1 term 3 from destination-address 6.6.6.6/32
set firewall family inet simple-filter sf_classify_1 term 3 then loss-priority low
set firewall family inet simple-filter sf_classify_1 term 3 then forwarding-class best-effort
set interfaces ge-0/0/1 unit 0 family inet simple-filter input sf_classify_1
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
```

□□ □□□□ □□ □□

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□□ □□ □□ □□:

1. □□ □□ sf_classify_1□ □□□□.

```
[edit]
user@host# edit firewall family inet simple-filter sf_classify_1
```

2. □□ IP □□□ □□□□ TCP □□□ □□□ □□□□□.

```
[edit firewall family inet simple-filter sf_classify_1]
user@host# set term 1 from source-address 172.16.1.1/32
user@host# set term 1 from protocol tcp
user@host# set term 1 then loss-priority low
```

3. □□ IP □□□ □□□□ HTTP □□□ □□□ □□□□□.

```
[edit firewall family inet simple-filter sf_classify_1]
user@host# set term 2 from source-address 172.16.4.0/8
user@host# set term 2 from protocol tcp
user@host# set term 2 from source-port http
user@host# set term 2 then loss-priority high
```

4. □□ IP □□□ □□□□ □□ □□□□ □□□ □□□□□.

```
[edit firewall family inet simple-filter sf_classify_1]
user@host# set term 3 from destination-address 6.6.6.6/32
user@host# set term 3 then loss-priority low
user@host# set term 3 then forwarding-class best-effort
```

□□

□□ □□ □□□ □□□□ □□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□.

```
[edit]
user@host# show firewall
family inet {
    simple-filter sf_classify_1 {
        term 1 {
            from {
                source-address {
                    172.16.1.1/32;
                }
                protocol {
                    tcp;
                }
            }
            then loss-priority low;
        }
        term 2 {
            from {
                source-address {
                    172.16.4.0/8;
                }
                source-port {
                    http;
                }
                protocol {
                    tcp;
                }
            }
            then loss-priority high;
        }
        term 3 {
            from {
                destination-address {
                    6.6.6.6/32;
                }
            }
            then {
                loss-priority low;
                forwarding-class best-effort;
```

```
            }
        }
    }
}
```

[illegible]

[illegible]

[illegible]:

1. [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set simple-filter input sf_classify_1
```

[illegible]

[illegible] show interfaces [illegible]. [illegible].

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            simple-filter {
                input sf_classify_1;
```

```
            }
            address 10.1.2.3/30;
        }
    }
}
```

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- □□□□□□ □□ CoS □□□ □□□ □□ | 1393
- □□□ □□□□□□ □□ CoS □□□ □□□ □□ □□ □□ | 1394

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□□

show class-of-service forwarding-class □□ □□ □□□ □□□□□.

```
[edit]
user@host> show class-of-service forwarding-class
```

□□ □□□ □□ □□□ □□□ CLI □□□□□ "show class-of-service forwarding-class"□ □□□□□.

□□□□□□ □□ CoS □□□ □□□ □□

□□

□□□□□□ CoS(class-of-service) □□□ □□□□ □□□ □□□□□□ □□□ □□ □□□ □□□□□ □□□□□.

??

show interfaces ?? ??? ??? ??? ??????? ?? ??? ???? ?? extensive ?? ??? ??????detail.

```
[edit]
user@host> show interfaces ge-0/0/1 detail
```

Physical interface ??? Ingress queues?? ???? Queue counters ? ??? ???? ?? ?? ??? ???? ??????.

?? ??? ?? ??? ??? CLI ???? "show interfaces "? ??????.

??? ??????? ?? CoS ??? ??? ?? ?? ??

??

??? ??????? ?? CoS ??? ??? ?? ??? ??? ??????? ??? ?? ??? ?????? ??????.

??

show interfaces queue ?? ??? ???? ??? ??????? ?? ??? ???? ??? ??????ingress.

```
[edit]
user@host> show interfaces queue ge-0/0/1 ingress
```

?? ??? ?? ??? ??? CLI ????? "show interfaces queue"? ??????.

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- ?: MAC ??? ??? ??? ?? | 1396
- ?: IEEE 802.1p ??? ?? ??? ??? ?? | 1397
- ?: ?? ?? ?????? ?? ??? ??? ?? | 1399
- ?: VPLS ??? ????? ????? ??? ? ?? ?? | 1400
- OVSDB ?? ??????? ??? ?? ?? | 1403
- ?: OVSDB ?? ??????? ??? ?? ?? | 1404

??? ??? ? VPLS ????? ?? ????? ????? ? ????? ??? ?? ??

??? ????? MX ??? 5G ????? ??? ????? ? vpls ????? ????? bridge ?? ??? ??? ??????. ??? ??? ? VPLS ????? ?? ? ??? ????? ?? ??? ??? ??? ??????. ? ?????? ??? 2 ????? ??? ????? ????? ??? ? ?? ? ?? ??? ??????.

MX ??? ??? ??? ??? ??? ??? ? ?????.

- ?? ??????
- ?? ??????
- ??? 2 ??? ????? ?? ??

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1. ?? ????? ?? ????? ??? ??? [edit firewall] ??????.
2. ????? ??? ??? ??? ?????? ?? ??? ????? ??????.

?: ??? ??? IP ????? ?? ?? ?? ??? ????? ??? ??? ?? ?? ?? ?? ?????? ??????. ??? ??? ??? ??? ? ? ??? ????? ?? ??? ?? ?????? ??????.

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?: VPLS ??? ???? ???? ??? ? ?? ?? | 1400

?: MAC ??? ??? ??? ?? | 1396

?: IEEE 802.1p ??? ?? ??? ??? ?? | 1397

?: ?? ?? ?????? ?? ???? ??? ?? | 1399

?: MAC ??? ??? ??? ??

? ?? ??? ??? ?? ?? MAC ??(88:05:00:29:3c:de/48)? ?? ???? ?? ?? ????? ??? ????. ??? ?? ?? ?? ??? ? ? ??? ??? ??? ??, ??? ?? ? ??? ??? ??? ???? ???????. ??? ??? 1?? ?? ??? vlan100200 ??? VLAN? ???? ?.

?: ? ???? ??? ?? ???? ?? ??? ?? ??? ???? ????. ??? ? ?? ?? ???? ?? ??? ?? ???? MX ?? ? ??? ???? ??? OAM(??, ?? ? ?? ??) ??? ??? ? ????.

MAC ??? ??? ???? ??????:

1. ??? ??? ?????? evil-mac-address.

```
[edit firewall]
family bridge {
    filter evil-mac-address {
        term one {
            from {
                source-mac-address 88:05:00:29:3c:de/48;
            }
            then {
                count evil-mac-address; # Counts frame with the bad source MAC address
                discard;
            }
            term two {
                then accept; # Make sure to accept other traffic
            }
        }
    }
}
```

2. ??? 1?? ? ?? ?? ?? vlan100200 ? ??evil-mac-address:

```
[edit routing-instances]
virtual-switch-R1-1 {
    bridge-domains {
        vlan100200 {
            domain-type bridge;
            forwarding-options {
                filter {
                    input evil-mac-address;
                }
            }
        }
    }
}
```

?? ??

??? ??? ? VPLS ????? ?? ????? ????? ? ????? ??? ?? ?? | 1395
?: VPLS ??? ????? ????? ??? ? ?? ?? | 1400
?: IEEE 802.1p ??? ?? ??? ??? ?? | 1397
?: ?? ?? ?????? ?? ??? ??? ?? | 1399

?: IEEE 802.1p ??? ?? ??? ??? ??

? **anyvpls** ????? ??? **bridge**??, MX ??? ??? ??? ??? VLAN ??? ?? ??? IEEE 802.1p ?? ?? ??? ?? ??? ????? ? ??? ? ????.

- IEEE 802.1p ??? VLAN ?? ??(?? VLAN ??)? ?? ??? ????? ??? ?? ??? **learn-vlan-1p-priority** ?????? ?? **learn-vlan-1p-priority-except** ?? ??? ??????.
- IEEE 802.1p ??? ?? ??(?? VLAN ??)? ?? ??? ????? ??? ?? ??? **user-vlan-1p-priority** ?????? ?? **user-vlan-1p-priority-except** ?? ??? ??????.

MX ??? ?????? ??? 2 ??? ????? ?? ??? ?? ?? ? ?? ?? ?? ??? ?? ??? ??? ??? ??, ??? ?? ? ??? ??? ?? ????? ???????.

□: □□□ 2 □□□□ MX □□□ □□□□□□ □□□□□. □□□ 2 □□□ □□ □□□ □□ □□□ □□□ □□□ □□, □□□ □□ □ □□□ □ □□ □□ □□□□ □□□□□□□.

□ □□ □□□ 2 □□□ □□□ □□□ IEEE 802.1p □□ VLAN □□ □□ □□□ 1 □□ 2□ □□ □□□□ □□ □□ □□ □□□ □□□□□ □□□ **best-effort** □□□□□.

□: □ □□□□ □□□ □□ □□□□ □□ □□□ □□ □□□ □□□□ □□□□. □□□ □ □□ □□ □□□□ □□ □□□ □□ □□□□ MX □□ □ □□□ □□□□ □□□ OAM(□□, □□ □ □□ □□) □□□ □□□ □ □□□□.

IEEE 802.1p □□□ □□ □□□ □□□ □□:

1. □□□ □□ **filter-learn-vlan-configure-forwarding**□□:

```
[edit firewall]
family bridge {
    filter filter-learn-vlan-configure-forwarding {
        term 0 {
            from {
                learn-vlan-1p-priority [1 2];
            }
            then forwarding-class best-effort;
        }
    }
}
```

2. □□□ □□□ **filter-learn-vlan-configure-forwarding** □□ □□□ □□ □□ **ge-0/0/0**:

```
[edit interfaces]
ge-0/0/0 {
    unit 0 {
        family bridge {
            filter {
                input filter-learn-vlan-configure-forwarding;
            }
        }
    }
}
```

□□ □□

□□□ □□□ □ VPLS □□□□ □□ □□□□ □□□□ □ □□□□ □□□ □□ □□ | 1395

□: VPLS □□□ □□□□ □□□□ □□□ □ □□ □□ | 1400

□: MAC □□□ □□□ □□□ □□ | 1396

□: □□ □□ □□□□□ □□ □□□ □□□ □□ | 1399

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□□□□ □□□□ □□ □□ □□□□(PLP) □□□□ □□□ □□□□□ MX □□□ □□□ □□□ □□□ □□□□□ □□ **loss-priority-except** □□ □□□ □□ □□□**loss-priority**. □□ □□ □□□□ □□□ □□ □□□□□ □□□ □ □□□. MX □□□ □□□□□ □□□ 2 □□□ □□□□ □□ □□□ □□ □□ □ □□ □ □ □□ □□□ □□ □□□ □□□ □□□ □□, □□□ □□ □ □□□ □□□ □□ □□□□ □□□□□.

> □: □□□ 2 □□□□ MX □□□ □□□□□□ □□□□□. □□□ 2 □□□□ □□□□ □□□ □□ □□□ □□□ □□□ □□□□□ Junos OS □□□ □□□□ □□□□□□ □□□□□.

□ □□ □□□ 2 □□□ □□□ □□□ □□ □□ □□ □□(PLP) □□□ □ **medium-high**□□ □□□□ □□ □□ □□ □□□ □□□□□ □□□ □□□□□ **expedited-forwarding** .

> □: □ □□□□ □□□ □□ □□□□ □□ □□□ □□ □□□ □□□□ □□□□. □□□ □ □□ □□ □□□□ □□ □□□ □□ □□□□ MX □□ □ □□□ □□□□ □□□ OAM(□□, □□ □ □□ □□) □□□ □□□ □ □□□□.

□□ □□ □□ □□□ □□ □□□ □□□ □□□□:

1. □□□ □□ **filter-plp-configure-forwarding**□□:

```
[edit firewall]
family bridge {
    filter filter-plp-configure-forwarding {
        term 0 {
            from {
                loss-priority medium-high;
            }
            then forwarding-class expedited-forwarding;
        }
    }
}
```

2. ??????? ?? **ge-0/0/0** ??? 2 ??? ???? **bd** ??????(?? ???? ?? ?? `[edit interfaces]` ?).

```
[edit bridge-domains]
bd {
    domain-type bridge {
        interface ge-0/0/0;
    }
}
```

3. ??? **filter-plp-configure-forwarding** ??????? ?? ??? ??????.**ge-0/0/0**

```
[edit interfaces]
ge-0/0/0 {
    unit 0 {
        family bridge {
            filter {
                input filter-plp-configure-forwarding;
            }
        }
    }
}
```

?? ??

??? ??, ??? ?? ? ??? ??? ??? ???

??? ??? ? VPLS ???? ?? ???? ???? ? ???? ??? ?? ?? | **1395**

?: VPLS ??? ???? ???? ??? ? ?? ?? | **1400**

?: MAC ??? ??? ??? ?? | **1396**

?: IEEE 802.1p ??? ?? ??? ??? ?? | **1397**

?: VPLS ??? ???? ???? ??? ? ?? ??

? ?? ??? ??? ???? ??? ??????? VPLS(Virtual Private LAN Service) ??? ???? ? ??????? ???? ??? ? ????. ?? ? ???????? ??? ??????? ?? ? ? ?????? ??? ???????, ? ? ?? ?????? ? ? IP ?????? ?????? ???? ???? ????. ?? ?? ? ??????? ??? IP ?????? ???? ???? ?? 2?? ??? 3? ???? ???????. ??? ??? ?? ??? ??? ??? ?????? Junos OS ??? ?? ?? ???? ???????.

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□□ 65: VPLS □□□ □□□□ □□□ □□□ □ □□

□□□□ □ □□ □□ □□□ □□□□.

- □□□□□□, □ □ □□ □□□□□ □ □ IP □□□□□ □□□□ □□ □□□□□□□. □ □□□□ □□□ □□□ □□□□ 50Kbps□ □□□□ □□ □□ □□ □□□ □□ □□□ □□□□□.
- IP □□□□□ □□□□ □□ 2□□ □□, 3□ □□□□□□. □ □□□□ 4Mbps□ CIR(Committed Information Rate), 256KB□ □□□ □□□ □□, 4.1Mbps□ □□ □□ □□ □ 256KB□ □□ □□□ □□□ □□□□□(CIR□ □□).
- VPLS□ □ □□□□ □□□□ □□□□□.
- □□ □□□□□ □□□ □□ □□□ □□ □□□ □□□□□.

□: □ □□□□ □□□ □□ □□□□ □□ □□□ □□ □□□ □□□□ □□□□. □□□ □ □□ □□ □□□□ □□ □□□ □□ □□□□ MX □□ □ □□□ □□□□ □□□ OAM(□□, □□ □ □□ □□) □□□ □□□ □ □□□□.

VPLS □□□ □□□□ □□□□ □□□ □ □□□ □□□□□,

1. □□□ □□□□ □□ **policer bcast-unknown-unicast-non-ip-mcast-policer**□□ □□ □□□□□□, □ □ □□ □□□□□ □ □ IP □ □□□□□ 50kbps□ □□□□□.

```
[edit firewall]
policer bcast-unknown-unicast-non-ip-mcast-policer {
    if-exceeding {
        bandwidth-limit 50k;
        burst-size-limit 150k;
    }
    then loss-priority high;
}
```

2. IP ?????? ???? ???? 3? ???? ? ?????? **three-color-policer ip-multicast-traffic-policer**.

```
[edit firewall]
three-color-policer ip-multicast-traffic-policer {
    two-rate {
        color-blind;
        committed-information-rate 4m;
        committed-burst-size 256k;
        peak-information-rate 4100000;
        peak-burst-size 256k;
    }
}
```

3. ? ???? ???? ?? ???? ???? ???? ??? ??? ? ?????? **customer-1**. ? ?? ??? ?? MAC ??? ???? IP ?????? ?? ?? ????, ? ?? ??? ???????, ? ? ?? ?????? ? ? IP ?????? ???? ???? ??????.

```
[edit firewall]
family vpls {
    filter customer-1 {
        term t0 {
            from {
                destination-mac-address {
                    01:00:5e:00:00:00/24;
                }
            }
            then {
                three-color-policer {
                    two-rate ip-multicast-traffic-policer;
                }
                forwarding-class expedited-forwarding;
            }
        }
        term t1 {
            from {
                traffic-type [ broadcast unknown-unicast multicast ];
            }
            then policer bcast-unknown-unicast-non-ip-mcast-policer;
        }
    }
}
```

4. [illegible] ge-2/1/0

```
[edit interfaces]
ge-2/1/0 {
    vlan-tagging;
    encapsulation flexible-ethernet-services;
    unit 5 {
        encapsulation vlan-vpls;
        vlan-id 9;
        family vpls {
            filter {
                input customer-1;
            }
        }
    }
}
```

[illegible]

[illegible] VPLS [illegible] | 1395

[illegible]: MAC [illegible] | 1396

[illegible]: IEEE 802.1p [illegible] | 1397

[illegible]: [illegible] | 1399

OVSDB [illegible]

Contrail [illegible] QFX [illegible] VXLAN [illegible](Open vSwitch Database—OVSDB—[illegible]) VXLAN [illegible] encapsulation extended-vlan-bridge [illegible] flexible-vlan-tagging [illegible]. Junos OS [illegible] 14.1X53-D30 [illegible] [illegible] [illegible] [illegible](VLAN [illegible]) [illegible] family ethernet-switching [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] 2(family ethernet-switching) [illegible] [illegible] [illegible] [illegible], [illegible] OVSDB [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]: [illegible] OVSDB [illegible] [illegible] [illegible] [illegible] [illegible] family ethernet-switching [illegible]. [illegible] 2([illegible]) [illegible] [illegible].

Contrail □□□□□ □□ □□□□□□ □□□□ □□□ □ □□□□, □□□□□ □□ □□□□□□ □□□ □□□ □□□ □□ □□□□□□ □□□□□ □□□ □□□ □□□ □ □□□. □□ □□□ □□□□ □□□ □□□ □□□□ □□□□ □□□. □□□ □□□ "□: OVSDB □□ □□□□□□ □□□ □□ □□" □□□ 1404□(□) □□□□ □□.

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□: OVSDB □□ □□□□□□ □□□ □□ □□ | 1404

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VXLAN □□□□

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OVSDB □□ □□□□□□ □□□ □□ | 1910

□: OVSDB □□ □□□□□□ □□□ □□ □□

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- □□ | 1405
- □□ | 1405

Junos OS □□□ 14.1X53-D30□□ Contrail □□□□□ □□□□ VXLAN □□□□□□ □□□ □□(□□ □□□□□)□ □□□ `family ethernet-switching` □ □□□□. □□□□□ □□□□ Open vSwitch Database(OVSDB) □□ □□□□□ □□ □□□□□. □ □□□ □□ □□□ □□ □□□□□□ □□□ 2(`family ethernet-switching`) □□□ □□□ □□□ □ □□□, □□ OVSDB □□ □□□□□□ □□□ □□□ □□□□□ □□ □□□ □□. Contrail □□□□□ □□ □□□□□□ □□□□ □□□ □ □□□□, □□□□□ □□ □□□□□□ □□□ □□□ □□□ □□ □□□□□□ □□□□□ □□□ □□□ □□□□ □□□. □□ □□□ □□□□ □□□ □□□ □□□□ □□□□ □□□. (□□ □□ □□ □□□ □□□□ □□□. □, □□□ □□ □□□□□□ □□□ □□□ □□ □□□ □ □□□□.)

□: □□□ □□□ OVSDB □□ □□□□□□ □□ □□□□□□□ □□□□ □□□□ □□ □□ `family ethernet-switching` □□□. □ □□ 2(□□) □□□ □□□□□.

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- QFX5100 □□□
- Junos OS □□□ 14.1X53-D30 □□

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□ □□□□ □□□□ □□□□□ xe-0/0/0 □ xe-0/0/1□ Contrail □□□□□ □□ □□□□ VXLAN □□□□□□□ □□□□□. □□ □□□□□ □□□ □□□□□□ □ encapsulation extended-vlan-bridge □□ □□ flexible-vlan-tagging □□□ □□□□□. □□□ □□□□ □□□□ □□□□□ □□□ □ □□□□ □□ □□ □□□□□□ □□□□ □□□ □□□ □□□□□ □□□. □□□ □□ □□□ 2(□□) □□□ □□□ □□□□ □□□ □□ □□□□□□ □□□□□ □ □□ □□ □□□ □□□□ □□□□ □□□.

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Contrail □□□□□ □□ □□□□ □□□ □□ □□□□□□ □□□ □□□ □□□□ □□□□□ □□□□□ □□ □□□ □□□□□□.

CLI □□ □□

```
[edit]
set groups vxlan-filter-group interfaces xe-0/0/0 unit <*> family ethernet-switching filter
input vxlan-filter
set groups vxlan-filter-group interfaces xe-0/0/1 unit <*> family ethernet-switching filter
input vxlan-filter
set groups vxlan-filter-group firewall family ethernet-switching filter vxlan-filter term t1
from destination-port 80
set groups vxlan-filter-group firewall family ethernet-switching filter vxlan-filter term t1
then accept
set apply-groups vxlan-filter-group
```

□□

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1. □□□□□ xe-0/0/0□ □□ □□ □□□□□□□ □□□ □□□ vxlan-filter □□□ □□ □□□ vxlan-filter-group □□□□□. □□□ □□□ □□ unit <*>□□□ □□ □□ □□□□□□□ □□□□□.

```
[edit]
user@switch# set groups vxlan-filter-group interfaces xe-0/0/0 unit <*> family ethernet-
switching filter input vxlan-filter
```

2. □□□□□ xe-0/0/1□ □□ □□□ □□□ □□□□□.

```
[edit]
user@switch# set groups vxlan-filter-group interfaces xe-0/0/1 unit <*> family ethernet-
switching filter input vxlan-filter
```

3. □□□ □□□ □□□□ □□□□ □□□ ethernet-switching □□□ □□□□□ □□□ □□□□□.

```
[edit]
user@switch# set groups vxlan-filter-group firewall family ethernet-switching filter vxlan-
filter term t1 from destination-port 80
```

4. □□□ □□□□ □□□□ □□□□□ □□□ □□□□□.

```
[edit]
user@switch# set groups vxlan-filter-group firewall family ethernet-switching filter vxlan-
filter term t1 then accept
```

5. □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@switch# set apply-groups vxlan-filter-group
```

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Junos OS ?? ?? ??

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VXLAN ????

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?: OVSDB ?? ?????? ??? ?? | **1911**

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- ?? ?? ?? ??? ?? ?? ?? | 1410

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IPv4 ?? IPv6 ???? ????, ??? ??? ? ??? ????? ?? ??????? ??? ??? ???? ??????? ??? ???? ??? ??? ? ????. ?? *??? ??? ???* (FBF)??? ???.

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□: uRPF(Unicast Reverse Path Forwarding) □□□ FBF □□□ □□□□□. □□ □ □□ □□□□□□□ □□ FBF □□ □ □□□□□ □□ □□ □□ □□□ □□ uRPF □□□ □□□□□. □□ IPv4 □ IPv6 □□□ □□□ □□□□□.

□: SOF(Services Offload) □ PMI(Power Mode Ipsec) □□ □□□ FBF□ □□□□ □□□ □□□□ □□□□.

- SOF - SOF□ □□□□ □□□□ □□□ FBF□ □□□□ SOF□ □□□□ □□□□.
- PMI - □□□ □□□ □□□ PMI□ □□□ □□ □□ □□□ □□□ PMI□ □□□□ □□□□. □□ □□□ FBF□ □□□□ □□ □□ □□ □□□ PMI□ □□□□□.

□: □□□□□□ □□ □□□□□ trace-route□ □□□□ □□ □□ □□□□ □□□ ACX7K(Junos OS Evolved) □□□□□ □□ □□□ □□ □ □□ □□□□ □□ □□ □□□□□.

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```
[edit firewall]
family inet {
    filter test {
        term 1 {
            then {
                routing-instance default;
            }
        }
    }
}
```

□: □ □□ routing-instance master□□ □□□□. □□□ □□□□ □□□□.

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RFC 1858, *IP □□ □□□□ □□ □□ □□ □□□* □□□□□□.

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- Bandwidth limit(??? ??) - ????? ?? ???? ???, ?? ?? ?? ??????.
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- policer *policer-name*
- three-color-policer (single-rate | two-rate) *policer-name*
- prefix-action *action-name*

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- ?? | 1412
- ?? | 1415
- ?? | 1422

? ????? PBR(?? ?? ???)????? ?? FBF(?? ?? ???)? ????? ??? ??????. ??? ??? ????? ?? ??? ????? ??? ?? ??? ? ?????.

?? ?? ??? IP ?? 4(IPv4) ? IP ?? 6(IPv6)? ?? ??????.

?: QFX5110, QFX5120, QFX5130, QFX5200, QFX5210, QFX5220, QFX5230, QFX5240 ? QFX5700? ????? `instance-type forwarding`??? ? `instance-type virtual-router` ????? ?.

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? ????? ??? ?? ?? ISP?? ????? ??? ??? ?????? ?? ??? ??? ????? ?? ??? ????? ??? FBF? ??????. ?? ???(?: ?? ? ??)? ??? ? ?? ??? ????? ?????? ??? 2 ?? ??? 3 ??? ?? ??? ??????. ??? 2 ????? ?? ????? ??? ????? ?? ??? ? ??? ??? ? ?? ?? ????? ??? ? ?????.

FBF? ???? ????????? ??? ?? ??? ??????. ? ??? ?? ??? ?? ??? ??????. ??? ?? ?? ??? ???? ??? ?????? ??? ?? FBF? ??? ??????. ??? ??? ?????? ??? ?? ?? ????? ??????. ?? ???? ?? ?? ?? ?? LSP? ? ? ????.

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FBF□ □□□□□ □□ □□□ □□□□□.

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- □□□ □□□□ □□□ □□□□ □□□ □□ [edit routing-instances] □□ □□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□□. □ □□ □□ □□ □ □□ □□□□.

```
[edit]
routing-instances {
    routing-table-name1 {
        instance-type forwarding;
        routing-options {
            static {
                route 0.0.0.0/0 next-hop 172.16.0.14;
            }
        }
    }
    routing-table-name2 {
        instance-type forwarding;
        routing-options {
            static {
                route 0.0.0.0/0 next-hop 172.16.0.18;
            }
        }
    }
}
```

- RIB □□□ □□□□ □□ □□ □□□(FBF)□ □□□□ □□□ □□□ □□□□□ □□□□□ □□□ □□□□□. □□□ □ □□□ □□□ □□□□□ □□□ □□□ □ □ □□□□□□ □□ □□□ □□ □□□ □□□□□. □□ □□□□ □□□ □□□ □□□ [edit routing-options] □□□□.

```
[edit]
routing-options {
    interface-routes {
        rib-group;
        inet {
            int-routes;
```

```
            }
        }
    }
}
routing-options {
    rib-groups {
        int-routes {
        import-rib {
            inet.0;
            webtraffic.inet.0;
            }
        }
    }
}
```

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□□□ SP1 □□□□ □□□ □□ □□□ □□ □□ sp1-route-table.inet.0 □□□ □□□□ □□□□ □□ □□ □□□ □□□□□. □□□ SP2 □□□□ □□ □ □□ □□□ □□ □□ sp2-route-table.inet.0 □□□ □□□□ □□□□ □□ □□ □□□ □□□□□. □□□ □□□ □□ □ □□□ □□□□ □□□ □□□ □□ □ □□□□ □□ inet.0 □□□ □□□□ □□□□ □□ □□ □□□ □□□□□.

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□□□□ P1□□ □□ □□□ □□□□ PE3 □ □□□□ PE4□□ □□□ □□□ □□□□□. □□□ □□ □□□ □□□□ □□□□□□. 10.1.1.0/24 □ 10.1.2.0/24 □□□□□ □□ □□□ □□ □□□ □□□□ PE1□ □□□□□□. 10.2.1.0/24 □ 10.2.2.0/24 □□□□□ □□ □□□ □□ □□□ □□ □□ PE2□ □□□□□□.

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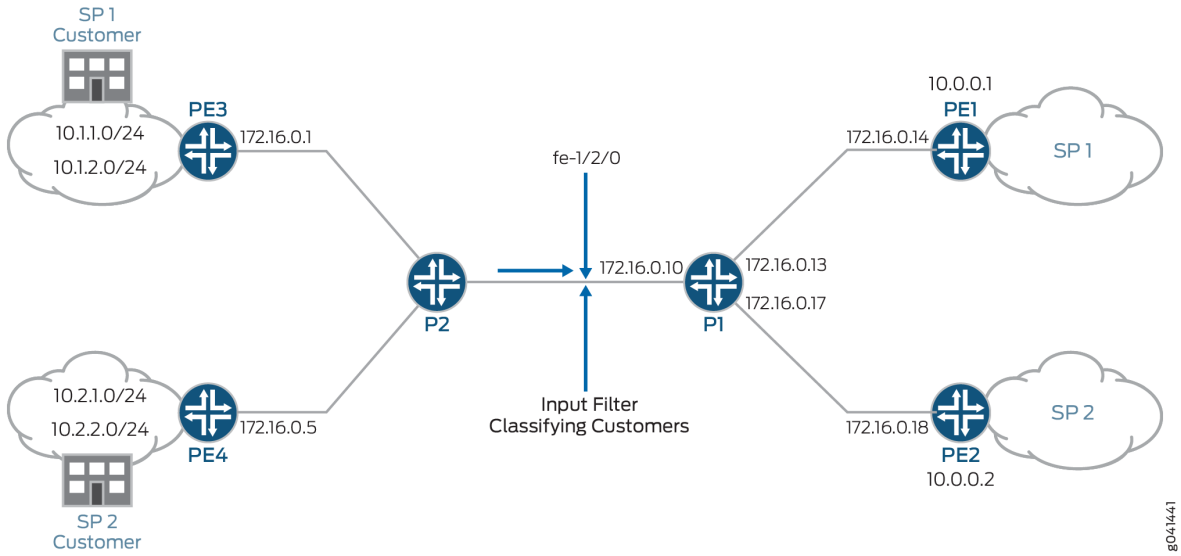

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- P1□□ □□□ □□ □□ | **1417**
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□□□□ P1

```
set firewall filter classify-customers term sp1-customers from source-address 10.1.1.0/24
set firewall filter classify-customers term sp1-customers from source-address 10.1.2.0/24
set firewall filter classify-customers term sp1-customers then log
set firewall filter classify-customers term sp1-customers then routing-instance sp1-route-table
set firewall filter classify-customers term sp2-customers from source-address 10.2.1.0/24
set firewall filter classify-customers term sp2-customers from source-address 10.2.2.0/24
set firewall filter classify-customers term sp2-customers then log
set firewall filter classify-customers term sp2-customers then routing-instance sp2-route-table
set firewall filter classify-customers term default then accept
set interfaces fe-1/2/0 unit 0 family inet filter input classify-customers
set interfaces fe-1/2/0 unit 0 family inet address 172.16.0.10/30
set interfaces fe-1/2/1 unit 0 family inet address 172.16.0.13/30
set interfaces fe-1/2/2 unit 0 family inet address 172.16.0.17/30
set protocols ospf rib-group fbf-group
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
set routing-instances sp1-route-table instance-type forwarding
set routing-instances sp1-route-table routing-options static route 0.0.0.0/0 next-hop 172.16.0.14
set routing-instances sp2-route-table instance-type forwarding
set routing-instances sp2-route-table routing-options static route 0.0.0.0/0 next-hop 172.16.0.18
set routing-options interface-routes rib-group fbf-group
set routing-options rib-groups fbf-group import-rib inet.0
set routing-options rib-groups fbf-group import-rib sp1-route-table.inet.0
set routing-options rib-groups fbf-group import-rib sp2-route-table.inet.0
```

□□□□ P2

```
set interfaces fe-1/2/0 unit 0 family inet address 172.16.0.2/30
set interfaces fe-1/2/1 unit 0 family inet address 172.16.0.6/30
set interfaces fe-1/2/2 unit 0 family inet address 172.16.0.9/30
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

□□□□ PE1

```
set interfaces fe-1/2/0 unit 0 family inet address 172.16.0.14/30
set interfaces lo0 unit 0 family inet address 172.16.1.1/32
```

```
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

□□□□ PE2

```
set interfaces fe-1/2/0 unit 0 family inet address 172.16.0.18/30
set interfaces lo0 unit 0 family inet address 172.16.2.2/32
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

□□□□ PE3

```
set interfaces fe-1/2/0 unit 0 family inet address 172.16.0.1/30
set interfaces lo0 unit 0 family inet address 10.1.1.1/32
set interfaces lo0 unit 0 family inet address 10.1.2.1/32
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

□□□□ PE4

```
set interfaces fe-1/2/0 unit 0 family inet address 172.16.0.5/30
set interfaces lo0 unit 0 family inet address 10.2.1.1/32
set interfaces lo0 unit 0 family inet address 10.2.2.1/32
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
```

P1□□ □□□ □□ □□

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1. SP1 □□□ □□ □□ □□□ □□□□□.

```
[edit firewall filter classify-customers term sp1-customers]
user@host# set from source-address 10.1.1.0/24
user@host# set from source-address 10.1.2.0/24
```

2. [illegible] sp1-route-table.inet.0 [illegible] SP1-route-table [illegible].

```
[edit firewall filter classify-customers term sp1-customers]
user@host# set then log
user@host# set then routing-instance sp1-route-table
```

3. SP2 [illegible].

```
[edit firewall filter classify-customers term sp2-customers]
user@host# set from source-address 10.2.1.0/24
user@host# set from source-address 10.2.2.0/24
```

4. [illegible] sp2-route-table.inet.0 [illegible] SP2-route-table [illegible].

```
[edit firewall filter classify-customers term sp2-customers]
user@host# set then log
user@host# set then routing-instance sp2-route-table
```

5. [illegible] IPv4 [illegible] inet.0[illegible].

```
[edit firewall filter classify-customers term default]
user@host# set then accept
```

[illegible] P1[illegible]

[illegible]

[illegible] Junos OS CLI [illegible] *[illegible] CLI [illegible]*[illegible].

[illegible].

1. [illegible].

```
[edit interfaces fe-1/2/0]
user@host# set unit 0 family inet address 172.16.0.10/30
[edit interfaces fe-1/2/1]
```

```
user@host# set unit 0 family inet address 172.16.0.13/30
[edit interfaces fe-1/2/2]
user@host# set unit 0 family inet address 172.16.0.17/30
```

2. [illegible] fe-1/2/0.0 [illegible] classify-customers .

```
[edit interfaces fe-1/2/0]
user@host# set unit 0 family inet filter input classify-customers
```

3. [illegible].

   [illegible].

```
[edit  protocols ospf area 0.0.0.0]
user@host# set interface all
user@host# set interface fxp0.0 disable
```

4. classify-customers [illegible]. [illegible] [illegible].

```
[edit routing-instances]
user@host# set sp1-route-table instance-type forwarding
user@host# set sp2-route-table instance-type forwarding
```

5. (PE1 PE2)[illegible].

```
[edit routing-instances ]
user@host# set sp1-route-table routing-options static route 0.0.0.0/0 next-hop 172.16.0.14
user@host# set sp2-route-table routing-options static route 0.0.0.0/0 next-hop 172.16.0.18
```

6. [illegible] inet.0 [illegible]. (IPv4) [illegible].

```
[edit routing-options]
user@host# set rib-groups fbf-group import-rib inet.0
user@host# set rib-groups fbf-group import-rib sp1-route-table.inet.0
user@host# set rib-groups fbf-group import-rib sp2-route-table.inet.0
```

7. OSPF □□ □□□ fbf-group □□□ □□□ □□□ □□□□ OSPF □□□ 3□□ □□□ □□□□ □□□□□.

```
[edit protocols ospf]
user@host# set rib-group fbf-group
```

8. □□□□ □□□ □□□□□.

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

□□

, show firewall, show protocols, show routing-instances, □ show routing-options □□□ show interfaces□□□□ □□□ □□□□□.

```
user@host# show interfaces
fe-1/2/0 {
    unit 0 {
        family inet {
            filter {
                input classify-customers;
            }
            address 172.16.0.10/30;
        }
    }
}
fe-1/2/1 {
    unit 0 {
        family inet {
            address 172.16.0.13/30;
        }
    }
}
fe-1/2/2 {
    unit 0 {
        family inet {
            address 172.16.0.17/30;
        }
```

```
    }
}
```

```
user@host# show firewall
filter classify-customers {
    term sp1-customers {
        from {
            source-address {
                10.1.1.0/24;
                10.1.2.0/24;
            }
        }
        then {
            log;
            routing-instance sp1-route-table;
        }
    }
    term sp2-customers {
        from {
            source-address {
                10.2.1.0/24;
                10.2.2.0/24;
            }
        }
        then {
            log;
            routing-instance sp2-route-table;
        }
    }
    term default {
        then accept;
    }
}
```

```
user@host# show protocols
ospf {
    rib-group fbf-group;
    area 0.0.0.0 {
        interface all;
        interface fxp0.0 {
```

```
            disable;
        }
    }
}
```

```
user@host# show routing-instances
sp1-route-table {
    instance-type forwarding;
    routing-options {
        static {
            route 0.0.0.0/0 next-hop 172.16.0.14;
        }
    }
}
sp2-route-table {
    instance-type forwarding;
    routing-options {
        static {
            route 0.0.0.0/0 next-hop 172.16.0.18;
        }
    }
}
```

```
user@host# show routing-options
rib-groups {
    fbf-group {
        import-rib [ inet.0 sp1-route-table.inet.0 sp2-route-table.inet.0 ];
    }
}
```

??

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- ??? ?? ??? Ping | 1423
- ??? ?? ?? | 1424

□□□ □□□□ □□□□ □□□ □□□□□.

□□□ □□ □□□ Ping

□□

□□□ □□□ □□□□□ □□ □□□□□ □□ □□ ICMP □□□ □□□□.

□□

1. ping □□□ □□□□ □□□□ PE1□□ lo0.0 □□□□□□ ping□□□.

   □ □□□□□□ □□□ □□□ 172.16.1.1□□□.

   □□□□ PE3□ lo0.0 □□□□□□ □□□ □□□ □□ □□ 10.1.2.1□ □□□□□.

   ```
   user@PE3> ping 172.16.1.1 source 10.1.2.1
   PING 172.16.1.1 (172.16.1.1): 56 data bytes
   64 bytes from 172.16.1.1: icmp_seq=0 ttl=62 time=1.444 ms
   64 bytes from 172.16.1.1: icmp_seq=1 ttl=62 time=2.094 ms
   ^C
   --- 172.16.1.1 ping statistics ---
   2 packets transmitted, 2 packets received, 0% packet loss
   round-trip min/avg/max/stddev = 1.444/1.769/2.094/0.325 ms
   ```

2. ping □□□ □□□□ □□□□ PE2□□ lo0.0 □□□□□□ ping□□□.

   □ □□□□□□ □□□ □□□ 172.16.2.2□□□.

   □□□□ PE4□ lo0.0 □□□□□□ □□□ □□□ □□ □□ 10.2.1.1□ □□□□□.

   ```
   user@PE4> ping 172.16.2.2 source 10.2.1.1
   PING 172.16.2.2 (172.16.2.2): 56 data bytes
   64 bytes from 172.16.2.2: icmp_seq=0 ttl=62 time=1.473 ms
   64 bytes from 172.16.2.2: icmp_seq=1 ttl=62 time=1.407 ms
   ^C
   --- 172.16.2.2 ping statistics ---
   2 packets transmitted, 2 packets received, 0% packet loss
   round-trip min/avg/max/stddev = 1.407/1.440/1.473/0.033 ms
   ```

??

??? ping? ???? ???? ?? ???? ???????.

???? ?? ??

??

???? ?? ???? ?????? ??????.

??

1. ????? P1?? show firewall log ???? ??????.

```
user@P1> show firewall log
Log :
Time      Filter    Action Interface     Protocol        Src Addr           Dest Addr
13:52:20  pfe       A      fe-1/2/0.0    ICMP            10.2.1.1           172.16.2.2
13:52:19  pfe       A      fe-1/2/0.0    ICMP            10.2.1.1           172.16.2.2
13:51:53  pfe       A      fe-1/2/0.0    ICMP            10.1.2.1           172.16.1.1
13:51:52  pfe       A      fe-1/2/0.0    ICMP            10.1.2.1           172.16.1.1
```

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?? ?? ???? ????? ???????? ????? ?? ????? ?????

?? ?? ???? ?? | 1408

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- □: □□ □□ □□□□□□ □□ □□ □□ □□ □□ | 1427
- □: □□ □□ IP □□□ □□ □□ □□ □□ □□ | 1433

□□ □□ □□□□□ □□ □□ IP □□□ □□ □□ □□ □□ □□

□□ □□ □□□(□□ □□ □□□□□□□ □)□ □□□□□□ □□□□ □□□ □□□ □□□□ □□ IP □□ □□□ □□□□□ □□□ □□□□□ □□□□□ □□ □□□ □□□ □ □□□ □□□□□ □□ □□□□.

Junos OS □□□ 12.2□□ *□□□ □□□* , then next-ip□□ then next-ip6 □ □□□□ □□□ then next-interface□ □□□□. □□ □□ □□ □□ IPv4 □ IPv6 □□ □□ □□□□□ □□□ □□□ □□ □□ □□□□ □□□ □ □□□□.

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- □□□ 3 □□(□: □□ □□ □□ IP □□ □□ TOS □□□)
- □□ 4 □□(□: □□ □□ □□ □□)

□□ □□ □□□□ □□□□□ □□□ IPv4 □□ IPv6 □□□ □□□ □□□ □□□□ □□□ □□□. □□□□□, □□□ □□□□□□ □□□□ □□□ □□□ □□□□ next-interface □□□ □□□ □□□□□. □□ OSPF □□ IS-IS□ □□ IGP(Interior Gateway Protocol)□ □□□□ □□□ 3 □□□ □□□□ □□ □□□ □ □□□□.

□□□ □□□ □□□ □□□□ □□□ □□ □ □□□ □□□□□.

- IPv4 □□(□□□ □□ □□ □□ next-ip)
- IPv6 □□(□□□ □□ □□ □□ next-ip6)
- □□□□□(□□□ □□ □□ □□ next-interface)

□□ □□ □□□□ □□□□ □□□□□ □□□ □□□□ □□ □□ □□□ □□□ □□□ □□□□□. □□□□ □□□ □□□□ DNS □□ □□□□ FTP□ □□□□. □□ □ □□□ □□□ □□□□ □□□ □□□□□ □□□□ □□ □□ □□□□ □□□□ MAC □□□ IP □□ □□ □□□ □□ □□□□□□ □□ □□□ □□□□ □□□ □□□□ □□□□ □□ □□□ □□□ □□ □□ □□□□□□ □□□ □□□ □ □□□□. □□ □□□ IPv4 □□ IPv6 □□□ □ □□□, □ □□ next-ip □□ next-ip6 □□ □ □□□□□.

□□□□□ □□ □□□□□ □□ IP □□□ □□□ □□□□□ □□□ □ □□□□.

□ □□ □□ □□ □□□ □□□□.

```
firewall {
    filter filter1 {
        term t1 {
            from {
                source-address {
```

```
                    10.1.1.3/32;
                }
            }
            then {

                next-interface {
                    xe-0/1/0.1;
                    routing-instance rins1;
                }
            }
        }
        term t2 {
            from {
                source-address {
                    10.1.1.4/32;
                }
            }
            then {
                next-interface {
                    xe-0/1/0.2;
                    routing-instance rins2;
                }
            }
        }
    }
}
routing-instances {
    rins1 {
        instance-type virtual-router;
        interface xe-0/1/0.1;
    }
    rins2 {
        instance-type virtual-router;
        interface xe-0/1/0.2;
    }
}
```

SEE ALSO

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?: ?? ?? ??????? ?? ?? ?? ?? ??

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? ????? ???? ????? ???? as ????? then next-interface ??? ?? ???.

?? ??

? ???? ????? ? ?????? ?? ???? ???? ?????.

- MX ??? 5G ????? ???? ????? ???? ???? ???? ???? ?????? ???? ? ?????.
- ???? ???? ???? ???? ??????? ????? Junos OS ??? 12.2.
- (??next-ip) ???? next-interface ?? ??? Trio MPC?? ?????? ????????? ??? ? ?????. I-? ?? DPC? ???? ????? ?? ??? ??????.
- ????? ?? next-interface *interface-name* ?? ?? ??????? Trio MPC ?? I-? ?? DPC?? ????? ? ?????.

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? ???? ????? R1?? ???? ???? ?????? ?? 2?? ?????. 172.16.1.1 ? 172.16.2.2.

????? R2?? ???? ????? ?? ???? ????? ?????. ? ???? ?? ????? ?? ?? ? ???? ?????, ????? ???? ?? ??????? ???????. ?? ??????? ????? R2? ????? R3 ????? VLAN ???? ???? ??????? ??????.

IS-IS? ????? ? ???? ??????.

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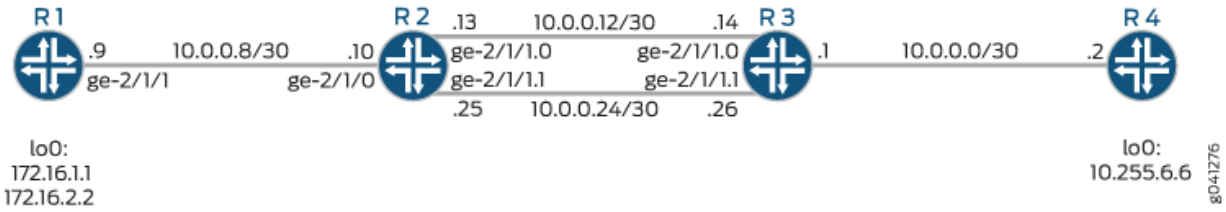

□ □□ □□□□ R2□ □□□ □□□□□.

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□□□□ R2

```
set interfaces ge-2/1/0 unit 0 family inet filter input filter1
set interfaces ge-2/1/0 unit 0 family inet address 10.0.0.10/30
set interfaces ge-2/1/0 unit 0 description to-R1
set interfaces ge-2/1/0 unit 0 family iso
set interfaces ge-2/1/1 vlan-tagging
set interfaces ge-2/1/1 description to-R3
set interfaces ge-2/1/1 unit 0 vlan-id 1001
set interfaces ge-2/1/1 unit 0 family inet address 10.0.0.13/30
set interfaces ge-2/1/1 unit 0 family iso
set interfaces ge-2/1/1 unit 1 vlan-id 1002
set interfaces ge-2/1/1 unit 1 family inet address 10.0.0.25/30
```

```
set interfaces ge-2/1/1 unit 1 family iso
set interfaces lo0 unit 0 family inet address 10.255.4.4/32
set interfaces lo0 unit 0 family iso address 49.0001.0010.0000.0404.00
set firewall family inet filter filter1 term t1 from source-address 172.16.1.1/32
set firewall family inet filter filter1 term t1 then next-interface ge-2/1/1.0
set firewall family inet filter filter1 term t2 from source-address 172.16.2.2/32
set firewall family inet filter filter1 term t2 then next-interface ge-2/1/1.1
set protocols isis interface all level 1 disable
set protocols isis interface fxp0.0 disable
set protocols isis interface lo0.0
```

??? ??

?? ?? ?? ???? ??? ??? ??? ?????. CLI ??? ?? ??? Junos OS CLI ??? ???? "?? ???? CLI ??? ??" ??? 1787 ?(?) ???????.

???? R2 ??:

1. ??????? ?????.

```
[edit interfaces]
user@R2# set ge-2/1/0 unit 0 family inet filter input filter1
user@R2# set ge-2/1/0 unit 0 family inet address 10.0.0.10/30
user@R2# set ge-2/1/0 unit 0 description to-R1
user@R2# set ge-2/1/0 unit 0 family iso
user@R2# set ge-2/1/1 vlan-tagging
user@R2# set ge-2/1/1 description to-R3
user@R2# set ge-2/1/1 unit 0 vlan-id 1001
user@R2# set ge-2/1/1 unit 0 family inet address 10.0.0.13/30
user@R2# set ge-2/1/1 unit 0 family iso
user@R2# set ge-2/1/1 unit 1 vlan-id 1002
user@R2# set ge-2/1/1 unit 1 family inet address 10.0.0.25/30
user@R2# set ge-2/1/1 unit 1 family iso
user@R2# set lo0 unit 0 family inet address 10.255.4.4/32
user@R2# set lo0 unit 0 family iso address 49.0001.0010.0000.0404.00
```

2. ??? ??? ?????.

```
[edit firewall family inet filter filter1]
user@R2# set term t1 from source-address 172.16.1.1/32
user@R2# set term t1 then next-interface ge-2/1/1.0
```

```
user@R2# set term t2 from source-address 172.16.2.2/32
user@R2# set term t2 then next-interface ge-2/1/1.1
```

3. ???????? IS-IS? ???????.

```
[edit protocols is-is]
user@R2# set interface all level 1 disable
user@R2# set interface fxp0.0 disable
user@R2# set interface lo0.0
```

??

?? ???? show interfaces, show firewall ? show protocols ??? ???? ??? ??????. ??? ??? ??? ???? ???, ? ?? ?? ? ?? ???? ??????.

```
user@R2# show interfaces
ge-2/1/0 {
    unit 0 {
        description to-R1;
        family inet {
            filter {
                input filter1;
            }
            address 10.0.0.10/30;
        }
        family iso;
    }
}
ge-2/1/1 {
    description to-R3;
    vlan-tagging;
    unit 0 {
        vlan-id 1001;
        family inet {
            address 10.0.0.13/30;
        }
        family iso;
    }
    unit 1 {
        vlan-id 1002;
```

```
        family inet {
            address 10.0.0.25/30;
        }
        family iso;
    }
}
lo0 {
    unit 0 {
        family inet {
            address 10.255.4.4/32;
        }
        family iso {
            address 49.0001.0010.0000.0404.00;
        }
    }
}
```

```
user@R2# show firewall
family inet {
    filter filter1 {
        term t1 {
            from {
                source-address {
                    172.16.1.1/32;
                }
            }
            then {
                next-interface {
                ge-2/1/1.0;
            }
        }
        term t2 {
            from {
                source-address {
                    172.16.2.2/32;
                }
            }
            then {
                next-interface {
                    ge-2/1/1.1;
                }
```

```
            }
        }
    }
}
```

```
user@R2# show protocols
isis {
    interface all {
        level 1 disable;
    }
    interface fxp0.0 {
        disable;
    }
    interface lo0.0;
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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□□□□ R1□□ □□□□ R4□ □□□□ □□□ □ □□ □□□ □□□□□ □□□□□.

??

???? R1?? ??? ????? traceroute .

```
user@R1> traceroute 10.255.6.6 source 172.16.1.1
traceroute to 10.255.6.6 (10.255.6.6) from 172.16.1.1, 30 hops max, 40 byte packets
 1  10.0.0.10 (10.0.0.10)  0.976 ms  0.895 ms  0.815 ms
 2  10.0.0.14 (10.0.0.14)  0.868 ms  0.888 ms  0.813 ms
 3  10.255.6.6 (10.255.6.6)  1.715 ms  1.442 ms  1.382 ms
```

```
user@R1> traceroute 10.255.6.6 source 172.16.2.2
traceroute to 10.255.6.6 (10.255.6.6) from 172.16.2.2, 30 hops max, 40 byte packets
 1  10.0.0.10 (10.0.0.10)  0.973 ms  0.907 ms  0.782 ms
 2  10.0.0.26 (10.0.0.26)  0.844 ms  0.890 ms  0.852 ms
 3  10.255.6.6 (10.255.6.6)  1.384 ms  1.516 ms  1.462 ms
```

??

??? ???? ???? ?? ???? ?? ? ?? ?? ????? traceroute ??????.

? ???? ????? ?? ????? R1?? ????? R4? ?? ?? ???? ??????. ?? IP ???? 172.16.1.1?? ???? ????? R2? ge-2/1/1.0 ? ?????? ??????. ?? IP ???? 172.16.2.2? ??, ???? ????? R2? ge-2/1/1.1 ??????? ??????.

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□ □□□□ □□□ □□□□ □□□ as □□□□ then next-ip □□□ □□ □□□.

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- MX □□□ 5G □□□□ □□□ □□□□ □□□ □□□ □□□ □□□ □□□□□ □□□ □ □□□□.
- □□□ □□□ □□□ □□□ □□□□□□ □□□□ Junos OS □□□ 12.2.
- (□□next-ip) □□□ next-interface □□ □□□ Trio MPC□□ □□□□□ □□□□□□□ □□□ □ □□□□. I-□ □□ DPC□ □□□ □□□□ □□ □□□ □□□□□.
- next-interface interface-name □□□□ □□□□ □□ □□□□□□ Trio MPC □□ I-□ □□ DPC□□ □□□□ □ □□□□.

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□ □□□ □□□□ R2□□ □□□ □□□ □□ □□□ □ □□ □□□ □□□□□ □□□□. □□ □□□ □□□□ IP □□□□□ □□□□ □□□□ □□□ □□□□□□ □□□ □□ □□ □□□ □□ □□□□□ □□□. □□□ □□□□□□ □□□ □□□□ □□□□ □□ □□□ □□□□□. R1>R3 □ R3>R1 □□□ □□□ □□□ □□□ □□□ □.

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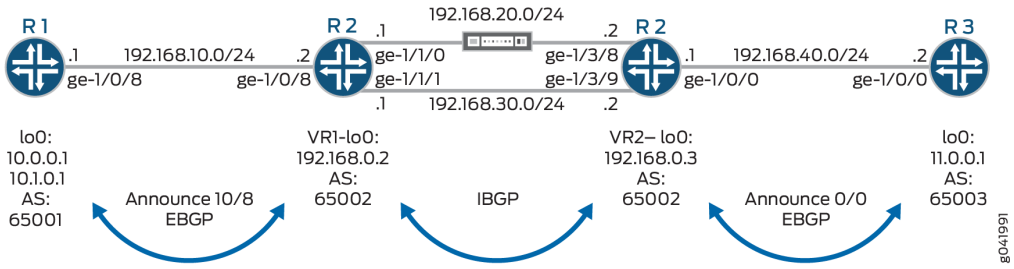

□□□□ R2□□ □□□ □□□ □□ □□□□ □□□□□ ge-1/0/8□ □□□□□. □ □□ □□□ □□ □□ □□ 10.0.0.0/24□ □□□□ □□□□ □□ 192.168.0.3□□ □□□□□□. □ □□□ □□ □ 192.168.20.2□ □□□□□. □□□□□ ge-1/1/0□ □□□ □□□ □□□□ □□ 192.168.0.3 □ □□ □ 192.168.30.2□ □□□□□.

□□□□ R2□□ □□□ □□□ □□ □□□□ □□□□□ ge-1/0/0□ □□□□□. □ □□ □□□ □□ □□ □□ 10.0.0.0/24□ □□□□ □□□□ □□ 192.168.0.2□ □□□□□□. □ □□□ □□ □ 192.168.20.1□ □□□□□. □□□□□ ge-1/3/8□ □□□ □□□ □□□□ □□ 192.168.0.2□ □□ □ 192.168.30.1□ □□□□□.

> **□:** □□□ □□□□ `next-ip` □□□ □□□ □□□□ □□□□ □□□□. □□□ □□□□□□□□□ □□□ □□□ □□□ □□□□ □□ □□ □□□ □ □□□ □□□□□ □□□□□.

□□□□ R2-VR1□ □□□□ R2-VR2 □□□□ □□ BGP(IBGP)□ □□□□□. □□ BGP(EBGP)□ □□□□ R1□ □□□□ R2-VR1 □□ □□□ □□□□ R2-VR2□ □□□□ R3 □□□□ □□□□□.

BGP □□□ □□□ □□ □□□□□.

- R2-VR1□ R1□□ 10/8□, R2-VR2□□ 0/0□ □□□□□.
- R2-VR2□ R3□□ 0/0□ □□□□ R2-VR1□□ 10/8□ □□□□□.
- R1□ 10/8□ □□□□ R2-VR1□□ 0/0□ □□□□□.
- R3□ 0/0□ □□□□ R2-VR2□□ 10/8□ □□□□□.

□□□□ R2□ □□□ □□□ □□□ □□ □□□ □□□□□(□ □□ EBGP □□)□ □□ □□□ □□□ □□□□ □□□□ □□□.

□ □□ □□□□ R2□ □□□ □□□□□.

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□□□□ R1

```
set interfaces lo0 unit 0 family inet address 10.0.0.1/32
set interfaces lo0 unit 0 family inet address 10.1.0.1/32
set interfaces ge-1/0/8 unit 0 family inet address 192.168.10.1/24
set routing-options autonomous-system 64501
set protocols bgp group eBGP neighbor 192.168.10.2 peer-as 64502
set protocols bgp group eBGP export Announce10
set policy-options policy-statement Announce10 term 1 from route-filter 10.0.0.0/8 exact
set policy-options policy-statement Announce10 term 1 then accept
set policy-options policy-statement Announce10 term 2 then reject
```

□□□□ R2

```
set interfaces ge-1/0/8 unit 0 family inet address 192.168.10.2/24
set interfaces ge-1/0/8 unit 0 family inet filter input SteerSrcTrafficOptimizer
set interfaces ge-1/1/0 unit 0 family inet address 192.168.20.1/24
set interfaces ge-1/1/1 unit 0 family inet address 192.168.30.1/24
set routing-instances VR1 instance-type virtual-router
set routing-instances VR1 interface ge-1/0/8.0
set routing-instances VR1 interface ge-1/1/0.0
set routing-instances VR1 interface ge-1/1/1.0
set routing-instances VR1 routing-options static route 192.168.0.3 next-hop 192.168.20.2
set routing-instances VR1 routing-options static route 192.168.0.3 qualified-next-hop
192.168.30.2 metric 100
```

```
set routing-instances VR1 routing-options autonomous-system 64502
set routing-instances VR1 protocols bgp group eBGP neighbor 192.168.10.1 peer-as 64501
set routing-instances VR1 protocols bgp group iBGP neighbor 192.168.30.2 peer-as 64502
set routing-instances VR1 protocols bgp group iBGP neighbor 192.168.30.2 export AcceptExternal
set firewall family inet filter SteerSrcTrafficOptimizer term 0 from source-address
192.168.10.0/24
set firewall family inet filter SteerSrcTrafficOptimizer term 0 then accept
set firewall family inet filter SteerSrcTrafficOptimizer term 1 from source-address 10.0.0.0/24
set firewall family inet filter SteerSrcTrafficOptimizer term 1 then next-ip 192.168.0.3 routing-
instance VR1
set firewall family inet filter SteerSrcTrafficOptimizer term 2 from source-address 10.0.0.0/8
set firewall family inet filter SteerSrcTrafficOptimizer term 2 then accept
set interfaces ge-1/0/0 unit 0 family inet address 192.168.40.1/24
set interfaces ge-1/0/0 unit 0 family inet filter input SteerDstTrafficOptimizer
set interfaces ge-1/3/8 unit 0 family inet address 192.168.20.2/24
set interfaces ge-1/3/9 unit 0 family inet address 192.168.30.2/24
set routing-instances VR2 instance-type virtual-router
set routing-instances VR2 interface ge-1/0/0.0
set routing-instances VR2 interface ge-1/3/8.0
set routing-instances VR2 interface ge-1/3/9.0
set routing-instances VR2 routing-options static route 192.168.0.2/32 next-hop 192.168.20.1
set routing-instances VR2 routing-options static route 192.168.0.2/32 qualified-next-hop
192.168.30.1 metric 100
set routing-instances VR2 routing-options autonomous-system 64502
set routing-instances VR2 protocols bgp group eBGP neighbor 192.168.40.2 peer-as 64503
set routing-instances VR2 protocols bgp group iBGP neighbor 192.168.30.1 peer-as 64502
set routing-instances VR2 protocols bgp group iBGP neighbor 192.168.30.1 export AcceptExternal
set firewall family inet filter SteerDstTrafficOptimizer term 0 from source-address
192.168.40.0/24
set firewall family inet filter SteerDstTrafficOptimizer term 0 then accept
set firewall family inet filter SteerDstTrafficOptimizer term 1 from destination-address
10.0.0.0/24
set firewall family inet filter SteerDstTrafficOptimizer term 1 then next-ip 192.168.0.2 routing-
instance VR2
set firewall family inet filter SteerDstTrafficOptimizer term 2 from destination-address
10.0.0.0/8
set firewall family inet filter SteerDstTrafficOptimizer term 2 then accept
set policy-options policy-statement AcceptExternal term 1 from route-type external
set policy-options policy-statement AcceptExternal term 1 then accept
```

□□□□ R3

```
set interfaces lo0 unit 0 family inet address 10.11.0.1/32
set interfaces ge-1/0/0 unit 0 family inet address 192.168.40.2/24
set routing-options autonomous-system 64503
set protocols bgp group eBGP neighbor 192.168.40.1 peer-as 64502
set protocols bgp group eBGP export Announce0
set policy-options policy-statement Announce0 term 1 from route-filter 0.0.0.0/0 exact
set policy-options policy-statement Announce0 term 1 then accept
set policy-options policy-statement Announce0 term 2 then reject
```

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□□□□ R2 □□:

1. □□□□□□ □□□□□.

```
[edit interfaces]
user@R2# set ge-1/0/8 unit 0 family inet address 192.168.10.2/24
user@R2# set ge-1/0/8 unit 0 family inet filter input SteerSrcTrafficOptimizer
user@R2# set ge-1/1/0 unit 0 family inet address 192.168.20.1/24
user@R2# set ge-1/1/1 unit 0 family inet address 192.168.30.1/24
user@R2# set ge-1/0/0 unit 0 family inet address 192.168.40.1/24
user@R2# set ge-1/0/0 unit 0 family inet filter input SteerDstTrafficOptimizer
user@R2# set ge-1/3/8 unit 0 family inet address 192.168.20.2/24
user@R2# set ge-1/3/9 unit 0 family inet address 192.168.30.2/24
```

2. □□□ □□□□□ □□□□□.

```
[edit routing-instances]
user@R2# set VR1 instance-type virtual-router
user@R2# set VR1 interface ge-1/0/8.0
user@R2# set VR1 interface ge-1/1/0.0
user@R2# set VR1 interface ge-1/1/1.0
user@R2# set VR2 instance-type virtual-router
user@R2# set VR2 interface ge-1/0/0.0
```

```
user@R2# set VR2 interface ge-1/3/8.0
user@R2# set VR2 interface ge-1/3/9.0
```

3. □□ □ BGP □□□□ □□□□□.

```
[edit routing-instances]
user@R2# set VR1 routing-options static route 192.168.0.3 next-hop 192.168.20.2
user@R2# set VR1 routing-options static route 192.168.0.3 qualified-next-hop 192.168.30.2
metric 100
user@R2# set VR1 routing-options autonomous-system 64502
user@R2# set VR1 protocols bgp group eBGP neighbor 192.168.10.1 peer-as 64501
user@R2# set VR1 protocols bgp group iBGP neighbor 192.168.30.2 peer-as 64502
user@R2# set VR1 protocols bgp group iBGP neighbor 192.168.30.2 export AcceptExternal
user@R2# set VR2 routing-options static route 192.168.0.2/32 next-hop 192.168.20.1
user@R2# set VR2 routing-options static route 192.168.0.2/32 qualified-next-hop 192.168.30.1
metric 100
user@R2# set VR2 routing-options autonomous-system 64502
user@R2# set VR2 protocols bgp group eBGP neighbor 192.168.40.2 peer-as 64503
user@R2# set VR2 protocols bgp group iBGP neighbor 192.168.30.1 peer-as 64502
user@R2# set VR2 protocols bgp group iBGP neighbor 192.168.30.1 export AcceptExternal
```

4. □□□ □□□ □□□□□.

```
[edit firewall family inet]
user@R2# set filter SteerSrcTrafficOptimizer term 0 from source-address 192.168.10.0/24
user@R2# set filter SteerSrcTrafficOptimizer term 0 then accept
user@R2# set filter SteerSrcTrafficOptimizer term 1 from source-address 10.0.0.0/24
user@R2# set filter SteerSrcTrafficOptimizer term 1 then next-ip 192.168.0.3 routing-instance
VR1
user@R2# set filter SteerSrcTrafficOptimizer term 2 from source-address 10.0.0.0/8
user@R2# set filter SteerSrcTrafficOptimizer term 2 then accept
user@R2# set filter SteerDstTrafficOptimizer term 0 from source-address 192.168.40.0/24
user@R2# set filter SteerDstTrafficOptimizer term 0 then accept
user@R2# set filter SteerDstTrafficOptimizer term 1 from destination-address 10.0.0.0/24
user@R2# set filter SteerDstTrafficOptimizer term 1 then next-ip 192.168.0.2 routing-instance
VR2
user@R2# set filter SteerDstTrafficOptimizer term 2 from destination-address 10.0.0.0/8
user@R2# set filter SteerDstTrafficOptimizer term 2 then accept
```

5. [illegible]

```
[edit policy-options policy-statement AcceptExternal term 1]
user@R2# set from route-type external
user@R2# set term 1 then accept
```

[illegible]

[illegible] [illegible] show interfaces, show firewall [illegible] show protocols [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@R2# show interfaces
ge-1/0/0 {
    unit 0 {
        family inet {
            filter {
                input SteerDstTrafficOptimizer;
            }
            address 192.168.40.1/24;
        }
    }
}
ge-1/0/8 {
    unit 0 {
        family inet {
            filter {
                input SteerSrcTrafficOptimizer;
            }
            address 192.168.10.2/24;
        }
    }
}
ge-1/1/0 {
    unit 0 {
        family inet {
            address 192.168.20.1/24;
        }
    }
}
ge-1/1/1 {
    unit 0 {
```

```
        family inet {
            address 192.168.30.1/24;
        }
    }
}
ge-1/3/8 {
    unit 0 {
        family inet {
            address 192.168.20.2/24;
        }
    }
}
ge-1/3/9 {
    unit 0 {
        family inet {
            address 192.168.30.2/24;
        }
    }
}
```

```
user@R2# show firewall
family inet {
    filter SteerSrcTrafficOptimizer {
        term 0 {
            from {
                source-address {
                    192.168.10.0/24;
                }
            }
            then accept;
        }
        term 1 {
            from {
                source-address {
                    10.0.0.0/24;
                }
            }
            then {
                next-ip 192.168.0.3/32 routing-instance VR1;
            }
        }
```

```
        term 2 {
            from {
                source-address {
                    10.0.0.0/8;
                }
            }
            then accept;
        }
    }
    filter SteerDstTrafficOptimizer {
        term 0 {
            from {
                source-address {
                    192.168.40.0/24;
                }
            }
            then accept;
        }
        term 1 {
            from {
                destination-address {
                    10.0.0.0/24;
                }
            }
            then {
                next-ip 192.168.0.2/32 routing-instance VR2;
            }
        }
        term 2 {
            from {
                destination-address {
                    10.0.0.0/8;
                }
            }
            then accept;
        }
    }
}
```

```
user@R2# show policy-options
policy-statement AcceptExternal {
```

```
    term 1 {
        from route-type external;
        then accept;
    }
}
```

```
user@R2# show routing-instances
VR1 {
    instance-type virtual-router;
    interface ge-1/0/8.0;
    interface ge-1/1/0.0;
    interface ge-1/1/1.0;
    routing-options {
        static {
            route 192.168.0.3/32 {
                next-hop 192.168.20.2;
                qualified-next-hop 192.168.30.2 {
                    metric 100;
                }
            }
        }
        autonomous-system 64502;
    }
    protocols {
        bgp {
            group eBGP {
                neighbor 192.168.10.1 {
                    peer-as 64501;
                }
            }
            group iBGP {
                neighbor 192.168.30.2 {
                    export NextHopSelf;
                    peer-as 64502;
                }
            }
        }
    }
}
VR2 {
    instance-type virtual-router;
```

```
    interface ge-1/0/0.0;
    interface ge-1/3/8.0;
    interface ge-1/3/9.0;
    routing-options {
        static {
            route 192.168.0.2/32 {
                next-hop 192.168.20.1;
                qualified-next-hop 192.168.30.1 {
                    metric 100;
                }
            }
        }
        autonomous-system 64502;
    }
    protocols {
        bgp {
            group eBGP {
                neighbor 192.168.40.2 {
                    peer-as 64503;
                }
            }
            group iBGP {
                neighbor 192.168.30.1 {
                    export NextHopSelf;
                    peer-as 64502;
                }
            }
        }
    }
}
```

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□□□□□ R1□□ □□ □□ □□□ □□□ □□□□□□ traceroute

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```
user@R1> traceroute 10.11.0.1 source 10.0.0.1
traceroute to 10.11.0.1 (10.11.0.1) from 10.0.0.1, 30 hops max, 40 byte packets
 1  192.168.10.2 (192.168.10.2)  0.519 ms  0.403 ms  0.380 ms
 2  192.168.20.2 (192.168.20.2)  0.404 ms  0.933 ms  0.402 m0
 3  10.11.0.1 (10.11.0.1)  0.709 ms  0.656 ms  0.644 ms
```

```
user@R1> traceroute 10.11.0.1 source 10.1.0.1
traceroute to 10.11.0.1 (10.11.0.1) from 10.1.0.1, 30 hops max, 40 byte packets
 1  192.168.10.2 (192.168.10.2)  0.524 ms  0.396 ms  0.380 ms
 2  192.168.30.2 (192.168.30.2)  0.412 ms  0.410 ms  0.911 ms
 3  10.11.0.1 (10.11.0.1)  0.721 ms  0.639 ms  0.659 ms
```

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```
user@R1> traceroute 10.11.0.1 source 10.0.0.1
traceroute to 10.11.0.1 (10.11.0.1) from 10.0.0.1, 30 hops max, 40 byte packets
 1  192.168.10.2 (192.168.10.2)  0.506 ms  0.400 ms  0.378 ms
 2  192.168.30.2 (192.168.30.2)  0.433 ms  0.550 ms  0.415 ms
 3  10.11.0.1 (10.11.0.1)  0.723 ms  0.638 ms  0.638 ms
```

```
user@R1> traceroute 10.11.0.1 source 10.1.0.1
traceroute to 10.11.0.1 (10.11.0.1) from 10.1.0.1, 30 hops max, 40 byte packets
 1  192.168.10.2 (192.168.10.2)  0.539 ms  0.411 ms  0.769 ms
 2  192.168.30.2 (192.168.30.2)  0.426 ms  0.413 ms  2.429 ms
```

```
3  10.11.0.1 (10.11.0.1)  10.868 ms  0.662 ms  0.647 ms
```

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? ???? ????? ?? ????? R1?? ????? R3?? ?? ?? ???? ??????. ?? IP ??? 10.0.0.1? ??, ???? ????? R2? ge-1/1/0.0 ??????? ??????. ?? IP ??? 10.1.0.1?? ???? ????? R2? ge-1/1/1.0 ??????? ??????.

ge-1/1/0? ge-1/3/8 ?? ???? ????? ?? IP ??? 10.0.0.1? ???? ????? R2? ge-1/1/1.0 ??????? ??????.

SEE ALSO

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- EX2200 □□□
- EX3300 □□□
- EX3200 □□□
- EX4200 □□□

- EX4300 ???
- EX4400 ???
- EX4100 ???
- EX4100-F ???
- EX4650 ???
- EX4500 ???
- EX4550 ???
- EX6200 ???
- EX8200 ???

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- EX2200 ????? ?? 512
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- EX3200 ? EX4200 ????? ?? 7,042 - ???? ???? ?? TCAM(Ternary Content Addressable Memory)? ?? ?? ? ?? ????.
- EX4300 ??????? ?? ? ?? ????, ??, VLAN ? ???? 3 ??????? ???? ???? ???? ?? ???? ?? ?? ?? ?? ??????.
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  - IPv4 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□
  - IPv6 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□

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- EX4400 □□□□ □□, □□ □ □□ □□□, □□, VLAN □ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□□ □□ □□ □□ □□ □□□□□.
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    - VLAN□ □□□ □□□ □□□ □□ □□ 512□.
    - □□□ 3 □□□□□□ □□□ □□□ □□□ □□ 1024□ □□.
- EX4100 □□□□ □□, □□, VLAN □ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □ □□ □□□□ □□ □□□ □□ □□ □□ □□ □□□□□.
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- EX4100-F □□□□ □□, □□, VLAN □ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □ □□ □□□□ □□ □□□ □□ □□ □□ □□ □□□□□□.
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- EX4650 □□□□ □□, □□, VLAN □ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □ □□ □□□□ □□ □□□ □□ □□ □□ □□ □□□□□□.
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- EX4500 □ EX4550 □□□□ □□ 1200
- EX6200 □□□□ □□ 1400
- EX8200 □□□ □□ 32,768□

□: EX8200 □□□□□ □□ □□ TCAM□ □□□□ □□ □□□ □□□ □□□ □□ □□ □□□ □□□□□□ □□□□□□. □□□ □□□ □ □□ □□ □□ □□ □□□□□. □□ □ VLAN □□□ □□ □□□□(□ □□ □□□ □□□□ 22K) □□□ □□□ □□□ □□□ □□□□□ (□ □□ □□□□ 32K). □□□ □□ □ □□□ □□ □□□□□. □□ □□ □□□ □□□ □□ □ □□□ □□□ □□□ □□ □□□ □□□ □ □□ □□. TCAM □□□□ □□□□ □□□ □□□ □□□□□ □□ □□ □□□□ □□□□□.

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- Action(□□) - □□□ □□ □□□ □□□□ □□ □□□ □□□ □□□□□. □□□ □□□ □□□ □□ □□ □□□□□ □□□ □□ □□ □□□ □□□□□□ □□□ □ □□□. □□ □□□ □□□□□ □□ □□□ □□□ □ □□□□. □□□ □□ □□□ □□□□ □□ □□, □□ □□□ □□□ □□□□ □□□□.
- Action modifier - □□□ □□ □□□ □□□□ □□ □□□□ □□ □□ □□□ □□□ □□□□□. □□, □□□, □□ □□ □ □□ □□□ □□ □□ □□□□ □ □□ □ □□□□.

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- EX3300 □□□□□ □□□ □□ □□ 1436□□ □□□ □ □□□□.
- EX3200 □ EX4200 □□□□□ □□□ □□ □□ 7042□ □□□ □ □□□□.
- EX2300 □□□□□□ □□ □ □□ □□□, □□, VLAN □ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□□ □□ □□ □□ □□ □□□□□.
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    - VLAN□ □□□ □□□ □□□ □□ □□ 128□
    - IPv4 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□
    - IPv6 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□

  EX3400 □□□□□□ □□ □ □□ □□□, □□, VLAN □ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□□ □□ □□ □□ □□ □□□□□.

  - □□ □□□:
    - □□□ □□□ □□□ □□□ □□ □□ 512□
    - VLAN□ □□□ □□□ □□□ □□ □□ 512□
    - IPv4 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□
    - IPv6 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□
  - □□ □□□:
    - □□□ □□□ □□□ □□□ □□ □□ 512□
    - VLAN□ □□□ □□□ □□□ □□ □□ 256□
    - IPv4 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 1024□
    - IPv6 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 1024□

  EX4300 □□□□□□ □□ □ □□ □□□, □□, VLAN □ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□□ □□ □□ □□ □□ □□□□□.

- □□ □□□:
  - □□□ □□□ □□□ □□□ □□ □□ 3500□
  - VLAN□ □□□ □□□ □□□ □□ □□ 3500□
  - IPv4 □□□□ □□ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □□ 7000□
  - IPv6 □□□□ □□ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □□ 3,500□

    □: EX4300 □□□□ □□ □□□□ □□ TCAM(Ternary Content Addressable Memory) □□□ 256□ □□□□□.

- □□ □□□:
  - □□□ □□□ □□□ □□□ □□ □□ 512□
  - VLAN□ □□□ □□□ □□□ □□ □□ 256□
  - IPv4 □□□□ □□ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □□ 512□
  - IPv6 □□□□ □□ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □□ 512□

    □: □□□□ □ □□ □□□ □□□ □□(□□, VLAN □□ □□□(□□□ 3) □□□ □□)□ □□□□ □□□□ □□□□□□□□ □□ □□□ □□□□□ □□ □□□□ □□ □□ □□ □□□ □ □□□□.

- EX4500 □ EX4550 □□□□□ □□□ □□ □□ 1,200□□ □□□ □ □□□□.
- EX6200 □□□□□ □□□ □□ □□ 1400□□ □□□ □ □□□□.
- EX8200 □□□□□ □□□ □□ □□ 32,768□□ □□□ □ □□□□.

□□ □□ □□ □□□ □□ □□ □□ □□□ □ □□ □□□ □□□ □□ □□□ □ □□ □□□ □ □□□□ □ □□□□ □ □□□ □□□ □□□□ □□(□□) □□ □□□□□ □ □□□ □□□. □□□□□ □□ □□□ □ □□□ □□□□□□□ □□□ □□□ □□□□ □□ □□□ □□□ □□□□□ □□□ □□□□□ □□□ □ □□□□.

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1. □□□ □□□ □□□ □□□□□?

   □□ □□, □□□ □□□ □□□□ □□□□ □□ □ □□ MAC □□, □□ □□□□ □□ □□ □□□ □□□ □□□□□ DoS(□□□ □□) □□□ □□□ □ □□□□.

2. □□□ □□ □□□ □□□□□?

   a. □□□ □□ □□□ □□□□ □□ □□ □□ □□□ □□□□□. □□□ □□□ □□□ □□□□.

      - □□□ 2 □□ □□ - □□ □ □□ MAC □□, dot1q □□, □□□ □□ □ VLAN

- ??? 3 ?? ?? - ?? ? ?? IP ??, ????? ? IP ??(IP ?????, IP ??? ???, TTL ??)
- TCP ?? ?? - ?? ? ?? ??? ???
- ICMP ?? ?? - ?? ?? ? ??

b. ??? ??? ??, VLAN ?? ??? ??????? ??????.

3. ??? ??? ?? ??? ? ??? ??? ??????

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4. ?? ?? ?? ????? ??? ? ?????

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5. ?? ??????? ??? ??? ????? ???

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- ?????? ?? ??? ????? ??? ?? ??? ??? ??? ??????.

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6. ??? ??? ?? ????? ????? ???

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EX ??? ????? ??? ?? ?? | 1447

??? ????? ??? ?? ?? | 2076

??? ?? ?? ?? ?? | 1462

EX ??? ???? ?? ?? ?? ??? ?? | 1578

?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | 1578

?: ??? ??????? ???-?? ??? ?? ?? ??? ?? | 1611

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in this section

- ?? ?? ?? | 1456
- ?? ?? ?? ?? | 1456
- ????? ?? ?? ?? | 1457
- IP ?? ?? ?? ?? | 1458
- MAC ?? ?? ?? ?? | 1458
- ?? ?? ?? ?? ?? | 1459

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from*???? ??* ??? ??? ?? ? ? then ???? ??? ?????? ?? ??? ??????. **then** ??? ??? **then interfacethen vlan**???? ? . from ???? ?? ??? ???? ??? ??????. ?? ??? ???? ??? ???? ????. ??? ??? ?? ??? ??? ?? ??? ???? ??????.

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source-port 25;
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- ??? synonym for a single number— ?? ?? ???? ???? ??? ???? ??? ?????. ? ?? ?? ?? ??? ????.

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source-port http;
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```
[edit firewall family family-name filter filter-name term term-name from]
vlan 10;
vlan 30;
```

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- ?? ??? ??? ? ????.

- ??? ??? ? ??? ??? ? ????.

- ?? ?? ?? ???? ?? ?? ??? ? ????. ?? ??, ?? ??? ??? ?? ?? ?? ???? ???? ??? ??? ? ????.

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```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set interface ge-0/0/1
```

?? ? VLAN ??????? ???? ?? ???? ???? ????. ???? ??? ??????? ???? ??? ??? ??? ?? ?????? ?? ?? ???? ?? ?? ??? ??? ? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set interface ge-0/1/0.0
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```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set interface ge-0/*/1
user@switch# set interface ge-0/1/*
user@switch# set interface ge-*
```

IP □□ □□ □□ □□

□□ □□ □□ □□□□ IP □□ □ □□ □□□□□ □□ □□□□ □□□□ □□ □□□□ □ □□□□□. □□ □□ □□ □□□□ □□, □□□□ □□□□□ □□□□□ □□□□ □□□□□ □□ □□ □□□□ □□□□ □□□□ □□□□□□.

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```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-address 10.2.1.0/28;
```

□ □□□□□□ □□□□ 0/0 except □□ □□□□□ □□□□, □□ □□□□ □□□□□ □□□□□ □□ □□□□□ □□□□□□ □□□□□ □□ □□□□ □□□□□ □□□□□□.

□□ □□□□□ □□□□□□ prefix/prefix-length □□□□□ □□□□□□. prefix-length□ □□□□□ □□□□□ /32□□□□. □ □□ □□ □□ □□□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-address 10
[edit firewall family family-name filter filter-name term term-name from]
user@switch# show destination-address
10.0.0.0/32;
```

□□ □□□□ □ □ □□□□ IP □□□□ □□□□□□ □□ □□ □□ □ □□□□ □□□□□□. □□ □□, □□ □□ **source-address** □□ source-address □□□□ □ □□□□ □□□□□ □□ □□ □□□□□ □□□□ □□□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-address 10.0.0.0/8
user@switch# set source-address 10.1.0.0/16
```

MAC □□ □□ □□ □□

MAC □□ □□ □□ □□□□ □□□□ □□ □ □□ MAC □□ □□ □□□□□ □ □□□□□. MAC □□ □□ □□ □□□□ □□, □□□□ □□□□□ □□□□□ □□□□ □□□□□ □□ □□ □□□□ □ □□□□ □□□□□□.

MAC ??? ?? ??? 6?? ???? ??? ? ????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-mac-address 0011.2233.4455
```

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-mac-address 00:11:22:33:44:55
```

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set destination-mac-address 001122334455
```

?? ??? MAC ??? ? ? ?? ?????? ?? ?? ?? ? MAC ??? ??????. ?? ??, ?? ?? **source-mac-address** ?? ?? ? ??? ???? ?? ?? ???? ??? ??????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set source-mac-address 00:11:22:33:44:55
user@switch# set source-mac-address 00:11:22:33:20:15
```

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?? ?? ?? ??? ?? ??? ?? ??? ?????? ???? ?? ?? ?? ??? ??????. IP ??, TCP ??? ? IP ??? ??? ???? ? ????. ?? ?? ?? ?? ??? ??, ??? ???? ???? ???? ??? ??? ??? ???? ?? ????????.

???? ?? ?? ?? ?????? ?? ?????? ????. ?? ??, TCP ??? ??? ??? ??? ?? **RST** ??? ??????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "rst"
```

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□ 87: □□ □□ □□ □□□□ □□□□□ □□ □□ □□□

□□ □□□	□□
!	□□.
&	□□□ AND.
|	□□□ OR.

□□ □□□ □□□□□□□ □ □□ □□□□ □□□□. □□ □□, TCP □□□ □□□ RST □□□ □□□□ □□ □□□□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "!rst"
```

□□ □□□ AND □□ □□□ □□□ TCP □□□ □□ □□□ □□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "syn&!ack"
```

□□ □□□ OR □□ □□□□ □□□ TCP □□ □□ □□ □□□ □□□ □□ □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags "syn|fin"
```

□□ OR □□□ □□, □□ □□□ □□ 2□□ □□ □□□ □□□ □ □□□□. □□ OR □□□□ □ □ □□□ □□ □□ □□ □□□□□ □□ □□, □□ □□ □□ □□ □ □□□ □□□ □□ □□□ □□□□□ □□□□□. □□ □□□ □□□ □ □□□ TCP □□□ □□□ SYN, ACK, FIN □□ RST □□□ □□□□□.

```
[edit firewall family family-name filter filter-name term term-name1 from]
user@switch# set tcp-flags "syn|ack"
[edit firewall family family-name filter filter-name term term-name2 from]
user@switch# set tcp-flags "fin|rst"
```

??? ????? ????? ? ?? ????? ?? ?? ??? ??? ? ?????. ??? ?? ??? ?? ????? ??????. ??? ????? ?? ??? ??? TCP ??? ?? ??? ?? ??? ??????.

```
[edit firewall family family-name filter filter-name term term-name from]
user@switch# set tcp-flags tcp-initial
```

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EX ??? ???? ???? ?? ?? | 1447

??? ??? ??? ?????? ?????? ?? ?? | 1577

?: EX ???? ????? ??, VLAN, ??? ???? ???? ?? ????? | 1578

?: ??? ??????? ???-?? ???? ?? ?? ???? ?? | 1611

EX ???? ????? ???? ?? ?? ??, ?? ? ?? ?? | 1466

??? ??? ?? ??? ???? ?? ??

??? ???? EX ??? ??? ???? ??? ??? ?? ??? ??? ??? ? ?? ??? ??? ??????. *???? ??*? ???? ???? ??? ? ???? ? ??? ??? ??????. *??? ??*? ???? ?????? ???? ?? ???? ??? ??????. ?? ???? ?????? ??? ???? ???, Telnet ?? SSH ? ?? IP ????? ?? ???, ICMP(Internet Control Message Protocol)? ?? ?? ?????? ?? ???? ??????.

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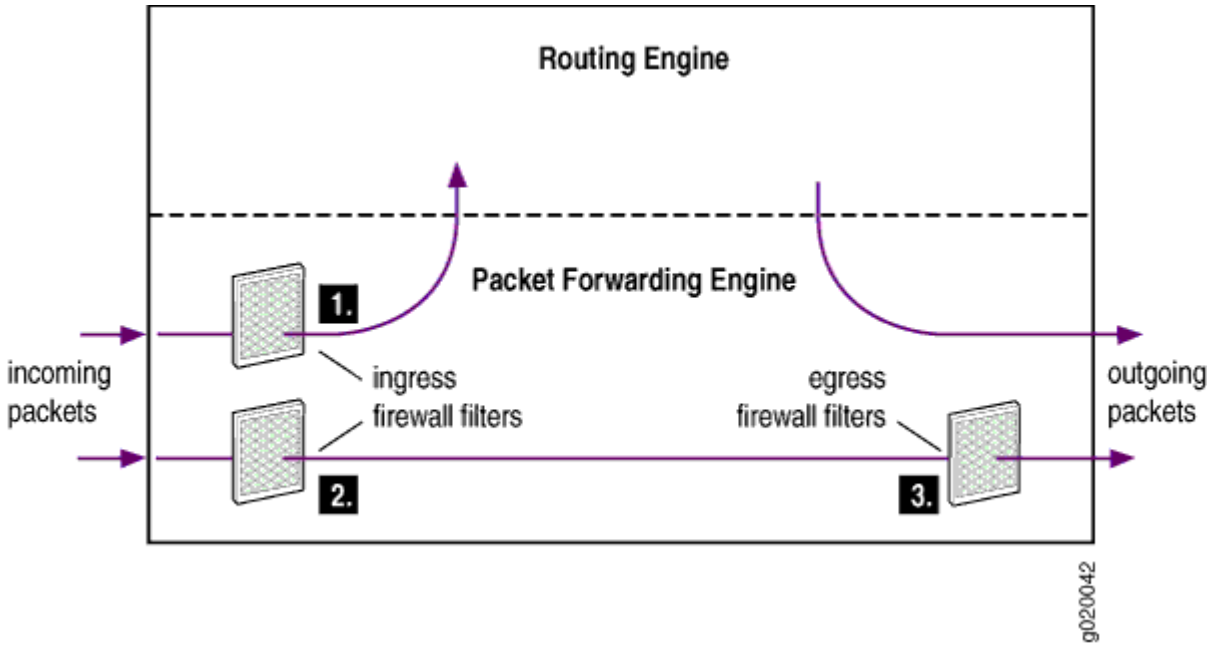
- ?? ??? ??? ????? ????????? ????? ??? ??? ????? ??? ?????, ??? ????? ??? ??? ?? ??? ?????? ??? ??? ??? ?. ?? ?? ??? ?????? ????? ??? ??? ????? ????? ?? ??? ??? ??? ??????. ?? ?? ??? ??? ??? ?? ?? ??? ????? ?.

?? 69 ??? 1462 ?(?) ????? ????? ??? ??? ????? ?? ?? ? ?? ??? ??? ??? ??????.

□□ 69: □□ □□ □□□ □□ □□□ □□ □□



1. □□□□ □□□□□□□ □□□□ □□□ □□□□ □□□ □□□ □□□ □□□ □□□□ □□ □□□□ □□ *□□□ □□*.
2. □□□ □□□□□□□ □□□□ □□□ □□□□ □□ □□□ □□ □□□ □□□□□.
3. □□□□ □□□□□□ □□□□ □□□ □□□□ □□ □□□ □□ □□□ □□□□□.

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EX □□□ □□□□□ □□□ □ □□□□ □□□ □□ □□□ □□ □□ □□ □□ | 1464
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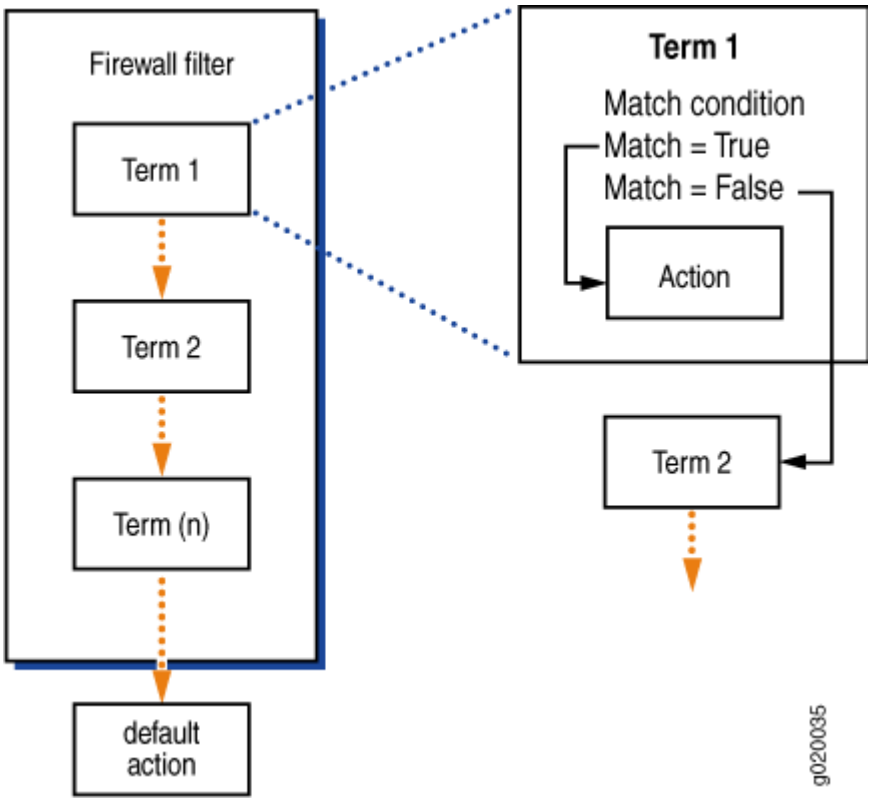
1. [illegible] [illegible] [illegible] [illegible] from [illegible] [illegible] [illegible] [illegible].
2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] then [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible].
3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] from [illegible] [illegible].

   [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] from [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].
4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] 70 [illegible] 1463 [illegible](EX [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] 70: [illegible] [illegible] [illegible] [illegible] [illegible]



[illegible] [illegible] [illegible] [illegible] [illegible] from [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] then [illegible] [illegible].

[illegible] [illegible] [illegible] then [illegible] [illegible] [illegible] then [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] from [illegible] [illegible] [illegible] [illegible].

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```
term implicit-rule {
then discard;
}
```

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> □: EX □□□ □□□□□ □□, VLAN, □□□ □□□□ □□□ □□ □□□□ | **1578**

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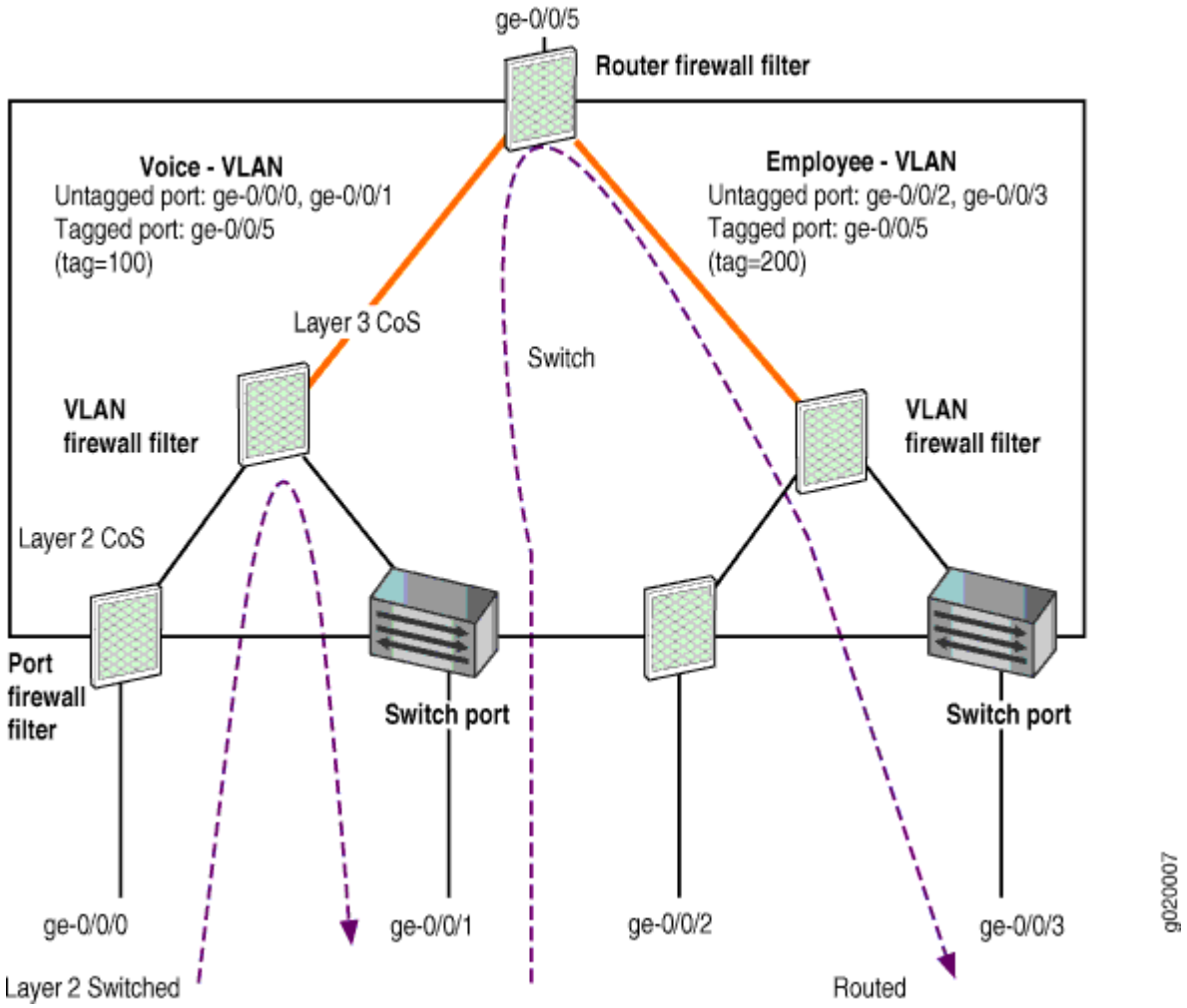

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- □□ VLAN □□□ □□

□□□ 3(□□□ □ □□□□□ □□□) □□□□□ □□□ □□ □□ □□□ □□ □□ □□□ □□□□□.

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- □□ VLAN □□□ □□

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EX □□□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□

in this section

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EX □□□ □□□□ □□ □□□ □□□ □□□ □, □□□ □□ □□□ □□(*terms*, □ □□ *match conditions*)□ □□□□ *action* □□□ □□□ □□□ □□ □ □□ □□□□ □□ □□□ □□(□ □□□□□) *action modifier*□ □□□□□. □□□ □□□ □□□□ IPv4, IPv6 □□ □ IP □□□□ □□□□□ □ □□□ □.

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□ 89 □□□ 1467 □(□) EX □□□ □□□□ □□□ □□□ □□ □□□□ □□ □□ □□□ □□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□

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destination-address *ip-address*	□□ □□ □□□ □□□ IP □□ □□ □□□□□.
ip-destination-address *ip-address*	□□ □□ □□□ □□□ IP □□ □□ □□□□□.
ip6-destination-address *ip-address*	□□ □□ □□□ □□□ IP □□ □□ □□□□□.
destination-mac-address *mac-address*	□□□ □□ □□□ □□□ □□(MAC) □□□□□. □ □□ **destination-mac-address 00:01:02:03:04:05/24**□□□□ □□□□ □□ MAC □□□ □□□ □ □□□□. □□□□ □□□□ □□□ □□□ 48□ □□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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destination-port ***number***	TCP □□ UDP □□ □□. □□□□□ □ □□ □□□ □□ **ip-protocol** □□ □□□ □□ protocol □□ □□ □□□□ □□ □□□□□ □□□□□ □□□□□. □ □□ *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)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)mobilip-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)telnet (23)tftp (69)timed (525)who (513)xdmcp (177)zephyr-clt (2103)zephyr-hm (2104)**
destination-prefix-list ***prefix-list***	IP □□ □□□ □□ □□□□□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□ □□□ [edit policy-options] □□□□□.
dot1q-tag *number*	□□□ □□□ □□ □□. □□ □□ □□□ 1□□ 4095 □□□□□. dot1q-tag □□ □□□ **vlan** □□ □□□ □□ □□□□□□.
user-vlan-id *number*	□□□ □□□ □□ □□. □□ □□ □□□ 1□□ 4095 □□□□□. user-vlan-id □□ □□□ learn-vlan-id □□ □□□ □□ □□□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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dot1q-user-priority *number*	□□□ □□□ □□□ □□□ □□□ □□ □□ □□□□□. □□□ □□ □□ □□ □□□ 0□□ 7□□□□□. □ □□ *number*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□).
user-vlan-1p-priority *number*	□□□ □□□ □□□ □□□ □□□ □□ □□ □□□□□. □□□ □□ □□ □□ □□□ 0□□ 7□□□□□. □ □□ *number*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□).

- **background (1)**- □□
- **best-effort (0)**—□□□ □□
- **controlled-load (4)**- □□□ □□
- **excellent-load (3)**- □□□ □□
- **network-control (7)**- □□□□ □□ □□□ □□□
- **standard (2)**- □□ □□ □□ □□
- **video (5)**—□□□
- **voice (6)**—□□□

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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dscp *number*	DSCP(Differentiated Services Code Point)□ □□□□□. DiffServ □□□□□ IP □□ □ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□□. □ □□ *number*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□). • **ef (46)**- RFC 2598, *□□□ □□□ PHB*□ □□□□ □□□□. • **af11 (10)**, **af12 (12)**, , **af21 (18)af13 (14)**, **af22 (20)**, , **af23 (22)** **af31 (26)**, **af32 (28)**, , **af33 (30)**, **af41 (34)**, **af42 (36)af43 (38)** □ □□□□ 3□□ □□ □□ □□□ □□ □ 4□□ □□□□ RFC 2597, *Assured Forwarding PHB Group*□ 12□ □□ □□□□ □□ □□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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ether-type ***value***	□□□ □□□ □□ □□□□□. *□ /□□* □□□ □□□□□ □□□□ □□□□□ □□□□□. □ □□ *value*□□ □□□ □ □□ □ □□□ □□□ □ □□□□. • **aarp**- EtherType □ AARP(0x80F3) • **appletalk**—EtherType □ AppleTalk(0x809B) • **arp**- EtherType □ ARP(0x0806) • **ipv4**—EtherType □ IPv4(0x0800) • **ipv6**- EtherType □ IPv6(0x08DD) • **mpls multicast**- EtherType □ MPLS □□□□□(0x8848) • **mpls unicast**—EtherType □ MPLS □□□□□(0x8847) • **oam**- EtherType □ OAM(0x88A8) • **ppp**—EtherType □ PPP(0x880B) • **pppoe-discovery**—EtherType □ PPPoE 0x8863(Discovery Stage) • **pppoe-session**—EtherType □ PPPoE □□ □□□□(0x8864) • **sna**- EtherType □ SNA(0x80D5) □: □□ □□ □□□ □(□) □ □□□ □□ **ether-type** □□□□ □□□□.**ipv6** • **dscp** • **fragment-flags** • **is-fragment** • `precedence` □□ `ip-precedence` • `protocol` □□ `ip-protocol`

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

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fragment-flags *fragment-flags*	IP □□□ □□□□, □□ □□ □□ 16□□ □□□□ □□□□□. □□ □□ □ □□□ □□□ □ □□□□. • **dont-fragment** (0x4000) • **more-fragments** (0x2000) • **reserved** (0x8000)
GBP-DST □□	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□ □□□□□ □□ □□□ □□□□□□. □: VXLAN □□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□
gbp-src-□□	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□ □□□□□ □□ □□□ □□□□□□. □: VXLAN □□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□
icmp-code *number*	ICMP □□ □□□□□. □ □ □□ □□□ □□ **icmp-type**□ □□□□ □□□ □□□□□. □□ □□□ □□□ **icmp-type**□ □□ □□□□□ □ **icmp-code**□□ □□□□ **icmp-type** □□□. □ □□ *number*, □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□ □□□ ICMP □□□□ □□□□□ □. • **parameter-problem—ip-header-bad (0), required-option-missing (1)** • **redirect—redirect-for-host (1), redirect-for-network (0), redirect-for-tos-and-host (3), redirect-for-tos-and-net (2)** • **time-exceeded—ttl-eq-zero- during-reassembly (1), ttl-eq-zero-during-transit (0)** • **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)**

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
icmp-type *number*	ICMP □□ □□ □□□□□. □□□□□ □ □□ □□□ □□ `ip-protocol` □□ □□□ □□ `protocol` □□ □□ □□□□ □□ □□ □□□□□ □□□□□. □ □□ *number*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□). **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)**, **unreachable (3)**
interface *interface-name*	□□□ □□□□ □□□□□□□□. □□□□□ □□(*)□ □□□□□ □□□ □□□ □□□ □ □□□□. □: Junos OS Evolved□ □□□□ □□□□□□ □□ □□ *IRB* □□□□□□ `interface` □□ L2 IFL □□□□ □□□□□. □: EX8200 Virtual Chassis□ **interface** □□ □□□□□ □□ □□□ □□□□ □□□□.
ip-options	IP □□□ □□ □□□ □□□ □□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□
ip-version *version match_condition(s)*	□□ □ VLAN □□□ □□□ □□ IP □□□□ □□ □ □□□□□. □ □□ *version* □□ □□ **ipv6**□ □ □□ □□**ipv4**. □□ ip-version □ □□□□, □□□ □□□□ □□□□ □□ □□□ □□ □□ □□□ □□ **□□ □□□** . • destination-address, ip-destination-address□□ ip6-destination-address • **destination-port** • **destination-prefix-list** • **dscp** • **fragment-flags** • **icmp-code** • **icmp-type** • **is-fragment** • precedence □□ ip-precedence • protocol □□ ip-protocol • source-address □□ ip-source-address • **source-port** • **source-prefix-list** • **tcp-established** • **tcp-flags** • **tcp-initial**
is-fragment	□□□ □□ □□□ □□ □ □□ □□□ □□□□ □□□ □ □□ □□□ □□□□ □□□□. □ □□□ □□□□ □ □□ □□ □ □□□ □□□ □□□□□□□. □: EX2300, EX3400 □ EX4300 □□□□ □□□□ □□ □ □□ □□□ "□□□ □□□ □□□"□ □□□ □ □□□□ □□□ □□□ □□□ □□□□ □□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
l2-encap-type llc-non-snap	□□□□ □□□ □□□□(SNAP) □□□ □□□ □□□ □□ LLC(□□□ □□ □□) □□ □□□□ □□□□□.
next-header *bytes*	IPv6 □□ □□ □□ □□ □□ □□□ □□□□ 8□□ □□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). **ah (51), dstops (60), egp (8)esp (50)fragment (44)gre (47)hop-by-hop (0)icmp (1)icmp6 (1)igmp (2)ipip (4)ipv6 (41)no-next-header (59)ospf (89)pim (103)routing (43)rsvp (46)sctp (132)tcp (6)udp (17)vrrp (112)**
packet-length *bytes*	□□□ □□□ □□(□□□)□□□. □□□ □□ □□□ □□□ IP □□□ □□□□, □□□ 2 □□□ □□□□□ □□□□ □□□□.
precedence *precedence*	IP □□ □□. □ □□ *precedence*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□). **critical-ecp (5), , flash (3), immediate (2)flash-override (4), internet-control (6), net-control (7), , priority (1)routine (0)**
ip-precedence *precedence*	IP □□ □□. □ □□ *precedence*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□). **critical-ecp (5), , flash (3), immediate (2)flash-override (4), internet-control (6), net-control (7), , priority (1)routine (0)**
protocol *list of protocol*	IPv4 □□□□ □. □ □□ *protocols*□□ □□□ □□□ □ □□□ □□□ □ □□□□. **egp (8), esp (50), , icmp (1)gre (47), igmp (2), , ipip (4) ospf (89), pim (103), rsvp (46), , tcp (6)udp (17)**
ip-protocol *list of protocol*	IPv4 □□□□ □. □ □□ *protocols*□□ □□□ □□□ □ □□□ □□□ □ □□□□. **egp (8), esp (50), , icmp (1)gre (47), igmp (2), , ipip (4) ospf (89), pim (103), rsvp (46), , tcp (6)udp (17)**
source-address *ip-address*	IP □□ □□ □□□, □□□ □□□□ □□ □□□ □□□□□. IPv6□ □□, source-address □□□ □□□ 128□□□□□. □□ □□ □□□ RFC 2373, *IP □□ 6 □□ □□ □□□□□* □□□ IPv6 □□□ □□ □□ □ □□□ □□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ *(Continued)*

□□ □□	□□
ip-source-address (*ip-address* / *ip6-address*)	IP □□ □□ □□□, □□□ □□□□ □□ □□□ □□□□□. IPv4 □□(ip-address) □□ IPv6 □□(ip6-address)□ □□□ □ □□□□. IPv6□ □□ ip-source-address □□□ □□□ 128□□□□□. □□ □□ □□□ RFC 2373, *IP □□ 6 □□ □□ □□□□□* □□□ IPv6 □□□ □□ □□□ □□□ □□□□□.
source-mac-address *mac-address*	□□ MAC □□□□□. □□ MAC □□□ □□□ □□ **source-mac-address 00:01:02:03:04:05/24**□□□□ □□ □ □ □□□□. □□□□ □□□□ □□□ □□□ 48□ □□□□□.
source-port *number*	TCP □□ UDP **source-port** □□. □□□□□ □□ □□ □□□ □□ protocol**ip-protocol** □ □ □□ □□□□ □□□□ □□ □□ □□□□□ □□□□□. □ □□ *number*, □□□ **destination-port**□□□ □□□ □□□ □ □□□ □□□ □ □□□□.
source-prefix-list *prefix-list*	IP □□ □□□ □□ □□□□□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□ □□□ [edit policy-options] □□□□□.
tcp-established	□□□ TCP □□□ TCP □□□□□. □ □□□ □□□ □ □□ □□ □□□ □□□ □□□□□. **tcp-established** □ □□ □□□ **"(ack | rst)"**□□□□□□. **tcp-established** □□□□□ TCP□□ □□□ □□□□□ □□□□ □□□□. □□□ □□□ □□ □□□ □□□ □□ **next-header tcp** .
tcp-flags (*flags* tcp-initial)	□□ □□□ TCP □□□: • □□ □□—**fin**, **syn**, **rst**, **push**, **ackurgent** • □□ □□□ **-&** (□□□ AND), **|** (□□□ OR), **!** (□□) • □□ □ - 0x01 - 0x20 • □□□ □□□—**tcp-initial** □□ □□□□ □□□□□ □□ □□□□ □□□□□.

□ 89: EX □□□ □□□□□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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tcp-initial	□□□ □ □□ TCP □□□ □□□□□. **tcp-initial** □ □□ □□□ **"(syn&!ack)"**□□□□□□. **tcp-initial** □□□□□ TCP□□ □□□ □□□□□ □□□□ □□□□. □□□ □□□ □□ **ip-protocol tcp** □□ □□□ □□□□□protocol tcp.
traffic-class *number*	□□□ □□ DSCP □□ □□□□ □□□□□.
ttl *value*	□□□□ TTL □□□□□. □□ □□□ 1□□ 255 □□□□□.
vlan (*vlan-name* | *vlan-id*)	□□□ □□□ VLAN□□□. □ □□ *vlan-id*VLAN ID □□ VLAN □□□ □□□ □ □□□□. **vlan** □ □ □□□ **dot1q-tag** □□ □□□ □□ □□□□□□.
learn-vlan-id (*vlan-name* | *vlan-id*)	□□□ □□□ VLAN□□□. □ □□ *vlan-id*VLAN ID □□ VLAN □□□ □□□ □ □□□□. **vlan** □ □ □□□ **user-vlan-id** □□ □□□ □□ □□□□□□.

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□□□ □□ □□□ □□□ □□□ □□□ □□□ □□ □□□□ □□□ □□□ □□□ □ □□□□. □ 90 □□□ 1477 □□□ □□□ □□ □□□□ □□□□ □□□ □□□□ □.

□ 90: □□□ □□□ □□ □□

□□	□□
accept	□□□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□□ □□□□.

□ 90: □□□ □□□ □□ □□ *(Continued)*

□□	□□
reject *message-type*	□□□ □□□ ICMPv4 □□□(□□ 3) **destination unreachable**□ □□□□. □□ □□□□ □□ **syslog** □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □□ □ □□□ □□□ □ □□□□. **administratively-prohibited (default), bad-host-tos, bad-network-tos, host-prohibited, host-unknown, host-unreachable, network-prohibited, network-unknown, network-unreachable, port-unreachable, precedence-cutoff, precedence-violation, protocol-unreachable, source-host-isolated, source-route-failed, tcp-reset**. □ □□□□ **tcp-reset**□□□ TCP □□□ □□ TCP □□□□ □□□□□. □□□ □□□ □□ □□ □□□□ □□□ □. □□□ □□□ □□□□ □□□ ICMP □□ **destination unreachable** □ □□ □□□ **communication administratively filtered**□ □□ □□□□□.
routing-instance *routing-instance-name*	□□□□ □□□ □□ □□□ □□□□□ □□□□□. □: EX4200 □□□□ □□ □□□ □□□□□□ □□□ □□ □□ □□□□□ □□□□ □□□□.
vlan *vlan-name*	□□□□ □□□ □□ VLAN□□ □□□□□. □□□ □□□ □□□□ □□□□ **vlan** VLAN □□ □□ VLAN ID□ *vlan-range* □□□□ VLAN □□□ □□□□ □□□ □□□. □: dot1q □□□□ □□□ □ □□ VLAN□ □□□ □□ □□ □□ VLAN□ □□ VLAN □□□ □□□ □□ □□(□□ □□ **vlan** *vlan-name*)□□ □□□□ □□□□.

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□ □ 90 □□□ 1477□□□ □□ □□□, □□□ □□ □□□ □□□ □□□ □□□ □□□□ □□ □□□□ □□ □□□ □□ □□□□ □□ □□□□ □□□ □ □□□□. □ 91 □□□ 1479 □□□ □□□ □□ □□□□ □□□□ □□ □□□□ □□□□.

□ 91: □□□ □□□ □□ □□ □□□

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analyzer *analyzer-name*	□□□□ □□□ □□□□□□□ □□□ □□□ □□ □□ □□ VLAN□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□ □ □□□ □□ □□□ □□ □□□ □□□ □□□□ □□□□ □□□ □□□□□. □□□ □□□ □□ [edit ethernet-switching-options analyzer]□□□□ □□□. □: **analyzer** □(□) □□ □□□□□□ □□ □□□□ □□ □□□□ □□□□. □: EX4500 □□□□□□ □□□□ □□□ □□□□ □□□ □□□ □□□ □ □□□□. □□□□ □□ □ □□□□ □ □ □□□ □□□ □ □□ □□□ □□□ □□□ □□□ □ □□□□.
dscp *number*	□□□□ □□□ DSCP □□ □ □□ □□□□ □□□ DSCP □□□ □□□□□. *number* DSCP(Differentiated Services Code Point)□ □□□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□□. □ □□ *number*□□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□). • **ef (46)**- RFC 2598, *□□□ □□□ PHB*□ □□□□ □□□□. • **af11 (10)**, **af12 (12)**, , **af21 (18)af13 (14)**, **af22 (20)**, , **af23 (22)** **af31 (26)**, **af32 (28)**, , **af33 (30)**, **af41 (34)**, **af42 (36)af43 (38)** □ □□□□ 3□□ □□ □□ □□□ □□ □ 4□□ □□□□ RFC 2597, *Assured Forwarding PHB Group*□ 12□ □□ □□□□ □□ □□□□□.
count *counter-name*	□ □□, □□ □□ □□□□ □□□□ □□ □□ □□□□□□. □□□□ □□□□ □□□□ □□□□□□ □□□□ □□□□ □ □ □□ □□□ □□□ □ □□□□. □: EX4300 □□□□□□ TCAM(Ternary Content Addressable Memory)□ □□ □ □ □□□ □□ □□□ □ □□□□ □□□ □ □□□□.
forwarding-class *class*	□□ □□□ □□□ □ □□□□ □□□ □□□□□. • **assured-forwarding** • **best-effort** • **expedited-forwarding** • **network-control**

□ 91: □□□ □□□ □□ □□ □□□ *(Continued)*

□□ □□□	□□
gbp-src-tag(EX4400 □ EX4650□ □□)	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□□ □□ □□ □□ □□ □□(0..65535)□ □□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□
interface *interface-name*	□□□ □□□ □□□□ □□□□ □□□ □□□□□□ □□□□□.
log	□□□ □□□ □□□ □□ □□□ □□□□□. □ □□□ □□□ CLI□□ □□□ □□□□□ `show firewall log`. □: **log** □□ **syslog** □□ □□□□ □□ □□ **interface** □□ □□□□ □□ **vlan** □□□ □□ □□□□ □□ □□ □□ □ □□□□. □□□ □□□□ □□□□□ □□□ □□□□ □□□□□.
loss-priority (high | low)	□□ □□ □□□□(PLP)□ □□□□□.
policer *policer-name*	□□□□ □□ □□□ □□□□□. □□, VLAN, □□□□ □□ □□□□ □□□□ □□□ □□□□ □□□□ □□□ □ □□□□. □: □□□□ □□ □□□□ EX8200 □□□□□ □□□□ □□□□. □: EX4300 □□□□□□ TCAM□ □□ □□ □□□ □□ □□□ □ □□□□ □□□ □ □□□□.
`port-mirror`	□□□ □□□ □□□□□□ □□□ □□□□□□ `[edit forwarding-options analyzer]`.
`port-mirror-instance` *instance-name*	□□□ □□□ □□□□□ □□□ □□□□□□ `[edit forwarding-options analyzer]`.
syslog	□ □□□ □□ □□□ □□□□□. □□ □ □□□ □□ □□□ □□□ □□□□ □□□ □ □□□□. □: **log** □□ **syslog** □□ □□□□ □□ □□ **interface** □□ □□□□ □□ **vlan** □□□ □□ □□□□ □□ □□ □□ □ □□□□. □□□ □□□□ □□□□□ □□□ □□□□ □□□□□.
three-color-policer	3□ □□□□ □□□□□.

□□ □□

EX □□□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□□□ □□ □□□ □□ | **1481**

□□□ □□ □□ □□ □□ | **1456**

EX ??? ???? Junos OS?? ???? ??? ?? ?? ? | 2116

?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | 1578

?: ??? ??????? ???-?? ??? ?? ?? ??? ?? | 1611

EX ??? ???? ??? ?? ?? ??, ?? ? ?? ???? ?? ??? ??

in this section

- ??? ?? ?? ? ?? ??? ?? | 1482
- ???? IPv4 ? IPv6 ??? ??? ?? ??? ?? | 1482
- IPv4 ???? ?? ??? ?? ??? ?? | 1483
- IPv6 ???? ?? ??? ?? ??? ?? | 1511
- ? IP ???? ?? ?? ??? ?? ??? ?? | 1531
- IPv4 ??? ??? ?? ??? ?? | 1532
- IPv6 ??? ??? ?? ??? ?? | 1537
- IPv4 ???? ?? ?? ???? ?? ??? ?? | 1542
- IPv6 ???? ?? ?? ???? ?? ??? ?? | 1552

EX ??? ????? ??? ??? ??? ??? ??? ??? ???? ????? ??? ??? ???? ? ??? ??? ??? ???? ???? ???. ?? ??? ? ?, VLAN ??? ?? ? ??? 3(?? ???) ??? ??? ??? ??? ??? ??? ?? ???? ??? ? ?? ??? ??? ??? ?????. ?? ??? ?? ? ??? 2 ??????? ?????, VLAN ??? ??? VLAN? ????? ??? ??? VLAN ??? ????? ???? ?????. ??? 3 ??? ?? ? ??? 3(???) ????? ? ???? VLAN ?????(RVI)? ?????.

?: ???? ??? ???? ???? ???? ????? ???? ??? ?????(lo0)?? ??? ??? ???? ???. ???? ??? ? ?????? ???? ?? ??, ?? ? ?? ???? ?? ??? ??? "???? ??? ??? ??? ?? ?? ?? ? ?? ??" ??? 1563? ??? ???????.

? ??? EX ??? ????? ???? ??? ??? ?? ?? ??, ?? ? ?? ???? ?? ???? ??? ? ??? ??? ?? ?????. ?? EX4100, EX4100-F, EX4400, EX4600, EX4650 ????? ???? ?? ??? ?? ?? ?? ? ?? ??? ??? ?? ?? ?? ? ??(QFX ? EX ??? ???) ? ??? ? ????. ?? ??, ?? ? ?? ???? ?? ??? "EX ??? ???? ?? ??? ?? ?? ??, ?? ? ?? ????" ??? 1466 ???????. EX4600 ???? ?? ??? ??? ??? ?? ?? ?? ? ??? ???????.

??? ?? ?? ? ?? ??? ??

?? ???? ???? ???? ???? ????? IPv4, IPv6 ?? ? IP ????? ????? ? ?????. ?? ?? ???? ???? ?? ?? ???? ???? ?? ???? ???? ? ???? ???? ???? ????????.

? 92 ??? 1482 ?(?) ?????? ????? ???? ?? ?? ? ?? ???? ???? ??????.

? 92: ??? ?? ??? ??? ??? ??

??? ???	??? ?? ??
??(??? 2 ??????)	?? ??? ??
VLAN	VLAN ??? ??
??? 3 ??????(??? 3(???) ?????? ?? ????? VLAN ??????(RVI)	???? ???? ??

????? IPv4 ? IPv6 ??? ??? ?? ???? ??

EX2200, EX2300/EX3400, EX3200/EX4200, EX3300, EX4500 ? EX6200 ?????? IPv6 ????? ?? ? VLAN ? ?? ???? 2 ?? ????? ???? ? ?????. EX8200 ?????? ?? ? VLAN ????? IPv6 ????? ???? 2 ?? ?? ???? ???? 3 ? ???? 4 ? ? ????? ???? ? ?????. EX4300 ?????? IPv6 ????? ?? ? VLAN ???? ???? 3 ? ???? 4 ?? ???? ???? ? ?????.

????? IPv4 ? IPv6 ???? ???? ?? ???? ?? ???? 1482 ?(?) ?? ?????? IPv4 ? IPv6 ???? ???? ?? ???? ????? ??????. ?? ?? ????? ??, VLAN ? ???? ???? ???? ?? ???? ? ???? ?? ????? ???? ??????.

? 93: ????? IPv4 ? IPv6 ??? ??? ?? ???? ??

???	IPv4 ??? ?? ??	IPv6 ??? ?? ??
EX2200	?	?
EX2300 ? EX3400	?	?
EX3200 ? EX4200	?	?
EX3300	?	?

□ 93: □□□□ IPv4 □ IPv6 □□□ □□□ □□ □□□ □□ ***(Continued)***

□□□	IPv4 □□□ □□ □□	IPv6 □□□ □□ □□
EX4100	□	□
EX4100-F	□	□
EX4300	□	□
EX4400	□	□
EX4500	□	□
EX4650	□	□
EX6200	□	□
EX8200	□	□

IPv4 □□□□ □□ □□□ □□ □□□ □□

□□ EX □□□ □□□□□ □□ □ □□ IPv4 □□□□ □□ □□, VLAN □ □□□ □□□ □□□ □□□ □ □□□□. □ 94 □□□ 1484 □□□ □□ □□ □□□ □ □□ □ □□ IPv4 □□□□ □□ □□ □□ □□□ □□□ □□ □□ □□□ □□□□□.

□:

EX4400, EX4100 □ EX4650 □□□□□ □□ □□ □□□ □□ □ □□ VLAN □□□ □□□□ □□ □□ □□□ □□□□ □□ □□□□ □□□□ egress-l2-extended-match □□□.

- `dscp`
- `ip-version ipv4`

  IPv4 □□□ □□ □□□□ □□ □□:

- destination-port
- dscp
- icmp-code
- icmp-type
- ip-destination-address
- ip-protocol
- ip-source-address
- is-fragment
- source-port
- tcp-established
- tcp-flags
- tcp-initial

- icmp-code
- icmp-type
- tcp-established
- tcp-flags
- tcp-initial

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
destination-address *ip-address*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ip-destination-address	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4650	□□ □ VLAN	□□ □ VLAN
destination-mac-address *mac-address*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□ □ VLAN	□□ □ VLAN
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
destination-port *number*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□ (EX4300) □□□□ □□(EX2300)
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
destination-prefix-list *prefix-list*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
dot1q-tag *number*	EX2200	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□□□ □□
user-vlan-id number	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4650	□□ □ VLAN	□□ □ VLAN
dot1q-user-priority *number*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX 4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX 4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX8200	□□ □ VLAN	□□ □ VLAN
user-vlan-1p-priority number	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX 4400	□□ □ VLAN	□□ □ VLAN
	EX 4650	□□ □ VLAN	□□ □ VLAN
dscp *number*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ether-type *value*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN

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		□□	□□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□ □ VLAN	□□ □ VLAN
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□□□ □□
fragment-flags *fragment-flags*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
icmp-code *number*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
icmp-type *number*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

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		□□	□□
interface *interface-name* □: □ □□ □□□ □□□□ □□□□ □□ □□ □□□(ae) □□□□□□ □ □□ L3 □□□□□ □ □□ VLAN □□□□□□ □□□ □□ □ □□□□ □□□□ □□□□.	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ip-options	EX2200	□□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□□ □□

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		□□	□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4100	□□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□□ 3 □□□□□	□□□□ □□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX4650	□□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□□ 3 □□□□□	□□□□ □□
ip-version *versionmatch_condition(s)*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN

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		□□	□□
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□ □ VLAN	□□ □ VLAN
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
is-fragment □: EX2300, EX3400 □ EX4300 □□□□ □□□□ □ □ □ □□ □□□ □□ □□ VLAN□ □□□ □ □□□□ □□ □ □□□ □□□ □□□□ □□□□.	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

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		□□	□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
precedence *precedence*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□

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		□□	□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ip-precedence precedence	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□
	EX4100	□□ □ VLAN	□□□□ □□
	EX4100-F	□□ □ VLAN	□□□□ □□
	EX4300	□□ □ VLAN	□□□□ □□
	EX4400	□□ □ VLAN	□□□□ □□
	EX4650	□□ □ VLAN	□□□□ □□
protocol *list of protocols*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

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		□□	□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ip-protocol list of protocols	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX4650	□□ □ VLAN	□□ □ VLAN
source-address *ip-address*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ip-source-address ip-address	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□(EX2300) □□ □ VLAN(EX3400)

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4650	□□ □ VLAN	□□ □ VLAN
source-mac-address *mac-address*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4500	□□ □ VLAN	□□ □ VLAN

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4650	□□ □ VLAN	□□ □ VLAN
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
source-port *number*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
source-prefix-list *prefix-list*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
tcp-established	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
tcp-flags (*flags* tcp-initial)	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
tcp-initial	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
`ttl` *value*	EX2200	□□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)

□ 94: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□□ □□
	EX4100	□□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX4650	□□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
vlan (*vlan-name* | *vlan-id*)	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN

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		□□	□□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
learn-vlan-id vlan-id	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□□□ □□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□

IPv6 □□□□ □□ □□□ □□ □□□ □□

□ 95 □□□ 1512 □□ □□ □□ □□□□ □□ □ □□ IPv6 □□□□ □□ □□ □□ □□□ □□□ □□ □□ □□□ □□□□ □□ □□□□.

□:

EX4650, EX4400 □ EX4100 □□□□□ □□ □□ □□□ □□ □ □□ VLAN □□□ □□□□ □□ □□ □□□ □□□□ □□ □□□□ □□□□ egress-l2-extended-match □□□.

- dscp
- ip-version ipv6

  IPv6 □□□ □□ □□□□ □□ □□:

  - destination-port
  - icmp-code
  - icmp-type
  - next-header
  - source-port
  - tcp-established
  - tcp-flags
  - tcp-initial
- icmp-code
- icmp-type
- tcp-established
- tcp-flags
- tcp-initial

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
destination-address *ip-address*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3(□□□) □□□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3(□□□) □□□□□□ □□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□
destination-mac-address *mac-address*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
destination-port *number*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
`destination-prefix-list` *`prefix-list`*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3(□□□) □□□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	□□□ 3 □□□□□	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
dot1q-tag *number*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX 4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□□□ □□
user-vlan-id number	EX4300	□□ □ VLAN	□□ □ VLAN
dot1q-user-priority *number*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX 4400	□□□□ □□	□□□□ □□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX 4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
user-vlan-1p-priority number	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□□□ □□	□□□□ □□
	EX4650	□□ □ VLAN	□□□□ □□
ether-type (ipv6)*value*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
icmp-code *number*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
icmp-type *number*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□ □□ □ VLAN

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	□□□ 3 □□□□□	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
interface *interface-name* □: □ □□ □□□ □□□□ □□□□□□ □□ □□□ (ae) □□□□□□ □ □□ L3 □□□□□ □ □□ VLAN □□□□□□ □□ □ □□□ □□□□ □□□□ □□□□.	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
ip-version *version match_condition(s)*	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□□□ □□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX8200	□□ □ VLAN	□□ □ VLAN
next-header *bytes*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
packet-length *bytes*	EX2200	□□□□ □□	□□□□ □□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□□□ □□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
source-address*ip-address*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□□ 3 □□□□□	□□□□ □□
	EX4300	□□□ 3 □□□□□	□□□□ □□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□□ □□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
source-mac-address *mac-address*	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□ □ VLAN	□□ □ VLAN
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN
source-port *number*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN, □□□ 3 □□□□□	□□ □ VLAN(EX3400) □□□□ □□(EX2300)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN, □□□ 3 □□□□□	□□ □ VLAN

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
source-prefix-list *prefix-list*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

□□ □□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
tcp-established	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
tcp-flags (*flags* tcp-initial)	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
tcp-initial	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□ □ VLAN(EX3400)
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□ □ VLAN
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
`traffic-class` *`number`*	EX2200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□ 3 □□□□□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX3300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4100-F	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4300	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX6200	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
vlan (*vlan-id* | *vlan-name*)	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□

□ 95: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□ *(Continued)*

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		□□	□□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□□□ □□

□ IP □□□□ □□ □□ □□□ □□ □□□ □□

□□ EX □□□ □□□□□ □□ □ □□ □IP □□□□ □□ □□, VLAN □ □□□ □□□ □□□ □□□ □ □□□□. □ 96 □□□ 1531 □□ □□ □□ □□□□ □□ □ □□ □IP □□□□ □□ □□ □□ □□□ □□□ □□ □□ □□□ □□□□ □□ □□□□.

□ 96: □□□□ □IP □□□□ □□ □□□□ □□□ □□ □□ □□

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		□□	□□
l2-encap-type llc-non-snap	EX2200	□□ □ VLAN	□□ □ VLAN
	EX2300 □ EX3400	□□□□ □□	□□□□ □□

□ 96: □□□□ □IP □□□□ □□ □□□□ □□□ □□ □□ □□ ***(Continued)***

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		□□	□□
	EX3200 □ EX4200	□□ □ VLAN	□□ □ VLAN
	EX3300	□□ □ VLAN	□□ □ VLAN
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□ □ VLAN	□□ □ VLAN
	EX4500	□□ □ VLAN	□□ □ VLAN
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN	□□ □ VLAN

IPv4 □□□ □□□ □□ □□□ □□

□ 97 □□□ 1533 □□□ □□ □□ □□□□ □□ □ □□ IPv4 □□□□ □□ □□ □□ □□□ □□□□□ □□ □□□ □□□□□.

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		□□	□□
accept	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
discard	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 97: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
`reject` *`message-type`*	EX2200	□□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□□ □□

□ 97: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100	□□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□□ 3 □□□□□	□□□□ □□
	EX4300	□□□ 3 □□□□□	□□□□ □□
	EX4400		
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX4650	□□□ 3 □□□□□	□□□□ □□
	EX6200	□□□ 3 □□□□□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
routing-instance *routing-instance-name*	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□□□ □□(EX2300) □□□ 3 □□□□□(EX3400)	□□□□ □□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□□ □□
	EX4100	□□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□□ 3 □□□□□	□□□□ □□

□ 97: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

□□	□□□	□□□□ □□□ □□□	
		□□	□□
	EX4300	□□□ 3 □□□□□	□□□□ □□
	EX4400	□□□ 3 □□□□□	□□□□ □□
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX4650	□□□ 3 □□□□□	□□□□ □□
	EX6200	□□□ 3 □□□□□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
vlan *vlan-name*	EX2200	□□ □ VLAN	□□□□ □□
	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□□□ □□
	EX3300	□□ □ VLAN	□□□□ □□
	EX4100	□□ □ VLAN	□□□□ □□
	EX4100-F	□□ □ VLAN	□□□□ □□
	EX4300	□□ □ VLAN	□□□□ □□
	EX4400		
	EX4500	□□ □ VLAN	□□

□ 97: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
	EX4650	□□ □ VLAN	□□□□ □□
	EX6200	□□ □ VLAN	□□ □ VLAN
	EX8200	□□ □ VLAN □: □□ □□□□ □□ interface □□ □ □□ □□□□□. EX8200 Virtual Chassis□□ □ vlan □ □□ VLAN□ □□□□ □□□□□.	□□□□ □□

IPv6 □□□ □□□ □□ □□□ □□

□ 98 □□□ 1537 □□□ □□ □ □□ IPv6 □□□□ □□ □□ □□ □□□ □□□□□ □□ □□□ □□□□□.

□ 98: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□

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		□□	□□
accept	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 98: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
discard	EX2200	□□ □ VLAN, □□□ 3 □□□□□	□□ □ VLAN, □□□ 3 □□□□□
	EX2300 □ EX3400	□□ □ VLAN, □□□ 3 □□□□□	□□ □ VLAN, □□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100	□□ □ VLAN, □□□ 3 □□□□□	□□ □ VLAN, □□□ 3 □□□□□
	EX4100-F	□□ □ VLAN, □□□ 3 □□□□□	□□ □ VLAN, □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 98: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
`reject` *`message-type`*	EX2200	□□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□□ □□
	EX4100	□□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□□ 3 □□□□□	□□□□ □□
	EX4300	□□□ 3 □□□□□	□□□□ □□
	EX 4400		
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX 4650	□□□ 3 □□□□□	□□□□ □□

□ 98: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
	EX6200	□□□ 3 □□□□□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
routing-instance *routing-instance-name*	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□□□ □□(EX2300) □□□ 3 □□□□□(EX3400)	□□□□ □□
	EX3200 □ EX4200	□□□ 3 □□□□□	□□□□ □□
	EX3300	□□□ 3 □□□□□	□□□□ □□
	EX4100	□□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□□ 3 □□□□□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX 4400	□□□ 3 □□□□□	□□□□ □□
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX 4650	□□□ 3 □□□□□	□□□□ □□
	EX6200	□□□ 3 □□□□□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□

□ 98: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ ***(Continued)***

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		□□	□□
vlan *vlan-name*	EX2200	□□ □ VLAN	□□□□ □□
	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□□□ □□
	EX3300	□□ □ VLAN	□□□□ □□
	EX4100	□□ □ VLAN	□□□□ □□
	EX4100-F	□□ □ VLAN	□□□□ □□
	EX4300	□□ □ VLAN	□□□□ □□
	EX 4400		
	EX4500	□□ □ VLAN	□□□□ □□
	EX 4650	□□ □ VLAN	□□□□ □□
	EX6200	□□ □ VLAN	□□□□ □□
	EX8200	□□ □ VLAN □: □□ □□□□ □□ interface □□ □ □□ □□□□□. EX8200 Virtual Chassis□□ □ vlan □ □□ VLAN□ □□□□ □□□□□.	□□□□ □□

IPv4 [illegible]

[illegible] 99 [illegible] 1542 [illegible] IPv4 [illegible].

[illegible] 99: [illegible] IPv4 [illegible]

[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]
analyzer	EX2200	[illegible] VLAN	[illegible]
	EX2300 [illegible] EX3400	[illegible] VLAN	[illegible]
	EX3200 [illegible] EX4200	[illegible] VLAN	[illegible]
	EX3300	[illegible] VLAN	[illegible]
	EX4100	[illegible] VLAN	[illegible]
	EX4100-F	[illegible] VLAN	[illegible]
	EX4300	[illegible] VLAN	[illegible]
	EX 4400	[illegible] VLAN	
	EX4500	[illegible] VLAN	[illegible]
	EX 4650	[illegible] VLAN	[illegible]
	EX6200	[illegible] VLAN	[illegible]
	EX8200	[illegible] VLAN	[illegible]
dscp	EX2200	[illegible]	[illegible]

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□□□ □□	□□□□ □□
	EX 4400	□□□□ □□	□□□□ □□
	EX4500	□□□□ □□	□□□□ □□
	EX 4650	□□□□ □□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
count	EX2200	VLAN □ □□□ 3 □□□□□(me0 □□□□ □□ □□)	□□□ 3 □□□□□(me0 □□□□□□ □□)
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ ***(Continued)***

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		□□	□□
	EX3300	VLAN □ □□□ 3 □□□□□(me0 □ vme0 □□□□□□ □□)	□□□ 3 □□□□□(me0 □ vme0 □□□□ □□ □□)
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
`forwarding-class` *class*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400		
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
interface *interface-name*	EX2200	□□ □ VLAN	□□□□ □□
	EX2300 □ EX3400	□□ □ VLAN	□□ □ VLAN
	EX3200 □ EX4200	□□ □ VLAN	□□□□ □□
	EX3300	□□ □ VLAN	□□□□ □□
	EX4100	□□ □ VLAN	□□ □ VLAN
	EX4100-F	□□ □ VLAN	□□ □ VLAN
	EX4300	□□ □ VLAN	□□□□ □□
	EX 4400	□□ □ VLAN	□□□□ □□

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ ***(Continued)***

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		□□	□□
	EX4500	□□ □ VLAN	□□□□ □□
	EX 4650	□□ □ VLAN	□□□□ □□
	EX6200	□□ □ VLAN	□□□□ □□
	EX8200	□□ □ VLAN □: EX8200 Virtual Chassis `interface` □□ □□ □□□□ VLAN □ □□□□ □□□□□.	□□□□ □□
log	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
loss-priority (high | low)	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
policer *policer-name*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
port-mirror	EX2200	□□□□ □□	□□□□ □□

□ 99: □□□□ IPv4 □□□□ □□ □□□□ □□□ □□ □□ □□□ ***(Continued)***

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		□□	□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□□□ □□	□□□□ □□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□□ □□	□□□□ □□
port-mirror-instance instance-name	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)

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		□□	□□
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□□□ □□	□□□□ □□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□□ □□	□□□□ □□
syslog	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□

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		□□	□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
three-color-policer	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

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		□□	□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX 4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□□□ □□	□□□□ □□

IPv6 □□□□ □□ □□ □□□□ □□ □□□ □□

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		□□	□□
analyzer	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□

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		□□	□□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□□ 3 □□□□□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
dscp	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□□□ □□	□□□□ □□
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□

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		□□	□□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4500	□□□□ □□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□ 3 □□□□□	□□□□ □□
count	EX2200	VLAN □ □□□ 3 □□□□□(me0 □ vme0 □□□□□□ □□)	□□□ 3 □□□□□(me0 □ vme0 □□ □□□□ □□)
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX3300	□□□ 3 □□□□□(me0 □ vme0 □□□□ □□ □□)	□□□ 3 □□□□□(me0 □ vme0 □□□□ □□ □□)
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
forwarding-class *class*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
interface *interface-name*	EX2200	□□ □ VLAN	□□□□ □□
	EX2300 □ EX3400	□□ □ VLAN	□□□□ □□
	EX3200 □ EX4200	□□ □ VLAN	□□□□ □□
	EX3300	□□ □ VLAN	□□□□ □□
	EX4100	□□ □ VLAN	□□□□ □□
	EX4100-F	□□ □ VLAN	□□□□ □□
	EX4300	□□ □ VLAN	□□□□ □□
	EX4400	□□ □ VLAN	□□□□ □□
	EX4500	□□ □ VLAN	□□□□ □□
	EX4650	□□ □ VLAN	□□□□ □□
	EX6200	□□ □ VLAN	□□□□ □□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ ***(Continued)***

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		□□	□□
	EX8200	□□ □ VLAN □: EX8200 Virtual Chassis interface □□ □□ □□□□ VLAN□ □□□□ □□□□□.	□□□□ □□
log	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

□□ □□□	□□□	□□□□ □□□ □□□	
		□□	□□
loss-priority (high | low)	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□ □ □□□ 3 □□□□□
policer *policer-name*	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ ***(Continued)***

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		□□	□□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4400	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4500	□□□ 3 □□□□□	□□□ 3 □□□□□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
port-mirror	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□□□ □□	□□□□ □□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□□ □□	□□□□ □□
port-mirror-instance instance-name	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□(EX2300) □□, VLAN □ □□□ 3 □□□□□ (EX3400)
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□□□ □□	□□□□ □□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX4100-F	□□□□ □□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□□□ □□	□□□□ □□
	EX4650	□□□□ □□	□□□□ □□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□□ □□	□□□□ □□
syslog	EX2200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3300	□□, VLAN, □□□ 3 □□□□□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4300	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4400	□□, VLAN, □□□ 3 □□□□□	□□□□ □□

□ 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX4500	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX4650	□□, VLAN, □□□ 3 □□□□□	□□□□ □□
	EX6200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX8200	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
three-color-policer	EX2200	□□□□ □□	□□□□ □□
	EX2300 □ EX3400	□□, VLAN □ □□□ 3 □□□□□	□□□□ □□
	EX3200 □ EX4200	□□□□ □□	□□□□ □□
	EX3300	□□□□ □□	□□□□ □□
	EX4100	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4100-F	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4300	□□□□ □□	□□□□ □□
	EX4400	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□
	EX4500	□□□□ □□	□□□□ □□
	EX4650	□□, VLAN □ □□□ 3 □□□□□	□□, VLAN □ □□□ 3 □□□□□

표 100: □□□□ IPv6 □□□□ □□ □□□□ □□□ □□ □□ □□□ *(Continued)*

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		□□	□□
	EX6200	□□□□ □□	□□□□ □□
	EX8200	□□□□ □□	□□□□ □□

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- □ 101 □□□ 1564
- □ 102 □□□ 1566
- □ 103 □□□ 1566

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□ 101: IPv4 □ IPv6 □□□□ □□ □□□ □□□□□□ □□□ □□□ □□ □□ □□ - □□□□ □□

□□ □□	EX2200	EX3200, EX4200	EX3300	EX4500	EX6200	EX8200
IPv4 □□□ □□ □□ □□:						
□□ □□	✓	✓	✓	✓	✓	✓
□□□ □□	✓	✓	✓	✓	✓	✓
□□ □□□ □□	✓	✓	✓	✓	✓	✓
□□ □□ □□□	✓	✓	✓	✓	✓	✓
icmp □□	✓	✓	✓	✓	✓	✓
ICMP□	✓	✓	✓	✓	✓	✓
□□□□□	✓	✓	✓	✓	✓	✓
is-fragment	✓	✓	✓	✓	–	–
□□ □□	–	–	–	–	–	✓
□□ □□	✓	✓	✓	✓	✓	✓
□□□□	✓	✓	✓	✓	✓	✓
□□ □□	✓	✓	✓	✓	✓	✓
□□ □□	✓	✓	✓	✓	✓	✓

□ 101: IPv4 □ IPv6 □□□□ □□ □□□ □□□□□□ □□□ □□□ □□ □□ □□ - □□□□ □□ ***(Continued)***

□□ □□	EX2200	EX3200, EX4200	EX3300	EX4500	EX6200	EX8200
□□ □□□ □□	✓	✓	✓	✓	✓	✓
IPv6 □□□□ □□ □□ □□:						
ip6 □□ □□	✓	✓	✓	✓	✓	✓
□□□ □□	✓	✓	✓	✓	✓	✓
□□ □□□ □□	✓	✓	✓	✓	✓	✓
icmp □□	✓	✓	✓	✓	✓	✓
ICMP□	✓	✓	✓	✓	✓	✓
□□□□□	✓	✓	✓	✓	✓	✓
□□ □□	✓	✓	✓	✓	✓	✓
□□ □□	–	–	–	–	–	✓
□□ □□	✓	✓	✓	✓	✓	✓
□□ □□	✓	✓	✓	✓	✓	✓
□□ □□□ □□	✓	✓	✓	✓	✓	✓
tcp □□	✓	✓	✓	✓	✓	–
tcp-□□□	✓	✓	✓	✓	✓	–
tcp-□□□	✓	✓	✓	✓	✓	–

□ 101: IPv4 □ IPv6 □□□□ □□ □□□ □□□□□□ □□□ □□□ □□ □□ □□ - □□□□ □□ ***(Continued)***

□□ □□	EX2200	EX3200, EX4200	EX3300	EX4500	EX6200	EX8200
□□□ □□□	✓	✓	✓	✓	✓	✓

□ 102: IPv4 □ IPv6 □□□□ □□ □□□ □□□□□□ □□□ □□□ □□ □□ - □□□□ □□

□□	EX2200	EX3200, EX4200	EX3300	EX4500	EX6200	EX8200
IPv4 □□□□ □□ □□:						
□□	✓	✓	✓	✓	✓	✓
□□□	✓	✓	✓	✓	✓	✓
IPv6 □□□□ □□ □□:						
□□	✓	✓	✓	✓	✓	✓
□□□	✓	✓	✓	✓	✓	✓

□ 103: IPv4 □ IPv6 □□□□ □□ □□□ □□□□□□ □□□ □□□ □□ □□ □□□ - □□□□ □□

□□	EX2200	EX3200, EX4200	EX3300	EX4500	EX6200	EX8200
IPv4 □□□□ □□ □□ □□□:						
□□□□□□	–	✓	–	✓	✓	–
□□□ □□□	✓	✓	✓	✓	–	✓
□□ □□ □□	✓	✓	✓	✓	–	✓

□ 103: IPv4 □ IPv6 □□□□ □□ □□□ □□□□□□ □□□ □□□ □□ □□ □□□ - □□□□ □□ ***(Continued)***

□□	EX2200	EX3200, EX4200	EX3300	EX4500	EX6200	EX8200
IPv6 □□□□ □□ □□ □□□:						
□□□□□□□	–	✓	–	✓	–	–
□□□ □□□	✓	✓	✓	✓	–	✓
□□ □□ □□	✓	✓	✓	✓	–	✓

□: EX8200 □□□□□ IPv4 □□□□ □□ □□□ □□□□□□ □□□ □□ □□□ discard □□□ □□□ □□ □□ □ □□ □□□ □□ □□ □□□□ □□□□ □□□□□. □□□ IPv6 □□□□ □□, □□ □□ IPv6 □□ □□□ □□□□ □□□□□ □□□□ □□□ □□□□□ □ □□□ □□□.

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EX □□□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□ | 1466

EX □□□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□□□ □□ □□□ □□ | 1481

□□□ □□ □□ □□ □□ | 1456

□□□ □□ □□ □□ □□ | 1462

□□□ □□□ □□□ □□□□□ □□□□□ □□ □□ | 1577

□□□ □□□□ □□□ □□ □□ | 2076

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in this section

- □□□ □□ □□ | 1568
- IPv4 □□ IPv6 □□□□ □□ □□ □□ □□ | 1572

- □□□ □□□ □□□□ □□□ □□ | 1573
- □□□ □□□ □□□□ □□ □□□□□□ □□□□ □□ | 1574
- □□□□□ VLAN□ □□□ □□ □□ | 1575
- □□□ □□□ □□□ 3(□□□) □□□□□□ □□□□ □□ | 1576

EX □□□ □□□□□ □□□ □□□ □□□□ □□□□□ □□□ □□□□□ □□□□ □ □□□ 3(□□□) □□□□□□□ VLAN□ □□□□ □□□□ □□□□□. □□□ □ □□ □□□□□ □□□ □□□ □□ □□, VLAN □□ □□□ 3 □□□□□□ □□□□ □□□.

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□□, VLAN □□ □□□ 3 □□□□□□ □□□ □□□ □□□□ □□ □□□ □□□ □□□ □□, □□□ □□ □□ □ □□ □□ □□ □□ □□□ □□ □□□ □□□□ □□ □ □□□ □□□□ □□□. □□□ □□ □□□ □□ □□□□ □□ □□□ □□ □□□ □□□□ □□ □□ □□□ □□□ □ □□□□. □□□ □□□ □□□ □□□ □□ □ □□ □ □ □□□ □□□ □□□□ □□□. □□ □□ □□ □ □□□ □□ □□□ "EX □□□ □□□□ □□ □□□ □□ □□ □□, □□ □ □□ □□ □□" □□□ 1466□ □□□□ □□.

□□□ □□ □□ □□:

1. □□□ □□□ □□ □□□ □□ □□ □□:

   - □□ □□ VLAN□ □□□□ □□□ □□□ □□ □□□ 2(□□□) □□□ □□□ 3(IP) □□□ □□□□□ □□ □□□ □□ □□ ethernet-switching□(□) □□□□ □□□. □:

     ```
     [edit firewall]
     user@switch# set family ethernet-switching
     ```

   - □□□ 3(□□□) □□□□□□ □□□□ □□□ □□□ □□:

     - IPv4 □□□ □□□□□□ □□□ □□ □□ inet□(□) □□□□ □□□. □:

       ```
       [edit firewall]
       user@switch# set family inet
       ```

     - IPv6 □□□ □□□□□□ □□□ □□ □□ inet6□(□) □□□□ □□□. □:

       ```
       [edit firewall]
       user@switch# set family inet6
       ```

□: □□□ □□□ 3 □□□□□□□ IPv4□ IPv6 □□□ □□□ □□ □□□ □□□ □□□ □ □□□□.

2. □□ □□ □□:

```
[edit firewall family ethernet-switching]
user@switch# set filter ingress-port-filter
```

□□ □□□ □□, □□ □ □□□(-)□ □□□ □ □□ □□ 64□□ □□ □ □□□□. □ □□ □□□ □□□□ □□□.

3. □□□ □□□ □□ □□□□□□□ □□□□ □ □□□□□□□ □□□ □□ □□□ □□□ □□□ □□□□□□ **interface-specific** □□□ □□□□ □□□.

```
[edit firewall family ethernet-switching filter ingress-port-filter]
user@switch# set interface-specific
```

4. □□ □□ □□:

```
[edit firewall family ethernet-switching filter ingress-port-filter]
user@switch# set term term-one
```

□□ □□□ □□, □□ □ □□□(-)□ □□□ □ □□ □□ 64□□ □□ □ □□□□.

□□□ □□□ □□ □□□ □□□ □□□ □ □□□□. □ □□ □□□ □□ □□□ □□□□ □□□.

□: EX □□□ □□□□ □□□ □□□ □□□□ □□ □□ □□ □□□ □□□□.

- EX2200 □□□□ □□ 512
- EX3300 □□□□ □□ 1,436

  □: EX3300 □□□□□□□, □□□ □□ □□□□ □□□ □□ □□ □□(1,000□ □□□ □)□ □□ □□□ □□ □ □□□ □□ □□ □□□ □□□□ □□□□. □□□ □□ □□□ □□□ □□□□ □□□ □□ □□□□ □□□ □□□□ □□□.

- EX3200 □ EX4200 □□□□ □□ 7,168
- EX4300 □□□□□, □□, VLAN □ □□□ 3 □□□□□□□ □□□ □□□ □□□ □□ □□ □ □□ □□□□ □□□□ □□□ □□ □ □□ □□□□.

- □□ □□□:
  - □□□ □□□ □□□ □□□ □□ □□ 3,500□
  - VLAN□ □□□ □□□ □□□ □□ □□ 3,500□
  - IPv4 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 7,000□
  - IPv6 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 3,500□
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  - □□□ □□□ □□□ □□□ □□ □□ 512□
  - VLAN□ □□□ □□□ □□□ □□ □□ 256□
  - IPv4 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□
  - IPv6 □□□□ □□ □□□ 3 □□□□□□ □□□ □□□ □□□ □□ □□ 512□

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- EX4500 □ EX4550 □□□□ □□ 1,200□
- EX6200 □□□ □□ 1,400□
- EX8200 □□□ □□ 32,768□

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5. □ □□□ □□ □□ □□ □□□□□ □□ □□□ □□□□ □□□. □□ □□□ □□ IP □□ □ □□□□ □□□ □□□□□ □□□ □□□□ □□□□.

```
[edit firewall family ethernet-switching filter ingress-port-filter term term-one]
user@switch# set from source-address 192.0.2.0
user@switch# set from source-port 80
```

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from □□ □□ □□□□□ □□□ □□□ □□ from □□ □□ □ □ □□□□.□□□□□ □□ □□□□ □□ □□□ □□□□ □□□ □□□□□.

6. □ □□□ □□ □□□ □□□ □□ □□□ □□ □□□ □□□ □□ □□□ □□ □□□ □□□□ □□□.

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```
[edit firewall family ethernet-switching filter ingress-port-filter term term-one]
user@switch#  set then discard
```

□□ □□□ □□□ □□□ □□□ □ □□□□.

- □□ □□, □□□ □□□□□ □□□ □□□□□ □□□□ □□ □□□ □□ □□ □□□ □□□□ □□□ □□□ □□□□.

```
[edit firewall family ethernet-switching filter ingress-port-filter term term-one]
user@switch# set then count counter-one
user@switch# set then forwarding-class expedited-forwarding
```

then □□□ □□□ □□ □□ □□□□ □□□ □ □□□□.

- analyzer *analyzer-name* - □□□□ □□□ □□□□□□□ □□□ □□ □□ □□ □□ VLAN□ □□ □□ □□□ □□□ analyzer□ (□) □□□ ethernet-switching □□□ □□ □□□ □□ □□□□ □□□. *□□ □□□□ □□□□ □□□ □□(CLI □□)*□ □□□□□□.
- count *counter-name* - □ □□ □□□ □□□□ □□ □□ □□□□□□.

  □: □ □□ □□□□ □□□ □□□ □□□□ □□ □□ □□□□□ □ □□□ □□□ □□□□ □ □□□ □□ □□□□ □□□□ □□ □□ □□.

- forwarding-class *class* - □□□ □□□□□ □□□ □□□□□.
- loss-priority *priority* - □□ □□□ □□ □□□□□ □□□□□.
- policer *policer-name* - □□□□ □□ □□□ □□□□□.
- interface*interface-name* - □□□ □□□ □□□□ □□□□ □□□ □□□□□□□ □□□□□□.
- log - □□□ □□□□ □□□ □□ □□□ □□□□□.

then □□ □□□□□ □□□ □□□□ □□□ from □□ □□ □□□ □□□□ □□□ □□□□□. □□□ then □□□ □□□ □□ □/□□ □□ □□ □□□ □□ □□ □ □□□□ □□□. □□□ □□□ □□□ □ □□□ □□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□ □□ □□□ □□□□□ from □□ □□ □□□ □□□ □ □□□.

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□□□ □□□□ EX8200 □□□ □□□□□, IPv4 □□□□ □□ □□□ □□□□□□ □□□ □□□□□□ □□□□ **discard** □□□ □□ □ □□, □□ □□ □□ □□□ □□□□ □□□□ □□□□□ □□□□□. □□□ IPv6 □□□□ □□, □□ □□ IPv6 □□□ □□□□ □□□□ □ □□□□ □□□ □□□□□ □□□□ □□□.

IPv4 □□ IPv6 □□□□ □□ □□ □□ □□

IPv4 □□□□ □□ □□ □□□ □□ □□ □ □□ □□ □□:

1. □□ □ □□□ ether-type ipv6□□ ip-version ipv6□(□) □□□□ □□□□ □□□□□. □□□□□ □□□ ether-type ipv6 □□ ip-version ipv6 □ □□□ □□□□ □□ □□□ IPv4 □□□□ □□□□□.
2. (□□ □□) □□□ □□ □□ □ □□□ □□□□□.
   - □□ □ □□□□ ether-type ipv4□(□) □□□□□.
   - □□ □ □□□□ ip-version ipv4□(□) □□□□□.
   - □□ □ □□□ ether-type ipv4 □ ip-version ipv4 □□□ □□□□□.
   - □□ □ □□□ ether-type ipv6 □□ ip-version ipv6□(□) □□□□ □□□□ □□□□□. □□□□□, ether-type ipv6 □□ ip-version ipv6□(□) □□□□ □□ □□ □□□ ether-type ipv6 □□ ip-version ipv6□(□) □□□□ □□ □□□ IPv4 □□□□ □□□□□.
3. □□□ □□ □□ □□□ IPv4 □□□□□□ □□□□ □□□□□.

IPv6 □□□□ □□ □□ □□□ □□ □□ □ □□ □□ □□:

1. □□□ □□ □□ □ □□□ □□□□□.
   - □□ □ □□□□ ether-type ipv6□(□) □□□□□.
   - □□ □ □□□□ ip-version ipv6□(□) □□□□□.
   - □□ □ □□□ ether-type ipv6 □ ip-version ipv4 □□□ □□□□□.

     □: □□□□□ □□□ ether-type ipv6 □□ ip-version ipv6 □ □□□ □□□□ □□ □□□ IPv4 □□□□ □□□□□.
2. □□□ □□ □□ □□□ IPv6 □□□□ □□□□ □□□□□.

□: □□ IPv6 □□ □□□ □□□□ □□ □□□□ □□□ □□ □□ ether-type ipv6 □□ ip-version ipv6 □ □□□ □□□□ □□, □□ IPv6 □□□□ □□□□□.

□: IPv4□ IPv6 □□□ □□□ □□ □□□ □□□ □□□□□ IPv4 □□□□ IPv6 □□□□ □□ □□ □□□, □ □□ □□ □□□ □□□ □ □□□.

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1. ????? ??? ???? ??? ?? ? ??? ??? ??????? ?? ?? ?? ??? ?????.

```
[edit interfaces]
user@switch# set ge-0/0/1 description "filter to limit tcp traffic filter at trunk port for
employee-vlan and voice-vlan applied on the interface"
```

?: ??? ???? ?? ?? ?????.

2. ?????? ?? ?? ? ??? ?? ??? ?????.

```
[edit interfaces]
user@switch# set ge-0/0/1 unit 0 family ethernet-switching
```

??? ???? ??? ??? ??, ??? ?? ??? ??? ethernet-switching??? ???.

3. ??? ??? ???? ??? ???? ??? ????? ??:

```
[edit interfaces]
user@switch# set ge-0/0/1 unit 0 family ethernet-switching filter input ingress-port-filter
```

??? ??? ???? ??? ??? ??? ????? ??:

```
[edit interfaces]
user@switch# set ge-0/0/1 unit 0 family ethernet-switching filter output egress-port-filter
```

?: ??? ??? ?? ??? ??? ??? ??? ? ????.

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??? ??? ?? ??????? ?? ? ???? ???? ??????? ?????? ??? ???? ??? ? ????. SSH ?? Telnet ?? ?????? ???? ?? ?? ??? ?? ??????? ??? ?? SNMP ?? ?? ?????? ???? ?????? ?? ???? ??? ? ????. ?? ??? ??????? ??? ??? ?? ?? ?? ????, ?? ?? ???? ???? "EX ??? ???? ?? ??? ?? ?? ??, ?? ? ?? ???" ??? 1466? ??? ?? ?? ??, ?? ? ? ? ???? ???? ?? ???????? ??? ??? ??? ? ????.

- **loss-priority**
- **forwarding-class**

??? ??? ?? EX ??? ???? ?? ??? ???????? ??? ? ????. ?? ??? ??? EX4200 ???? ?? ?? ???(VME) ??????? ?? ? ? ????. ?? ??? ?????? ? VME ??????? ?? ??? ??? *??? ?????? ??*? ???????.

?? ??????? ??? ??? ???? ?? ?? ?? ???? ?????? ??:

1. ?????? ??? ???? ??? ?? ? ??? ??? ??????? ?? ?? ?? ??? ??????.

```
[edit interfaces]
user@switch# set me0 description "filter to limit tcp traffic filter at management interface"
```

?: ??? ???? ?? ?? ??????.

2. ?? ??????? ?? ?? ? ??? ?? ??? ??????.

```
[edit interfaces]
user@switch# set me0 unit 0 family inet
```

?: ?? ??????? ??? ??? ??? ??, ??? ?? ??? **inet** ?? **inet6** ? ??? ? ? ????.

3. ??? ??? ???? ?? ??????? ???? ??? ?????? ??:

```
[edit interfaces]
user@switch# set me0 unit 0 family inet filter input ingress-port-filter
```

??? ??? ???? ?? ??????? ??? ??? ?????? ??:

```
[edit interfaces]
user@switch# set me0 unit 0 family inet filter output egress-port-filter
```

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□□□□□ VLAN□ □□□ □□ □□

□□□ □□□ □□□□□ VLAN□ □□□□ □□□□□□□ □□ □□ □□ □□□□ □□□□ □ □□□□. □□□ □□□ VLAN□ □□□□□ VLAN □□□ ID□ □□ □ □□ □□□ □□□ VLAN□ □□□□ □□□. □□□ □□ □□ □, "EX □□□ □□□□ □□ □□□ □□ □□ □□, □□ □ □□ □□ □□" □□□ 1466□ □□□ □□ □□ □□, □□ □ □□ □□ □□□ □□□ □ □□□□. □□ □□□ □□□ □□□ □□ □ □□ □□□□□ □□□□ □□□ □□ □□□ □□□□□.

□□□ □□□ VLAN□ □□□□ □□:

1. VLAN □□□ VLAN ID□ □□□□ □□□ □□ □ □□□ □□□ VLAN□ □□ □□ □□ □□□ □□□□□.

```
[edit vlans]
user@switch# set employee-vlan vlan-id 20 vlan-description "filter to rate limit traffic
applied on employee-vlan"
```

□: □□□ □□□□ □□ □□ □□□□□.

2. □□□ □□□ VLAN□ □□□□□ □□□ □□□ □□□□□□.

- □□□ □□□ □□□□ VLAN□ □□□□ □□□ □□□□□ □□:

```
[edit vlans]
user@switch#  set employee-vlan vlan-id 20 filter input ingress-vlan-filter
```

(EX4300 □□□□□) □□□ □□□ □□□□ VLAN□ □□□□ □□□ □□□□□ □□:

```
[edit vlans]
user@switch#  set employee-vlan vlan-id 20 forwarding-options input ingress-vlan-filter
```

- □□□ □□□ □□□□ VLAN□ □□□ □□□ □□□□□ □□:

```
[edit vlans]
user@switch#  set employee-vlan vlan-id 20 filter output egress-vlan-filter
```

(EX4300 ??????) ??? ??? ???? VLAN? ??? ??? ????? ??:

```
[edit vlans]
user@switch#  set employee-vlan vlan-id 20 forwarding-options output egress-vlan-filter
```

?: VLAN? ??? ?? ??? ??? ??? ??? ? ????.

??? ??? ??? 3(???) ??????? ???? ??

??? ??? ??? 3(???) ??????? ???? ????? ?? ?? ?? ???? ???? ? ????. ??? ?? ?? ?, "EX ??? ???? ?? ??? ?? ?? ??, ?? ? ?? ?? ??" ??? 1466? ??? ?? ?? ??, ?? ? ?? ?? ??? ??? ? ????. ?? ??? ??? ??? ?? ? ?? ????? ???? ??? ?? ??? ?????.

???? ??? 3 ?????? ??? ??? ???? ??:

1. ????? ??? ???? ??? ?? ? ??? ??? ??????? ?? ?? ?? ??? ??????.

```
[edit interfaces]
user@switch# set ge-0/1/0 description "filter to count and monitor employee-vlan traffic
applied on layer 3 interface"
```

?: ??? ???? ?? ?? ?????.

2. ??????? ?? ?? ??, ??? ?? ?? ? ??? ?????.

```
[edit interfaces]
user@switch# set ge-0/1/0 unit 0 family inet address 10.10.10.1/24
```

??? 3 ?????? ??? ??? ??? ??, ??? ?? ??? IPv4 ???? ?? inet?(?) ??? IPv6 ???? ?? inet6?(?) ??? ???.

3. ??? ??? ???? ??? 3(???) ??????? ?????? ??? ??? ???? ? ????.

- ??? ??? ???? ??? 3 ??????? ???? ??? ?????? ??:

```
[edit interfaces]
user@switch# set ge-0/1/0 unit 0 family inet address 10.10.10.1/24 filter input ingress-
router-filter
```

- ??? ??? ???? ??? 3 ??????? ??? ??? ????? ??:

```
[edit interfaces]
user@switch# set ge-0/1/0 unit 0 family inet address 10.10.10.1/24 filter output egress-router-filter
```

?: ??? ??? VLAN? ??? IRB ??????? ??? ??, ???? VLAN ID? ?? ?? ??? 3 ???????? ??? ?? ???. ?? ?? VLAN ??? ?? ?? ??? 3 ???????? ??? ???? ??????.

?: ??? 3 ??????? ??? ?? ??? ??? ??? ??? ? ?????.

?? ??

?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | 1578

?: ??? ??????? ???-?? ??? ?? ?? ??? ?? | 1611

?: EX ??? ???? ?? ??????? ??? ?? ?? | 1606

??? ??? ????? ?? | 1765

??? ?? ??? ???? | 1766

??? ??? ???? ??? ????(CLI ??) | 2080

??? ??? ??? ????? ????? ?? ??

?? ??? ??? ? ??? ???? EX ??? ??? ???? ??? ???? Junos ?? ??(Junos OS)? ??? ??? ???????. ??????? ??? IP ???? ??? ???? ?? IP ??? ????? ????? ????. ??? ?? ???? ??? ?? ??? ????? ?? ?? ??? ?? ?? ?? ??? ?? ?? **protocol** ???.

???? ?? ??? ????? ICMP ?? ?? TCP ??? ??? ??? ???? ??? ???? ??? ????. ?? ?? ??? ??, ??? ??? ???? ? ? ??? ????? ???? ???.

- **destination-port**- ?? **protocol tcp** ?? ?? **protocol udp**? ?????.
- **source-port**- ?? **protocol tcp** ?? ?? **protocol udp**? ?????.

?? ??? ??? ? ????? ???? ??? ?? ?? ??? ??? ? ??? ??? ???? ?????. ?? ??, ? ?? **destination-port ssh**? ??? ? ??, ???? IP ???? ??? ???? ?? IP ??? ??? 2???? 2??? ??? ?? **22** ?? ?? ??? ????? ???????.

?? ??

EX ??? ???? ??? ?? ?? | 1447

??? ?? ?? ?? ?? | 1456

?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | 1578

EX ??? ???? ?? ?? ?? ??? ??

??? ???? EX ??? ??? ??? ???? ?? ??? ????? ?? ??? ??? ???? ??????? ??? ???? ??? ??? ??? ? ????. ?? ? ? ??????? ?? ? ??? ????? ?? ? ?? ??? ??? ?? ??? ?? ?? ??? ????? ?????.

???? ?? ???? ???? ?? ?? ?? ???? ???? ??? ?? ?? ????? ?? ?? ??? ???? ???? ? ????. ?? ?? ?? ???? ??? ? ?? ??? ???? ?? ??? ????? ??? ???? ?? ???? ??? ? ????.

?? ??

EX ??? ???? ?? ??? ???? ????

EX ??? ???? ??? ?? ?? | 1447

?: ??? ??????? ???-?? ??? ?? ?? ??? ?? | 1611

?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ????

in this section

?? ?? | 1579

?? | 1579

?? ???? ?? ??? ???? TCP? ICMP ??? ?? ??? ?? ?? ?? ??? ?? ????? | 1583

?? ????? VoIP ??? ???? ??? ?? VLAN ?? ??? ?? ???? | 1591

?? VLAN? ?? ?? ??? ???, ????, ??? ?? VLAN ??? ??? ???? | 1594

???? ???? ???? ?? VLAN? ?? ? ?? ??????? ???? ?? VLAN ??? ?? ???? | 1597

?? ????? ??? ?? ???? ?? ??? ???? ?? ??? ??? ?? ???? | 1600

?? | 1603

□□ □□□ □□□□□ □□, □□□□□□□ VLAN, □□□□□ □□□ 3 □□□□□□□ □□□□□ □□□ □□□□ □□□□ □□ □□□ □□□ □□□□ □□□□ □□□ □□ □□□.

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- EX □□□ □□□□ □□ Junos OS □□□ 9.0 □□.
- □□□ □□□□ EX3200-48T □□□ □ □: □□□ □□□ □□□ □□ □ □□ □□ □ □□ □□ □□□ □□
- □□□ □□□□ EX-UM-4SFP □□□ □□ □ □
- □□□ □□□□ J-□□□ □□□ □ □

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- □□□ □□ □□, □□□, CoS(class of service)□ □□ □□
- □□ □□□□□ □□□ □□ □□□. EX3200 □□□□ □□□ □□ □□□□□ □□□□□□.

□□

in this section

- □□□□ □□□□ | **1581**

□□ □□ □□□ □□ □□□ □□□□ □□ voice-vlan, employee-vlan, □ guest-vlan □□□□ □□□□ EX □□□ □□□□□ □□□□□ □□□□ □□□□ □□, □□□, □□, □□□, □□□□ □□□□□ □□□□ □□□ □□□□ □□ □□□ □□□ □□□□ □□□□ □□□ □□□□□.

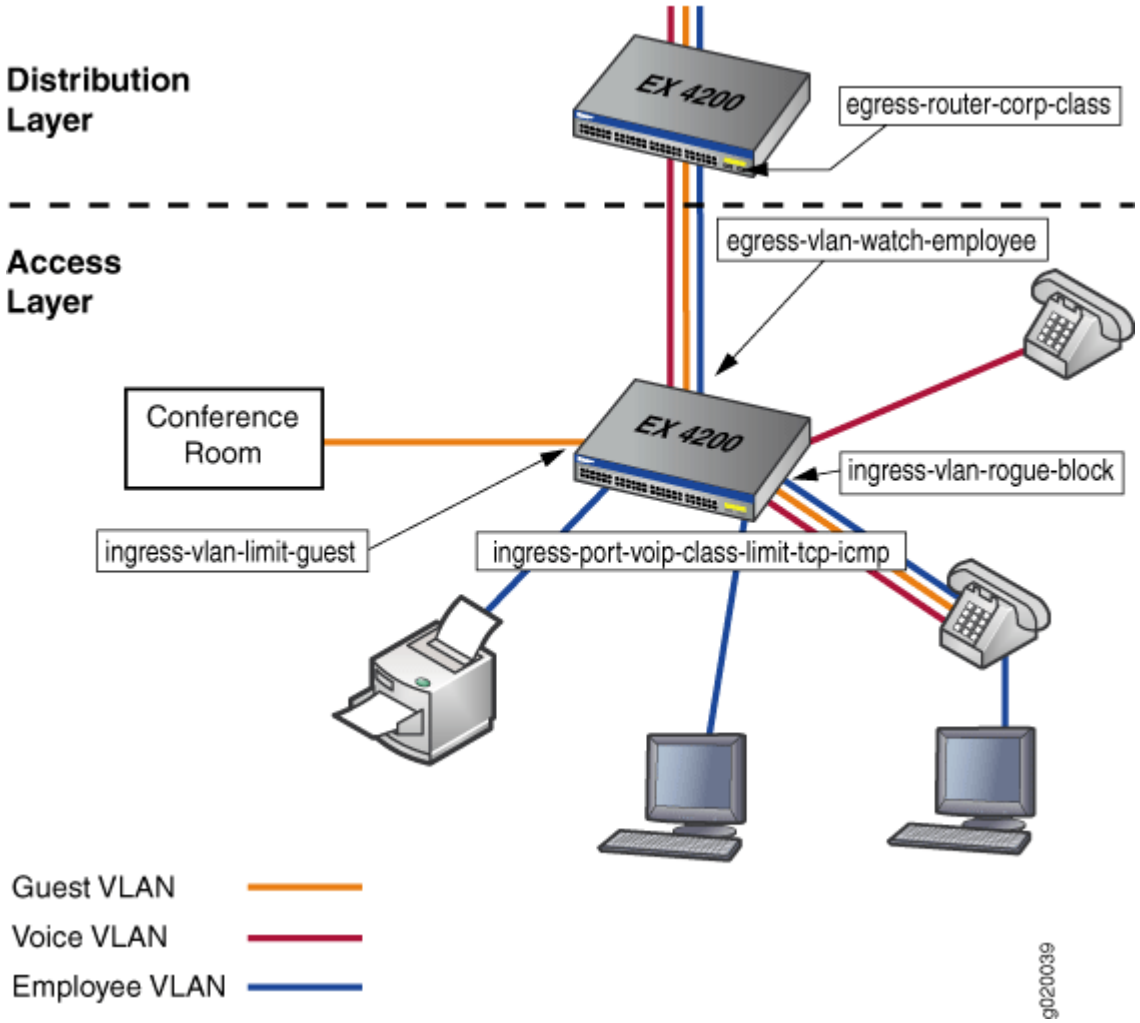
□ 104 □□□ 1580□(□) □ □□□ EX □□□ □□□ □□□ □□□ □□□ □□□ □□□□□.

표 104: □□ □□: □□□ □□

□□ □□	□□/□□
□□ □□□ □□, ingress-port-voip-class-limit-tcp-icmp	□ □□□ □□□ □□□ □ □□ □□□ □□□□□. • □□ MAC □□□ □□□□ □□ MAC □□□ □□□ □□ □□ □□ □□□ □□□□. □□ □□□ expedited-forwarding□(□) □ □ voice-vlan □□□□ □□ □□ □□, □□ □□, □□ □□, □□□ □□, □□□□□ □□□□ □□□□□. • employee-vlan □□□ □□□□ □□□ □□ □□ □□ □□□ □□□□□. TCP □ ICMP □□□ □□□ □□□ □□□ □□□ □□ 30,000□□□□ 1Mbps□ □□□□□. □ □□□ □□□ □□□ □□□□ □□ □□□□□□ □□□□□.
VLAN □□□ □□, ingress-vlan-rogue-block	□□ □□□ HTTP □□□ □□□□ VoIP □□□ □□ □□ □□, □□, □□ □□□ □□□□ □□□□□ □□□□□ □□□□ □□ □□□□□. TCP □□ UDP □□□ □□□□ □□□. □□□□□□ HTTP□ □□□□□. □ TCP □□□ □□ □□ voice-vlan □□□□ □□□□□ □□□□□ □□□□ □□□ □□□. □ □□□ □□□ VLAN□ □□ □ □□□ □□ □□□ □□□□□ □□□□ □ VLAN □□□ □□ □□ □□□ □□□□ voice-vlan□ □□ □□□□ □□□□□. □ □□□ □□□ □□□ □□□□ VLAN □□□□□□ □□□□□.
VLAN □□□ □□, egress-vlan-watch-employee	□□ □□□□ □□□□ employee-vlan □□□□ □□□□□ □ □□□□ □□□□□□□ □□□□. □□□ □□□ □□□ □□□□ □□□□□ □□□□ □. □ □□□ □□□ □□□ □□□□ VLAN □□□□□□ □□□□□.
VLAN □□□ □□, ingress-vlan-limit-guest	□□□ □□ □□□ □□ □□ employee-vlan□□ □□□□□ □□□ □□□□ □□ □□□□□. □□ □□□□ guest-vlan□□ □□ □ □□ □ □□□□□□ □□□□□ □□□□ □□ □□□ □ □ □□□□. □ □□□ □□□ □□□ □□□□ VLAN □□□□□□ □□□□□.
□□□ □□□ □□, egress-router-corp-class	employee-vlan □□□□ □□ □□□□□ □□□ □□ □□□ □ □□ □□ □□□ □□□□ □□ □□□ □□□□□. □ □□□ □□□ □□ □□□ □□ □□□ □□(□□ 3 □□□ □□)□ □□□□□.

□□ 72 □□□ 1581□(□) □□□ □□ □□, VLAN, □□□ 3 □□□ □ □□□ □□□ □□□□□□□ □□□□□.

□□ 72: □□, VLAN, □□□ 3 □□□ □ □□□ □□□ □□□□□□



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EX □□□ □□□□ VLAN □□□□ □□□□ □□ □□□□ □□□□. □ 105 □□□ 1582□(□) VLAN□ □□ VLAN □□ □□□ □□□□□.

□ 105: □□ □□: VLAN

VLAN □□	VLAN ID	VLAN □□□ □ □□ □□□ IP □□	VLAN □□ □□
voice-vlan	10	192.0.2.0/28 192.0.2.1□□ 192.0.2.14 □□ 192.0.2.15 □(□) □□□□ □□□□ □□ □□□□□.	□□ VoIP □□□□ □□□□ □□ VLAN
employee-vlan	20	192.0.2.16/28 192.0.2.17□ □ 192.0.2.30 192.0.2.31□ (□) □□□□ □□□□□□ □□□□□	VLAN □□□ PC, VoIP □□□ □ □ □□□ □□ □□□□□ □□□ PC, □ □ □□□ □□□ □ □□□. □ VLAN□ □□ VLAN□ □□□ □□□□□. VLAN □ □((voice-vlan, employee-vlan)□ □□□□ □□□ □□□ □□□□□ □□□.
guest-vlan	30	192.0.2.32/28 192.0.2.33□ □ 192.0.2.46 192.0.2.47□ (□) □□□□ □□□□□□ □□□□□	□□□□ □□□ □□□□(PC)□ VLAN. □ □□□□□ □□□ □□□ □ □□□ □□ □□ □□□□□ □□ □□ □□ □ □□□, □□□□ □□ □□□ VPN□ □□□ PC□ □□□ □ □□ □□□ □□ □□□ □□□□□.
camera-vlan	40	192.0.2.48/28 192.0.2.49□ □ 192.0.2.62 192.0.2.63□ (□) □□□□ □□□□□□ □□□□□	□□ □□ □□□□ □□ VLAN.

EX □□□ □□□□ □□□ PoE(Power over Ethernet)□ □□□ □□□ □□□□ VoIP□ □□ □□□□ □□ □ □□□ □□□□□. □ 106 □□□ 1583□(□) VLAN□ □□□ □□□ □□□ □□□ □□□ □□□ □□□□□ □ IP □ MAC □□□ □□□□□.

□ 106: □□ □□: 48 □□ □□ PoE □□□□ □□ □□□ □□

□□□ □ □□ □□	VLAN □□	IP □ MAC □□	□□ □□
ge-0/0/0, ge-0/0/1	voice-vlan, employee-vlan	IP □□: 192.0.2.1□□ 192.0.2.2 □□ MAC □□: 00.00.5E.00.53.01, 00.00.5E.00.53.02	VoIP □□ □ □, □□ □□□ PC□ □ □□.
ge-0/0/2, ge-0/0/3	employee-vlan	192.0.2.17□□ 192.0.2.18□□	□□□,
ge-0/0/4, ge-0/0/5	guest-vlan	192.0.2.34□□ 192.0.2.35□□	□□□□ PC□ □□□ □ □□ □ □□ □ □. □□□ □□ □□ □□□□ □□ □□ □ □□□□ □□ □□ □□□ □□□□ □□□ □.
ge-0/0/6, ge-0/0/7	camera-vlan	192.0.2.49□□ 192.0.2.50□□	□□ □□□ □ □
ge-0/0/9	voice-vlan	IP □□: 192.0.2.14 MAC □□: 00.05.5E.00.53.0E	□□□□□ □□□□. □□□□□□ VoIP □□□ □□ □□ □□, □□, □□ □□□ □ □□□□.
ge-0/1/0		IP □□: 192.0.2.65	□□□□ □□ □□□ 3 □□. □□□ □□□ □ □□□ □□□ □□□□ □□□□□.

□□ □□□□ □□ □□□ □□□□ TCP□ ICMP □□□ □□ □□□ □□ □□ □□ □□□ □□ □□□□

in this section

- □□ | 1584

□□, VLAN, □□□ □□□□□□ □□ □□□ □□□ □□□□ □□□□ □□ □□□ □□□ □□□□□.

□□

CLI □□ □□

employee-vlan □□□□ □□□□ □□ □□ □□□ □□ □□ □ □□ □□ □□□ □□ □□ □□□ □□□ □□□ □□□□ □□□□ □□ □□□ □□□□ □□□□ □□□ □□ □□ □□ □□□□.

```
[edit]
                        set firewall policer tcp-connection-policer if-exceeding burst-size-
limit 30k bandwidth-limit 1m
                        set firewall policer tcp-connection-policer then
discard
                        set firewall policer icmp-connection-policer if-exceeding burst-size-
limit 30k bandwidth-limit 1m
                        set firewall policer icmp-connection-policer then
discard
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term voip-high from source-mac-address 00.00.5E.00.53.01
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term voip-high from source-mac-address 00.00.5E.00.53.02
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term voip-high from protocol udp
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term voip-high then forwarding-class expedited-forwarding
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term voip-high then loss-priority low
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term network-control from precedence net-control
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term network-control then forwarding-class network-control
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term network-control then loss-priority low
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term tcp-connection from destination-address 192.0.2.16/28
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term tcp-connection from protocol tcp
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term tcp-connection then policer tcp-connection-policer
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term tcp-connection then count tcp-counter
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term tcp-connection then forwarding-class best-effort
```

```
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term tcp-connection then loss-priority high
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term icmp-connection from destination-address 192.0.2.16/28
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term icmp-connection from protocol icmp
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term icmp-connection then policer icmp-connection-policer
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term icmp-connection then count icmp-counter
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term icmp-connection then forwarding-class best-effort
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term icmp-connection then loss-priority high
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term best-effort then forwarding-class best-effort
                        set firewall family ethernet-switching filter ingress-port-voip-class-
limit-tcp-icmp term best-effort then loss-priority high
                        set interfaces ge-0/0/0 description "voice priority and tcp and icmp
traffic rate-limiting filter at ingress port"
                        set interfaces ge-0/0/0 unit 0 family ethernet-switching filter input
ingress-port-voip-class-limit-tcp-icmp
                        set interfaces ge-0/0/1 description "voice priority and tcp and icmp
traffic rate-limiting filter at ingress port"
                        set interfaces ge-0/0/1 unit 0 family ethernet-switching filter input
ingress-port-voip-class-limit-tcp-icmp
                        set class-of-service schedulers voice-high buffer-size percent
15
                        set class-of-service schedulers voice-high  priority
high
                        set class-of-service schedulers net-control buffer-size percent
10
                        set class-of-service schedulers net-control priority
high
                        set class-of-service schedulers best-effort buffer-size percent
75
                        set class-of-service schedulers best-effort priority
low
                        set class-of-service scheduler-maps ethernet-diffsrv-cos-map forwarding-
class expedited-forwarding scheduler voice-high
                        set class-of-service scheduler-maps ethernet-diffsrv-cos-map forwarding-
class network-control scheduler net-control
```

```
                        set class-of-service scheduler-maps ethernet-diffsrv-cos-map forwarding-
class best-effort scheduler best-effort
```

□□□ □□

employee-vlan □□□□ □□□□ □□ □□ □□□ □□ □□ □ □□ □□ □□□ □□ □□ □□□ □□□ □□□□ □□□□□.

1. □□□ tcp-connection-policer □ icmp-connection-policer □□:

```
[edit]
user@switch# set firewall policer tcp-connection-policer if-exceeding burst-size-limit 30k
bandwidth-limit 1m
user@switch# set firewall policer tcp-connection-policer then discard
user@switch# set firewall policer icmp-connection-policer if-exceeding burst-size-limit 30k
bandwidth-limit 1m
user@switch# set firewall policer icmp-connection-policer then
discard
```

2. □□□ □□ ingress-port-voip-class-limit-tcp-icmp □□:

```
[edit firewall]
user@switch# set family ethernet-switching filter ingress-port-voip-class-limit-tcp-
icmp
```

3. □□voip-high □□:

```
[edit firewall family ethernet-switching filter ingress-port-voip-class-limit-tcp-icmp ]
user@switch# set term voip-high from source-mac-address 00.00.5E.00.53.01
user@switch# set term voip-high from source-mac-address 00.00.5E.00.53.02
user@switch# set term voip-high from protocol udp
user@switch# set term voip-high then forwarding-class expedited-forwarding
user@switch# set term voip-high then loss-priority low
```

4. □□network-control □□:

```
[edit firewall family ethernet-switching filter ingress-port-voip-class-limit-tcp-icmp ]
user@switch# set term network-control from precedence net-control
```

```
user@switch# set term network-control then forwarding-class network-control
user@switch# set term network-control then loss-priority low
```

5. TCP □□□ □□ □□□ □□□□ □□ tcp-connection □□ □□:

```
[edit firewall family ethernet-switching filter ingress-port-voip-class-limit-tcp-icmp]
user@switch# set term tcp-connection from destination-address 192.0.2.16/28
user@switch# set term tcp-connection from protocol tcp
user@switch# set term tcp-connection then policer tcp-connection-policer
user@switch# set term tcp-connection then count tcp-counter
user@switch# set term tcp-connection then forwarding-class best-effort
user@switch# set term tcp-connection then loss-priority high
```

6. ICMP □□□ □□ □□□ □□□□ □□ icmp-connection □□ □□:

```
[edit firewall family ethernet-switching filter ingress-port-voip-class-limit-tcp-icmp]
user@switch# set term icmp-connection from destination-address 192.0.2.16/28
user@switch# set term icmp-connection from protocol icmp
user@switch# set term icmp-connection then policer icmp-policer
user@switch# set term icmp-connection then count icmp-counter
user@switch# set term icmp-connection then forwarding-class best-effort
user@switch# set term icmp-connection then loss-priority high
```

7. □□□ □□□ □□ □□□ □□□□ □□ □□ □□□ □□□ □□□ □□ □□ □□□ □□ best-effort □□ □□:

```
[edit firewall family ethernet-switching filter ingress-port-voip-class-limit-tcp-icmp]
user@switch# set term best-effort then forwarding-class best-effort
user@switch# set term best-effort then loss-priority high
```

8. □□□ □□ ingress-port-voip-class-limit-tcp-icmp□(□) employee-vlan□ □□ □□□□□□□ □□ □□ □□□ □□:

```
[edit interfaces]
user@switch# set ge-0/0/0 description "voice priority and tcp and icmp traffic rate-
limiting filter at ingress port"
user@switch# set ge-0/0/0 unit 0 family ethernet-switching filter input ingress-port-voip-
class-limit-tcp-icmp
user@switch# set ge-0/0/1 description "voice priority and tcp and icmp traffic rate-
limiting filter at ingress port"
```

```
user@switch# set ge-0/0/1 unit 0 family ethernet-switching filter input ingress-port-voip-
class-limit-tcp-icmp
```

9. ?? ?????? ?? ??? ?? ??? ??????.

?: ?????? ?? ?? ??? ?? ? ?? ???? ??? ??? ?????? ?? ??????.

```
[edit class-of-service]
user@switch# set schedulers voice-high buffer-size percent 15
user@switch# set schedulers voice-high priority  high
user@switch# set schedulers network-control buffer-size percent 10
user@switch# set schedulers network-control priority high
user@switch# set schedulers best-effort buffer-size percent 75
user@switch# set schedulers best-effort priority low
```

10. ???? ?? ???? ?????? ??? ???? ??:

```
[edit class-of-service]
user@switch# set scheduler-maps ethernet-diffsrv-cos-map
user@switch# set scheduler-maps ethernet-diffsrv-cos-map forwarding-class expedited-
forwarding scheduler voice-high
user@switch# set scheduler-maps ethernet-diffsrv-cos-map forwarding-class network-control
scheduler net-control
user@switch# set scheduler-maps ethernet-diffsrv-cos-map forwarding-class best-effort
scheduler best-effort
```

11. ??? ???????? ?? ????? ?? ??:

```
[edit class-of-service]
user@switch# set interfaces ge-0/1/0 scheduler-map ethernet-diffsrv-cos-
map
```

??

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```
user@switch# show
    firewall {
        policer tcp-connection-policer {
            if-exceeding {
                bandwidth-limit 1m;
                burst-size-limit 30k;
            }
            then {
                discard;
            }
        }
        policer icmp-connection-policer {
            if-exceeding {
                bandwidth-limit 1m;
                burst-size-limit 30k;
            }
            then {
                discard;
            }
        }
        family ethernet-switching {
            filter ingress-port-voip-class-limit-tcp-icmp {
                 term voip-high {
                    from {
                        destination-mac-address 00.00.5E.00.53.01;
                            destination-mac-address 00.00.5E.00.53.02;
                        protocol udp;
                    }
                    then {
                        forwarding-class expedited-forwarding;
                        loss-priority low;
                    }
                }
                term network-control {
                    from {
                        precedence net-control ;
                    }
                    then {
```

```
                        forwarding-class network-control;
                        loss-priority low;
                    }
                }
                term tcp-connection {
                    from {
                        destination-address 192.0.2.16/28;
                        protocol tcp;
                    }
                    then {
                        policer tcp-connection-policer;
                            count tcp-counter;
                            forwarding-class best-effort;
                        loss-priority high;
                    }
                }
                term icmp-connection
                    from {
                        protocol icmp;
                    }
                    then {
                         policer icmp-connection-policer;
                            count icmp-counter;
                            forwarding-class best-effort;
                        loss-priority high;
                    }
                }
                term best-effort {
                    then {
                        forwarding-class best-effort;
                        loss-priority high;
                    }
                }
            }
        }
    }
    interfaces {
        ge-0/0/0 {
            description "voice priority and tcp and icmp traffic rate-limiting filter at ingress
port";
            unit 0 {
                family ethernet-switching {
                    filter {
```

```
                        input ingress-port-voip-class-limit-tcp-icmp;
                    }
                }
            }
        }
        ge-0/0/1 {
            description "voice priority and tcp and icmp traffic rate-limiting filter at ingress
port";
                unit 0 {
                family ethernet-switching {
                    filter {
                        input ingress-port-voip-class-limit-tcp-icmp;
                    }
                }
            }
        }
    }
    scheduler-maps {
        ethernet-diffsrv-cos-map {
            forwarding-class expedited-forwarding scheduler voice-high;
                forwarding-class network-control scheduler net-control;
            forwarding-class best-effort scheduler best-effort;
        }
    }
    interfaces {
        ge/0/1/0 {
            scheduler-map ethernet-diffsrv-cos-map;
        }
    }
```

□□ □□□□□ VoIP □□□ □□□□ □□□ □□ VLAN □□ □□□ □□ □□□□

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□□ □□□□□ HTTP □□□ □□□□ VoIP □□□□ □□□□ □□□□□ □□□□□ □□□□ □□ □□□□ voice-vlan□□ VLAN □□□ □□□ □□□ □□□ □ □□ □□ □□□□ □□□□ □□□ □□□□ □□ □□:

```
[edit]
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term to-gatekeeper from destination-address 192.0.2.14
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term to-gatekeeper from destination-port 80
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term to-gatekeeper then accept
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term from-gatekeeper from source-address 192.0.2.14
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term from-gatekeeper from source-port 80
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term from-gatekeeper then accept
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term not-gatekeeper from destination-port 80
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term not-gatekeeper then count rogue-counter
                        set firewall family ethernet-switching filter ingress-vlan-rogue-block
term not-gatekeeper then discard
                        set vlans voice-vlan description "block rogue devices on voice-
vlan"
                        set vlans voice-vlan filter input ingress-vlan-rogue-
block
```

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□□ □□□□□ HTTP□ □□□ VoIP □□□□ □□□□ □□□□□ □□□□□ □□□□ □□ □□□□ voice-vlan□□ VLAN □□□ □□□ □□□□ □□:

1. □□ □ □□□ □□□ □□□□ □□ □□ □□□ □□□□ □□ □□□ □□ ingress-vlan-rogue-block□□:

   ```
   [edit firewall]
   user@switch# set family ethernet-switching filter ingress-vlan-rogue-
   block
   ```

2. ??????? ?? IP ??? ???? ??? ?????? ?? ??to-gatekeeper ??:

```
[edit firewall family ethernet-switching filter ingress-vlan-rogue-block]
user@switch# set term to-gatekeeper from destination-address 192.0.2.14
user@switch# set term to-gatekeeper from destination-port 80
user@switch# set term to-gatekeeper then accept
```

3. ??????? ?? IP ??? ???? ??? ?????? ?? ??from-gatekeeper ??:

```
[edit firewall family ethernet-switching filter ingress-vlan-rogue-block]
user@switch# set term from-gatekeeper from source-address 192.0.2.14
user@switch# set term from-gatekeeper from source-port 80
user@switch# set term from-gatekeeper then accept
```

4. TCP ??? ?? ?? voice-vlan ???? ????? ????? ???? ??? ?? ??not-gatekeeper ??:

```
[edit firewall family ethernet-switching filter ingress-vlan-rogue-block]
user@switch# set term not-gatekeeper from destination-port 80
user@switch# set term not-gatekeeper then count rogue-counter
user@switch# set term not-gatekeeper then discard
```

5. VoIP ??? VLAN ??????? ?? ?? ??? ??? ??ingress-vlan-rogue-block ??:

```
[edit]
user@switch# set vlans voice-vlan description "block rogue devices on voice-vlan"
user@switch# set vlans voice-vlan filter input ingress-vlan-rogue-block
```

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```
user@switch# show
    firewall {
        family ethernet-switching {
            filter ingress-vlan-rogue-block {
                term to-gatekeeper {
                    from {
```

```
                    destination-address 192.0.2.14/32
                    destination-port 80;
                }
                then {
                    accept;
                }
            }
            term from-gatekeeper {
                from {
                    source-address 192.0.2.14/32
                    source-port 80;
                }
                then {
                    accept;
                }
            }
            term not-gatekeeper {
                from {
                    destination-port 80;
                }
                then {
                    count rogue-counter;
                    discard;
                }
            }
    }
vlans {
    voice-vlan {
        description "block rogue devices on voice-vlan";
        filter {
             input ingress-vlan-rogue-block;
        }
    }
}
```

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□□□ □□□ employee-vlan □□ □□□□ □□□□□ □□ VLAN □□□□□□ □□□□ □□□□□. □□ □□□□ □□□□ □□ □□ □□□□ □□□□□ □□□□□ □ □□□□. □□□ □□□ □□□ □□□□ □□□□□ □□□□□.

VLAN □□□ □□□ □□□ □□□□ □□□□ □□ □□ □□□ □□□□ □□□ □□□□ □□ □□:

```
[edit]
                        set firewall family ethernet-switching filter egress-vlan-watch-
employee term employee-to-corp from destination-address 192.0.2.16/28
                        set firewall family ethernet-switching filter egress-vlan-watch-
employee term employee-to-corp then accept
                        set firewall family ethernet-switching filter egress-vlan-watch-
employee term employee-to-web from destination-port 80
                        set firewall family ethernet-switching filter egress-vlan-watch-
employee term employee-to-web then count employee-web-counter
                        set firewall family ethernet-switching filter egress-vlan-watch-
employee term employee-to-web then analyzer employee-monitor
                        set vlans employee-vlan description "filter at egress VLAN to count and
analyze employee to Web traffic"
                        set vlans employee-vlan filter output egress-vlan-watch-
employee
```

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□□ □□□□ □□ employee-vlan □□□□ □□□□□ □□□□ □□ □□ □□ □□□ □□□ □□□□ □□□□:

1. □□□ □□ egress-vlan-watch-employee □□:

```
[edit firewall]
user@switch# set family ethernet-switching filter egress-vlan-watch-
employee
```

2. □□ □□□□ □□□□□□ □□ employee-vlan□□□□ □□□□□ □□□□□□ □□ □□employee-to-corp □□:

```
[edit firewall family ethernet-switching filter egress-vlan-watch-employee]
user@switch# set term employee-to-corp from destination-address 192.0.2.16/28
user@switch# set term employee-to-corp then accept
```

3. □□□ □□□ □□ employee-vlan□□□□ □□□□□ □□□□□□ □□employee-to-web □□:

```
[edit firewall family ethernet-switching filter egress-vlan-watch-employee]
user@switch# set term employee-to-web from destination-port 80
user@switch# set term employee-to-web then count employee-web-counter
user@switch# set term employee-to-web then analyzer employee-monitor
```

□: □: employee-monitor □□□□ □□□□ □□□ □□ EX □□□ □□□ □□ □□ □□ □□ □□ □□□□□ □□ □□ □□□ □□□□.

4. VoIP □□□ □□ □□□□□□□ □□ □□□ □□□ □□ egress-vlan-watch-employee□(□) □□:

```
[edit]
user@switch# set vlans employee-vlan description "filter at egress VLAN to count and analyze
employee to Web traffic"
user@switch# set vlans employee-vlan filter output egress-vlan-watch-
employee
```

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```
user@switch# show
    firewall {
        family ethernet-switching {
            filter egress-vlan-watch-employee {
                term employee-to-corp {
                    from {
                        destination-address 192.0.2.16/28
                    }
                    then {
                        accept;
```

```
                }
            }
            term employee-to-web {
                from {
                    destination-port 80;
                }
                then {
                    count employee-web-counter:
                    analyzer employee-monitor;
                }
            }
        }
    }
}
vlans {
    employee-vlan {
        description "filter at egress VLAN to count and analyze employee to Web traffic";
        filter {
             output egress-vlan-watch-employee;
        }
    }
}
```

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```
[edit]
                        set firewall family ethernet-switching filter ingress-vlan-limit-guest
term guest-to-guest from destination-address 192.0.2.33/28
                        set firewall family ethernet-switching filter ingress-vlan-limit-guest
term guest-to-guest then accept
                        set firewall family ethernet-switching filter ingress-vlan-limit-guest
term no-guest-employee-no-peer-to-peer from destination-mac-address
00.05.5E.00.00.DF
                        set firewall family ethernet-switching filter ingress-vlan-limit-guest
term no-guest-employee-no-peer-to-peer then accept
                        set vlans guest-vlan description "restrict guest-to-employee traffic
and peer-to-peer applications on guest VLAN"
                        set vlans guest-vlan forwarding-options filter input ingress-vlan-limit-
guest
```

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□□□□ □□□□ □□□□ guest-vlan□□ □□ □ □□ □□□□□□□ □□□□ □□ VLAN □□□ □□□ □□□□ □□:

1. □□□ □□ ingress-vlan-limit-guest □□:

   ```
   [edit firewall]
                               set firewall family ethernet-switching filter ingress-vlan-limit-
   guest
   ```

2. guest-vlan□□ □□□ □□ □□□ □□□ □ □□□ □□□□□ employee-vlan□□ □□□ □□□□ □□ □□□□ □□ □□guest-to-guest □□:

   ```
   [edit firewall family ethernet-switching filter ingress-vlan-limit-guest]
   user@switch# set term guest-to-guest from destination-address 192.0.2.33/28
   user@switch# set term guest-to-guest then accept
   ```

3. □□□ guest-vlan□ □ □□□□ □□□□□ guest-vlan□□ □□ □ □□ □□□□□□□ □□□□ □□□ □□ □□no-guest-employee-no-peer-to-peer □□.

□: destination-mac-address□(□) □□ □□□□□□ VLAN□ □□ □□□□ □□ □□ □ □□□□□□.

```
[edit firewall family ethernet-switching filter ingress-vlan-limit-guest]
user@switch# set term no-guest-employee-no-peer-to-peer from destination-mac-address
00.05.5E.00.00.DF
user@switch# set term no-guest-employee-no-peer-to-peer then accept
```

4. □□□ □□ ingress-vlan-limit-guest□(□) guest-vlan □ □□□□□□□ □□ □□ □□□ □□:

```
[edit]
user@switch# set vlans guest-vlan description "restrict guest-to-employee traffic and peer-to-
peer applications on guest VLAN"
user@switch# set vlans guest-vlan forwarding-options filter input ingress-vlan-limit-
guest
```

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```
user@switch# show
    firewall {
        family ethernet-switching {
            filter ingress-vlan-limit-guest {
                term guest-to-guest {
                    from {
                        destination-address 192.0.2.33/28;
                    }
                    then {
                        accept;
                    }
                }
                term no-guest-employee-no-peer-to-peer {
                    from {
                        destination-mac-address 00.05.5E.00.00.DF;
                    }
                    then {
                        accept;
                    }
```

```
                }
            }
        }
    }
    vlans {
        guest-vlan {
            description "restrict guest-to-employee traffic and peer-to-peer applications on
guest VLAN";
            filter {
                input ingress-vlan-limit-guest;
            }
        }
    }
```

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employee-vlan ???? ???? ?? ???? ??(??? 3 ??? ??)? ??? ??? ??? ???? ?? ?? ????? ??? ???? ?? ?? ??? ?? ? ???? ?? ??? ???? ??? ?? ?? ?? ??:

```
[edit]
                        set firewall family inet filter egress-router-corp-class term corp-
expedite from destination-address 192.0.2.16/28
                        set firewall family inet filter egress-router-corp-class term corp-
expedite then forwarding-class expedited-forwarding
                        set firewall family inet filter egress-router-corp-class term corp-
expedite then loss-priority low
                        set firewall family inet filter egress-router-corp-class term not-to-
corp then accept
```

```
                         set interfaces ge-0/1/0 description "filter at egress router to
expedite destined for corporate network"
                         set ge-0/1/0 unit 0 family inet address 203.0.113.0
                         set interfaces ge-0/1/0 unit 0 family inet filter output egress-router-
corp-class
```

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□□ □□□□□ □□□ employee-vlan □□□□ □□ □□ □□ □□□ □□□□ □□ □□□□ □□(□□□ 3 □□□ □□)□ □□□ □□□ □□□□ □□□□:

1. □□□ □□ egress-router-corp-class □□:

```
[edit]
user@switch# set firewall family inet filter egress-router-corp-class
```

2. □□corp-expedite □□:

```
[edit firewall]
user@switch# set family inet filter egress-router-corp-class term corp-expedite from
destination-address 192.0.2.16/28
user@switch# set family inet filter egress-router-corp-class term corp-expedite then
forwarding-class expedited-forwarding
user@switch# set family inet filter egress-router-corp-class term corp-expedite then loss-
priority low
```

3. □□not-to-corp □□:

```
[edit firewall]
user@switch# set family inet filter egress-router-corp-class term not-to-corp then
accept
```

4. □□□□ □□□ 3 □□□ □□□□ □□□ □□□ □□□ □□□ □□ □□ □□□ □□□ □□ egress-router-corp-class□(□) □□:

```
[edit interfaces]
user@switch# set ge-0/1/0 description "filter at egress router to expedite employee traffic
destined for corporate network"
user@switch# set ge-0/1/0 unit 0 family inet address 203.0.113.0
```

```
user@switch# set ge-0/1/0 unit 0 family inet filter output egress-router-corp-
class
```

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```
user@switch# show
    firewall {
        family inet {
            filter egress-router-corp-class {
                term corp-expedite {
                    from {
                        destination-address 192.0.2.16/28;
                    }
                    then {
                        forwarding-class expedited-forwarding;
                        loss-priority low;
                    }
                }
                term not-to-corp {
                    then {
                        accept;
                    }
                }
            }
        }
    }
    interfaces {
        ge-0/1/0 {
            unit 0 {
                description "filter at egress router interface to expedite employee traffic
destined for corporate network";
                family inet {
                    source-address 203.0.113.0
                    filter {
                        output egress-router-corp-class;
                    }
                }
            }
```

```
        }
    }
```

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```
user@switch>                                  show
firewall
Filter: ingress-port-voip-class-limit-tcp-icmp
Counters:
Name                                                Packets
icmp-counter                                              0
tcp-counter                                               0
Policers:
Name                                                Packets
icmp-connection-policer                                   0
tcp-connection-policer                                    0

Filter: ingress-vlan-rogue-block

Filter: egress-vlan-watch-employee
Counters:
```

```
Name                                                Packets
employee-web-counter                                      0
```

□□

show firewall □□□ □□□ □□□ □□□ □□□ □□, □□□ □ □□□□ □□□ □□□□□. □□ □□□ □□ □□□ □□□□ □□□□ □□ □□ □□□□ □□ □□□ □ □□ □□ □□□□□.

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```
user@switch>                              show class-of-service scheduler-
map

Scheduler map: default, Index: 2

  Scheduler: default-be, Forwarding class: best-effort, Index: 20
    Transmit rate: 95 percent, Rate Limit: none, Buffer size: 95 percent,
    Priority: low
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             non-TCP         1    default-drop-profile
      Low             TCP             1    default-drop-profile
      High            non-TCP         1    default-drop-profile
      High            TCP             1    default-drop-profile

  Scheduler: default-nc, Forwarding class: network-control, Index: 22
    Transmit rate: 5 percent, Rate Limit: none, Buffer size: 5 percent,
    Priority: low
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             non-TCP         1    default-drop-profile
      Low             TCP             1    default-drop-profile
      High            non-TCP         1    default-drop-profile
```

```
      High            TCP             1    default-drop-profileScheduler map: ethernet-diffsrv-
cos-map, Index: 21657

  Scheduler: best-effort, Forwarding class: best-effort, Index: 61257
    Transmit rate: remainder, Rate Limit: none, Buffer size: 75 percent,
    Priority: low
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             non-TCP         1    <default-drop-profile>
      Low             TCP             1    <default-drop-profile>
      High            non-TCP         1    <default-drop-profile>
      High            TCP             1    <default-drop-profile>

  Scheduler: voice-high, Forwarding class: expedited-forwarding, Index: 3123
    Transmit rate: remainder, Rate Limit: none, Buffer size: 15 percent,
    Priority: high
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             non-TCP         1    <default-drop-profile>
      Low             TCP             1    <default-drop-profile>
      High            non-TCP         1    <default-drop-profile>
      High            TCP             1    <default-drop-profile>

  Scheduler: net-control, Forwarding class: network-control, Index: 2451
    Transmit rate: remainder, Rate Limit: none, Buffer size: 10 percent,
    Priority: high
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             non-TCP         1    <default-drop-profile>
      Low             TCP             1    <default-drop-profile>
      High            non-TCP         1    <default-drop-profile>
      High            TCP             1    <default-drop-profile>
```

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> *?: EX ??? ????? CoS(class of service) ????*
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> ??? ?? ??(CLI ??) | **1567**

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EX □□□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□ | 1466

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EX □□□ □□□□ □□ □□□□□□□ □□□ □□□ □□□□ □□□□ □□ □□□□□□□ □□ □□ □□ □□□□ □□□□ □ □□□□. SSH □□ Telnet □□ □□ □□□ □□□□ □□□□ □□□ □□ □□□□□□ □□□ □□ SNMP □□ □□ □□□□□ □□□□ □□□□□ □□ □□□□ □□□ □ □□□□.

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- EX □□□ □□□□ Junos OS □□□ 10.4 □□

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□ □□□ □□ PC□ □□□□ □□ □□□□□□□ SSH □□□ □□□□ □□□□ □□□□ □□□□□. □□ □□□□□□□ □□ □□□ IP □□□ 10.204.33.103/20□□□. □□□ □□□ □□ □□□□□□□ □□ SSH □□□□ □□□□ □□ □□ □□□□□ □□ □□□□□□□ □□□□□. □□ PC□ □□ □ □□□□□ SSH □□□ □□□□ □□ □□□□□□□ SSH □□□ □□ PC□ □□□□ □□□ □□□□□□□ □□□□□. □□□ SSH □□□ □□ PC□ □□□□ □□ □ □□ □□□ □□□ □□ □□□ □□ □□□□□□□. □□□ □□□ □□ □□□□□□□ □□ SSH □□□□ □□□□□ □□ □□□□□□□ □□□ □□ □□□ □□□□□. □□□□ SSH □□ □□ □□ □□□□□□□ □□□ □□ □□ □□□□□. □□□ □□□□ □ □□□ □□□□ □□ □□□□ □□□□□□□ □□□ □□ □□□ □□ □ □□□□.

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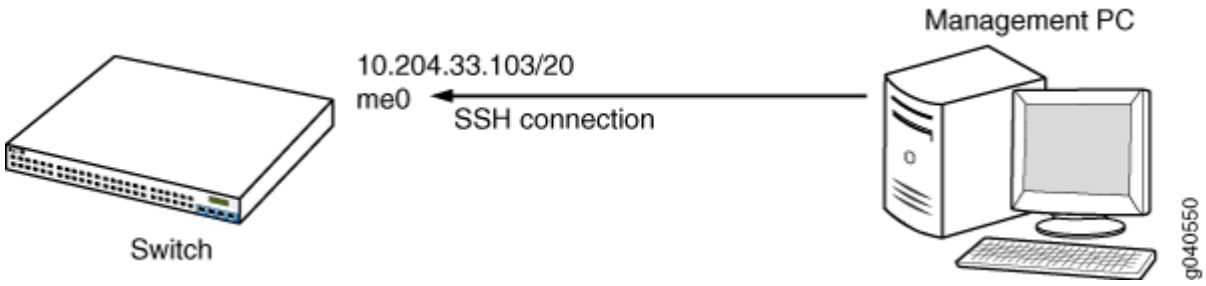

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```
[edit]
set firewall family inet filter mgmt_fil1 term t1 from source-port ssh
set firewall family inet filter mgmt_fil1 term t1 then count c1
```

```
set firewall family inet filter mgmt_fil1 term t2 then accept
set interfaces me0 unit 0 family inet filter output mgmt_fil1
```

??? ??

?? ????????? ??? ??? ????? SSH ??? ?????? ??:

1. ?? ??? SSH ??? ????? ??? ??? ??????.

   ```
   [edit]
   user@switch# set firewall family inet filter (Firewall Filters) mgmt_fil1 term t1 from source-
   port ssh
   user@switch# set firewall family inet filter mgmt_fil1 term t1 then count c1
   user@switch# set firewall family inet filter mgmt_fil1 term t2 then accept
   ```

   ??? ?? ?? ???????? ?? SSH ????????? ????? SSH ?? ?? ????? ??? **c1** ? ??????.

2. ?? ???????? ?? ??? ??? ??????.

   ```
   [edit]
   user@switch# set interfaces me0 unit 0 family inet filter output mgmt_fil1
   ```

   ?: VME ???????? ?? ??? ??? ??? ?? ?????.

??

?? ??? ??????:

```
[edit]
user@switch# show

interfaces {
    me0 {
        unit 0 {
            family inet {
                filter {
                    output mgmt_fil1;
                    }
```

```
                address 10.93.54.6/24;
            }
        }
    }
}

firewall {
    family inet {
        filter mgmt_fil1{
            term t1 {
                 from {
                    source-port ssh;
                 then count c1;
                }
            }
            term t2 {
                then accept;
            }
        }
    }
}
```

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- ??? ??? ?? ??????? ????? ??? ?? | 1609

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??

????? ?? ???????? ??? ??? ???????? ??????.

??

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@switch# show interfaces me0
unit 0 {
    family inet {
        filter {
            output mgmt_fil1;
               }
        address 10.204.33.103/20;
                }
       }
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@switch> show firewall
Filter: mgmt_fil1
Counters:
Name                                Bytes              Packets
c1                                  0                    0
```

3. [illegible] PC[illegible] [illegible] [illegible] [illegible] [illegible].

```
[user@management-pc ~]$ ssh user@10.204.33.103
```

4. [illegible] PC[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] SSH [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@switch> show firewall
Filter: mgmt_fil1
Counters:
Name                                Bytes              Packets
c1                                  3533                 23
```

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] 23[illegible] SSH [illegible] [illegible] [illegible] [illegible].

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□□□ □□ □□(CLI □□) | 1567

□: EX □□□ □□□□□ □□, VLAN, □□□ □□□□ □□□ □□ □□□□ | 1578

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- □□ | 1611
- □□ | 1615

□ □□□□ EX □□□ □□□ □□ QFX10000□□ □□ □□ □□□□ □□□□ □□□ □□□□□. □□□ □□□ □□□□ □□□□ □□□□ □□ □□ □□□ □□□ □□ □□□□□□ □□ □□ □□□ □□□ □ □□□□.

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□ □□ Junos OS □□□ 9.4 □□□ □□□□ EX □□□ □□□□ Junos OS □□□ 15.1X53-D10 □□□ □□□□ QFX10000 □□□□ □□ □□□□□.

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□ □□□□ □□ □□□□□□ □□□ □□□□ □□□ □□ □□(192.168.0.1)□ □□ □ □□□□□□ □□□□ □□ □□□□□□ □□□ □□□□ □□□□ □□□□□ □□□ □□□ □□□□. □□□□ □□□ □□□□ □□ □□□□□ □□□ □□ □□ □□□□□□ □□□ □□□□ □□ □□□ □□□□□ □□□□□□.

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- ?? | 1614

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CLI ?? ??

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```
[edit]
                    set interfaces xe-0/0/0 unit 0 family inet address
10.1.0.1/24
                    set interfaces xe-0/0/3 unit 0 family inet address
10.1.3.1/24
                    set firewall family inet filter f1 term t1 from source-address
10.1.0.50/32
                    set firewall family inet filter f1 term t1 from protocol
tcp
                    set interfaces xe-0/0/0 unit 0 family inet filter input f1
                    set routing-instances vrf01 instance-type virtual-router
                    set routing-instances vrf01 interface xe-0/0/3.0
                    set routing-instances vrf01 routing-options static route 192.168.0.1/24
next-hop 10.1.3.254
                    set firewall family inet filter f1 term t1 then routing-instance
vrf01
```

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1. ??????? ??? ??? ??????? ??????.

```
[edit interfaces]
user@switch# set xe-0/0/0 unit 0 family inet address 10.1.0.1/24
```

2. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces]
user@switch# set xe-0/0/3 unit 0 family inet address 10.1.3.1/24
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] TCP [illegible] [illegible] [illegible] [illegible].

```
[edit firewall]
user@switch# set family inet filter f1 term t1 from source-address 10.1.0.50/32
user@switch# set firewall family inet filter f1 term t1 from protocol
tcp
```

4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces]
user@switch# set xe-0/0/0 unit 0 family inet filter input f1
```

5. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@switch# set routing-instances vrf01 instance-type virtual-router
```

6. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit routing-instances]
user@switch# set vrf01 interface xe-0/0/3.0
```

7. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit routing-instances]
user@switch# set vrf01 routing-options static route 192.168.0.1/24 next-hop 10.1.3.254
```

8. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall]
user@switch# set family inet filter f1 term t1 then routing-instance
vrf01
```

[illegible]

[illegible] [illegible] [illegible]:

```
user@switch> show configuration
interfaces {
    xe-0/0/0 {
        unit 0 {
            family inet {
                filter {
                    input f1;
                }
                address 10.1.0.1/24;
            }
        }
    }
    xe-0/0/3 {
        unit 0 {
            family inet {
                address 10.1.3.1/24;
            }
        }
    }
}
firewall {
    family inet {
        filter f1 {
            term t1 {
                from {
                    source-address {
                        10.1.0.50/32;
                    }
                    protocol tcp;
                }
                then {
```

```
                    routing-instance vrf01;
                }
            }
        }
    }
}
    routing-instances {
        vrf01 {
            instance-type virtual-router;
            interface xe-0/0/3.0;
            routing-options {
                static {
                    route 192.168.0.1/24 next-hop 10.1.3.254;
                }
            }
        }
    }
```

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??

1. show interfaces filters ??? ??????.

```
user@switch>                                    show interfaces filters
xe-0/0/0.0
```

```
Interface        Admin Link Proto Input Filter         Output Filter
xe-0/0/0.0       up    down inet  fil
```

2. show route forwarding-table ??? ?????.

```
user@switch> show route forwarding-table

Routing table: default.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            user     1 0:12:f2:21:cf:0    ucst   331     4 me0.0
default            perm     0                    rjct    36     3
0.0.0.0/32         perm     0                    dscd    34     1
10.1.0.0/24        ifdn     0                    rslv   613     1 xe-0/0/0.0
10.1.0.0/32        iddn     0 10.1.0.0           recv   611     1 xe-0/0/0.0
10.1.0.1/32        user     0                    rjct    36     3
10.1.0.1/32        intf     0 10.1.0.1           locl   612     2
10.1.0.1/32        iddn     0 10.1.0.1           locl   612     2
10.1.0.255/32      iddn     0 10.1.0.255         bcst   610     1 xe-0/0/0.0
10.1.1.0/26        ifdn     0                    rslv   583     1 vlan.0
10.1.1.0/32        iddn     0 10.1.1.0           recv   581     1 vlan.0
10.1.1.1/32        user     0                    rjct    36     3
10.1.1.1/32        intf     0 10.1.1.1           locl   582     2
10.1.1.1/32        iddn     0 10.1.1.1           locl   582     2
10.1.1.63/32       iddn     0 10.1.1.63          bcst   580     1 vlan.0
255.255.255.255/32 perm     0                    bcst    32     1

Routing table: vrf01.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   559     2
0.0.0.0/32         perm     0                    dscd   545     1
10.1.3.0/24        ifdn     0                    rslv   617     1 xe-0/0/3.0
10.1.3.0/32        iddn     0 10.1.3.0           recv   615     1 xe-0/0/3.0
10.1.3.1/32        user     0                    rjct   559     2
192.168.0.1/24     user     0 10.1.3.254         ucst   616     2 xe-0/0/3.0
192.168.0.1/24     user     0 10.1.3.254         ucst   616     2 xe-0/0/3.0
10.1.3.255/32      iddn     0 10.1.3.255         bcst   614     1 xe-0/0/3.0
224.0.0.0/4        perm     0                    mdsc   546     1
224.0.0.1/32       perm     0 224.0.0.1          mcst   529     1
255.255.255.255/32 perm     0                    bcst   543     1
```

```
Routing table: default.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    60     1

Routing table: vrf01.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   600     1
```

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?: 802.1X ?? MAC RADIUS ???? ????? ??????? ?? ????? ???? ?? ??

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- ?? ?? | 1618
- ?? ? ???? | 1618
- ?? | 1620
- ?? | 1623

EX ??? ?????? 802.1X ?? MAC RADIUS ???? ?? ????? ??????? ????? ???? ??? RADIUS ????? ????? ????? ????? ??? ????? ??????. ????? ?? ???? ????? ?????? ???? ??? RADIUS ???? ??? ???? ????? ????? ???????? ???? ?? ???? ? ? ???? ???? ???? ?? ????? ???? ??????.

□ □□□□ 802.1X □□ □□□□□□□□ □□ □□□□ □□ □□ □□□ □□□ □□□□ □□□ □□□□□(□ □□ □□□ □□ □□□ □□□ MAC RADIUS □□ □ □□□□ □□□□□□ □□□).

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- EX □□□ □□□□ Junos OS □□□ 9.5 □□
- EX □□□ □□□ 1□
- RADIUS □□ □□ 1□. □□ □□□ □□□ □□□□□□ □□□ □□, □□□□□ □□□ □ □□ □□□ □□ □□□(□□□□□)□ □□ □□□□ □□□ □□□□□.

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- □□□□ RADIUS □□ □□ □□□ □□□□□. □: 802.1X□ RADIUS □□□ EX □□□ □□□□ □□□□□.
- □□□□□□ **ge-0/0/2** □□ □□ □□□ □ □□□□ □□□□ 802.1X □□□ □□□□□□ **multiple**. 802.1X □□□□□ □□ □□(CLI □□) □ □ □ □□□□□□. EX □□□ □□□□□ □□ □□□ □□ □□ □□□ □□□ □□ 802.1X □□.
- RADIUS □□ □□□ □□□ □□□.

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- □□□□ | **1618**

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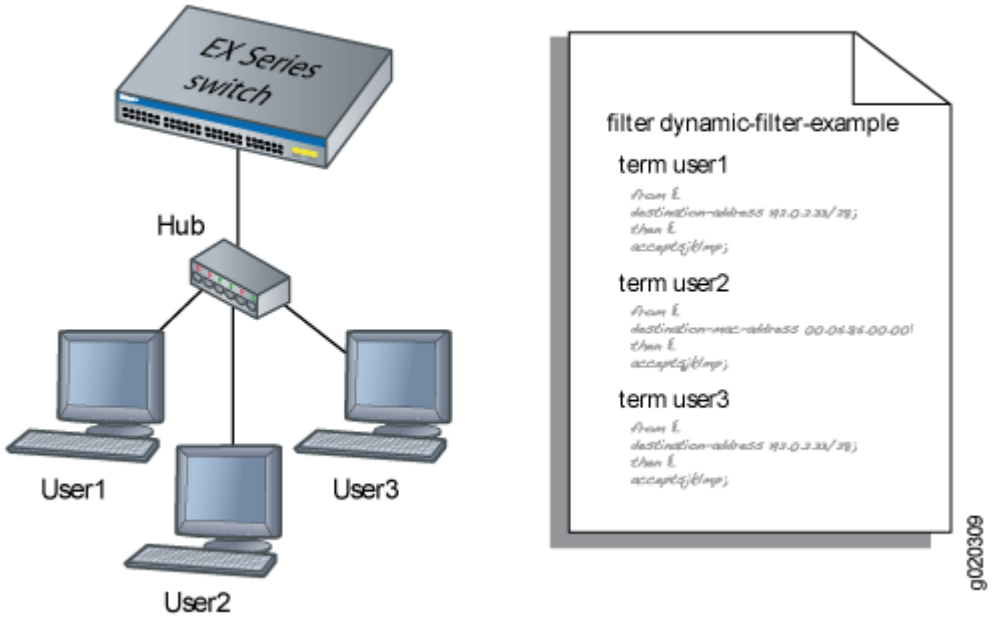
□□□□□ 802.1X □□□ Multiple Supplicant □□□ □□□ □□, □□□□ □□□□□ □□□ □□□ □□ □□ RADIUS □□□□ □□□□ □□□ □ □□ □□□ □□□□ □□□□ □ □□□□ □□ □□□ □□□ □□□□□. □□□□□□□ □□□ □ □□□□□ □□□ □□□ □□□□ □ □□ □□ □□□□ □□□□ □□□ □ □□□□□□ □□□ □□ □□□□ □□□ □ □ □□□□.

□□□ □□□(□□ □□□ □□□)□ □□□□□□□ □□□□, □□□□ □□□□□□ □□□ □□□ □□□ □□□ □□□□, □ □□□□ □□ □□(□□)□ □□□□ MAC □ □□ □□□□□. □ □□□□ □□ □□□ RADIUS □□□ □□□ □□□□ □□□ □□□□□□ □□□ □□□ □□□□ □□□. □□ □□, □□ □□ 74 □□□ 1619 □ □ □□□ User1□ EX □□□ □□□□ □□ □□□□ □□□□ □□□ □□□ **dynamic-filter-example**□□□□. User2□ □□□□ □□□ □□□ □ □ □□□ □□□□ □□□□.

□□ 74: □□□ □□: □ □ □□□□ □□ □□□□□□□ □□ □□



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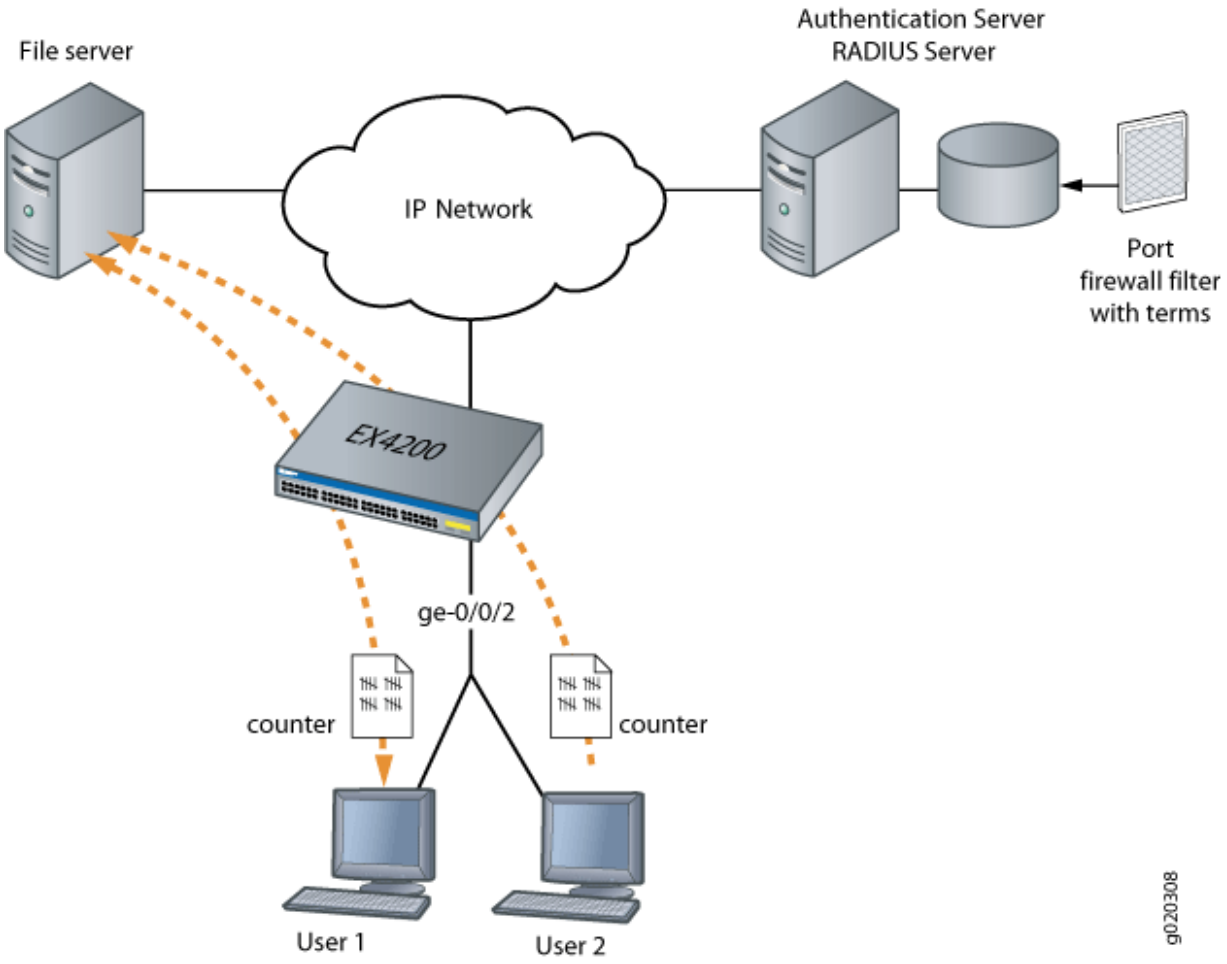
□: □□□(□□ □□□ □□□)□ □□□ □ □□□□□□ □□□ □□□ □□□□ □□□□ □□□□□ □□ □ □□ □□□ □□ □□□ □□□□ □□□ □.

□ □□□□ □□□ □□□ □□□□ □□□192.0.2.16/28□ □□□ □□ □□□ □□ □□□□□□□ ge-0/0/2 □□□ □ □□□□□□ □□□ □□□□, □□□ □ □□ □□□□□ □□□ □□□ □□□□□. □□ 75 □□□ 1620 □(□) □ □□□ □□□□ □□□□□ □□□□□.

□□ 75: □□ □□□ □□□□ 802.1X □□ □□□□□□□ □□ □□□



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802.1X □□ □□□□□□□ □□ □□□□□□□ □□ □□□ □□ □□:

CLI ?? ??

802.1X ?? ????????? ?? ????? ?? ???? ??? ????? ?????? ?? ???? ????? ???? ???? ?? ????????.

```
[edit]
                        set protocols dot1x authenticator interface ge-0/0/2 supplicant
multiple
                        set firewall family ethernet-switching filter filter1 term term1 from
destination-address 192.0.2.16/28
set firewall policer p1 if-exceeding bandwidth-limit 1m
set firewall policer p1 if-exceeding burst-size-limit 1k
                        set firewall family ethernet-switching filter filter1 term term1 then
count counter1
set firewall family ethernet-switching filter filter1 term term2 then policer p1
```

??? ??

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1. ?? ?????? ?? ???? ?? ?????? ge-0/0/2 ??:

   ```
   [edit protocols dot1x]
   user@switch# set authenticator interface ge-0/0/2 supplicant multiple
   ```

2. ???? ?? ??:

   ```
   user@switch# show policer p1 |display set
   set firewall policer p1 if-exceeding bandwidth-limit 1m
   set firewall policer p1 if-exceeding burst-size-limit 1k
   set firewall policer p1 then discard
   ```

3. ? ????? ??? ?????? ??? ???? ????? ??? ??? ????? ????? ??????. ???? ? ????? ?? ???? ????????? ????? ? ?? ???? ????? ?? ????? ???? ???? ??????.

   ```
   [edit firewall family ethernet-switching]
   user@switch# set filter filter1 term term1 from destination-address 192.0.2.16/28
   ```

```
user@switch# set filter filter1 term term1 then count counter1
user@switch# set filter filter1 term term2 then policer p1
```

??

?? ??? ?????:

```
user@switch> show configuration

firewall {
    family ethernet-switching {
        filter filter1 {
            term term1 {
                from {
                    destination-address {
                        192.0.2.16/28;
                    }
                }
                then count counter1;
                term term2 {
                from {
                    destination-address {
                        192.0.2.16/28;
                    }
                }
                then policer p1;
            }
        }
    }
    policer p1 {
        if-exceeding {
            bandwidth-limit 1m;
                burst-size-limit 1k;
            }
            then discard;
        }
}
protocols {
    dot1x {
        authenticator
            interface ge-0/0/2 {
```

```
                supplicant multiple;
            }
        }
    }
```

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- ?? ???? ?? ???????? ???? ?? ?? | 1623

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??

1. ???????? ??? ? ?? ???? ??? ??????. ? ?? ???? ???? ??????.ge-0/0/2

```
user@switch> show dot1x firewall

Filter: dot1x_ge-0/0/2
Counters
counter1_dot1x_ge-0/0/2_user1 100
```

2. ? ?? ???? User2? ??? ???????? ge-0/0/2???? ???????? ??? ? ??? ??? ?? ??? ??? ?????? ??? ? ????.

```
user@switch>  show dot1x firewall

Filter: dot1x-filter-ge-0/0/0
Counters
```

```
counter1_dot1x_ge-0/0/2_user1 100
counter1_dot1x_ge-0/0/2_user2 400
```

??

?? ??? show dot1x firewall ?? ????? ??? ? ?? ????? ????? ??? ?? ??? ??????. User1? ??? ?? ??? ?? ?? ??? 100? ?????? User2? ??? ?? ??? 400? ????????.

?? ??

> ?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | **1578**
>
> RADIUS ?? ??? ??? 802.1X ??? ???

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- ?? | **1624**
- ?? | **1625**

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```
user@switch>                        show policer
Filter: egress-vlan-watch-employee
Filter: ingress-port-filter
Filter: ingress-port-voip-class-limit-tcp-icmp
```

```
Policers:
Name                                                Packets
icmp-connection-policer                                   0
tcp-connection-policer                                    0
Filter: ingress-vlan-rogue-block
Filter: ingress-vlan-limit-guest
```

??

? show policer ??? ???? ??? ?? ??? ?? ? ???? ??? ?????. ?? ??? ??? ? ???? ?? ?? ??? ??? ?? ??? ???? ? ? ??? ?? ?? ?? ?????.

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- ??? ??? ???? ??? ????(CLI ??) | 2080
- ??? ?? ??(CLI ??) | 1567
- ?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | 1578
- ??? ?? ??? ???? | 1766

??? ?? ?? ??

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- QFX10000 ??? ?? ?? | 1626
- ?? ??? ?? ?? | 1627

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QFX10000 □□□ □□ □□

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- □□ □□ □□□□ □□ □□ □□□ □□□□ □□□□ | 1626
- □□□ 2 □□□ □□□ □□□ □□□ □ □□□□. | 1626
- Protect-RE(□□□) □□□ □□□ EM0 □□□□□□ □□□ □□□ □□□□□ □□□□. | 1627

□ □□□□□ QFX10000 □□□□ □□□ □□□ □□ □□□□□.

□□ □□ □□□□ □□ □□ □□□ □□□□ □□□□

QFX10000 □□□□□ □□□ 2□ □□□ □□ □□□□ □□ □□ □□□ □□□□ `family ethernet-switching` □□□□. (□□ □□, □□□ □□□ MAC □□ □ IP □□□ □□□□ □□□ □□□□ □□□□.) □□□ □□ □□□ □□□□□ □□□□□ □□□□ □□□□. □□ □□□ □□ □□ □□□□ □□□□□. `L2 filter filter-name doesn't support mixed L2 and L3/L4 match conditions. Please re-config.`

□□□ 2 □□□ □□□ □□□ □□□ □ □□□□.

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- □□ | 1626
- □□□ | 1627

□□

□□

LLDP(Link Layer Discovery Protocol) □ BPDU(Bridge Protocol Data Unit)□ □□ L2(Layer 2) □□ □□□ □□□ □□□ □□□□ □□□ □ □□□□.

□□□

L2 □□ □□□ DDoS(Distributed Denial-of-Service) □□□ □□□□ □ □□□ □□□ □ □□□ □□ □□□ 1□ □□□□□. □□ □□

```
[edit system ddos-protection protocols protocol name]
```

user@host# **set aggregate bandwidth 1**

```
[edit system ddos-protection protocols protocol name]
```

user@host# **set aggregate burst 1**

Protect-RE(□□□) □□□ □□□ EM0 □□□□□□□ □□□ □□□ □□□□□ □□□□.

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- □□ | **1627**
- □□□ | **1627**

□□

□□

QFX10000 □□□□□ Protect-RE(□□□) □□□ □□□ SNMP, Telnet □ □□ □□□□ □□□ EM0 □□□□□□□ □□□ □□□ □□□□□ □□□ □.

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- □□□ □□ □□□ TCAM □□□□□ □□ □□□ □□□ □□□ □□□ | **1628**

- [illegible] | 1630
- [illegible] | 1631
- [illegible] | 1632
- [illegible]. | 1633
- QFX [illegible] | 1633
- [illegible] Q-in-Q [illegible] | 1634
- [illegible] VLAN [illegible] | 1634
- L2PT [illegible] | 1636
- [illegible] BGP [illegible] | 1636
- [illegible] | 1637
- [illegible]. | 1637

[illegible] QFX10000 [illegible] QFX [illegible] [illegible] [illegible] [illegible]. [illegible] OCX1100 [illegible] EX4600 [illegible] [illegible].

[illegible] TCAM [illegible]

in this section

- [illegible] | 1628
- [illegible] | 1629

[illegible]

[illegible]

[illegible] TCAM(Ternary Content Addressable Memory) [illegible] `syslogd` [illegible].

```
No space available in tcam.
Rules for filter filter-name will not be installed.
```

[illegible], VLAN [illegible] 3 [illegible] [illegible] TCAM [illegible] [illegible] [illegible] CLI [illegible].

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1. ??? ??, VLAN ?? ???? 3 ??????? ?? ????? ??????. ? ?? ?? ?? ???? ?????.

```
[edit]
user@switch# delete firewall family ethernet-switching filter ingress-vlan-rogue-block
user@switch# delete vlans employee-vlan description "filter to block rogue devices on
employee-vlan"
user@switch# delete vlans employee-vlan filter input ingress-vlan-rogue-block
```

2. ?? ???? ??????.

```
[edit]
user@switch# commit
```

3. ?? ???? TCAM ???? ?? ????? ?? ? ?? ???? ? ?? ???? ??????. ? ?? ?? ?? ???? ?????.

```
[edit]
user@switch# set firewall family ethernet-switching filter new-ingress-vlan-rogue-block ...
```

4. ? ???? ???? ??, VLAN ?? ???? 3 ??????? ??(???)????. ? ?? ?? ?? ???? ?????.

```
[edit]
user@switch# set vlans employee-vlan description "filter to block rogue devices on employee-
vlan"
user@switch# set vlans employee-vlan filter input new-ingress-vlan-rogue-block
```

5. ?? ???? ??????.

```
[edit]
user@switch# commit
```

□ □□□ □□□ □□□□ □□ □□□□ □□□□□ □□ □□□ □□□□ □□□□:

1. □□ □□□□ □ □□ □□□ □□□ □□□ □□□□□.

```
[edit]
user@switch# set firewall family ethernet-switching filter new-ingress-vlan-rogue-block...
```

2. □□□ □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□□□ □□ □□□ □□□□ □□□□□. □:

```
[edit]
user@switch# set vlans employee-vlan description "smaller filter to block rogue devices on
employee-vlan"
user@switch# set vlans employee-vlan filter input new-ingress-vlan-rogue-block
```

VLAN□ □□□ □□□ □□□ □□□ □□□ □ □□ □□□ VLAN□ □□ □□ □□□ □□□ □□□□ □ □□□ □□ new-ingress-vlan-rogue-block □ □□□□□.

3. □□ □□□ □□□□□.

```
[edit]
user@switch# commit
```

□: □□ □□□ □□□□ □□□ □□□□ □□ □□□ □ □□□□.

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- □□ | 1631
- □□□ | 1631

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- ?? ??? ????? ??? ????? ?? ??? ??????. ?? ??, 10.10.1.0/24 ??? ??? ??? ????? ?? ??? ??? ??? ?????? ?? ?? VLAN ??? ??? ??? ??????. ?? ????? VLAN? ??? admin ????? ?????? xe-0/0/1? ?? VLAN? ??? ???.
- ? ?? ??? ?? ??? ??? ????? ?????? ?? ??? ??????. ? ????? ?? ??? xe-0/0/1?? ????? 192.168.1.0/24 ??? ? ?? ??? ????? ????? ?? ??? ?????.

?? VLAN ??? ?? ????? 192.168.1.0/24 ??? ??? ??? ????? ?????. ?? ?? ??? ??? ????? ??? ??? ????? ????? ? ?????. ??? ????? ??? ?? ?? ??? ?? ????? ????? ????? ?????.

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?? ??:

1. ??(??? 2) ??
2. VLAN ??
3. ???(??? 3) ??

?? ??:

1. ???(??? 3) ??
2. VLAN ??
3. ??(??? 2) ??

???

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- ?? | 1632
- ??? | 1632

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??? ??????? ?? ????? ?? ? ?? ?? ??? ????? ??? ? ??? ????? ?? ??? ? ??? ?? ??? ??????.

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- ????? xe-0/0/1? ?? ????? ????? ?? ?? ??? ??????.
- VLAN? ?? admin????? ????? ?? VLAN ??? ????? ?????? xe-0/0/1? ?? VLAN? ??????.
- ??? ? ??? ??????.

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- loss-priority
- policer

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TTL(Time-to-Live) □□ 1□□ □ BGP □□□ □□□ □□□□□□ □□□□□ □□□ 3 □□□□□□□ □□ □□□ □□□ □□□ □□□ □□□□ □□□ □ □□ □□. TTL □□ 1 □□ 0□ BGP □□□ □□□ □□□□□□ □□□ □□□ □□□ □□□□□ □□□ 3 □□□□□□ □□ □□□ □□□ □ □□□□.

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- Port(??) - ??? ??? ???? ??? 2 ???? ???????.
- VLAN - VLAN? ??????, VLAN ??? ???????, VLAN? ??? ??? 2 ??? ?????? ??? ??? ??????.
- ??? 3(???) ?????? - IPv4 ? IPv6 ??????, ???? VLAN ??????(RVI) ? ??? ??????? ???? ???????. ??? ???????? ??? ??? ?????? ???? ?? ??? ???? ????????.
- ??? 2 CCC ?????? - ??? 2 CCC(Circuit Cross-Connect) ??????? ???????.
- MPLS—MPLS ??????? ???????.

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- (QFX □□□) Junos OS □□□ 13.2X51-D15□□ □□ □□□ □□□ □□□□□□ □□□ □□□ □ □□□□.
- (QFX10000) Junos OS □□□ 18.2R1□□ □□□ 2 □□ □□□□□□□□ □□□ □□□□ □□ □ □□ □□□ □□□ countdiscard □□□ □ □ □□□.
- (QFX10002-36Q, QFX10002-72Q, QFX10002-60C, QFX10008, QFX10016, PTX10008, PTX10016) Junos OS □□□ 19.2R1□□ IPv4 □ IPv6 □□□□□□ □□ □□□□, forwarding-class, loss-priority □□ □□□ □□□ interface□ □□□□.

□: EX4600, QFX5000 □□□ □ QFX5000 EVO □□□ □□□□ □□ □□ □□□ □□□□□□ □□□ □□□ □□□ □□ VRF □□□ □□□□ □□□□. □□□ □□□□□ □□□ □□(□: lo0.100, lo0.103, lo0.105)□ □□□□ □□□ □□□ □ □□ □ □□ □□□ □ □□□□. □□□ □□(lo0.0)□ □□□ □□□ □□□□□ □□□□ □□ □□□□.

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- Action(□□) - □□□ □□ □□□ □□□ □□ □□□□ □□□□□. □□□ □□□ □□□□ □□□□ □□□ □□, □□ □□ □□□ □□ □□, □□, □□□□ □□ □ □ □□□ □□□ □ □□□□. □□ □□□ accept□□□.

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release heading in release-history	desc heading in release-history
19.2R1	(QFX10002-36Q, QFX10002-72Q, QFX10002-60C, QFX10008, QFX10016, PTX10008, PTX10016) Junos OS □□□ 19.2R1□□ IPv4 □ IPv6 □□□□□□□ □□ □□□□, forwarding-class, loss-priority □ □ □□□ □□□ interface□ □□□□.
18.2R1	(QFX10000) Junos OS □□□ 18.2R1□□ □□□ 2 □□ □□□□□□□ □□□ □□□□ □□ □ □□ □□□ □□□ countdiscard □□ □ □ □□□□.
13.2X51-D15	(QFX □□□) Junos OS □□□ 13.2X51-D15□□ □□ □□□ □□□ □□□□□□ □□□ □□□ □ □□□□.

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□□, VLAN □□ □□□ □□□□□□ □□(□□ □ □□)□ □□□ □□□ □□□ □□□ □ □□□□. □□ □□, □□□ □□□ □□ □□ □□□ □□ □□□ □□□ □□□□ □□ □□□ □□□ □□□ □□□ □ □□□□. □□□ □□ □□□ □□ □□ □□ □□ □□□ □ □□ □□□ □□□ □ □□ □□□ □ □□□□ □ □□□□ □ □□□ □□□ □ □□□ □□(□□)□ □□ □□□□□ □□□□ □□□.

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2. ??? ?? ??? ??????? ??? ?? ??? ?????? ?? ?? ?? ??? ???????. ??? ??? ??? ?????.

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   - ??? 3 ?? ?? - ?? ? ?? IP ??, ????? ? IP ??(IP ?????, IP ??? ??? ?? TTL ??).
   - TCP ?? ?? - ?? ? ?? ??? ???.
   - ICMP ?? ?? - ?? ?? ? ??.

3. ??? ??? ?? ??? ? ??? ??? ??????

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4. ?? ?? ?? ????? ??? ? ?????

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5. ??? ??? ????? ?? ??, ??? ?????? ?? VLAN? ??????

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   - ??? 2 ??????(??)? ?????? ??? ??? ?????? ?? ?? ?? ????? ??? `[edit family ethernet switching filter]` ?? ???. ?? ??????.
   - ?? VLAN? ??? ?????? ??? ??? ?????? ?? ?? VLAN ??? ??????.
   - ??? 3(???) ?????? ?? *RVI(????? VLAN ??????)*? ?????? ??? ??? ?????? ?? ?? ??? ??? ??? ??????. ?? ? ??? ??????? `[edit family inet]` ???? ??????. ???? ??????? ??? ??? ??? ??? ?? ?????.

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6. ??? ??? ?? ????? ????? ???

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7. ??? ? ?? ????? ???

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[illegible] [illegible] [illegible] [illegible] [illegible]

in this section

- [illegible] [illegible] [illegible] [illegible] [illegible] | 1644
- TCAM ([illegible]) | 1645
- [illegible] [illegible] [illegible] [illegible] [illegible] | 1646
- TCAM [illegible] [illegible] [illegible] | 1646
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- (QFX5220) 512[illegible] [illegible] [illegible] VLAN [illegible] [illegible] [illegible] [illegible] VLAN ID[illegible] 6[illegible], [illegible] [illegible] VLAN ID[illegible] 7[illegible], [illegible] [illegible] VLAN ID[illegible] 8[illegible] [illegible]. [illegible] [illegible] VLAN[illegible] [illegible] [illegible] 1[illegible] [illegible] VLAN ID 1029[illegible] [illegible]. 512[illegible] [illegible] [illegible] VLAN [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 512[illegible] [illegible] [illegible] VLAN ID[illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 1024[illegible] [illegible] [illegible] 512[illegible] [illegible].
- Junos OS [illegible] 19.1R1[illegible] [illegible] [illegible] `egress-to-ingress` QFX5110[illegible] [illegible] VLAN [illegible] [illegible] [illegible] 1024[illegible] 2048[illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] `[edit firewall]` [illegible] `from` [illegible] [illegible] [illegible].

Junos OS Evolved □□□ 19.4R2□□ □□ □□□□ □ [edit system packet-forwarding-option firewall] □□ eracl-profile □□□ □□□□ egress-scale QFX5220□□ □□ 2,000□□ □□ □□□ □□□ □□□ □ □□□□. □ □□□ □□ □□(□□□□□□ □□□ □□□□ □□□)□□□ □□□□□.

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- □□□ □□□□□ □□□ □□□ egress-scale □ □□□□. □ cli □□□ □□ □□□ □□□□□. □□□□ □□ □□(□□□□ □□□□) □□□□ ERACL □□□ □□□□ IFP tcam □□□ □□□□ □□□ □□ □□□□ ERACL□ □□□ □ □□□□. □, □□ □□□ ERACL□ □□□□ □□□□.

TCAM (□□)

> □: Junos OS □□□ 20.3R1 □□□ □□□□ QFX5120-48Y □ EX4650 □□□□ □□, □□□ □□□□□□ □□□ □□ □□ □□ IPv6□ □□ 384(□□□)□□ 768□, IPv4□ □□ 384(□□□)□□ 1152□ □□ □ □□□□. set loopback-firewall-optimization CLI□ [edit chassis] □□ □□]□□ □□□□ □□□□ □□□□□□. □ □□□ FPC □□□ □ □□□ □□□ □□□□□. CLI□ □□ □□□ □□□ □(□) □□□□□□ https://www.juniper.net/documentation/us/en/software/junos/cli-reference/topics/ref/statement/chassis-loopback-firewall-optimization.html .

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> □: EVPN □□□□ QFX5200 □□□ □□□□ □□ 512□□ TCAM □□□□ □□□□□.

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- □□□ 3: □ □□□□□ □□□ □□□□□. □□ □□(□□, □□□ 3 □□ VLAN)□ □□ □□□ 256□□ □□□ □□□ □□□ □ □□□ □□ □□□ □ □□ □□□□□ □□□.

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- □□ □□□ syslog □□□ □□□ □ □□□□ `set system syslog file` *filename* `pfe emergency` .
- □□□ □□ □□□ □□□ □ □□□□ `set system syslog console pfe emergency` .
- SSH □□□ □□□ □□ □□□ □□□□ □ □□□□ `set system syslog user` *user-login* `pfe emergency` .

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□ 107: □□□ □□ □□□ □ □□ □□

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inet(IPv4/IPv6)	profile1	ip-source-address ip-source-□□□ □□ □□□□ □□ □□ □□ □□ □□□ □□ □ □□ □□ is-fragment icmp □□ ICMP□ tcp □□ tcp-□□□ tcp-□□□	[edit system packet-forwarding-options firewall profiles inet profile1]

□ 107: □□□ □□ □□□ □ □□ □□ ***(Continued)***

□□□ □□	□□□ □□ □□□	□□ □□(□□ □□□)	□□ □□
	profile2	ip-source-address ip6 □□ □□ ip-source-□□□ □□ ip6 □□ □□□ □□ □□□□ □□ □□ □□ □□ □□□ □□ □ □□ □□ is-fragment icmp □□ ICMP□ tcp □□ tcp-□□□ tcp-□□□ □□ □□ □□□ □□ □□ □□□ □□□ □□ □□ □□□ □ □□	[edit system packet-forwarding-options firewall profiles inet profile2]
□□□ □□□	profile1	□□ MAC □□ □□ MAC □□	[edit system packet-forwarding-options firewall profiles ethernet-switching profile1]

□ 107: □□□ □□ □□□ □ □□ □□ ***(Continued)***

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	profile2	□□ MAC □□ □□ MAC □□ □□□ □□ ip-source-address ip-source-□□□ □□ IP □□□□ □□ □□ □□□ □□ □□ □□	[edit system packet-forwarding-options firewall profiles ethernet-switching profile2]

□: □□□ □□ □□□□ □□□ □□ □□ □□□ □□ □□ □□ □□□ □□□ □□ □□□ □□□□ □□□. □□□ □□ □□□□ □□ □□□ □□ □ □ □□ □□□ □□□ □□ □□ □□□ □□□□ □□ □□□ □□□□□. □□ □□, inet □□□ □□□□ profile1 □□ □□□ □□ □□□ □□ □ □□ □ □□ □□□ □□ ip-destination-address□□, □□ □□ □□ □□□ ip-destination-address inet □□□ □□□ profile1 □□□□ □□□ □□□□□.

CLI □□□ □□□□ show pfe filter hw profile-info □□□ □□ □□□□ □□ □□□ □ □ □□□□.

□□□ □□ □□□ □□□□□□ □□□□□ □□(□□□ 2 □□ □□□ 3) □□□ □□□□ □□ □□ □□ □□ □□□□□□ □□□□□□ □□□□ □□□ □□□□ □□ □□□ □. □ □□□□□ □□□ □□ □□□□□□□ □□□ □□□ □□□□ □□ □□ □□□□□□ □□□□□. □ □□ □□□ □□□ □ □□□□□□ □□□ □□ □□ □□□□□□ TCAM □□□ □□□ □□□□□.

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CLI □□□ □□□□ show pfe filter hw port-pipe-info □ □□□ □□□□□□ □□□□ □□ □□ □□□□□□ □□ □□□ □ □ □□□□. □ CLI □□□ □□□ □□ □□ □□□□□□ □□□ □□□ □□□ □□ □□□ □□□□□. □ □□□ □□□□ □□□□□ □□□ □□□ □□□ □□□□ □□□□ □□ □□□ □□□ □ □□□ □.

CLI ??? `show pfe filter hw port-pipe-info` ?? ?? ??? ? ??? ??????? ????? ?? ?? ??????? ?? ??? ??????.

```
user@host> show pfe filter hw port-pipe-info
IFD         Pipe
et-0/0/0     1
et-0/0/1     1
...
et-0/0/10     0
```

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- ? 500?? ????? ????? ?? ??? ????? 1,000?? TCAM ??? ?????? ??? ??????. ??? ?? ??? ?? ? ?? ?? ??? ??? ??.
  - 20?? ?? 20?? ????? A? ???????. ?? ????? ??? TCAM ??? ?? ??? ? ??? ?? ??? ??????.
  - ?? B? ?? A ??? ?? 5?? ?? 5?? ????? ?????. *??* ????? ?? ??? ??? ????? ?? ??? ? ??? ?? ??? ????? ??? ?. (5?? TCAM ??? ?????? 4?? ??? ? ?????.)

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- ??? ??? ??? 1024?? ?? ??? ?? ??? ?????.
- ?? ??? ????? 10?? ??? ?? ?? ??? ?????. ?? ????? ????? ??? ? ????? ??? ?? ????? ?????.

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□, 1Gbps□ □□□□ □□□□ □□□□□ □□□□ □□□□ 3□□ □□ □□□ □□□□□ □□□ 3□□ □□ □□□ □□ □□□□ □□□□ □□, □□□ □□□□ □ □ □□□ 1Gbps□ □□ 3Gbps□□□.

□□□ □□□ □□ □□□ □□□□ □□□ □□□ □□ TCAM □□□□□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□ □□ □□□ □□ □□□ □□□ TCAM □□□□□ □□□□□ □□ □□□ □□□□□.

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release heading in release-history	desc heading in release-history
19.4R2-EVO	Junos OS Evolved □□□ 19.4R2□□ □□ □□□□ □ `[edit system packet-forwarding-option firewall]` □□ `eracl-profile` □□□ □□□□ egress-scale QFX5220□□ □□ 2,000□□ □□ □□□ □□□ □□□ □ □□□□.
19.1R1	Junos OS □□□ 19.1R1□□ □□□ □□□□ `egress-to-ingress` QFX5110□ □□ VLAN □□□ □□ □□ 1024□□□ 2048□□ □□ □ □□□□.

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□□□ □□ □□ □□ □□ | 802

□□□ □□ □□ □□ | 1642

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□□ □□ □□ □□ | 1754

□□□ □□ □□ □□ □ □□(QFX □ EX □□□ □□□)

in this section

- □□ □□, □□ □□ □ □□ □□ | **1652**
- □□□ □□ □□ □□ □ □□(EX4100, EX4100-F, EX4100-H, EX4400, EX4600, EX4650, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210) | **1653**
- □□□ □□ □□ □□ □ □□(QFX5220, QFX5700 □ QFX5130-32CD) | **1676**

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(QFX5100, QFX5110, QFX5200) IPv6 □□□□□□□□ □□ □□ □□□□ □□□□ □□ (□□ □□)□□ □□□ □□ □□ □□□ □□□□□. source-address, destination-address, source-prefix-list, destination-prefix-listhop-limiticmp-typesource-portdestination-port, .next-header

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(QFX5110) □□ □□□□ [edit firewall] □□□ □□□ egress-to-ingress □□ , discard, □□ count □ accept□□□□□.

(QFX5100, QFX5110, QFX5120, QFX5130-32CD, QFX5220, QFX5700) EVPN-VXLAN □□□□□ □□□ □□ □□ □□□ □□□ □□. source-address, destination-address, source-port, destination-port, ttlip-protocol, , □ user-vlan-id.

(QFX5100, QFX5110, QFX5200 □ QFX5120) EVPN-VXLAN IRB □□□□□□□□ □□ □□□□ □□□ □□□ □□□ □ □□□□.

(QFX5700) □□□ □□□□□□□□ □□ □□□□ □□□ □□□ □□□ □ □□□□.

(QFX5100, QFX5110) □□□ □□□ □□□□ EVPN-VXLAN □□□□ MAC □□□□ □□□□ □□ □□□□ □□ □□□ *EVPN-VXLAN □□□□ MAC □□□, □□ □□ □ □□ □□□ □□□*□□□□□□.

(QFX5100, QFX5110) VXLAN□ □□□□ □ □□□ □□□ □□ □□□ 2(□□□) □□□ □□□□□□ family inet IRB □□□□□□□□ □□□□□□ □□□ family ethernet-switching □ □□□□. IRB □□□□□□□□ □□ □□□□ □□□ □□□ □□□ □ □□□□.

(EX4100, EX4400, EX4600, EX4650, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210) □□□ □□□□□□ □□ □□□ □ □□ interface □□ □□ □□□ □□□ □ □□ □□□ □□□□□□ □□□□□. □□□ □ □□ □□□□□□ □□□□ □□□ □□ □□□ □□□□□.

□□□ 2 □□□ □□□□ □□ □□□□□□ IPv4 □ IPv6 □□□□□□ □□□ □□ □□□ □□□□□.

(QFX5120, EX4650) Junos □□□ 21.4R1□□ QFX5120 □ EX4650□ EVPN-VXLAN □□□□ □□□ □□ □□ □□□ □□□□□. gbp-src-tag, □ gbp-dst-tag.

Junos OS □□□ 21.4R1□□ source-port-range-optimize □ destination-port-range-optimize □□□ □□ □□□□ □□□□□ [edit firewall family ethernet-switching filter <filter-name> term <term-name> from] . □□□ □□ TCAM □□ □□□□ □□□ □□□□ □. source-port-range-optimize □ destination-port-range-optimize □□ □□□ □□□ QFX5100 □□□□□□ □□ 24□□ □□□□ □□ source-port range □ destination-port range □□ □□□ □□□□□. 24□ □□□ □□□□ □□ □□ □□□ □□□ □□ □□□ □□□ □ □□□□.

Junos □□□ 22.4R1□□ □□□□ EX4100, EX4400, EX4650 □ QFX5120 □□□ □□□□ EVPN-VXLAN □□□□ GBP □□□ □□ □□□ □ □ □□ □□□ □□□□□. ip-version ipv4, ip-version ipv6, mac-address, vlan-id, interface + vlan-id □□ □ interface.

Junos □□□ 23.2R1□□ EX4100 □□□, EX4400 □□□, EX4650 □□□, QFX5120-32C □ QFX5120-48Y □□□□ □□ □□ □□□ □□ □□□ IPV4 □ IPv6 L4 □□□ □□□□□.

Junos OS □□□ 23.4R1 □□□□ □□□□ EX4100, EX4400, vlan-id *vlan list* EX4650 □ QFX5120 □□□ □□□□ EVPN-VXLAN □□□□ GBP □□□ □□ | *vlan-range* □ interface *interface-list* □□ □□□ □□□□□. EX4100 □□□□ VLAN □ □□+VLAN □□ GBP□ □ □□□ □□□□.

Junos OS □□□ 24.4R1arp-typearp-sender-address□□ □□□□ □□ □□□ *[edit firewall family ethernet-switching filter <name> term <name>]* EX4100, EX4400, EX4650-48Y, QFX5120-48Y, QFX5120-32C, QFX5120-48T □ QFX5120-48YM □□□□ □□ , □ arp-target-address □□□ □□ □□ □□□ □□□□□. □□ □□□ □□ □□ VLAN □□ □□□ □□□ □□□ □ □□□□. □□ □□□ □□ □□□ □□□□ □□□□ □□□□. arp-sender-address □ arp-target-address □□ □□□ EX2300, EX3400 □ EX4300-MP □□ □□□ □□□□ □□□□.

Junos OS Evolved □□□ 24.4R1 vlan *vlan ID* □□ QFX5130-32CD, QFX5130-48C □ QFX5700 □□□□ □□ □□□ □□□□□. □ □□ □□□□□ □ □□ □□□□ □□□□□□ □□□ □□ set system packet-forwarding-options firewall profiles actions ethernet-switching profile1 □□ □□□. □□ □ VLAN □□□ □□ □□□□ □□□ □□□ vlan *vlanID* □ □□□□.

□□□ □□ □□ □□ □ □□(EX4100, EX4100-F, EX4100-H, EX4400, EX4600, EX4650, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210)

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- □ 109 □□□ 1654 □(□) □□□ □□□ □□□ □ □□□ □ □□ □□ □□□ □□□□□. □□ □□ □□ □ □□ □□ □□ □□□□□ □□□ □□□□ □□□ □ □□□□. □□ □□□ □□ □□ □□□ □□□ □□□ □□ □□□ □□□ □□□□□ ? .
- □ 110 □□□ 1672 □□□ □□□ □□□ □ □□ □□□ □□ □□□.
- □ 111 □□□ 1673 □(□) □□□ □□□, □□□, □□ □□ □ □□□□ □ □□□ □ □□ □□ □□□□ □□□□□.

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□ 109: □□□ □□□ □□ □□□□ □□ □□

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arp-type	ARP □□ □□ □□ ARP □□ □□□□□.	□□ □ □□ □□□□□.
ARP □□	ARP □□ □□ □□ ARP □□ □□□□□.	□□ □□ □ VLAN
arp □□□ □□	ARP □□ □□□ □□□□ IPv4 □□	□□ □□ □ VLAN
arp □□ □□	□□□□ ARP □□ □□ IPv4 □□	□□ □□ □ VLAN
destination-address *ip-address*	□□ □□ □□□ □□□ IP □□ □□ □□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□ □ IPv6(inet6) □ □□□□.
destination-mac-address *mac-address*	□□□ □□ □□□ □□□ □□(MAC) □□□□□.	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ □□ □ VLAN.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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destination-port *value*	TCP □□ UDP □□ □□. □□□□□ □ □□ □□□ match □□ protocol □□ □□□□□. □□□ □□ □ □□□ □□□ □□ □□□ □□□□ □□□ □ □□□□(□ □ □□□ □□□□ □□). 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), ftp-data (20), http (80), https (443), ident (113), imap (143), kerberos-sec (88), klogin (543), , krb-prop (754)kpasswd (761), krbupdate (760), , kshell (544) ldap (389), login (513), mobileip-agent (434), mobilip-mn (435), msdp (639), netbios-dgm (138), , netbios-ns (137), nfsd (2049)netbios-ssn (139), nntp (119), ntalk (518), , ntp (123) pop3 (110), pptp (1723), printer (515), radacct (1813),radius (1812), rip (520), rkinit (2108), smtp (25), , snmp (161), snpp (444)sunrpc (111)snmptrap (162)ssh (22)socks (1080)syslog (514),	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

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	tacacs-ds (65), talk (517), , telnet (23), tftp (69), timed (525) who (513), xdmcp (177), zephyr-clt (2103), zephyr-hm (2104)	
destination-port range-optimize *range*	□□ □□□ □□□□ □□ □□□□□ □□□□□ TCP □□ UDP □□ □□ □□□ □□□□□□□. □ □□□ □□□□ □□ □□ □□□ □□□□ □□□ □ □□ □□□ □□□ □□ □ □ □□□□. (□□ □□ □□□□□ □□□□ □□□□.)	□□ □□, VLAN, IPv4(inet) □□□□□.
destination-prefix-list *prefix-list*	IP □□ □□□ □□ □□□□□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□ □ IPv6(inet6) □ □□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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dscp *value*	DSCP(Differentiated Services Code Point)□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6 □□□ DSCP□ □□□□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□ (□□ □□ □□□□ □□). • be- Best Effort(□□□) • ef (46)- RFC 3246, *□□ □□ PHB□* □□□□ □□□□. • af11 (10), af12 (12), af13 (14); af21 (18), af22 (20), af23 (22); af31 (26), af32 (28), af33 (30); af41 (34), af42 (36), af43 (38) □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □□ □□□ □□ □ 4□□ □□□□ RFC 2597, *Assured Forwarding PHB□* □□□□ □□□□. • cs0, , cs1, cs3cs6cs2cs5cs4cs7,cs5	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

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ether-type *value*	□□□ □□□ □□ □□□□□. EtherType □□ □□□ □□□□□ □□ □□ □□□□□ □□□□□. □□ □ □□ □ □ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□ □□ □□). • aarp (0x80F3)- EtherType □ AARP • appletalk (0x809B)—EtherType □ AppleTalk • arp (0x0806)- EtherType □ ARP • fcoe (0x8906)- EtherType □ FCoE • fip (0x8914)- EtherType □ FIP • ipv4 (0x0800)- EtherType □ IPv4 • ipv6 (0x08DD)- EtherType □ IPv6 • mpls-multicast (0x8848)- EtherType □ MPLS □□□□□ • mpls-unicast (0x8847)— EtherType □ MPLS □□□□□ • oam (0x88A8)- EtherType □ OAM • ppp (0x880B)- EtherType □ PPP • pppoe-discovery (0x8863)— EtherType □ PPPoE □□□□□ □□□□ • pppoe-session (0x8864)— EtherType □ PPPoE □□ □□□□ • sna (0x80D5)- EtherType □ SNA	□□ □□ □ VLAN. □□ □□ □ VLAN.
egress-to-ingress	□□ VLAN □□□ □□ □□ □□ 1024□□□ 2048□□ □□□□ □ □□□ □□□□□.	□□ VLAN IPv4(inet) □□□□□ □ IPv6(inet6) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

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exp	MPLS EXP □□□□ □□□□□.	□□ MPLS □□□□□. □□ MPLS □□□□□.
fragment-flags *value*	IP □□□ □□□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(16□□ □□ □□□□ □□). • is-fragment • dont-fragment (0x4000) • more-fragments (0x2000) • reserved (0x8000)	□□ □□ □ VLAN.
gbp-dst-tag	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□ □□□□□ □□ □□□ □□□□□□. □: VXLAN□ □ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□.	□□ □□ □□
gbp-src-tag	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□ □□□□□ □□ □□□ □□□□□□. □: VXLAN□ □ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□.	□□ □□ □□

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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icmp-code *value*	ICMP □□ □□□□□. □□ □□□ □□□ icmp-type□ □□ □□□□□ □ □□ icmp-code□□ □□ □ □□ icmp-type □□ □□□□ □□□. □□ □□ □□ □ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□ □ □□ □□□ □□□ □□□□. • *IPv4:* parameter-problem—ip-header-bad (0), required-option-missing (1) • *IPv6:* parameter-problem—ip6-header-bad (0), unrecognized-next-header (1), unrecognized-option (2) • redirect—redirect-for-network (0), redirect-for-host (1), redirect-for-tos-and-net (2), redirect-for-tos-and-host (3) • time-exceeded—ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • *IPv4:* □□□ □ □□—network-unreachable (0), host-unreachable (1), protocol-unreachable (2)port-unreachable (3)fragmentation-needed (4)source-route-failed (5)destination-network-unknown (6)destination-host-unknown (7)source-host-isolated (8)destination-network-prohibited (9)destination-host-prohibited (10)network-unreachable-for-TOS (11)host-unreachable-for-TOS	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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	(12)communication-prohibited-by-filtering (13)host-precedence-violation (14)precedence-cutoff-in-effect (15) • *IPv6:* □□ □□—address-unreachable (3), administratively-prohibited (1), no-route-to-destination (0), port-unreachable (4)	
hop-limit *value*	□□□ □ □□ □□ □ □□ □□□ □□□□□□. □□ □ □ □ 0□□ 255 □□□ □ □□□ □□□□□.	□□ □ □□ IPv6(inet6) □□□□□. □: QFX3500, QFX3600, QFX5100, QFX5120, QFX5110, QFX5200 □ QFX5210 □□□□ □□ □□□□□ □□□□ □□□□.
ip-version ipv4 *<ip address>* | *<prefix-list>* ip-version ipv6 *<ip address>* | *<prefix-list>*	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□ □□□□□ IPv4 □□ IPv6 □□ □□ □□ □□□ □□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □ □□(□□□ □□).
ip-version ipv4 destination-port *DST_PORT*	□ □□□ □□ GBP □□ □□ L4 □□□ □□ □□□□ □□ TCP/UDP □□ □□□ □□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv4 source-port *SRC_PORT*	□ □□□ □□ GBP □□ □□ L4□ □□ □□□□ □□ TCP/UDP □□ □□□ □□□□□□. □: VXLAN □□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv4 ip-protocol *PROTOCOL*	□ □□□ □□ GBP □□ □□ L4 □□□ □□ □□□□ □□ IP □□□□ □□□ □□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.

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ip-version ipv4 is-fragment	□□□ □□□ □□ GBP □□ □□□ □□ □□□□ □□ □ □□□□□. L4□ □ □□□ □□ □□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv4 fragment-flag *FLAGS*	□ □□□ □□ GBP □□ □□ L4 □□□ □□ □□□□ □□ □□ □□□(□□ □□ 16□□ □□)□ □□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □ □□ □□□□□□	□□ □□.
ip-version ipv4 ttl *Value*	IP TTL(Time-to-Live) □□(10□□)□□□. □ □ 1-255□ □ □□□□. □ □□□ □□ GBP □□ □ □ L4 □□ □□□ □□ □□□ □□: □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv4 tcp-flags *FLAGS*	□ □□□ □□ GBP □□ L4 □□□ □□ □□□□ □□ □□ □□□ TCP □□□(□□ □□ 16□□ □□)□ □□□ □□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□ □ □ □□□ □□□□□□	□□ □□.
ip-version ipv4 tcp-initial	□□□ □ □□ TCP □□□ □□□□□□. □ □□□ □□ GBP □□ L4 □□□ □□ □□□ □□: □: VXLAN □□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv4 tcp-established	□ □□□ □□ GBP □□ L4 □□□ □□ □□□□ □□ □□□ TCP □□□ □□□ □□□□□□. □: VXLAN □□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv6 source-port *SRC_PORT*	□ □□□ □□ GBP □□ L4 □□□ □□ □□□□ □□ TCP/UDP □□ □□□ □□□□□□. □: VXLAN □□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv6 destination-port *DST_PORT*	□ □□□ □□ GBP □□ □□ L4 □□□ □□ □□□□ □□ TCP/UDP □□ □□□ □□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□	□□ □□.

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ip-version ipv6 next-header *PROTOCOL*	□ □□□ □□ GBP □□ L4 □□□ □□ □□□□□ □□ □□ □□□ □□□ □□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv6 tcp-flags*FLAGS*	□ □□□ □□ GBP □□ L4 □□□ □□ □□□ □□ TCP □□□ □□□□□. □: VXLAN□□ □□ □ □ □□□ □□□ □□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv6 tcp-initial	□ □□□ □□ □□□ TCP □□□ □□ □□□ □□□□□ □. □: VXLAN□□ □□ □□ □□□ □□□ □□□ □ □□□ □□□□□□	□□ □□.
ip-version ipv6 tcp-established	□ □□□ □□ □□□ TCP □□□ □□□ □□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□ □ □ □□ □□□□□	□□ □□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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icmp-type *value*	ICMP □□□ □□ □□□□□. □□□□□ □ □□ □□□ match □□ protocol □□ □□□□ □□□□ □□ □ □ □□□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). *IPv4:* echo-reply (0), destination unreachable (3), source-quench (4)redirect (5)echo-request (8)IPv4 (inet)-advertisement (9)IPv4 (inet)-solicit (10)time-exceeded (11)parameter-problem (12)timestamp (13)timestamp-reply (14)info-request (15)info-reply (16)mask-request (17)mask-reply (18) *IPv6:* destination-unreachable (1), packet-too-big (2), time-exceeded (3)parameter-problem (4)echo-request (128)echo-reply (129)membership-query (130)membership-report (131)membership-termination (132)router-solicit (133)router-advertisement (134)neighbor-solicit (135)neighbor-advertisement (136)redirect (137)router-renumbering (138)node-information-request (139)node-information-reply (140) □ icmp-code *variable*□□□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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interface *interface-name* | *<interface_list>*	□□□ □□□ □□□□ □□□ □□□□ □□□□□□□□. □ □□□□ □□(*)□ □□□□□ □□ □□ □□□ □□□ □□ □ □□□ □ □□□□. □: □□□ □□□□ □□□□□□ □□ □□□□ □□□ □ □□□□. □□□□ □□□ □□ □□□ □□□□□ □□□ □□□□□□. VXLAN□□ □□□□ □□□□□□□□ □□ □□□□ □□, □□□ □□□□ □□□□. □: VXLAN□□ □□ □□ □ □□ □□□ □□□□ □ □□□ □□□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□ □ IPv6(inet6) □ □□□□.
ip-destination-address *address*	□□□ □□ □□ □□ □□□ IPv4 □□□□□.	□□ □□ □ VLAN.
ip6-destination-address *address*	□□□ □□ □□ □□ □□□ IPv6 □□□□□.	□□ □□ □ VLAN. (□ □□ □□□ □□ □□□ □□ □ 2 □□□ □□ □□□ □□□□ VLAN□ □□□ □ □□ □ □□□□.)
ip-options	IP □□□ □□ □□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □□□□□ any .	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
ip-precedence *ip-precedence-field*	IP □□ □□ □□□□□. □□ □□ □ □□ □□ □□□ □□ □ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp (0xa0), flash (0x60), flash-override (0x80), immediate (0x40), internet-control (0xc0), net-control (0xe0), priority (0x20) □□ routine (0x00).	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
ip-protocol *number*	IP □□□□ □□□□□.	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
ip-source-address *address*	□□□ □□□□ □□ □□□ IPv4 □□□□□.	□□ □□ □ VLAN.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□ □ □□□□□
ip6-source-address *address*	□□□ □□□□ □□ □□□ IPv6 □□□□□.	□□ □□ □ VLAN. (□ □□ □□□ □□ □□□ □□ □ 2 □□□ □□ □□□ □□□□ VLAN□ □□□ □ □□ □ □□□□.)
ip-version *address*	□□□ IP □□□□□. □□□ 2 □□ □□ VLAN □□□ □□□ □□□□ □□□□□ IPv4 □□ IPv6 □□ □□□ □□□□□□ □ □□□ □□□□□.	□□ □□ □ VLAN.
is-fragment	IP □□□□ More Fragments □□□□ □□□□□ □□□ □□ □□□□ □□□ □□ □□ □ □□□ □□□□ □ □□ □□□□□.	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
l2-encap-type llc-non-snap	□□□□ □□□ □□□□(SNAP) □□□ □□□ □□□ □ □ LLC(□□□ □□ □□) □□ □□□□ □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN.
label	MPLS □□□ □□□□ □□□□□.	□□ MPLS □□□□□. □□ MPLS □□□□□.
learn-vlan-id *number*	□□ VLAN□ ID □□ □□(□□□) VLAN(Q-in-Q VLAN□)□ ID□ □□□□□. □□□ □ □□ □□ 1-4095□□□. □: QFX3600, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210, QFX5220, EX4600, EX4650, EX4400, EX4100 □ EX4300-MP □□□□□□ □□□□ □□□□. user-vlan-id □□ □□□ □□□□ □□ VLAN ID□ □□□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN.
mac-address *mac-address*	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□ □□□□ □□ □□ □□□ □□□ □□(MAC) □□□ □□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□.	□□ □ □□(□□□ □□) .

표 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□ □ □□□□□
next-header	IPv4 □□ IPv6 □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□ □ □□). hop-by-hop (0),icmp (1), icmp6 (58)igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	□□ □□, VLAN □ IPv6(inet6) □□□□□. □□ IPv6(inet6) □□□□□.
packet-length	□□ □□(□□□)□□□. 0□□ 65535 □□□ □□ □□ □□ □□□.	□□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□□□. □□ IPv4(inet) □□□□□.
payload-protocol	IPv4 □□ IPv6 □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□ □ □□). hop-by-hop (0),icmp (1), icmp6 (58)igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132) □: QFX3500, QFX3600, QFX5100, QFX5110, QFX5200 QFX5210 □□□□□□ □□□□ □□□□.	□□ □□, VLAN □ IPv6(inet6) □□□□□. □□ IPv6(inet6) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□ □ □□□□□
Port qualifier	□□ □□□□ □□ □□ □□□ □ □□ □□□ □□□□□. □ □□ source-port□□ □ □□□ destination-port□□□. □: EX4400, EX4300, EX4100, EX4300(□□□□□□ PoE), EX2300, EX2300(□□□□□□ PoE) □ EX3400 □ □□□□□ □□ □□□□ □□□□ □□□□.	□□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□□□. □□ IPv4(inet) □□□□□.
precedence *value*	IP □□□ □□□ □□(ToS) □□□□ □□ IP □□ □□ □□□□□. (□ □□□□ DiffServ DSCP□□ □□□ □ □□□□.) □□ □ □□ □□ □□□ □□□ □ □□□ □□ □ □ □□□□(□□ □□ □□□□ □□). • routine (0) • priority (1) • immediate (2) • flash (3) • flash-override (4) • critical-ecp (5) • internet-control (6) • net-control (7)	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
protocol *type*	IPv4 □□ IPv6 □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□ □ □□). hop-by-hop (0),icmp (1), icmp6igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.

표 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

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rat-type *tech-type-value*	Proxy Mobile IPv4(PMIPv4) □□□ □□ □ □ □□□ □□ 8□□ Tech-Type □□□ □□□□ □□ RAT(Radio Access Technology) □□□ □ □□□□□. □□ □□□ □□□□ □□□ □□□ □□□□ □□ □□ □□□ □□□□□ □□□ □□□□□ □□□□□. □□ □, □ □□ □□ □ □□□ □□□□□. 0~255 □□□ □ □ □ □□ □□□ □□□□ □□ □□□ □□□ □ □□□□. • □□ □ 1□ IEEE 802.3□ □□□□□. • □□ □ 2□ IEEE 802.11a/b/g□ □□□□ □. • □□ □ 3□ IEEE 802.16e□ □□□□□. • □□ □ 4□ IEEE 802.16m□ □□□□□. • □□□ □□□ eutran□(□) 4G□ □□□□□. • □□□ □□□ geran□(□) 2G□ □□□□□. • □□□ □□□ utran□(□) 3G□ □□□□□.	□□ □ □□ IPv4(inet) □□□□□.
sample	□□ □□□□ □□□□□□□. □□□ □□□□ □□□□ □□□ □ □ □□□ □□□□□□□.	□□ □ □□ IPv4(inet) □□□□□.
source-address *ip-address*	IP □□ □□ □□□, □□□ □□□ □□□ □□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.
source-mac-address *mac-address*	□□□ □□ MAC(□□□ □□□ □□) □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN.
source-port *value*	TCP □□ UDP □□ □□. □□□□□ □ □□ □□□ match □□ protocol □□ □□□□□. □□ □□ □ □ destination-port □□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.

□ 109: □□□ □□□ □□ □□□□ □□ □□ ***(Continued)***

□□ □□	□□	□□ □ □□□□□
source-port range-optimize *range*	□□ □□□ □□□□ □□ □□□□□ □□□□□ TCP □□ UDP □□ □□ □□□ □□□□□□. □ □□□ □□□□ □□ □□ □□□ □□□□ □□□□ □ □□ □□□ □□□ □ □□ □ □□□□. (□□ □□ □□□□□ □□□□ □□□□.)	□□ □□, VLAN, IPv4(inet) □□□□□.
source-prefix-list *prefix-list*	IP □□ □□□ □□□□□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.
tcp-established	□□□ TCP 3□□ □□□□□ □□(SYN, SYN-ACK, ACK)□ □□□ □□□□□□. □□□□ □□ □□□ □ □□□ SYN □□□ □□□□□ □□□□□□ □ □□ □ □□□□. □ □□□ □□, □ □□ □□□□ □□□□ tcp-initial □□□. □ □□□ tcp-established□ □□□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □□ □□□ protocol tcp □□□□ □□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.
tcp-flags *value*	□□ □□□ TCP □□□: • ack (0x10) • fin (0x01) • push (0x08) • rst (0x04) • syn (0x02) • urgent (0x20)	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.

표 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□ □ □□□□□
tcp-initial	□□□ □ □□ TCP □□□ □□□□□□. TCP □□□□ □□□□ TCP □□□ SYNACK □ □□□□ □□ □□ □ □□ □□□□□. □ □□□ tcp-initial□ □□□□ □□□□□ TCP□ □ □□□□□ □□□□ □□□□. □□ □□□ protocol tcp □□□□ □□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.
traffic-class	□□□ CoS(Class of Service) □□ □□□ □□□ □ 8□□ □□□□□. traffic-class □□□ DSCP(DiffServ Code Point) □□ □□□□ □ □□□□□. □ □□□ □□□ IPv4□□ □□□ □□ (ToS) □□□ □□□□□□□, □ □□(□: DSCP)□ □□ □□□ IPv4□ □□ □□□ □□□□□. □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □ □□□ □□). af11 (10), af12 (12), af13 (14)af21 (18)af22 (20)af23 (22)af31 (26)af32 (28)af33 (30)af41 (34)af42 (36)af43 (38)cs0 (0)cs1 (8)cs2 (16)cs3 (24)cs4 (32)cs5 (40)cs6 (48)cs7 (56)ef (46)	□□ □□, VLAN □ IPv6(inet6) □□□□□. □□ IPv6(inet6) □□□□□.
ttl *value*	IP TTL(Time-to-Live) □□(10□□)□□□. □ □ 1-255□ □ □□□□.	□□ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
user-vlan-1p-priority *value*	□□□□ 0-7□□□ 802.1p VLAN □□ □□□ □ □□□□.	□□ □ □□ □□ □ VLAN.

표 109: □□□ □□□ □□ □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□ □ □□□□□
user-vlan-id *number*	Q-in-Q VLAN□ □□ □□(□□) VLAN□ ID□ □□□□□. □□□ □ □□ □□ 1-4095□□□. □: QFX3600, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210, EX4600, EX4650, EX4400, EX4100 □ EX4300-MP □ □□□ □□ □ □□□□ user-vlan-id □□ VLAN□ ID□ □□□□□□. QFX5220 □□□ □□□□ MX □ ACX □□ □ □□□□ □□ □(□) □□□□ *learn*-vlan-id □□ VLAN□ ID□ □□□□ user-vlan-id □□ VLAN□ ID□ □□□□□□. □□□□ □(□) user-vlan-id □□□□ □□ VLAN ID□ □ □□□ □ □□□□□.	□□ □ □□(□□□ □□)
vlan-id *<vlan id> / <vlan-range> / <vlan list>*	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□□ VLAN □□□ *vlan-range* (VLAN □□ □ □ □□ □ □□□ VLAN ID □□) □□ *vlan list* (□□ □□)□ □□□□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□□□. □: EX4100 □□□□□□ □□□□ □□□□.	□□ □ □□(□□□ □□)

□□□□ □□□□ then □□□ □□□□ □□ □□□ □□□ □□ □□□□ □□ from □□□ □□□□□. □ 110 □□□ 1672□□□ □□□ □□□ □ □□ □□□ □□ □□□. (□□□□ □□□□ then □□□ □□□□ □□□ □□□□ □□□ □□□□□.)

표 110: □□□ □□□ □□ □□

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accept	□□□ □□□□□. □□ □□□ □□□□ □□□ □□ □□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□□ □ □□□.

표 110: □□□ □□□ □□ □□ *(Continued)*

□□	□□
reject *message-type*	□□□ □□□□ "□□□ □□□ □ □□" ICMPv4 □□□(□□ 3)□ □□□□. □□□ □□□ □□□□ □ □□ □□□□ □□□□□ syslog . □□ □□□ □□ □ □□□ □□□ □ □□□□. administratively-prohibited (default), bad-host-tos, bad-network-tos, host-prohibited, host-unknown, host-unreachable, network-prohibited, network-unknown, network-unreachable, port-unreachable, precedence-cutoff, precedence-violation, protocol-unreachable, source-host-isolated, source-route-failed, □□ tcp-reset □ □□□ tcp-reset□□, □□□ TCP □□□□ □□□□□ TCP □□□□ □□□, □□□ □□□ □ □ □□ □□□□ □□□□. □□□ □□□ □□□□ □□□ ICMP □□ "□□□ □□□ □ □□"□ □□ □□□ "□□ □□□□□ □□ □□"□ □□ □□□□□. □: □□□ reject □□ □□□□□□□□ □□□□□.
routing-instance *instance-name*	□□□□ □□□ □□ □□□ □□□□□ □□□□□.
vlan *VLAN-name*	□□□□ □□□ □□ VLAN□□ □□□□□. □: □□□ vlan □□ □□□□□□□□ □□□□□. □: □ □□□ OCX □□□ □□□□□□ □□□□ □□□□.

□□ □ □□□ □ 111 □□□ 1673 □□ □□□□ □□□□ □□□ □□□, □□□, □□ □□ □ □□□ □ □□□□.

표 111: □□□ □□□ □□ □□ □□□

□□ □□□	□□
analyzer *analyzer-name*	(□ ELS □□□) □□ □□□□ □□□ □□□□ □□□(□□ □□)□ □□□□□□ [edit ethernet-switching-options analyzer]. □□ □□, VLAN □ IPv4(inet) □□□ □□□ □□□□ □□ □□□□ □□□ □ □□□□.
count *counter-name*	□□□ □□□□ □□ □□ □□□□□.

□ 111: □□□ □□□ □□ □□ □□□ *(Continued)*

□□ □□□	□□
decapsulate [gre | *routing-instance*]	GRE □□□ □□□□ □□□□□ □□□ □□□ GRE □□□ □□□ □□□ □□□□□ □□
dscp *value*	DSCP(Differentiated Services Code Point)□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • be- Best Effort(□□□) • ef (46)- RFC 3246, *□□ □□ PHB*□ □□□□ □□□□. • af11 (10), af12 (12), af13 (14); af21 (18), af22 (20), af23 (22); af31 (26), af32 (28), af33 (30); af41 (34), af42 (36), af43 (38) □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □□ □□□ □□ □ 4□□ □□□□ RFC 2597, *Assured Forwarding PHB*□ □□□□ □□□□. • cs0, , cs1, cs3cs6cs2cs5cs4cs7,cs5
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□□ □□□ □□□□□. • best-effort • fcoe • mcast • network-control • no-loss □: □□□ □□□□ □□□□□ □□ □□□□□ □□□□ □□□.

□ 111: □□□ □□□ □□ □□ □□□ *(Continued)*

□□ □□□	□□
gbp-src-tag (QFX5120 □ EX4650□ □□)	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□□ □□ □□ □□ □□ □□ (0..65535)□ □□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□ □.
gbp-tag (EX4100, EX4400, EX4650 □ QFX5120)	□□□ □□□ □□ VXLAN□□ □□□□ □□□□□□□ □□□ □□ □□ □□ □□ □□ (1..65535)□ □□□□□. □: VXLAN□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□□□ □. □: Junos OS □□□ 22.4R1 □□□ □□□□□.
interface	□□□□ □□□□ □□ □□□ □□□□□□ □□□□□. □ □□□ □□□ □□ □ □□□□ □□□□ □□□□ □.
log	□□□ □□□ □□□ □□ □□□ □□□□□. □ □□□ □□□ □□ □□ □□□ show firewall log □□□□□. □: log □□ □□□□ □□ □□□□□□□□ □□□□□.
loss-priority (low | medium-low | medium-high | high)	□□ □□ □□□□(PLP)□ □□□□□. □: loss-priority □□ □□□□ □□ □□□□□□□□ □□□□□. □: loss-priority □□ □□□□ □□□ □□ policer □□□□ □□□□.
policer *policer-name*	□□□□ □□□ □□□□□(□□ □□□ □□□□ □□). □□ □□, VLAN, IPv4(inet), IPv6(inet6) □ MPLS □□□ □□ □□□□ □□□ □ □ □□□. □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□.
port-mirror	(ELS □□□) □□ □□□ □□ □□□ □□□□□ □□□ □□ □□□□□□ □□□(□□ □□)□ □□□□□ □ [edit forwarding-options port-mirroring]. □□ □□, VLAN □ IPv4(inet) □□□ □□□ □□□□ □□ □□□□ □□□ □ □□□□.

□ 111: □□□ □□□ □□ □□ □□□ *(Continued)*

□□ □□□	□□
port-mirror-instance *port-mirror-instance-name*	(ELS □□□) □□ □□□□ □□□ □□ □□□ □□□□□ □□□□ □□□□□□ [edit forwarding-options port-mirroring]. □□ □□, VLAN □ IPv4(inet) □□□ □□□ □□□□ □□ □□□□ □□□ □ □□□□. □: □ □□ □□□□ OCX □□□ □□□□□ □□□□ □□□□.
syslog	□ □□□ □□ □□□ □□□□□. □: syslog □□ □□□□ □□ □□□□□□□□ □□□□□.
three-color-policer *three-color-policer-name*	3□ □□□□ □□□ □□□□□(□□ □□□ □□□□ □□). □□ □ □□ □□, VLAN, IPv4(inet), IPv6(inet6) □ MPLS □□□ □□ 3□ □□□□ □□□ □ □□□□. □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□.

SEE ALSO

- □□□ □□ FMC(Flexible Match Condition) | 809

□□□ □□ □□ □□ □ □□(QFX5220, QFX5700 □ QFX5130-32CD)

□ □□□□□ QFX5220-CD, QFX5220-128C □ QFX5130-32CD □□□□ □□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□□□ □□ □□□□□.

□□□ □□□ □ □□□ *□□ □□□□□□□* □□□□□. □□ □□□ □□□ □□□ □□□□ □□ □□□□ □□ □□□ □□□□. *□□ □□□* □□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□ □□□□ □□ □ □□□, □ □□ □□□ □□ □□□ □□□□□.

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- □ 112 □□□ 1677 □(□) IPv4(inet) □ IPv6inet6() □□□□□□ □□ □□ □□□ □□□□□. □□ □□ □ VLAN□ □□ □□ □□□ □□□□ □□□□(ethernet-switching).
- □ 113 □□□ 1688 □□ □□□ □□□ □ □□ □□ □ □□ □□□□ □□□□□.

□□: □□ □□□ □□, □□ □□ □□□ □□ □□ □□ □□□□ □□□ □□□□ □□□ □ □□□□. □□ □□□ □□ □□ □□□ □□□ □□□ □□ □□□ □□□ □□□□□ ? .

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□)

□□ □□	□□	□□ □ □□□□□
arp-type	ARP □□ □□ □□ ARP □□ □□□□□.	□□ □ □□ □□ □ VLAN
destination-address *ip-address*	□□ □□ □□□ □□□ IP □□ □□ □□□□□.	□□ □ □□ IPv4 □ IPv6 □□□□□ □□ □□ □ VLAN
destination-mac-address *mac-address*	□□□ □□ MAC □□□□□.	□□ □ □□ □□ □ VLAN

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
destination-port *value*	TCP □□ UDP □□ □□. IPv4 □□□□ □□ □□ □ □□ next-header IPv6 □□□□ protocol □□ □□ □□□ □ □□□ □□□□ □□□. □□□ □□ □ □□□ □□ □ □□ □□□ □□ □□□ □□□□ □□□ □ □□□□. 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), ftp-data (20), http (80), https (443), ident (113), imap (143), kerberos-sec (88), klogin (543), , krb-prop (754)kpasswd (761), krbupdate (760), , kshell (544) ldap (389), login (513), mobileip-agent (434), mobilip-mn (435), msdp (639), netbios-dgm (138), , netbios-ns (137), nfsd (2049)netbios-ssn (139), nntp (119), ntalk (518), , ntp (123) pop3 (110), pptp (1723), printer (515), radacct (1813),radius (1812), rip (520), rkinit (2108), smtp (25), , snmp (161), snpp (444)sunrpc (111)snmptrap (162)ssh (22)socks (1080)syslog (514), tacacs-ds (65), talk (517), , telnet (23), tftp (69), timed (525) who (513), xdmcp (177), zephyr-clt (2103), zephyr-hm (2104)	□□ □ □□ IPv4 □□□□□ □□ IPv6 □□□□□. □□ □□ □ VLAN

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
destination-port range-optimize *range*	□□ □□□ □□□□ □□ □□□□□ □□□□□ TCP □□ UDP □□ □□□ □□□ □□□ □□□. □ □□□ □□□□ □□ □□ □□□ □□□□ □□□ □ □□ □□□ □□□ □□□ □ □□ □□. (□□ □□ □□□□□ □□□□ □□□□.)	□□ IPv4 □□□□□
destination-prefix-list *prefix-list*	IP □□ □□□ □□ □□□□□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□ □ □□□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□ □□□.	□□ □ □□ IPv4 □ IPv6 □□□□□ □□ □□ □ VLAN.
dscp *value*	DSCP(Differentiated Services Code Point)□□□. DiffServ □□ □□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□□. □□ □ □□ □□□ □□ □□□ □□□ □ □□ □ □□□ □□□ □ □□□□. • be- Best Effort(□□□) • ef (46)- RFC 3246, *□□ □□ PHB*□ □□□□ □□□□. • af11 (10), af12 (12), af13 (14); af21 (18), af22 (20), af23 (22); af31 (26), af32 (28), af33 (30); af41 (34), af42 (36), af43 (38) □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □□ □□□ □□ □ 4□□ □□□ □ RFC 2597, *Assured Forwarding PHB*□ □□□□ □□□□. • cs0, , cs1, cs3cs6cs2cs5cs4cs7,cs5	□□ □ □□ IPv4 □□□□□ □□ □□ □ VLAN

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
ether-type *value*	□□□ □□□ □□ □□□□□. EtherType □□ □□□ □□□□□ □□ □□ □□□□□ □ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□. □□ □□ □□□□□. • aarp (0x80F3)- EtherType □ AARP • appletalk (0x809B)—EtherType □ AppleTalk • arp (0x0806)- EtherType □ ARP • fcoe (0x8906)- EtherType □ FCoE • fip (0x8914)- EtherType □ FIP • ipv4 (0x0800)- EtherType □ IPv4 • ipv6 (0x08DD)- EtherType □ IPv6 • mpls-multicast (0x8848)- EtherType □ MPLS □□□□□ • mpls-unicast (0x8847)—EtherType □ MPLS □□□□□ • oam (0x88A8)- EtherType □ OAM • ppp (0x880B)- EtherType □ PPP • pppoe-discovery (0x8863)—EtherType □ PPPoE □□□□ □ □□□ • pppoe-session (0x8864)—EtherType □ PPPoE □□ □□□□ • sna (0x80D5)- EtherType □ SNA	□□ □ □□ □□ □ VLAN
□ □□ □ □	□□□ □□□□ □□□ □ □□ □□□ □□ □□□□□□. □□□ □□□□ □□□ □□ □□□ □□ □□ □□□ □□□□□. □□□□ □□□ □ □□ □□□ 0□ □□ □□□ □□ □□□□. □ □□ □□□ □□ □□ □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □□□ □□□ □□□ □□ □□□□□ □□ □□ □□ □□ □□□ □□□□ □ □□□ is-fragment□□□ □ □□□□ first-fragment .	□□ IPv4 □□□□□

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
icmp-code *value*	ICMP □□ □□□□□. □□ □□□ □□□ icmp-type□ □□ □□□□□ □ □□ icmp-code□□ □□ □ □□ icmp-type □□ □□□□ □□□. □□ □□ □□□ □□ □ □□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • *IPv4:* parameter-problem—ip-header-bad (0), required-option-missing (1) • *IPv6:* parameter-problem—ip6-header-bad (0), unrecognized-next-header (1), unrecognized-option (2) • redirect—redirect-for-network (0), redirect-for-host (1), redirect-for-tos-and-net (2), redirect-for-tos-and-host (3) • time-exceeded—ttl-eq-zero- during-reassembly (1), ttl-eq-zero-during-transit (0) • *IPv4:* □□□ □ □□—network-unreachable (0), host-unreachable (1), protocol-unreachable (2)port-unreachable (3)fragmentation-needed (4)source-route-failed (5)destination-network-unknown (6)destination-host-unknown (7)source-host-isolated (8)destination-network-prohibited (9)destination-host-prohibited (10)network-unreachable-for-TOS (11)host-unreachable-for-TOS (12)communication-prohibited-by-filtering (13)host-precedence-violation (14)precedence-cutoff-in-effect (15) • *IPv6:* □□ □□—address-unreachable (3), administratively-prohibited (1), no-route-to-destination (0), port-unreachable (4)	□□ □ □□ IPv4 □□□□□ □□ IPv6 □□□□□ □□ □□ □ VLAN

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
icmp-type *value*	ICMP □□□ □□ □□□□□. match □□ □□ □ □□ □□□ protocol □□□□ □ □□. □ □□□ IPv4 □□□□ □□ □□ □□ next-header IPv6 □□□□ □□ □□ □□□ □□ □□ □□□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). *IPv4:* echo-reply (0), destination unreachable (3), source-quench (4)redirect (5)echo-request (8)IPv4 (inet)-advertisement (9)IPv4 (inet)-solicit (10)time-exceeded (11)parameter-problem (12)timestamp (13)timestamp-reply (14)info-request (15)info-reply (16)mask-request (17)mask-reply (18) *IPv6:* destination-unreachable (1), packet-too-big (2), time-exceeded (3)parameter-problem (4)echo-request (128)echo-reply (129)membership-query (130)membership-report (131)membership-termination (132)router-solicit (133)router-advertisement (134)neighbor-solicit (135)neighbor-advertisement (136)redirect (137)router-renumbering (138)node-information-request (139)node-information-reply (140) □ icmp-code *variable*□□□□□□.	□□ □□ IPv4 □□□□□ □□ IPv6 □□□□□ □□ □□ □ VLAN
interface *interface-name*	□□□ □□□ □□□□ □□□ □□□□ □□□□□□□□□. □□□□□ □□(*)□ □□□□□ □□ □□ □□□ □□□ □□□ □□□ □ □□□□. □: □□□ □□□□ □□□□□□□ □□ □□□□ □□□ □ □□□□.	□□ □□ □ VLAN
ip-destination-address *address*	□□□ □□ □□ □□ □□□ IPv4 □□□□□.	□□ □□ □ VLAN

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
ip-options	IP □□□ □□ □□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □□□□□ any .	□□ IPv4 □□□□□
ip-protocol *number*	IP □□□□ □□□□□.	□□ □□ □ VLAN
ip-precedence *ip-precedence-field*	IP □□ □□ □□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□ □ □□ □□□□ □□). critical-ecp (0xa0), flash (0x60), flash-override (0x80), immediate (0x40), internet-control (0xc0), net-control (0xe0), priority (0x20) □□ routine (0x00).	□□ □□ □ VLAN
ip-source-address *address*	□□□ □□□□ □□ □□□ IPv4 □□□□□.	□□ □□ □ VLAN
ip-version *address*	□□□ IP □□□□□. □□□ 2 □□ □□ VLAN □□□□□□ □□□□ □□□□□ IPv4 □□ IPv6 □□ □□□ □□□□□□ □ □□□ □□□□□.	□□ □□ □ VLAN
is-fragment	IP □□□□ More Fragments □□□□ □□□□□ □□□ □□ □□□□ □□□ □□ □□ □ □□□ □□□□ □□□ □□□□□.	□□ □ □□ IPv4 □□□□□(QFX5220) □□ IPv4 □□□□□(QFX5130)

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
learn-vlan-id *number*	MAC □□□ □□ VLAN □□□□□□.	□□ □ □□ □□ □ VLAN(QFX5220) □□ □□ □ VLAN(QFX5130)
learn-vlan-1p-priority *value*	□□□ VLAN □□(802.1Q VLAN □□□ □□ □□ □□ □□□□ □□□ □□ □□ 802.1Q VLAN □□□ □□ □□ □□ □□□□ □□ □□)□□ IEEE 802.1p □ □□ VLAN □□ □□ □□□ □□□□□. 0□□ 7 □□□ □□ □ □□ □□ □□ □□□□ □.	□□ □□ □ VLAN
next-header	IPv4 □□ IPv6 □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □ □□□(□□ □□ □□□□ □□). hop-by-hop (0),icmp (1), icmp6 (58)igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	□□ □ □□ IPv6 □□□□□
packet-length	□□ □□(□□□)□□□. 0□□ 65535 □□□ □□ □□□□ □□□.	□□ IPv4 □ IPv6 □□□□□

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
precedence *value*	IP □□□ □□□ □□(ToS) □□□□ □□ IP □□ □□ □□□□□. (□ □□□□ DiffServ DSCP□□ □□□ □ □□□□.) □□ □ □□ □□ □□□ □□□ □ □□□ □ □□ □ □□□□(□□ □□ □□□□ □□). • routine (0) • priority (1) • immediate (2) • flash (3) • flash-override (4) • critical-ecp (5) • internet-control (6) • net-control (7)	□□ □ □□ IPv4 □□□□□
protocol *type*	IP □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). hop-by-hop (0),icmp (1), icmp6igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)tcp (4)	□□ □ □□ IPv4 □□□□□. □□ IPv4 □□□□□ □ VLAN
source-address *ip-address*	IP □□ □□ □□□, □□□ □□□ □□□ □□□□□.	□□ □ □□ IPv4 □□□□□ □□ IPv6 □□□□□ □□ □□ □ VLAN

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
source-mac-address *mac-address*	□□□ □□ MAC(□□□ □□□ □□) □□□□□.	□□ □ □□ IPv4 □□□□□ □ VLAN
source-port *value*	TCP □□ UDP □□ □□. IPv4 □□□□ □□ □□ □ □□ next-header IPv6 □□□□ protocol □□ □□ □□ □□ □ □□□ □□□□ □□□. □□ □□ □□ destination-port □□□ □□□ □□□ □□□ □ □□□ □□□ □ □□ □□.	□□ □ □□ IPv4 □□□□□ □□ IPv6 □□□□□ □□ □□ □ VLAN
source-port range-optimize *range*	□□ □□□ □□□□ □□ □□□□□ □□□□□ TCP □□ UDP □□ □□ □□□ □□□□ □□. □ □□□ □□□□ □□ □□ □□□ □□□□ □□□□ □ □□ □□□ □□□ □□□ □ □□ □□. (□□ □□ □□□□□ □□□□ □□□□.)	□□ IPv4 □□□□□
source-prefix-list *prefix-list*	IP □□ □□□ □□□□□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□□ □ □□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□ □.	□□ □ □□ IPv4 □□□□□ □□ IPv6 □□□□□ □□ □□ □ VLAN
tcp-established	□□□ TCP □□□ TCP □□(□□□ □ □□ □□ □□□ □□)□ □□□□□□. □□□ □ □ □□□□. tcp-flags "(ack | rst)". □ □□ □□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □□ □□□□□ protocol tcp □□ □□□ □□□□ □□□.	□□ □ □□ IPv4 □□□□□(QFX5220) □□ □ □□ IPv4 □□□□□(QFX5130) □□ IPv6 □□□□□(QFX5130)

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
tcp-flags *value*	TCP □□□(□□□ □□ □□□): • ack (0x10) • fin (0x01) • push (0x08) • rst (0x04) • syn (0x02) • urgent (0x20)	□□ □ □□ IPv4 □□□□□ □□ IPv6 □□□□□ □□ □□ □ VLAN
tcp-initial	□□□ □ □□ TCP □□□ □□□□□□□. TCP □□□□ □□□□ TCP □□□ SYNACK □ □□□□ □□ □□ □□□ □□□□□. □ □□□ tcp-initial□ □□□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □ □ □□□ protocol tcp □□□□ □□□. protocol *type*□(□) □□□□□.	□□ □ □□ IPv4 □□□□□(QFX5220) □□ □ □□ IPv4 □□□□□, □□ IPv6 □□□□□ (QFX5130)
traffic-class	□□□ CoS(Class of Service) □□ □□□ □□□□ 8□□ □□□□□. traffic-class □□□ DSCP(DiffServ Code Point) □□ □□□□ □ □□□□□. □ □ □□ □□□ IPv4□□ □□□ □□(ToS) □□□ □□□□□□□, □ □□(□: DSCP)□ □□ □□□ IPv4□ □□ □□□ □□□□□. □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). af11 (10), af12 (12), af13 (14)af21 (18)af22 (20)af23 (22)af31 (26)af32 (28)af33 (30)af41 (34)af42 (36)af43 (38)cs0 (0)cs1 (8)cs2 (16)cs3 (24)cs4 (32)cs5 (40)cs6 (48)cs7 (56)ef (46)	□□ □ □□ IPv6 □□□□□
ttl *value*	IP TTL(Time-to-Live) □□(10□□)□□□. □□ 1-255□ □ □□□□.	□□ □ □□ IPv4 □□□□□

□ 112: □□□□ □□ □□(QFX5220, QFX5700 □ QFX5130-32CD □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
user-vlan-id *number*	Q-in-Q VLAN□ □□ □□(□□) VLAN□ ID□ □□□□□. □□□ □ □□ □□ 1-4095□□□.	□□ □□ □ VLAN(QFX5130)
user-vlan-1p-priority *value*	□□□□ 0-7□□□ 802.1p VLAN □□ □□□ □□□□□.	□□ □□ □ VLAN(QFX5130)

□□□□ □□□□ then □□□ □□□□ □□ □□□ □□□ □□ □□□□ □□ from □□□ □□□□□. □ 113 □□□ 1688 □ □□□ □□□ □ □□ □□□ □□□□ □. (□□□□ □□□□ then □□□ □□□□ □□□ □□□□ □□□ □□□□□.)

□: □□ IPv4 □□□□□, IPv6 □□□□□ □ □□ □□□ □□ accept, discard □ count □□□ □□□ □ □□□□. □□ VLAN□ □□ □□ □□□ □□□ □ □□□□.

□ 113: □□ □ □□ □□□

□□	□□
accept	□□□ □□□□□. □□ □□□ □□□□ □□□ □□ □□ □□□□□.
apply-groups-except	□□ □□□□ □□□□ □□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□.
count *counter-name*	□□□ □□□□ □□ □□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□□ □ □□□.

□ 113: □□ □ □□ □□□ *(Continued)*

□□	□□
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□□ □□□ □□□□□. • best-effort • fcoe • mcast • network-control • no-loss □: □□□ □□□□ □□□□□ □□ □□□□□ □□□□ □□□.
log	□□□ □□□ □□□ □□ □□□ □□□□□. □ □□□ □□□ □□ □□ □□□ show firewall log □□□□□.
loss-priority (low | medium-low | medium-high | high)	□□ □□ □□□□(PLP)□ □□□□□. □: loss-priority □□ □□□□ □□ IPv4 □□□□□□□□ □□□□□. □: loss-priority □□ □□□□ □□□ □□ policer □□□□ □□□□.
policer *policer-name*	□□□□ □□□ □□□□□(□□ □□□ □□□□ □□). □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□.
port-mirror	□□ □□□ □□ □□□ □□□□□ □□□ □□ □□□□□□ □□□(□□ □□)□ □□□□□□ [edit forwarding-options port-mirroring].
port-mirror-instance *port-mirror-instance-name*	□□ □□□□ □□□ □□ □□□ □□□□□ □□□□ □□□□□□ [edit forwarding-options port-mirroring]. □□ □□, VLAN □ IPv4(inet) □□□ □□□ □□□□ □□ □□□□ □□□ □ □□□□.

□ 113: □□ □ □□ □□□ *(Continued)*

□□	□□
reject *message-type*	□□□ □□□□ "□□□ □□□ □ □□" ICMPv4 □□□(□□ 3)□ □□□□. □□□ □□□ □□□□□ □□ □□□□ □□□□□ syslog . □□ □□□ □□ □ □□□ □□□ □ □□□□. administratively-prohibited (default), bad-host-tos, bad-network-tos, host-prohibited, host-unknown, host-unreachable, network-prohibited, network-unknown, network-unreachable, port-unreachable, precedence-cutoff, precedence-violation, protocol-unreachable, source-host-isolated, source-route-failed. □□□ □□□ □□□□ □□□ ICMP □□ "□□□ □□□ □ □□"□ □□ □□□ "□□ □□□□□ □□□ □"□ □□ □□□□□. □: □ reject □□□ □□ IPv4 □□□□□□□□ □□□□□.
three-color-policer *three-color-policer-name*	3□ □□□□ □□□ □□□□□(□□ □□□ □□□□ □□). □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□. □: color-aware □ color-blind □□□□ □□□□ □□□□. □□□□□ □□□□ □ □□□ □□ color-blind.
vlan *VLAN-name*	□□□□ □□□ □□ VLAN□□ □□□□□. □□□ □□□□□ □ □□ □□□□ □□□□□□ □□□ □□ set system packet-forwarding-options firewall profiles actions ethernet-switching profile1 □□ □□□. □□ □ VLAN □□□ □□ □□□□ □□□ □□□ vlan *vlanID*□ □□ □□. □: □ vlan □□□ □□ □□ □ VLAN□□□ □□□□□.

SEE ALSO

□□□ □□ □□(OCX □□□) | 791

□□□ □□ □□ □□ □□ | 802

□□□ □□ □□ | 1729

□□□ □□ | 2066

??? ?? ?? ?? ? ??(QFX10000 ???)

??? ??? ? ??? *??? ???????* ??????. ?? ??? ??? ??? ???? ?? ???? ?? ??? ????. *??? ???* ?? ?? ?? ?? ??? ??? ? ????. ?? ?? ?? ???? ?? ? ???, ? ?? ??? ?? ??? ??????.

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? ?????? QFX10000 ???? ??? ???? ??? ? ?? ??? ?? ??, ?? ? ?? ???? ?? ??????. ?? QFX ???? ?? ??? ??? ? ??????? "??? ?? ?? ?? ? ??(QFX ? EX ??? ???)" ??? 1652.

- ? 114 ??? 1691 ?(?) ??? ??? ??? ? ??? ? ?? ?? ??? ??????. ?? ?? ?? ? ?? ?? ?? ?????? ??? ???? ??? ? ????. ?? ???? ?? ?? ??? ??? ??? ?? ??? ??? ????? ? .
- ? 115 ??? 1703 ??? ??? ??? ? ?? ??? ?? ???.
- ? 116 ??? 1704 ?(?) ??? ???, ???, ?? ?? ? ???? ? ??? ? ?? ?? ???? ??????.

? 114: ???? ?? ??(QFX10000 ???)

?? ??	??	?? ? ?????
destination-address *ip-address*	?? ?? ??? ??? IP ?? ?? ??????.	?? IPv4(inet) ????? ? IPv6(inet6) ? ????. ?? IPv4(inet) ????? ? IPv6(inet6) ? ????. EVPN/VXLAN ???? ?? ?? IRB ??? ??(???? ??)
destination-mac-address *mac-address*	??? ?? ??? ??? ??(MAC) ??????.	?? ?? ? VLAN. ?? ?? ? VLAN.

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
destination-port *value*	TCP □□ UDP □□ □□. □□□□□ □ □□ □□□ match □ □ protocol □□ □□□□□. □□□ □□ □ □□□ □□□ □□ □ □□ □□□□ □□□ □ □□□□(□□ □□□ □□□□ □□). 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), ftp-data (20), http (80), https (443), ident (113), imap (143), kerberos-sec (88), klogin (543), , krb-prop (754)kpasswd (761), krbupdate (760), , kshell (544) ldap (389), login (513), mobileip-agent (434), mobilip-mn (435), msdp (639), netbios-dgm (138), , netbios-ns (137), nfsd (2049)netbios-ssn (139), nntp (119), ntalk (518), , ntp (123) pop3 (110), pptp (1723), printer (515), radacct (1813),radius (1812), rip (520), rkinit (2108), smtp (25), , snmp (161), snpp (444)sunrpc (111)snmptrap (162)ssh (22)socks (1080)syslog (514), tacacs-ds (65), talk (517), , telnet (23), tftp (69), timed (525)	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ □□, VLAN, IPv4(inet) □□□□□ □ IPv6(inet6) □□□□□. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
	who (513), xdmcp (177), zephyr-clt (2103), zephyr-hm (2104)	
destination-prefix-list *prefix-list*	IP □□ □□□ □□ □□□□□. □□ □□□□ □□ prefix-list □ □ □□□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ □□, VLAN, IPv4(inet) □□□□□ □ IPv6(inet6) □□□□□.
dscp *value*	DSCP(Differentiated Services Code Point)□ □□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□□□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□ □. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • be- Best Effort(□□□) • ef (46)- RFC 3246, *□□ □□ PHB*□ □□□□ □ □□□. • af11 (10), af12 (12), af13 (14); af21 (18), af22 (20), af23 (22); af31 (26), af32 (28), af33 (30); af41 (34), af42 (36), af43 (38) □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □□ □□ □ □□ □ 4□□ □□□□ RFC 2597, *Assured Forwarding PHB*□ □□□□ □□□□. • cs0, , cs1, cs3cs6cs2cs5cs4cs7,cs5	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ □□, VLAN □ IPv4(inet) □□□□□.

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
ether-type *value*	□□□ □□□ □□ □□□□□. EtherType □□ □□□ □□□□□ □□ □□ □□□□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□ □ □□□ □ □□□□(□□ □□ □□□□ □□). • aarp (0x80F3)- EtherType □ AARP • appletalk (0x809B)—EtherType □ AppleTalk • arp (0x0806)- EtherType □ ARP • fcoe (0x8906)- EtherType □ FCoE • fip (0x8914)- EtherType □ FIP • ipv4 (0x0800)- EtherType □ IPv4 • ipv6 (0x08DD)- EtherType □ IPv6 • mpls-multicast (0x8848)- EtherType □ MPLS □□□□□ • mpls-unicast (0x8847)—EtherType □ MPLS □□□□□ • oam (0x88A8)- EtherType □ OAM • ppp (0x880B)- EtherType □ PPP • pppoe-discovery (0x8863)—EtherType □ PPPoE □□□□□ □□□□ • pppoe-session (0x8864)—EtherType □ PPPoE □□ □□□□ • sna (0x80D5)- EtherType □ SNA	□□ □□ □ VLAN. □□ □□ □ VLAN.

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□□ □□ □ □□□□. • best-effort • fcoe • network-control • no-loss	□□ IPv4(inet) □ IPv6(inet6) □□□□.
fragment-flags *value*	IP □□□ □□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□ □ □ □□□(16□□ □□ □□□ □□). • is-fragment • dont-fragment (0x4000) • more-fragments (0x2000) • reserved (0x8000)	□□ □□, VLAN □ IPv4(inet) □□□□.
hop-limit *value*	□□□ □ □□ □□ □ □□ □□□ □□□□□. □□ □ □□ 0□□ 255 □□□ □ □□□ □□□□.	□□ □ □□ IPv6(inet6) □□□□.

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
icmp-code *value*	ICMP □□ □□□□□. □□ □□□ □□□ icmp-type□ □□ □ □□□□ □ □□ icmp-code□□ □□ □ □□ icmp-type □□ □□□□ □□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□ □ □□□ □□ □□□ □□□ □□□. • *IPv4:* parameter-problem—ip-header-bad (0), required-option-missing (1) • *IPv6:* parameter-problem—ip6-header-bad (0), unrecognized-next-header (1), unrecognized-option (2) • redirect—redirect-for-network (0), redirect-for-host (1), redirect-for-tos-and-net (2), redirect-for-tos-and-host (3) • time-exceeded—ttl-eq-zero- during-reassembly (1), ttl-eq-zero-during-transit (0) • *IPv4:* □□□ □ □□—network-unreachable (0), host-unreachable (1), protocol-unreachable (2)port-unreachable (3)fragmentation-needed (4)source-route-failed (5)destination-network-unknown (6)destination-host-unknown (7)source-host-isolated (8)destination-network-prohibited (9)destination-host-prohibited (10)network-unreachable-for-TOS (11)host-unreachable-for-TOS (12)communication-prohibited-by-filtering (13)host-precedence-violation (14)precedence-cutoff-in-effect (15) • *IPv6:* □□ □□—address-unreachable (3), administratively-prohibited (1), no-route-to-destination (0), port-unreachable (4)	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
icmp-type *value*	ICMP □□□ □□ □□□□□. □□□□□ □ □□ □□□ match □□ protocol □□ □□□□ □□□□ □□ □□ □□□□□ □□□□ □. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □ □ □□□□ □□). *IPv4:* echo-reply (0), destination unreachable (3), source-quench (4)redirect (5)echo-request (8)IPv4 (inet)-advertisement (9)IPv4 (inet)-solicit (10)time-exceeded (11)parameter-problem (12)timestamp (13)timestamp-reply (14)info-request (15)info-reply (16)mask-request (17)mask-reply (18) *IPv6:* destination-unreachable (1), packet-too-big (2), time-exceeded (3)parameter-problem (4)echo-request (128)echo-reply (129)membership-query (130)membership-report (131)membership-termination (132)router-solicit (133)router-advertisement (134)neighbor-solicit (135)neighbor-advertisement (136)redirect (137)router-renumbering (138)node-information-request (139)node-information-reply (140) □ icmp-code *variable*□□□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ □□, VLAN, IPv4(inet) □□□□□ □ IPv6(inet6) □□□□□.
interface *interface-name*	□□□ □□□ □□□□ □□□ □□□□ □□□□□□□□□. □□□□□ □ □(*)□ □□□□□ □□ □□ □□□ □□□ □□□ □□□ □ □□□□. □: □□□ □□□□ □□□□□□ □□ □□□□ □□□ □ □□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□ □ IPv6(inet6) □ □□□□.
ip-destination-address *address*	□□□ □□ □□ □□ □□□ IPv4 □□□□□.	□□ □□, □□ □□ □ VLAN. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
ip-options	IP □□□ □□ □□□ □□□ □□□ □□ □□ □□ □□□ □□□□ □ □□□□ any .	□□ □□, VLAN □ IPv4(inet) □□□□□.
ip-precedence *ip-precedence-field*	IP □□ □□ □□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□ □ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp (0xa0), flash (0x60), flash-override (0x80), immediate (0x40), internet-control (0xc0), net-control (0xe0), priority (0x20) □□ routine (0x00).	□□ □□ □ VLAN. □□ □□ □ VLAN.
ip-protocol *number*	IP □□□□ □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)
ip-source-address *address*	□□□ □□□□ □□ □□□ IPv4 □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)
ip-version *address*	□□□ IP □□□□□. □□□ 2 □□ □□ VLAN □□□□□□ □□ □□ □□□□□ IPv4 □□ IPv6 □□ □□□ □□□□□□ □ □□ □ □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN.
is-fragment	IP □□□□ More Fragments □□□□ □□□□□ □□□ □ □ □□□□ □□□ □□ □□ □ □□□ □□□□ □□□ □□□□□.	□□ □□, VLAN □ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
learn-1p-priority *number*	□□ 0-7□□ □□□ IEEE 802.1p VLAN □□ □□ □□□ □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN.

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
learn-vlan-id *number*	□□ VLAN□ ID □□ □□(□□□) VLAN(Q-in-Q VLAN□)□ ID□ □□□□□. □□ □□□□ □□ □□□□□ □□□ □ □□□ □□ □□ □□□□□□□ □□(□□) VLAN ID□ □□□□ □□ □□□ user-id □□ □ □□□ □□□□□. □□□ □ □□ □□ 1-4095□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)
loss-priority (low | medium-low | medium-high | high)	□□ □□ □□□□(PLP)□ □□□□□. □: loss-priority □□ □□□□ □□□ □□ policer □ □□□ □□□□.	□□ IPv4(inet) □ IPv6(inet6) □□□□□.
next-header *value*	IPv4 □□ IPv6 □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). hop-by-hop (0),icmp (1), icmp6 (58)igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	□□ IPv6(inet6) □□□□□. □□ IPv6(inet6) □□□□□.
packet-length *number*	□□ □□(□□□)□□□. 0□□ 65535 □□□ □□□ □□□□ □□ □.	□□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□□□. □□ IPv4(inet) □□□□□.

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
precedence *value*	IP □□□ □□□ □□(ToS) □□□□ □□ IP □□ □□ □□□□□. (□ □□□□ DiffServ DSCP□□ □□□ □ □□□□.) □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • routine (0) • priority (1) • immediate (2) • flash (3) • flash-override (4) • critical-ecp (5) • internet-control (6) • net-control (7)	□□ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
protocol *type*	IPv4 □□ IPv6 □□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). hop-by-hop (0),icmp (1), icmp6igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	□□ IPv4(inet) □□□□□. □□ IPv4(inet) □□□□□.
source-address *ip-address*	IP □□ □□ □□□, □□□ □□□ □□□ □□□□□.	□□ IPv4(inet) □□□□□ □ IPv6(inet6) □ □□□□. □□ IPv4(inet) □□□□□ □ IPv6(inet6) □ □□□□. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)

□ 114: □□□□ □□ □□(QFX10000 □□□) *(Continued)*

□□ □□	□□	□□ □ □□□□□
source-mac-address *mac-address*	□□□ □□ MAC(□□□ □□□ □□) □□□□□.	□□ □□ □ VLAN. □□ □□ □ VLAN.
source-port *value*	TCP □□ UDP □□ □□. □□□□□ □ □□ □□□ match □ □ protocol □□ □□□□□. □□ □□ □□ destination-port □□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ □□, VLAN, IPv4(inet) □□□□□ □ IPv6(inet6) □□□□□. EVPN/VXLAN □□□□ □□ □□ IRB □□□ □□(□□□□ □□)
source-prefix-list *prefix-list*	IP □□ □□□ □□□□□. □□ □□□□ □□ prefix-list □□ □ □□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ □□, VLAN, IPv4(inet) □□□□□ □ IPv6(inet6) □□□□□.
tcp-established	□□□ TCP □□□ □□□ □□□□□□. □ □□□ TCP □□□ □□ □□ □ □□□ □□ □□□ □□, □ 3□□ □□□□□ □□□ □□□□ □□ □□□ □□□□□. □ □□□ tcp-established□ □□□□ □□□□□ TCP□□ □□□□□ □□□□ □□□□. □□ □□□ protocol tcp □□□□ □□□.	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.
tcp-flags *value*	□□ □□□ TCP □□□: • ack (0x10) • fin (0x01) • push (0x08) • rst (0x04) • syn (0x02) • urgent (0x20)	□□ □□, VLAN, IPv4 (inet) □□□□□ □ IPv6 (inet6) □□□□□. □□ IPv4(inet) □□□□□.

표 114: 필터링 및 정책(QFX10000 스위치) *(Continued)*

일치 조건	작업	지원 및 제한사항
`tcp-initial`	첫번째 및 후속 TCP 패킷 허용하지. TCP 헤더에 설정된 TCP 플래그 SYNACK 및 설정되지 않은 패킷 허용하지. 첫번째 `tcp-initial`의 설정되지 않은 TCP에 대한 후속 패킷. 또한 `protocol tcp` 설정해야 합니다.	모든 IPv4(inet), VLAN, IPv4 (inet) 및 IPv6 (inet6) 지원하지. 모든 IPv4(inet) 지원하지.
`traffic-class value`	패킷 CoS(Class of Service) 및 대기열 설정하여 8개 지원하지. traffic-class 사용 DSCP(DiffServ Code Point) 및 설정하지. 및 사용 가능한 IPv4에 대한 서비스(ToS) 필드 재작성하지, 및 값(및: DSCP)을 또는 사용 IPv4을 또는 필드 지원하지. 또는 사용 가능 및 사용 가능 및 설정(또는 또는 설정 및 및). `af11 (10), af12 (12), af13 (14)af21 (18)af22 (20)af23 (22)af31 (26)af32 (28)af33 (30)af41 (34)af42 (36)af43 (38)cs0 (0)cs1 (8)cs2 (16)cs3 (24)cs4 (32)cs5 (40)cs6 (48)cs7 (56)ef (46)`	모든 IPv6(inet6) 지원하지. 모든 IPv6(inet6) 지원하지.
`ttl value`	IP TTL(Time-to-Live) 값(10진수)입니다. 값 1-255을 및 설정하지.	모든 IPv4(inet) 지원하지. 모든 IPv4(inet) 지원하지. EVPN/VXLAN 구성에 대한 및 IRB 인터페이스(구성된 경우)
`user-vlan-id number`	Q-in-Q VLAN을 위(외부) VLAN ID을 지정하지. 값 구성에 대한 패킷 패킷 헤더 및 `learn-vlan-id` (및) 값 구성되지 않(내부) VLAN ID을 사용하지. 범위 및 값 값 1-4095입니다.	모든 및 VLAN. 모든 및 VLAN.

구성된 구성된 then 문에 구성된 값 문에 문에 값 구성된 값 from 문에 지정하지. 표 115 페이지 1703 의 문에 문에 및 값 문에 구성된 및. (구성된 구성된 then 문에 구성된 문에 구성된 문에 지정하지.)

□ 115: □□

□□	□□
accept	□□□ □□□□□. □□ □□□ □□□□ □□□ □□ □□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□□ □ □□□.
reject *message-type*	□□□ □□□□ "□□□ □□□ □ □□" ICMPv4 □□□(□□ 3)□ □□□□. □□□ □□□ □□□□ □ □□ □□□□ □□□□□ syslog . □□ □□□ □□ □ □□□ □□□ □ □□□□. administratively-prohibited (default), bad-host-tos, bad-network-tos, host-prohibited, host-unknown, host-unreachable, network-prohibited, network-unknown, network-unreachable, port-unreachable, precedence-cutoff, precedence-violation, protocol-unreachable, source-host-isolated, source-route-failed, □□ tcp-reset □ □□□ tcp-reset□□, □□□ TCP □□□□ □□□□□ TCP □□□□ □□□, □□□ □□□ □ □ □□ □□□□ □□□□. □□□ □□□ □□□□ □□□ ICMP □□ "□□□ □□□ □ □□"□ □□ □□□ "□□ □□□□□ □□ □□"□ □□ □□□□□. □: □□□ reject □□ □□□□□□□□□ □□□□□.
routing-instance *instance-name*	□□□□ □□□ □□ □□□ □□□□□ □□□□□. (□□□□ □□□□ □□□□ □□□ virtual-router□□□.) □□□ □□ □□□□□ □□□□ □ □□□□.
vlan *VLAN-name*	□□□□ □□□ □□ VLAN□□ □□□□□. □: □□□ vlan □□ □□□□□□□□ □□□□□. □: □ □□□ OCX □□□ □□□□□□ □□□□ □□□□.

□□ □ □□□ □ 116 □□□ 1704 □□ □□□□ □□□□ □□□ □□□, □□□, □□ □□ □ □□□ □ □□□□.

□ 116: □□ □□□

□□ □□□	□□
count *counter-name*	□□□ □□□□ □□ □□ □□□□□.
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□□ □□□ □□□□□. • best-effort • fcoe • mcast • network-control • no-loss □: □□□ □□□□ □□□□□ □□ □□□□□ □□□□ □□□.
log	□□□ □□□ □□□ □□ □□□ □□□□□. □ □□□ □□□ □□ □□ □□□ show firewall log □□□□□. □: log □□ □□□□ □□ □□□□□□□□ □□□□□.
loss-priority (low | medium-low | medium-high | high)	□□ □□ □□□□(PLP)□ □□□□□. □: loss-priority □□ □□□□ □□ □□□□□□□□ □□□□□. □: loss-priority □□ □□□□ □□□ □□ policer □□□□ □□□□.
policer *policer-name*	□□□□ □□□ □□□□□(□□ □□□ □□□□ □□). □□ □ □□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□ □□□ □□ □□□□ □□□ □ □□□□. □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□.
port-mirror	(ELS □□□) □□ □□□ □□ □□□ □□□□□ □□□ □□ □□□□□□ □□□(□□ □□)□ □□□□□ □ [edit forwarding-options port-mirroring]. □□ □ □□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□ □□□ □□ □□ □□□□ □□ □ □ □□□□.

□ 116: □□ □□□ *(Continued)*

□□ □□□	□□
port-mirror-instance *port-mirror-instance-name*	(ELS □□□) □□ □□□□ □□□ □□ □□□ □□□□□ □□□□ □□□□□□ [edit forwarding-options port-mirroring]. □□ □ □□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□ □□□ □□ □□ □□□□ □□ □ □ □□□□. □:
syslog	□ □□□ □□ □□□ □□□□□. □: syslog □□ □□□□ □□ □□□□□□□□ □□□□□.
three-color-policer *three-color-policer-name*	3□ □□□□ □□□ □□□□□(□□ □□□ □□□□ □□). □□ □ □□ □□, VLAN, IPv4(inet) □ IPv6(inet6) □□□ □□ 3□ □□□□ □□□ □ □□□□. □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□.

□□ □□

- □□□ □□ □□(OCX □□□) | **791**
- □□□ □□ □□ □□ □ □□(QFX □ EX □□□ □□□) | **1652**
- □□□ □□ □□ | **1729**
- □□□ □□ | **2066**

□□□ □□ □□ □□ □ □□(PTX □□□ □□□)

in this section

- □□□ □□ □□ □□ □ □□(PTX □□□ □□□) | **1706**
- IPv6 □□□ □□ □□ □□ □ □□(PTX10001-20C) | **1720**

??? ?? ?? ?? ? ??(PTX ??? ???)

??? ???? ? ???? *??? ????????* ??????. ?? ???? ???? ???? ????? ?? ????? ?? ???? ?????. *??? ??*?? ?? ?? ?? ?? ???? ???? ? ?????. ?? ?? ?? ????? ?? ? ????, ? ?? ???? ?? ???? ??????.

??? ???? ????? ????? ???? ???? ???? ??????. ?? ?? ????? ????? ???? ????, ????, ?? ?? ? ???? ? ?????. ???? ?? ?? ???? ????? ?? ??, ????? ?????? ???? ??????.

PTX10003?? ?? ???? ???? ?? ??????? ?? ?? ?? ?? ?? ????? ???? ? ?????(filter input-list and output-list). ???? ????? ?? ???? ????? ???? ???? ?? ???? ???? ? ?????. ?? ?? ??????? ???? ?????? ?? ?? ???? ????? ????? ??????. PTX10008??? ???? ???? ???? ? ????, ????? ?? ?? ???? ?? ???? ???? ????? ?? ??????.

- ? 117 ??? 1706 ?(?) ???? ???? ???? ? ???? ? ?? ?? ???? ??????. ?? ?? ?? ? ?? ?? ?? ?????? ???? ????? ???? ? ?????. ?? ???? ?? ?? ???? ???? ???? ?? ???? ???? ?????? ? .
- ? 118 ??? 1719 ?? ???? ???? ? ?? ?? ? ?? ????? ??????.

? 117: ????? ?? ??

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address *address* [except]	???? ????? ?? ?? ? except ?? ?? ?? ?? ???? ?? ?????.	IPv4(inet) ?????? ? IPv6(inet6) ????? ?.
destination-address *address* [except]	???? ????? ?? ?? ? except ?? ?? ???? ???????. ???? ???? ? destination-address ?? ???? ?? address ??? ? ?????.	IPv4(inet) ?????? ? IPv6(inet6) ????? ?.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□ □□□ □□ protocol tcp □□ □□ □□□□ protocol udp □□□. □□□ □□□ port □ destination-port □□ □□□ □□ □ □□ □ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
destination-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□ □ destination-port □□ □□□ □□□□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
destination-prefix-list *name* [except]	□□□ □□□□ □□ □□ □ □□□□ □□ □□□□ except □□□□ □□. □□ □□□□ □□ prefix-list □□ □□□ IP □□ □□□ □ □□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
dscp *number*	DSCP(Differentiated Services Code Point)□ □□□□□□. DiffServ □□□□□ IP □□□ □□□ □□(ToS) □□□□ □□□□□. □ □□□□ □□ □□□ 6□□□ DSCP□ □□ □□□. DSCP□ 16□□, 2□□ □□ 10□□ □□□□ □□□ □ □□□ □. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). • be- Best Effort(□□□) • ef (46)- RFC 3246, *□□ □□ PHB*□ □□□□ □ □□□. • af11 (10), af12 (12), af13 (14); af21 (18), af22 (20), af23 (22); af31 (26), af32 (28), af33 (30); af41 (34), af42 (36), af43 (38) □ 12□□ □□ □□□□ □□ □ □□□□ 3□□ □□ □□ □□ □ □□ □ 4□□ □□□□ RFC 2597, *Assured Forwarding PHB*□ □□□□ □□□□. • cs0, , cs1, cs3cs6cs2cs5cs4cs7,cs5	IPv4(inet) □ IPv6(inet6) □□□□□.
dscp-except *number*	DSCP □□□ □□□□□ □□□□. □□□ □□□ dscp □□ □□□ □□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
first-fragment	□□□ □□□□ □□□ □ □□ □□□ □□ □□□□□□. □□□ □□□ □ □□□ □□□ □□□ □□ □□□□□ □□□□. □□□□ □□□ □ □ □ □□□ 0□ □□ □□□ □□ □□□□. □ □□ □□□ □□ □□ □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□□ □□□ □ □□□□. first-fragment □ is-fragment.	IPv4(inet) □□□□□.
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□□ □□ □ □□□□□. • best-effort • fcoe • network-control • no-loss	IPv4(inet), IPv6(inet6) □ MPLS □□□□ □.
forwarding-class-except *class*	□□ □□□ □□□□ □□□□□ □□□□. □□□ □□□ forwarding-class □□ □□□ □□□□□□.	IPv4(inet), IPv6(inet6) □ MPLS □□□□ □.
fragment-flags *number*	IP □□□ 3□□ IP □□□ □□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □ □□□ □□). dont-(0x4), more-s(0x2) □□ reserved(0x8).	IPv4(inet) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
fragment-offset *value*	IP □□□ 13□□ □□ □□□ □□□ □□□□□□. □ □□ □□□ □ □□ □□ □□ □□□□□ □□□□ □□□(8□□ □□)□□□. □□ □, □ □□ □□ □ □□□ □□□□□. 0□ □□□ □□ □□□□ □□□ □ □□ □□□ □□□□□. first-fragment □□ □□□ fragment-offset 0 □□ □□□ □□ □□□□□. □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□(first-fragment □ is-fragment)□ □□□ □ □ □□□.	IPv4(inet) □□□□□.
fragment-offset-except *number*	13□□ □□ □□□ □□□ □□□□□ □□□□.	IPv4(inet) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
icmp-code *message-code*	ICMP □□□ □□ □□□ □□□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□ □. □ □□ □□□ □□□□ □□, □□□ □□□ icmp-type *message-type* □□ □□□ □□□□ □□□. ICMP □□□ □□ □ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □ □□ □□□ □□□ □□ ICMP □□□ □□□ □□□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip-header-bad (0), required-option-missing (1) • □□□□: redirect-for-host (1), redirect-for-network (0), redirect-for-tos-and-host (3), redirect-for-tos-and-net (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • □□ □□: 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)	IPv4(inet) □ IPv6(inet6) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
icmp-code-except *message-code*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
icmp-type *number*	ICMP □□□ □□ □□□ □□□□□□. □□ □□□ □□□ □□ icmpv6 □(□) protocol *next-header* □□ □□□□ □ □□□ icmp □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). 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) □□ unreachable (3). □ icmp-code *variable*□□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
icmp-type-except *message-type*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-type □□ □□□ □□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□

interface *interface-name*	□□ □□□ □□, □□□ □□□ □□□□□□ □□□□□□. □□ □□□ □□, □□□ □□□ □□□□□□ □□□□□□. □: PTX5000 □□□ □□□□ □□□□□(□□□ □□□ □□ □□ □□ □□ □□ □□)□ (□□□ □□□□□)□ lo0 □□□□ □ □ em0.0 □□□□ □□□□(□: em0.0□ □□□□ □□□□□ lo0□ □□□ □□□ □□□□ Telnet □ SSH□ □□ □□ □ □ □□□□ □□□). □□ □□ □□□ □□□□□ □□□□□.
	
	firewall
	  filter core-protect {
	  term Telnet {
	  from {
	  protocol tcp;
	  destination-port telnet;
	  interface em0.0;
	  }
	  then accept;
	  }
	  }
	}
		IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.

interface-except *number*	□□□ □□□ □□□ □□□□□□ □□□□□ □□□□. □□□ □□□ interface □□ □□□ □□□□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
is-fragment	□□□ □□□□ □□□ □□ □□□ □□ □□□□□□. □□□□ □□□ □ □□ □□□ □□□□□ □□□□. □: □ □□ □ □□□ □□ □□□ □□□□□ □□ □□ □□ □□□ □□□□ □ □□(first-fragment □ is-fragment)□ □□□ □ □□□□. Junos OS Evolved□ □□□□ PTX10003 □□□□ □ □, □□□□ □□□ □ □□ □□□ □□□ □□ □□□□ □□□ "is-fragment" □□□ □□□□ □□ □□□ □□ □□□□ □□□□□.	IPv4(inet) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
loss-priority *level*	□□ □□ □□□□(PLP)□ □□□□□□□. □□ □□ □□ □□ □□□ □□□□□. low, medium-low, medium-high □□ high □: loss-priority □□ □□□□ □□□ □□ policer □ □□□ □□□□.	IPv4(inet), IPv6(inet6) □ MPLS □□□□ □.
loss-priority-except *level*	PLP □□□ □□□□□ □□□□. □□□ □□□ loss-priority □□ □□□ □□□□□□□.	IPv4(inet), IPv6(inet6) □ MPLS □□□□ □.
next-header *header-type*	□□□ □ 8□□ □□ □□ □□□ □□□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstops (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), mobility (135), no-next-header (59), ospf (89), pim (103), routing (43), rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112).	IPv6(inet6) □□□□□.
next-header-except *header-type*	IPv6 □□□ □□□□ □□□ □□ □□□ □□□□ 8□□ Next Header □□□ □□□□□ □□□□. □□□ □□□ next-header □□ □□□ □□□□□□□.	IPv6(inet6) □□□□□
packet-length *bytes*	□□□ □□ □□□ □□□□ □□□□□□□. □□□ □□ □□□ □□□□ IP □□□ □□□□ □□ □□□ 2 □□□ □□□□□ □□□□ □□□□. □□ □□□ □□ □□□ □□□ □ □□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
packet-length-except *bytes*	□□□ □□ □□(□□□)□ □□□□□ □□□□. □□□ □□□ packet-length □□ □□□ □□□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
port *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□□. □□ □□□ □ □□ □□ □□□□□ □□□□ □□ □□□ □□□ □□ protocol tcp □□ □□ □□□□ protocol udp □□□. □□□ □□□□ destination-port □□ □□ □□ source-port □□ □□□ □□□ □ □□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
port-except *number*	□□ □□ □□ UDP□ TCP □□ □□□ □□□□□ □□□□. □□ □ □□□ port □□ □□□ □□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
precedence *ip-precedence-value*	IP □□□□ □□□ □□□□□□. □□ □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). critical-ecp(0xa0), flash(0x60), flash-override(0x80), immediate(0x40), internet-control(0xc0), net-control(0xe0), priority(0x20) □□ routine(0x00). 16□□, 2□□ □□ 10□□ □□□□ □□□ □□ □□□ □ □□□□.	IPv4(inet) □□□□□.
precedence-except *ip-precedence-value*	IP □□□□ □□□ □□□□□ □□□□.	IPv4(inet) □□□□□.
protocol *number*	IPv4 □□□□ □□ □□□ □□□□□□. □□ □ □□ □□ □□□ □ □□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). hop-by-hop (0),icmp (1), icmp6igmp (2)ipip (4)tcp (6)egp (8)udp (17)ipv6 (41)routing (43)fragment (44)rsvp (46)gre (47)esp (50)ah (51)icmp6 (58)no-next-header (59)dstopts (60)ospf (89)pim (103)vrrp (112)sctp (132)	IPv4(inet) □□□□□.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
protocol-except *number*	IP □□□□ □□ □□□ □□□□□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstopts(60), egp(8), esp(50), fragment(44), gre(47), hop-by-hop(0), icmp(1), icmp6(58), icmpv6(58), igmp(2), ipip(4), ipv6(41), ospf(89), pim(103), rsvp(46), sctp(132), tcp(6), udp (17) □□ vrrp(112).	IPv4(inet) □□□□□.
source-address *ip-address*	IP □□ □□ □□□, □□□ □□□ □□□ □□□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
source-address *address* [except]	□□□ □□□□ □□ □□ □ except □□□ □□□□ □□ □□□ IP □□□ □□□□□□. □□□ □□□□ □□ □□ □□□ □□□□ □□ □ □□ IP □□□ □□□□□ □□□□. □□□ □□□ address □ source-address □□ □□□ □□ □□□ □ □□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
source-port *value*	TCP □□ UDP □□ □□□ □□□□□□. □□ □□□ □□□ protocol udp □□ protocol tcp □□ □□ □□□□ □□ □. □□ □ □□, destination-port *number* □□ □□□□ □□ □ □□□ □□□ □ □□□ □□□ □ □□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
source-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□ □ source-port □□ □□□ □□□□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.
source-prefix-list *prefix-list*	IP □□ □□□ □□□□□. □□ □□□□ □□ prefix-list □□ □ □□ IP □□ □□□ □□□ □□□ □ □□□□. □□ □□□□ □ □□□ [edit policy-options] □□□□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
tcp-flags *value*	TCP □□□ 8□□ TCP □□□ □□□□ □□ □□□ □□□ 6□□ □ □□□□□□. □□ □□ □□□ □□□□ □□ □□ □□□ □□□□ 16□□ □□ □□ □ □ □□□□. • fin(0x01) • syn(0x02) • rst(0x04) • push(0x08) • ack(0x10) • urgent(0x20) TCP □□□□, SYN □□□□ □□□ □□ □□□□□ □□□□ □□ □□, ACK □□□□ □□ □□ □ □□□ □□ □□□ □□□□ □□□ □. □□ □□ □□ □□□□ □□□□ □□ □□ □□□□ □□ □□ □ □□□ □. □ □□ □□□ □□□□ □□, □□□ □□□ protocol tcp □□ □□ □□□□ TCP □□□□□ □□□□ □□□□□ □□□□ □□ □□ □□. IPv4 □□□□ □□□□, □ □□ □□□ □□□□□□□ □□□□ □□□ □ □□ □□□ □□□□□ □□□□□ □□□□ □□□□. IPv4 □□□ □□ □□□□ □ □□□ □□□□□ first-fragment □□ □□□ □□□□ □□□.	IPv4(inet) □□□□□ □ IPv6(inet6) □□□□ □.

□ 117: □□□□ □□ □□ *(Continued)*

□□ □□	□□	□□□□ □□□□□
`traffic-class` *value*	□□□ CoS(Class of Service) □□ □□□ □□□□ 8□□ □□□□□. traffic-class □□□ DSCP(DiffServ Code Point) □□ □□□□ □ □□□□□. □ □□□ □□□ IPv4□□ □□□ □□(ToS) □□□ □□□□□□□, □ □□(□: DSCP)□ □□ □□□ IPv4□ □□ □□□ □□□□□. □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □ □). `af11 (10), af12 (12), af13 (14)af21 (18)af22 (20)af23 (22)af31 (26)af32 (28)af33 (30)af41 (34)af42 (36)af43 (38)cs0 (0)cs1 (8)cs2 (16)cs3 (24)cs4 (32)cs5 (40)cs6 (48)cs7 (56)ef (46)`	IPv6(inet6) □□□□□.
`traffic-class-except` *number*	□□□ CoS □□□□□ □□□□ 8□□ □□□ □□□□□ □□□□. □ □□ □□□ □□ □□□ □□□□□□ `traffic-class` .	IPv6(inet6) □□□□□.
`ttl` *number*	IPv4 □□ IPv6 TTL(time-to-live) □□□ □□□□□□. TTL □ □□ TTL □ □□□ □□□□□. *number*□ □□, □□ □ □□ □(0~255)□ □□□ □ □□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
`ttl-except` *number*	IPv4 □□ IPv6 TTL □□□ □□□□□ □□□□. □□□ □□□ `ttl` □□ □□□ □□□□□□.	IPv4(inet) □ IPv6(inet6) □□□□□.
`vxlan`	VNI□ □□ □□ □ □□ □□ □ □□□ □□□□□. □□ □□□□□□ □□□ □□□□□. • `vni` *vni-value*- VNI□ □□□□□□. • `vni-except` *vni-value*- VNI□ □□□□□ □□□□. □: Junos OS Evolved □□□ 23.4R2□□ □□ □ □□ □□□□□ □□□□ □□ □□□ □□ `vxlan` □□ □□□□□ `vni-except` □□□ □□□ `vni` □ □□□□.	IPv4(inet) □□□□□.

□□□□ □□□□ `then` □□□ □□□□ □□ □□□ □□□ □□ □□□□ □□ `from` □□□ □□□□□. □ 118 □□□ 1719 □ □□□ □□□ □ □□ □□□ □□□□ □. (□□□□ □□□□ `then` □□□ □□□□ □□□ □□□□ □□□ □□□□□.)

□ 118: □□ □ □□ □□□

□□	□□
accept	□□□ □□□□□. □□ □□□ □□□□ □□□ □□ □□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□□ □ □□□.
count *counter-name*	□□□ □□□□ □□ □□ □□□□□.
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□□ □□□ □□□□□. • best-effort • fcoe • mcast • network-control • no-loss □: □ forwarding-class □□□ IPv4, IPv6 □ MPLS □□□□□□□ □□□□□.
log	□□□ □□□ □□□ □□ □□□ □□□□□. □ □□□ □□□ □□ □□ □□□ show firewall log □□□□□. □: log □□ □□□□ IPv4 □ IPv6 □□ □□□□□□□□ □□□□□.
loss-priority *level*	□□ □□ □□□□(PLP)□ □□□□□.
policer *policer-name*	□□□□ □□□ □□□□□(□□ □□□ □□□□ □□). PTX10003□ 2□, □□□□□ 3□ (srTCM) □ 2□□□ 3□ □□(trTCM) □□□□ □□□□□. □: policer □□ □□□□ □□□ □□ loss-priority □□□□ □□□□.

표 118: □□ □ □□ □□□ *(Continued)*

□□	□□
redirect *instance-name*	(Junos Evolved OS □□□ 22.1R1□ □□□□ PTX10004, PTX10008 □ PTX10016 □□□□□□□ □□□□□.) Junos □□ □□□□ □□□ □□□□□ □□□ □□ P4 □□□□□ **[services inline-monitoring instance *instance-name* *controller* p4]** □□□ □□□□.
reject *message-type*	□□□ □□□ "□□□ □□□ □ □□" ICMPv4 □□ ICMPv6 □□□(□□ 3)□ □□□□. □□ □ □□□ □□□□□ □□ □□□□ □□□□□ syslog . □□ □□□ □□ □ □□□ □□□ □ □□□□. administratively-prohibited (default), bad-host-tos, bad-network-tos, host-prohibited, host-unknown, host-unreachable, network-prohibited, network-unknown, network-unreachable, port-unreachable, precedence-cutoff, precedence-violation, protocol-unreachable, source-host-isolated, source-route-failed, . □: tcp-reset □□□ □□□ □□□□ □□□□. □□□ □□□ □□□□ □□□ ICMP □□ "□□□ □□□ □ □□"□ □□ □□□ "□□ □□□□□ □□ □□"□ □□ □□□□□.
syslog	□ □□□ □□ □□□ □□□□□.
routing-instance *instance-name*	□□□□ □□□ □□ □□□ □□□□□ □□□□□. □□□ □□ □□□□□ □□□□ □ □□□□. □ □□ virtual-router □□ forwarding instance-types.

IPv6 □□□ □□ □□ □□ □ □□(PTX10001-20C)

□ □□□□□ PTX10001-20C □□□□ □□ IPv6 □□□ □□ □□ □□, □□ □ □□ □□□□ □□ □□□□□.

□□□ □□□ □ □□□ *□□ □□□□□□□* □□□□□. □□ □□□ □□□ □□□ □□□□ □□ □□□□ □□ □□□ □□□□. *□□ □□* □□ □□ □□ □□ □□□ □□□ □ □□□□. □□ *no match □□* □□□ □ □□□, □ □□ □□□ □□ □□□ □□□□□.

□□□ □□□ □□□□ □□□□ □□□ □□□ □□□ □□□□□. □□ □□ □□□□ □□□□ □□□ □□, □□□ □ □□□ □ □□□□. □□□ □□ □□ □□□ □□□□ □□ □□, □□□□ □□□□□ □□□ □□□□□.

□: PTX10001-20C □□□□□□ □□ □□□□□ IPv6 □□□□□□ □□□ □□□ □□□ □ □□□□.

- □ 119 □□□ 1721 □(□) □□□□ □□ □□□ □□□□□.
- □ 120 □□□ 1725 □□□ □□□ □□□ □ □□ □□□ □□ □□□. □□□□ □□□□ then □□□ □□□□ □□□ □□□□ □□□ □□□□□.
- □ 121 □□□ 1726 □(□) □□□ □□□, □□□, □□ □□ □ □□□□ □ □□□ □ □□ □□ □□□□ □□□□□.

□ 119: IPv6 □□ □□ □□

□□ □□	□□
address *address* [except]	except □□□ □□□□ □□ □□ □ IPv6 □□ □□ □□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□, IPv6 □□ □□ □□ □□ □□□ □□□□□ □□□.
apply-groups	□□ □□□□ □□□□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□. □□ □□□□□ □□□□ □□□□ □□□. □ □□ □□□ □□ □□□□ □□ □□□ □□□□□ □□□□ □□□□.
apply-groups-except	□□ □□□□ □□□□ □□ □□□ □□□□□. □□ □□□ □□ □□ □□□ □ □□□□.
destination-address *address* [except]	except □□□ □□□□ □□ □□ □ IPv6 □□ □□ □□□ □□□□□□. □□□ □□□□ □□ □□, IPv6 □□ □□ □□□ □□□□ □ □□□□. □□□ □□□ address □ destination-address □□ □□□ □□ □□□ □ □□□□.
destination-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ destination-port □□ □□□ □□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□□ □□□□ □□□□). 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), 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), ldp (646), login (513), mobileip-agent (434), mobilip-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 (49), tacacs-ds (65), talk (517), telnet (23), tftp (69), timed (525), who (513), or xdmcp (177).

□ 119: IPv6 □□ □□ □□ *(Continued)*

□□ □□	□□
destination-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ destination-port □□ □□□ □□□□□□.
destination-prefix-list *prefix-list-name* [except]	□□□ □□□□ □□ □□ □ IPv6 □□ □□□□ □□□ □□□ □□□□□□ except . □□□ □□□□ □□ □□, IPv6 □□ □□□□ □□□ □□□ □□□□□ □□□□. □□□ □□□] □□ □□□□ □□□□□ [edit policy-options prefix-list *prefix-list-name*.
icmp-code *message-code*	ICMP □□□ □□ □□□ □□□□□□. □ □□ □□□ □□□□ □□ □□□ □□□ □□ next-header icmp6 □□ □□□ next-header icmp □□□□ □□ □□□□. ICMP □□□ □□□ ICMP □□□ □□□□ □ □□□□ □□□ □□□□□ ICMP □□□ □□□ □□□ □□ ICMP □□□ □□□ □□□□. □□ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). □□□□ ICMP □□□□ □□□□□ □□□ □□ □□□ □□□ □□□□. • □□□□ □□: ip6-header-bad(0), unrecognized-next-header (1), unrecognized-option (2) • □□ □□: ttl-eq-zero-during-reassembly (1), ttl-eq-zero-during-transit (0) • destination-unreachable: administratively-prohibited(1), address-unreachable (3), no-route-to-destination (0), port-unreachable (4)
icmp-code-except *message-code*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-code □□ □□□ □□□□□□.

□ 119: IPv6 □□ □□ □□ *(Continued)*

□□ □□	□□
message-type	ICMP □□□ □□ □□□ □□□□□□. □□ □□□ □□□□ □□□ □□ icmp □□□ next-header icmp6 □□□□□ □□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). certificate-path-advertisement(149), certificate-path-solicitation (148), destination-unreachable (1), echo-reply (129), echo-request (128), home-agent-address-discovery-reply (145), home-agent-address-discovery-request (144), inverse-neighbor-discovery-advertisement (142), (141), membership-queryinverse-neighbor-discovery-solicitation (130), membership-report (131), membership-termination (132), mobile-prefix-advertisement-reply (147), mobile-prefix-solicitation (146), neighbor-advertisement (136), neighbor-solicit (135), node-information-reply (140), node-information-request (139), packet-too-big (2), parameter-problem (4), private-experimentation-100 (100), private-experimentation-101 (101), private-experimentation-200 (200), private-experimentation-201 (201), redirect (137), router-advertisement (134), router-renumbering (138), router-solicit (133), time-exceeded □□ (3). (201)□ □□ private-experimentation-201 □□□ □□ □ □□□ □□□ □□ □□□□.
icmp-type-except *message-type*	ICMP □□□ □□ □□□ □□□□□ □□□□. □□□ □□□ icmp-type □□ □□□ □□□□□□.
next	□□□□ □□ □□□ □□ □□□□□.
next-header *header-type*	□□□ □ □□ 8□□ Next Header □□□ □□□□□□. □□ □ □□ □□ □□□ □□□ □ □□□ □□□ □ □□□□(□□ □□ □□□□ □□). ah(51), dstops (60), egp (8), esp (50), fragment (44), gre (47), hop-by-hop (0), icmp (1), icmp6 (58), icmpv6 (58), igmp (2), ipip (4), (41 ipv6), mobility (135), no-next-header (59), ospf (89), pim (103), routing (43), rsvp (46), sctp (132), tcp (6), udp (17) □□ vrrp (112). □: next-header icmp6 □ next-header icmpv6 □□ □□□ □□□ □□□ □□□□□. next-header icmp6 □ □□ □□□□□. next-header icmpv6 Junos OS CLI□ □□□ □□□□.
next-header-except *header-type*	IPv6 □□□ □□□□ □□□ □□ □□□ □□□ 8□□ Next Header □□□ □□□□□ □□□□. □□□ □□□ next-header □□ □□□ □□□□□□.

□ 119: IPv6 □□ □□ □□ *(Continued)*

□□ □□	□□
port *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□□□. □ □□ □□□ □□□□ □□, □□□ □□□ destination-port □□ □□ □□ source-port □□ □□□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □□ □ □□, destination-port□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
port-except *number*	UDP □□ TCP □□□ □□ □□ □□□ □□□□□ □□□□. □□□ □□□ port □□ □□□ □□□□□□□.
port-mirror *instance-name*	□□□ □□ □□□□□□□.
port-mirror-instance *instance-name*	□□□ □□□□□ □□ □□□ □□□□□□□.
prefix-list *prefix-list-name* [except]	□□□ □□□□ □□ □ □□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ except □□□□□□□. □□□ □□□□ □□ □□, □□ □□ □□ □□ □□□ □□□□ □□□ □□□ □□□□ □□□□□ □□□□. □□□ □□□ [edit policy-options prefix-list *prefix-list-name*] □□ □□□ □□□□ □□□□.
sample	□□□ □□□□□□□.
source-address *address* [except]	except □□□ □□□□ □□ □□ □ □□□ □□□□ □□ □□□ IPv6 □□□ □□□□□□□. □□□ □□□□ □□ □□, □□□ □□□□ □□ □□□ IPv6 □□□ □□□□□□ □□□□. □□□ □□□ address □ source-address □□ □□□ □□ □□□ □ □□□□.

□ 119: IPv6 □□ □□ □□ *(Continued)*

□□ □□	□□
source-port *number*	UDP □□ TCP □□ □□ □□□ □□□□□□. □□□ □□□ port □ source-port □□ □□□ □□□ □ □□□□. □ □□ □□□ □□□□ □□, □□□ □□□ □□ next-header tcp □□ □□□ □□ next-header udp □□ □□□□ □□ □□ □□□□□ □□□□ □□ □□□□. □: Junos OS Evolved□ □□, □□□ □□□ next-header udp □□ next-header tcp □□ □□ □□□□ □□ □. □□ □ □□, destination-port *number* □□ □□□□ □□□ □□□ □□□ □ □□□ □□□ □ □□□□.
source-port-except *number*	UDP □□ TCP □□ □□ □□□ □□□□□ □□□□. □□□ □□□ source-port □□ □□□ □□□□□□.
source-prefix-list *name* [except]	□□□ □□□□ □□ □□ □ □□ □□ □□□ IPv6 □□ □□□□ except □□□□□□. □□□ □□□□ □□ □□, □□ □□ □□□ IPv6 □□ □□□□ □□□□□ □□□□. □□ □□□□ □□□ [edit policy-options prefix-list *prefix-list-name*] □□□ □□ □□□ □□□□□.

□: □□ □□(address, destination-address, □□ source-address □□ □□)□□ IPv6 □□□ □□□□ □□ RFC 4291, *IP □□ 6 □□ □□ □□□□□* □□□ □□□ □□ □□□ □□□□□. IPv6 □□□ □□ □□□ □□□ IPv6 □□ □ □□□□ IPv6 □□□ □□□□□□.

□ 120: IPv6 □□□ □□□ □□ □□

□□	□□
accept	□□□ □□□□□. □□ □□□ □□□□ □□□ □□ □□ □□□□□.
discard	ICMP(Internet Control Message Protocol) □□□□ □□□ □□ □□□ □□□ □□□□.

□ 120: IPv6 □□□ □□□ □□ □□ *(Continued)*

□□	□□
redirect *instance-name*	(Junos Evolved OS □□□ 22.1R1□ □□□□ PTX10004, PTX10008 □ PTX10016 □□□□□□□ □□□□□.) Junos □□□ **[services inline-monitoring instance *instance-name* □□□□ p4]** □□□□ □□□ □□□□□ □□□ □□ P4 □□□□□ □□□ □□□□□.

□ 121: IPv6 □□□ □□□ □□ □□ □□□

□□ □□□	□□
count *counter-name*	□□□ □□□□ □□ □□ □□□□.
forwarding-class *class*	□□ □□ □□□ □□□ □ □□ □□ □□□ □□ □□□ □□□□ □□□ □□□□. • best-effort • fcoe • mcast • network-control • no-loss □: □□□ □□□□ □□□□ □□ □□□□ □□□□ □□□.
loss-priority (low | medium-low | medium-high | high)	□□ □□ □□□(PLP)□ □□□□.

□□ □□

□□□ □□ □□(QFX □□□) | 1640

□□□ □□ □□ | 1729

□□□ □□ | 2066

□□□□ □□□ □□ □□□ □□ □□ | 1265

□□ □□□ □□□ □□□□ □□□□ □□ □□ | 1268

PTX □□□ □□ □□ □□□□ T □□□ □□□□ □□□□ □□□ □ □□□ □□□

□ □□□ PTX □□ □□ □□□□□ □□□ □ □□ □□□ □ □□□ □□ □□□ □□□□ T □□□ □□□□ □□□ □ □□□ □□□ □□□□□.

□□□ □□

PTX □□□ □□ □□ □□□□ Junos OS □□□ □ □□□ □□□□□□ IPv4 □□, IPv6 □□, MPLS □□, CCC □□, □□□□□ □□□, LSP □□ □, MAC □□□, ARP □□□, L2 □□□ □ □□ □□□ □□□□□.

- PTX □□□ □□ □□ □□□□ □□□ □□□□ □□□□.
  - □□ □□□ □□□ □□
  - MPLS/CCC□ □□ □□□ □□□ □□
  - □□□ VPLS
- PTX □□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□ □□□□. filter] □□ □□□ □[edit firewall family *family-name* filter *filter-name* term *term-name*□ □□□□□□□.
- PTX □□□ □□ □□ □□□□□ □□□ PIC□ □□ □□□ □□□ □□□ IPv4 □ IPv6 □□□ □□□ □□ □□□□ □□□□. □□ □□□ □ [edit firewall family (inet | inet6)] □ service-filter □□□□□□□.
- PTX □□□ □□ □□ □□□□ □□ □□□ □□□□□. □□□ □□□ □□□□ □□□ □□□ □□(IQ2) □ □□□ □□ □□□ □□ □□□(EQ DPC) □□□□ □□□□ □□□□□. simple-filter □□ □□□ □[edit firewall family inet)] □ □□□□□□□.
- □□□ □□□□□ □□□□ □□□□ □□□□. physical-interface-filter □□ □□□ □[edit firewall family *family-name* filter *filter-name*] □ □□□□□□□.
- □□□ □□ □□□ PTX □□□ □□ □□ □□□□□ □□□□ □□□□. □□ □□□ □ [edit firewall family inet] □ prefix-action □□□□□□ □.
- T □□□ □□□□□□ □□□□ □ □□ □□ □□□ □□□□ □□ □□□ □□ □□□□ □□□□ □□□□□ □□□□ □□□□ □□ □□□ □□□ □□□ □ □□□□.
  PTX □□□ □□ □□ □□□□ □□□ □□□ □□ □□ □□□ □□□□ □□□□.accounting-profile □□ □□□ □ [edit firewall family *family-name* filter *filter-name*] □ □□□□□□□.
- reject □□□(lo0) □□□□□□□□ □□□ □□□□ □□□□.□□□□□□ □□□ lo0 □□□□ □□□ □□□ □□□□ reject □□□ □□ □□□□ □□□□□.
- PTX □□□ □□ □□ □□□□ □□□□□□□ □□□ □□□ □□□□□ □□ □□□ □□□□ □□□□.□□□ □□ □□ □□□□□ □□□ □□□□□.

- PTX ??? ?? ?? ????? ??? ?? ?? ? ??? ??? ?? ??? ??? ????? ?? ?? ? ????? ?? ??????. T ??? ????? ? ?? ?? ???.

- PTX ??? ?? ?? ????? ??? ?? ??????? ????? ? ??? ??? ?????? ?? ?????. interface-specific ?? ?? ???? ??? ? ?????.

- PTX ??? ?? ?? ?????? ?? ??????? CCC ????? ?? ?? ?? CCC ??????? ?? ????? ???? ?? ???? ?? ????? ?????.

- CCC ????? ??, PTX ??? ?? ?? ????? ?? ??? 2 ????? ?? 8????? ??????. T ??? ????? ??? ?????. ??? PTX ??? ?? ?? ????? ?? ????? ? ??? ?? 8????? ??? ????? ??? ????? ??? ?????.

- PTX ??? ?? ?? ?????? CLI ??? show pfe statistics traffic ????? DMAC ? SMAC ????? ?? ??? ??? ??????. T ??? ??????? MAC ??? FPC? ?? PIC?? ????? ???? ?? ????? ??? ??? ??? ????? ?????.

- PTX ????? ????? ??? ?? ??? ?? ??? ?? is-fragment ? ? ?????. ? ??? T ??? ?????? ??????.

  PTX ??? ?? ?? ?????? ??? ?? ??? ??? ????? ? ?? ?? ??? ????? ?????. ? ????? ? is-fragment ?? ?? ??? ????? ?? ????? ? fragment-offset -except 0?? ?? ??? ??????.

- PTX ??? ?? ?? ?????? ?? ??? 100Mbps? ????? MAC ?? ?? ????? ??????. ? ??? ??? ??? 105?????? ?? ?? ?? ??????.

?? ??

PTX ??? ?? ?? ????? Junos OS ??? ? ??? ??????? IPv4 ??, IPv6 ??, MPLS ??, CCC ??, ?????? ???, LSP ??, MAC ???, ARP ???, L2 ??? ? ?? ??? ??????. ??? ??? ????? ?????.

- PTX ??? ?? ?? ????? ARP ????? ??????. T ??? ????? ??? ?????.

- PTX ??? ?? ?? ????? LSP ????? ????? ?????.

- PTX ??? ?? ?? ????? hierarchical-policer ?? ?? ????? ?????. .

- PTX ??? ?? ?? ????? interface-set ?? ?? ????? ?????. ? ?? ?? ??????? ??? ??? ????? ????? ???????.

- ??? ??? ??? ???, ?? ?? ?? ??? ??? ??(*?/?/?/?/?*) ??? ?????, PTX ??? ?? ?? ????? T ??? ????? ??? ??????. ?? ??? ?? ????? ? ?? ??? ????? PTX ??? T ??? ??? ????? ?????? ? ? ?????.

  PTX ??? ??:

```
rule-1 {
    match: {x, y, z}
    action: {forwarding-class, loss-prio, next}
}
    rule-2 {
        match: {x, y, z}
```

```
        action: {policer}
    }
```

T ??? ??:

```
rule-1 {
    match: {x, y, z}
    action: {forwarding-class, loss-prio, policer}
}
```

?? ??

> ??? ??, ??? ?? ? ??? ??? ??? ???

??? ?? ??

in this section

- ??? ?? ?? | **1729**
- ??? ?? ??? ?? ??(QFX5110 ? QFX5220 ???) | **1733**
- ??? ??? ?? ?? | **1734**
- VLAN? ??? ?? ?? | **1734**
- ??? ??? ??? 3(???) ??????? ???? ?? | **1735**
- ??? ??? ??? 2 CCC? ??(QFX10000 ???) | **1736**

?? ???? ???? ?? ????? ???? ???? ????? ??????.

??? ?? ??

???? ?? ?? ??:

1. [illegible] ([illegible]: [illegible]) [illegible].

```
[edit]
user@switch# set firewall family ethernet-switching filter ingress-port-filter term term-one
from source-address 192.0.2.14
```

- [illegible] 2 [illegible]([illegible] VLAN)[illegible] ethernet-switching[illegible].
- [illegible] 3([illegible]) [illegible](inet IPv4[illegible]) [illegible] IPv6[illegible] (inet6)[illegible].
- [illegible] 2 [illegible] ccc[illegible].

[illegible] (-)[illegible] 64[illegible]. [illegible].

2. [illegible].

[illegible] 80[illegible] 2 [illegible].

```
[edit firewall family ethernet-switching filter ingress-port-filter term term-one from]
user@switch# set source-port 80
```

[illegible] ge-0/0/6.0[illegible] VLAN[illegible].

```
[edit firewall family inet filter ingress-interface-match-condition term term-one from]
user@switch#set interface ge-0/0/6.0.
```

[illegible] from [illegible]. [illegible]. [illegible] from [illegible]. from [illegible].

3. [illegible].interface-specific

```
[edit firewall family ethernet-switching filter ingress-port-filter]
user@switch# set interface-specific
```

4. [illegible]. [illegible].

- [illegible], [illegible].

```
[edit firewall family ethernet-switching filter ingress-port-filter term term-one then]
user@switch#  set discard
```

[illegible](, discard, , routing-instancefloodreject, [illegible])[illegible].acceptvlan

- □□ □□, QFX5100/QFX5110/ QFX5120-32C/QFX5200/QFX5210□ MAC □□□ □□□□ □□□ □□□□□ □□ □□ □□□ □□□□□:

```
[edit firewall family ethernet-switching filter f1 term t2 then]
user@switch# set flood
```

□□ MAC □□□ □□ □□□□ □□□□ □□ □□ □□ □□□ □□□ □□□□ □□ BPDU□ □□□□□□ □□□ □ □□□□.

□□□□	DMAC(Destination Media Access Control) □□	□□□ □□(Firewall Action)
□□ □□□□□□ □□ □□□□(LACP)	01:80:□2:00:00:02	□□□/□□/□□□
LLDP(Link Layer Discovery Protocol)	01:80:c2:00:00:0E	□□□/□□/□□□
EAPOL(Extensible Authentication Protocol over LAN)	01:80:□2:00:00:03	□□□/□□/□□□
□□□ □□ □□□□(STP)	01:80:c2:00:00:00	□□/□□/□
VLAN □□□ □□ □□□□(VSTP)	01:00:0c:cc:cc:cd	□□□/□□/□□□
□□□ □□□□□ □□□□(CDP)/VLAN □□□ □□□□(VTP)	01:00:0C:□□:□□:□□	□□/□□□
ISIS L1	01:80:C2:00:00:14	□□/□□□
ISIS L2	01:80:□2:00:00:15	□□/□□□

□:

- CDP/VTP, ISIS L1/L2 □□□□□ □□ □□ □□□ □□□□ □□□□□□. □□□ □□□ □□□□□ □□ □□ □□□ □□ □ □□□ □□□□.
- □□ □□ □□ □□□ □□□ □□ □□□□ □□□□□ □□□ □□□□□ □□□ □□□□ □□□ □□□□□□ □□ □□□ □□□ □□□ □ □□□□.

- □□□ □□□□ □□□ □□ □□ BPDU□ □□□□ □□□□□ □□□□ VLAN□ □□□□ □□□. □□□□ VLAN□ □□□ □ □□ □□, □□ □□ BPDU□ □□ FPC□ □□ □□□□□□ □□□□□□.
- IGMP □□□ □□ MLD(Multicast Listener Discovery) □□□□ □□□□□ □□□ □□□ □□□□ □□□□.
- □□□ □□□ □□ □□□ □□□ □□□□□□ □□□□ □□□ □□□□□□ □□□□ □□ □□□□□□□ □□□ BPDU□ □□ □□ □ □□□□ □□□□□□□.

- □□ □□, □□□ □□□□ □□ □□□ □□□□□ □□□□ □□ □□ □□□□ □□□□□:

```
[edit firewall family ethernet-switching filter ingress-port-filter term term-one then]
user@switch# set count counter-one
user@switch# set forwarding-class expedited-forwarding
user@switch# set loss-priority high
```

□□□ □□□ □□ □□ □□□□ □□□ □ □□□□ then .

- analyzer *analyzer-name*- □□□□ □□□□ □□ □□□ □□□□ □□ □□ □□□□ □□□□□□ [ethernet-switching-options] .
- count *counter-name* - □ □□ □□□ □□□□ □□ □□ □□□□□□□.

  □: □ □□ □□□□ □□□ □□□ □□□□ □□ □□ □□□□□ □ □□□ □□□ □□□□ □ □□□ □□ □□□□ □□□□ □□ □□ □□.

  □: QFX3500 □ QFX3600 □□□□□ □□□ □□ □□ □□(CRC) □□□ □□ □□ □□□□ □□□ □□□ □□□□ □□□□□.
- forwarding-class *class*- □□□ □□□□ □□□ □□□□□.
- log- □□□ □□□ □□ □□ □□□ □□□□□.
- loss-priority *priority*- □□ □□□ □□□□□ □□□□□.
- policer *policer-name*- □□□□ □□ □□□ □□□□□.
- flood- □□□ □□□□□□□.
- syslog- □ □□□ □□ □□□ □□□□□.

□□ □□ then □□□ □□□ □□□□ □□□ □□ □□ □□□ from □□□□ □□□ □□□□□. □□□ □□ □□□ then □□□ □□□□ □□□. □□□ □□ □□□ □ □□□ □ □□□ □□ □□ □□ □□ □□□ □□□ □ □□□□. □□ □□ □□ □□ □□□ □□□□□ from □□ □□ □□□ □□□□ □□□.

□: implicit discard □□□ □□□□□□ □□□ □□□ □□□ □□□ □ □□ □□□□□lo0.

□□□ □□ □□□ □□ □□(QFX5110 □ QFX5220 □□□)

□□□□ □□□□ □□ QFX5110 □ QFX5220 □□□□ □□ 1,000□□ □□ □□□ □□(eRACL)□ □□□ □ □□□□. □□ □□□□ □□□□ □□□□ □ □□ 2000□□ □□ □ □□□□. □ □□□□ □□□□ □□ TCAM □□(IFP)□ □□□□ □ □□ □□□□ □□□□□.

□□ □□□ □□□□□ □□□ □□ □□(inet IPv4□ □□) □□ IPv6□ □□ (inet6), □□ □□ □ □□ □□□ □□□□□. □□□□ □□ □□□ □□ □□□ □□□ □, □□ □□ □ □□□ □□□ □□ □□ □□□ □□□□□. □□ □□ □□□□□□ □□ □□□□ □□□ □□□□□.

□□ □□□ □□, □□ □□ □□□ □□□ □□□ □□□□ □□ □□ □□(PFE)□ □□ □□□□ □□□.

QFX5110□ □□ □□ □□ □□□□ □□□ □□□ □□□□□ egress-to-ingress . □□ □□ □□□ □ □□□ □□□ □ □□□□. □□□ □□ □□□□□.

```
set firewall family inet filter f1 term t1 from egress-to-ingress
set firewall family inet filter f1 term t1 from source-port 1500
set firewall family inet filter f1 term t1 then accept
set interfaces irb unit 100 family inet filter output f1
```

QFX5220□ □□ □□ □□ □□□□ □ □□□ egress-profile □□□ □□□□□eracl-scale. □□□ □□ □□□□□.

□: □□□ eracl-scale □□ □□□ □□□□□. □□□□□ □□□□ □□ □□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□.

```
set system packet-forwarding-options firewall eracl-profile eracl-scale
set firewall family inet filter f1 term t1 from source-port 1500
set firewall family inet filter f1 term t1 then accept
set interfaces irb unit 100 family inet filter output f1
```

□□ □□ □□□ □□□□□ □□□□ □□□ □□ □□ □□□ □□□□□.

- □□ □□(VLAN□□ □□□ □□□)□□□ □□□ □□□ □ □□□□.
- inet6 □ □□□□ □□□□ inet □□□□□.
- GRE(Generic Routing Encapsulation) □□□□□□ □□□□ □□□□.
- □□ □□□ □□□ □□ □□ □□ □□□ □□□□□.
- □□ □□ VLAN □□ □□□ 3 □□□□□□ □□□ □□ □□□ □□ □□□ □□□ □ □□□□. □□□□ □□□□ □□□ accept, discard, □□□ count.
- □□ □□□ □□ □□□ □□ TCAM□ □□□□□□□□□. □, □□□ □□□ □□ □□□□ □□□□ VLAN□ □□□□ □□□□□.

[illegible]

[illegible]:

1. [illegible]

```
[edit]
user@switch# set interfaces ge-0/0/6 description "filter to limit tcp traffic at trunk port
for employee-vlan"
```

2. [illegible](ethernet-switching), [illegible]

```
[edit]
user@switch# set ge-0/0/6 unit 0 family ethernet-switching filter input ingress-port-filter
```

[illegible]

VLAN[illegible]

[illegible]: VLAN [illegible] EVPN-VXLAN [illegible] QFX5100, QFX5100 Virtual Chassis, QFX5110 [illegible] QFX5120 [illegible]

[illegible] VLAN[illegible]:

1. [illegible]

```
[edit]
user@switch# set vlans employee-vlan vlan-id 20 description "filter to block rogue devices on
employee-vlan"
```

2. [illegible] VLAN[illegible]

- VLAN[illegible]

```
[edit]
user@switch#  set vlans employee-vlan vlan-id 20 filter input ingress-vlan-rogue-block
```

- □□□ □□□ □□□□ VLAN□ □□□ □□□ □□□□□□□ □□□ □□□□□.

```
[edit]
user@switch#  set vlans employee-vlan vlan-id 20 filter output egress-vlan-filter
```

□: □□□ □□(□□ □□ □□)□ □□ VLAN□ □□□ □□□ □□□ □ □□□□.

□□□ □□□ □□□ 3(□□□) □□□□□□ □□□□ □□

IPv4 □ IPv6 □□□□□, □□□□ VLAN □□□□□(RVI)(□□ □□□ □ □□□(IRB) □□□□□□□□□ □) □ □□□ □□□□□□ □□□ □□□ □□□ □ □ □□□. □□□ □□ □□□ 3 □□□ □□□□□□ □□□□□.

□: (QFX5100 □ QFX5110 □□□) EVPN-VXLAN □□□□□ IRB □□□□□□ □□□□ □□□□ □□□ 3 □□□ □□ □ □ □□□□. IRB □□□□□□ □□□□□ □: *□□□□□□* □□□□ □□□ 3 □□□ □□□□ □□ EVPN-VXLAN □□□□ IRB □ □□□□ □□. □□ □□ □□ □□□ □□ IRB □□□□□□ □□□ □□□ □□□ □ □□□□(□□ □□□ □□□). □□□□ □□ □□ □□□ "□□ □ □□ □□ □□ □ □□(QFX5100, QFX5110, QFX5120, QFX5200, EX4600, EX4650)" □□□ 1653 □ □□□□□□.

□:
□□□ □□□ VLAN□ □□□ IRB □□□□□□ □□□ □□, □□□□ VLAN ID□ □□ □□ □□□ 3 □□□□□□□ □□□ □□□□□. □□ □□ VLAN □□□ □□ □□ □□□ 3 □□□□□□□ □□□ □□□□ □□□□□.

□□□ 3 □□□□□□ □□□ □□□ □□□□□ □□□ □□□□□.

1. □□□ □□□ □□ □□ □□ □□□ □□□ □□□ □□□□□. □ □□□ □□□□□□ □□□ □□□□ □ □□□□ □□□□□.

```
[edit]
user@switch# set interfaces ge-0/1/6 description "filter to count and monitor traffic on
layer 3 interface"
```

2. □□□ □□□ □□□□□.

- □□□□□□ □□□□ □□□ □□□□□ □□:

```
[edit]
user@switch# set interfaces ge-0/1/6 unit 0 family inet filter input ingress-router-filter
```

- [illegible]:

```
[edit]
user@switch# set interfaces ge-0/1/6 unit 0 family inet filter output egress-router-filter
```

[illegible] IPv4[illegible] (inet [illegible] IPv6[illegible] (inet6)[illegible].

> [illegible]: [illegible]([illegible])[illegible].

[illegible] 2 CCC[illegible](QFX10000 [illegible])

QFX10000 [illegible] 2 CCC(Circuit Cross-Connect) [illegible]. [illegible] [edit firewall family ccc] .

[illegible]([illegible]) count [illegible].

```
set firewall policer traffic-cnt if-exceeding bandwidth-limit 1g
set firewall policer traffic-cnt if-exceeding burst-size-limit 100m
set firewall policer traffic-cnt then loss-priority low
set firewall family ccc filter srTCM-cnt term t1 then policer traffic-cnt
set firewall family ccc filter srTCM-cnt term t1 then count traffic-counter
```

[illegible]([illegible]) discard [illegible].

```
set firewall policer discard-traffic if-exceeding bandwidth-limit 1g
set firewall policer discard-traffic if-exceeding burst-size-limit 500m
set firewall policer discard-traffic then discard
set firewall family ccc filter srTCM1 term t1 then policer discard-traffic
```

[illegible]

[illegible](QFX [illegible]) | 1640
[illegible] | 1644
[illegible](QFX [illegible] EX [illegible]) | 1652
[illegible](QFX10000 [illegible]) | 1691
[illegible] | 774

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??? ??? ????? ?? ??? ??????? ???? ???. ?? ???? ?? ???? ??? ??????? ??? ? ???? ?????filter.[edit interfaces]

```
[edit interfaces]
user@switch# set interface-name unit logical-unit-number family family-name filter (input |
output) filter-name
```

input ??? ???????? ??? ??? ? ??? ??? ??? ??????. ??? ??????? ??? ?? ??? ??? ???? ??? ????? ??? ????.

output ??? ??? ??????? ?? ? ??? ??? ??????.

?: ??? ??????? ??? ? ??? ??? ??? ? ??? ?? ??? ???? ?? ??????. ??? ??????? lo0??? ??? ? ? ? ???? apply-groups ?? ????. ??? ?? ??? ? ?? ??? ??????? ??? lo0 ?? ??? ???????? ???? ?? ???.

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??? ??????? MPLS ??? ?? ??

in this section

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- ?? ? ?? ?? | 1738
- ???? MPLS ??? ?? ?? | 1738

?? ??????? ????? ??? ??????? ?? ??? ????? ???? ???? ??? ??? ?? ???? ??? ?? ??? ? ????. ??? ??????? ? ??? ??? ???? ???? ?? ?? ???? ??????????. QFX5100, QFX5110, QFX5200 ? QFX5210 ???? ??? mpls? ? ? ??? ?????(lo0)?? ??? ??? ???? ???? ??? ? ????. ??? ??? ??? ??? ?? CPU? ??? ????? ??? ????. ??? ? ?? ??? *??*??(??????? ???? ??)??? ??? ? ????. Junos OS ??? 19.2R1?? QFX5100, QFX5110, QFX5200 ? QFX5210 ???? ??? ??? ???(LSR)? ?? ??? ??????? MPLS ??? ??? ??? ? ????.

MPLS □□□ □□□ □□□ □ □□□ □□ □□□ □□(*□□, □□ □□ □□*)□ □□□ □□□ □□□ □□□ □□ □□□□ □□ *□□□*□□□□. □□□ □□□□□□ □□ □ □□□□ □□□ □□ `family mpls` TTL(Time to Live) □□ □□□ □□□□□ □□□□ □□ TTL □□ 1(`ttl=1`)□ □□□□ □□□. TTL□ 8□□ (IPv4) □□ □□□, IP □□□ □□□ □□ □□□□□□ □□ □□□ □□□□□. □□ , exp, □□□ 4, □□□ 4 `destination portsource port`□□ □□ MPLS □□□□ `label`□□□ □□□□ □ □□□□.

□□□ □□□□□□ MPLS □□□ □□□ □□□ □□□ □□

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- □□□ □□ □□□□□□ □□□ □□□ □□□□□.
- □□ □□□ □□ □□□ □□□ □□□□ □ □□ □□□□ □□□□□. □□ □□ traceroute□ □□□□ □□ TCP □□ UDP□ □□□□ □□□□ □□□□□ □□□□ □ □□□□.

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- □□□ □□□ □□□ *□□*□□□□□ □□□ □ □□□□
- MPLS □□ `label`, `exp`, `ttl=1` □□□ 4 □□ `tcp` □ `udp` □□ □□□ □□□□□.
- , `discard`, □□ `count` □ `accept`□□□□□.
- TLL □□□□ □□□□□□ □□ `family mpls` □ □□□□□ □□□□ `ttl=1` □□□.
- □□□ □□□□□□ □□□ □□□ IPv6 □□□ □□ □□(□□ □□□□)□□ □□□□ □ □□□□.
- □ □ □□□ MPLS □□□□ □□ □□□□ □□□ □□□ □ □□□□.
- TCP □□ UDP □□ □□□ □□ □□ □□□ □□□ □ □□□□.
- 255□□ □□□ □□□ □□□□□.

□□□□ MPLS □□□ □□ □□

□ 122: □□□□ □□

□□□	□□□
QFX5100 / QFX5110 / QFX5200 / QFX5210	Junos OS 19.2R1□□ MPLS □□□ □□□ `lo0` □□□□□. □□ □□□ □ □, `ttl=1` □□□ `family mpls`□□□□□.

표 122: 릴리스 정보 *(Continued)*

플랫폼	설명
MX 시리즈	또한 lo0MPLS 인터페이스 주소입니다. fxp0 MPLS에 대한 IP 주소 주소입니다.
PTX 시리즈	또한 lo0MPLS 인터페이스 주소입니다.

릴리스 정보

이 섹션에는 이 릴리스에 대한 새로운 기능 및 변경 사항이 포함되어 있습니다. Feature Explorer 를 사용하여 특정 릴리스 및 플랫폼 정보를 확인하십시오.

release heading in release-history	desc heading in release-history
19.2R1	Junos OS 릴리스 19.2R1에서 QFX5100, QFX5110, QFX5200 및 QFX5210 스위치 라우터 또는 레이어(LSR)에 대 한 지원 추가되었습니다 MPLS 인터페이스 주소 및 루프백 주소.

이해하기 MPLS 인터페이스 주소 및 루프백 주소

in this section

- MPLS 인터페이스 주소 개요 | **1740**
- MPLS 구성하기 MPLS 인터페이스 주소 예제 | **1740**
- 인터페이스 구성하기 MPLS 인터페이스 주소 예제 | **1740**
- LSP에 대한 인터페이스 주소 | **1741**

일반 인터페이스 MPLS 인터페이스 주소를 사용합니다. MPLS 인터페이스 주소는 각 인터페이스 주소 MPLS 인터페이스 주소 대한 고유한 주소입니다. 또 MPLS 인터페이스 주소 대한 인터페이스 주소(예, 루프백)에 대 한 주소입니다.

MPLS 인터페이스 주소 및 루프백 주소(또 인터페이스 주소)는 인터페이스 주소 대한 인터페이스 주소입니다.

참: 또 구성된 MPLS 인터페이스 주소 및 루프백. 또 MPLS 인터페이스 주소 주소입니다.

MPLS □□□ □□ □□

MPLS □□□ □□ □□ □□:

1. □□ □□, □□ □□ □ □□ □□□ □□ □□(□: EXP □□□ 0 □□ 4□ □□□ MPLS □□□□ □□)□ □□□□□.

```
[edit firewall family mpls]
user@switch# set filter ingress-exp-filter term term-one from exp 0,4
```

2. □ □□□ □□ □□□□ □□□ □□ □□□ □□ □□□ □□□ □□ □□□ □□□ □□□□□(□: EXP □□□ 0 □□ 4□ □□□ MPLS □□ □).

```
[edit firewall family mpls filter ingress-exp-filter term term-one then]
user@switch# set count counter0
user@switch# set accept
```

3. □□□□ □□ □□□ □□ □□□□□□ □□□ □□□□□.

MPLS □□□□□□ MPLS □□□ □□ □□

MPLS □□□ □□□□ □□ □□□ □□□□□□ MPLS □□□ □□□ □□□□□(□□ □□□□ □ [edit interfaces *interface-name* unit *unit-number*] □□family mpls):

□: □□□□□□ □□□□ MPLS □□□ □□□□□ □□□□ □□□ □□□ □□□ □ □□□□.

1. □□□ □□□ MPLS □□□□□□ □□□□□(□: □□□□□ xe-0/0/5□ □□□ □□ □□).

```
[edit interfaces]
user@switch# set xe-0/0/5 unit 0 family mpls filter input ingress-exp-filter
```

2. □□□ □□□□ □□□ □□□□□.commit

```
[edit interfaces]
user@switch# commit
commit complete
```

□□□ □□□□□□ MPLS □□□ □□ □□

□□□ □□□□□(lo0)□ MPLS □□□ □□□ □□□□□:

1. □□ *packet-format-match* □□□ □□□□ □□ □□□ □□□□□. □ □□□ □□□ □□□ PFE□ □□ □□□□ □□□.

2. □ "MPLS □□□ □□ □□" □□□ 1740□□□ □□ □□□ □□ □□ □□ □ □□□ □□□□□. TTL □□ □□□ □□□□□ (ttl=1)□ □□□□ □□□. □ □ , , □□□ 4, □ □□ labelexp□□ MPLS □□□□ □□□ □□□□ □ □□□□destination port.source port
3. □□□ □□□□□□ □□□ □□ □□□ □□□□□.

```
[edit interfaces]
user@switch# set lo0 unit 0 family mpls filter input ingress-exp-filter
```

4. □□□ □□□□ □□□ □□□□□.commit

```
[edit interfaces]
user@switch# commit
commit complete
```

□□□ □□ □□□□□.

```
set groups lo_mpls_filter interfaces lo0 unit 0 family mpls filter input mpls_lo
set groups lo_mpls_filter firewall family mpls filter mpls_lo term mpls_lo_term from ttl 1
set groups lo_mpls_filter firewall family mpls filter mpls_lo term mpls_lo_term from ip-version ipv4
protocol udp source-port 10
set groups lo_mpls_filter firewall family mpls filter mpls_lo term mpls_lo_term from ip-version ipv4
protocol udp destination-port 11
set groups lo_mpls_filter firewall family mpls filter mpls_lo term mpls_lo_term then count c1
set groups lo_mpls_filter firewall family mpls filter mpls_lo term mpls_lo_term then accept
```

LSP□ □□ □□□ □□

Junos OS 13.2X51-D15□□ MPLS □□□ □□□□ □□□□ 2□ □□□ □□ 3□ □□□□ □□ □ □□□□. MPLS LSP □□□□ □□□□ □□ LSP□ □□ □□□□ □□□□ □□ □□□ □ □□□□. □□□□ LSP□ □□ □□□□ □□□□ □□ □□□ □□□ □□□ □□□□ □□□ □□ □ □□□ □□□. LSP □ □□□ □□ LSP, DiffServ □□ □□□ □□□□□□□ □□□ LSP □ □□ □□□ LSP□□ □□□□□. □ □□ □□□ LSP□ □□ □□ □□□□ □□□ □ □□ □□. □□ LSP□ □□, □ LSP □□□□ LSP□ □□□□ □□ □□□□ □□□□□. □□□□ □□□ □□□ LSP□ □□□□ □□□□ □□□ □□□ □□□ □□□□ □ □ □□□ □□□□□.

□□□□ □□□□□ LSP □ DiffServ □□ □□□ □□□□□ LSP □□□□ □□□□□. □□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□ □□ □□□□ □□ □□□ □□□ □ □□□□. □□□□ EXP □□□ □□□□ □□□ □□□ □□□□□.

□□ □□□□ family any LSP □□□□ □□□□□. family any □□□ □□□□ LSP□ □□□□ □□□□ □□□□ □□□ □□□□□. □ □□□□ □□ □□□□□ □□□ □ □□□□. IPv6, MPLS □. □□ □□□ □□ □□□ □□□□ □□□□□ □□ LSP□ □□ □□□ □□□□ □□□□□ □ □□□ □□□□.

MPLS LSP □□□□ □□□ □ □□□ □□ □□ □□□ □□ □□□ □□□.

- LSP □□□□ □□ LSP□ □□□□ □□□□□.

- LSP □□□□ □□□□□ □□ □□□□ □□□□□. □□□□□ □□ □□ □□□□ □□□□.
- LSP □□□□ □□ □□□□ □□ □□□□□.
- □□□ □□□□ □□□ □□□(□: ping □□□)□ □□ □□□□ □□□ □□□ □□□ □□□ □□□□. □□□ □□□ □□□□ □□□□ □ □□□□.

□□□□□ MPLS □□□ □□ □ □□□ □□

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- LSP□ □□ □□□ □□ | **1744**
- □: LSP □□□ □□ | **1746**
- □□ □□□ □□ | **1747**
- MPLS □□□ □□□ IP □□□ □□ □□ DSCP □ EXP □ □□ | **1750**

□□□ □□□ MPLS □□□□ □□ EXP □□□ □□□□ □□□ □□□□□ MPLS □□□ □□□ □□□ □ □□□□. MPLS LSP□ □□ □□□□ □□□ □□ □□□□.

□□ □□□□□ MPLS □□□ □□ □ □□□□ □□ □□□□□.

MPLS □□□ □□ □□

□□□ □□□ MPLS □□□□ □□ EXP □□□ □□□□ □□□ □□□□□ MPLS □□□ □□□ □□□ □ □□□□. □□ □□ □ □□□ □□ □□□□□□ □□□ □ □□□□. □□ MPLS □□□ □□ □□□□ □□□□ □□□ □□□ □□□□□□ □□□□ □□(□, □□ □□)□ □ □□□□.

□□ □□□□ MPLS □□ [edit firewall family mpls filter *filter-name* term *term-name* from] □ □□ □□□ □□ □□ □□ □□□ □□ □ □ □□□□.

- exp
- exp-except

□□□ □□□ 0□□ 7 □□□ EXP □□□ □□□ □ □□□□. □□□ □□ □□ □□□ □□□ □ □□□□.

- □□ EXP □□ - □: exp 3;
- □□ EXP □□ - □: exp 0, 4;

- EXP □□ □□ - □: exp [0-5];

□□ □□□ □□□□ □□□(□, □□ □□ from □□ □□ action □□□□ then □□ count □□ □□) □□□ □□□ □□□□□□ □□□□ □□ MPLS □□□ □ □□□□.

□□ □□ □□□□ □□ □□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* then] □ □□□ □□□ □ □□□□.

- count
- accept
- discard
- next
- policer

□□□ □□□ □□□□ □□□ □□ □□□ □□□ □□□ □□, □□□ □□ □ □□□ □□□ □□□ □□□□ □□□□□□. □□□□□ □□ □□□ □□ □□□ □□□ □□□ □ □□□□ Junos OS □□□□ □□□□□ □□□□□ □ □□□ □□□□□ Junos OS □□□ □□□□□ □□□□□□ □□□□□□.

□: MPLS □□□ □□ □□

□□ □□ MPLS □□□ □□□ □□□ □□ □□□ □□□□□□ □□□□ □□□ □□□□□. □ □□□ EXP □□□ 0 □□ 4□ □□□ MPLS □□□ □□□□□ □□ □□□.

□□□ MPLS □□□ □□□ □□ □□□ □□□□□.

```
[edit firewall]
family mpls {
    filter expf {
        term expt0 {
            from {
                exp 0,4;
            }
            then {
                count counter0;
                accept;
            }
        }
    }
}
```

□□□ □□□□□□□ MPLS □□□ □□□ □□□□ □□□ □□□□□.

```
[edit interfaces]
so-0/0/0 {
    mtu 4474;
    encapsulation ppp;
    sonet-options {
        fcs 32;
    }
    unit 0 {
        point-to-point;
        family mpls {
            filter {
                input expf;
                output expf;
            }
        }
    }
}
```

MPLS □□□ □□□ □□□□□□□ □□ □ □□□ □□□□□(□□ □□□ input □ output □ □□).

LSP□ □□ □□□ □□

MPLS LSP □□□□ □□□□ □□ LSP□ □□ □□□□ □□□□ □□ □□□ □ □□□□. □□□□ LSP□ □□ □□□□ □□□□ □□ □□□ □□□ □□□ □□□ □ □□□ □□ □ □□□ □□□. LSP □□□□ □□ LSP, DiffServ □□ □□□ □□□□□□□ □□□ LSP □ □□ □□□ LSP□□ □□□□□. □ □□ □□□ LSP□ □□ □□ □□□□ □□□ □ □□□□. □□ LSP□ □□, □ LSP □□□□ LSP□ □□□□ □□ □□□□ □□□□□. □□□□ □□□ □□□ LSP□ □□□□ □□□□ □□□ □□□ □□□ □□□□ □□ □□□ □□□□□.

□: PTX10003 □□□□ □□ LSP□ □□□□□.

□□□□ □□□□□ LSP □ DiffServ □□ □□□ □□□□□ LSP □□□□ □□□□□. □□□ □□ □□ □□□ □□□ □□□□ □ □□□ □□□ □□ □□□□ □□ □□□ □□□ □ □□□□. □□□□ EXP □□□ □□□□ □□□ □□□ □□□□□.

□□ □□□□ family any LSP □□□□ □□□□□. family any □□□ □□□□ LSP□ □□□□ □□□□ □□□□ □□□ □□□□□. □ □□□□ □□ □□□□□ □□□ □ □□□□. IPv6, MPLS □. □□ □□□ □□ □□□ □□□□ □□□□□ □□ LSP□ □□ □□□ □□□□ □□□□□ □ □□□ □□□□.

□□ □□□ □□□□ □□□□ □□ □□□ □□□ □ □□□□. □□□ LSP □□□□ □□ □□□□ □□ □□□□□.

- forwarding-class
- packet-length

- interface
- interface-set

LSP□□ □□□□ □□□□□□ □□ □□□ □□□ □□□ □□ LSP □□□ □□□□□ □□□. □□□ □□ □□□ □□ □□□ □□□ □□□ □□, □□□ □□ □ □□□ □ □□ □□□ □□□□ □□□□□□.

LSP□ □□ □□□□ □□□□□ □□ □□□ □□□□ filter □□□ □□□□□.policing

```
policing {
    filter filter-name;
}
```

□□ □□ □□□□ policing □□□□ □□□□ □ □□□□.

- [edit protocols mpls label-switched-path *lsp-name*]
- [edit protocols mpls static-label-switched-path *lsp-name*]
- [edit logical-systems *logical-system-name* protocols mpls label-switched-path *lsp-name*]
- [edit logical-systems *logical-system-name* protocols mpls static-label-switched-path *lsp-name*]

LSP □□□ □□ □□

MPLS LSP □□□□ □□□ □ □□□ □□ □□ □□□ □□ □□□ □□□.

- LSP □□□□ □□ LSP□ □□□□ □□□□□.
- LSP □□□□ □□□□□ □□ □□□□ □□□□□. □□□□□ □□ □□ □□□□ □□□□.
- LSP □□□□ □□□□□□ □□□□□□□ □□□□ □□□□.
- LSP □□□□ □□ □□□□ □□ □□□□□.
- □□□ □□□□ □□□ □□□(□: ping □□□)□ □□ □□□□ □□□ □□□ □□□ □□□ □□□□. □□□ □□□ □□□□ □□□□ □ □□□□.
- LSP □□□□ □□ T □□□ □□□□ □□□ □□□□ II ASIC(Application-Specific Integrated Circuit)□ □□ M □□□ □□□□□ □□ □□□.
- LSP □□□□ point-to-multipoint LSP□ □□ □□□□ □□□□.

□: Junos OS □□□ 12.2R2□□ T □□□ □□□□□□□ □□ LSP□ □□ LSP □□□□ □□□□ □□ □□ □□□□ □□□ □□□□ □□□ □ □□□□. □□ □□□□ □□ □□□□ [edit firewall policer *policer-name*]*logical-interface-policer* □□ □□□□ □□□.

?: LSP ??? ??

?? ?? LSP? ?? ??? ??? ???? ??? ?????.

```
[edit firewall]
policer police-ct1 {
    if-exceeding {
        bandwidth-limit 50m;
        burst-size-limit 1500;
    }
    then {
        discard;
    }
}
policer police-ct0 {
    if-exceeding {
        bandwidth-limit 200m;
        burst-size-limit 1500;
    }
    then {
        discard;
    }
}
family any {
    filter bar {
        term discard-ct0 {
            then {
                policer police-ct0;
                accept;
            }
        }
    }
    term discard-ct1 {
        then {
            policer police-ct1;
            accept;
        }
    }
}
```

?? ??? ??

LSP? ?? ????? ?? ????? ????? ?? ??? ??? ??? ??? ? ?????. ??? ??? ??? ?????? LSP? ?? ????? ????? ????? ?? ? ???, MPLS ?????? ?? ATM ????? ?? ? ?? ??????? ??????. LSP? ????? ????? ?? ??? ??? DiffServ ?? ??? ????? ? ??? ???????.

??? ?????? LSP? ?? ????? ????? ?? EXP ??? ????? MPLS ????? ?? ??? ??? ? ?????. ??? ??? ??? ?? ??? ????? ????? ????? ?????? ????? ?????. ????? ??? ??? ??? ?? ?? ??? ????? ?? ? ?????.

LSP? ?? ??? ?????? ??? ????? ??? ? ?? ??? ?? ?????? ??????. ??? LSP? ??? ??? ?? ????? ????? ??????? ?? ? ?? ?????? ? ?? ????? LSP? ????? ??? ????? ?? ? ??? ?? ??? ??? ? ?????.

??? ??? ????? ????? ????? LSP? ??????? LSP ????? ??? ? ?????. ??? ??? ??? ?? ?? ?? ?? ?? ??? ????? ?? ??? ???. LSP?? ??? ?? ??? ??? ??? ??? ??? ?? ??? ? ??? ??? ? ?????. ??? LSP? ????? ?????? ?? ????? ????? ?? ?? ?????.

LSP? ?? ?? ????? ????? ????? ??? ?? LSP? ????? ??????. ??? ?? LSP?? ?? ????? ?????? ? ?????.

> ?: DiffServ ?? ??? ?????? LSP? ?? ?? ????? ??? ? GRES? ????? ????.

> ?: CCC ????? ????? LSP? ?? ?? ????? ??? ? ?????.

?? ?????? LSP? ?? ?? ????? ????? ??? ??????.

LSP? ?? ?? ??? ??

?? LSP(DiffServ ?? ??? ?????? LSP ?? ?????? LSP? ??)? ?? ?? ????? ?????? ?? ?? ??? ?? `class all` *policer-action* ?? ??????auto-policing.`class ct0` *policer-action*

```
auto-policing {
    class all policer-action;
    class ct0 policer-action;
}
```

?? ?? ????? ? ????? ????? ? ?????:

- `[edit protocols mpls]`
- `[edit logical-systems` *logical-system-name* `protocols mpls]`

?? ????? ?? ??? ?? ??? ??? ??? ? ?????.

- drop- ?? ??? ??????.

- loss-priority-high- ?? ?? ????(PLP)? ???? ??????.
- loss-priority-low- PLP? ???? ??????.

??? ???? ???? ?? ??? LSP? ??? ? ????. ?? ??? ???? ?? ??? ???? ?? ????.

LSP? ?? ?? ???? LSP? ?? ??? ???? ?? ???? ???? ??????. ?? ???? ?? ???? bandwidth LSP? [edit protocols mpls label-switched-path *lsp-path-name*] ???? ??????. ?????? ?? ???? ??????, LSP? ???? ???? ????, ???? ??? ?? ?? ??, ?? ???? ?? LSP? ???? ???? ????. LSP? ???? ???? ???? ?????? ?????? ???? ?????? clear mpls lsp .

?: ?? ?????? ?? MLPPP(Multilink Point-to-Point Protocol) ??????? ???? LSP? ???? ?? ??? ? ??? ? ???? ? ????.

DiffServ ?? ??? ?????? LSP? ?? ?? ??? ??

DiffServ ?? ??? ?????? LSP ? ?? ??? LSP? ?? ?? ???? ?????? ??? ?? ???? ??????.auto-policing

```
auto-policing {
    class all policer-action;
    class ctnumber policer-action;
}
```

?? ?? ???? ? ???? ???? ? ????:

- [edit protocols mpls]
- [edit logical-systems *logical-system-name* protocols mpls]

?? ??? ??? ??? class all *policer-action* ?? ??? ?? class ct*number policer-action* ???? ??????(? ???? ?? ?? ?? ? ??? ??? ? ??). ???? ?? *policer-action* ? ? ?? ?? ??? ? ??????? "LSP? ?? ?? ??? ??" ??? 1747. ?? ??? ??? ? ? ??? ???? ?? ????.

?: ??????? ?????? ?? MLPPP ??????? ???? LSP? ???? ?? ???? ??? ? ????.

Point-to-Multipoint LSP? ?? ?? ??? ??

?? ?? class ct0 *policer-action* ??? ?? ?? ???? auto-policing point-to-multipoint LSP? class all *policer-action* ?? ?? ???? ??? ? ????. ?? ???-?-?????? LSP??? auto-policing ???? ???? ???(?? ???-?-?????? LSP? ?? ??? ??? ?? ???-?-?????? LSP ?? ??). point-to-multipoint LSP? ?? subLSP? ?? ??? ???? ????. ???-?-?????? ?? ???? ???-?-?????? LSP? ?? ???? ??????. ?? ?? ???? point-to-multipoint ???? ??? ??? ???? ?? ?? ?? VRF

□□□□□□□ □□□□□□. Junos Trio □□□ MPLS Point-to-Multipoint LSP□ □□ □□ □□□□□ □□ □□□□□ Junos OS □□□ 11.1R2, 11.2R2 □ 11.4□□ □□□□□□.

Point-to-Multipoint LSP□ □□ □□□ □□□□ □□ LSP□ □□ □□□ □□□ □□□□□□. □□□ □□□ "LSP□ □□ □□ □□□ □□" □□□ 1747□ □□□□□□□.

LSP□□ □□ □□□ □□□□

□□ □□□□□ □□□□□□ □□□ □□ □□□ □□□□□ □□ LSP□ □□□ □□□□□. □□ □□□□□ □□□□□ □□□□□ □□ LSP□□ □□ □□□□□ □□□□□□□□ □□□ policing □□ □□□□□ □□□□□□.no-auto-policing

```
policing no-auto-policing;
```

□□ □□ □□□□□ □ □□□□□ □□□□□ □ □□□□□:

- [edit protocols mpls label-switched-path *lsp-name*]
- [edit logical-systems *logical-system-name* protocols mpls label-switched-path *lsp-name*]

□: LSP□ □□ □□ □□□ □□

□□ □□□ LSP□ □□ □□ □□□□□ □□□□□ □□□ □□ ct0, ct1, ct2□ ct3□ □□ □□ □□ □□□ □□□□□□.

```
[edit protocols mpls]
diffserv-te {
    bandwidth-model extended-mam;
}
auto-policing {
    class ct1 loss-priority-low;
    class ct0 loss-priority-high;
    class ct2 drop;
    class ct3 loss-priority-low;
}
traffic-engineering bgp-igp;
label-switched-path sample-lsp {
    to 3.3.3.3;
    bandwidth {
        ct0 11;
        ct1 1;
        ct2 1;
        ct3 1;
    }
```

```
}
interface fxp0.0 {
    disable;
}
interface t1-0/5/3.0;
interface t1-0/5/4.0;
```

MPLS ??? ??? IP ??? ?? ?? DSCP ? EXP ? ??

?? ??? ??? ??? ?? ?? MPLS ?? ?? IPv4 ? IPv6 ??? DSCP(DiffServ Code Point) ??? 0?? ????? ??? ? ???, ??? ???? ???? ??? ?? ?? ???? ?? MPLS EXP ??? ?? ??? ? ????. MPLS ??? ??? ??? ?? ??? ??? ???? ?? ??? ? ????.

MPLS ??? ?? ? ??? ??

in this section

- MPLS ??? ?? ?? | **1750**
- ?: MPLS ??? ?? ?? | **1751**
- LSP? ?? ??? ?? | **1752**

??? ??? MPLS ???? ?? EXP ??? ???? ??? ????? MPLS ??? ??? ??? ? ????. MPLS LSP? ?? ???? ??? ?? ????.

?? ????? MPLS ??? ?? ? ???? ?? ?????.

MPLS ??? ?? ??

??? ??? MPLS ???? ?? EXP ??? ???? ??? ????? MPLS ??? ??? ??? ? ????. ?? ?? ? ??? ?? ?? ??? ?? ?? ???? ??? ? ????. ?? MPLS ??? ?? ???? ???? ??? ??? ??????? ???? ??(?, ?? ??)? ? ????. ??? ???????? MPLS ??? ??? ??? ? ????.

?? ???? MPLS ??? [edit firewall family mpls filter *filter-name* term *term-name* from] ?? ??? ?? ?? ??? ??? ? ????.

- exp

- label

□□□ exp □□ □□□ 0□□ 7 □□□ EXP □□□ □□□ □ □□□□. □□□ □□ □□ □□□ □□□ □ □□□□.

- □□ EXP □□ - □: exp 3;
- □□ EXP □□ - □: exp 0, 4;
- EXP □□ □□ - □: exp [0-5];

label □□ □□□ 0□□ 1048575□□□ □ □□□ □□□ □ □□□□.

□□ □□□ □□□□ □□□(□, □□ □□ from □□ □□ action □□□□ then □□ count □□ □□) □□□ □□□ □□□□□□ □□□□ □□ MPLS □□□ □ □□□□.

□□ □□ □□□□ □□ □□ □□□ [edit firewall family mpls filter *filter-name* term *term-name* then] □ □□□ □□□ □ □□□□.

- accept
- count
- discard
- policer
- three-color-policer

□: MPLS □□□ □□ □□

□□ □□ MPLS □□□ □□□ □□□ □□ □□□ □□□□□□ □□□□ □□□ □□□□□. □ □□□ EXP □□□ 0 □□ 4□ □□□ MPLS □□□ □□□□□ □□ □□□.

□□□ MPLS □□□ □□□ □□ □□□ □□□□□.

```
[edit firewall]
family mpls {
    filter expf {
        term expt0 {
            from {
                exp 0,4;
            }
            then {
                count counter0;
                accept;
            }
        }
```

```
    }
}
```

LSP? ?? ??? ??

MPLS LSP ????? ????? ?? LSP? ?? ????? ????? ?? ??? ? ?????. ????? LSP? ?? ????? ????? ?? ??? ??? ??? ??? ? ??? ?? ? ??? ???. LSP ????? ?? LSP, DiffServ ?? ??? ????????? ??? LSP ? ?? ??? LSP?? ??????. ? ?? ??? LSP? ?? ?? ????? ??? ? ?????. ?? LSP? ??, ? LSP ????? LSP? ????? ?? ????? ??????. ????? ??? ??? LSP? ????? ???? ??? ??? ??? ????? ?? ??? ??????.

???? ?????? LSP ? DiffServ ?? ??? ?????? LSP ????? ??????. ???? ?? ?? ??? ??? ????? ? ??? ??? ?? ????? ?? ??? ??? ? ?????. ????? EXP ???? ????? ???? ???? ??????.

?? ????? `family any` LSP ???? ??????. `family any` ??? ???? LSP? ????? ????? ????? ??? ??????. ? ????? ?? ?????? ??? ? ?????. IPv6, MPLS ?. ?? ??? ?? ??? ????? ?????? ?? LSP? ?? ??? ????? ?????? ? ??? ?????.

LSP ??? ?? ??

MPLS LSP ????? ??? ? ??? ?? ?? ??? ?? ??? ???.

- LSP ????? ?? LSP? ????? ??????.
- LSP ????? ?????? ?? ????? ??????. ?????? ?? ?? ????? ?????.
- LSP ????? ??????? ???????? ????? ?????.
- LSP ????? ?? ????? ?? ??????.
- ??? ????? ??? ???(?: ping ???)? ?? ????? ??? ??? ??? ??? ?????. ???? ??? ????? ????? ? ?????.
-

?? ??

> ??? ?? | **2066**

??? ??? ?????? ?????? ?? ??

???? ???? ?? ??? ??? ? ????? ??? ??? ???????. ?????? ????? ?? ??? ?????? ?????? ?????. ?? ??, ? ?? ??? `source-port ssh`????? ??, ?????? TCP?? ????? ?? ??? ????? ?????. ? ?? ????? *???* IP ?? ?? ?? 2???? ??? (10??) ?? 22 ?? ?? ??? ????? ??? ??????. TCP ????? ??? ?????? ??? ?? ??? ?????? `ip-protocol tcp` .

□□ □□ □□□ □□, □□□ □□□ □□□□ □□ □□□ □□□□□ □□□□ □□□.

- destination-port- □□□□ tcp □□ □□□□□ udp□□□□□.
- icmp-code- □□□□ icmp □ icmp-type□ □□□□□.
- icmp-type- □□□□ icmp □□ □□□□□ icmp6□□□□□.
- source-port- □□□□ tcp □□ □□□□□ udp□□□□□.
- tcp-flags- □□□□□ tcp□□□□□.

□□ □□

□□□ □□ □□ □□ □□ | 804

□□□ □□ □□ | 1729

□□□ □ □□□□ □□□ □□ □□□ □□ □□ □□ □□

□□□ □□□ □□ □□ □□□ □□□ □□□ □□□□□. □ □□ □□□□ □□□ □□ □□□ □□□ □□□ □□□ □□ □□ □□□ □□□□ □□ □□□ □□ □□□□□.

□□□□(□□□ 2) □□□□□ □□□ □□□□(□□□ 3) □□□□□ □□ □□□ □□ □□□ □□□ □□□ □□□ □□□ □□□□ □□□□□(□ □□□ □□□□ □ □□□ □ □□ □□□□□ □□).

□□□ □□:

1. □□ □□ □□
2. □□ VLAN □□
3. □□ VLAN □□
4. □□ □□ □□

□□□□ □□:

1. □□ □□ □□□ □□
2. □□ VLAN □□□ □□(□□□ 2 CoS)
3. □□ □□□ □□□ □□(□□□ 3 CoS)
4. □□ □□□ □□□ □□
5. □□ VLAN □□□ □□

6. ?? ?? ??

?: MAC ??? ??? ???? ?? ????? ???? ?? ??? ?? ??? ??? MAC ??? ?????.

?? ??

??? ?? ??(QFX ???) | 1640
??? ??? ?? ??? ???? ?? ?? | 732
??? ?? ?? | 1729

?? ?? ?? ??

in this section

- ?? ?? ???? ?? | 1754

IPv4 ?? IPv6 ???? ??, ?? ??? ????? ?? ??? ??? ???? ??????? ??? ??? ?? ??? ??? ? ????. ? ??? ?? ?? ??? (FBF)??? ?? ?? ?? ???(PBR)???? ???.

???? ?? ???? ???? ?? FBF? ???? ??? ?? ?? ?? ????? ?? ?? ??? ???? ???? ? ????. ?? FBF? ???? ?? ??? ???? ??? ? ????. ?? ??, ?? ??? ?? ?? ???? 40???? ??? ??? ?? ????? ? ? ????.

FBF? ????? ??? ?? ?? ?? ? ??? ??? ?? ??? ??? ?? ??? ????? ?????.

?: ??? ?? ??? ????? ??? ???? ?? 128?? ?? ?? ??? ??? ? ????.
(QFX5100, QFX5110 QFX5200 ???) Junos OS ??? 19.1R1?? ?? ?? ???? IPv6 ???????? ? ????(?? ??? ??).

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- ?? ??? ????? ????? ???? ??? ?? ???? ? ? ??? ? ????.

?? ?? ?

□□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□. Feature Explorer □ □□□□ □□□□□ □□□ □□□□□ □□□□□.

release heading in release-history	desc heading in release-history
19.1R1	(QFX5100, QFX5110 QFX5200 □□□) Junos OS □□□ 19.1R1□□ □□ □□ □□□□ IPv6 □□□□□□□ □□□□ □(□□ □□□ □□).

□□ □□

□□□ □□ □□(QFX □□□) | 1640

□□□ □□ □□ □□ □ □□(EX4100, EX4100-F, EX4400, EX4600, EX4650, QFX5100, QFX5110, QFX5120, QFX5200, QFX5210) | 1653

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□ □□□□ EX □□□ □□□ □□ QFX10000□□ □□ □□ □□□□ □□□□ □□□ □□□□□. □□□ □□□ □□□□ □□□□ □□□□ □□ □□ □□□ □□□ □□ □□□□□□ □□ □□ □□□ □□□ □ □□□□.

□□ □□

□ □□ Junos OS □□□ 9.4 □□□ □□□□ EX □□□ □□□□ Junos OS □□□ 15.1X53-D10 □□□ □□□□ QFX10000 □□□□ □□ □□□□□.

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□ □□□□ □□ □□□□□□ □□□ □□□□ □□□ □□ □□(192.168.0.1)□ □□ □ □□□□□□ □□□□ □□ □□□□□□ □□□ □□□□ □□□□ □□□□□ □□□ □□□ □□□□. □□□□ □□□ □□□□ □□ □□□□□ □□□ □□ □□ □□□□□□ □□□ □□□□ □□ □□□ □□□□□ □□□□□□.

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CLI ?? ??

??????? ? ??? ?????? ?? ??? ??? ??? ????, ? ??? ????, ??? ?? ??? ?? ??? ??????. ?? ?? ??? ???? ?? ???? CLI? ??????? [edit].

```
[edit]
                    set interfaces xe-0/0/0 unit 0 family inet address
10.1.0.1/24
                    set interfaces xe-0/0/3 unit 0 family inet address
10.1.3.1/24
                    set firewall family inet filter f1 term t1 from source-address
10.1.0.50/32
                    set firewall family inet filter f1 term t1 from protocol
tcp
                    set interfaces xe-0/0/0 unit 0 family inet filter input f1
                    set routing-instances vrf01 instance-type virtual-router
                    set routing-instances vrf01 interface xe-0/0/3.0
                    set routing-instances vrf01 routing-options static route 192.168.0.1/24
next-hop 10.1.3.254
                    set firewall family inet filter f1 term t1 then routing-instance
vrf01
```

□□

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□□ □□ □□□ □□□□□ □□□ □□□□□.

1. □□□□□□ □□□ □□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@switch# set xe-0/0/0 unit 0 family inet address 10.1.0.1/24
```

2. □□ □□□□□ □□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@switch# set xe-0/0/3 unit 0 family inet address 10.1.3.1/24
```

3. □□□□ □□□ □□□□□□ □□□ □□□ □□□□ □□□ □□□□ □□□ □□□ □□□□. □□ TCP □□□ □□□□□ □□□ □□□□□.

```
[edit firewall]
user@switch# set family inet filter f1 term t1 from source-address 10.1.0.50/32
user@switch# set firewall family inet filter f1 term t1 from protocol
tcp
```

4. □□ □□□□□□ □□□ □□□□ □□□□□□ □□□ □□□□ □□ □□□ □□□□□ □□□□□.

```
[edit interfaces]
user@switch# set xe-0/0/0 unit 0 family inet filter input f1
```

5. □□ □□□□ □□□□□.

```
[edit]
user@switch# set routing-instances vrf01 instance-type virtual-router
```

6. □□ □□□□ □□ □□□□□ □□□□ □□□□□□ □□□□□.

```
[edit routing-instances]
user@switch# set vrf01 interface xe-0/0/3.0
```

7. ?? ??? ?????? ?? ??? ??? ??????.

```
[edit routing-instances]
user@switch# set vrf01 routing-options static route 192.168.0.1/24 next-hop 10.1.3.254
```

8. ??? ?? ???? ????? ??? ??????.

```
[edit firewall]
user@switch# set family inet filter f1 term t1 then routing-instance
vrf01
```

??

?? ??? ??????:

```
user@switch> show configuration
interfaces {
    xe-0/0/0 {
        unit 0 {
            family inet {
                filter {
                    input f1;
                }
                address 10.1.0.1/24;
            }
        }
    }
    xe-0/0/3 {
        unit 0 {
            family inet {
                address 10.1.3.1/24;
            }
        }
    }
}
firewall {
    family inet {
        filter f1 {
            term t1 {
                from {
```

```
                    source-address {
                        10.1.0.50/32;
                    }
                    protocol tcp;
                }
                then {
                    routing-instance vrf01;
                }
            }
        }
    }
}
    routing-instances {
        vrf01 {
            instance-type virtual-router;
            interface xe-0/0/3.0;
            routing-options {
                static {
                    route 192.168.0.1/24 next-hop 10.1.3.254;
                }
            }
        }
    }
```

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?????? ?? ?? ??? ????? ????????? ??????.

□□

1. show interfaces filters □□□ □□□□□.

```
user@switch>                                    show interfaces filters
xe-0/0/0.0
Interface        Admin Link Proto Input Filter         Output Filter
xe-0/0/0.0       up    down inet  fil
```

2. show route forwarding-table □□□ □□□□□.

```
user@switch> show route forwarding-table

Routing table: default.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            user     1 0:12:f2:21:cf:0    ucst   331     4 me0.0
default            perm     0                    rjct    36     3
0.0.0.0/32         perm     0                    dscd    34     1
10.1.0.0/24        ifdn     0                    rslv   613     1 xe-0/0/0.0
10.1.0.0/32        iddn     0 10.1.0.0           recv   611     1 xe-0/0/0.0
10.1.0.1/32        user     0                    rjct    36     3
10.1.0.1/32        intf     0 10.1.0.1           locl   612     2
10.1.0.1/32        iddn     0 10.1.0.1           locl   612     2
10.1.0.255/32      iddn     0 10.1.0.255         bcst   610     1 xe-0/0/0.0
10.1.1.0/26        ifdn     0                    rslv   583     1 vlan.0
10.1.1.0/32        iddn     0 10.1.1.0           recv   581     1 vlan.0
10.1.1.1/32        user     0                    rjct    36     3
10.1.1.1/32        intf     0 10.1.1.1           locl   582     2
10.1.1.1/32        iddn     0 10.1.1.1           locl   582     2
10.1.1.63/32       iddn     0 10.1.1.63          bcst   580     1 vlan.0
255.255.255.255/32 perm     0                    bcst    32     1

Routing table: vrf01.inet
Internet:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   559     2
0.0.0.0/32         perm     0                    dscd   545     1
10.1.3.0/24        ifdn     0                    rslv   617     1 xe-0/0/3.0
10.1.3.0/32        iddn     0 10.1.3.0           recv   615     1 xe-0/0/3.0
10.1.3.1/32        user     0                    rjct   559     2
```

```
192.168.0.1/24     user     0 10.1.3.254          ucst   616     2 xe-0/0/3.0
192.168.0.1/24     user     0 10.1.3.254          ucst   616     2 xe-0/0/3.0
10.1.3.255/32      iddn     0 10.1.3.255          bcst   614     1 xe-0/0/3.0
224.0.0.0/4        perm     0                     mdsc   546     1
224.0.0.1/32       perm     0 224.0.0.1           mcst   529     1
255.255.255.255/32 perm     0                     bcst   543     1

Routing table: default.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct    60     1

Routing table: vrf01.iso
ISO:
Destination        Type RtRef Next hop           Type Index NhRef Netif
default            perm     0                    rjct   600     1
```

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] IP [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] | 1729

[illegible] [illegible] [illegible] [illegible] | 1754

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

GRE [illegible] IPIP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

in this section

- GRE [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1762
- IPIP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1763
- [illegible] [illegible] [illegible] [illegible] | 1765

GRE(Generic Routing Encapsulation) □ IPIP(IP over IP)□ □□ □□□ □□□(□□ □□□)□□ □□□□□ □□ □□□ □□□□ □□ □□□□ □□□ □□□ □□□□□ . □□□□ □□□□ □□□□□□□ □□□ □□□□ □□ □□□□□□□ □□ □□□□□.

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□: EX4600 □ QFX5100 □□□□ □□□ □□□ □□□ □□□ □□□□ □□ 512□□ GRE □□□ □□□□□. □, □□□□ □□ □ □□□□ □ 512□□ GRE □□□ □□□ □ □□□□.

GRE □□□ □□□ □□□ □□ □□ □□

GRE □□□□ □□□□ □□□□□ □□□ □□□ □□□□□ □□□ □□□□□.

1. IPv4 □□□ □□□ □□□□ □□□ □□ □□□ □□□□□(□□ □□).

```
[edit ]
user@switch# set firewall family (QFX) inet filter filter-name term (Application Aware Access List)
term-name from source-address address
```

GRE □□□ □□ □□□ IPv4□□ □□□ □ family inet □□□□ IPv4 □□□ □□□□ □□□. □□ □□□ □□□□ □□ □□□□ GRE □□□□ □□□ □□ □□□□□ □□□□ □□□.

□: □□□ □□□ □□□ □□ □□ IP □□□□ □□ □□□ □□□□□ □□ □□□ □□□□ □□□□. □ □□ □□□ □□□ □□□□ □□□□□□ □ □□□ □□ GRE □□□ □□□□ □□□□□.

2. □□□ □□ □□□ □□□□□.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name from destination-
address address
```

□ □□□ □□□ □□□□ GRE □□□ □□□ □□□ □□□ □□□□□□ □□□□ □□□.

□□ □□□□□ □□□ □□□ □□ □□ □□ □□□□□ □ □□□ □□ □□ □□□□ □□□□ □□□.

3. □□□ GRE □□□□ □□□□ □□□□□ □□□□□.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name from protocol gre
```

4. ??? GRE ???? ???? ????? ?????.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name then decapsulate gre
```

???? ??? ??? ?? ???? ?? ??? ?? ??? ???(inet0)? ???? ??? ??? ??? ?????. ???? ?? ??? ????? ???? ?? ? ??? ??? ????? ??? ?? ??? ?????.

5. ?? ??? ????? ??? ?????.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name then decapsulate
routing-instance instance-name
```

6. ?? ??? ????? ?? ???? ?????.

```
[edit ]
user@switch# set routing-instances instance-name instance-type virtual-router
```

7. ?? ???? ??? ??????? ?????.

```
[edit ]
user@switch# set routing-instances instance-name interface interface-name
```

IPIP ??? ??? ??? ?? ?? ??

IPIP ???? ???? ???? ?? ??? ?? ??:

1. IPv4 ??? ??? ???? ??? ?? ??? ?????(?? ??).

```
[edit ]
user@switch# set firewall family (QFX) inet filter filter-name term (Application Aware Access List)
term-name from source-address address
```

IPIP ??? ?? ??? IPv4?? ??? ? family inet ???? IPv4 ??? ???? ???. ?? ??? ???? ?? ???? IPIP ???? ??? ? ????? ???? ???.

?: ??? ??? ??? ?? ?? IP ???? ?? ??? ????? ?? ??? ???? ????. ? ?? ??? ??? ???? ??????? ? ??? ?? IPIP ??? ???? ?????.

2. ??? ?? ??? ?????.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name from destination-
address address
```

? ??? ??? ???? IPIP ??? ??? ??? ??? ?????? ???? ???. ?? ????? ??? ??? ?? ?? ?? ????? ? ??? ?? ?? ???? ???? ???.

3. ??? IPIP ???? ???? ????? ?????.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name from protocol ipip
```

4. ??? IPIP ???? ???? ????? ?????.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name then decapsulate ipip
```

???? ??? ??? ?? ???? ?? ??? ?? ??? ???(inet0)? ???? ??? ??? ??? ?????. ???? ?? ??? ????? ???? ?? ? ??? ??? ????? ??? ?? ??? ?????.

5. ?? ??? ????? ??? ?????.

```
[edit ]
user@switch# set firewall family inet filter filter-name term term-name then decapsulate
routing-instance instance-name
```

6. ?? ??? ????? ?? ???? ?????.

```
[edit ]
user@switch# set routing-instances instance-name instance-type virtual-router
```

7. ?? ???? ??? ?????? ?????.

```
[edit ]
user@switch# set routing-instances instance-name interface interface-name
```

??????? ?? ??

??? ???? ???? ???? GRE ?? IPIP ????? ??? ????????? ???? ???. ?? ???? ???? ???. ?? ??,

```
[edit ]
user@switch# set interfaces interface-name unit logical-unit-number family inet filter input filter-name
```

GRE ?? IPIP ??? ?? ??? IPv4?? ??? IPv4 ??????? ??? ???? ? ???? family inet???.

?? ??

> *?? ???? ??? ????*
>
> *?? ???? ??? ??? ??*
>
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??? ???? ????? ??, VLAN ?? ??? 3 ??????? ??? ? ?? ??? ???? EX ??? ????? ??? ??? ??? ??? ?????? ??? ? ? ???.

??

?? ?? ???? ????? ????? ??? ??? ??? ?????? ??????.

```
user@switch>                        show firewall
Filter: egress-vlan-watch-employee
```

```
Counters:
Name                                                Bytes              Packets
counter-employee-web                                    0                    0
Filter: ingress-port-voip-class-limit-tcp-icmp
Counters:
Name                                                Bytes              Packets
icmp-counter                                            0                    0
Policers:
Name                                               Packets
icmp-connection-policer                                 0
tcp-connection-policer                                  0
Filter: ingress-vlan-rogue-block
Filter: ingress-vlan-limit-guest
```

??

??? show firewall ???? ??? ?? ??? ??, ??? ? ???? ??? ?????. ?? ??? ??? ? ???? ?? ?? ???? ???? ??? ??? ?? ??? ?? ?? ?? ??????. ?? ??? ??? ? ???? ?? ?? ??? ??? ?? ??? ???? ??? ?? ?? ?? ??????.

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- ??? ?? ??(CLI ??) | 1567
- ??? ??? ???? ??? ????(CLI ??) | 2080
- ?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | 1578
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EX □□□ □□□□□ □□□ □□ □□□□ □□□□□ □ □□□□.

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□□

□□ □□ □□□ □□□□□.

```
user@switch>                          show firewall
Filter: egress-vlan-watch-employee
Counters:
Name                                                Bytes              Packets
counter-employee-web                                 3348                   27
Filter: ingress-port-voip-class-limit-tcp-icmp
Counters:
Name                                                Bytes              Packets
icmp-counter                                         4100                   49
Policers:
Name                                               Packets
icmp-connection-policer                                  0
tcp-connection-policer                                   0
Filter: ingress-vlan-rogue-block
Filter: ingress-vlan-limit-guest
```

??

??? show firewall ????? ??? ?? ??? ??, ???? ? ????? ??? ??????. ?? ??? ????? ?? ???? ? ?? ?? ????? ?? ?? ?? ? ????.

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??? ??? ????? ?? ? ???? ?? ??????? ???? ?? ???? ??? ?? ?? ???????? ?? ???? ??????.

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?? ?? ???? ??????.

```
user@switch> show firewall filter ingress-vlan-rogue-block
Filter: ingress-vlan-rogue-block
Counters:
Name                                                Bytes              Packets
rogue-counter                                        2308                   20
```

??

??? show firewall filter *filter-name* ??? ???? ??, ???? ???? ?? ????? ?? ? ???? ?, ???? ???? ?? ????? ?? ?? ??????.

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□□

□□ □□ □□□ □□□□□.

```
user@switch>                          show policer tcp-connection-policer
Filter: ingress-port-voip-class-limit-tcp-icmp
Policers:
Name                                                Packets
tcp-connection-policer                                    0
```

□□

□□□ show policer *policer-name* policer-action□ □□□□ □□□ □□□ □□□ □□□□ □□□ □□□ □□ □□ □□□ □□□ □□ □□ □□□□□.

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□□□ □□ □□(CLI □□) | 1567

□□□ □□□ □□□□ □□□ □□□□(CLI □□) | 2080

□: EX □□□ □□□□□ □□, VLAN, □□□ □□□□ □□□ □□ □□□□ | 1578

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□□□ □□ □□□ □□ □□□ TCAM(Ternary Content Addressable Memory) □□□ □□□□ □□□□□ □□ syslogd □□□□ □□□□□.

```
No space available in tcam.
Rules for filter filter-name will not be installed.
```

□□, VLAN □□ □□□ 3 □□□□□□ □□□ □□□ □□□ TCAM □□□□□ □□ □□□ □□□ □□□□ □□ □□ □□ □□□□ □ □□□□ □□□□□. □□□ □□□□ □□□ □□□ □□ □□□ □□ □□ □□□ CLI □□□□ □□□□□.

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1. □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□ □□□□ □□□□□. □ □□ □□ □□ □□□ □□□□.

   ```
   [edit]
   user@switch# delete firewall family ethernet-switching filter ingress-vlan-rogue-block
   user@switch# delete vlans employee-vlan description "filter to block rogue devices on
   employee-vlan"
   user@switch# delete vlans employee-vlan filter input ingress-vlan-rogue-block
   ```

2. □□ □□□ □□□□□.

   ```
   [edit]
   user@switch# commit
   ```

3. □□ □□□ TCAM □□□ □□ □□□□ □□ □ □□ □□□ □ □□ □□□ □□□□□. □ □□ □□ □□ □□□ □□□□.

   ```
   [edit]
   user@switch# set firewall family ethernet-switching filter new-ingress-vlan-rogue-block ...
   ```

4. □ □□□ □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□(□□□)□□□. □ □□ □□ □□ □□□ □□□□.

```
[edit]
user@switch# set vlans employee-vlan description "filter to block rogue devices on employee-
vlan"
user@switch# set vlans employee-vlan filter input new-ingress-vlan-rogue-block
```

5. □□ □□□ □□□□□.

```
[edit]
user@switch# commit
```

□ □□□ □□□ □□□□ □□ □□□□ □□□□□ □□ □□□ □□□□ □□□□:

1. □□ □□□□ □ □□ □□□ □□□ □□□ □□□□□.

```
[edit]
user@switch# set firewall family ethernet-switching filter new-ingress-vlan-rogue-block...
```

2. □□□ □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□□□ □□ □□□ □□□□ □□□□□. □:

```
[edit]
user@switch# set vlans employee-vlan description "smaller filter to block rogue devices on
employee-vlan"
user@switch# set vlans employee-vlan filter input new-ingress-vlan-rogue-block
```

VLAN□ □□□ □□□ □□□ □□□ □□□ □ □□ □□□ VLAN□ □□ □□ □□□ □□□ □□□□ □ □□□ □□ new-ingress-vlan-rogue-block □ □□□□□.

3. □□ □□□ □□□□□.

```
[edit]
user@switch# commit
```

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□□ VLAN □□□ □□ □□□□ 192.168.1.0/24 □□□ □□□ □□□ □□□□ □□□□. □□ □□ □□□ □□□ □□□□ □□□ □□□ □□□□ □□□□ □ □□□□. □□□ □□□□ □□□ □□ □□ □□□ □□ □□□□ □□□□ □□□□ □□□□.

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1. □□(□□□ 2) □□
2. VLAN □□
3. □□□(□□□ 3) □□

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1. □□□(□□□ 3) □□
2. VLAN □□
3. □□(□□□ 2) □□

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- VLAN? ?? admin???? ???? ?? VLAN ??? ???? ?????? xe-0/0/1? ?? VLAN? ??????.
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- □□□ , term2, □ term3□ □□ term1□ □□□ □□ □□□□ □□□ □□□ □□□□ □□□ □□□□□. □□ □□□□ □□□ □□□□ □□ □□□ □□ □□□□ O□□ □□□□□□.
- □□□ □ term2□ □□□ term1 □□□□□. □□ □□ □□ □□□□ □□ □□□□ □□□ □□□□ □□ 1000□□ □□□□ □□□ □□□□□ □□□□□ term2policer . □□ □□□□ □□ term1term2 □□ □□, □□ term2 □□□□ □□□□ □□ □□□□ O□□ □□□□□□.

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QFX □□□ □□□□ □□□ □□□ □□ □□□ □□ □□□ □□ □□□ □□ □□□□.

- loss-priority
- policer

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QFX ?????? ????? ?? ????? ?? ???? ? ??

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QFX ??? ?????? ????? QFX ?????? ????? ?? ?? ????? ??? ???? ??? ?? ????? ????? ? ?????. ? ??? ICMP(ping), STP, LACP ?? ?? ?????? ?? ?? ????? ??????.

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?? dot1q-user-priority ? ?? ???? dot1q-tag ????? ???? ???? ????? ???? VLAN? ????? ???? ???? ???? ???? ????? ??, Q-in-Q EtherType? 0x8100?? ???? ?? ???? ????? ?????. (Q-in-Q ????? ?????? ???? ??????? ???? ?????? ?? ?????? ?????? ???? ?????? ???? VLAN? ??????.)

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□□ □□□ □□□□□. Q-in-Q EtherType□ 0x8100□ □□□□□ □□ □□□□ □□ [edit ethernet-switching-options] □□□□□**set dot1q-tunneling ethertype 0x8100**. □□ □□□ Ethertype□ □□□□□ □□□ □□ □ □□ □□□□ □□□.

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- [illegible] *[illegible]*. [illegible] VLAN [illegible].

[illegible]

[illegible]. [illegible] VLAN[illegible] [illegible] VLAN[illegible] [illegible].

L2PT [illegible]

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- [illegible] | 1778

[illegible]

[illegible]

L2PT [illegible] QFX3500 [illegible]. [illegible], [illegible] L2PT[illegible] [illegible]. [illegible] L2PT [illegible].

[illegible]

[illegible].

[illegible] BGP [illegible]

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- [illegible] | 1779

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TTL(Time-to-Live) □□ 1□□ □ BGP □□□ □□□ □□□□□□□ □□□□□ □□□ 3 □□□□□□□ □□ □□□ □□□ □□□ □□□ □□□□ □□□ □ □□ □□. TTL □□ 1 □□ 0□ BGP □□□ □□□ □□□□□□□ □□□ □□□ □□□ □□□□□ □□□ 3 □□□□□□□ □□ □□□ □□□ □ □□□□.

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- ? 500?? ????? ????? ?? ??? ????? 1,000?? TCAM ??? ?????? ???? ??????. ???? ?? ???? ?? ? ?? ?? ???? ???? ??.
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> *FIP ???, FBF ? MVR ?? ??? ??*
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> ??? ?? ??

chapter label in part29

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□ □□□□□ □□ □□ □□□□□ □□ 192.168.207.222 ICMP □□□□ □□□□□ □□□□□ □□ □□□□ □□□□ □□□□ □□□□□□.

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CLI ?? ??

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```
set system syslog file ICMP_filter firewall info
set system syslog file ICMP_filter archive no-world-readable
set firewall family inet filter icmp_syslog term icmp_match from address 192.168.207.222/32
set firewall family inet filter icmp_syslog term icmp_match from protocol icmp
set firewall family inet filter icmp_syslog term icmp_match then count packets
set firewall family inet filter icmp_syslog term icmp_match then syslog
set firewall family inet filter icmp_syslog term icmp_match then accept
set firewall family inet filter icmp_syslog term default_term then accept
set interfaces ge-0/0/1 unit 0 family inet address 10.1.2.3/30
set interfaces ge-0/0/1 unit 0 family inet filter input icmp_syslog
```

??? ??? ?? syslog ??? ?? ??

??? ??

??? ?? **firewall** syslog ??? ??? ?????? ??? ??????.

1. [illegible] [illegible] **firewall** [illegible] [illegible] syslog [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@host# set system syslog file ICMP_filter firewall info
```

2. [illegible] **firewall** [illegible] [illegible] syslog [illegible] [illegible] [illegible] [illegible] [illegible] Junos OS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@host# set system syslog file ICMP_filter archive no-world-readable
```

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] ICMP [illegible] **192.168.207.222** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] **icmp_syslog** [illegible],

1. [illegible] [illegible] [illegible] **icmp_syslog**[illegible].

```
[edit]
user@host# edit firewall family inet filter icmp_syslog
```

2. ICMP [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter icmp_syslog]
user@host# set term icmp_match from address 192.168.207.222/32
user@host# set term icmp_match from protocol icmp
```

3. [illegible] [illegible] [illegible], [illegible], [illegible].

```
[edit firewall family inet filter icmp_syslog]
user@host# set term icmp_match then count packets
user@host# set term icmp_match then syslog
user@host# set term icmp_match then accept
```

4. [illegible] [illegible] [illegible] [illegible].

```
[edit firewall family inet filter icmp_syslog]
user@host# set term default_term then accept
```

[illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]:

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces ge-0/0/1 unit 0 family inet
```

2. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set address 10.1.2.3/30
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces ge-0/0/1 unit 0 family inet]
user@host# set filter input icmp_syslog
```

[illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible] show system [illegible] [illegible] **firewall** syslog [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show system
syslog {
    file ICMP_filter {
        firewall info;
        archive no-world-readable;
    }
}
```

2. ?? ?? ??? ???? ??? ??? ??? show firewall ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show firewall
family inet {
    filter icmp_syslog {
        term icmp_match {
            from {
                address {
                    192.168.207.222/32;
                }
                protocol icmp;
            }
            then {
                count packets;
                log;
                accept;
            }
        }
        term default_term {
            then accept;
        }
    }
}
```

3. ?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ??? ???? ??? ?? ????.

```
[edit]
user@host# show interfaces
ge-0/0/1 {
    unit 0 {
        family inet {
            filter {
                input icmp_syslog;
            }
            address 10.1.2.3/30;
        }
```

```
    }
}
```

4. ???? ??? ???? ?? ??? ?????.

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

??

??? ??? ?????? ?????? ?? ??? ??????.show log filter

```
user@host> show log ICMP_filter
Mar 20 08:03:11 hostname feb FW: ge-0/1/0.0   A icmp 192.168.207.222
192.168.207.223      0     0 (1 packets)
```

? ?? ???? ?? ??? ???? ????.

- **Date and Time**- ??? ??? ?? ? ??????(?????? ???? ??).
- ?? ??:
  - **A**- ??(?? ?? ??)
  - **D**- ??
  - **R**- ??
- **Protocol**- ??? ???? ?? ?? ?????.
- **Source address**- ??? ?? IP ?????.
- **Destination address**- ??? ?? IP ?????.

?: ?????? ICMP? ?? ICMP ?? ? ??? ??????. ?? ?? ?????? ?? ?? ? ?? ??? ?????.

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```
user@host> show log filename
Mar 20 08:18:45 hostname feb FW: ge-0/1/0.0   A icmp 192.168.207.222
192.168.207.223     0     0 (515 packets)
```

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□□□ □□□ □□□□□. edit □□□ □□□□ □□□ □□□ □□□□ □□□ □□□ □□□□ □□□ □ □□□□. edit □□□ □□□□ □□□ □□ □□□ □ □□□□.	edit *hierarchy-level value*	[edit] user@host# edit security zones security-zone myzone [edit security zones security-zone myzone] user@host#
□□□ □□□ □□□□ □□□ □□ □□□□□. set □□□ □□□□ □□ □□□ □□□□ □□□□ □□ □□□□ edit□ □□□□.	set *hierarchy-level value*	[edit] user@host# set security zones security-zone myzone [edit] user@host#
□□ □□		
□□ □□ □□□□ □□□ □□□□□.	edit *hierarchy-level*	[edit] user@host# edit security zones [edit security zones] user@host#

(Continued)

??	???/???	?
???? ? ?? ?? ??????.	up	[edit security zones] user@host# up [edit security] user@host#
??? ????? ??????.	top	[edit security zones] user@host# top [edit] user@host#
?? ?? ?? ?? ??		
??? ??????.	commit	[edit] user@host# commit commit complete
?? ????? ?? ??? ??????. rollback ??? ????? ?? ?? ??? ?? ?? ??? ??????. ??? ?????? ?? ??? ????? ?? rollback ??? ????? ? ? ??????? ?? ??? ??? ??? ?????? ??????. ??? edit ????? rollback ?? ????? ???.	rollback	[edit] user@host# rollback load complete
?? ?? ??		

(Continued)

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□□□ □□□□ □□ □□□ □□□□□.	commit and-quit	[edit] user@host# **commit and-quit** user@host>
□□□ □□□□ □□ □□ □□□ □□□□□. □□ □□□ □□□□□ □□ up □□ top □□□ □□□□ □□□ □□□□ □ □□□ □□□.	exit	[edit] user@host# exit The configuration has been changed but not committed Exit with uncommitted changes? [yes,no] (yes)
□□ □□		
□□ □□ □□□ □□ □□□ □□ □□□ □□□□□.	?	[edit] user@host# edit security zones ? Possible completions: <[Enter]> Execute this command > functional-zone Functional zone > security-zone Security zones | Pipe through a command [edit]

?? ??

> *Junos OS CLI ?? ?? ??*

3

PART IN COVERPAGE

??? ??? ??

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- ??? ?? ?? ? ?? ?? | **1852**
- ??? 2 ??? ?? | **1861**
- ??? 3?? 2? ? 3? ??? ??? ?? | **1916**
- ??? 3?? ??? ? ??? ?????? ??? ??? ?? | **2036**
- ?????? ??? ?? | **2065**

chapter label in part30

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in this chapter

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- ARP ??? ?? | 1797
- ?: ARP ??? ?? | 1798
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- ??? ???? ?? ??? ??? ?? ?? | 1805
- ??? ???? ??? ???? ??? ?? ?? | 1811
- ??? ??? ?? | 1815
- ??? ? ??? ?? ?? ?? | 1819
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- ACX ??? ????? ??? ???? ???? ?? ?? | 1841
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- ACX ??? ????? ??? ??? ?? | 1846
- ACX ??? ????? ??? ???? ?? ???? ?? | 1847
- ACX ??? ????? ?? ?? ? ?? ??? ?? | 1849

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- *?? ?? 2? ???* — ?? ????? ???. ?? ??? ?????? ????? ?? ???? ? ???? ???? ???? ??????. ? ????? ???? ? ?? ?? ???? (???)? ??(???)????.
- *?? ?? 3? ???* — ????? ???? ?? ?? 2? ????? ??????. ?? ? ???? *CIR(Committed Information Rate*) ? CBR(*Committed Burst Rate*)? ??????.
- *2???? 3? ???* — ? ?? ?? ???? ????? ?? ?? 3? ????? ????? ??????. *2????*? ???? ???? ?? ???? ??, *PIR(?? ?? ??*) ? PBS(*?? ??? ??*)? ???? ??????.

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- bps? ???? ???? ??(??? **bandwidth-limit** ??)
- ???? ???? ???? ???? ??(? ?? **burst-size-limit**)

> ?: ?? ?? 2? ????? ????? ?? ????? ???? ?????? ?? ?? ?? ???? *???? ??????*??? ???? ????? ???? ??? ??? ?? ????? **bandwidth-percent** *percentage* . ????? ???????, ?? ?? ?????? ??????? ???? ???? ?????? ???? ? ?????.

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```
user@router# set firewall policer <policer name> if-exceeding ?
Possible completions:
  <[Enter]>            Execute this command
+ apply-groups         Groups from which to inherit configuration data
+ apply-groups-except  Don't inherit configuration data from these groups
  bandwidth-limit      Bandwidth limit (8000..100000000000 bits per second)
  bandwidth-percent    Bandwidth limit in percentage (1..100 percent)
  burst-size-limit     Burst size limit (1500..100000000000 bytes)
  |                    Pipe through a command
```

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token size x token arrival rate = policer rate (configured bandwidth limit)

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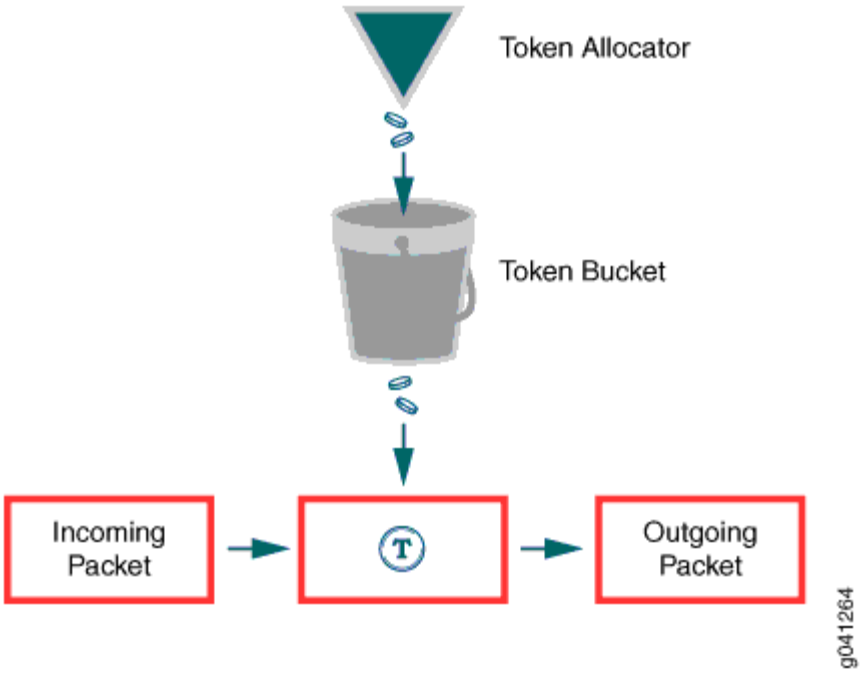

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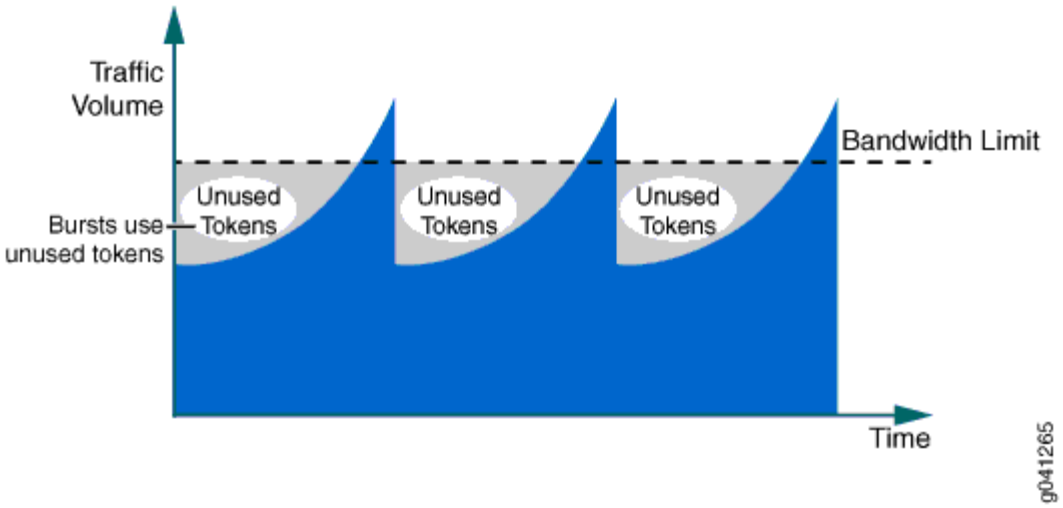

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□□□ □□□ □□□ □□□ □□□ □□ □□□ □□ □□□ □□□ □□□□ □□□□ □□□□ □□□□ □□ □□□ □□□ □□□□ □□ □□□ □□□ □□□□□. □□ □□□ □□□ □□□□ □□ □□□ □□ □ □□□ □□□□ □□□□. □ □□, □□□□ □□□ □□□ □□□□ □□□, "□□□ □ □□ □□ □□□□□ □□ □□" □□□ 1803 □□ □□□ TCP □□ □□□ □□ □□ □□□□ □□□□. □ □□ □□□ □□□ □□□ □□□ □□□ □□□□□ □□□ □□□ □□ □□□ □□□□□.

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ARP ??? ??

in this section

- ARP ???? ?? | 1797

?? ??? ??????? IP ??? ????? IP ???? MAC(??? ??? ??) ??(??? ?? ???? ??)? ???? ???.

??? ????? ARP(Address Resolution Protocol)? ???? MAC ??? IP ??? ?????. ARP? IP ??(??? ??)? ??? MAC ??? ???? ???????. ????? IP ??? ???? ?? ARP? IP ??? ??? ??? ??????? ???? MAC ??? ?????.

ARP? ???? ???? ??? ???-??? ?? ??? ??? ???? ARP ??????? ??? ?? ???????. ??? ?? ??? ?? ???? ?? ?? ?? ?? ???? ?? ??? ?????. ??? ??? ?? ???? ???? ???-??? ?? ??? ?????. ??? ?? ? ?? ?? ???? ARP ??? ????.

Junos OS ??? 18.4R1?? SRX ??? ???? ARP ???? ???? ??? ? ????. MX ??? ???? ?? ?? ??????? ?? ARP ? ??? ?? ??? Junos OS ??? 20.2R1?? ??? ? ????. ?? ??? ?????.

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- Bandwidth(???) - ?????? ???? ?? ?? ????
- ?? ??? ?? - ??? ??? ??? ???? ??? ???? ???? ?? ??????

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?: SRX5400, SRX5600 ? SRX5800 ??????? ARP ??? ??? ??? ???? ??? SPU?? ??????. ?? ? ?, SPU A? 15,000?? ARP ??? ??? ???? SPU B? 5,000?? ??? ??????. ???? ?? ?? 10K? ?? ?? ???? ARP ?????? ??????. ? ??, SPU A? 5,000?? ARP ??? ??? ???? 10,000?? ??? ??? ? ??? ????, SPU B? 5,000?? ARP ??? ??? ???? ??????. ??? ??? ??? ? 15,000?? ARP ??? ? ?? ??????.

ARP ???? ??

- ??????? ???? ?? ???? ?? ??

- [illegible] [illegible] [illegible] [illegible] SRX [illegible] [illegible] [illegible] [illegible] [illegible]
- DoS(Denial-of-Service) [illegible] [illegible]

[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. Feature Explorer [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

release heading in release-history	desc heading in release-history
20.2R1	MX [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ARP [illegible] [illegible] [illegible] Junos OS [illegible] 20.2R1[illegible] [illegible] [illegible] [illegible] [illegible].
18.4R1	Junos OS [illegible] 18.4R1[illegible] SRX [illegible] [illegible] ARP [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

> bandwidth-limit([illegible] [illegible])
>
> burst-size-limit([illegible] [illegible])
>
> [illegible]: ARP [illegible] [illegible] | **1798**

[illegible]: ARP [illegible] [illegible]

in this section

- [illegible] [illegible] | **1799**
- [illegible] | **1799**
- [illegible] | **1799**
- [illegible] | **1802**

[illegible] [illegible] SRX [illegible] [illegible] ARP(Address Resolution Protocol) [illegible] [illegible] [illegible] [illegible] [illegible].

MX [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ARP [illegible] [illegible] [illegible] Junos OS [illegible] 20.2R1[illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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- SRX □□□ □□□.
- Junos OS □□□ 18.4R1 □□.

□□□□ □□ □ □□□□□□ "ARP □□□ □□" □□□ 1797.

□□

ARP□ MAC □□□ IP □□□ □□□□ □ □□□□□. ARP□ IP □□(□□□ □□)□ □□□ MAC □□□ □□□□ □□□□□□. IP □□□□□ □□□ □□□ □ □□, ARP□ IP □□□ □□□ □□□ □□□□□□□ □□□ MAC □□□ □□□□□. □ □□□ □□ SRX □□□ □□□□□ □□□□□. SRX □□□ □□□□□ □□□ □□□ □□ □□□□ ARP□ □□□□ □□□□ □□□□□. □□ □□ □□□□□□ □□□□ □□ □□□□ □□□ □□□ □ □□□□.

> □: □□ *__default_arp_policer__* □□ ARP □□□□ □□□□□ □□□ □□ □□□ □□□□□□□□ `family inet` □□ □ □□ □□□.

MX □□□ □□□□□□ □□ □□ □□□□□□□ ARP □□□□ □□ □□□□ □□□ □ □□□□. (□□□ □□□□ □□□ □ □□□ □□ □□□ □□□□ □□ □□□□ □□ □□□□□ □□□ □□ □□ □□□□□□ □□□□ □□□□ □□ □□ □□□ □□□□, □□ □□□□ □□ □□ □□□□□□ `[edit interfaces interface-name unit unit-number family inet policer arp policy-name]` ARP □□□□ □□□□□. □□□ □□ □□□ □□□□ □□□□ □□□□□ □□ □ □ □□□ □□□□ □□□ □□□ □ □□□ □ □□□□.

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in this section

- □□□□□□□ ARP □□□ □□ | **1800**

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CLI ?? ??

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```
set firewall policer arp_limit if-exceeding bandwidth-limit 1m
set firewall policer arp_limit if-exceeding burst-size-limit 1m
set firewall policer arp_limit then discard
set interfaces ge-0/0/7 unit 0 family inet policer arp arp_limit
```

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ARP ????? ?????? ???? ??????.

1. ????? ???? ??????.

   ```
   [edit firewall]
   user@host# set policer arp-limit
   ```

2. ????? ?? ?? ???? ??????.

   - ??????? ???? ???? ????? ?? ?? ?? ?(bps)? ???? ???? ??????.

     ```
     [edit firewall policer arp_limit]
     user@host# set if-exceeding bandwidth-limit 1m
     ```

     ??? ?? ??? 1?? 150,000bps??????.

   - ???? ?? ??(???? ???? ?? ?? ???? ??)? ????? ???? ???? ?? ??????.

     ```
     [edit firewall policer arp_limit]
     user@host# set if-exceeding burst-size-limit 1m
     ```

     ??? ?? ?? ?? ?????? ???? ????? ??????? ????? ?? ?????? ???? ????? ??? ? ?? ??? ?????.

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□□□ □□ □□□ □□□ 1□□□□□ 150,00□□□□□□.

3. □□ □□□ □□□□ □□□ □□□□□ □□□ □□ discard□ □□□□□.

```
[edit firewall]
user@host# set policer arp_limit then discard
```

□□□ □□□□ □□□□ □□□ □□□□□.

4. □□□□□□ □□□□□.

```
user@host# set interfaces ge-0/0/7 unit 0 family inet policer arp arp_limit
```

□□

□□ □□□□ show firewall □□□ □□□□ □□□ □□□□□. □□□ □□□ □□□ □□□□ □□□ □ □□ □□□ □□□□ □□□□□□.

```
[edit]
    user@host# show firewall
    policer arp_limit {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 1m;
    }
    then discard;
}
[edit]
    user@host# show interfaces
    ge-0/0/7 {
    unit 0 {
        family inet {
            policer {
                arp arp_limit;
            }
        }
    }
}
```

□□□□ □□□ □□□ □ □□ □□□□ □ □□□□□ commit .

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in this section

- arp ???? ?? ?? | 1802

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arp ???? ?? ??

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Arp ???? ??? ??????.

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?? ??? ?? ???? ??? ?????? show policer *policer-name* .

```
user@host> show policer arp_limit-ge-0/0/7.0-inet-arp
Policers:
Name                                                Bytes              Packets
arp_limit-ge-0/0/7.0-inet-arp                           0                    0
```

??

??? show policer *policer-name* ????? ??? ?? ??? ?? ? ???? ??? ??????.

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release heading in release-history	desc heading in release-history
20.2R1	MX ??? ???? ?? ??? Junos OS ??? 20.2R1?? ??? ? ???, ?? ??? ??? ??? ?? ??????.

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in this section

- ???? 1: ?? TCP ?? | 1803
- ???? 2: ?? TCP ?? | 1804

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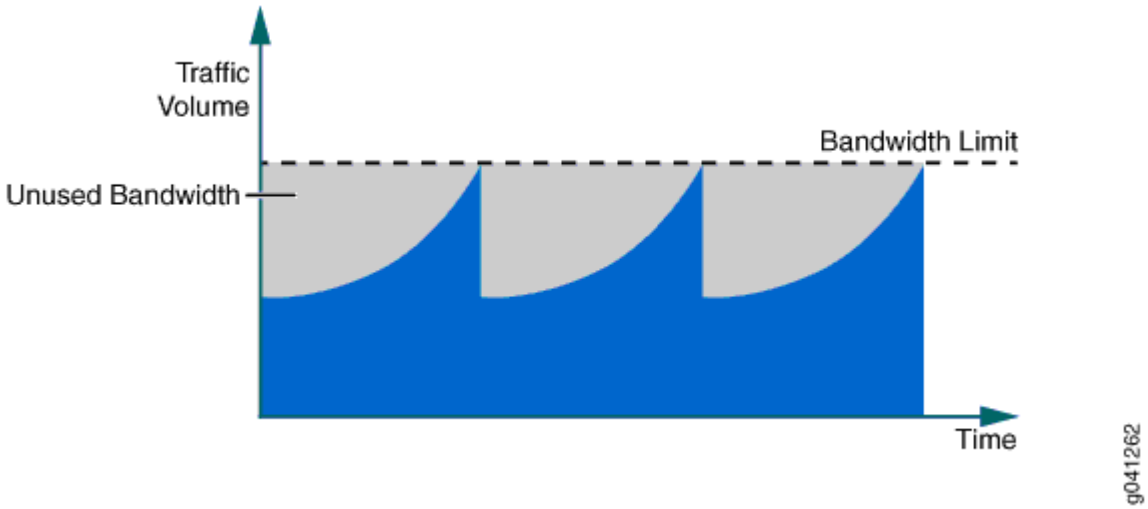
- "???? 1: ?? TCP ??" ??? 1803
- "???? 2: ?? TCP ??" ??? 1804

???? 1: ?? TCP ??

?? 78 ??? 1804 ?(?) ????? ??? ???????? ??? ??? ??????. ??? ??? ??? ??? ??? ?????(?? ??? ???) TCP ??? ? ?? ?????? ???? ??? ??? ????? ?????. ???? ??? ?? ????? ???? ??? ??????.

□□ 78: □□ TCP □□□ □□□ □□



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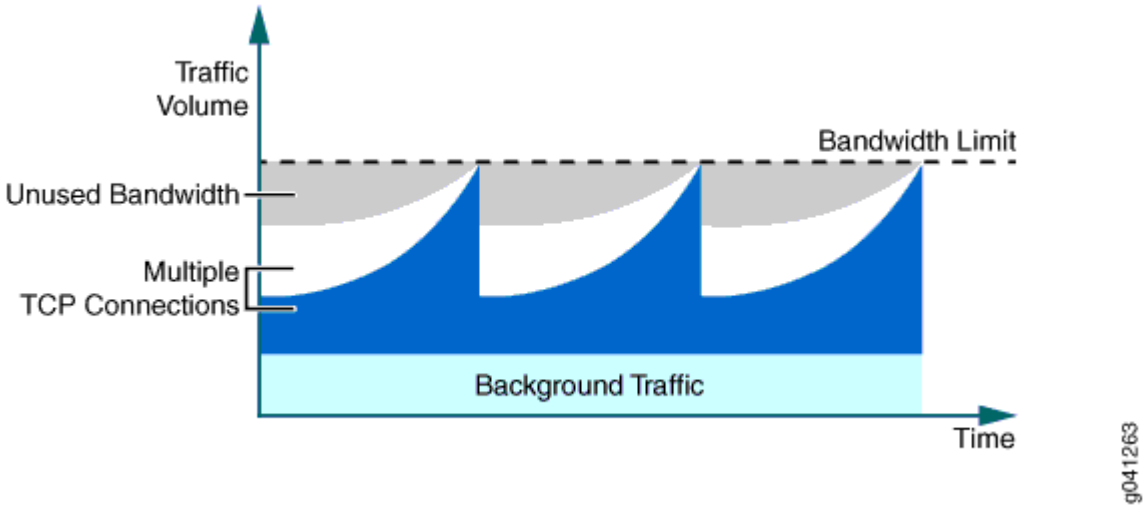
□□□□ 2: □□ TCP □□

□□ TCP □□ □□ □□ □□□□□ □ TCP □□ □□□□ □□ □ □□ 79 □□□ 1804□□□ □□ □□□□ □□ □□□□ □□□□. □□□ □□□ □□□ □□□ □ □□ □□□ □□□ □□□ □ □□ TCP □□□ □□□□ □□ □□□□ □□ □□□□ □□□ □□□ □□□ □□□□□.

□□ 79: □□□□□ □□□□ □□ □□□ □□(□□ TCP □□)



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??? ?? ?? | 1794

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in this section

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- ??? ??? ??? ?? ?? ??(MTU) ??? ?? ? ?? ?? ???.

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- ??? ?? ??? ????? ???????? ????? ?? ?? ??(MTU)?? 10? ?? ?? ?????? ? ???.
- ???? ??????? ?? ?? ????? ??? ????? ????? ??? 5ms?? ????? ? ???.
- ??? ??? ?? ??? ?? ??? ? ?? ?? ? ?? ?? ??? ??(2? ?? 3?)? ?? ??????.

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?? 80 ??? 1806?(?) ?? ?? ??? ??? ? ??? ??? ???? ??? ???? ????? ?? ?? ???? ???? ???? ??? ??????.

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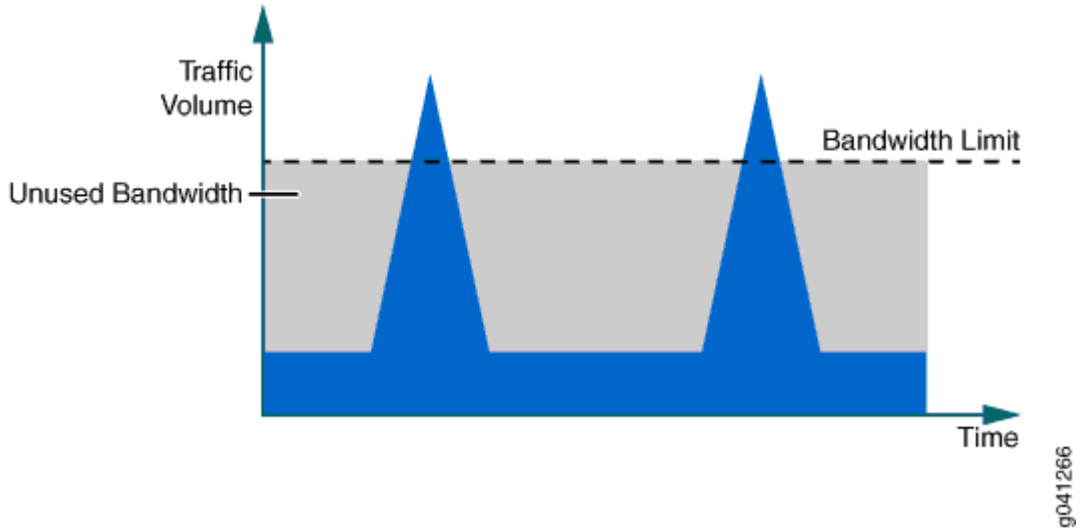

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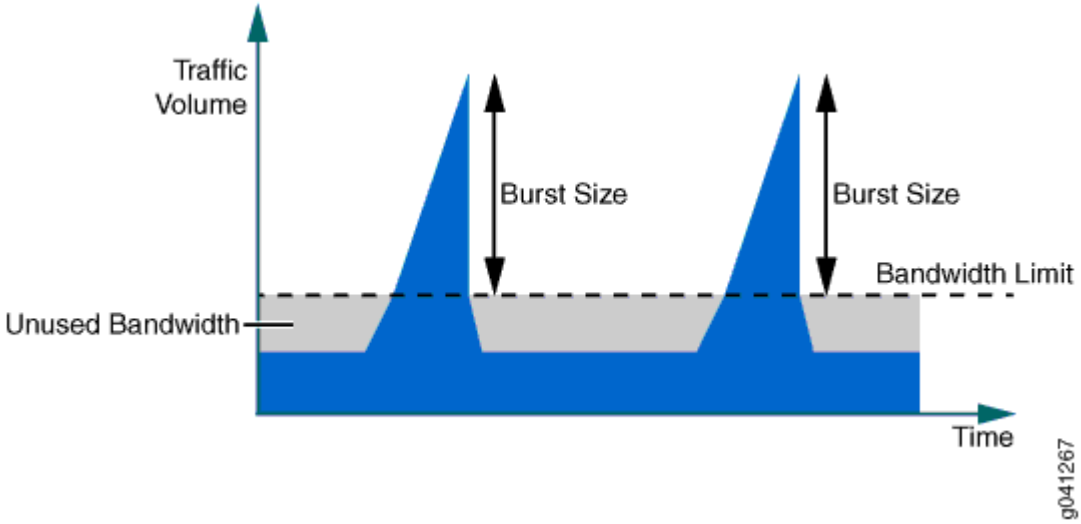
?? 81 ??? 1807?(?) ??? ??? ??? ?? ? ??? ???? ????? ? ??? ???? ??? ??? ??? ?????. ? ??? ??? ??? ?? ? ? ??? ? ?? ??? ??? ??? ??? ???? ??? ??? ???? ?? ???????. ??? ??? ?? ??? ??? ?????.

□□ 81: □□□ □□□ □□□ □□□□ □□□(□□□ □□□ □□)



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- bandwidth - □□□□ □□□□□□ □□ □□(□□: bps)
- burst-period - □□ □□□ □□□ □□□ □□(5ms □□)

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```
bandwidth  X  burst-period  /  8
```

□□□ □□ □□ □□(MTU) □□ □□

□□□□ □□□□□□ □□□□ □□□ □□, □□ □□ □□□□ □□□ □□□ □□ □□□ □□□□□.

- interface MTU - □□□□ □□□□□□ □□ □□ □□ □□(□□: □□□).

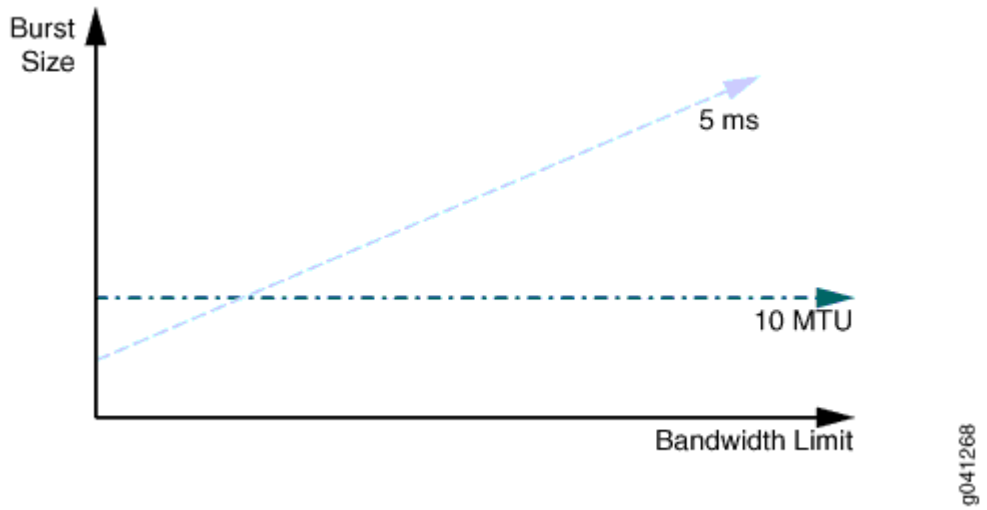
□□□ □□□ □□□ □□□□ □□□□□

```
interface MTU  X  10
```

□ □□ □□□ □□

□□ 82 □□□ 1808□(□) □□□ □□□ □□□ □□ □□□ □□□□ □ □□ □□□ □□ □□□ □□(□□□ □□□ □□)□ □□□□ □□□ □□ □□ □□ □□□ □□ □□□. □□□□□ □□□ □ □□ □□□ □□□ □□□ □□□□ □□ □□ □□, □□ □□□ **5 ms**(□)□ □□□ □□□□□. □□ □□ □□(MTU) □□□ □□□□ □□ □□□ □□ □□□ **10 MTU**(□)□ □□□ □□□□□.

□□ 82: □□□ □□ □□ □□ □□

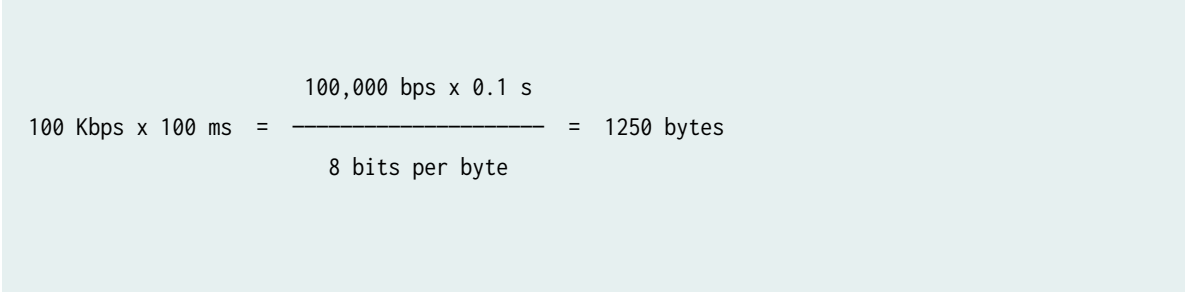


5 ms □□□ □□□□ □□□ □□□ □□□ □□ □□□ □□, □□□□ □□□ □□ □□□ □□□ □□□ □□□ □□□□□. □□□ □□□ □□ □□ □□ □□□□ □□□ □ □ □□□ □□ □□□ □□□ □□ □□ □□□□ □□□ □□□ □ □□□□ □ □□□□. □□ □□, □ □□ MTU □□□ □□□ □□□ "□□□(burst)"□ □□ □□□□ □ □□□□. □ □□□□□□□ **10 MTU** □□□ □□□ □□□ □□□ □□□ □□ □□□ □ □□ □□□□ □□□□.

100Kbps ???? ?? ???? ???? ?? ?? ??? ??? ???? 10 x MTU ??

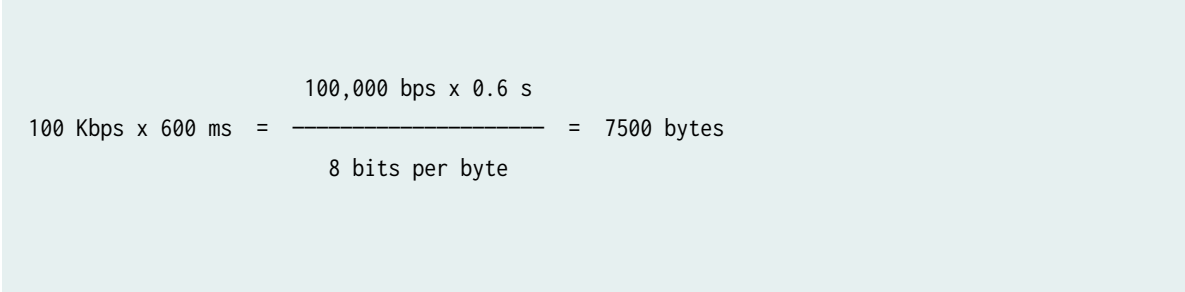
?? ???? 10 x MTU ??? ???? 100kbps ??? ???? ??? ???? ??? ??????? ?? ??? ??? ?? ??? ??? ???? ?? ?? ???.

1. 100ms ??? ?? ??? ???? ?? ?? ?? ??????? ????? ???? ?? ???? ?? 1,250????? ??? ?? ?????.



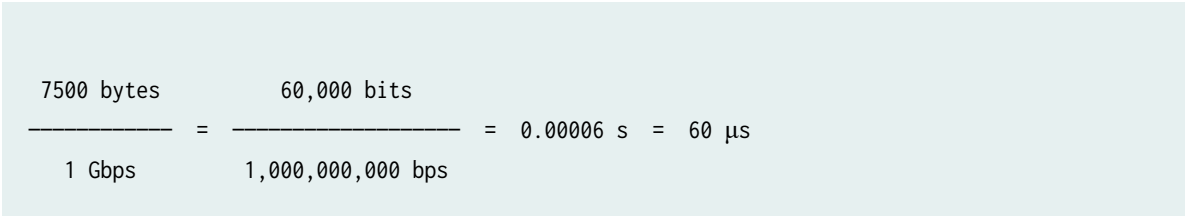
```
                      100,000 bps x 0.1 s
100 Kbps x 100 ms  =  ———————————————————  =  1250 bytes
                        8 bits per byte
```

2. ????? 10 x MTU ??? ??? ?? ?? ?? 15,000????? ??? ?????. ??? ?? 600ms? ?? ??? ?? ??? ???? ??, ? ? ?? ??????? ????? ???? ?? ???? 7,500????? ??? ?? ?????.



```
                      100,000 bps x 0.6 s
100 Kbps x 600 ms  =  ———————————————————  =  7500 bytes
                        8 bits per byte
```

???? ??? ???????? 600ms? ??? ??? ?? ??? ???? ??? ?? ???? 60µs? ??? ??? ????, ??? ?? ?????.



```
 7500 bytes          60,000 bits
————————————  =  ——————————————————  =  0.00006 s  =  60 µs
   1 Gbps         1,000,000,000 bps
```

3. ????? ????? ?? ??? ?? ??? ???? ??? ???? ??? ?? ??? ? ?? ??, ?? ??? ??? ?? ??? ??? ?? ??? ????.

200Mbps ???? ???? ??? ??????? ?? ?? ??? ??? ???? 5ms ??

?? ???? 200Mbps ??? ???? ??? ???? ??? ??????? ?? ??? ??? ?? ??? ??? ???? 5ms ??? ??? ?????. ? ?? ??? ? ? ??? ?? ??? ??? ??? ??? ??? ??? ?? ? ??? ?????.

1. 5ms ??? ?? ??? ???? ?? ???? ?? ??????? ????? ??? ??? ?? 125,000???(? 83 1500??? ??)?? ??? ?? ? ????.

$$200\ \text{Mbps} \times 5\ \text{ms} = \frac{200{,}000{,}000\ \text{bps} \times 0.005\ \text{s}}{8\ \text{bits per byte}} = 125{,}000\ \text{bytes}$$

???? ??? ???????? 5ms? ??? ??? ?? ??? ???? ??? ?? ???? 1ms? ??? ??? ????, ??? ?? ??????.

$$\frac{125{,}000\ \text{bytes}}{1\ \text{Gbps}} = \frac{1{,}000{,}000\ \text{bits}}{1{,}000{,}000{,}000\ \text{bps}} = 0.001\ \text{s} = 1\ \text{ms}$$

1?? ?? ??? ??? 200Mbps + 1Mbps = 201Mbps? ??, ?? 200Mbps?? ??? ??? ??? ?? ?? ??????.

2. 600ms? ??? ?? ??? ???? ?? ?? ?? ??????? ????? ??? ??? ?? 15Mbytes(? 10,000 1500??? ??)???.

$$200\ \text{Mbps} \times 600\ \text{ms} = \frac{200{,}000{,}000\ \text{bps} \times 0.6\ \text{s}}{8\ \text{bits per byte}} = 15{,}000{,}000\ \text{bytes}$$

???? ??? ???????? 600ms? ??? ??? ?? ??? ???? ??? ?? ???? 120ms? ??? ??? ????, ??? ?? ??????.

$$\frac{15{,}000{,}000\ \text{bytes}}{1\ \text{Gbps}} = \frac{120{,}000{,}000\ \text{bits}}{1{,}000{,}000{,}000\ \text{bps}} = 0.12\ \text{s} = 120\ \text{ms}$$

1?? ?? ??? ??? 200Mbps + 120Mbps = 320Mbps? ??, ?? 200Mbps?? ??? ??? ???? ?? ????.

200Mbps ??? ??, 5ms ??? ??

200Mbps ??? ??? 5ms ??? ??? ??? ?? ??? **200 Mbps x 5 ms = 125 Kbytes**?(?) ??, ?? ?? 83 1500??? ?? ???. 200Mbps ??? ??? ???? ??? ??????? ??? ??, ??? ??? ??? ?? ???? **125000 bytes / 1 Gbps = 1 ms**?? ?.

200Mbps ??? ??, 600ms ??? ??

200Mbps?? ??? ??? ???? ? ??? ??? 600ms?? ??? ?? ??? **200 Mbps x 600 ms = 15 Mbytes**?(?) ???. ?? ???? ??? ?? ???? 120ms? ??? ??? ??????. 1??? ?? ??? ??? **200 Mbps + 15 Mbytes = 320 Mbps**?(?) ??, ? ? 200Mbps?? ??? ??? ???? ?? ????. ? ??? ? ? ??? ??? ??? ??? ??? ??? ?? ? ??? ??????.

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??? ?? ?? | 1794

??? ? ?? ?? ?????? ?? ???? | 1803

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in this section

- IP ??? ???? ?? ?? ?? | 1811
- ??? ?? | 1812
- ??? ?? ?? | 1813
- ??? ??? ? PLP ?? | 1814
- ???? ?? ??? ??????? | 1815

IP ??? ???? ?? ?? ??

??? ??????? ?? ??? ???? DoS(??? ??) ??? ????? ??? ???? ??? ??? ?? ?? ?????. ??? ???? ???? ???????? ? ???? IP ???? ?? ??? ???? ???? ???? *???? ???*???? ?? ?? ?? ?? ???? ??? ? ????. ???? ??? ?? ?? ??? ???? ??? ??? ???? ?? ???? ?? ??? ????. ??? ??? ???? ?? ??? ??? ??? ????? ?? ??? ??? ?? ?? ?? ????(PLP) ???? ?????.

□ □□□(□□□ □□□□□□□ □□□ □□ □□□□ □□□ □ □□□ □□□□□)□ □□ □□□□□ □□□ □□□□ □□□□, *□/□/□* *□/□/□/□/□/□* □□□ 2 □□ □□□ 3 □□□ □□□□ □□ IP □□□ □□□□ □□□ □ □□□□.

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□: □□□ □□□□ PIC □□□ □□□□□□□□. □□□ □□ □□ □□ □□(L-PDF) □□□□ □□ □□□□ AMS □□□ □□ □□□□□ PIC□ □□□□ □□□ □□□□ □□□□ □□□□.

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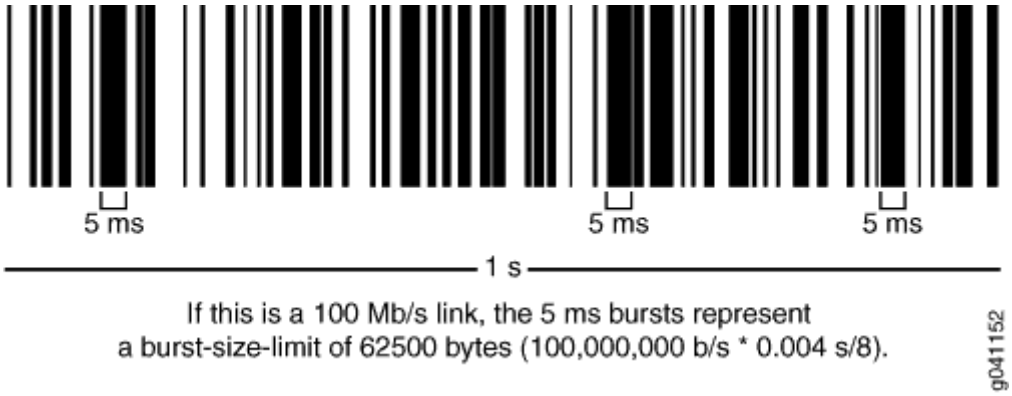
Junos □□□□ *□/□ □/□ □/□/□/□* □□□□ □□□□□□□ □□ □□□ □□ □□ □□ □□□ □□□ □□□□ □□□ □□□ □□□ □□ □ □□□ □□□ □□□ □□□□ □□□□□ □□□ □□□□ □□□□□. □□ □□ □□□□□ □□ □□□ □□□□ □□ □□□ □□□ □□□□ □□□ □ □□□ □□□ *□/□ □/□ □/□/□/□* □□ □ □□ □□□ □ □□□□□. □□ □□ □□ □□□□□ □□□□ □□ □□ □□□ □□ □□ □□ □□ □□ □□ □□□ □□ □□□□ □□□ □ □□□□.

token-bucket □□□□ □□□ □□□□ □□ □□ □□□ □□□□□. □□□ □□□ □□□ □□□ □□□□□ □□□ □□ □□□ □□□□ □□□ □□□ □□□ □□ □ □□□ □ □□□□. □ □□□ □□ □□ □□ □□ "□□□"□ □□□□, □□□ □□□ □□□□□□□ □□□□ □□□□□ □□□□ □□□ □□ "□□□"□□□. □□□ □□□ □□□ □□□ □□□ □□□ □□ □□ □□□□□. □□□ □□□ □□□ □□□□□ □ □□ □□□ □□□, □ □□ PLP(Packet Loss Priority) □□ □□ □ □□ □□ □□□ □ □□□□.

- □□□ □□□ □□□□ □□□ □□□ □□□ □□□ □□□□ □□ □□ □□□ □□ □□ □□ □□ □□ □□□ □□□□□. □ □□ □□ □□ □□□ □□□ □□□□ *□/□ □/□* □□ □□□□□. □□□ □□□(□□ □□ □□ □□)□ □□ □□□ □□ □□□□ □□□ □□□ □□□□ □□ □□ □□□ □□□ □ □□ □□□ □□□ □□□□ □□□□. □□□□□ □□□□ □□ □□(□□ □□ □□□□ □□ □□ □□□ □□□□□□ □□□□□ □□□□□□□ □□□□ □□□) □□ □□□□ □□ □□□ □□□ □ □□□□.
- □□□ □□(□□□)□ □□□□ □□ □□□□ □□ □□□□□. □ □□□ □□□□ *□/□/□ □/□* □□ □□□□□. □ □ □□ □□□ □□□ □□ □□ □□ □□ □□□ □□ □□□□ □□□ □□ □□□□ □□ □□ □□ □□ □□□ □□□ □□□□. □□ □□□ □□ □□□ □□□□ □□□□ □□□□ □□□□ □ □□□ □ □□ □□□ □ □□ □□□ □□□□□.

?? 83: ???? ??? ? ??? ??



?? ???? ? ? ??? UPC ???? ???? ???? ??? ????? ?? ?? ?????. ??????? ?? ????(?? ??? ???) ??? ????. ??? ?? ??? ?? ??? ???? ??? ?? ??? ??? ? ?? ?? ??? ??????.

??? ???? ??? ??, ??? ??? ???? ???? ??? ???? ??? ????? ? ?? PLP ???? ??????, ??? ??? ???? ??????, ??? PLP ??(?? ? ?)?? ??????, ??? ??? ? ????. ??? ?????? ??? ??? ??, PLP ??? `low` ??? , `medium-high`?? `high` PLP ? ?? `medium-low`???? ??? ???? ????.

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- *?? ?? 2?* - 2? ?? ???(?? ?? ?? ???? ?? "???")? ??? ???? ???? ??? ??? ? ??? ?? ??? ?? ??? ? ?? ??? PLP(?? ?? ?? ??)? ??????. ?? ???? ??? ? ??? ?? ??? ???? ??? ?????? ??? ??? ? ????.

  ???? ??(??? ??????) ???? ???? ???? ? ?? ??????.

- *?? ?? 3?* - ? ??? ???? RFC 2697, *?? ?? 3? ??*? DiffServ(Differentiated Services) ??? ?? AF(Assured Forwarding) PHB(per-hop-behavior) ?? ???? ??? ??????. ? ??? ???? ??? CIR(Committed Information Rate), CBS(Committed Burst Size) ? EBS(Excess Burst Size)? ???? ???? ??????. ???? ???? ??? CBS(??) ????, CBS(???)? ?????? EBS? ???? ???, EBS(???)? ??????? ?? ? ?? ??(??, ??? ?? ???) ? ??? ??? ??? ? ????.

  ?? ?? 3? ???? ???? ?? ?? ??? ?? ?? ??? ?? ??? ? ?? ??????.

- *Two-rate three-color* - ? ??? ???? RFC 2698, A *Two Rate Three Color Marker*? DiffServ(Differentiated Services) ??? ?? AF(Assured Forwarding) PHB(per-hop-behavior) ?? ???? ??? ??????. ??? ??? ???? ??? CIR ? PIR(peak information rate)? ?? ??? ??, CBS ? *PBS(peak burst size*)? ? ??? ???? ??????. ???? ???? ??? CIR(??) ????, CIR(???)? ?????? PIR? ???? ???, ?? PIR(???)? ??????? ? ? ? ?? ??(??, ??? ?? ???) ? ??? ??? ??? ??????.

  2???, 3? ???? ???? ?? ??? ?? ???? ?? ???? ? ?? ??????.

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□ 123: □□□ □□

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	□□□(□□□)	□□	□□□ □□ □□ □□ □□ □□, □□□ □ □□ □□ □□ □□ □□ □□-□□ □□ □□-□□ □□ □□ □□□ □□□ □ □□□□
□□ □□□ 3□	□□(□□)	□□ □□ □□ □□ □□	□□
	□□□(CIR □ CBS □)	□□-□□ □□ □□ □□ □□	□□
	□□□(EBS □)	□□ □□ □□ □□ □□	□□□
2 □□□ 3 □	□□(□□)	□□ □□ □□ □□ □□	□□
	□□□(CIR □ CBS □)	□□-□□ □□ □□ □□ □□	□□
	□□□(PIR □ PBS □)	□□ □□ □□ □□ □□	□□□

□□□ □□□ □ PLP □□

□□□ □□□ □□□ □□ □ PLP □□□ Junos CoS □□□ □□ □□□□□. Junos CoS □□□□ □□□ □□□ □□□ □□□□ □□ □ DiffServ□ □□ □□ □ □□□ □ □□ □□□ □□□□□ □□□□ □□□□. IPv4, IPv6 □ MPLS □□□□ □□□□ □□□□□□ □□, □□□□ □□□□ □□□□ □□□□ □□ □ □□□ □□□□□ □□□□ □□□ □□ □□□ □□□ □□□□ □□□□□ CoS □□□ □□□ □ □□□□. □□□ □□□□□ □□ □□□ □□□ □□□ □□ □ PLP □□ □ □□□ □□□ □□ □□ □□□ □ □□□□(□□)□ □□□□□.

□: □□□ □□ □□□ □□□ □□□ □□□□ □□□ □□□ □ □□ □□ □□ □□□ □□ □□ □□□ BA □□□□□ □□□ □□□ □□□□□□.

CoS □□□ □□ □□□ □□□ □□□□ □□□ □□ □□ □□ □□ □□□□, □ □□ □□ /□/□/□□ □□□ □□ □□□ □□□ □□□□□.

□□ CoS □□□ □□□□ □□ □□□□ □□□ □□□ □□□□ □□ □□ □□ □□ □ □□ □□□ RED(Random Early Detection) □□□□□ □□ □□ □ □□□□ □ □□□□.

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- nonterminating □□ □□ `three-color-policer (single-rate | two-rate)` *policer-name* nonterminating □□□ □□□□ `policer` *policer-name* □□ □□ □□□ □□□ □□□ □□□ □ □□□□. □□ □□□□□□□ □□ □□ □□□ □□ □□□ □□□□ □□ □□□ □□□ □□□ □ □□□ □□□ □□□□ □□□□ □□ □□□ □□□□ □□□□□.

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>
> *Junos OS CoS □□□□□ □□ □□ □□□ □□*

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in this section

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- 2? ? 3? ??? ?? | 1817

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Junos OS? ? ?? ??? 3? ???? ??????. ?? ?? ? ?? ??. ?? ?? ???? 2 ?? ???? ?? ???? ?? ?? ???? ?? ?? ?? ?? ? ???? ???? ??, 2 ?? ???? ?? ???? ??? ???? ????? ????. ?? ?? ???? ?? ?? ?? ??? ???? ?????, ?? ??? ?? ??? ? ??? ??? ??? ??? ????? ?? ??? ??? ???? ???. ?? ?? ???? ?? ?? ?? ??? ???? ????, ?? ?? ? ?? ?? ?? ??? ???? ??????.

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□□ □□ 3□ □□□ □□□□ RFC 2697, *□□ □□ 3□ □□□* □□□□ □□□□. □□□ □□□ □□□□ □□□□ □□□ □□□□ □□ □□ □ □ □□ □□□ □□ (□□, □□□ □ □□□)□ □□ □□□ □ □□□□. □□ □□ 3□ □□□□ *□□*□ □□□ □□□ □□□ □□ □□□ □□□ *□□*□□□ □□ □□□ □□□□□. □□□ □□□ □□□ □□□□ □□□□ □□(□□)□□ □□□□□. □□ □□□ □□ □□□ □□ □□□□ □□□ □□□□ □□□□□ □□□ □□□ □□□□ □□□□ □□□□□ □□□□□. □□ □□ □□□□ □□□□□ □□□□□.

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2□□□ 3□ □□□

2□□□ 3□ □□□ □□□ RFC 2698, *2□□□ 3□ □□*□ □□□□ □□□□. □□□ □□□ □□□□ □□□□ □□□ □□□□ □ □□ □□□ □ □□ □□□ □□(□□, □□□ □ □□□)□ □□□ □□□ □ □□□□. 2□□□ 3□ □□□□ *□□*□ □□□ □□ □ □□□ □□ □□□ □□□ *□□*□□□ □□ □ □□□ □□ □□□ □□□□□. □□□ □□□ □□□ □□□□ □□□□ □□(□□)□□ □□□□□. □□□ □□□ □□□ □□□□□ □□ □□□ □□ □□□□ □□□□ □□□□ □□□□□ □□□□□. □□ □□□ □□□ □□□□ □□□□ □□□□□ □□□□□.

2□□□, 3□ □□□□ □□□□ □□ □□□ □□ □□□□ □□ □□□□ □ □□ □□□□□.

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2□ □ 3□ □□□ □□

2□ □ 3□ □□□□ □□ □□ □□□□ □□□ □ □□□□.

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CoS(Class of Service) ? ???? ?????? ?? BA(Behavior Aggregate) ???? ??????, ????? ??? ? ???? ???? ???, ?? ?? ????? ?? ?? ? ?? ????? ?? ????? ????? ??????. CoS ????? ???? ???? ????? ?? ?? ????? ??? ??????. CoS RED(Random Early Detection) ?????? ?? ?? ??, ?? ???? ?? ?? ? ?? ?? ?????? ????? ?? ????? ???? ????? ?? ?? ? ?? ???? ??????.

BA ???? ????? ???? ???? ?? ?? ???? ????? ???? ???? ??????. BA ???? IP ?? ???? *CoS ??* ????? ???. ?? ?? ??? CoS ?? ????? IP ?? ??? *?? ???* ????? ? ? ?????. CoS ?? ?? ???? ???? ????? ???? ????? ? ? BA ?? ?? ????? ???? ??????. ????? ??? ?? ?? ?? ????? ????? ????? ??? ??? ???, ?? ????? ?? ? ?? ????? ?? ??? ???? ?? ???? ????? ??????. ?? ? ???? ?? ?? ?? ???? ???? ?? ?? ?? ???? ?? ????? ????? ????? ?? ???? ? ?????.

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> 2? ???? ?? ?? | **1916**
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> 3? ???? ?? ?? | **1992**
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> ??? ???? ?? ?? | **1821**
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?? 84 ??? 1819 ?(?) ??? ???????? ??? ? ??? ?? ?? ??? ??????.

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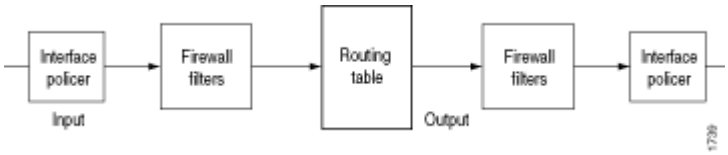

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3? ??? ?? ?? | 1992
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□ 124: □□□ □□□□ □□ □□□□ □□ □□

□□□□	□□□ □□ □□
□□(Any)	□□□ □□□ L3 □□□
IPv4	□□□ □□□ L3 □□□
IPv6	□□□ □□□ L3 □□□
MPLS	□□□ □□□ L3 □□□
VPLS	□
□□□	□
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Traffic Manager□□ □□ □□□□ □□□□ □□□ □□□□ | 1981

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3□ □□□□ DiffServ(Differentiated Services) □□□ □□ AF(Assured Forwarding) PHB(per-hop-behavior) □□ □□□ □ □□□□, □□ RFC□ □□ □ □□□□ □□□□.

- RFC 2474, *IPv4 □ IPv6 □□□ DS □□(Differentiated Services Field) □□*
- RFC 2475, *□□□□ □□□□ □□ □□□□*
- RFC 2597, *□□□ □□□ PHB □□*
- RFC 2598, *□□□ □□□ PHB*
- RFC 2698, *2□□□ 3□ □□*

DiffServ ???? IP ??? ?? ??? ??(ToS) ??? ?? ??? 6???? DSCP(*Differentiated Services Code Point*)?? ?? ?????. DSCP ?? ??? ?? ??? 3??? *IP ?????*??? ????, ? ??? ??? ?? ??? ?? ?? ??? ???? ? ??? ? ?????.

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- ?? FPC? SFPC?, ?? FPC? FFPC? M40e, M120 ? M320 ?? ????? ????? SONET ?????.
- ??? ??? ??(IQE) PIC? ?? T320, T640 ? T1600 ?? ????? ????? SONET ?????.
- ???? ??? ??? ?? 2(IQ2) ? ??? ?? IQ2(IQ2E) PIC? ??? ?????.
- MPC ?? DPC? ?? MX ??? ???.

? 125 ??? 1821 ??? ??? ???? ???? ??? ? ?? ?? ??? ??????.

? 125: ??? ??? ?? ? ??????? ??

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[edit firewall]
hierarchical-policer *policer-name*
{
aggregate {
if-exceeding {
bandwidth-limit *bps*;
burst-size-limit *bytes*;
}
then {
discard;
forwarding-class *class-name*;
loss-priority *supported-value*;
}
	?? A - ??? ??????? ??? 2 ?? ???? ?? ??:
	
	[edit interfaces]
	interface-name {
	layer2-policer {
	input-hierarchical-policer *policer-name*;
	}
	}
		??? ??????? ??? ?? ???? ??? ? ??? ??????? ?? ?? ?? ?? ?? ??? 2 ?? ???.
		
		layer2-policer ?? ???? ?? ?? [edit interfaces *interface-name*] ??????.
		
		?: ??? ??????? ??? ???? ? ??? ??, ??? ??? ??????? ?? ? ???? ??? ?? ????.

□ 125: □□□ □□□ □□ □ □□□□□□ □□ *(Continued)*

□□□ □□	□□□ 2 □□□□□□	□ □□□

}
premium {
if-exceeding {
bandwidth-limit *bps*;
burst-size-limit *bytes*;
}
then {
discard;
}
}
}
	□□ B - □□□ □□□□□□ □□□ 2 □□ □□□□ □□ □□□□□.
	
	[edit interfaces]
	interface-name {
	unit *unit-number* {
	layer2-policer {
	input-hierarchical-policer *policer-name*;
	}
	}
	}
		□□ □□□ □□□□□□ □□□ □□ □□□□ □ □□□ □□ □□ □ □□ □□ □□□ 2 □□ □ □□.
		
		layer2-policer □□ □□□□ □□ □□ [edit interfaces *interface-name* unit *unit-number*] □□□□ □.
		
		□: □□□ □□□□□□ □□ □□ □□□ □ □□□ □□□□ □□□□ □□□.

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□□□ □□□ | **1861**

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□: □ □□□ ACX7100-32C, ACX7100-48L, ACX7509 □ ACX7024 □□□□□ □□□ □ □□□□.

□□□ □□□ □□□ □□□□□ □□ 4□□ □□□□ □□□□□. □ □□□□ □□□ □□ □□□ □□□□□. □□ □□□ □□ □□□ 4□□ □□□ □□ □□□ □□, □□-□□, □□-□□ □ □□□□□. □□□ □□ □□□ □□□□□, □□□ □□ □□□ □□ □□ □□□ □□ □□□□, □□□ □□ □□□ □□ □□ □□□ □□ □□□□□. □□ □□ □□□ □□ □□□ □□ □□□ □□□□ □□□ □□□□□ □□ □□□ □□□ □□ □□□ □□ □□□ □□ □□□ □□□□ □□□ □□□□□ □□ □□□ □□□ □□ □□□□ □.

□□□ □□ □□□ □□□ □□ □□□(1□ □□ □□ 4□)□ □□ □□ □□□□ □□□□ □□□□□. □ 1□□ □ □□ □□ □□□□ 65Mbps□□□. □ □□□□□ □ □□ □□ □□□□□ CIR(Confirmed Information Rate) □ □□ □□ □□ □□(Maximum Confirmed Information Rate)□ □□ □□□. □□□□□□ □□ CIR □ □□ CIR □□ □□ □□□ □□ □□ □□□□ □□ □□ □□□□□.

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□ 126: □□□ □□□ □□□ □□□ □

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□□□ □□/□□□ □□ □□	**□□ □□ □□□**	**□□ CIR**
□□	5mbps	5mbps
□□-□□	10Mbps	15mbps
□□-□□	20mbps	35mbps
□□	30mbps	65mbps

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- □□□ □□□ □□□□ □□□ □□ □□□□. □□□ □□□ □□ □□□ □□ □□□ □□□ □□□□ □□□□□ □□□ □□□□ □□□□□.
- □□□ □□□ □□□ □□ □□□□ enhanced-hierarchical-policer □□□ □□□ □□ □□□ □□ □□□□ □□□.
- □□□ □□□ □□□ □□ □ □□□ □□ □□□ □□□□ □□□ □□ □□□□ □□ □□□ □□□□ □□□. □ □□ □□□ □□ □□□ □□□ □□ □□ □□ □□ □□□ □□ □□ CIR, MAX CIR □ CBS □□□ □□□□ □□□. □□□ □□ □□□ □□□ □□ □□ □□□ □□□□ □□ □□ □□□□.
- □ □□□ □□□ □□□ □□□ □□□ □□□□ □□□□ □□□ □□□□ □□□□ □□□□□ □□□.

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- [illegible] [illegible] [illegible] [illegible].
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible].
- [illegible] [illegible] [illegible].

[illegible] [illegible]:

- Junos OS [illegible] 23.3 R1 [illegible].
- ACX7100-32C, ACX7100-48L, ACX7509 [illegible] ACX7024 [illegible].

[illegible] [illegible]

1. [illegible] [illegible] [illegible].

```
[edit]
user@host# set firewall enhanced-hierarchical-policer hpol
```

2. 4[illegible] [illegible] [illegible], [illegible], [illegible]-[illegible], [illegible]-[illegible], [illegible] [illegible] CIR(Committed Information Rate), MIR(Maximum Committed Information Rate) [illegible] CBS(Committed Burst Size)[illegible] [illegible].

```
user@host# set firewall enhanced-hierarchical-policer hpol filter-specific
user@host# set firewall enhanced-hierarchical-policer hpol high committed-information-rate 5m
user@host# set firewall enhanced-hierarchical-policer hpol high max-committed-information-
rate 5m
user@host# set firewall enhanced-hierarchical-policer hpol high committed-burst-size 5k
user@host# set firewall enhanced-hierarchical-policer hpol high then discard
user@host# set firewall enhanced-hierarchical-policer hpol medium-high committed-information-
rate 10m
user@host# set firewall enhanced-hierarchical-policer hpol medium-high max-committed-
information-rate 15m
user@host# set firewall enhanced-hierarchical-policer hpol medium-high committed-burst-size
15k
user@host# set firewall enhanced-hierarchical-policer hpol medium-high then discard
user@host# set firewall enhanced-hierarchical-policer hpol medium-low committed-information-
rate 20m
user@host# set firewall enhanced-hierarchical-policer hpol medium-low max-committed-
information-rate 35m
user@host# set firewall enhanced-hierarchical-policer hpol medium-low committed-burst-size 35k
```

```
user@host# set firewall enhanced-hierarchical-policer hpol medium-low then discard
user@host# set firewall enhanced-hierarchical-policer hpol low committed-information-rate 30m
user@host# set firewall enhanced-hierarchical-policer hpol low max-committed-information-rate
65m
user@host# set firewall enhanced-hierarchical-policer hpol low committed-burst-size 65k
user@host# set firewall enhanced-hierarchical-policer hpol low then discard
```

3. [illegible]

```
user@host# set firewall family inet filter hpol-inet interface-specific
user@host# set firewall family inet filter hpol-inet term platinum from dscp af11
user@host# set firewall family inet filter hpol-inet term platinum then enhanced-hierarchical-
policer hpol traffic-priority high
user@host# set firewall family inet filter hpol-inet term gold from dscp af12
user@host# set firewall family inet filter hpol-inet term gold then enhanced-hierarchical-
policer hpol traffic-priority medium-high
user@host# set firewall family inet filter hpol-inet term silver from dscp af13
user@host# set firewall family inet filter hpol-inet term silver then enhanced-hierarchical-
policer hpol traffic-priority medium-low
user@host# set firewall family inet filter hpol-inet term dflt then enhanced-hierarchical-
policer hpol traffic-priority low
```

4. [illegible]

```
user@host# set interfaces et-0/0/1 unit 0 family inet address 100.1.1.6/32
user@host# set interfaces et-0/0/1 unit 0 family inet filter input hpol-inet
```

5. [illegible]

```
user@host# show firewall
Filter: hpol-inet-et-0/0/1.0-i
Enchanced Hierarchical Policers:
Name           Bytes     Packets
hpol
  High            0          0
  Medium-High     0          0
```

```
Medium-Low      0          0
Low             0          0
```

pps(Packets-Per-Second) ?? ??? ??

?? ????? ?????? DoS(??? ??) ??? DDoS(?? ??? ??) ??? ?? ?? ???????. ??? ??? ?? ??? ??? ????? ??? ?? ?? ?????? ??? ?? ??? ????? ??????? ??? ? ?? ??? ?? ?? ????? ????? ????? ?? ?? ????? ????? ? ?? ??? ????? ? ?? ??? ????? ? ?? ?? ????? ???????.

????? ?? ? ?? ?? ??? ????? Junos OS ??? 9.6?? ??? ?? ?? ??? ???(DDoS) ??? ????? ? ??? ? ?????. ??? ?? ?? ??? ??????? ?? ??? ??? ?????? ??? ?? ??? ????? "?? ????" ??? 817 ??? ??? ????? ????? ??????.

Junos OS ??? 15.1 ? ?? ??????? ????? ??? ? ?? ? ?? ?? ??? ??????. ??? ? ??? ??. ??? ?? ??? ?? ??? ?? ?? ?(bps)?? ??? ?? ?? ??? ?? ??? ???(B)???. ??? ??? "??? ??? ? ??? ?? ???" ??? 1852 ???????. ??? ????? ?? ??? ????? ?? ??? ???(DDoS) ??? ????? ? ?????? ?????.

Junos OS ??? 16.1?? ??? ????? ? `packet-burst` ?? ?? `pps-limit` ?? ?? ?(pps)? ????? ??? ? ?????. ? ?? `pps-limit` ?? ??? ?? ?? ?(pps)??, ? ?? `packet-burst` ?? ??? ??????. ??? pps ?? ????? ??? ?? ??? DDoS ??? ????? ? ? ?? ?????.

????? `if-exceeding-pps` ??? ????? ??? ?? ????? ??? ??? ??? ??? ??????. PPP ?? ????? ??? ?? ????? ??? ??? ? ?????. ??? ??? ?? ? ?? ??? ??? ??? ? ?? ??? ????? ????? ? ?? ??? ????? ??? ? ?????.

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> *if-exceeding-pps*
>
> *pps ??*
>
> *?? ???*

??? ??? ?? ??

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- ? ?? ??? ????? ??? ??? ?? ??? ???????? ?? ?? ??? ??? ? ?????. ?? ??, ????? ??? ????? ??? ??? ????????? ? ? ????? ??? ? ?????.
- ????? ??, ? ????? ??? ?? ??? ??? ?????? ??? ????? ?? ????? ?????.

- ?? ??? CoS ?? ???? ?? ??? ??? BA(Behavior Aggregate) ??? ?? ??????? ???? ?? ? ??? ?? ??? ??????? ?? 64?? ???? ??????.
- ???? BA ??? ??????? ???. BA ??? ??? ??????? ?? ???? ??? ?? EF(Expedited Forwarding) ?? ? EF(Non-EF)? ??????. BA ??? ???? ??? ?? ??? ??????? ?? 64?? ???? ??? ? ????. ??????? ??? ?????? ?? ??? ??? ??? ? ????.
- BA ??? ???? ?? ???(BA ?? DSCP/EXP ??? ???? *??* ???)? ? EF ?????? ???????. ? ???? ?? ??? ???? ??? ? ????.
- ???? ?????? ???? ??? ? ????. ???? ???? ?? ?? ??? ?? ??? ??? *???? ???? ?? ??*? ????????.

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> 2? ??? ?? ?? | **1916**
>
> 3? ??? ?? ?? | **1992**
>
> ??? ??? ?? ?? | **1821**

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??????? ???????? ?? ?? ???, 3? ?? ????, 2???? 3? ?? ????, ???? ????, ???? ?? ???? ??????. ?????? ???????? ???? ?? ? ???? ???? ? ???? ???? ???? ?? ???? ? ???? ??? ???? ????.

??????? ???? ?? ?? ???????? SONET ???? ???? ??????? ???? ???? ?? ???? ? ???? ???? ???? ?? ?? ???? ? ????. shared-bandwidth-policer ? ?? ???? ?????? ?? ??????.

? ???? ?? ???? ?? ???????? ???? ??????. ?? ?? ????, ?? ?? 3? ?? ????, 2???? 3? ?? ???? ? ???? ????. ???? ?? ???? ????? ???? ???? ?? ?? ?????? ?? ???? ???? ???? ???? ????. ???? shared-bandwidth-policer ???? ?? ???? ?? ???? ???? ???? ??????.

> ?: ? ???? ?? ?????? ??????. T ???? ???(T4000 Type 5 FPC ??), M120, M10i, M7i(CFEB-E? ? ?), M320(SFPC? ??), MX240, MX480, MX960(DPC, MIC ? MPC ?????? ??), EX ???? ???.

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- ?? ???? ???? ?????? ???:

```
[edit] interfaces (aeX | asX) unit unit-num family  family policer [input | output | arp]
```

- ??????? ?? ??? ???? ??? ? 3? ???(?????? 3? ?? ? 2??? 3? ?? ??); ?, interface-specific ???? ?? ?? ???? ???? ?????.

```
[edit] interfaces (aeX | asX) unit unit-num family family filter [input | output]
```

- ?? ?? ??? ?? - CLI ?? ???? ???? ??????? ??? ?????. ??? ??? ???? ?? ??? ? 3? ???? ??? ????.

?? ?? ?????? ???? ????.

- ??????? ?????? ?? ?? ??? ???? ??? ? 3? ???; ??? ??? ?? ???????? ?????? ???.
- ?? ??? ??? ?? ??? ??? ??? ???. ?? ??, ?? ??? ??????? ???? ?? ARP ???????. ??? ???? ?? ???????? ??? ?? ???.
- ???? ?? ???.

? ??? ?????? ?? ?? ???? ?? ?????? shared-bandwidth-policer . [edit firewall policer *policer-name*], [edit firewall three-color-policer *policer-name*] ?? [edit firewall hierarchical-policer *policer-name*]???.

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- ?? | 1829
- ?? | 1829
- ?? | 1835

? ???? ?? ?? 2? ???? ??? ?????? ???? ???? ??? ??????.

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- ???? | 1829

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?? ????? ???(? family any??)? ?? ????? ??? ????? ??? ??? ?? ??? ??? ????? ????? ????? ??? 3 ?? ?? ?? ?? ?? ??? ????? ????? ??? ? ?????. ?? ??? ??? ?? ??? ????? ?? ????? ?? ??? ?????, ????? ??? ??? ????? ??? ??? ?? ????? ??????.

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? ??? shared-policer-A??? ????? ????? 10,000,000bps? ??? ????? 500,000????? ?? ??? ????? ??????. ??? ?? ?? ??? ????? ????? ??????, ?? ??? ???, ?? ?? ?????(PLP) ?? ?? ? ?? ????? ??? ????? ?? ?????? ????? ??? ? ? ???.

????? ????? IPv4 ??? ??? ?????? IPv4 ??? ?????? ????? ????? ????? ???. ? ????? ?? ?? ?? ? ??? ????? ??? IPv4 ??? ?????? ??? ??????.

- TCP? ?? ????? IP ????? ??? `critical-ecp` (0xa0), (0x40) `immediate` ?? `priority` (0x20)? ??
- TCP? ?? ????? IP ????? ?? `internet-control` (0xc0) ?? `routine` (0x00)? ?? ??

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- ??? ????????? ??? ?????? ?? | 1830
- ??? ?????? ??? ?? | 1831
- IPv4 ??? ?????? ?? ?? | 1833

- IPv4 [illegible] | 1834

[illegible] CLI [illegible] "[illegible] CLI [illegible]" [illegible] 1787.

[illegible].

CLI [illegible]

[illegible], [illegible] CLI[illegible] [illegible] [edit].

```
set interfaces so-1/0/0 unit 0 family inet address 192.168.1.1/24
set interfaces so-1/0/0 unit 0 family vpls
set interfaces so-1/0/0 unit 1 family mpls
set firewall policer shared-policer-A physical-interface-policer
set firewall policer shared-policer-A if-exceeding bandwidth-limit 100m burst-size-limit 500k
set firewall policer shared-policer-A then discard
set firewall family inet filter ipv4-filter physical-interface-filter
set firewall family inet filter ipv4-filter term tcp-police-1 from precedence [ critical-ecp
immediate priority ]
set firewall family inet filter ipv4-filter term tcp-police-1 from protocol tcp
set firewall family inet filter ipv4-filter term tcp-police-1 then policer shared-policer-A
set firewall family inet filter ipv4-filter term tcp-police-2 from precedence [ internet-control
routine ]
set firewall family inet filter ipv4-filter term tcp-police-2 from protocol tcp
set firewall family inet filter ipv4-filter term tcp-police-2 then policer shared-policer-A
set interfaces so-1/0/0 unit 0 family inet filter input ipv4-filter
```

[illegible] [illegible]

[illegible]

[illegible] [illegible].

1. [illegible] [illegible].

```
[edit]
user@host# edit interfaces so-1/0/0
```

2. ?? ?? O?? ???? ???? ????.

```
[edit interfaces so-1/0/0]
user@host# set unit 0 family inet address 192.168.1.1/24
user@host# set unit 0 family vpls
```

3. ?? ?? 1?? ???? ???? ????.

```
[edit interfaces so-1/0/0]
user@host# set unit 1 family mpls
```

??

?? ?? ??? ???? ??? ??? show interfaces ??? ????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show interfaces
so-1/0/0 {
    unit 0 {
        family inet {
            address 192.168.1.1/24;
        }
        family vpls;
    }
    unit 1 {
        family mpls;
    }
}
```

??? ????? ??? ??

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1. 2□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# edit firewall policer shared-policer-A
```

2. 2□ □□□□ □□□ □□□□□.

```
[edit firewall policer shared-policer-A]
user@host# set physical-interface-policer
```

3. □□□ □□□ □□□ □□□ □□ □□□ □□ □ □□□ □□□□□.

```
[edit firewall policer shared-policer-A]
user@host# set if-exceeding bandwidth-limit 100m burst-size-limit 500k
user@host# set then discard
```

□□□ □□□□□ □□□ □□, □□□ □□□ □□□ □□□ □□ □□□ □ □□ □□□ □□□ □□□□□, □□□ □□□□ □□□□□, PLP □□ □□□□□, □□□ □ □□□ PLP □□ □□ □□□□ □□□□.

□□

□□ □□ □□□ □□□□ □□□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
policer shared-policer-A {
    physical-interface-policer;
    if-exceeding {
        bandwidth-limit 100m;
        burst-size-limit 500k;
    }
    then discard;
}
```

IPv4 □□□ □□□□□ □□ □□

□□□ □□

IPv4 □□□ □□□□□ □□□□ □□□ □□ □□□□ □□□ □□□□□ □□□□ □□□□□:

1. □□ □□□□ □□□□□ □□ □□□□□□ □□□ □□□ □□□□□.

```
[edit]
user@host# edit firewall family inet filter ipv4-filter
```

   □ □□ family any□□□ □□□□□ □□□ □□□ □□□ □ □□□□.

2. □□□ □□□□□ □□□□ □□□□ □□□ □ □□□ □□□ □□□ □□□□□ □□□ □□□□□.

```
[edit firewall family inet filter ipv4-filter]
user@host# set physical-interface-filter
```

3. TCP□ □□ □□□ IPv4 □□□ IP □□□□ □□ critical-ecp, immediate□□ priority □ □□□□□□□ □ □□ □□□ □□□□ □□□ □□□□□ □ □□□ □□ □□□□ □□□□□.

```
[edit firewall family inet filter ipv4-filter]
user@host# set term tcp-police-1 from precedence [ critical-ecp immediate priority ]
user@host# set term tcp-police-1 from protocol tcp
user@host# set term tcp-police-1 then policer shared-policer-A
```

4. TCP□ □□ □□□ IPv4 □□□ IP □□□□ □□ internet-control □ □□□□□□□ routine □ □□□ □□□□□ □□□□ □□ □□□□ □□□□□ □ □□ □□□ □□□□□.

```
[edit firewall family inet filter ipv4-filter]
user@host# set term tcp-police-2 from precedence [ internet-control routine ]
user@host# set term tcp-police-2 from protocol tcp
user@host# set term tcp-police-2 then policer shared-policer-A
```

??

?? ?? ??? ???? ??? ??? show firewall ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ??????.

```
[edit]
user@host# show firewall
family inet {
    filter ipv4-filter {
        physical-interface-filter;
        term tcp-police-1 {
            from {
                precedence [ critical-ecp immediate priority ];
                protocol tcp;
            }
            then policer shared-policer-A;
        }
        term tcp-police-2 {
            from {
                precedence [ internet-control routine ];
                protocol tcp;
            }
            then policer shared-policer-A;
        }
    }
}
policer shared-policer-A {
    physical-interface-policer;
    if-exceeding {
        bandwidth-limit 100m;
        burst-size-limit 500k;
    }
    then discard;
}
```

IPv4 ??? ????? ??? ???? ??? ????? ??? ??

??? ??

??? ????? ??? ???? ??? ????? ???? ????? ??? ??? ?????.

1. [illegible] IPv4 [illegible].

```
[edit]
user@host# edit interfaces so-1/0/0 unit 0 family inet
```

2. [illegible] IPv4 [illegible].

```
[edit interfaces so-1/0/0 unit 0 family inet]
user@host# set filter input ipv4-filter
```

[illegible]

[illegible] `show interfaces` [illegible].

```
[edit]
user@host# show interfaces
so-1/0/0 {
    unit 0 {
        family inet {
            filter {
                input ipv4-filter;
            }
            address 192.168.1.1/24;
        }
        family vpls;
    }
    unit 1 {
        family mpls;
    }
}
```

[illegible] `commit`[illegible]([illegible]) [illegible].

[illegible]

in this section

- [illegible] | 1836

- [illegible] | 1836

[illegible].

[illegible]

[illegible]

[illegible] ipv4-filter [illegible] so-1/0/0.0IPv4 [illegible].

[illegible]

show interfaces statistics [illegible] so-1/0/0.0[illegible] detail. **Protocol inet** [illegible] **Input Filters** [illegible] ipv4-filter [illegible].

```
user@host> show interfaces statistics so-1/0/0 detail
  Logical interface so-1/0/0.0 (Index 79) (SNMP ifIndex 510) (Generation 149)
    Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 173, Route table: 0
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Input Filters: ipv4-filter
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.39/16, Local: 10.39.1.1, Broadcast: 10.39.255.255, Generation: 163
```

[illegible]

[illegible]

[illegible].

[illegible]

[illegible] show firewall [illegible].

```
user@host> show firewall filter ipv4-filter
Filter: ipv4-filter
```

```
Policers:
Name                                                Packets
shared-policer-A-tcp-police-1                         32863
shared-policer-A-tcp-police-2                          3870
```

□□ □□□□ □□□ □□(shared-policer-A), □□□ □□□ □□□ □□ □□ □□(police-1) □ □□ □□□ □□□□ □□ □□ □□□□□. □□ □□□ □□□ (out-of-spec) □□ □□ □□ □□□, □□□□ □□ □□□□ □□ □□□ □□□□.

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□□ □□□ □□□□ □ □□□ □□ □□ □□ | 933

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2□ □□□ □□ □□ | 1916

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PTX □□□ □□ □□ □□□□ T □□□ □□□□ □□□□ □□□ □ □□□ □□□

□ □□□ PTX □□ □□ □□□□□ □□□ □ □□ □□□ □ □□□ □□ □□□ □□□□ T □□□ □□□□ □□□ □ □□□ □□□ □□□□□.

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PTX □□□ □□ □□ □□□□ Junos OS □□□ □ □□□ □□□□□□ IPv4 □□, IPv6 □□, MPLS □□, CCC □□, □□□□□ □□□, LSP □□ □, MAC □□□, ARP □□□, L2 □□□ □ □□ □□□ □□□□□. □□□ □□□ □□□□ □□□□.

- PTX □□□ □□ □□ □□□□ □□□ □□□□ □□□□.
  - □□ □□□ □□□ □□
  - MPLS/CCC□ □□ □□□ □□□ □□
  - □□□ VPLS
- PTX □□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□ □□□□. filter] □□ □□□ □[edit firewall family *family-name* filter *filter-name* term *term-name*□ □□□□□□□□.
- PTX □□□ □□ □□ □□□□□ □□□ PIC□ □□ □□□ □□□ □□□ IPv4 □ IPv6 □□□ □□□ □□ □□□□ □□□□. □□ □□□ □ [edit firewall family (inet | inet6)] □ service-filter □□□□□□□□.

- PTX ??? ?? ?? ???? ?? ??? ?????. ??? ??? ???? ??? ??? ??(IQ2) ? ??? ?? ??? ?? ???(EQ DPC) ???? ???? ?????. simple-filter ?? ??? ?[edit firewall family inet)] ? ????????.

- ??? ????? ???? ???? ????. physical-interface-filter ?? ??? ?[edit firewall family *family-name* filter *filter-name*] ? ????????.

- ??? ?? ??? PTX ??? ?? ?? ????? ???? ????. ?? ??? ? [edit firewall family inet] ? prefix-action ??????? ?.

- T ??? ??????? ???? ? ?? ?? ??? ???? ?? ??? ?? ???? ???? ????? ???? ???? ?? ??? ??? ??? ? ????. PTX ??? ?? ?? ???? ??? ??? ?? ?? ??? ???? ????. accounting-profile ?? ??? ? [edit firewall family *family-name* filter *filter-name*] ? ????????.

- reject ???(lo0) ????????? ??? ???? ????. ??????? ??? lo0 ???? ??? ??? ???? reject ??? ?? ???? ?????.

- PTX ??? ?? ?? ???? ???????? ??? ??? ????? ?? ??? ???? ????. ??? ?? ?? ????? ??? ?????.

- PTX ??? ?? ?? ???? ??? ?? ?? ? ??? ??? ?? ??? ??? ???? ?? ?? ? ???? ?? ?????. T ??? ???? ? ?? ?? ???.

- PTX ??? ?? ?? ???? ??? ?? ??????? ???? ? ??? ??? ????? ?? ????. interface-specific ?? ?? ???? ??? ? ????.

- PTX ??? ?? ?? ????? ?? ??????? CCC ???? ?? ?? ?? CCC ??????? ?? ???? ??? ?? ??? ?? ???? ????.

- CCC ????? ??, PTX ??? ?? ?? ???? ?? ??? 2 ????? ?? 8???? ?????. T ??? ???? ??? ????. ??? PTX ??? ?? ?? ???? ?? ???? ? ??? ?? 8???? ??? ???? ??? ???? ??? ????.

- PTX ??? ?? ?? ????? CLI ??? show pfe statistics traffic ???? DMAC ? SMAC ???? ?? ??? ??? ?????. T ??? ??????? MAC ??? FPC? ?? PIC?? ???? ??? ?? ???? ??? ??? ??? ???? ????.

- PTX ???? ???? ??? ?? ??? ?? ??? ?? is-fragment ? ? ????. ? ??? T ??? ????? ??????.

  PTX ??? ?? ?? ????? ??? ?? ??? ??? ???? ? ?? ?? ??? ???? ????. ? ????? ? is-fragment ?? ?? ??? ???? ?? ????? ? fragment-offset -except 0?? ?? ??? ??????.

- PTX ??? ?? ?? ????? ?? ??? 100Mbps? ???? MAC ?? ?? ???? ??????. ? ??? ??? ??? 105????? ?? ?? ?? ??????.

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PTX ??? ?? ?? ???? Junos OS ??? ? ??? ??????? IPv4 ??, IPv6 ??, MPLS ??, CCC ??, ????? ???, LSP ??, MAC ???, ARP ???, L2 ??? ? ?? ??? ??????. ??? ??? ???? ????.

- PTX ??? ?? ?? ????? ARP ???? ??????. T ??? ???? ??? ????.

- PTX ??? ?? ?? ???? LSP ???? ???? ????.

- PTX ??? ?? ?? ????? hierarchical-policer ?? ?? ???? ????. .

- PTX ??? ?? ?? ????? interface-set ?? ?? ????? ????. ? ?? ?? ??????? ??? ??? ????? ????? ???????.

- ??? ??? ??? ???, ?? ?? ?? ??? ??? ??(*?/?/?/?/?/?/?*) ??? ????, PTX ??? ?? ?? ????? T ???? ????? ??? ??????. ?? ??? ?? ????? ? ?? ??? ????? PTX ??? T ???? ??? ????? ?????? ? ? ?????.

  PTX ??? ??:

```
rule-1 {
    match: {x, y, z}
    action: {forwarding-class, loss-prio, next}
}
    rule-2 {
        match: {x, y, z}
        action: {policer}
    }
```

  T ???? ??:

```
rule-1 {
    match: {x, y, z}
    action: {forwarding-class, loss-prio, policer}
}
```

?? ??

> ??? ??, ??? ?? ? ??? ??? ??? ???

ACX ??? ????? ??? ??? ??

ACX ??? ??????? 2?? ?? ??? ????? ??????. ?? ?? ????? ?????? ?? ?? ??? ?????? ????? ?? ??? ????? ??????. 2? ? ????? ????? ?????? ???? ? ?? ?? ?? ??? ?? ?? ???? ????? ?? ??? ??? ????? ??? ? ?????. ?????? ?? ??? ????? ? ? ??? ?????? ??? ? ?????. ?? ?? ????? ????? ??? ?????? ??? CIR(Committed Information Rate) ? PIR(Peak Information Rate) ?? ?? ?? ?????? ????? ??? ??? ? ?????. ?? ??, ?? ????? ????? ?? ?? ??? CIR? ????? ?? ??? ? ?????? ? ? ?????. ???? ????????? ?? ?? ????? ????? ? ?? ???? ???? ? ???? ?? ?? ??? ????? ????? ????.

?: ??? ????? ACX5048 ? ACX5096 ????? ????? ?????.

□□□ □□□□ □□ □□□ □□ □□□ □□□□ □□□□ □□ □□□□ □□□□□ □□ □□□ □□□ □□□ □□□□□. □□□□ □□□□ □□□ □□ □□□ □□□□ □□ □□ □□□□, □□□ □□□ □□□ □□□ □□□□ □□□□□. □ □□□ □□□ □□ □□ □□□□ □□□ □□□□ □□□□□ □□□ □ □□ □□ □□□□ □□ □□□□□. □□□□ □□□□ □□□□ □□□ □□□□ □□□ □□□□ □□□ □ □□□□.

□: ACX □□□□ □□□ □□□ □□□□□ MX □□□ □□□□□ □□□□ □□□ □□□ □□□ □□□□. □□□ □□□□ □□ MX □□□ □□□□□ □□ □□□ □□□ □□□ □□□ □□ □□ □□ □□□□ □□□ □ □□ □□, ACX □□□ □□□□□□ □□ □□ □□□ □□□ □ □ □□ □□ □□□□ □□□□ □□□ □ □□□□. ACX □□□□ □□□ □□□ □□□□ □□ □□□□□□□ □□□.

□□□□ □□□ □□□□ □□□ □□□□ □□□□ □ □□□□□. □□□ □□□□ SLA(□□□ □□ □□) □ □□□□ □□□ □□ □□□□□□ □□□□□□ □□□ □□ □□ □ □□ □ □□□□ □□ □□□□□. □□□ □□□□ □□ □□ □□□ □□□□ □□□□□.

- □□ □□ □(bps)□ □□□□ CIR(Committed Information Rate)□□.
- CBS(Committed Burst Size)□ □□□ □□□ □□□□□.
- bps□ □□□□ □□ □□□(EIR).
- EBS(□□ □□□ □□)□ □□□ □□□ □□□□□.
- CM(□ □□)□ □□ □□ □ □□□ □ □□ □□□ □ □ □□□ □□□ □ □□□□. □□ □□ □□□□ □□ □□□□ □ □□ □□ □□ □□ □□□ □□□ □ □□□ □ □□ □□ □□ □□ □□□ □□□ □□ □□□□. □□ □□□□ □□ □□□□ □□□ □□ □□□ □□□□ □ □□□ □□ □□ □□ □□ □□□ □□□ □ □□□□.

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ACX □□□□ □□□ □□ □ □□□□ □□□□ □□□□. □□ □□ □□□□ □□, □□ □□ □□ □ □□ □□ □ □□□ □□ □□□ □ □□□□. □□ □□, 2□□ □□ □□□ □□□□ 2□□ □□ □□ □□□□□□ □□□□ 4□□ CoS □□□ □□□□□.

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ACX □□□ □□□□□ □□□ □□□□ □□□□ □□ □□ | 1841

ACX □□□ □□□□ □□□ □□□ □□ | 1842

ACX □□□ □□□□□ □□□ □□□ □□ | 1846

ACX □□□ □□□□□ □□□ □□□□ □□ □□□□ □□ | 1847

ACX □□□ □□□□□ □□ □□ □ □□ □□□ □□ | 1849

ACX ??? ?????? ??? ????? ????? ?? ??

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- ??? ????? ?? ????? ?? ????? ??? ????? ??????. ??? ??? ??? ? IPv4 ????? ?? ????? ?? ??? ? ?? ????? ?? ?? ??? ?????.
  - ??? ???

    ?? ??? ??? ??? ????? 124?? ??? ?? ??.

    ??? ??? ?? ??? ??? ?? ?? family-bridge ??? ?? ?? ?? ? 62?? ???.

    62?? ????? ?? ??? ??? ?? ??? ?? ?? ?? 62?? family-bridge ??? ??? ? ?????.

  - ??? inet

    ?? family-inet ??? ????? 250? ??? ??? ??.

    ??? ????? ?? family-inet ??? ?? ?? ?? ? 125?? ???.

    125?? ????? ?? ??? ?? ?? ?? 62?? family-inet ??? ??? ? ?????.
- ??? ????? ?? ????? ??? ??? ??? ? ??? ?? ??? ??????.
- ??? ?? ??? ?????? ?????? ????? ?? ?? ????? ?? ??? ??? ??? ??? ????? ???.
- ?? ??? ? ?? ????? ??? ??? ????? ??? ? ?????.
- ?? ??? ? ?? ?? ??? ????? ??? ?? ??? ??? ??? ? ?????.
- ?? ????? ????????? ?? ?? ????? ??? ????? [edit firewall policer *policer-name*] ??? ? ?????. ??, ????? ??????? ?? ????? ?? ?? [edit firewall policer *policer-name*] ????? ??????.
- ?? ?? ????? ?? ?? ????? ??? ?? ?? ?? ??? ????? ???.
- ?? ??? ?????? ??? ?? ????? ?? ??????.
- ?? 2?? ??? ????? ?? ACX ?????? ??????.
- ?? ????? ?? ????? ??? ?? ????? ?? ?? ??? ????? ??? ?????? ??????.
- ?? 32?? ??? ??? ?????? ??? ? ?????. ??? ??? ?????? ?? 32?? ?? ????? ??? ? ?????.
- ??????? ??? ???????? ??? ????? ??? ? ?????.

□: □□□ □□□□ ACX5048 □ ACX5096 □□□□ □□□□ □□□□.

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ACX □□□ □□□□ □□□ □□□ □□ | 1839

ACX □□□ □□□□ □□□ □□□ □□ | 1842

ACX □□□ □□□□□ □□□ □□□ □□ | 1846

ACX □□□ □□□□□ □□□ □□□□ □□ □□□□ □□ | 1847

ACX □□□ □□□□□ □□ □□ □ □□ □□□ □□ | 1849

ACX □□□ □□□□ □□□ □□□ □□

in this section

- □□□ □□ | 1842
- □□ □□ | 1844
- □□□□□ □□ | 1845

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□: □□□ □□□□ ACX5048 □ ACX5096 □□□□ □□□□ □□□□.

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□□□□ □□ □□□□ □□ □□ □□ PIR(□□ □□ □□)□ 140Mbps□ □□ □□□□□ □□□□□. EF(Expedited Forwarding), □□, □□ □ □□ □□□ □□ □ 4□□ □□□ □□ □□□□□□□ CIR□ □□ 50Mbps, 40Mbps, 30Mbps □ 20Mbps□ □□□□ □□ □□□ □□□ □□ □□□□□.

□□ □□, 4□□ □□□ □□□ □□ 140Mbps□ □□□□ □□□□ □□□□ □□□ □□□ □□ 50, 40, 30 □ 20Mbps□□□. 150Mbps□ □□ □□ □□ □□□□ □□ □□□□□ 140Mbps□ □□□□□.

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Junos OS?? ?? ??? ?? ?? ??? ???? ???? ??? CIR, PIR, CBS ? PBS ?? ?? ??? ??? ???? ?????? ???? ?? ?? ??? ???? ? ?????. ?? ???? ???? ???? ??? ?? ??? ??? ?? ?? ??? ??? ??? ??? ????.

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- Global(???) - ???? ?? ?? ??? ?????? ??? ?? ???? ?????.
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- Filter-specific—??? ??? ?? ?? ??? ??????? ??? ?? ???? ?????. ? ??? ACX ????? ???? ????.
- Interface-specific—??? ??? ??????? ?? ?? ??? ??????? ??? ?? ???? ?????. ? ??? ACX ????? ???? ??? ?.

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P3??? ?? ???? ??? ?? ??? ???????. P1 ? P2? ?? ???????. T1, T2, T3 ? T4? ??????. F1 ? F2? ??????. ???? ?? ???, IFL1 ? IFL2? ? ???? ?? ??? ??????? IFD1 ? IFD2? ??????. ?????? ?? ???? ??????? IFF1 ? IFF2? ??????.

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ACX □□□ □□□□□ □□□ □□□ □□ | 1839

ACX □□□ □□□□□□ □□□ □□□□□ □□□□□ □□ □□ | 1841

ACX □□□ □□□□□ □□□ □□□ □□ | 1842

ACX □□□ □□□□□□ □□□ □□□ □□ | 1846

ACX □□□ □□□□□□ □□ □□ □ □□ □□□ □□ | 1849

ACX □□□ □□□□□□ □□ □□ □ □□ □□□ □□

ACX □□□ □□□□□□□ 2□□ □□ □□□ □□□□□ □□□□□□. □□ □□ □□□□□ □□ □□□ □□□□□ □□□□□□. □□ □□ □□ □□ □□□□□ □□□□□ □□ □□□□□ □□□□□□ □□ □□□ □□ □□ □□□□□ □□□□□□ □□□□□ □□□□. □□ □□, □□ □□ □□ □□□□□□ □□□ □□□ □□ □□ □□□□□ □□ □□□ □□ □□ □□□ □□ □ □□□ □ □□□□□.

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□: ACX □□□□ □□□ □□□ □□□□□ MX □□□ □□□□□ □□□□□ □□□ □□□ □□□ □□□□□. □□□ □□□□□ □□ MX □□□ □□□□□□ □□ □□□ □□□ □□□ □ □□ □□ □□ □□ □□□□□ □□□ □ □□ □□, ACX □□□ □□□□□□ □□ □□ □□□ `[edit firewall]` □□ □□ □□□ □□□ □□ □□ □□ □□□□□ □□□□□ □□□ □ □□□□□. ACX □□□□ □□□ □□□ □□□□□ □□ □□□□□ □□ □□□. `hierarchical-policer` MX □□□ □□□□□ `[edit firewall]` □□□□ □□ □□□ □□ □□ □□ ACX □□□ □ □□□□ □□□ □ □□□□.

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1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
user@host# set policer mi_pol_1 if-exceeding bandwidth-limit 25m
user@host# set policer mi_pol_1 if-exceeding burst-size-limit 3k
user@host# set policer mi_pol_1 if-exceeding aggregate-policing policer mi_pol_x aggregate-
sharing-mode peak;
user@host# set policer mi_pol_1 then discard
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] aggregate-sharing-mode [illegible] [illegible] [illegible] [illegible].

```
user@host# set policer mi_pol_2 if-exceeding bandwidth-limit 30m
user@host# set policer mi_pol_2 if-exceeding burst-size-limit 30k
user@host# set policer mi_pol_2 if-exceeding aggregate-policing policer mi_pol_x aggregate-
sharing-mode peak;
user@host# set policer mi_pol_2 then discard
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] aggregate-sharing-mode [illegible] [illegible] [illegible] [illegible].

```
user@host# set policer mi_pol_x if-exceeding bandwidth-limit 55m
user@host# set policer mi_pol_x if-exceeding burst-size-limit 35k
user@host# set policer mi_pol_x aggregate global
```

4. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] show filter policer template [illegible] [illegible].

```
user@host# show filter policer template
AppType Template name       Bw limit-bits/sec      Burst-bytes     Action Options
------- -------------       -----------------      -----------     --------------
      0 mi_pol_1
                            25000000                3000             DROP
         Aggregate Child of mi_pol_x mode=2
      0 mi_pol_2
                            30000000                30000            DROP
         Aggregate Child of mi_pol_x mode=2
      0 mi_pol_x
                            55000000                35000            DROP
         Aggregate Parent
```

5. [illegible] show filter aggregate-policer [illegible].

```
user@host# show filter aggregate-policer p1
CHILDREN
-------
#1) [UNI1_filtermi_pol_trtcm1-t2]  CBS[1000]kB; CIR[10000]kbps;  CBS[2000]kB; PIR[30000]kbps;
Agg mode = 3;
#2) [UNI2_filtermi_pol_trtcm2-t2]  CBS[1000]kB; CIR[15000]kbps;  CBS[2000]kB; PIR[35000]kbps;
Agg mode = 3;


PARENT
------
[p1]  PBS[3000]kB; PIR[38000]kbps;
Sum child CIR[25000]kbps;CBS[2000]kB;
Sum child PIR[65000]kbps;PBS[4000]kB;
Max child CIR[15000]kbps;CBS[1000]kB;
Max child PIR[35000]kbps;PBS[2000]kB;


RESULTS
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STATUS = OK
```

[illegible]

ACX [illegible] | 1839

ACX [illegible] | 1841

ACX [illegible] | 1842

ACX [illegible] | 1846

ACX [illegible] | 1847

chapter label in part31

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in this chapter

- ??? ??? ? ??? ?? ?? | 1852
- ??? ?? ?? ? ?? | 1854
- ?? ?? ?? ???? | 1857
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	bandwidth-percent 1..100 ???	

□ 127: □□□ □□□ □□ □ □□□ □□ □□ ***(Continued)***

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	peak-information-rate *bps*; M □ T □□□ □□□: 1500..100000000000 MX □□□ □□□: 8000..1844674407370955161 5	peak-burst-size *bytes*; M, MX, T □□□ □□□: 1500..100000000000
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□ 128 □□□ 1855 □□ □□□□ □ Junos OS □□□ □□□ □□□□ □□□□. □ □□□ □□□ □□ □□□ □□□ □□□□ □□□□ □ □□□□ □□ □□ □ □□ □ □□□ □□ □□ □□□ □□□ □□□□ □□□ □□ □□ □□□ □□□□ □□□□.

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- CIR(Committed Information Rate)
- □□□ □□□ □□(CBS)
- □□ □□□ □□(EBS)

	□□ CIR □ CBS □□	PLP□ □□□□ □□ low	-
	□□ CIR □ CBS□ □□□□□ EBS□ □□□□□.	PLP□ □□□□ □□ medium-high	-
	□□ EBS□ □□□□□.	PLP□ □□□□ □□ high	• □□□ □□□□□.

□ 128: □□ □□□ □□□□ □□ □□□□□ □□ □□□ □□□ □□ *(Continued)*

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- CIR(Committed Information Rate)
- □□□ □□□ □□(CBS)
- □□ □□ □□(PIR)
- □□ □□□ □□(PBS)

	□□ CIR □ CBS □□	PLP□ □□□□ □□ low	–
	□□ CIR □ CBS□ □□□□□ PIR□ □□□□□.	PLP□ □□□□ □□ medium-high	–
	□□ PIR □ PBS □□	PLP□ □□□□ □□ high	• □□□ □□□□□.

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	□□ □□ □□ □□	PLP□ □□□□ □□ low	–
	□□ □□ □□ □□	–	• □□□ □□□□□. • □□□ □□□□ □□□□□. • PLP□ low □□ high□ □□□□□. □□ □□□□□□ PLP□ □□ medium-high□ □□□ □□ □□□□ medium-low.

표 128: ■■ ■■■ ■■■■ ■■ ■■■■■ ■■ ■■■ ■■■ ■■ *(Continued)*

■■■ ■■ ■■ ■ ■■ ■■	■■■ ■■	■■ ■■■ ■■
■■■■ ■■■ • ■■■ ■■ • ■■■ ■■		
■■ ■■ ■■ ■■	PLP■ ■■■■ ■■ low	–
■■ ■■ ■■ ■■	–	• ■■■ ■■■■■.

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> ■■■ ■■■ ■ ■■■ ■■ ■■ | 1852
> ■■■ ■■■■ ■■ ■■■ ■■■ ■■ ■■ | 1805

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in this section

- ■■ ■■ ■■ | 1857
- ■■ ■■ ■■ ■■■■ | 1858
- 2■ ■■■ ■■ ■■■ ■■ | 1858

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- □□ □□ □□□ □□□□ □□ □□□ □□ *□□□ □□□* □□□□□. □□□□ □□□□ burst-size-limit *bytes* □□□ □□□ □□□□□.
- □□□ □ □□ □□□□ □□□ □□□ "□□□□"□□ □□□□□.

□□□ □□□□□□□ □□□□ □□□□□ □□□□ □□ □□□ □□□□ □□ □□ □□□ □□□□□ □ □□ □□□ □□□, □ □□ □□ □□ □□ □□(PLP) □□ □□ □ □□ □□ □□□ □ □□□□.

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2□ □□ □□□□□ □□ □□ □□ □□ □□□ □□ □□ □□(□□□ □□)□ □□□□ □□ □□□ □□□ *□□□□ □□□□ □□□* □□□□□. □□□ □□□ □□(□□ □□ □□□ □□□)□ □□□ □□□□□ □□ □□ □□□□(PLP) □□□□ low □□□ □□ □□□□□□ □□□□□.

□□ □□ □□ □□ □□□ □□ □□ □□□ □□□□ □□□ □□□ □□, 2□ □□□ □□ □□□ □□ □□ □□□ □□□ □□□ □□ □□□□□. □□□ □□□ □□□ □□ □ □□ □□□□ □□□□ □□□□ □□□ □□□□□. □□□ □□□ □□□ □□□□ □□ □□□ □□□□ *□□□ □□□□□* □□□□□. □□□ □□□ □□□(□□ □□□□□ □ □)□ □□□ □□□ □□□ □□ □□□□□. 2□ □□□□ □□□ □□ □□□ □□□□□ □□□ □ □□□□. □□ □□□ □□□ □□□ □□□, □□□ PLP □□ □ □□ □ □ □□□ □□ □□□□□□ □□□ □ □□□□.

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□□□□□ □□□□ □□ □□(□□ □□ □□□□ □□ □□ □□□ □□□□□□ □□□□□ □□□□□□□ □□□□ □□□) □□ □□□□ □□ □□□ □□□ □□□□□ □□□ □□ □□ □□□□□ □□□□□.

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2□ □□□ □□ □□ | 1916

□□□ □□□ □□ □□ | 1821

??? ?? ?? ? ?? | 1854

bandwidth-limit (Hierarchical Policer)

bandwidth-limit (Policer)

bandwidth-percent

burst-size-limit (Hierarchical Policer)

burst-size-limit (Policer)

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in this section

- ?? ?? ?? | 1859
- 3? ??? ?? ??? ?? | 1859
- ?? ?? 3? ??? ?? ??? ?? | 1860
- 2 ??? 3 ? ??? ?? ??? ?? | 1860

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??????? ?? ?? ?? ???? ??? ???? ??? ?, ??? ??? ??? ?? ?? ? ??? ??????? ?? ??? ??? ?? ??? ???? ??? ?? ? ?? ??? ???? ?? ??? ??? ??? ???? ???? ? ?????. Junos OS ???? *??? ??? ??????* ???? ??? ?? ??? ?? ??? ??? ??? ?????. ?? ?? ??? ???? ?? ????? ?? ?? ?? ??? ???? ???? ??, ???? ?? ?? ?? ??? ?? ???? ??? ???? ?? ???.

3? ??? ?? ??? ??

CIR(Committed Information Rate)? ???? ?? ???? ??????? ????? ???????? ???? ???? ?? ??? ???? ?????. CIR? ???? ?? ??? ??? ???? ???? ????, ?? ???? ??? ????? ?? ?? ????(PLP)? low ??? ?? ??????? ?????. ?? ??? ?? ???(CIR ??? ?? ??? ??????? ????? ???????? ???? ???) ?? ?? ???? ?? ??? ??? ? ?? ?? ??? ????? ? ?? ??? ???? ?????. ???? ?? ??? ??? ? ?? ??? ??????? ?? ???? ? ?? ?? ??? ?????.

??? ??? ??(CBS)? ??? ???? ??? ?? ? ?? ?? ??? ??? ? ?? ?? ??? ?? ?????. CIR? ???? ?? ??? ??? ???? ? ? ? ?? ???? ??? ??? ??? ??? ??? ? ?? ?? ???? ?????.

?? ?? 3? ??? ?? ??? ??

?? ?? 3? ??? ??? ? ?? ??? ??(EBS)? ????, ? ?? ?? ??? ? ?? ???? ??????? ??? ???? ??? ? ?? ?? ??? ?? ?? ???.

??? ??? ?? ??? CIR? ??? ?? ????? ????, ? ?? ?? ???? ???? ?? ??? ??? ??? ??? ? ?? ?? ? ?? ??? ??? ?? ??? ??? ??? ?????. ??? ??? ??? ????? PLP? `medium-high` ??? ?? ??????? ?????.

??? ??? ????? ????, ?? ??? CIR? ???? ? ?? ??? ??? ?? ??? ??? ??? ?????. ??? ??? ??? ????? PLP? `high` ??? ?? ??????? ????? ????? ?????.

2 ??? 3 ? ??? ?? ??? ??

2?? ??? 3? ??? ???? ?? ???? ??????? ????? ???????? ???? ???? ?? ?? ??? ??? ???? ? ?? ?? ??? PIR(Peak-Information-Rate)? ?????.

?? 2??? 3? ??? ???? ? ?? ?? ??? ???? ?? ?? ??? ??? ??? ? ?? ?? ??? ?? ???? ? ?? ??? ??? ?? ??? ?? (PBS)? ?????. ????? ?? ?? ???(PIR? ???? ?? ??? ??????? ????? ???????? ???? ???) ?? ???? ?? ?? ??? ?? ? ? ?? ?? ??? ????? PBS?? ??? ?? ??? ???? ?????.

??? ??? CIR ? ? ?? ?? ??? ??? ?? ??? ?? ??? ??? ????? PIR? ???? ?? ????? ?????. ??? ??? ??? ????? PLP? `medium-high` ??? ?? ??????? ?????.

??? ??? PIR ? ? ?? ?? ??? ??? ?? ??? ?? ??? ??? ???? ?? ????? ?????. ??? ??? ??? ????? PLP? `high` ?? ? ?? ??????? ????? ????? ?????.

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> 3? ??? ?? ?? | **1992**
>
> ??? ?? ?? ? ?? | **1854**
>
> *committed-burst-size*
>
> *committed-information-rate*
>
> *excess-burst-size*
>
> *peak-burst-size*
>
> *peak-information-rate*

chapter label in part32

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- □□□ □□□ | 1861
- □□□ □□□□ □□ | 1885
- □□□ 2□ 2□ □ 3□ □□□ | 1887
- □□ □□□ □□□ 2 □□□ □□□ □□ | 1900
- □□ □□□ □□ 2□ □□□ 2 □□□ □□ | 1900
- □□ □□□ □□ 3□ □□□ 2 □□□ □□ | 1901
- □□ □□□ □□□□□□ □□□ □□ | 1903
- □□□ □□□□□ □□ □□□ □□ | 1904
- □□ □□ □□□□ □□□ 2 □□□ □□□□ □□ □□ □□ | 1905
- □□□ □□□ □□ □□□ □□ | 1906
- □□□ □□□ □□ □□ □□□ □□□ | 1907
- □□□ □□□ □□□ □□□□□ □□ □□□ □□ | 1908
- VPLS □□□□ □□□ 2 □□□ □□□ □□ | 1909
- OVSDB □□ □□□□□□ □□□ □□ | 1910
- □: OVSDB □□ □□□□□□ □□□ □□ | 1911

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- □□□ □□□ □□ | 1862
- □: □□□ □□□ □□ | 1863
- □: □□□ □□□ □□□(ACX7100-48L □□□□)□ □□ □□□ □□□ □□ | 1871

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- ??? ??? ??? ???(ACX7100-48L ????) | **1863**

??? ????? ????? ??? ?? *???? ????????* ?? ??? 2 ????? ??? ????? ??? EF(?? ??) ?? ?? ?? ??? ?????? ??? ?? ?? ??? ??? ??? ? ?????.

??? ????? ?? FPC(Flexible PIC Concentrator)? SFPC?, ?? FPC? FFPC? ???? M40E, M120 ? M320 ?? ??? ? IQE(Enhanced Intelligent Queuing) PIC? ?? MX ???, ACX7100-L, T320, T640 ? T1600 ?? ?????? ????? ?.

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??? ??? ??? ??? ????? ????? ? ?? ???(??? EF ??? ??, ?? ??? ? EF ????)? ??????.

- ????? ??? - ?? ??? ?? EF ????? ????? ??? ??? ?? ????? ????? ??????. ??? ??? ? ?? ??? ?? ??. EF ????? ?? ?? ??? ??? ????? ????? ?? ?? ??? ????? ??? ?? ??? ??? ? ?????? ??????. ????? ????? ??, ??? ????? ?? ?? ? ?? ??? ??? ??? ????? ?????.

- ?? ??? - ?? ???(??? ?????? ?? ??? ?? EF ????? ?? ?? ??? ?? EF ????? ?? ????? ??)? ? EF ????? ?? ??? ?? ????? ?? ????? ??????. ?EF ????? ?? ?? ??? EF ?????? ?? ????? ?? ? ????? ?? ????? ?? ?? ??? ?? ????? ??? ??? ?? ??? ??? ? ?????? ??????. ?? ????? ??, ??? ????? ?? ?? ??? ??? ??? ??????, ??? ????? ??????, PLP(Packet Loss Priority) ??? ????? ?????.

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EF ????? ????? ??? ????? ??? ????? ????? ??, ? EF ????? ?? EF ?????? ????? ?? ? ????? ??? ??? ??????. EF? ?? ????? EF ????? ?? ????? ?? ?? ?????? ??? ??????.

?? ??, ?? ?? ??? ??? ????? ?????? ??? ??????.

- ??? ??? 2Mbps? ?????, ???? ?? ??? 3000????? ?????, ??? ??? ??? ?????? ??? ????? ???????.

- ??? ??? 10Mbps? ?????, ???? ?? ??? 3000????? ?????, ??? ??? ??? ?????? ??? ?? ???.

EF ????? 2Mbps? ????? ??????. EF ??? ???(2Mbps ??? ??? ??????? ????? EF ???)? 3000??? ????? ??? ??? ??? ? ?? ?? ??????? ??? ? ?????. EF? ?? ????? ????? ??? ? ?? ??? ?? ?? ??? ????? ????? ?? ??? ??? ????? ?? ? ??????.

□ EF □□□□ EF □□□□ □□ □□ □□□ □□ 8Mbps□□ 10Mbps □□□ □□□ □□□□ □□□□□. □ EF □□□□ □□□(□ EF □□□□ □□ □□ □□□ □□□□ □□□ □□□□□□□ □□□□ □ EF □□□)□ 3000□□□ □□□□ □□□ □□□ □□□ □ □□ □□ □□□□□□□ □□□□□. □ EF □□□□ □□ □ □□ □□□□ □□□□□ □ EF □□□□ □□□□ □□□ □ □□ □□□ □□ □□, □□□ □□ □□□□ □□ □□□ □□□ □□□□ □□□ □□□□□.

□□□ □□□ □□□ □□□(ACX7100-48L □□□□)

- Junos Evolved □□□ 23.4R1□□ □□□ □□□ □□ CoA □□ □□□□□ □□□ □□□□□□ DHCP □ PPPoE □□□ □□□ □□□ □□□□ □□□ □ □□□□. □ □□□ □□□ □□ □□□ □□ □□□□ □□□ □□□ □□□□ □□□□□. □□ □□□ □ □□ □□□ □□ □□□ □□□□ □□ □□□ □□ □□ □□□ □□ □□□□□. No Link Title □□□ □□ □□ □ □ □□ □□□ □□□□ □□□ □□□□□□.

SEE ALSO

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>
> No Link Title

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- □□ | **1864**
- □□ | **1864**
- □□ | **1870**

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  - □□ FPC□ SFPC□, □□ FPC□ FFPC□ □□□□ M40e, M120 □□ M320 □□ □□□.
  - IQE(Enhanced Intelligent Queuing) PIC□ □□ MX □□□, T320, T640 □□ T1600 □□ □□□.
- □□□ □□□□ □□□□ □□□□□□ □□□□ □□ □□□□ □□□□ □□□□.

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- ???? | 1864

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IPv4 ? VPLS ???? ?? ???? SONET ??? ??????? so-1/0/0.0???? ?????. ??? ???? ?? ??? ??????? ???? IPv4 ? VPLS ??? ?? ????? ??? ?????.

?? MPLS ???? ?? ??? ??????? so-1/0/0.1 ?????. ??? ???? ??? ??????? so-1/0/0????? ??? ??, ??? ???? ? so-1/0/0.0 IPv4 ? VPLS ???? ? so-1/0/0.1MPLS ???? ?????.

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- ??? ??? ?? | 1866
- ??? ??? ?? | 1867
- ??? ?? ??? ???????? ??? 2 ?? ???? ??? ??? ?? | 1869

?? ?? ?? ???? ??? ??? ??? ?????. CLI ??? ?? ??? ??? ? ??????? "?? ???? CLI ??? ??" ??? 1787.

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CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ?????, ? ??? ??? ??, ?? ????? ??? CLI? ??????? [edit].

```
set interfaces so-1/0/0 unit 0 family inet address 192.168.1.1/24
set interfaces so-1/0/0 unit 0 family vpls
set interfaces so-1/0/0 unit 1 family mpls
set class-of-service forwarding-classes class fc0 queue-num 0 priority high policing-priority
premium
set class-of-service forwarding-classes class fc1 queue-num 1 priority low policing-priority
normal
set class-of-service forwarding-classes class fc2 queue-num 2 priority low policing-priority
normal
set class-of-service forwarding-classes class fc3 queue-num 3 priority low policing-priority
normal
set firewall hierarchical-policer policer1 aggregate if-exceeding bandwidth-limit 300m burst-
size-limit 30k
set firewall hierarchical-policer policer1 aggregate then forwarding-class fc1
set firewall hierarchical-policer policer1 premium if-exceeding bandwidth-limit 100m burst-size-
limit 50k
set firewall hierarchical-policer policer1 premium then discard
set interfaces so-1/0/0 unit 0 layer2-policer input-hierarchical-policer policer1
```

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1. ??? ??????? ??? ???????.

   ```
   [edit]
   user@host# edit interfaces so-1/0/0
   ```

2. ?? ?? O? ?????.

   ```
   [edit interfaces so-1/0/0]
   user@host# set unit 0 family inet address 192.168.1.1/24
   user@host# set unit 0 family vpls
   ```

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3. □□ □□ 1□ □□□□□.

```
[edit interfaces so-1/0/0]
user@host# set unit 1 family mpls
```

□□

□□ □□□ □□□□ show interfaces □□□□□□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show interfaces
so-1/0/0 {
    unit 0 {
        family inet {
            address 192.168.1.1/24;
        }
        family vpls;
    }
    unit 1 {
        family mpls;
    }
}
```

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1. □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# edit class-of-service forwarding-classes
```

2. ??? ???? ?????.

```
[edit class-of-service forwarding-classes]
user@host# set class fc0 queue-num 0 priority high policing-priority premium
user@host# set class fc1 queue-num 1 priority low policing-priority normal
user@host# set class fc2 queue-num 2 priority low policing-priority normal
user@host# set class fc3 queue-num 3 priority low policing-priority normal
```

??

?? ??? ???? show class-of-service ?? ??? ???? ???? ??? ???? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ? ?? ???? ??? ????????.

```
[edit]
user@host# show class-of-service
forwarding-classes {
    class fc0 queue-num 0 priority high policing-priority premium;
    class fc1 queue-num 1 priority low policing-priority normal;
    class fc2 queue-num 2 priority low policing-priority normal;
    class fc3 queue-num 3 priority low policing-priority normal;
}
```

??? ??? ??

??? ??

??? ???? ??????:

1. ??? ???? ??? ????????.

```
[edit]
user@host# edit firewall hierarchical-policer policer1
```

2. ?? ???? ??????.

```
[edit firewall hierarchical-policer policer1]
user@host# set aggregate if-exceeding bandwidth-limit 300m burst-size-limit 30k
user@host# set aggregate then forwarding-class fc1
```

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3. □□□□ □□□□ □□□□□.

```
[edit firewall hierarchical-policer policer1]
user@host# set premium if-exceeding bandwidth-limit 100m burst-size-limit 50k
user@host# set premium then discard
```

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□□

□□ □□□ □□□□ □□□ □□□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
hierarchical-policer policer1 {
    aggregate {
        if-exceeding {
            bandwidth-limit 300m;
            burst-size-limit 30k;
        }
        then {
            forwarding-class fc1;
        }
    }
    premium {
        if-exceeding {
            bandwidth-limit 100m;
            burst-size-limit 50k;
        }
        then {
            discard;
        }
    }
}
```

[illegible]

[illegible]

[illegible] [illegible] so-1/0/0.0[illegible] IPv4 [illegible] VPLS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces so-1/0/0 unit 0
```

[illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

2. [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# set layer2-policer input-hierarchical-policer policer1
```

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] so-1/0/0[illegible] *[illegible] [illegible] [illegible]* [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] show interfaces [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show interfaces
so-1/0/0 {
    unit 0 {
        layer2-policer {
            input-hierarchical-policer policer1;
        }
        family inet {
            address 192.168.1.1/24;
        }
        family vpls;
    }
    unit 1 {
        family mpls;
```

```
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

- □□□ □□□□□□ □□ □□□ □□ □ □□□ □□ | 1870
- □□□□ □□ □□ □□ | 1870

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□□

show interfaces □□□ □□□□□□□ so-1/0/0.0□□ □□ □□ □□□ □□□□, □□ extensive □□□ detail □□□□□. □ □□ **Traffic statistics** □□ □□ □□□ □□□ □□□□□□□□ □□ □ □□□ □□□ □ □□ □□ □□□□, □□□□ **Protocol inet** □□□ □□ □□□□ policer1 □□ □ □ □□ □□□□ □□□□ □□□ □□□□ **Policer** □□□□.

- **Input: policer1-so-1/0/0.0-inet-i**
- **Output: policer1-so-1/0/0.0-inet-o**

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??

?? ?? ??? show policer ???? ????? ???? ??? ??????. ?? ??? ? ???? ??? ? ???(?? ??? ???)? ??? ?? ?? ???? ?. ??? policer1? ??, ?? ? ?? ??? ??? ??? ?? ??????.

- **policer1-so-1/0/0.0-inet-i**
- **policer1-so-1/0/0.0-inet-o**

-inet-i ???? IPv4 ?? ???? ???? ???? ????, **-inet-o** ???? IPv4 ?? ???? ???? ???? ??????. ? ??? ???? ?? ?? ??? ??????.

SEE ALSO

??? ??? ?? ?? | 1821

??? ??? ??

?: ??? ??? ???(ACX7100-48L ????)? ?? ??? ??? ??

IN THIS SECTION

- ?? | 1871
- ?? ???? | 1872

? ?? ??? ???? ???? ???? ???(ACX7100-48L)? ??? ???????? ?? ???? ???? ???? ??? ??????.

??

Junos Evolved ??? 23.4R1?? ??? ???? ???? ? ???? ??? ???????? ?? ???? ??? ? ????. ? ??? ACX7100-48L ???? ??????.

NOTE:

- ??? ??? ??? ?????? ??? ?? ??? ????.
  - 4? ??? ??? ???? ??? ? ???, ? ???? ???????? ? ???? ??? ????.

- [illegible]

- [illegible]

```
class-of-service
{
     forwarding-classes
            {
               class BestEffort queue-num 0 priority low policing-priority
normal;
            }
}
```

- next term [illegible]

- [illegible]

- [illegible] forwarding-class [illegible] loss-priority high [illegible]

- [illegible] policer [illegible] loss-priority.

- filter-specific [illegible]

- [illegible]

- [illegible]

- Tri-color [illegible]

[illegible]

IN THIS SECTION

- [illegible] | 1873
- [illegible] | 1873
- 2 [illegible] | 1877
- DHCP [illegible] PPPoE[illegible] | 1879

[illegible]

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DHCP □ PPPoE □□□ □□□□ □□ □□ 2□ □□ □□□□ □□□ □ □□□□. □□□ □□□ □□□ □□ CoA □□ □□□□□□. □□□ □□□□ show dynamic-profiles pppoe-client-policer-1-profile □□□ □□□. □□ □□□ □□□ □□□□.

```
[edit]

root@bng-controller# show dynamic-profiles pppoe-client-policer-1-profile
variables {
    downstream-inet uid;
    upstream-inet uid;
    HPolicer-in uid;
    HPolicer-out uid;
}
interfaces {
    pp0 {
        unit "$junos-interface-unit" {
            actual-transit-statistics;
            no-traps;
            ppp-options {
                chap;
                pap;
            }
            pppoe-options {
                underlying-interface "$junos-underlying-interface";
                server;
            }
            keepalives interval 30;
            family inet {
                filter {
                    input "$upstream-inet";
                    output "$downstream-inet";
                }
                unnumbered-address lo0.0;
            }
            family inet6 {
                unnumbered-address lo0.0;
            }
        }
    }
```

```
}
firewall
{
    family inet
{
        filter "$downstream-inet"
        {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    policer "$HPolicer-in";
                    accept;
                }
            }
        }
        filter "$upstream-inet" {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    policer "$HPolicer-out";
                    accept;
                }
            }
        }
    }
    policer "$HPolicer-in" {
        if-exceeding {
            bandwidth-limit 5m;
            burst-size-limit 5k;
        }
        then discard;
    }
    policer "$HPolicer-out" {
        if-exceeding {
            bandwidth-limit 10m;
            burst-size-limit 10k;
        }
```

```
        then discard;
    }
}
```

DHCP 및 PPPoE 클라이언트 프로필에 대한 변수 및 인터페이스 구성 확인. 클라이언트 프로필 및 CoA 프로필 확인. 클라이언트 프로필 show dynamic-profiles pppoe-client-policer-1-profile 명령을 실행. 변수 구성 및 인터페이스 구성.

```
[edit]
user@bng-controller# show dynamic-profiles pppoe-client-policer-2-profile | no-more
variables
    {
        downstream-inet uid;
        upstream-inet uid;
        HPolicer-in uid;
        HPolicer-out uid;
    }
interfaces
    {
        pp0
            {
                unit "$junos-interface-unit" {
                actual-transit-statistics;
                no-traps;
                ppp-options
                    {
                        chap;
                        pap;
                    }
            pppoe-options
                {
                    underlying-interface "$junos-underlying-interface";
                    server;
                }
            keepalives interval 30;
            family inet {
                filter {
                    input "$upstream-inet";
                    output "$downstream-inet";
                }
                unnumbered-address lo0.0;
            }
            family inet6 {
```

```
                unnumbered-address lo0.0;
            }
        }
    }
}

firewall {
    family inet {
        filter "$downstream-inet" {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    policer "$HPolicer-out";
                    accept;
                }
            }
        }
        filter "$upstream-inet" {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    three-color-policer {
                        single-rate "$HPolicer-in";
                    }
                    count three-color-policer-count;
                    accept;
                }
            }
        }
    }
policer "$HPolicer-out" {
        if-exceeding {
            bandwidth-limit 10m;
            burst-size-limit 10k;
        }
        then discard;
    }
```

```
    three-color-policer "$HPolicer-in" {
        action {
            loss-priority high then discard;
        }
        single-rate {
            color-blind;
            committed-information-rate 5m;
            committed-burst-size 5k;
            excess-burst-size 15k;
        }
    }
}
```

2 ??? ???? ?? ?? ???

DHCP ? PPPoE ??? ???? ? ?? ?? ???? ?? ?? ???? ???? ? ????. ???? ???? ?? CoA ?? ???????.

? ?????? ???? ???? ?? ?? ???? ???? ? ? ????. ?? ???? ???? ?????? ???? ?? ???? ???? ?? ???? ???? ?? ???? ?? ? ?? ??????. ???? ???? show dynamic-profiles pppoe-client-policer-1-profile ???? ????. ?? ???? ???? ????.

```
[edit]

root@bng-controller# show dynamic-profiles pppoe-client-policer-3-profile | no-more
variables {
    downstream-inet uid;
    upstream-inet uid;
    HPolicer-in uid;
    HPolicer-out uid;
}
interfaces {
    pp0 {
        unit "$junos-interface-unit" {
            actual-transit-statistics;
            no-traps;
            ppp-options {
                chap;
                pap;
            }
            pppoe-options {
                underlying-interface "$junos-underlying-interface";
                server;
```

```
            }
            keepalives interval 30;
            family inet {
                filter {
                    input "$upstream-inet";
                    output "$downstream-inet";
                }
                unnumbered-address lo0.0;
            }
            family inet6 {
                unnumbered-address lo0.0;
            }
        }
    }
}
firewall {
    family inet {
        filter "$downstream-inet" {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    policer "$HPolicer-out";
                    accept;
                }
            }
        }
        filter "$upstream-inet" {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    three-color-policer {
                        two-rate "$HPolicer-in";
                    }
                    count three-color-policer-count;
                    accept;
                }
            }
```

```
        }
    }
    policer "$HPolicer-out" {
        if-exceeding {
            bandwidth-limit 10m;
            burst-size-limit 10k;
        }
        then discard;
    }
    three-color-policer "$HPolicer-in" {
        action {
            loss-priority high then discard;
        }
        two-rate {
            color-blind;
            committed-information-rate 5m;
            committed-burst-size 5k;
            peak-information-rate 10m;
            peak-burst-size 10k;
        }
    }
}
```

DHCP □ PPPoE□ □□ □□□ □□□

□ □□□□□ DHCP □ PPPoE □□□ □□□ □□□□ □□□□□ □□ □□ □□□ □□□ □ □ □□□□. □□ □□□□ □□□ □□□□□ □□□□ □□ □□□ □□ □ □□ □□□ □□□□ □□ □□□ □□□ □□ □□□□□. □□□ □□□□ show dynamic-profiles pppoe-client-policer-1-profile □□□ □□□. □ □ □□□ □□□ □□□□.

```
[edit]
user@host# show dynamic-profiles pppoe-client-policer-4-profile
variables {
    downstream-inet uid;
    upstream-inet uid;
    HPolicer-in uid;
    HPolicer-out uid;
    P0-IN uid;
    P1-IN uid;
    P2-IN uid;
    Session-IN uid;
}
```

```
interfaces {
    pp0 {
        unit "$junos-interface-unit" {
            actual-transit-statistics;
            no-traps;
            ppp-options {
                chap;
                pap;
            }
            pppoe-options {
                underlying-interface "$junos-underlying-interface";
                server;
            }
            keepalives interval 30;
            family inet {
                filter {
                    input "$upstream-inet";
                    output "$downstream-inet";
                }
                unnumbered-address lo0.0;
            }
            family inet6 {
                unnumbered-address lo0.0;
            }
        }
    }
}
firewall {
    family inet {
        filter "$downstream-inet" {
            interface-specific;
            term t1 {
                from {
                    source-port 80;
                }
                then {
                    policer "$HPolicer-out";
                    accept;
                }
            }
        }
        filter "$upstream-inet" {
            interface-specific;
```

```
            term P0-Aggregate {
                from {
                    dscp 46;
                }
                then {
                    hierarchical-policer "$P0-IN";
                    next term;
                }
            }
            term P1-Premium {
                from {
                    dscp [ 46 22 ];
                }
                then {
                    force-premium;
                    next term;
                }
            }
            term P1-Aggregate {
                from {
                    dscp [ 46 22 ];
                }
                then {
                    hierarchical-policer "$P1-IN";
                    next term;
                }
            }
            term P2-Premium {
                from {
                    dscp [ 46 22 56 ];
                }
                then {
                    force-premium;
                    next term;
                }
            }
            term P2-Aggregate {
                from {
                    dscp [ 46 22 56 ];
                }
                then {
                    hierarchical-policer "$P2-IN";
                    next term;
```

```
                }
            }
            term final-Premium {
                from {
                    dscp [ 46 22 56 00 ];
                }
                then {
                    force-premium;
                    next term;
                }
            }
            term final {
                then {
                    hierarchical-policer "$Session-IN";
                    accept;
                }
            }
        }
    }
    policer "$HPolicer-out" {
        if-exceeding {
            bandwidth-limit 10m;
            burst-size-limit 10k;
        }
        then discard;
    }
    hierarchical-policer "$HPolicer-in" {
        aggregate {
            if-exceeding {
                bandwidth-limit 30m;
                burst-size-limit 30k;
            }
            then {
                loss-priority high;
            }
        }
        premium {
            if-exceeding {
                bandwidth-limit 10m;
                burst-size-limit 10k;
            }
            then {
                discard;
```

```
            }
        }
    }
    hierarchical-policer "$P0-IN" {
        logical-interface-policer;
        aggregate {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
        premium {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
    }
    hierarchical-policer "$P1-IN" {
        logical-interface-policer;
        aggregate {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
        premium {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
```

```
        }
    }
    hierarchical-policer "$P2-IN" {
        logical-interface-policer;
        aggregate {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
        premium {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
    }
    hierarchical-policer "$Session-IN" {
        logical-interface-policer;
        aggregate {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
        premium {
            if-exceeding {
                bandwidth-limit 5m;
                burst-size-limit 5k;
            }
            then {
                discard;
            }
        }
```

```
    }
}
```

[illegible] commit?(?) [illegible].

SEE ALSO

[illegible] | 1821

[illegible]

[illegible]

[illegible] | 1821

[illegible] | 1826

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] ?, [illegible] [illegible] [illegible] ?([illegible])? [illegible] [illegible] [illegible] [illegible] [illegible]. ? [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ? [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ? [illegible]. [illegible] [illegible] [illegible] [illegible] 2 ? MAC [illegible] [illegible] [illegible] [illegible] ? [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ? [illegible].

? [illegible] IQ2 PIC [illegible] IQ2E PIC? [illegible] M [illegible] ? T [illegible] [illegible] MX [illegible] DPC[illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [edit chassis] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit chassis]
   user@host# edit fpc fpc pic pic
   ```

   ? [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit chassis]
   user@host# edit fpc 0 pic 1
   ```

2. ??????? ?? ?? ?? ????? ????? ?? ??? ?????? ??????. ? ????? ? ? ? ??? ?????? ? ?? ?? ??? ? ?????.

```
[edit chassis fpc fpc pic pic]
user@host# set ingress-policer-overhead bytes;
user@host# set egress-policer-overhead bytes;
```

? ?? ?? ?? ??? ?????.

```
[edit chassis fpc 0 pic 1]
user@host# set ingress-policer-overhead 10;
user@host# set egress-policer-overhead 20;
```

3. ?? ??:

```
[edit chassis]
user@host# show
fpc 0 {
    pic 1 {
        ingress-policer-overhead 10;
        egress-policer-overhead 20;
    }
}
```

?: PIC?? ??? ????? ????? ?? ??? ????? PIC? ????? ??? ????? ?? ??? ??? ???. ?? CLI? ??? PIC ??? ??????? PIC? ?? ??? ??????.

?? ??

?? ??? ????

?? ??? ????

??? 2? 2? ? 3? ???

in this section

- ??? 2? 2? ??? ?? | 1887
- ??? 2? 3? ??? ?? | 1889
- ?: 3? ??? ??????(???????) ??? ?? | 1891

??? 2? 2? ??? ??

in this section

- ??? 2 ????? 2? ??? ?? ?? | 1887
- ??? 2 ????? ?? 2? ??? ??? ?? ??? ?? | 1888
- ??? 2 ????? 2? ????? ????? ?? ??? ?? | 1888

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- ????? ??? ?? ??? ?? ????? ?????? ??? ????? ????? ??? 2 ????? 2? ????? ??? ? ?????.

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```
firewall {
    policer policer-name {
        logical-interface-policer;
        if-exceeding {
            (bandwidth-limit bps | bandwidth-percent percentage);
            burst-size-limit bytes;
        }
        then {
            discard;
            forwarding-class class-name;
            loss-priority (high | low | medium-high | medium-low);
        }
    }
}
```

□□ □□ □□□□ □□□ □□□ □ □□□□.

- [edit]
- [edit logical-systems *logical-system-name*]

□□□ 2 □□□□ 2□ □□□□ □□□□ □□ □□□ □□

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```
interfaces {
    (ge-fpc/pic/port | xe-fpc/pic/port) {
        unit unit-number {
            layer2-policer {
                input-policer policer-name;
                output-policer policer-name;
            }
        }
    }
}
```

□□ □□ □□□□ □□□ □□□ □ □□□□.

- [edit]
- [edit logical-systems *logical-system-name*]

SEE ALSO

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>
> *□: 2□ □□□ □□□□□(□□) □□□ □□*

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in this section

- □□□ 2 □□□□ 3□ □□□ □□ □□ | 1889
- □□□ 2 □□□□ □□ 3□ □□□ □□□ □□ □□□ □□ | 1890
- □□□ 2 □□□□ 3□ □□□□ □□□□ □□ □□□ □□ | 1890

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```
firewall {
    three-color-policer policer-name {
        action {
            loss-priority high then discard;
        }
        logical-interface-policer;
        single-rate {
            (color-aware | color-blind);
            committed-burst-size bytes;
            committed-information-rate bps;
            excess-burst-size bytes;
        }
        two-rate {
            (color-aware | color-blind);
            committed-burst-size bytes;
            committed-information-rate bps;
            peak-burst-size bytes;
            peak-information-rate bps;
        }
    }
}
```

?? ?? ????? ??? ??? ? ?????.

- [edit]
- [edit logical-systems *logical-system-name*]

??? 2 ???? 3? ???? ???? ?? ??? ??

??? ?????? ???? ??? 2 ???? ?????? ??? ?? ???? ???? ??? ??????? ?? ???? ?????? layer2-policer . input-three-color *policer-name* ??? ?? output-three-color *policer-name* ???? ???? ???? ???? ??? ??????.

```
interfaces {
    (ge-fpc/pic/port | xe-fpc/pic/port) {
        unit unit-number {
            layer2-policer {
```

```
                input-three-color policer-name;
                output-three-color policer-name;
            }
        }
    }
}
```

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- [edit]
- [edit logical-systems *logical-system-name*]

SEE ALSO

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logical-interface-policer

three-color-policer (Configuring)

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in this section

- □□ □□ | 1891
- □□ | 1892
- □□ | 1893
- □□ | 1898

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in this section

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□ □□□□ 2□□□ 3□ □□□□ trTCM2-cb □□ □□□ □□□□□ □□□□ □□□□ □ □□□□ □□□ □□□□□□ ge-1/3/1.0□□ □□□ 2 □□□□ □□□□ □.

□: □□□ 2 □□□□ □□□ □□□□ □□ 3□ □□□□ □□□ □□, □□ □□ □□□□ □□ □□□□□ □□□ □ □□□□.

□□□□ □□□ □□□□ □□ 100KB□ □□□□ 40Mbps□ □□□ □□□ □□□□ □□□(token-bucket □□□ □□)□ □□□□ □□□□□ □□□ □□□ □□ □□□ □□□□□. □□□□ □□ □□□□ □□□□□ □□ □□□ □□□ □□□□□ □□ □□ □□□ low □□□ □□ □□□□□.

60Mbps □□□ □□ □ □□□ □□□□ □□ 200KB □□□(token-bucket □□ □□)□ □□ □□□ □□ □□ □□□□ □□□ □□□□ □□□□□ □□□□ □. □□□ □□□ □□□ □□□ □□□□□ □□ □□□□□ medium-high □□□ □□ □□□□□.

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in this section

- CLI ?? ?? | 1893
- ??? ????? ?? | 1893
- ??? ????? ????? 2??? 3? ??? ?? | 1895
- ??? ??????? ??? 2 ??? 3? ??? ?? | 1897

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? ?? ?????? ?? ??? ?????.

CLI ?? ??

? ?? ??? ??????, ?? ?? ???? ??? ??? ????, ? ???? ??? ??, ?? ???? ??? CLI? ??????? [edit] .

```
set interfaces ge-1/3/1 vlan-tagging
set interfaces ge-1/3/1 unit 0 vlan-id 100
set interfaces ge-1/3/1 unit 0 family inet address 10.10.10.1/30
set interfaces ge-1/3/1 unit 1 vlan-id 101
set interfaces ge-1/3/1 unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac
00:00:11:22:33:44
set firewall three-color-policer trTCM2-cb logical-interface-policer
set firewall three-color-policer trTCM2-cb two-rate color-blind
set firewall three-color-policer trTCM2-cb two-rate committed-information-rate 40m
set firewall three-color-policer trTCM2-cb two-rate committed-burst-size 100k
set firewall three-color-policer trTCM2-cb two-rate peak-information-rate 60m
set firewall three-color-policer trTCM2-cb two-rate peak-burst-size 200k
set firewall three-color-policer trTCM2-cb action loss-priority high then discard
set interfaces ge-1/3/1 unit 0 layer2-policer input-three-color trTCM2-cb
```

??? ????? ??

??? ??

??? ??????? ?????? ??? ??????.

1. ?????? ??? ???????.

```
[edit]
user@host# edit interfaces ge-1/3/1
```

2. ?? ??? ??????.

```
[edit interfaces ge-1/3/1]
user@host# set vlan-tagging
```

3. ??? ??????? ge-1/3/1.0??????.

```
[edit interfaces ge-1/3/1]
user@host# set unit 0 vlan-id 100
user@host# set unit 0 family inet address 10.10.10.1/30
```

4. ??? ??????? ge-1/3/1.0??????.

```
[edit interfaces ge-1/3/1]
user@host# set unit 1 vlan-id 101
user@host# set unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac 00:00:11:22:33:44
```

??

?? ?? ??? ???? show interfaces ??? ??????? ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ????? ??.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.10.10.1/30;
        }
    }
```

```
    unit 1 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

??? ????? ????? 2??? 3? ??? ??

??? ??

2??? 3? ???? ??? ????? ???? ?????:

1. 3? ???? ??? ???????.

```
[edit]
user@host# edit firewall three-color-policer trTCM2-cb
```

2. ???? ??? ??????(???????) ?????? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set logical-interface-policer
```

??? ?????? ???? ???? ???? ??? ??????? ??? ?? ??? ??????? ??? ?? ??? ???? ??? ??? ????, ???? ??? ? ?? ?? ???? ?? ??????? ?? ??????.

3. ???? 2-rate ? ???? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set two-rate color-blind
```

?? ?? 3? ???? ?? ???? ???? ??? ?? ??? ???? ?? ??? ?? ?????? ? ?? ?? ?? ??? ????, ??? ?? ??? ??? ? ?? ???? ? ??? ?? ?? ??? ??????.

??? 2? ??? ??? ? 3? ???? ???? ??? ???? ???? ???? ???.

4. [illegible]

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set two-rate committed-information-rate 40m
user@host# set two-rate committed-burst-size 100k
```

5. [illegible]

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set two-rate peak-information-rate 60m
user@host# set two-rate peak-burst-size 200k
```

6. (선택 사항) [illegible]

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set action loss-priority high then discard
```

선택 사항으로 3색 정책 내 패킷 손실 우선순위(Packet Loss Priority) 설정 값 중 하나를 구성합니다. 예를 들어, 정책 내 3색 중 하나에 PLP 설정 값 없이 패킷이 도착하면 PLP 설정 값이 높은 패킷 중 하나 PLP 설정 값과 같이 처리됩니다.

결과

3색 정책 구성을 show firewall 명령으로 확인합니다. 출력 결과가 의도한 대로 정책 구성을 표시하는지 확인합니다.

```
[edit]
user@host# show firewall
three-color-policer trTCM2-cb {
    logical-interface-policer;
    action {
        loss-priority high then discard;
    }
    two-rate {
        color-blind;
        committed-information-rate 40m;
        committed-burst-size 100k;
        peak-information-rate 60m;
        peak-burst-size 200k;
```

```
    }
}
```

??? ??????? ??? 2 ??? 3? ???? ??

??? ??

??? ??????? ??? 2 ???? 3? ????? ??????:

1. ??? 2 ??? ?????? ????? ??? ???????.

```
[edit]
user@host# edit interfaces ge-1/3/1 unit 0
```

2. 3? ??? ?????? ????? ??? ?????? ??? ??????.

```
[edit interfaces ge-1/3/1 unit 0]
user@host# set layer2-policerinput-three-color trTCM2-cb
```

??

?? ?? ???? ????? show interfaces ???? ???????? ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ????? ???? ????? ??.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        layer2-policer {
            input-three-color trTCM2-cb;
        }
        family inet {
            address 10.10.10.1/30;
        }
    }
    unit 1 {
        vlan-id 101;
```

```
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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show interfaces □□□ □□□□□□ ge-1/3/1.0□□ □□ □□ □□□ □□□□, □□ extensive □□□ detail □□□□□. □ □□ **Traffic statistics** □□ □□ □□□ □□□ □□□□□□□ □□ □ □□□ □□□ □ □□ □□ □□□□, □□□□ **Protocol inet** □□□ □□ □□□□ trTCM2-cb □□ □□ □□ □□□□ □□□□ □□□ □□□□ **Policer** □□□□.

- **Input: trTCM2-cb-ge-1/3/1.0-log_int-i**
- **Output: trTCM2-cb-ge-1/3/1.0-log_int-o**

log_int-i □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□, **log_int-o** □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□□. □ □□□ □□□ □□□□□ □□□□ □□ □□□□□ □□□□□.

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□□ □□ □□□ `show policer` □□□□ □□□□□ □□□□ □□□ □□□□□. □□ □□□ □ □□□□ □□□ □ □□□(□□ □□□ □□□)□ □□□ □□ □□ □□□□ □. □□□ `trTCM2-cb`□ □□, □□ □ □□ □□□ □□□ □□□ □□ □□□□□.

- **trTCM2-cb-ge-1/3/1.0-log_int-i**
- **trTCM2-cb-e-1/3/1.0-log_int-o**

log_int-i □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□, **log_int-o** □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□□. □ □□□ □□□ □□□□□ □□□□ □□ □□□□□ □□□□□.

SEE ALSO

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layer2-policer (EX)

logical-interface-policer

three-color-policer (Configuring)

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layer2-policer (EX)

logical-interface-policer

policer (Configuring)

three-color-policer (Configuring)

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□□ 85 □□□ 1900 □(□) □□□□□ □□(PE) □□□□ □□□ MX □□□ 5G □□□□ □□□ □□□□ □□□□□. □□ □□□ □□ □□ PE □□□□ □□□ □□. □□□□□ □□□□ □□□□□ □□□□ □□ □□□□ □□ □□□ □□ □□□ □ □□□□. □□ □□□ □□ □□□□ □□□□ □□ MPLS □□ □□□□□ □□□ □ □□ □□□ □□□□ □□□ □ □□□□.

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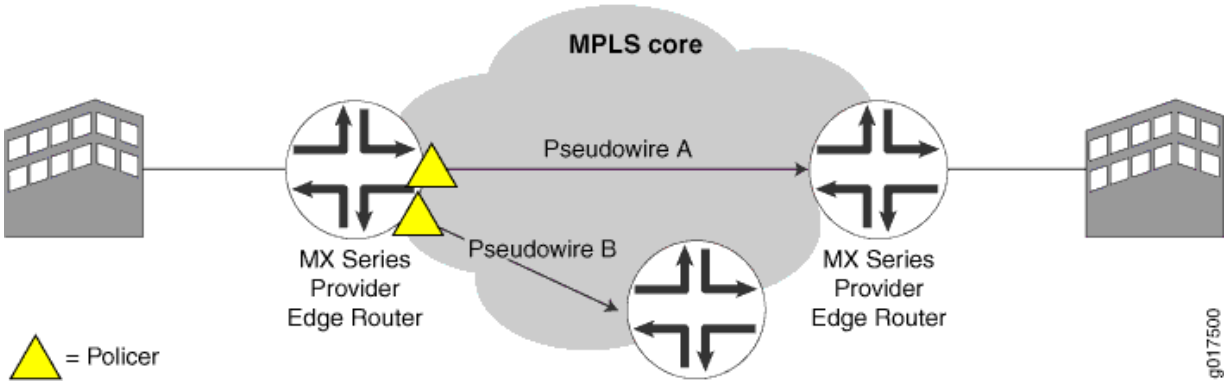

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1. 2□ □□□□ □□□□.

```
[edit firewall]
user@host#  edit policer 2color-l2-policer
```

2. □□□□ □□□ □□□□□□□ □□□□□ □□□□□.

```
[edit firewall policer 2color-l2-policer]
user@host#  set logical-interface-policer
```

3. □□□□ □□□□□.

```
[edit firewall policer 2color-l2-policer]
user@host#  edit if-exceeding
[edit firewall policer 2color-l2-policer if-exceeding]
user@host#  set bandwidth-limit 30m
user@host#  set burst-size-limit 300k
```

4. □□□□ □□□ □□□ loss-priority□ □□□□ □□ □□ □□□□(PLP)□ □□□ □□□□□.

```
[edit firewall policer 2color-l2-policer]
user@host#  set then loss-priority high
```

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3□ □□□ □□ □□:

1. 3□ □□□□ □□□□.

```
[edit firewall]
user@host# edit three-color-policer trTCM-policer
```

2. □□□□ □□□ □□□□□□□ □□□□□ □□□□.

```
[edit firewall three-color-policer trTCM-policer]
user@host# set logical-interface-policer
```

3. □□□□ □□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM-policer]
user@host# set action loss-priority high then discard
```

4. □□□□ 2□□□ □□□□□ □□□□ □□□□ □□□□□.

```
[edit firewall three-color-policer trTCM-policer]
user@host# edit two-rate
user@host# set color-aware
user@host# set committed-information-rate 10m
user@host# set committed-burst-size 50m
user@host# set committed-burst-size 150k
user@host# set peak-information-rate 50m
user@host# set peak-burst-size 450k
```

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Two-Rate Three-Color Policer □□ | 2020

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- "?? ??? ?? 2? ??? 2 ??? ??" ??? 1900

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1. 3? ????? ?? ?? ????? ??????.

```
[edit dynamic-profiles]
user@host#  edit pw-trTCM-policer
```

2. ?? ?? ?????? ??? ?? ?? ??? ??????? ????.

```
[edit dynamic-profiles pw-trTCM-policer]
user@host#  edit interfaces $junos-interface-ifd-name unit $junos-underlying-interface-unit
```

3. VPLS? ????? ?????? ??????.

```
[edit dynamic-profiles pw-trTCM-policer interfaces "$junos-interface-ifd-name" unit "$junos-
underlying-interface-unit"]
user@host#  set family vpls
```

4. ?? ????? 3? ????? ??????.

```
[edit dynamic-profiles pw-trTCM-policer interfaces "$junos-interface-ifd-name" unit "$junos-
underlying-interface-unit"]
user@host#  set layer2-policer output-three-color trTCM-policer
```

5. 2? ????? ?? ?? ????? ??????.

```
[edit dynamic-profiles]
user@host#  edit pw-2color-l2-policer
```

6. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit dynamic-profiles pw-2color-l2-policer]
user@host#  edit interfaces $junos-interface-ifd-name unit $junos-underlying-interface-unit
```

7. VPLS[illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit dynamic-profiles pw-2color-l2-policer interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit"]
user@host#  set family vpls
```

8. [illegible] [illegible] 2[illegible] [illegible] [illegible] [illegible].

```
[edit dynamic-profiles pw-2color-l2-policer interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit"]
user@host#  set layer2-policer output-policer 2color-l2-policer
```

[illegible] [illegible]

[illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] | 1900

[illegible] [illegible] [illegible] 3[illegible] [illegible] 2 [illegible] [illegible] | 1901

[illegible] [illegible] [illegible] 2[illegible] [illegible] 2 [illegible] [illegible] | 1900

[illegible] [illegible] [illegible] [illegible] [illegible] | 1904

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] VPLS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] VPLS [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] neighbor [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] VPLS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [edit routing-instances *routing-instance-name* protocols vpls] [illegible] no-tunnel-services [illegible].

- VPLS [illegible] [illegible] [illegible] [illegible] [illegible] [illegible],

```
[edit routing-instances]
user@host#  edit green protocols vpls associate-profile
```

```
[edit routing-instances green protocols vpls associate-profile]
user@host#  set pw-2color-l2-policer
```

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```
[edit routing-instances]
user@host#  edit green protocols vpls mesh-group lata-1 associate-profile
[edit routing-instances green protocols vpls mesh-group lata-1 associate-profile]
user@host#  set pw-trTCM-policer
```

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```
[edit routing-instances]
user@host#  edit green protocols vpls mesh-group lata-1 neighbor 10.10.1.1 associate-profile
[edit routing-instances green protocols vpls mesh-group lata-1 neighbor 10.10.1.1 associate-
profile]
user@host#  set pw-2color-l2-policer
```

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1. ???? ??????.
2. ?? ???? ??? ?? ???? ??? ??? ??? ??????.
3. ???? ?? ???? ??? ?? junos-layer2-output-policer ??????. ? ?? ??? ? ??? ??????.

4. [illegible] [illegible] [illegible] [illegible] [illegible] [edit dynamic-profiles *profile-name* interfaces "$junos-interface-ifd-name" unit "$junos-underlying-interface-unit"] [illegible] [illegible] 2 [illegible] [illegible] [illegible] [illegible] **junos-layer2-output-policer** .

5. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] **associate-profile** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

6. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]

[illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] | 1900

[illegible] [illegible] [illegible] [illegible] [illegible] | 1906

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1907

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1908

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] 2 [illegible] [illegible] [illegible] [illegible] 2[illegible] [illegible] [illegible].

2[illegible] [illegible] [illegible] [illegible]:

1. 2[illegible] [illegible] [illegible].

```
[edit firewall]
user@host#  edit policer 10m-policer
```

2. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall policer 10m-policer]
user@host#  set logical-interface-policer
```

3. [illegible] [illegible].

```
[edit firewall policer 10m-policer]
user@host#  edit if-exceeding
[edit firewall policer 10m-policer if-exceeding]
user@host#  set bandwidth-limit 10m
user@host#  set burst-size-limit 100k
```

4. [illegible] loss-priority [illegible](PLP) [illegible].

```
[edit firewall policer 10m-policer]
user@host#  set then loss-priority high
```

[illegible]

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[illegible] 2 [illegible] | 1905
[illegible] | 1907
[illegible] | 1908

[illegible]

[illegible], [illegible].

[illegible]:

1. [illegible].

```
[edit  dynamic-profiles]
user@host#  edit pw-policer
```

2. [illegible] junos-layer2-output-policer . [illegible] 10m-policer.

```
[edit dynamic-profiles pw-policer]
user@host#  edit profile-variable-set pw-policer-var-set
user@host#  set junos-layer2-output-policer 10m-policer
```

3. [illegible].

```
[edit dynamic-profiles pw-policer]
user@host#  edit interfaces $junos-interface-ifd-name unit $junos-underlying-interface-unit
```

4. 2□ □□ □□□□ □□□ □□□□□ **junos-layer2-output-policer** .

```
[edit dynamic-profiles pw-policer interfaces "$junos-interface-ifd-name" unit "$junos-
underlying-interface-unit"]
user@host#  set layer2-policer output-policer $junos-layer2-output-policer
```

5. VPLS□ □□□□ □□□□□ □□□□□.

```
[edit dynamic-profiles pw-2color-l2-policer interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit"]
user@host#  set family vpls
```

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- VPLS □□□□ □□□□ □□ □□□ □ □□□ □□ □□□ □□□□□,

```
[edit routing-instances]
user@host#  edit green protocols vpls associate-profile
[edit routing-instances green protocols vpls associate-profile]
user@host#  set profile-variable-set pw-policer
user@host#  set profile-variable-set pw-policer-var-set
```

- ?? ?? ???? ?? ??? ? ??? ?? ??? ?????:

```
[edit routing-instances]
user@host#  edit green protocols vpls mesh-group lata-1 associate-profile
[edit routing-instances green protocols vpls mesh-group lata-1 associate-profile]
user@host#  set profile-variable-set pw-policer
user@host#  setprofile-variable-set pw-policer-var-set
```

- ?? ??? ? ?? ??? ??? ??? ??? ?????:

```
[edit routing-instances]
user@host#  edit green protocols vpls mesh-group lata-1 neighbor 10.10.1.1 associate-profile
[edit routing-instances green protocols vpls mesh-group lata-1 neighbor 10.10.1.1 associate-
profile]
user@host#  profile-variable-set pw-policer
user@host#  profile-variable-set pw-policer-var-set
```

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VPLS ???? ??? 2 ??? ??? ??

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- ?? | 1910
- ?? | 1910
- ?? | 1910

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VPLS ??? ???? ?? ???? ??? 2 VPN ???? ???? ??? ?????.

??

```
user@host> show vpls connections
Layer-2 VPN connections:

...
Instance: vpls-10gige
  Local site: 10Gige-PE (2)
    connection-site           Type  St     Time last up          # Up trans
    1                         rmt   Up     Mar 28 21:27:57 2010           1
      Remote PE: 10.10.1.1, Negotiated control-word: No
      Incoming label: 262145, Outgoing label: 262146
      Local interface: lsi.1048576, Status: Up, Encapsulation: VPLS
      Dynamic profile: pw-policer
        Description: Intf - vpls vpls-10gige local site 2 remote site 1
```

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?? ??? ???? VPLS ???? ?? ?? ?? ???? ?????.

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> ?? ??? ??? 2 ??? ??? ?? | 1900

OVSDB ?? ?????? ??? ??

Contrail ????? ???? QFX ????? VXLAN? ????(Open vSwitch Database—OVSDB—?? ????? ??) VXLAN ?????? ? `encapsulation extended-vlan-bridge` ??? `flexible-vlan-tagging` ?? ?????. Junos OS ??? 14.1X53-D30 ?? VXLAN ?????? ??? ??(?? ?????)? ??? `family ethernet-switching` ? ????. ??? ?? ??? ?? ?????? ??? `three-color-policer` ?? ??? ??? ??? ? ???, ?? OVSDB ?? ?????? 2??? 3? ??(???)? ??? ? ??? ?????. Contrail ????? ???? VXLAN ???????? ???? ???? ??? ?? ??? ??? ?(?) ?????? "?: OVSDB ?? ?????? ??? ??" ??? 1911 .

□: □□□ □□□ OVSDB □□ □□□□□□□ □□ □□□□□□□□ □□□□ □□□□ □□ □□ family ethernet-switching □□□. 2 □□□ 3□ □□□ □□□□ □□□□ □□□□□□□.

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□□ □□□ □□ □□ □□□□ □□□□ □□ □□□□□. Feature Explorer □ □□□□ □□□□□ □□□ □□□□□ □□□□□.

release heading in release-history	desc heading in release-history
14.1X53-D30	Junos OS □□□ 14.1X53-D30□□ VXLAN □□□□□□ □□□ □□(□□ □□□□□)□ □□□ family ethernet-switching □ □□□□.

□□ □□

□: OVSDB □□ □□□□□□ □□□ □□ | 1911

□□□ □□ | 2066

VXLAN □□□□

□□□ □□□□ □□□□□□ □□□□ OVSDB □□□□ □□

OVSDB □□ □□□□□□□ □□□ □□ □□ | 1403

□: OVSDB □□ □□□□□□□ □□□ □□

in this section

- □□ □□ | 1912
- □□ | 1912
- □□ | 1912

Junos OS □□□ 14.1X53-D30□□ Contrail □□□□□ □□□□ VXLAN □□□□□□ □□□ □□(□□ □□□□□)□ □□□ family ethernet-switching □ □□□□. □□□□□ □□□□ Open vSwitch Database(OVSDB) □□ □□□□□ □□ □□□□□. □ □□□ □□ □□□ □□ □□□□□□□ □□□ three-color-policer □□□ □□□ □□□ □□□ □ □□□, □□ OVSDB □□ □□□□□□□ 2□□□ 3□ □□(□□□)□ □□□ □ □ □□ □□□□□.

Contrail ?????? ?? ??????? ????? ??? ? ?????, ?????? ?? ??????? ??? ??? ??? ?? ??????? ?????? ??? ??? ??? ? ???. ?? ??? ????? ??? ??? ????? ????? ???. (?? ?? ?? ??? ????? ???. ?, ???? ?? ??????? ??? ??? ?? ??? ? ? ???.)

?: ??? ??? OVSDB ?? ??????? ?? ???????? ????? ????? ?? ?? family ethernet-switching ???. 2 ??? 3? ???? ????? ????? ???????.

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- QFX5100 ???
- Junos OS ??? 14.1X53-D30 ??

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? ????? ????? ?????? xe-0/0/0 ? xe-0/0/1? Contrail ?????? ?? ????? VXLAN ???????? ??????. ?? ?????? ??? ??????? ? encapsulation extended-vlan-bridge ?? ?? flexible-vlan-tagging ??? ??????. ???? ??? ??? ??? ?? ??? 2(??) ??? ??? ?????? ????? ????? ?? ?? ??????? ?????? ? ?? ?? ??? ????? ????? ???.

?: ???? ? ? ??? ??? ??(? ???)? OVSDB ?? ?? ??????? ?????? ?? ?? ?? ??? ????? ???.

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- CLI ?? ?? | 1912
- ?? | 1913

Contrail ?????? ?? ????? ??? ?? ??????? ????? ?????? ??? ??? ?? ??? ??? ?????? ?? ??? ??????.

CLI ?? ??

```
[edit]
set groups vxlan-policer-group interfaces xe-0/0/0 unit <*> family ethernet-switching filter
input vxlan-filter
```

```
set groups vxlan-policer-group interfaces xe-0/0/1 unit <*> family ethernet-switching filter
input vxlan-filter
set groups vxlan-policer-group firewall three-color-policer vxlan-policer action loss-priority
high then discard
set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-rate color-blind
set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-rate committed-
burst-size 2m
set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-rate committed-
information-rate 100m
set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-rate peak-burst-
size 4m
set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-rate peak-
information-rate 100m
set groups vxlan-policer-group firewall family ethernet-switching filter vxlan-filter term t1
then three-color-policer two-rate vxlan-policer
set apply-groups vxlan-policer-group
```

[illegible]

[illegible] [illegible]

1. [illegible] xe-0/0/0[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] vxlan-filter [illegible] [illegible] [illegible] vxlan-policer-group [illegible]. [illegible] [illegible] [illegible] unit <*>[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit]
   user@switch# set groups vxlan-policer-group interfaces xe-0/0/0 unit <*> family ethernet-
   switching filter input vxlan-filter
   ```

2. [illegible] xe-0/0/1[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit]
   user@switch# set groups vxlan-policer-group interfaces xe-0/0/1 unit <*> family ethernet-
   switching filter input vxlan-filter
   ```

3. [illegible] (Junos OS[illegible].) [illegible].

```
[edit]
user@switch# set groups vxlan-policer-group firewall three-color-policer vxlan-policer
action loss-priority high then discard
```

4. [illegible].

```
[edit]
user@switch# set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-
rate color-blind
```

5. 2MB [illegible].

```
[edit]
user@switch# set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-
rate committed-burst-size 2m
```

6. 100MB[illegible].

```
[edit]
user@switch# set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-
rate committed-information-rate 100m
```

7. 4MB [illegible].

```
[edit]
user@switch# set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-
rate peak-burst-size 4m
```

8. 100MB□ □□ □□ □□□ □□□□□ □□□□ □□□□□. □□□ □□ □□□ □□□□□ □□ □□ □□□□ □□ □□□ □□-□□ □□ □□ □□ □□(□□□)□ □□□□□. □□ □□ □□□ □□□□ □□□ □□ □□ □□ □□□□(□□□)□ □□□□□.

```
[edit]
user@switch# set groups vxlan-policer-group firewall three-color-policer vxlan-policer two-rate peak-information-rate 100m
```

9. □□□□ □□□□ □□(□□ □□□□ from □□ □□)□ □□□□□ □□□ □□□ vxlan-filter □□□□□.

```
[edit]
user@switch# set groups vxlan-policer-group firewall family ethernet-switching filter vxlan-filter term t1 then three-color-policer two-rate vxlan-policer
```

10. □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@switch# set apply-groups vxlan-policer-group
```

□□ □□

> *Junos OS □□ □□ □□*
>
> □□□ □□ □□(QFX □□□) | **1640**
>
> □□□ □□ | **2066**
>
> *VXLAN □□□*
>
> *□□□ □□□ □□□□□ □□□ OVSDB □□□ □□*
>
> OVSDB □□ □□□□□ □□ □□ | **1910**

chapter label in part33

??? 3?? 2? ? 3? ??? ??? ??

in this chapter

- 2? ??? ?? ?? | 1916
- ?? ?? ?? 2? ??? | 1922
- ??? ??? | 1948
- ???? ??? ? ??? ?? | 1960
- Traffic Manager?? ?? ???? ???? ??? ???? | 1981
- 3? ??? ?? ?? | 1992
- ??? ?? | 1996
- 3? ??? ?? ?? | 2007
- ?? ?? ?? 3? ??? | 2011
- ?? 2???? 3? ??? | 2019
- ?: 2???? 3? ??? ?? | 2028

2? ??? ?? ??

? 129 ??? 1916 ?(?) ?? ?? 2? ???? ???? ??? 3 ???? ??? ? ?? ?? ??? ??????. ??? 2 ???? ?? ?? 2? ???? ?? ?? ??? ?? ??? ??? "??? 2? 2? ??? ???" ??? 1887 ??????.

? 129: 2? ??? ?? ? ???????? ??

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□ 129: 2□ □□□ □□ □ □□□□□□ □□ *(Continued)*

□□□ □□	□□□ 3 □□□□□□	□ □□□

□□ □□□ □□:
 	
 [edit firewall]
 policer *policer-name* {
 if-exceeding {
 bandwidth-limit *bps*;
 burst-size-limit *bytes*;
 }
 then {
 discard;
 forwarding-class *class-name*;
 loss-priority *supported-value*;
 }
 }
	□□ A - □□□□ □□□ □□□□ □□□□□ □□□□ □□:
	
	 [edit interfaces]
	 interface-name {
	 unit *unit-number* {
	 family *family-name* {
	 policer {
	 input *policer-name*;
	 output *policer-name*;
	 }
	 }
	 }
	 }
	
	 □□ B - □□□□ □□□ □□□□ □□□ □□ □□□□ □□:
	
	 [edit firewall]
	 family *family-name* {
	 filter *filter-name* {
	 interface-specific; # (*)
	 from {
	 ... *match-conditions* ...
	 }
	 then {
	 policer *policer-name*;
	 }
	 }
	 }
	
	 [edit interfaces]
	 interface-name {
	 unit *unit-number* {
	 family *family-name* {
	 filter {
	 input *filter-name*;
	 output *filter-name*;
	 }
	 ... *protocol-configuration* ...
	 }
		□□□ □□:
		
		 • □□□□ □□□□ □ □□□□□ **bandwidth-limit *bps*** .
		
		 □□□ □□ □□(*)
		
		 • □□ □□□□□□□ □□□ □□, □□□□ □ □□□ **interface-specific** □ □ □□□□□ □□ □□□ □□□□ □□□□ □□□□□.
		
		 □□□□□ □□□ □□:
		
		 • **show interfaces (detail | extensive)** □□ □□ □□□ □□□ □□.
		
		 • **show policer** □□ □□ □□□ □ □□□□.
		
		 □□□ □□ □□□ □□:
		
		 • **show interfaces (detail | extensive)** □□ □□ □□□ □□□ □□.
		
		 • **show firewall filter *filter-name*** □□ □□ □□□ □□□□□.

□ 129: 2□ □□□ □□ □ □□□□□□ □□ ***(Continued)***

□□□ □□	□□□ 3 □□□□□□	□ □□□
	} }	

□□□ □□□

□□□ □□□□□□□ □□□ 3 □□□□□ □□□□ □□□ □ □□ □□□ □□ □□□ □□□□□, □□□ □□□ □□□ □□□ □□□□□. □□□□ □□□ □□□□□ □□ □□(□□□) □□ □□ □ □□□□□ □□□ □□□ □□□□ □ □ □□□□. □□□ □□□□□□ □□ □□ □□□ □□□□□ □□□ □□□□□ □□□ □□ □□□ □□ □□□□ □□□ □ □□□□.

□ 129: 2□ □□□ □□ □ □□□□□□ □□ *(Continued)*

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□□□ □□□ □□:	□□ A - □□□□ □□□ □□□□ □□□□□ □□□□ □□:	□□□ □□:

[edit firewall]
policer *policer-name* {
logical-bandwidth-policer;
if-exceeding {
bandwidth-percent (1..100);
burst-size-limit *bytes*;
}
then {
discard;
forwarding-class *class-name*;
loss-priority *supported-value*;
}
}
	[edit interfaces]
	interface-name {
	unit *unit-number* {
	family *family-name* {
	policer {
	input *policer-name*;
	output *policer-name*;
	}
	}
	}
	}
	
	□□ B - □□□□ □□□ □□□□ □□□ □□ □□□□ □□:
		• **bandwidth-percent** ***percentage*** □ □□ **bandwidth-limit** ***bps*** □□ □ □□□□.
		□□□□□ □□□ □□□ □□□ □□□ □ □□□□ □□□ □□□ □□ □□□ □□□ □ □□□□ □□□□□.
		• □□□ □□□ □□□□□ □□□ □□□ □ □□ □□□□ □□□ □□□ □□□□□ □ □□□ **logical-bandwidth-policer** □□□□□.
		
		□□□ □□ □□:

	[edit firewall]
	family *family-name* {
	filter *filter-name* {
	interface-specific;
	from {
	... match-conditions ...
	}
	then {
	policer *policer-name*;
	}
	}
	}
	
	[edit interfaces]
	interface-name {
	unit *unit-number* {
	family *family-name* {
	filter {
	input *filter-name*;
	output *filter-name*;
	}
	... protocol-configuration ...
	}
		• □□□ □□□ □□□□□ □□□ **interface-specific** □□□ □□ □ □□□□ □□□ □ □□□□.
		
		□□□□□ □□□ □□:
		• **show interfaces (detail | extensive)** □□ □□ □□□ □□□ □□.
		• **show policer** □□ □□ □□□ □ □□□□.
		
		□□□ □□ □□□ □□:
		• **show interfaces (detail | extensive)** □□ □□ □□□ □□□ □□.
		• **show firewall filter** ***filter-name*** □□ □□ □□□ □□□□□.

□ 129: 2□ □□□ □□ □ □□□□□□ □□ *(Continued)*

□□□ □□	□□□ 3 □□□□□□	□ □□□
	} }	

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□□□□ □□ □□□□□ □□□□ □□ □□□ □□□ □□□□□□ □□ □□□□ □□□□ □□□ □ □□ □□□ □□ □□□ □□□□□. *□□□ □□□□□ □□□□ □□ □□□ □ □□□□.*

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[edit firewall]
policer *policer-name* {
logical-interface-policer;
if-exceeding {
bandwidth-limit *bps*;
burst-size-limit *bytes*;
}
then {
discard;
forwarding-class *class-name*;
loss-priority *supported-value*;
}
}
	[edit interfaces]
	interface-name {
	unit *unit-number* {
	policer { # All protocols
	input *policer-name*;
	output *policer-name*;
	}
	family *family-name* {
	policer { # One protocol
	input *policer-name*;
	output *policer-name*;
	}
	}
	}
	}
		• **logical-interface-policer** □ □ □□□□□.
		
		□□□□□ □□□ □□□□□□□□ □□ □ □□ □ □:
		
		• □□□□ □□□□ □□□□ □□ □□□ □ □□ □□□ □□□□□ □□□ □□ □□□ □ □□□ □□□□□ □□□□ □□□□□.
		
		• □□ □□□□ □□□□ □□□ □□□ □□ □□□ □□□□ □□□ □□□□ □□□ □ □□□□ □□□□ □□□□□.
		
		□□□□□ □□□ □□:
		
		• **show interfaces (detail | extensive)** □□ □□ □□□ □□□ □□.
		
		• **show policer** □□ □□ □□□ □ □□□□.

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□□□□□□□ □□ □□ □□□ □□□□□ □□ □□□□ □□□ □□□□□□□ □□□ □□ □□□ □□□□□ □ □□□□ □□□□ □□□□ □□□ □□ □□□ □□□□□. □□□ □□□□□ □□□□ □ □□□□ □□□ □□ □□□□□ □□□ □ □□□□.

□ 129: 2□ □□□ □□ □ □□□□□□ □□ *(Continued)*

□□□ □□	□□□ 3 □□□□□□	□ □□□

□□□ □□□□□ □□□ □□:
 	
[edit firewall]
policer *policer-name* {
physical-interface-policer;
if-exceeding {
bandwidth-limit *bps*;
burst-size-limit *bytes*;
}
then {
discard;
forwarding-class *class-name*;
loss-priority *supported-value*;
}
}
	□□□□ □□□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□ □□□ □□ □□□□ □□:
	
	[edit firewall]
	family *family-name* {
	filter *filter-name* {
	physical-interface-filter;
	from {
	... *match-conditions* ...
	}
	then {
	policer *policer-name*;
	}
	}
	}
	
	[edit interfaces]
	interface-name {
	unit *number* {
	family *family-name* {
	filter {
	input *filter-name*;
	output *filter-name*;
	}
	... *protocol-configuration* ...
	}
	}
	}
		□□□ □□:
		• **physical-interface-policer** □□ □□□□□.
		
		□□□ □□ □□:
		• **physical-interface-filter** □ □ □□□□□.
		
		□□:
		• □□□□ □□□ □□□□ □□ □□□□□□ □□ □□ □□□ □□□ □□□□□.
		
		□□□ □□ □□□ □□:
		• **show interfaces (detail | extensive)** □□ □□ □□□ □□□ □□.
		• **show firewall filter *filter-name*** □□ □□ □□□ □□□□□.

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□□ □□ □□ 2□ □□□ | 1922

□□□ □□□ | 1948

□□□□ □□□ □ □□□ □□ | 1960

Multifield Classifier Example: □□□□ □□ □□ | 1235

Traffic Manager□□ □□ □□□□ □□□□ □□□ □□□□ | 1981

2□ □ 3□ □□□ □□□□□ □□□ | 2053

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in this section

- Single-Rate Two-Color Policer □□ | 1922
- □: □□ □□ □□ 2□ □□□ □□ | 1923
- □: □□□ □□□□□□□□ □□□□□ □ □□□ □□ □□□ □□ | 1934

Single-Rate Two-Color Policer □□

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- Bandwidth limit(□□□ □□) - □□□□□□□ □□ □□ □□□ □□□ □□□□ □□ □□ □□ □□□□. □□□ □□□ □□ □□ □□ □ □□ 1□□ 100 □□□ □□□ □□□ □□□ □ □□□□. □□□ □□ □□□□ □□ □□□ □□□ □□□ □□□□□ □□□ □□ □□ *□□□ □□□□□* □□ □□□ □□□ □□□□ □□ □□□.
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□: MX □□□□□ □□□ □□□ □□□ □□□ □□□□ □□□ □ PLP(Packet Loss Priority)□ □□□□□ □□(□□)□ □□□□.
□□ □□, □□-□□, □□-□□□ □□ □□□ □□ PLP □□ □□□□□. MX □□□□□ □ □□□ □□□□□□ □□□ edit firewall policer <policer-name> □□□□□dp-rewrite. □□□ □□□□□ □□ □□ □□□ □□ □□□ □□ □□ □□□ □□ □ □□□□.

SEE ALSO

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  ?: ???????? ??? ?? ??? ????. ?????? ??????? ?? ? ?? ??? ? 125ms???.

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□ □□ □□□□ □□□□ R1 □ R2□ □□□ □□□ □□□□□ □□ □□□ □□□ □□□□ □□, □□□□ □□□□ Host1□□ □□□□ HTTP □□ 80 □□□□ □□□ □□□□ Host1□ □□□□ R1 □ □□□□ □□□ □□□□□□ MTU □□□ 10□□ □□ □□□ □□□ □□□ □□ □□□ □□□□ 700Mbps(70%)□ □□□□□ □□□□□.

□: □□ □□□□□□□ FTP, SFTP, SSH, □□, SMTP, IMAP □ POP3□ □□ □□□ □□ □□□ □□ □□ □□ □□□□ □ □□□ □□□□ □□ □□ □□□□ □□□□ □□□□□.

□: □□□ □□□□, DNS □ □□□□ □□ □□□ □□□□ □ □□□ □□ □□□□□ □□ □□□□ □□ □□□□□ □□ □□□ □□□□ □□ □ □□ □□ □□□□ □□□ □ □□□ □□ □□□ □□□. □□□ □□□ □□□ □□ □□ □□□ □□ □□□□□.

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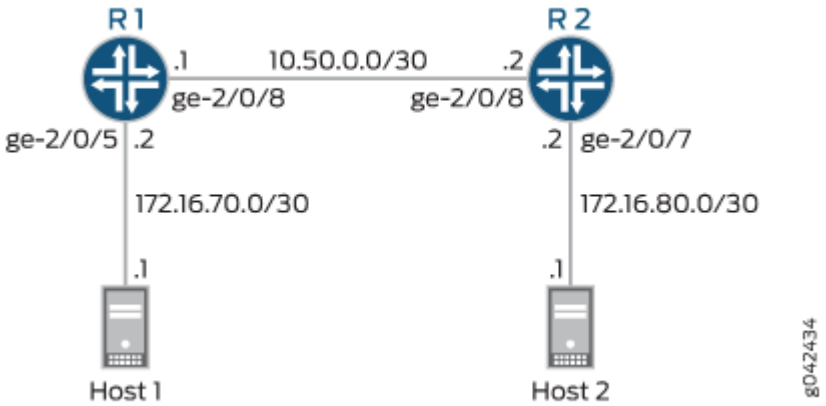

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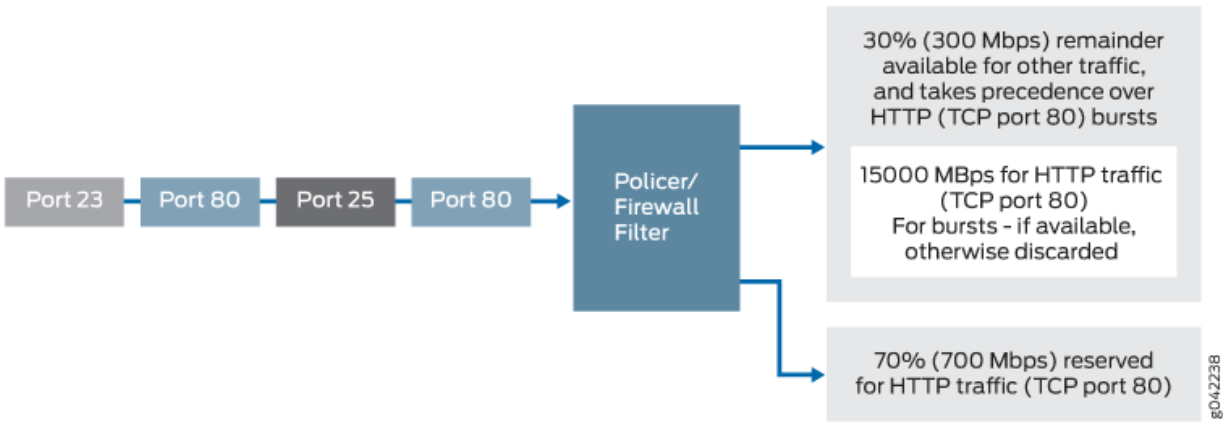

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□□□□ R1

```
set interfaces ge-2/0/5 description to-Host
set interfaces ge-2/0/5 unit 0 family inet address 172.16.70.2/30
set interfaces ge-2/0/5 unit 0 family inet filter input mf-classifier
set interfaces ge-2/0/8 description to-R2
set interfaces ge-2/0/8 unit 0 family inet address 10.50.0.1/30
set interfaces lo0 unit 0 description looback-interface
set interfaces lo0 unit 0 family inet address 192.168.13.1/32
set firewall policer discard if-exceeding bandwidth-limit 700m
set firewall policer discard if-exceeding burst-size-limit 15k
```

```
set firewall policer discard then discard
set firewall family inet filter mf-classifier term t1 from protocol tcp
set firewall family inet filter mf-classifier term t1 from port 80
set firewall family inet filter mf-classifier term t1 then policer discard
set firewall family inet filter mf-classifier term t2 then accept
set protocols ospf area 0.0.0.0 interface ge-2/0/5.0 passive
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface ge-2/0/8.0
```

□□□□ R2

```
set interfaces ge-2/0/8 description to-R1
set interfaces ge-2/0/8 unit 0 family inet address 10.50.0.2/30
set interfaces ge-2/0/7 description to-Host
set interfaces ge-2/0/7 unit 0 family inet address 172.16.80.2/30
set interfaces lo0 unit 0 description looback-interface
set interfaces lo0 unit 0 family inet address 192.168.14.1/32
set protocols ospf area 0.0.0.0 interface ge-2/0/7.0 passive
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ospf area 0.0.0.0 interface ge-2/0/8.0
```

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□□□□ R1 □□

1. □□□□ □□□□□□ □□□□□.

```
[edit interfaces]
user@R1# set ge-2/0/5 description to-Host
user@R1# set ge-2/0/5 unit 0 family inet address 172.16.70.2/30
user@R1# set ge-2/0/8 description to-R2
user@R1# set ge-2/0/8 unit 0 family inet address 10.50.0.1/30
user@R1# set lo0 unit 0 description looback-interface
user@R1# set lo0 unit 0 family inet address 192.168.13.1/32
```

2. □□□ □□□ □□□□□ ge-2/0/5□ □□ □□□ □□□□□.

```
[edit interfaces ge-2/0/5 unit 0 family inet]
user@R1# set filter input mf-classifier
```

3. HTTP □□□(TCP □□ 80)□ □□ 700Mbps□ □□□ □ 15000KBps□ □□□ □□□ □□□ □□□□□ □□□□ □□□□□.

```
[edit firewall policer discard]
user@R1# set if-exceeding bandwidth-limit 700m
user@R1# set if-exceeding burst-size-limit 15k
```

4. □□□ □□□ □□□□ □□□ □□□□□ □□□□ □□□□□.

```
[edit firewall policer discard]
user@R1# set then discard
```

5. □□ HTTP(□□ 80)□ □□ □□ TCP □□□□ □□□□□ □□□□ □ □□ □□□ □□□□□.

```
[edit firewall  family inet filter mf-classifier]
user@R1# set term t1 from protocol tcp
user@R1# set term t1 from port 80
```

6. □□□□ □□□□ HTTP TCP □□□□ □□□ □□□□□ □□□ □□□ □□□□□.

```
[edit firewall  family inet filter mf-classifier]
user@R1# set term t1 then policer discard
```

7. □□□ □□□ □□□ □□ □□ □□□□ □□□□ □□ □□□ □□□□□.

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```
[edit firewall  family inet filter mf-classifier]
user@R1# set term t2 then accept
```

8. OSPF? ??????.

```
[edit protocols ospf]
user@R1# set area 0.0.0.0 interface ge-2/0/5.0 passive
user@R1# set area 0.0.0.0 interface lo0.0 passive
user@R1# set area 0.0.0.0 interface ge-2/0/8.0
```

???? ??

???? R2 ??:

1. ???? ??????? ??????.

```
[edit interfaces]
user@R1# set ge-2/0/8 description to-R1
user@R1# set ge-2/0/7 description to-Host
user@R1# set lo0 unit 0 description looback-interface
user@R1# set ge-2/0/8 unit 0 family inet address 10.50.0.2/30
user@R1# set ge-2/0/7 unit 0 family inet address 172.16.80.2/30
user@R1# set lo0 unit 0 family inet address 192.168.14.1/32
```

2. OSPF? ??????.

```
[edit protocols ospf]
user@R1# set area 0.0.0.0 interface ge-2/0/7.0 passive
user@R1# set area 0.0.0.0 interface lo0.0 passive
user@R1# set area 0.0.0.0 interface ge-2/0/8.0
```

??

?? ????? , show firewall? show protocols ospf ???? ????? show interfaces ???? ??????. ?? ???? ???? ????? ????? ???? ? ?? ???? ????? ???? ????????.

```
user@R1# show interfaces
ge-2/0/5 {
    description to-Host;
    unit 0 {
        family inet {
```

```
            filter {
                input mf-classifier;
            }
            address 172.16.70.2/30;
        }
    }
}
ge-2/0/8 {
    description to-R2;
    unit 0 {
        family inet {
            address 10.50.0.1/30;
        }
    }
}
lo0 {
    unit 0 {
        description looback-interface;
        family inet {
            address 192.168.13.1/32;
        }
    }
}
```

```
user@R1# show firewall
family inet {
    filter mf-classifier {
        term t1 {
            from {
                protocol tcp;
                port 80;
            }
            then policer discard;
        }
        term t2 {
            then accept;
        }
    }
}
policer discard {
    if-exceeding {
```

```
        bandwidth-limit 700m;
        burst-size-limit 15k;
    }
    then discard;
}
```

```
user@R1# show protocols ospf
area 0.0.0.0 {
    interface ge-2/0/5.0 {
        passive;
    }
    interface lo0.0 {
        passive;
    }
    interface ge-2/0/8.0;
}
```

???? R1 ??? ???? ?? ???? ? ????? commit .

```
user@R2# show interfaces
ge-2/0/7 {
    description to-Host;
    unit 0 {
        family inet {
            address 172.16.80.2/30;
        }
    }
}
ge-2/0/8 {
    description to-R1;
    unit 0 {
        family inet {
            address 10.50.0.2/30;
        }
    }
}
lo0 {
    unit 0 {
        description looback-interface;
        family inet {
            address 192.168.14.1/32;
```

```
        }
    }
}
```

```
user@R2# show protocols ospf
area 0.0.0.0 {
    interface ge-2/0/7.0 {
        passive;
    }
    interface lo0.0 {
        passive;
    }
    interface ge-2/0/8.0;
}
```

□□□□ R2 □□□ □□□□ □□ □□□□ □ □□□□□ commit .

□□

in this section

- □□□ □□□ | 1932
- TCP □□□□ □□□□□ □□ □ □□ □□□□ | 1933

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??

???? R1?? ??? ???? clear firewall all ??? ???? 0?? ??????.

```
user@R1> clear firewall all
```

TCP ????? ?????? ?? ? ?? ?????

??

???? ?? ???? ?? ??????(ge-2/0/5)?? ?? ???? ??????.

??

1. ??? ???? ???? ?? ??? 80? 10?? TCP ??? ????.

   -s ???? ?? ??? ??????. -k ???? ?? ??? ???? ?? 80?? ???? ?????? ???. -c ???? ?? ?? 10?? ??????. -d ?? ?? ?? ??? ??????.

   ?? IP ?? 172.16.80.1? ???? R2? ??? ???? ??? 2? ????. ???? ??? 2? ???? ???? ??? 1(???? ??? 1? ?? ? ???? ?? ???????? ? ??)?? ? ???? ????????. ??? ????? ??? ????? ??? 2? ??? ?? ???? ???? ??? 1?? ????? ?.

   ?: ? ??? ??? ??? 8Kbps? ??? ??? 1500KBps? ??? ?? ???? ???? ? ??? ?? ?? ??? ?????? ???.

```
[root@host]#  hping 172.16.80.1  -c 10 -s 80  -k -d 300


[User@Host]#  hping 172.16.80.1 -c 10 -s 80 -k -d 350
HPING 172.16.80.1 (eth1 172.16.80.1): NO FLAGS are set, 40 headers + 350 data bytes
len=46 ip=172.16.80.1 ttl=62 DF id=0 sport=0 flags=RA seq=0 win=0 rtt=0.5 ms
.
.
.
--- 172.16.80.1 hping statistic ---
10 packets transmitted, 6 packets received, 40% packet loss
round-trip min/avg/max = 0.5/3000.8/7001.3 ms
```

2. □□□□ R1□□ □□□ □□□□ □□□ □□□□ show firewall □□□□□.

```
user@R1> show firewall


User@R1# run show firewall

Filter: __default_bpdu_filter__

Filter: mf-classifier
Policers:
Name                                                Bytes              Packets
discard-t1                                          1560               4
```

□□

1□□□ 2□□□□ □ □□□□□ □□□ 4□□ □□□ □□□□□□ □□□□□. □, □□ 8Kbps□ □□(□□ □ HTTP □□ 80) □□□□ □□□ □□□ □□ □ HTTP □□ 80 □□□□ □□ 1500KBps □□□ □□□ □□□□□□.

□: □□□ □□□□□□□ □□□□□ □ □□□ □□ □□□ □□

in this section

- □□ □□ | 1934
- □□ | 1935
- □□ | 1936
- □□ | 1945

□ □□ 3□□ □□ □□ 2□ □□□□ □□□□ □□□ □□ □□ □□ LAN(VLAN) □□□ □□□□□□□ IPv4 □□ □□□□ □□□□ □□□□ □□□ □□□□□.

□□ □□

□ □□ □□□□ □□ □□□□ □□□□ □□□ □□□ □□□ □□□□ □□□□.

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in this section

- ???? | 1935

? ????? 3?? ?? ?? 2? ????? ????? ???? ?? ?? VLAN ???? ???????? IPv4 ?? ????? ????? ??????. 2?? ????? ???? ?? ? ?? ??????? ?????, 1?? ????? ??????? ?? ??????.

??? ??? 5,000???? 1Mbps? ??? ??? ????? ?? ?? ??? ????? p-all-1m-5k-discard?????. ? ????? ??? ???????? IPv4 ?? ????? ?? ??????. ???? ????????? ?????? ????? ?? ????? ????? ????? *??????* *?????* ?????? ???.

?? ? ????? 500KB? ??? ??? ?????? ?????, IPv4 ?? ??????? ??? ??? ????? ??? ???????? IPv4 ?? ????? ??? ?? ?? ??????. ???? ?? ??? ?? ??? ????????? ?????? ????? ????? ????? ?? ????? *???* *??* *?????* ?????? ???.

- ??? ??? ????? ?? ??? ????? ??? ??? 500K???? 500Kbps? ??? ??? ?????? ??? p-icmp-500k-500k-discard ?? ?? ??????. ???? ?? ?? ? ??? ????? ? ????? ICMP(Internet Control Message Protocol) ??? ??????.
- ??? ??? ????? ?? ??? ????? ??? ??? 500KB? 10% ?????? ??? ??? ?????? ??? p-ftp-10p-500k-discard ????? ??????. ? ????? FTP(File Transfer Protocol) ??? ????? ?? ?? ??? ?? ??? ??????.

?? ??? ?? ?? ??? ??? ????? ??? ????? ????? ????? *???* *?????* ???. ?? ?? 2? ????? ??? ??? ????? ??? ? ?????. ?????? ??? ????? ?? ??? ??????? ??? ?? ??? ???????? ?? ??? ??? ????? ????? ??????.

?????

100Mbps? ????? ?? ??? ???????? ?? ??? ??????? ?? ?? VLAN ??? ??????? ??????. ?, 10% ??? ????? ????? ? ??(FTP ??? ????? ???)? ? ??????? FTP ????? 10Mbps? ?? ??????.

?: ? ????? ??? ????? *??* *???* *?????* ????? ?????. ???? ????? ??? ??????? ??? ??? ?????? ??? ??? ??? ????? ???.

? ?? ????? ?????? ????? ??? ??? *???????* *???* ????? ???. FTP ?? ?? ??? ????? ????? ??? ??? ??? ??? ????? ?? ? ? ????? ????? ??? ??? ??????? ??? ?????? ???. ???, ? ???? ? ???? ??? ?? ??? ???????? ?? ?? ??????? ??????, ??? ????? ? ??????? ?? ??? ????? ????? ??? ?????.

??

in this section

- CLI ?? ?? | 1936
- ?? ?? VLAN ??? ????? ?? | 1937
- 3?? ??? ?? | 1938
- IPv4 ??? ?? ?? | 1941
- ????? ??? ? ??? ?? ????? ??? ??????? ?? | 1943

?? ?? ?? ????? ??? ??? ??? ??????. CLI ??? ?? ??? ??? ? ??????? "?? ????? CLI ??? ??" ??? 1787.

? ?? ?????? ?? ??? ??????.

CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ?????, ? ??? ??? ??, ?? ????? ??? CLI? ??????? `[edit]`.

```
set interfaces fe-0/1/1 vlan-tagging
set interfaces fe-0/1/1 unit 0 vlan-id 100
set interfaces fe-0/1/1 unit 0 family inet address 10.20.15.1/24
set interfaces fe-0/1/1 unit 1 vlan-id 101
set interfaces fe-0/1/1 unit 1 family inet address 10.20.240.1/24
set firewall policer p-all-1m-5k-discard if-exceeding bandwidth-limit 1m
set firewall policer p-all-1m-5k-discard if-exceeding burst-size-limit 5k
set firewall policer p-all-1m-5k-discard then discard
set firewall policer p-ftp-10p-500k-discard if-exceeding bandwidth-percent 10
set firewall policer p-ftp-10p-500k-discard if-exceeding burst-size-limit 500k
set firewall policer p-ftp-10p-500k-discard then discard
set firewall policer p-icmp-500k-500k-discard if-exceeding bandwidth-limit 500k
set firewall policer p-icmp-500k-500k-discard if-exceeding burst-size-limit 500k
set firewall policer p-icmp-500k-500k-discard then discard
set firewall family inet filter filter-ipv4-with-limits interface-specific
set firewall family inet filter filter-ipv4-with-limits term t-ftp from protocol tcp
set firewall family inet filter filter-ipv4-with-limits term t-ftp from port ftp
set firewall family inet filter filter-ipv4-with-limits term t-ftp from port ftp-data
set firewall family inet filter filter-ipv4-with-limits term t-ftp then policer p-ftp-10p-500k-
discard
```

```
set firewall family inet filter filter-ipv4-with-limits term t-icmp from protocol icmp
set firewall family inet filter filter-ipv4-with-limits term t-icmp then policer p-
icmp-500k-500k-discard
set firewall family inet filter filter-ipv4-with-limits term catch-all then accept
set interfaces fe-0/1/1 unit 1 family inet filter input filter-ipv4-with-limits
set interfaces fe-0/1/1 unit 1 family inet policer input p-all-1m-5k-discard
```

[illegible] VLAN [illegible]

[illegible]

[illegible] VLAN [illegible] [illegible] [illegible].

1. [illegible] [illegible].

```
[edit]
user@host# edit interfaces fe-0/1/1
```

2. [illegible] VLAN [illegible].

```
[edit interfaces fe-0/1/1]
user@host# set vlan-tagging
```

3. VLAN ID[illegible] [illegible].

```
[edit interfaces fe-0/1/1]
user@host# set unit 0 vlan-id 100
user@host# set unit 1 vlan-id 101
```

4. [illegible] VLAN [illegible] IPv4[illegible].

```
[edit interfaces fe-0/1/1]
user@host# set unit 0 family inet address 10.20.15.1/24
user@host# set unit 1 family inet address 10.20.240.1/24
```

□□

□□ □□ □□□ □□□□ VLAN□ show interfaces □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show interfaces
fe-0/1/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.20.15.1/24;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            address 10.20.240.1/24;
        }
    }
}
```

3□□ □□□ □□

□□□ □□

3□□ □□□□ □□□□□ □□□ □□□□□.

1. 1Mbps□ □□□□ 5000□□□□ □□□ □□□ □□□□ □□ □□□ □□□□ 2□ □□□□ □□□ □□□□□□.

   □: □ □□□□ □□ □□ VLAN □□ □□□□□□ □□ IPv4 □□ □□□□ □□ □□□□□ □□□ □□ □□□ □□ □□ □□□□□ □□□ □.

   ```
   [edit]
   user@host# edit firewall policer p-all-1m-5k-discard
   ```

2. □ □□ □□□□ □□□□□.

```
[edit firewall policer p-all-1m-5k-discard]
user@host# set if-exceeding bandwidth-limit 1m
user@host# set if-exceeding burst-size-limit 5k
user@host# set then discard
```

3. "10%"□ □□□ □□□ □ 500,000□□□□ □□□ □□□ □□□□ □□ □□□ □□□□ 2□ □□□□ □□□ □□□□□□.

   □ □□□□ □□ □□ VLAN □□□ □□□□□□ FTP □□□□□ □□□□□.

   □ □□□□ TCP□ FTP □□□ □□□□ IPv4 □□□ □□ □□□ □□□□ □□□□□.

```
[edit firewall policer p-all-1m-5k-discard]
user@host# up

[edit]
user@host# edit firewall policer p-ftp-10p-500k-discard
```

4. □□□ □□ □ □□□ □□□□□.

```
[edit firewall policer p-ftp-10p-500k-discard]
user@host# set if-exceeding bandwidth-percent 10
user@host# set if-exceeding burst-size-limit 500k
user@host# set then discard
```

   □□□ □□□ □□□□ □□□□ □□□ □ □□□□ □□□□ □□□ □□□ □□□□□□ □□□ □□□□□ □□□.

> □: □ □□□□ (□□□ □□□□□ □□□ □□□ 10%□ □□) □□□ □□□□□ □□ □□□ □□□ 10%□ □□□ □□□□□ □□□ □□ □ □□□ □□□□ [edit firewall policer p-all-1m-5k-discard] □□□□ logical-bandwidth-policer □□□. □□□ □□□ □□□□ *□□ □□□ □□□□* □□□.

5. ICMP □□□ □□ IPv4 □□□ □□ □□□□ □□□ □□□□□□.

```
[edit firewall policer p-ftp-10p-500k-discard]
user@host# up
```

```
[edit]
user@host# edit firewall policer p-icmp-500k-500k-discard
```

6. [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall policer p-icmp-500k-500k-discard]
user@host# set if-exceeding bandwidth-limit 500k
user@host# set if-exceeding burst-size-limit 500k
user@host# set then discard
```

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] show firewall [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show firewall
policer p-all-1m-5k-discard {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 5k;
    }
    then discard;
}
policer p-ftp-10p-500k-discard {
    if-exceeding {
        bandwidth-percent 10;
        burst-size-limit 500k;
    }
    then discard;
}
policer p-icmp-500k-500k-discard {
    if-exceeding {
        bandwidth-limit 500k;
        burst-size-limit 500k;
    }
    then discard;
}
```

IPv4 ??? ?? ??

??? ??

IPv4 ??? ?? ????:

1. IPv4 ??? ??? ??? ???????.

```
[edit]
user@host# edit firewall family inet filter filter-ipv4-with-limits
```

2. ??? ??? ???????? ?????.

```
[edit firewall family inet filter filter-ipv4-with-limits]
user@host# set interface-specific
```

??? ??? ????????? ???? ???, ??? ??? ? ??? ??? ??? ???? ??? ???? ???? ?????.

3. FTP ??? ??? ????? ?? ?? ??? ???????.

```
[edit firewall family inet filter filter-ipv4-with-limits]
user@host# edit term t-ftp

[edit firewall family inet filter filter-ipv4-with-limits term t-ftp]
user@host# set from protocol tcp
user@host# set from port [ ftp ftp-data ]
```

FTP ???? TCP ?? 20()? ?? ???? TCP ?? 21(ftpftp-data)? ?? ?????.

4. FTP ??? ????? ?? ??? ?????.

```
[edit firewall family inet filter filter-ipv4-with-limits term t-ftp]
user@host# set then policer p-ftp-10p-500k-discard
```

5. ICMP ??? ??? ???? ?? ?? ??? ???????.

```
[edit firewall family inet filter filter-ipv4-with-limits term t-ftp]
user@host# up
```

```
[edit firewall family inet filter filter-ipv4-with-limits]
user@host# edit term t-icmp
```

6. ICMP □□□ □□ □□ □□ □□

```
[edit firewall family inet filter filter-ipv4-with-limits term t-icmp]
user@host# set from protocol icmp
user@host# set then policer p-icmp-500k-500k-discard
```

7. □□□ □□ □□ □□ □□□ □□□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter-ipv4-with-limits term t-icmp]
user@host# up

[edit firewall family inet filter filter-ipv4-with-limits]
user@host# set term catch-all then accept
```

□□

□□ □□ □□□ □□□□ □□□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ ? □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
family inet {
    filter filter-ipv4-with-limits {
        interface-specific;
        term t-ftp {
            from {
                protocol tcp;
                port [ ftp ftp-data ];
            }
            then policer p-ftp-10p-500k-discard;
        }
        term t-icmp {
            from {
                protocol icmp;
            }
            then policer p-icmp-500k-500k-discard;
        }
```

```
        term catch-all {
            then accept;
        }
    }
}
policer p-all-1m-5k-discard {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 5k;
    }
    then discard;
}
policer p-ftp-10p-500k-discard {
    if-exceeding {
        bandwidth-percent 10;
        burst-size-limit 500k;
    }
    then discard;
}
policer p-icmp-500k-500k-discard {
    if-exceeding {
        bandwidth-limit 500k;
        burst-size-limit 500k;
    }
    then discard;
}
```

□□□□□ □□□ □ □□□ □□ □□□□ □□□ □□□□□□ □□

□□□ □□

3□□ □□□□ VLAN□ □□□□□ □□□ □□□□□.

1. □□□ □□□□□□□□ IPv4 □□□ □□□□□□□.

```
[edit]
user@host# edit interfaces fe-0/1/1 unit 1 family inet
```

2. ??????? ??? ?? ???? ?????.

```
[edit interfaces fe-0/1/1 unit 1 family inet]
user@host# set filter input filter-ipv4-with-limits
```

3. ??????? ????? ???? ?????.

```
[edit interfaces fe-0/1/1 unit 1 family inet]
user@host# set policer input p-all-1m-5k-discard
```

? fe-0/1/1.0 ?? ??? ??? ?? ???? ?? ???? ?? ????? ???? ?? ?????. ??? ??? "??? ? ??? ?? ?? ??" ??? 1819? ???????.

??

?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show interfaces
fe-0/1/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.20.15.1/24;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            filter {
                input filter-ipv4-with-limits;
            }
            policer {
                input p-all-1m-5k-discard;
            }
            address 10.20.240.1/24;
        }
```

```
    }
}
```

[illegible] [illegible] [illegible] [illegible] [illegible] commit?(?) [illegible].

[illegible]

in this section

- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1945
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1946
- [illegible] [illegible] [illegible] ? [illegible] [illegible] [illegible] | 1946
- [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] | 1947

[illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] ? [illegible] [illegible] [illegible] [illegible].

[illegible]

show interfaces policers [illegible] [illegible] fe-0/1/1.1[illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] **Input Policer** [illegible] [illegible] **Proto** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ? [illegible] p-all-1m-5k-discard ? [illegible] [illegible].

```
user@host> show interfaces policers fe-0/1/1.1
Interface       Admin Link Proto Input Policer         Output Policer
fe-0/1/1.1      up    up
                           inet  p-all-1m-5k-discard-fe-0/1/1.1-inet-i
```

? [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] show policer [illegible]. [illegible] [illegible] [illegible] [illegible].

```
user@host> show policer p-all-1m-5k-discard-fe-0/1/1.1-inet-i
Policers:
Name                                                Bytes              Packets
p-all-1m-5k-discard-fe-0/1/1.1-inet-i                 200                    5
```

[illegible]

[illegible]

[illegible] filter-ipv4-with-limits [illegible] fe-0/1/1.1IPv4 [illegible].

[illegible]

show interfaces statistics [illegible] fe-0/1/1.1[illegible] detail. **Protocol inet** [illegible] **Policer** [illegible] **Input Filters** [illegible].

```
user@host> show interfaces statistics fe-0/1/1.1 detail
  Logical interface fe-0/1/1.1 (Index 83) (SNMP ifIndex 545) (Generation 153)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]  Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                   46
     Input  packets:                    0
     Output packets:                    1
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                   46
     Input  packets:                    0
```

```
      Output packets:                    1
     Transit statistics:
      Input  bytes  :                    0                   0 bps
      Output bytes  :                    0                   0 bps
      Input  packets:                    0                   0 pps
      Output packets:                    0                   0 pps
     Protocol inet, MTU: 1500, Generation: 176, Route table: 0
       Flags: Sendbcast-pkt-to-re
       Input Filters: filter-ipv4-with-limits-fe-0/1/1.1-i
       Policer: Input: p-all-1m-5k-discard-fe-0/1/1.1-inet-i
       Addresses, Flags: Is-Preferred Is-Primary
         Destination: 10.20.130/24, Local: 10.20.130.1, Broadcast: 10.20.130.255,
         Generation: 169
```

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□□□ □□□□□□□ □□□ show firewall □□□ □□ □□ □□ □□□ □□□□□.

```
[edit]
user@host> show firewall filter filter-ipv4-with-limits-fe-0/1/1.1-i

Filter: filter-ipv4-with-limits-fe-0/1/1.1-i
Policers:
Name                                                Bytes              Packets
p-ftp-10p-500k-discard-t-ftp-fe-0/1/1.1-i               0                    0
p-icmp-500k-500k-discard-t-icmp-fe-0/1/1.1-i            0                    0
```

□□ □□□□ □□□ □□(policer action)□ □□□□ □□ □□(□)□ □□□ □□□ □□□(p-ftp-10p-500k-discardp-icmp-500k-500k-discardt-ftpt-icmp□)□ □□□ □□□□□. □□□□ □□ □□□ □□ □□□ □□□□ □□ □□ □□□□□. □□ □□□ □□□(out-of-spec) □□ □□ □□ □□□, □□□ □ □□ □□□□ □□ □□□ □□□□.

SEE ALSO

- □□□ □ □□□ □□ □□ □□ | 1819
- 2□ □□□ □□ □□ | 1916
- Single-Rate Two-Color Policer □□
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- □□□ □ □□□ □□ □□ □□ | 1819
- 2□ □□□ □□ □□ | 1916
- □□□ □□□ □□ □□ | 1826
- □□□ □□□□ □□ □□□ □□□ □□ □□ | 1805

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in this section

- □□□ □□□ □□ | 1948
- □: □□□ □□□ □□□ □□ | 1950

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  ?? ???? ???? [edit class-of-service interfaces interface *interface-name* unit *logical-unit-number*] ???? shaping-rate *bps* ??? ????? ?? ??? ??? ? ????. ??? ????? ??? ??? ??? ?? ???? ??? ??????? ????? ???.

  > ?: ?? ??? ???? ??? ?? ??? ??? ???? ?? ?? ??????? ???? ????, ??? ??? ??? ?? ?? logical-bandwidth-policer ???? ???? ?? ?? ??????? ???? ?? ?? ?? ??? ????? ?? ??? ?? ??? ?? ??? ?????.

- ??????? *???? ??* ???? ??? ???? ???? ?? ??? ?? ??? ?? ???? interface-specific ???.

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SEE ALSO

> 2? ??? ?? ?? | 1916
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> ?: ??? ??? ??? ??
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> *bandwidth-percent*
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> *??????*
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shaping-rate(□□□□□□ □□)

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- □□ □□ | 1950
- □□ | 1950
- □□ | 1951
- □□ | 1957

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□□ □□□ □□□ 50%□□ □□ □□□ □□□ 125,000□□□□ □□□ □□□ □□□□ □□□ □□, □ ge-1/3/0.0□□□ □□□ □□□□ □□ □ □□ □□□□ □□□□ □□□□□. □□□ □□□□□□□ ge-1/3/0.0□□, □□□ □□□ 2Mbps(□□□ □□□□□□□ □□ □□□ 4Mbps □□□ □□□ 50%)□ □□□ □□□ □ □□□□□. □□□ □□□□□□□ ge-1/3/0.1□□, □□□ □□□ □□□□ 1Mbps(□□□ □□□□□□□ □□ □□□ 2Mbps □□□ □□□ 50%)□ □□□ □□ □□ □□□□□.

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in this section

- CLI □□ □□ | **1951**
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- □□□ □□□ □□□ □□ | **1954**
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```
set interfaces ge-1/3/0 per-unit-scheduler
set interfaces ge-1/3/0 vlan-tagging
set interfaces ge-1/3/0 unit 0 vlan-id 100
```

```
set interfaces ge-1/3/0 unit 0 family inet address 172.16.1.1/30
set interfaces ge-1/3/0 unit 1 vlan-id 200
set interfaces ge-1/3/0 unit 1 family inet address 172.16.2.1/30
set class-of-service interfaces ge-1/3/0 unit 0 shaping-rate 4m
set class-of-service interfaces ge-1/3/0 unit 1 shaping-rate 2m
set firewall policer LB-policer logical-bandwidth-policer
set firewall policer LB-policer if-exceeding bandwidth-percent 50
set firewall policer LB-policer if-exceeding burst-size-limit 125k
set firewall policer LB-policer then discard
set interfaces ge-1/3/0 unit 0 family inet policer input LB-policer
set interfaces ge-1/3/0 unit 0 family inet policer output LB-policer
set interfaces ge-1/3/0 unit 1 family inet policer input LB-policer
set interfaces ge-1/3/0 unit 1 family inet policer output LB-policer
```

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```
[edit]
user@host# edit interfaces ge-1/3/0

[edit interfaces ge-1/3/0]
user@host# set per-unit-scheduler
user@host# set vlan-tagging
```

2. □ □□ □□□ □□□□□□ □□□□□.

```
[edit interfaces ge-1/3/0]
user@host# set  unit 0 vlan-id 100
user@host# set  unit 0 family inet address 172.16.1.1/30
```

3. [illegible]

```
[edit interfaces ge-1/3/0]
user@host# set unit 1 vlan-id 200
user@host# set unit 1 family inet address 172.16.2.1/30
```

[illegible]

[illegible] show interfaces [illegible]. [illegible]

```
[edit]
user@host# show interfaces
 ge-1/3/0 {
    per-unit-scheduler;
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 172.16.1.1/30;
        }
    }
    unit 1 {
        vlan-id 200;
        family inet {
            address 172.16.2.1/30;
        }
    }
}
```

[illegible]

[illegible]

[illegible]:

1. [illegible] CoS [illegible].

```
[edit]
user@host# edit class-of-service interfaces ge-1/3/0
```

2. [illegible].

```
[edit class-of-service interfaces ge-1/3/0]
user@host# set unit 0 shaping-rate 4m
user@host# set unit 1 shaping-rate 2m
```

[illegible] 4Mbps[illegible] `ge-1/3/0.0` `ge-1/3/0.1` 2Mbps[illegible].

[illegible]

[illegible] `show class-of-service` [illegible].

```
[edit]
user@host# show class-of-service
interfaces {
    ge-1/3/0 {
        unit 0 {
            shaping-rate 4m;
        }
        unit 1 {
            shaping-rate 2m;
        }
    }
}
```

[illegible]

[illegible]

[illegible].

1. [illegible] 2[illegible].

```
[edit]
user@host# edit firewall policer LB-policer
```

2. [illegible].

```
[edit firewall policer LB-policer]
user@host# set logical-bandwidth-policer
```

[illegible].

3. [illegible].

```
[edit firewall policer LB-policer]
user@host# set if-exceeding bandwidth-percent 50
user@host# set if-exceeding burst-size-limit 125k
user@host# set then discard
```

[illegible]

[illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
policer LB-policer {
    logical-bandwidth-policer;
    if-exceeding {
        bandwidth-percent 50;
        burst-size-limit 125k;
    }
    then discard;
}
```

[illegible]

[illegible]

[illegible]:

1. [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces ge-1/3/0
```

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces ge-1/3/0]
user@host# set unit 0 family inet policer input LB-policer
user@host# set unit 0 family inet policer output LB-policer
```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces ge-1/3/0]
user@host# set unit 1 family inet policer input LB-policer
user@host# set unit 1 family inet policer output LB-policer
```

[illegible]

[illegible] [illegible] [illegible] [illegible] show interfaces [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show interfaces
ge-1/3/0 {
    per-unit-scheduler;
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            policer {
                input LB-policer;
                output LB-policer;
            }
            address 172.16.1.1/30;
        }
    }
    unit 1 {
        vlan-id 200;
        family inet {
```

```
            policer {
                input LB-policer;
                output LB-policer;
            }
            address 172.16.2.1/30;
        }
    }
}
```

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show interfaces □□ □□□□□ ge-1/3/0.0 □ ge-1/3/0.1□ □□ □□ □□ □□□ □□□□ □□ extensive □□□ □□□□□detail. □ □□ **Traffic statistics** □□ □□ □□□ □□□ □□□□□□□ □□ □ □□□ □□□ □ □□ □□ □□□□, □□□□ **Protocol inet** □□□ □□ □□□□ LB-policer □□ □□ □□ □□□□ □□□□ □□□ □□□□ **Policer** □□□□.

- **Input: LB-policer-ge-1/3/0.0-inet-i**
- **Output: LB-policer-ge-1/3/0.0-inet-o**

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```
user@host> show interfaces ge-1/3/0.0 detail
  Logical interface ge-1/3/0.0 (Index 80) (SNMP ifIndex 154) (Generation 150)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.100 ]  Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                  46
     Input  packets:                   0
     Output packets:                   1
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                  46
     Input  packets:                   0
     Output packets:                   1
    Transit statistics:
     Input  bytes  :                   0                  0 bps
     Output bytes  :                   0                  0 bps
     Input  packets:                   0                  0 pps
     Output packets:                   0                  0 pps
    Protocol inet, MTU: 1500, Generation: 174, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Policer: Input: LB-policer-ge-1/3/0.0-inet-i, Output: LB-policer-ge-1/3/0.0-inet-o
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 172.16.1.0/30, Local: 172.16.1.1, Broadcast: 172.16.1.3, Generation: 165


user@host> show interfaces ge-1/3/0.1 detail
  Logical interface ge-1/3/0.1 (Index 81) (SNMP ifIndex 543) (Generation 151)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.200 ]  Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                  46
     Input  packets:                   0
     Output packets:                   1
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                  46
     Input  packets:                   0
     Output packets:                   1
    Transit statistics:
     Input  bytes  :                   0                  0 bps
```

```
      Output bytes  :                    0                    0 bps
      Input  packets:                    0                    0 pps
      Output packets:                    0                    0 pps
    Protocol inet, MTU: 1500, Generation: 175, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Policer: Input: LB-policer-ge-1/3/0.1-inet-i, Output: LB-policer-ge-1/3/0.1-inet-o
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 172.17.1.0/30, Local: 172.17.1.1, Broadcast: 172.17.1.3, Generation: 167
```

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□□ □□ □□□ show policer □□□□ □□□□□ □□□□ □□□ □□□□□. □□ □□□ □ □□□□ □□□ □ □□□(□□ □□□ □□□)□ □□□ □□ □□ □□□□ □. □□□ LB-policer□ □□, □□ □ □□ □□□ □□□ □□□ □□ □□□□□.

- **LB-policer-ge-1/3/0.0-inet-i**
- **LB-policer-ge-1/3/0.0-inet-o**
- **LB-policer-ge-1/3/0.1-inet-i**
- **LB-policer-ge-1/3/0.1-inet-o**

-inet-i □□□□ □□□ □□□□□ □□ □□□□ □□□□ □□□□ □□□□, **-inet-o** □□□□ □□□ □□□□□ □□ □□□□ □□□□ □□□□ □□□□□. □ □□□ □□□□ □□□ □□□□□□□ □□□ □□□□□□□ ge-1/3/0.0ge-1/3/0.1□□ □ □□ □□□ □□□ □□□□□.

```
user@host> show policer
Policers:
Name                                                Packets
__default_arp_policer__                                   0
LB-policer-ge-1/3/0.0-inet-i                              0
LB-policer-ge-1/3/0.0-inet-o                              0
LB-policer-ge-1/3/0.1-inet-i                              0
LB-policer-ge-1/3/0.1-inet-o                              0
```

SEE ALSO

2□ □□□ □□ □□ | 1916

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bandwidth-percent

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shaping-rate(□□□□□□ □□)

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2□ □□□ □□ □□ | 1916

□□□ □□□ □□ □□ | 1826

bandwidth-percent

interface-specific (Firewall Filters)

logical-bandwidth-policer

shaping-rate(□□□□□□ □□)

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in this section

- □□□□ □□□ □ □□□ □□ | 1961
- □□□ □□□ □ □□□ □□ □□ | 1963
- □□□ □□□ □□ | 1964
- □: □□□□ □□□ □ □□□ □□ | 1964
- □□□□ □□□ □ □□□ □□ □□□□ | 1974

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- ? IPv4 ?? ??? ?? ??? ??? ? ??? | 1961
- ???? ?? ?? | 1961
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- ???? ?? ?? - ?? ?? ?? ??? ??? ???? IPv4 ?? ??? ?? ??? ???? ??? ? ?? ??????.
- Policer name(??? ??) - ???? ?????? ?????? ?????? ?? ??? 2? ???? ??????.

  ?: ??????? ??? ???????? ??, ??? ?????? ???(???????? ???????? ?)? ???? ???? ??? ??? ? ????. IPv4 ?? ??? ???? ??? ??? ???? ??? ??? ?? ???????? ?? ???? ??? ??? ? ????.

- Counting option(??? ??) - ???? ???? ??????? ?? ??? ??????.

- Filter-specific option(□□□ □□) - □□□ □□□ □□ □□□□ □□ □□□ □ □□□ □□□ □□□□□ □□ □□□ □□□□□. □□□ □□□□ □□□□ □□□□ □□□ *ZZZZ* □□□□ □□□□□ □□□. □ □□□ □□□□□ □□□ □□□□ □□□ *ZZ* □ □□□□ □□□□, □□ □□□□ □□□ □□□□ □ □□ □□□ □□ □□□ □□□ □ □□□ □□□ □□□□ □□□□□.
- Source address prefix length—□□ □□□ □□□□ □□□ □□□ □□ □□□□ □□(0□□ 32□□)□□□.
- Destination address prefix length(□□ □□ □□□ □□) - □□ □□□ □□□□ □□□ □□□ □□ □□□□ □□(0□□ 32□□)□□□.
- □□□ □□□ □□ - □□ □□ □□ □□□ □□□□ □□□ □□□ □□□ □□□□ □□(0□□ 32□□)□□□.

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1. Size of Counter and Policer Set = 2^(*source-or-destination-prefix-length* - *subnet-prefix-length*)

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□ 130: □□□ □ □□□ □□ □□ □ □□□□ □

□□□□ □□□ □□□ □□□ □□□ □	□□□ □□ □□□ □□ □□ □□	□□□□ □□□	
source-prefix-length = 32 *subnet-prefix-length* = 16	Size = 2^(32 - 16) = 2^16 = 65,536 instances □: □ □□□ □□□□ □□ □□□ □□ □□□ □□ □□□ □□□□ □.	□□□□ 0:	*x.x.* 0.0
		□□□□ 1:	*x.x.* 0.1
		□□□□ 65535:	*x.x.*255.255
source-prefix-length = 32 *subnet-prefix-length* = 24	Size = 2^(32 - 24) = 2^8 = 256 instances	□□□□ 0:	*x.x.x.* 0
		□□□□ 1:	*x.x.x.* 1
		□□□□ 255:	*x.x.x.* 255
source-prefix-length = 32 *subnet-prefix-length* = 25	Size = 2^(32 - 25) = 2^7 = 128 instances	□□□□ 0:	*x.x.x.* 0
		□□□□ 1:	*x.x.x.* 1

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		□□□□ 127:	*x.x.x.* 127
source-prefix-length = 24 *subnet-prefix-length* = 20	Size = 2^(24 - 20) = 2^4 = 16 instances	□□□□ 0:	*x.x.* 0.*x*
		□□□□ 1:	*x.x.* 1.*x*
		□□□□ 15:	*x.x.* 15.*x*

SEE ALSO

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prefix-action (Configuring)

prefix-action (Firewall Filter Action)

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- `[edit firewall family inet prefix-action` *`prefix-action-name`*`]`
- `[edit logical-systems` *`logical-system-name`* `firewall family inet prefix-action` *`prefix-action-name`*`]`

IPv4(family inet) ??? ?????? ???, ????? ??? ??? ??? ? ?????.

SEE ALSO

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- [edit firewall policer *policer-name*]
- [edit logical-systems *logical-system-name* firewall policer *policer-name*]

IPv4(family inet) ??? ?????? ??? ????? ??? ? ?????.

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rate-limit □□□□ 1,000,000bps□ □□□□ 63,000□□□□ □□□ □□ □□□□ □□□ 1Mbps-policer □□ □□ 2□ □□□□, □□□ □□□ □□ □□ □□□ □□□ □□ □□□ □□□□□.

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- □□ □□□ □□□ □□ 0x0000 0001 □□□, □ □□ □□□ □ □□□□ □□□ □□.
- □□ □□□ □□ 0x1111 1111 □□□, □□□ □□□ □□□ □ □□□□ □□□ □□.

□□□ □□□□ limit-source-one-24 □□ □□10.10.10.0□ □□□□ □□ /24 □□ □□□ □□□□ □□ □□□ □□□□ □□□, □□□ □□□ □□□□ □□□ □ psa-1Mbps-per-source-24-32-256□□□□□.

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- □□ □□□ 10.10.10.0 □□ □□□ □□□ □ □□ □□□□ □□□□ □□□□□□.
- □□ □□□ 10.10.10.1 □□ □□□ □□□ □ □□ □□□□ □□□□ □□□□□□.
- □□ □□□ 10.10.10.255 □□ □□□ □□□ □□□ □□□□ □□□□ □□□□□□.

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- CLI ?? ?? | 1966
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CLI ?? ??

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```
set firewall policer 1Mbps-policer if-exceeding bandwidth-limit 1m
set firewall policer 1Mbps-policer if-exceeding burst-size-limit 63k
set firewall policer 1Mbps-policer then discard
set firewall family inet prefix-action psa-1Mbps-per-source-24-32-256 policer 1Mbps-policer
set firewall family inet prefix-action psa-1Mbps-per-source-24-32-256 count
set firewall family inet prefix-action psa-1Mbps-per-source-24-32-256 subnet-prefix-length 24
set firewall family inet prefix-action psa-1Mbps-per-source-24-32-256 source-prefix-length 32
set firewall family inet filter limit-source-one-24 term one from source-address 10.10.10.0/24
set firewall family inet filter limit-source-one-24 term one then prefix-action psa-1Mbps-per-
source-24-32-256
set interfaces so-0/0/2 unit 0 family inet filter input limit-source-one-24
set interfaces so-0/0/2 unit 0 family inet address 10.39.1.1/16
```

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```
[edit]
user@host# edit firewall policer 1Mbps-policer
```

2. □□□ □□□ □□□□□.

```
[edit firewall policer 1Mbps-policer]
user@host# set if-exceeding bandwidth-limit 1m
user@host# set if-exceeding burst-size-limit 63k
```

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3. □□□ □□□□ □□ □□□ □□□□□.

```
[edit firewall policer 1Mbps-policer]
user@host# set then discard
```

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□□ □□ □□□ □□□□ □□□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
policer 1Mbps-policer {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 63k;
    }
    then discard;
}
```

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1. □□□□ □□□ □□□ □□□□□□.

```
[edit]
user@host# edit firewall family inet prefix-action psa-1Mbps-per-source-24-32-256
```

□□□□ □□□ □ □□□□ IPv4 □□□□ □□□□ □□□ □ □□□□.

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```
[edit firewall family inet prefix-action psa-1Mbps-per-source-24-32-256]
user@host# set policer 1Mbps-policer
user@host# set count
```

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> IPv4 □□ □□□ □□□□ □□□ □□□ □□□□ □□□ □□□ □□ □□□□□□□ □□ □□□□ □□□ □□□ □ □□□□.

3. IPv4 □□□ □□□ □ □□□ □□□ □□□□□ □□□ □□□ □□□□□.

```
[edit firewall family inet prefix-action psa-1Mbps-per-source-24-32-256]
user@host# set source-prefix-length 32
user@host# set subnet-prefix-length 24
```

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```
[edit]
user@host# show firewall
policer 1Mbps-policer {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 63k;
```

```
    }
    then discard;
}
family inet {
    prefix-action psa-1Mbps-per-source-24-32-256 {
        policer 1Mbps-policer;
        subnet-prefix-length 24;
        source-prefix-length 32;
    }
}
```

[illegible] [illegible] [illegible] IPv4 [illegible]

[illegible]

[illegible] [illegible] [illegible] IPv4 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. IPv4 [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit]
   user@host# edit firewall family inet filter limit-source-one-24
   ```

   [illegible] [illegible] [illegible] IPv4 [illegible] [illegible] [illegible] [illegible] [illegible].

2. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit firewall family inet filter limit-source-one-24]
   user@host# set term one from source-address 10.10.10.0/24
   ```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

   ```
   [edit firewall family inet filter limit-source-one-24]
   user@host# set term one then prefix-action psa-1Mbps-per-source-24-32-256
   ```

   [illegible] [illegible] [illegible] [illegible] next term [illegible] [illegible] [illegible] [illegible] [illegible] HTTP(Hypertext Transfer Protocol) [illegible] 500Kbps[illegible] [illegible] [illegible] [illegible] HTTP [illegible] 1Mbps[illegible] [illegible] [illegible] [illegible].

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```
[edit]
user@host# show firewall
policer 1Mbps-policer {
    if-exceeding {
        bandwidth-limit 1m;
        burst-size-limit 63k;
    }
    then discard;
}
family inet {
    prefix-action psa-1Mbps-per-source-24-32-256 {
        policer 1Mbps-policer;
        subnet-prefix-length 24;
        source-prefix-length 32;
    }
    filter limit-source-one-24 {
        term one {
            from {
                source-address {
                    10.10.10.0/24;
                }
            }
            then prefix-action psa-1Mbps-per-source-24-32-256;
        }
    }
}
```

□□□ □□□□□□□ IPv4 □□ □□□□ □□□ □□ □□

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□□□ □□□□□□□ IPv4 □□ □□□□ □□□ □□□ □□□□□ □□□ □□□□□.

1. [illegible] [illegible] IPv4 [illegible] [illegible].

```
[edit]
user@host# edit interfaces so-0/0/2 unit 0 family inet
```

2. IP [illegible] [illegible].

```
[edit interfaces so-0/0/2 unit 0 family inet]
user@host# set address 10.39.1.1/16
```

3. IPv4 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit interfaces so-0/0/2 unit 0 family inet]
user@host# set filter input limit-source-one-24
```

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] show interfaces [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show interfaces
so-0/0/2 {
    unit 0 {
        family inet {
            filter {
                input limit-source-one-24;
            }
            address 10.39.1.1/16;
        }
    }
}
```

[illegible] [illegible] [illegible] [illegible] [illegible] commit[illegible]([illegible]) [illegible].

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??? ??? limit-source-one-24 ???? ??????? so-0/0/2.0IPv4 ?? ???? ??????? ??????.

??

show interfaces statistics ???? ??????? so-0/0/2.0?? ?? ?? ??? ???? ??? ??????detail. ? **Input Filters** ?? **Protocol inet**?? ?? ???? ??? ?? ???? IPv4 ???? ???? ??????? ???? ? ??????**limit-source-one-24**.

```
user@host> show interfaces statistics so-0/0/2.0 detail
  Logical interface so-0/0/2.0 (Index 79) (SNMP ifIndex 510) (Generation 149)
    Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 173, Route table: 0
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Input Filters: limit-source-one-24
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.39/16, Local: 10.39.1.1, Broadcast: 10.39.255.255, Generation: 163
```

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□□ □□ □□□ show firewall prefix-action-stats filter *filter-name* prefix-action *name* □□□□ □□□ □□□ □□□ □□□□ □□□ □□ □□□ □□□□□.

□□□□, □□ □□□ □□□□ from *set-index* to *set-index* □□□ □□ □ □□ □□□ □□ □□□□ □□□ □ □□□□. □□□ □□□ 0□□ 65535□□ □ □□□□□.

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prefix-specific-action-name-term-name-set-index

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prefix-specific-action-name-set-index

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```
user@host> show firewall prefix-action-stats filter limit-source-one-24 prefix-action psa-1Mbps-per-source-24-32-256 from 0 to 9
Filter: limit-source-one-24
Counters:
Name                                                Bytes   Packets
psa-1Mbps-per-source-24-32-256-one-0                    0         0
psa-1Mbps-per-source-24-32-256-one-1                    0         0
psa-1Mbps-per-source-24-32-256-one-2                    0         0
psa-1Mbps-per-source-24-32-256-one-3                    0         0
psa-1Mbps-per-source-24-32-256-one-4                    0         0
psa-1Mbps-per-source-24-32-256-one-5                    0         0
psa-1Mbps-per-source-24-32-256-one-6                    0         0
psa-1Mbps-per-source-24-32-256-one-7                    0         0
psa-1Mbps-per-source-24-32-256-one-8                    0         0
psa-1Mbps-per-source-24-32-256-one-9                    0         0
```

SEE ALSO

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□ 131 □□□ 1974 □□□ □□□□ □□□ □□□ □□□ □□□ □□□□ □□□ □□□□ □□□ □□ □□□ □□□□ □□□ □□□ □□ □□ □□□ □□□□□.

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source-prefix-length = 32 *subnet-prefix-length* = 24 □□ □□: 2^8 = 256 □□□□ □□: 0 - 255	*source-address* = 10.10.10.0/24	□□□□ 0	10.10.10.0
		□□□□ 1:	10.10.10.1
		. . .	. . .
		□□□□ 255:	10.10.10.255

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"□□□□ 1: □□ □□□□ □□□ □□ □□ □□" □□□ 1976

source-prefix-length = 32 *subnet-prefix-length* = 24 □□ □□: 2^8 = 256 □□□□ □□: 0 - 255	*source-address* = 10.10.10.0/24 *source-address* = 10.11.0.0/16	□□□□ 0	10.10.10.0, 10.11.*x*.0
		□□□□ 1:	10.10.10.1, 10.11.*x*.1
		. . .	. . .
		□□□□ 255:	10.10.10.255, 10.11.*x*.255
	/16 □□□ *x* □ □□ □□□ □□ □□□ 0□□ 255 □□□□□.		

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"□□□□ 2: □□□ □□□□ □□ □□ □□□ □□□□□ □□□." □□□ 1977

source-prefix-length = 32 *subnet-prefix-length* = 25 □□ □□: 2^7 = 128 □□□□ □□: 0 - 127	*source-address* = 10.10.10.0/24	□□□□ 0	10.10.10.0, 10.10.10.128
		□□□□ 1:	10.10.10.1, 10.10.10.120
		. . .	. . .
		□□□□ 127:	10.10.10.255, 10.10.10.127

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"□□□□ 3: □□□128□□ □□□ □ □□□ □□□□ □□□ □□ □□ □□□ □□□□□ □□□□." □□□ 1979

표 131: 예제의 주소 할당 방법 *(Continued)*

계층 및 구성 요소	주소 구성 요소	할당 범위	
source-prefix-length = 32 *subnet-prefix-length* = 24 주소 수: 2^8 = 256 할당 범위: 0 - 255	*source-address* = 10.10.10.0/25 참고: 이 예제 10.10.10.127 주소 범위 10.10.10.0 주소 범위 할당 가능 주소 범위 수.	할당 0	10.10.10.0
		할당 1:	10.10.10.1
		. . .	. . .
		할당 127:	10.10.10.127
		할당 128 – 255: 예약 됨	

할당 1: 주 할당 범위 및 예 설명

이 예제 참: 할당 범위 및 주 할당범위, 이 예 *참조 참조* 할당 범위 범위 범위 범위 범위 범위 범위 범위 이 범위 할당 할당 이 이 범위 범위 범위. 범위 이 및 구성요소 이 이 범위 범위 및 이 IPv4 이 할당 할당 범위 할당. 이 할당 및 이 범위 범위 범위 범위 이 범위 범위 이 이 할당 이 범위 할당. 및 이 이 이10.11.0.0이 할당 /16 이 범위 할당.

참: 이 범위 10.10.10.0/24할당 범위 이, 이 범위 10.11.0.0/16 할당 범위 범위 및 범위 범위 할당 범위 할당.

할당 이 할당 할당 이 이 범위 범위 및 범위 할당 범위 이 및 할당 이 10.10.10.0/2410.11.0.0/16 범위 할당 범위 이 할당 할당 할당.

- 범위 및 이 할당 할당 이 이 10.10.10.0 및 10.11.*x*.0이 이 범위 이 할당, 범위 *x* 범위 0 이 할당 255.
- 범위 및 이 할당 할당 이 이 10.10.10.1 및 10.11.*x*.1이 이 범위 이 할당, 범위 *x* 범위 0 이 할당 255.
- 범위 256개(범위) 범위 및 할당 이 이 10.10.10.255 및 10.11.*x*.255이 이 범위 이 할당, 범위 *x* 범위 0 이 할당 255.

이 범위 이 이 2개 범위, 할당 할당 할당 이, 할당 범위 할당 IPv4 이 범위 범위 범위 할당 이 할당 할당.

```
[edit]
firewall {
    policer 1Mbps-policer {
        if-exceeding {
            bandwidth-limit 1m;
```

```
            burst-size-limit 63k;
        }
        then discard;
    }
    family inet {
        prefix-action psa-1Mbps-per-source-24-32-256 {
            policer 1Mbps-policer;
            subnet-prefix-length 24;
            source-prefix-length 32;
        }
        filter limit-source-two-24-16 {
            term one {
                from {
                    source-address {
                        10.10.10.0/24;
                        10.11.0.0/16;
                    }
                }
                then prefix-action psa-1Mbps-per-source-24-32-256;
            }
        }
    }
}
interfaces {
    so-0/0/2 {
        unit 0 {
            family inet {
                filter {
                    input limit-source-two-24-16;
                }
                address 10.39.1.1/16;
            }
        }
    }
}
```

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□: □□□ □□□ □□ □□□ 10.10.10.255□□ □□□ 10.10.10.0 □□ □□□□ □□ □□□ □□□□ □□, □□□□ □□□ 0□□ 127 □□ □□□ □□□ 128□□ □□□ □ □□□ □□□ □□□□□.

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- □□□ □ □□ □□□□ □□□□ □□ □□□ 10.10.10.110.10.10.129.
- □□□ 128□□(□□□) □□□ □ □□□□ □□ □□□ 10.10.10.127 □ □ 10.10.10.255□□□ □□ □□□□□□□.

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```
[edit]
firewall {
    policer 1Mbps-policer {
        if-exceeding {
            bandwidth-limit 1m;
            burst-size-limit 63k;
        }
        then discard;
    }
    family inet {
        prefix-action psa-1Mbps-per-source-25-32-128 {
            policer 1Mbps-policer;
            subnet-prefix-length 25;
            source-prefix-length 32;
        }
        filter limit-source-one-24 {
            term one {
                from {
                    source-address {
                        10.10.10.0/24;
                    }
                }
                then prefix-action psa-1Mbps-per-source-25-32-128;
            }
        }
    }
}
interfaces {
```

```
    so-0/0/2 {
        unit 0 {
            family inet {
                filter {
                    input limit-source-one-24;
                }
                address 10.39.1.1/16;
            }
        }
    }
}
```

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- □□□ 128□□ □□□□ □□□□ □□ □□□ 10.10.10.127□□ □□□ □□ □□□□□□□.
- □□□ □□ □□(128□□ 255□□ □□□ □□□ □□□□)□ □ □□ □□□ □□□□ □□□□ □□□□ □□□ □□□ □□ □□□□□ □□□□.

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```
[edit]
firewall {
    policer 1Mbps-policer {
        if-exceeding {
            bandwidth-limit 1m;
            burst-size-limit 63k;
        }
        then discard;
    }
```

```
    family inet {
        prefix-action psa-1Mbps-per-source-24-32-256 {
            policer 1Mbps-policer;
            subnet-prefix-length 24;
            source-prefix-length 32;
        }
        filter limit-source-one-25 {
            term one {
                from {
                    source-address {
                        10.10.10.0/25;
                    }
                }
                then prefix-action psa-1Mbps-per-source-24-32-256;
            }
        }
    }
}
interfaces {
    so-0/0/2 {
        unit 0 {
            family inet {
                filter {
                    input limit-source-one-25;
                }
                address 10.39.1.1/16;
            }
        }
    }
}
```

SEE ALSO

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egress-policer-overhead

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- □□ | 1990

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□□□□ □□ □□ 1□□ FPC□ PIC □□ 3□ □□□ □□□□ □□□ IQ2 PIC□ □□□□□□□. □□ PIC□□ □□ 1□ □□□ □□□□□□□ □□□ □□□□□ 0 □□ □□□□ □□□□ □□□ □□□□□ 1□□ □□ □□□□□ □□□□□. CoS(class of service) □□□□□ □□ □□□□ □□ 100Mbps□ □□□ □□ □□ □□□□□ □□□□□. 100□□□□ □□□ □□ □□□□□ □□ PIC□□ □□□□□. □□□ □□ □□□□ □□□ □□ □□□□ □□ □□ □ □□ □□□ □□□ □□ □ □ □□ □□□ □□□ □□□ 100□□□□ □□□□□.

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- □□ □□□□ □□ □□□□ [edit class-of-service interfaces *interface-name* unit *unit-number*] □□□□□.
- □□ □□□□ □□□ □□□□□ [edit chassis fpc *slot-number* pic *pic-number*] □□□□□.

□□□ □□□□ □□ □□□□ PIC □□ DPC (Dense Port Concentrator)□ □□□□ □□□ □□□□ □□ □□□ □□□ □□□.

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- CLI ?? ?? | 1983
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- ?? ???? ???? ??? ??????? ??? ?? | 1989

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CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ????, ? ??? ??? ??, ?? ???? ??? CLI? ??????? `[edit]`.

```
set interfaces ge-1/3/1 per-unit-scheduler
set interfaces ge-1/3/1 vlan-tagging
set interfaces ge-1/3/1 unit 0 vlan-id 100
set interfaces ge-1/3/1 unit 0 family inet address 10.10.10.1/30
set interfaces ge-1/3/1 unit 1 vlan-id 101
set interfaces ge-1/3/1 unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac
00:00:11:22:33:44
set class-of-service schedulers be transmit-rate percent 5
set class-of-service schedulers ef transmit-rate percent 30
set class-of-service schedulers af transmit-rate percent 30
set class-of-service schedulers nc transmit-rate percent 35
set class-of-service scheduler-maps my-map forwarding-class best-effort scheduler be
set class-of-service scheduler-maps my-map forwarding-class expedited-forwarding scheduler ef
set class-of-service scheduler-maps my-map forwarding-class network-control scheduler nc
set class-of-service scheduler-maps my-map forwarding-class assured-forwarding scheduler af
set class-of-service interfaces ge-1/3/1 unit 1 scheduler-map my-map
set class-of-service interfaces ge-1/3/1 unit 1 shaping-rate 100m
set firewall policer 500Kbps logical-interface-policer
set firewall policer 500Kbps if-exceeding bandwidth-limit 500k
set firewall policer 500Kbps if-exceeding burst-size-limit 625k
```

```
set firewall policer 500Kbps then discard
set chassis fpc 1 pic 3 ingress-policer-overhead 100
set chassis fpc 1 pic 3 egress-policer-overhead 100
set interfaces ge-1/3/1 unit 0 family inet policer input 500Kbps
```

??? ????? ??

??? ??

??? ??????? ?????? ??? ??????.

1. ?????? ?? ???

```
[edit]
user@host# edit interfaces ge-1/3/1
```

2. ? ???? ???????? ?? ?? ????? ????????(?? ?????? ? ???? ???????? ???? ? ????).

```
[edit interfaces ge-1/3/1]
user@host# set per-unit scheduler
user@host# set vlan-tagging
```

?: ????? ???? IQ2 PIC? ????? ?? ????? shared-scheduler ???? ????????? ?? ????? ? ????? ???????.

3. ???? ???????? ge-1/3/1.0??????.

```
[edit interfaces ge-1/3/1]
user@host# set unit 0 vlan-id 100
user@host# set unit 0 family inet address 10.10.10.1/30
```

4. ???? ???????? ge-1/3/1.1??????.

```
[edit interfaces ge-1/3/1]
user@host# set unit 1 vlan-id 101
user@host# set unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac 00:00:11:22:33:44
```

??

?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    per-unit-scheduler;
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.10.10.1/30;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

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??? ??

?? ???? ???? ??? ???????? ??? ?? ??? ?????:

1. ??? ?? ??? ??? ? ????.

   ```
   [edit]
   user@host# edit class-of-service
   ```

2. ??? ???????? ge-1/3/1.0?? ????? ?????.

- ?? ??? ???? ???? ????? ?????.

```
[edit class-of-service]
user@host# edit schedulers

[edit class-of-service schedulers]
user@host# set be transmit-rate percent 5
user@host# set ef transmit-rate percent 30
user@host# set af transmit-rate percent 30
user@host# set nc transmit-rate percent 35
```

0? ??? ???? ?? ??? ?????. rate-limit ??? ???? ?? ??? ?? ?? ??? ?????. ??? exact ??, ??? ?? rate-limit ????? ?? ??? ?? ???? ???? ?? ???? ?????.

- ? ????? ??? ???? ????? ???? ?? ?????.

```
[edit class-of-service]
user@host# edit scheduler-maps my-map

[edit class-of-service scheduler-maps my-map]
user@host# set forwarding-class best-effort scheduler be
user@host# set forwarding-class expedited-forwarding scheduler ef
user@host# set forwarding-class network-control scheduler nc
user@host# set forwarding-class assured-forwarding scheduler af
```

- ???? ?? ??? ????? ge-1/3/1.0? ?????.

```
[edit class-of-service]
user@host# edit interfaces ge-1/3/1 unit 1

[edit class-of-service interfaces ge-1/3/1 unit 1]
user@host# set scheduler-map my-map
```

3. ??? ???????? ge-1/3/1.1100Mbps? ??? ?? ?? ????? ?????.

```
[edit class-of-service interfaces ge-1/3/1 unit 1]
user@host# set shaping-rate 100
```

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□□ □□ □□□ □□□□ □□□ □□ □□(□□ □□□□ 100Mbp □□□ □□)□ show class-of-service □□□ □□□□□. □□ □□□ □□□ □□□ □□□ □ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show class-of-service
interfaces {
    ge-1/3/1 {
        unit 1 {
            scheduler-map my-map;
            shaping-rate 100m;
        }
    }
}
scheduler-maps {
    my-map {
        forwarding-class best-effort scheduler be;
        forwarding-class expedited-forwarding scheduler ef;
        forwarding-class network-control scheduler nc;
        forwarding-class assured-forwarding scheduler af;
    }
}
schedulers {
    be {
        transmit-rate percent 5;
    }
    ef {
        transmit-rate percent 30;
    }
    af {
        transmit-rate percent 30;
    }
    nc {
        transmit-rate percent 35;
    }
}
```

?? ??? ??? ??????? ?????? PIC ?? DPC?? ??? ???? ??

??? ??

?? ??? ??? ??????? ?????? PIC ?? MPC?? ??? ?????? ??????:

1. ???? PIC ?? MPC? ??? ???????.

```
[edit]
user@host# set chassis fpc 1 pic 3
```

2. ???? PIC ?? MPC?? 100???? ??? ?????? ??????.

```
[edit chassis fpc 1 pic 3]
user@host# set ingress-policer-overhead 100
user@host# set egress-policer-overhead 100
```

> ?: ??? ?? PIC ?? MPC? ?? ??? ??????? ?? ?? ? ?? ??? ??? ??? ? ?? ??? ???? ??? ??????.

??? ?????? 0?????? 255??????? ??? ??? ? ????.

??

?? ?? ??? ???? show chassis ?? ??? ???? ?? ??? ????????? ??? ???? ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show chassis
chassis {
    fpc 1 {
        pic 3 {
            egress-policer-overhead 100;
            ingress-policer-overhead 100;
        }
    }
}
```

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```
[edit]
user@host# edit firewall policer 500Kbps

[edit firewall policer 500Kbps]
user@host# set logical-interface-policer
user@host# set if-exceeding bandwidth-limit 500k
user@host# set if-exceeding burst-size-limit 625k
user@host# set then discard
```

2. IPv4 □□□ □□□□□□ □□□ 3 □□□ □□□□ □□□□□.

```
[edit]
user@host# set interfaces ge-1/3/1 unit 0 family inet policer input 500Kbps
```

□: □□ □ □□ □□□ □□□ □□□ □ □□ □□□ □□□□ □□□ 100Mbps □□□ □□□□□ □□□□□.

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□ show interfaces □□ □□ □□□ □□□□ □□ □□ □□□□□ □□□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□ □ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
policer 500Kbps {
    logical-interface-policer;
    if-exceeding {
        bandwidth-limit 500k;
        burst-size-limit 625k;
    }
    then discard;
```

```
}

[edit]
user@host# show interfaces
ge-1/3/1 {
    per-unit-scheduler;
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        layer2-policer {
            input-policer 500Kbps;
        }
        family inet {
            address 10.10.10.1/30;
        }
    }
    unit 0 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

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show interfaces □□□ □□□□□□□ ge-1/3/1.0□□ □□ □□ □□□ □□□□, □□ extensive □□□ detail □□□□□. □ □□ **Traffic statistics** □□ □□ □□□ □□□ □□□□□□□ □□ □ □□□ □□□ □ □□ □□ □□□□, □□□□ **Protocol inet** □□□ □□ □□□□ 500Kbps □□ □ □ □□ □□□□ □□□□ □□□ □□□□ **Policer** □□□□.

- **Input: 500Kbps-ge-1/3/1.0-log_int-i**
- **Output: 500Kbps-ge-1/3/1.0-log_int-o**

log_int-i □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□, **log_int-o** □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□□. □ □□□ □□□ □□□□□ □□□□ □□ □□□□□ □□□□□.

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- **500Kbps-ge-1/3/1.0-log_int-i**
- **500Kbps-ge-1/3/1.0-log_int-o**

log_int-i □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□, **log_int-o** □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□□. □ □□□ □□□ □□□□□ □□□□ □□ □□□□□ □□□□□.

SEE ALSO

> *egress-policer-overhead*
>
> *□□ □□□ □□□□*

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> 2□ □□□ □□ □□ | **1916**
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> CLI □□□

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□ 132 □□□ 1992 □(□) □□□ 3 □□□□ □□ □□ □□ □□(□□ □□ TCM) □□□ □ □□ □□ □□ □□(□□ □□ TCM) □□□□ □□□□ □□□ □ □□ □□ □□□ □□□□□. □□□ 2 □□□□ 3□ □□□□ □□□□ □□□ □□ □□□ □□□ □(□) □□□□□□ □□□ 2□ 3□ □□□ □□.

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□ 132: 3□ □□□ □□ □ □□□□□□ □□ *(Continued)*

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□□ □□ □□ TCM □□□ □□:
 	
[edit firewall]
three-color-policer *policer-name* {
single-rate {
(color-aware | color-blind);
committed-information-rate *bps*;
committed-burst-size *bytes*;
excess-burst-size *bytes*;
}
action {
loss-priority high then discard;
}
}
	□□□ □□□□ □□□□ □□□□ □□ □□□□□□ □□□□ □□□□ □□□ □□□□□.
	
	[edit firewall]
	family *family-name* {
	filter *filter-name* {
	term *term-name* {
	from {
	... *match-conditions* ...
	}
	then {
	three-color-policer {
	single-rate *policer-name*;
	}
	}
	}
	}
	}
	
	□□□□ □□□ □□□□ □□ □□□□□□ □□□ □□□□□.
	
	[edit interfaces]
	interface-name {
	unit *unit-number* {
	family *family-name* {
	filter {
	input *filter-name*;
	output *filter-name*;
	}
	}
	}
	}
		□□□ □□:
		• single-rate (color-aware | color-blind) □□ □□□□□.
		
		□□□ □□ □□:
		• three-color-policer single-rate *policer-name* □□□ □□□□□.
		
		□□□ □□□□□□ □□□ □□ □□:
		• filter (input | output) *filter-name* □□ □□□□□.

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□ 132: 3□ □□□ □□ □ □□□□□□ □□ *(Continued)*

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□□□ □□□□□ □□ □□ TCM □□□:
 	
[edit firewall]
three-color-policer *policer-name* {
physical-interface-policer;
single-rate {
(color-aware | color-blind);
committed-information-rate *bps*;
committed-burst-size *bytes*;
excess-burst-size *bytes*;
}
action {
loss-priority high then discard;
}
}
	□□□ □□□□□ □□□□□ □□□□ □□□□ □□□ □□□□□□ □□□□ □□□□ □□□ □□□□□.
	
	[edit firewall]
	family *family-name* {
	filter *filter-name* {
	physical-interface-filter
	term *term-name* {
	from {
	... *match-conditions* ...
	}
	then {
	three-color-policer {
	single-rate *policer-name*;
	}
	}
	}
	}
	}
	
	[edit interfaces]
	interface-name {
	unit *number* {
	family *family-name* {
	filter {
	input *filter-name*;
	output *filter-name*;
	}
	}
	}
	}
		□□□ □□:
		• physical-interface-policer □□ □□□□□.
		□□□ □□ □□:
		• physical-interface-filter □□ □□□□□.
		□□:
		• filter (input | output) *filter-name* □□ □□□□□.
		□□
		• □□□□□ □□ □□ □□□ show firewall filter *filter-name* □□□□□.

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□ 132: 3□ □□□ □□ □ □□□□□□ □□ *(Continued)*

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□□ 2□□□ TCM □□□ □□:
 	
[edit firewall]
three-color-policer *policer-name* {
two-rate {
(color-aware | color-blind);
committed-information-rate *bps*;
committed-burst-size *bytes*;
peak-information-rate *bps*;
peak-burst-size *bytes*;
}
action {
loss-priority high then discard;
}
}
	□□□ □□□□ □□□□ □□□□ □□ □□□□□□ □□□□ □□□□ □□□ □□□□□.
	
	[edit firewall]
	family *family-name* {
	filter *filter-name* {
	term *term-name* {
	from {
	... *match-conditions* ...
	}
	then {
	three-color-policer {
	two-rate *policer-name*;
	}
	}
	}
	}
	}
	
	[edit interfaces]
	interface-name {
	unit *unit-number* {
	family *family-name* {
	filter {
	input *filter-name*;
	output *filter-name*;
	}
	}
	}
	}
		□□□ □□:
		• two-rate (color-aware | color-blind) □□ □□□□□.
		□□□ □□ □□:
		• three-color-policer two-rate *policer-name* □□□ □□ □□□.
		□□□ □□□□□□ □□□ □□ □□:
		• filter (input | output) *filter-name* □□ □□□□□.

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in this section

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- □□ □□□ □□ | 1997
- □□□ □□□ □□ PIC□ □□□ □□□ □□ | 2000
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```
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
```

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- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

□□□ family □□□□ □□□□ , inet, inet6, mplstcc, □□ vpls□ □ □□□□ccc.

arp □□□ □□□□□□□ ARP(Address Resolution Protocol) □□□ □□□ □ □□□ □□□ □□□ □□□ □□□ □□□□□. □□□□□ □□ □□□ □□ □□□ □□□□□ □□ □□□□ ARP □□□□ family inet □□□□□. ARP □□□ □□ □□ □□□□□ □□□ □□□□ □□□ □□ □□□□□□ □□□□ □

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- □□ FPC□ □□ AE(Aggregated Ethernet) □□□□□□□ □□ MX □□□ □□□□□□ □□□□□ □□□□□ □□, □□□□□ □□□□ □□□□ AE □□□□ □ □□□□□□□ □□□□ □□□□□ □□□□ □□ □□□□ □□□□ □□□□ □□□□ □□□□ □ □□□□□. □□□□, □□ □□, 3□□ □□□□ □□□□ AE □□□□□□□ □□□□□ □ bandwidth-limit*600m*□ □□□□□□ □□□□ □□, AE□ 3□ □□□□□□(□, □□□□□□□ 200Mbps, □ 600Mbps)□ □□□□□ □□ □□□□ *200m* □□ □(□) □□□□□ bandwidth-limit □□□□.

- □□□□□□□ lo0□□□□□ □□□□□ □□□□ □□□□□ □□□□□□ □□□□□ □□□□ □□□□□□.

- T □□□□, M120 □ M320 □□□□□□ □□□□□□□ □□□□ FPC□ □□ □□□ □□ □□ □□□ □□□□□ □□□□□□□ □□□□□ □□□□ □□□□□ □□ □□ □□□□□ □□ □□.

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□□ □□□□□ □□□□□□ □□ □□□□□ □□□□□ [edit firewall policer *policer-template-name*] □□□□□□logical-interface-policer.

```
[edit firewall policer policer-template-name]
logical-interface-policer;
```

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```
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
```

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- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

□□□ family □□□□□ □□□□□ , inet, inet6, mplstcc, □□ vpls□ □ □□□□□ccc.

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□□ □□□□ □□□□□□□ □□□□□ policer1 □□, □□□□□ □ □□□□□□ □□□□□. □, Junos OS□ □□□□ □□ □□□□□□ □□□□□ □□□□ □□□□ □□□□□□ □□□□ □□ □□ □□□□□□□ □□□□□□□ □□ □□ □□□□□□□ □□□□□ □□□□ □□ □□□□□□ □□□□□□□.

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□ □□ □□□□ □□□□□□ □□□□□ □□□□□□. aggregate_police1 □ aggregate_police2. □□□□ □□□□□□□□ fe-0/0/0.0 □□□□□ IPv4 □ IPv6 □□□□□ □□□□□□aggregate_police1. □□□□ □□□□□□ fe-0/0/0.0□□ □□□□ CCC □ MPLS □□□□□ □□□□□□ aggregate_police2 . □ □□ □□ □□ □□□□□□□ □ □□□□□ aggregate_police1 □□□□ □ aggregate_police2□□□□□ □□□□ □□□□□.

□□ □□□□ □□□□□□□□ fe-0/0/0.1□□□□□ IPv4 □ IPv6 □□□□□ □□□□□□aggregate_police1. □ □□□□□ □□□□□□□ □□ 0□ □□□□□ □□□□□□ □□ 1□ □□□□□ □ □ □□□□□□ aggregate_police1□□□□□□.

```
[edit firewall]
policer aggregate_police1 {
    logical-interface-policer;
    if-exceeding {
        bandwidth-limit 100m;
        burst-size-limit 500k;
    }
    then {
        discard;
    }
}
policer aggregate_police2 {
```

```
    logical-interface-policer;
    if-exceeding {
        bandwidth-limit 10m;
        burst-size-limit 200k;
    }
    then {
        discard;
    }
}
[edit interfaces fe-0/0/0]
unit 0 {
    family inet {
        policer {
            input aggregate_police1;
        }
    }
    family inet6 {
        policer {
            input aggregate_police1;
        }
    }
    family ccc {
        policer {
            input aggregate_police2;
        }
    }
    family mpls {
        policer {
            input aggregate_police2;
        }
    }
}
unit 1 {
    family inet {
        policer {
            input aggregate_police1;
        }
    }
    family inet6 {
        policer {
            input aggregate_police1;
        }
```

```
    }
}
```

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in this section

- ??? ??? ?? PIC? ??? ??? ?? | 2000

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M40e, M120 ? M320 ?? ???? IQE(Enhanced Intelligent Queuing) PIC? ?? T ??? ?? ???? ?? ???? ??? ?? ?? ?? ????, ???? ? ??(???? ??? ??) ??? ??? ?? ??? ???? ??????? ??? ? ????. ??? ???? ??? ??? ??????? ?? ? ? ?? ?? ?? ??? ??????.

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- ???? ??, ? ???? ??? ?? ??? ??? ????? ??? ???? ?? ???? ????.
- BA ??? ?? ?? ??????? 64?? ???? ????, DLCI? ??? ???? ?????.
- ? ??? ???? ??? ?? ??? ??????? ??? ? ????.
- ???? BA ??? ??????? ???. BA ??? ??? ??????? ?? ???? ??? ?? EF ?? ? EF? ?????. BA ??? ???? ????? ? ?? 64?? ???? ??? ? ????. ?? ????, ??? ??????? ??? ????? ?? ??? ?????(?: DLCI)? ? ????.
- BA ??? ???? ?? ???(BA ?? DSCP/EXP ??? ???? *???*???)? ? EF ????? ???????. ? ???? ?? ??? ???? ??? ? ????.

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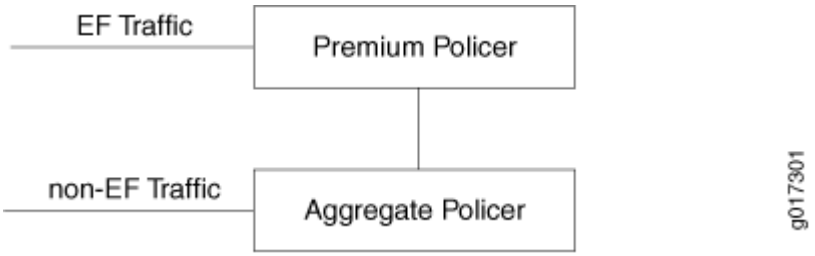

□ □□ 88 □□□ 2001□□□ EF □□□□ Premium Policer□ □□ □□□□□ □ EF □□□□ Aggregate Policer□ □□ □□□□□□□. □, EF □□□□ □□ □□□ □□□ □□□ □□□□ □□□□ □□ □□□ □□□□□ □□ □ EF □□□□ □□□ □□ □□□□ □□□ □□□□□.

□□□ EF □□□□ □□ □□□□ □□□ □□□ □□□ □□□□ □□□□. □□ □□□□ □□□□ □□□ □□□ □□□ □□□ □□□□ □□ □□, □□□ □□□ □□□ □□ □□□□ □□□ □□□□ □□□□. □□ □□□□ EF□ □□ □□□□ □□□□□□. □□□□□ □□ □□□ □ EF □□□□□ □□□□ EF □□□□ □□□□ □□ □□ □□ □ □□ □□□ □□□ □ □ □□□□. □□□ □□□ □□ □□ □□ □□ □□□ □□□ □□ □□ □□ □□□ □ □□□□. □ □□ □□ □□ □□□ □□□□.

- *□□□□ □□□:* □□□ 2Mbps, OOS □□: □□□
- *□□ □□□:* □□□ 10Mbps, OOS □□: □□□

□□ □□ EF □□□□ 2Mbps□ □□□□ □ EF □□□□ EF □□□□ □□ □□□ □□ 8Mbps□□ 10Mbps□ □□□□□.

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- □□ □□□□ □□□□ □□□□ □□ □□ EF □□□□ □ EF □□□□□ □□□□□.
  - □□□ Q-tree □□□ □□□□□.
- □□ □□□ □□ □□ □□ □□□□ □□□□□.
  - □□ □□ □□ □□□□ □ □□ □□ □□ □□□□ □□□□.
    - Policer1—EF □□□
    - Policer2—□ EF □□□
- □□ □□ □□□ □□□ □□ □□□□ □□□□ □ □□□□□.
  - Policer1□ EF □□(□: 2Mbps)□ □□□□□
  - Policer2□ □□□□□ □□□ □□(□: 10Mbps)□ □□□□□ □□□□□.
  - EF □□□□ Policer1□ □□□□□.
    - □□□□ □□ □□ □□ □□ Policer1□ Policer2 □□□□ □□ □ □□□ □ □□□□.

    - ???? ??? ???? ????? ? FC ?? ?? ????? ??? ? ????. Policer2? ??? ??? EF ????? ?? ??? ???? ? ???.
  - EF? ?? ???? Policer2?? ?????.
    - ???? ?? ?? ?? ?? ??? ???? Policer2? ??????.
    - ???? ??? ???? ????? ? FC? ????? ? ?? ?? ??? ?????.
- ??? 2?? ?? ??? ??? ??? ?? ??
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SEE ALSO

- ??? ?? ??? ???(??? ? EX9200 ???)

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```
[edit class-of-service forwarding-classes]
class fc1 queue-num 0 priority high policing-priority premium;
class fc2 queue-num 1 priority low policing-priority normal;
class fc3 queue-num 2 priority low policing-priority normal;
class fc4 queue-num 3 priority low policing-priority normal;
```

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```
[edit firewall hierarchical-policer foo]
aggregate {
    if-exceeding {
```

```
        bandwidth-limit 70m;
        burst-size-limit 1500;
    }
    then {
    discard;
}
premium {
    if-exceeding {
        bandwidth-limit 50m;
        burst-size-limit 1500;
    }
    then {
        discard;
    }
}
```

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```
[edit interfaces so-0/1/0 unit 0 layer2-policer]
input-hierarchical-policer foo;
```

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```
[edit interfaces so-0/1/0 layer2-policer]
input-hierarchical-policer foo;
```

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```
[edit firewall policer foo]
    if-exceeding {
        bandwidth-limit 50m;
        burst-size-limit 1500;
    }
then {
    discard;
}
```

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```
[edit interfaces so-0/1/0 unit 0 layer2-policer]
input-policer foo;
```

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```
[edit interfaces so-0/1/0 layer2-policer]
input-policer foo;
```

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```
[edit firewall three-color-policer foo]
single-rate {
    color-blind;
    committed-information-rate 50m;
    committed-burst-size 1500;
    excess-burst-size 1500;
}
```

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```
[edit interfaces so-0/1/0 unit 0 layer2-policer]
input-three-color foo;
```

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```
[edit firewall three-color-policer bar]
single-rate {
    color-aware;
    committed-information-rate 50m;
    committed-burst-size 1500;
    excess-burst-size 1500;
}
```

□□□ □□ □□ □□ □□ □□ □□□□ □□□ □ □□□□.

```
[edit interfaces so-0/1/0 unit 0 layer2-policer]
input-three-color foo;
```

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```
[edit interfaces so-0/1/0 layer2-policer]
input-three-color bar;
```

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- (1K) trTCM - □□ □□ □□(□□□, □□□ □ □□ □□)
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  - +/- □□□ □ □□□ □□
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  - □□ □□□ □□□ □□□□ q-tree □□□ □□□ □□□□□□□.
    - □□□ □□(ToS)
    - □□
- □□□□□ □□□ □□ □□:
  - □□(□□, □□□, □□)
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  - □□ □□ LUT□ □□□ □□□□ □ □□□□ □□□□□.
  - □□ □□□ □□□ □□□□ □□□ □ □□(LUT□ □□□ □□□ □□□□ □□□)
- □□ □□□□ □□ □□□ □ trTCM□ □□□□□.
  - □

- □□ □□□□□(ifl/DLCI)
- □□□ □□□□□(ifd)
- □□□ □□(□□□□ ifd)
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□□ trTCM □□

```
[edit firewall three-color-policer foo]
two-rate {
    color-blind;
    committed-information-rate 50m;
    committed-burst-size 1500;
    peak-information-rate 100m;
    peak-burst-size 3k;
}
```

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```
[edit interfaces so-0/1/0 unit 0 layer2-policer]
input-three-color foo;
```

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```
[edit interfaces so-0/1/0 layer2-policer]
input-three-color foo;
```

□□ □□ trTCM □□

```
[edit firewall three-color-policer bar]
two-rate {
    color-aware;
    committed-information-rate 50m;
    committed-burst-size 1500;
    peak-information-rate 100m;
```

```
    peak-burst-size 3k;
}
```

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```
[edit interfaces so-0/1/0 unit 0 layer2-policer]
input-three-color bar;
```

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```
[edit interfaces so-0/1/0 layer2-policer]
input-three-color bar;
```

SEE ALSO

- □□□ □□ □□□ □□□(□□□ □ EX9200 □□□)

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in this section

- 3□ □□□□ □□ □□□□ □□□ | **2007**
- 3□ □□□□ □□ □□ | **2008**
- 3□ □□□□ □□ □□ □□ | **2009**

3□ □□□□ □□ □□□□ □□□

3□ □□□□ □□ □□□ □□□□ □□□□□ □□□□□.

- M120 □□□□□ □□ □□□
- Enhanced II FPC(Flexible PIC Concentrator)□ □□□ M320 □□□□□ □□ □□□ □ T □□□ □□ □□□
- MX □□□ 5G □□□□ □□□ □□□

- □□□ □□□ FPC□ □□□□ T640 □□ □□□4
- FPC5□ □□□ T4000 □□ □□□

MX □□□ □ M120 □□□□□□ □□□□□□□ □□□□□□ 3□ □□□□ □□□ □ □□□□.

`discard`*□□□ □□□* □□ □□ □□ □□□□ □□ □□□ M120 □□□, Enhanced-III FPC□ □□ M320 □□□, Enhanced CFEB-E(Enhanced CFEB-E)□ □□ M7i □ M10i □□□, Trio MPC□ □□ MX □□□ □□□□□ □□□□□, □□ □□ □□ □□□ `logical-interface-policer` □□□ □□□□.

SEE ALSO

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2□□ □□, 3□ □□□□ □□, Junos OS□ □ □□ □□ □□□ □□□□ □ □□ □□□ □□□ □□ □□□□ □□□□□. □□ □□, □□□□□ □□ □□□□□ 2□□ □ □□□□ □□□ □ □□□. 2□□□ □□□□ □□□ □□□(□□ □□□□ □□-□□)□□ □□□□□□. □□ □□ □□□□ □□□ □□□ □□□ □□□ □ □ □□□ □□

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□: □□ □□ □□□□ □□□□□ 3□ □□□□□ □□, □□ □□□□ PLP□ □□-□□□□ □, □□□□□ □□ □□ □□□□ □□□□ □□□□□□ □□□□□□.
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- T1600 Enhanced Scaling Type 4 FPC(T1600-FPC4-ES)□□ □□ □□□□ PLP□ □□-□□□□□ □□□□□ □.
- T4000 □□ 5 FPC(T4000-FPC5-3D)□□ □□ □□□□ PLP□ □□ □□□□□ □□□□□□.

□□□ □□□□ □□ PLP□ □□□□□ □□ □□□□□□□(□: □□ □□□□□□□ □□□□ □ WRED □□)□ □□, □□□□□ □□□□□ FPC □□ (T1600 Enhanced Scaling FPC4(T1600-FPC4-ES) □□ T4000 FPC5(T4000-FPC5-3D))□ □□ □□□□ □□□□□ □□ □□□□ □□□□ □□□□□□.

SEE ALSO

3□ □□□□ □□ □□ | **1992**

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- Three-color policer type—□□ srTCM/□□ 3□ □□□□□ trTCM □□□□□ *2* □□□□ 3□ □□□□□ □□□□□□.
- Three-color policer color mode(3□ □□□□ □□ □□) - □□□□ ca/□□ /□□ 3□ □□□□□ cb □□□□□ */□□ 3/□ /□□□□□* □□□□□□.

□:
TCM□ □□ □□□□ □□□□□□.

□ 133 □□□□ 2010 □□□□ □□□□□ □□□□□ □□ □□□□ □□□□□□.

□ 133: □□□□ □□□□ □□ □□

3□ □□□ □□	□□ □□	□□ □□
□□ □□ 3□, □□ □□	srTCM*number*-ca	srTCM1-ca, srTCM2-ca, srTCM3-ca, ...
□□ □□ 3□, □□	srTCM*number*-cb	srTCM1-cb, srTCM2-cb, srTCM3-cb, ...
2 □□□ 3 □, □ □□	trTCM*number*-ca	trTCM1-ca, trTCM2-ca, trTCM3-ca, ...
2 □□□ 3 □, □□	trTCM*number*-cb	trTCM1-cb, trTCM2-cb, trTCM3-cb, ...

SEE ALSO

3□ □□□ □□ □□ | **1992**

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3□ □□□ □□ □□ | **1992**

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in this section

- Single-Rate Three-Color Policer ?? | 2011
- ?: ?? ?? 3? ??? ?? | 2012

Single-Rate Three-Color Policer ??

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?? ??? 3? ???? ??? ?? ??? ??? ??? ?? ??? ???? ?????.

- CIR(Committed Information Rate) - ??? ???? ?? ??? ?????.
- CBS(Committed Burst Size) - CIR? ???? ??? ???? ???? ?? ?? ?????.
- ?? ??? ??(EBS) - ?? ???? ???? ?? ?? ?????.

?? ?? ?? ??(?? ?? TCM)? ???? ? ?? ?? ?? ? ??? ??? ??? ???? ?? ??? ?? ??? ?? ?? ?? ??? ?????.

- ?? - *???/???*(CIR ?? CBS)? ?? ??? ?? *??*??? ??? ???? ???????. ?? ??? ???? ??, ?? ??? ??? ??? ?? ?? ?? `low` ? ???? ??? ?????.
- ??? - ??? ???(CIR ? CBS)? ?? ??? ?? *?*??? ??? *??*?????? ?? ???(EBS)? ?? ??? ??? ???? ?? ???????. ? ?? ??? ??? ??, ?? ??? ??? ??? ?? ???? `medium-high` ? ???? ??? ?????.
- ??? - ?? ???(EBS)? ??? ??? ???? ???, ?? ??? ??? ?? ???? `high` ? ??? ???? ????? ??? ?????.

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?: ?? ?? ? 2 ?? 3? ???? ??, ???? *??* *???*??? ??? ??? ??? ??? ???? ????.

`discard`*???* *???*?? ?? ?? ???? ?? ??? M120 ???, Enhanced-III FPC? ?? M320 ???, Enhanced CFEB-E(Enhanced CFEB-E)? ?? M7i ? M10i ???, MPC? ?? MX ??? ????? ?????, ?? ?? ?? ??? `logical-interface-policer` ??? ????.

SEE ALSO

> 3□ □□□ □□ □□ | 1992
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> □: □□ □□ 3□ □□□ □□

□: □□ □□ 3□ □□□ □□

in this section

- □□ □□ | 2012
- □□ | 2012
- □□ | 2013
- □□ | 2018

□ □□ □□ □□ 3□ □□□□ □□□□ □□□ □□□□□.

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in this section

- □□□□ | 2013

□□ □□□ 3□ □□□□ □□□ □□□□ □□ □□□ □□ □ □□□ □□ □□□ □□ □□□ □□□□ □□□□, □□ □□□□ □□ □ □□ □□□ □□ □□□ □□□□. □□ □ □□□□ □□ □□□ □□□□ □□□□ □□□□ □□□□, □□□ □□□□ □□ □ □□ □□ □ □□□ □□□□□.

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- □□ □□□□ □□ □□□ □□□ □□□□ □□□ □□□□ □□□□□ □□□□□.

□ □□□ □□□ □□□□□. □□ □□□□ □□, □□□ □□ □□□□ □□□ low □□□□□ □□□ □ □□□□□. □□□ □□□□ □□, □□□ □□ □□ □□ □□□ medium-high □□□□□ □□□ □□ □□□□□. □□ □□□□ □□, □□□ □□ □□□□ □□□ high □□□□□ □□□ □ □□□□□. □□□ □□□ □□□ action □□□(action loss-priority high then discard)□ □□□ □□ □□□ □□□ □□□ □□ □□□□□.

□□□ 3 □□□□ 3□ □□□□ □□□ □□ □□□□□ □□□ □ □□□□. □□□ □□□ □□ □□□□ □□□□ □□□ □□ □□□□ □□□□ □□ □□□□□□ □□ □□ □□□ □□□ □□□□□.

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□ □□□□ □□ □□□□□□ ge-2/0/5.0□□ IPv4 □□□□ □□ □□, □□ □□ 3□ □□□□ □□□□□. □□□□ □□□□ IPv4 □□□ □□ □□□ □□ □□□ □ □□□□ □□□□. □□□ □□□□□□ 3□ □□□□ □□□□ □□ □□□□□.

□□□□ □□□□ □□□□ 40Mbps□ □□□ □□□ □□ □□□□ □□ 100KB□ □□□ □□ □□□□ □□ □□□□□, □□□ □□□□ □□ 200KB□ □□ □ □□ □□ □□□ □□□□□. □□ □□□ □□ □□□ □□□□ □□□ □□□□ □□□□□ □□□□□. □ □□□□ □□□ □□□□ □□□□ □□□ □□ □□□□□ high □□ □□□ 3□ □□□ □□□ loss-priority high then discard□□□□.

□□

in this section

- CLI □□ □□ | 2013
- □□ □□ 3□ □□□ □□ | 2014
- □□□□ □□□□ IPv4 □□□ □□□ □□ □□ | 2015
- □□ □□□□□□ □□ □□ | 2016

□□ □□ □□ □□□□ □□□ □□□ □□□ □□□□□. CLI □□□ □□ □□□ □□□ □ □□□□□□ "□□ □□□□ CLI □□□ □□" □□□ 1787.

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CLI □□ □□

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```
set firewall three-color-policer srTCM1-ca single-rate color-aware
set firewall three-color-policer srTCM1-ca single-rate committed-information-rate 40m
set firewall three-color-policer srTCM1-ca single-rate committed-burst-size 100k
set firewall three-color-policer srTCM1-ca single-rate excess-burst-size 200k
set firewall three-color-policer srTCM1-ca action loss-priority high then discard
set firewall family inet filter filter-srtcm1ca-all term 1 then three-color-policer single-rate
srTCM1-ca
set class-of-service interfaces ge-2/0/5 unit 0 forwarding-class af
```

```
set interfaces ge-2/0/5 unit 0 family inet address 10.20.130.1/24
set interfaces ge-2/0/5 unit 0 family inet filter input filter-srtcm1ca-all
```

?? ?? 3? ??? ??

??? ??

?? ?? 3? ???? ????? ??? ?????.

1. 3? ???? ??? ???????.

```
[edit]
user@host# edit firewall three-color-policer srTCM1-ca
```

2. ?? ?? 3? ???? ? ??? ?????.

```
[edit firewall three-color-policer srTCM1-ca]
user@host# set single-rate color-aware
```

3. ?? ?? ?? ??? ??? ?????.

```
[edit firewall three-color-policer srTCM1-ca]
user@host# set single-rate committed-information-rate 40m
user@host# set single-rate committed-burst-size 100k
```

4. ??? ???? ???? ? ???? ?? ?? ??? ?? ??? ?????.

```
[edit firewall three-color-policer srTCM1-ca]
user@host# set single-rate excess-burst-size 200k
```

5. (?? ??) ??? ???? ?? ??? ?????.

```
[edit firewall three-color-policer srTCM1-ca]
user@host# set action loss-priority high then discard
```

3? ???? ??, ???? ??? ? ?? ??? ??? ??? ??? ??? ???? ????. ? ??? ??? ??? ???? ??? ?? ?? ????(PLP) ? ?? high ????? ???????, ?? ??? ???? ?? ?? ??(?? ?? ??)? ? ? ??? ?? ??(?? committed-information-rate 40m ?

□ □□ excess-burst-size 200k)□ □□ □□□ □□ □□□ □□□□ □□□□□. □□□ action □□ □□□□ □□ □□□ □ □□□□ □□□ □□□ □□□ □ □□□ □□□□ □ □□□ □□□ □□□□□.

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□□ □□□ □□□□ □□□ □□□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
three-color-policer srTCM1-ca {
    action {
        loss-priority high then discard;
    }
    single-rate {
        color-aware;
        committed-information-rate 40m;
        committed-burst-size 100k;
        excess-burst-size 200k;
    }
}
```

□□□□ □□□□ IPv4 □□□ □□□ □□ □□

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1. IPv4 □□ □□□ □□□ □□□ □□□ □ □□□□.

   ```
   [edit]
   user@host# edit firewall family inet filter filter-srtcm1ca-all
   ```

2. □□□□ □□□□ □□ □□□ □□□□□.

   ```
   [edit firewall family inet filter filter-srtcm1ca-all]
   user@host# set term 1 then three-color-policer single-rate srTCM1-ca
   ```

   □ □□□ □□ □□□ □□□□ □□□□. □□□ □□□ □□ □□□ □□□□ □□□□□.

??

?? ?? ???? ????? ???? ???? show firewall ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ????? ???? ???????.

```
[edit]
user@host# show firewall
family inet {
    filter filter-srtcm1ca-all {
        term 1 {
            then {
                three-color-policer {
                    single-rate srTCM1-ca;
                }
            }
        }
    }
}
three-color-policer srTCM1-ca {
    action {
        loss-priority high then discard;
    }
    single-rate {
        color-aware;
        committed-information-rate 40m;
        committed-burst-size 100k;
        excess-burst-size 200k;
    }
}
```

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1. (MX ???? ????? ??) (?? ??) ?? ???? ????? ???? ??????? ge-2/0/5.0 ?? ?? ???? ???? ?????? ???????.

   ```
   [edit]
   user@host# set class-of-service interfaces ge-2/0/5 unit 0 forwarding-class af
   ```

   ???? ???? ???? ???? ?? ?? ???? ? ???? ? ?????.

2. [illegible]

```
[edit]
user@host# edit interfaces ge-2/0/5 unit 0 family inet
```

3. IP [illegible]

```
[edit interfaces ge-2/0/5 unit 0 family inet]
user@host# set address 10.20.130.1/24
```

4. [illegible]

```
[edit interfaces ge-2/0/5 unit 0 family inet]
user@host# set filter input filter-srtcm1ca-all
```

[illegible]

[illegible] show interfaces [illegible] show class-of-service [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show class-of-service
interfaces {
    ge-2/0/5 {
        unit 0 {
            forwarding-class af;
        }
    }
}

[edit]
user@host# show interfaces
ge-2/0/5 {
    unit 0 {
        family inet {
            filter {
                input filter-srtcm1ca-all;
                }
            address 10.20.130.1/24;
```

```
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

□□

in this section

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□□

show interfaces □□□ □□□□□□ ge-2/0/5.0□□ □□ □□ □□□ □□□□ □□□ □□□□□detail. □□ □□□ □□□□ **Protocol inet** □□□ □□ □□□□ □□ IPv4 □□□ □□□□□. □□ □□ **Input Filters** □□□ □□□ □□□ □□□□□□ IPv4 □□ □□□□ □□□ □□□ □□□ □□□ □□□□□.

```
user@host> show interfaces ge-2/0/5.0 detail
  Logical interface ge-2/0/5.0 (Index 105) (SNMP ifIndex 556) (Generation 170)
    Flags: Device-Down SNMP-Traps 0x4004000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
```

```
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :                    0                    0 bps
     Input  packets:                    0                    0 pps
     Output packets:                    0                    0 pps
    Protocol inet, MTU: 1500, Generation: 242, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Input Filters: filter-srtcm1ca-all
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.20.130/24, Local: 10.20.130.1, Broadcast: 10.20.130.255,
        Generation: 171
    Protocol multiservice, MTU: Unlimited, Generation: 243, Route table: 0
      Policer: Input: __default_arp_policer__
```

SEE ALSO

> 3□ □□□ □□ □□ | **1992**
>
> Single-Rate Three-Color Policer □□

□□ □□

> 3□ □□□ □□ □□ | **1992**
>
> 3□ □□□ □□ □□ | **2007**

□□ 2□□□ 3□ □□□

in this section

- Two-Rate Three-Color Policer □□ | **2020**
- □: 2□□□ 3□ □□□ □□ | **2021**

Two-Rate Three-Color Policer ??

2????, 3? ????? 2?? ??? ??(??? ??? ???, ?? ??? ?? ???)? 2?? ??? ??(? ??? ??? ?? ???)? ??????. 2????, 3? ? ??? ????? ?? ??? ?? ????? ?? ????? ? ?? ??????.

2?? ??? 3? ????? ??? ?? ??? ??? ??? ?? ??? ???? ??????.

- CIR(Committed Information Rate) - ??? ????? ?? ??? ??????.
- CBS(Committed Burst Size) - CIR? ????? ??? ????? ????? ?? ?? ??????.
- PIR(Peak Information Rate) - ?? ????? ?? ??? ??????.
- ?? ??? ??(PBS) - PIR? ????? ??? ????? ????? ?? ?? ??????.

2??? ?? ??(2??? TCM)? ????? 3?? ?? ?? ? ??? ??? ??? ????? ?? ??? ????? ??? ?? ?? ?? ??? ??????.

- ?? - ??? ???(CIR ? CBS)? ?? ??? ?? ? ??? ??? ????? ???????. ?? ??? ????? ??, 2??? TCM? ??? ??? ?? ? ??? `low` ? ????? ??? ??????.
- ??? - ??? ???(CIR ?? CBS)? ?? ??? ?? ?? ??? ??? ?????? ?? ???(PIR ? PBS)? ?? ??? ?? ? ??? ??? ??? ? ?? ???????. ??? ??? ??? ??, 2??? TCM? ??? ?? ????? `medium-high` ? ??? ????? ??? ??????.
- ??? - ?? ???(PIR ? PBS)? ?? ??? ?? ? ??? ??? ????? ???????. ??? ??? ??? ??, 2??? TCM? ??? ?? ????? `high` ? ??? ?????, ?????? ??? ??????.

???????? ??? ????? ?? ?????? ?? ??? ??? ????? ?????.

?: ?? ?? ? 2 ?? 3? ????? ??, ????? *??? ????* ??? ??? ??? ??? ??? ????? ?????.

???? ?? ??? ????? ?? ?? ????? ??, `discard` ??? ??? ?? ??? ?????? ??????.

- EX ??? ???
- Enhanced CFEB(CFEB-E)? ??? M7i ? M10i ???
- Enhanced-III FPC? ??? M120 ? M320 ???
- Trio MPC? ?? MX ??? ???

??? ??? ????? ?? ?? ????? ????? ?? ?? ??? `logical-interface-policer` ??? ?????.

SEE ALSO

?: 2???? 3? ???? ?? | **2028**

□: 2□□□ 3□ □□□ □□

in this section

- □□ □□ | 2021
- □□ | 2021
- □□ | 2022
- □□ | 2027

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```
set firewall three-color-policer trTCM1-ca two-rate color-aware
set firewall three-color-policer trTCM1-ca two-rate committed-information-rate 40m
set firewall three-color-policer trTCM1-ca two-rate committed-burst-size 100k
set firewall three-color-policer trTCM1-ca two-rate peak-information-rate 60m
set firewall three-color-policer trTCM1-ca two-rate peak-burst-size 200k
set firewall three-color-policer trTCM1-ca action loss-priority high then discard
set firewall family inet filter filter-trtcm1ca-all term 1 then three-color-policer two-rate
trTCM1-ca
set interfaces ge-2/0/5 unit 0 family inet address 10.10.10.1/30
set interfaces ge-2/0/5 unit 0 family inet filter input filter-trtcm1ca-all
set class-of-service interfaces ge-2/0/5 forwarding-class af
```

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1. 3□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# set firewall three-color-policer trTCM1-ca
```

2. 2□□□ 3□ □□□□ □□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set two-rate color-aware
```

3. 2□□ □□ □□ □□□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set two-rate committed-information-rate 40m
user@host# set two-rate committed-burst-size 100k
```

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4. 2□□ □□□ □□ □□□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set two-rate peak-information-rate 60m
user@host# set two-rate peak-burst-size 200k
```

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5. (□□ □□) □□□ □□□□ □□ □□□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set action loss-priority high then discard
```

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□□ □□ □□□ □□□□ □□□□ show firewall □□□ □□□□□.

```
[edit]
user@host# show firewall
three-color-policer trTCM1-ca {
    action {
        loss-priority high then discard;
    }
    two-rate {
        color-aware;
        committed-information-rate 40m;
        committed-burst-size 100k;
        peak-information-rate 60m;
        peak-burst-size 200k;
    }
}
```

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1. IPv4 □□ □□□ □□□ □□□ □□□ □ □□□□.

```
[edit]
user@host# set firewall family inet filter filter-trtcm1ca-all
```

2. □□□□ □□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter-trtcm1ca-all]
user@host# set term 1 then three-color-policer two-rate trTCM1-ca
```

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```
[edit]
user@host# show firewall
family inet {
    filter filter-trtcm1ca-all {
        term 1 {
            then {
                three-color-policer {
                    two-rate trTCM1-ca;
                }
            }
        }
    }
}
three-color-policer trTCM1-ca {
    action {
        loss-priority high then discard;
    }
    two-rate {
        color-aware;
        committed-information-rate 40m;
        committed-burst-size 100k;
        peak-information-rate 60m;
        peak-burst-size 200k;
    }
}
```

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1. IPv4 ??? ???? ???? ? ?????.

```
[edit]
user@host# edit interfaces ge-2/0/5 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-2/0/5 unit 0 family inet]
user@host# set address 10.10.10.1/30
user@host# set filter input filter-trtcm1ca-all
```

3. (MX [illegible] EX [illegible]) ([illegible]) [illegible]. [illegible].

> [illegible]: [illegible] Junos OS [illegible].

```
[edit]
user@host# set class-of-service interfaces ge-2/0/5 forwarding-class af
```

[illegible].

[illegible]

[illegible] show interfaces [illegible]. [illegible].

```
[edit]
user@host# show interfaces
ge-2/0/5 {
    unit 0 {
        family inet {
            address 10.10.10.1/30;
            filter {
                input filter-trtcm1ca-all;
            }
        }
    }
}
```

[illegible] commit[illegible]([illegible]) [illegible].

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show interfaces ??? ???????? ge-2/0/5.0?? ?? ?? ??? ????? ??? ??????detail. ?? ??? ????? **Protocol inet** ??? ?? ????? ?? IPv4 ??? ??????. ?? ?? **Input Filters** ??? ??? ??? ???????? ??? IPv4 ??? ??? ??? ??????.

```
user@host> show interfaces ge-2/0/5.0 detail
  Logical interface ge-2/0/5.0 (Index 105) (SNMP ifIndex 556) (Generation 170)
    Flags: Device-Down SNMP-Traps 0x4004000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                  0 bps
     Output bytes  :                   0                  0 bps
     Input  packets:                   0                  0 pps
     Output packets:                   0                  0 pps
    Protocol inet, MTU: 1500, Generation: 242, Route table: 0
```

```
    Flags: Sendbcast-pkt-to-re
    Input Filters: filter-trtcm1ca-all
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.20.130/24, Local: 10.20.130.1, Broadcast: 10.20.130.255,
      Generation: 171
  Protocol multiservice, MTU: Unlimited, Generation: 243, Route table: 0
    Policer: Input: __default_arp_policer__
```

SEE ALSO

- Two-Rate Three-Color Policer □□ | 2020

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- 3□ □□□ □□ □□ | 2007

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```
set firewall three-color-policer trTCM1-ca two-rate color-aware
set firewall three-color-policer trTCM1-ca two-rate committed-information-rate 40m
set firewall three-color-policer trTCM1-ca two-rate committed-burst-size 100k
set firewall three-color-policer trTCM1-ca two-rate peak-information-rate 60m
set firewall three-color-policer trTCM1-ca two-rate peak-burst-size 200k
set firewall three-color-policer trTCM1-ca action loss-priority high then discard
set firewall family inet filter filter-trtcm1ca-all term 1 then three-color-policer two-rate
trTCM1-ca
set interfaces ge-2/0/5 unit 0 family inet address 10.10.10.1/30
set interfaces ge-2/0/5 unit 0 family inet filter input filter-trtcm1ca-all
set class-of-service interfaces ge-2/0/5 forwarding-class af
```

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1. 3□ □□□□ □□□ □□□□□□□.

```
[edit]
user@host# set firewall three-color-policer trTCM1-ca
```

2. 2□□□ 3□ □□□□ □□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set two-rate color-aware
```

3. 2□□ □□ □□ □□□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set two-rate committed-information-rate 40m
user@host# set two-rate committed-burst-size 100k
```

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4. 2□□ □□□ □□ □□□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set two-rate peak-information-rate 60m
user@host# set two-rate peak-burst-size 200k
```

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5. (□□ □□) □□□ □□□□ □□ □□□ □□□ □□□□□.

```
[edit firewall three-color-policer trTCM1-ca]
user@host# set action loss-priority high then discard
```

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```
[edit]
user@host# show firewall
three-color-policer trTCM1-ca {
    action {
        loss-priority high then discard;
    }
    two-rate {
        color-aware;
        committed-information-rate 40m;
        committed-burst-size 100k;
        peak-information-rate 60m;
```

```
        peak-burst-size 200k;
    }
}
```

□□□□ □□□□ IPv4 □□□ □□□ □□ □□

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□□□□ □□□□ IPv4 □□□ □□□ □□□ □□□□□ □□□ □□□□□.

1. IPv4 □□ □□□ □□□ □□□ □□□ □ □□□□.

```
[edit]
user@host# set firewall family inet filter filter-trtcm1ca-all
```

2. □□□□ □□□□ □□ □□□ □□□□□.

```
[edit firewall family inet filter filter-trtcm1ca-all]
user@host# set term 1 then three-color-policer two-rate trTCM1-ca
```

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□□ □□ □□□ □□□□ □□□ □□□ show firewall □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show firewall
family inet {
    filter filter-trtcm1ca-all {
        term 1 {
            then {
                three-color-policer {
                    two-rate trTCM1-ca;
                }
            }
        }
    }
}
three-color-policer trTCM1-ca {
```

```
    action {
        loss-priority high then discard;
    }
    two-rate {
        color-aware;
        committed-information-rate 40m;
        committed-burst-size 100k;
        peak-information-rate 60m;
        peak-burst-size 200k;
    }
}
```

[illegible]

[illegible]

[illegible].

1. IPv4 [illegible].

```
[edit]
user@host# edit interfaces ge-2/0/5 unit 0 family inet
```

2. [illegible].

```
[edit interfaces ge-2/0/5 unit 0 family inet]
user@host# set address 10.10.10.1/30
user@host# set filter input filter-trtcm1ca-all
```

3. (MX [illegible] EX [illegible]) ([illegible]) [illegible].

> [illegible]: [illegible] Junos OS [illegible].

```
[edit]
user@host# set class-of-service interfaces ge-2/0/5 forwarding-class af
```

[illegible].

??

?? ?? ??? ???? show interfaces ????? ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ??????.

```
[edit]
user@host# show interfaces
ge-2/0/5 {
    unit 0 {
        family inet {
            address 10.10.10.1/30;
            filter {
                input filter-trtcm1ca-all;
            }
        }
    }
}
```

???? ??? ???? ?? ???? commit?(?) ?????.

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??? ??? ??? ??????? IPv4 ?? ???? ????? ?????.

□□

show interfaces □□□ □□□□□□□ ge-2/0/5.0□□ □□ □□ □□□ □□□□ □□□ □□□□□detail. □□ □□□ □□□□ **Protocol inet** □□□ □□ □□□□ □□ IPv4 □□□ □□□□□. □□ □□ **Input Filters** □□□ □□□ □□□ □□□□□□□ □□□ IPv4 □□□ □□□ □□□ □□□□□.

```
user@host> show interfaces ge-2/0/5.0 detail
  Logical interface ge-2/0/5.0 (Index 105) (SNMP ifIndex 556) (Generation 170)
    Flags: Device-Down SNMP-Traps 0x4004000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Protocol inet, MTU: 1500, Generation: 242, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Input Filters: filter-trtcm1ca-all
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.20.130/24, Local: 10.20.130.1, Broadcast: 10.20.130.255,
        Generation: 171
    Protocol multiservice, MTU: Unlimited, Generation: 243, Route table: 0
      Policer: Input: __default_arp_policer__
```

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Two-Rate Three-Color Policer □□ | 2020

chapter label in part34

??? 3?? ??? ? ??? ?????? ??? ??? ??

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- ?: 3? ??? ??????(???????) ??? ?? | 2045

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?? ?? 2? *???? ??????* ????? ?????? ?? ?? ?? ? ???? ????? ?????? logical-interface-policer .

- [edit firewall policer *policer-name*]
- [edit logical-systems *logical-system-name* firewall policer *policer-name*]

?? ?? ?? 2 ?? 3? ???? ?????? ????? ?????? ?? ?? ?? ? ???? ?? ?????? logical-interface-policer .

- [edit firewall three-color-policer *name*]
- [edit logical-systems *logical-system-name* firewall three-color-policer *name*]

?: 3? ???? ??? 2 ???? ??? ????? ????? ??? ? ????. *(???? ????)* ??? 2 ???? ??? ????? ? ???? 3? ???? ??? ? ????.

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?? ??????? ??? ????? ???? ????? show interfaces policers *?? ?? ????* ??????.

SEE ALSO

2? ??? ?? ?? | 1916

3? ??? ?? ?? | 1992

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interface-specific (Firewall Filters)

logical-interface-policer

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CLI ?? ??

? ?? ??? ??????, ?? ?? ??? ??? ??? ?????, ? ??? ??? ??, ?? ????? ??? CLI? ??????? `[edit]` .

```
set interfaces ge-1/3/1 vlan-tagging
set interfaces ge-1/3/1 unit 0 vlan-id 100
```

```
set interfaces ge-1/3/1 unit 0 family inet address 10.10.10.1/30
set interfaces ge-1/3/1 unit 1 vlan-id 101
set interfaces ge-1/3/1 unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac
00:00:11:22:33:44
set firewall policer policer_IFL logical-interface-policer
set firewall policer policer_IFL if-exceeding bandwidth-percent 90
set firewall policer policer_IFL if-exceeding burst-size-limit 300k
set firewall policer policer_IFL then loss-priority high
set firewall policer policer_IFL then forwarding-class best-effort
set interfaces ge-1/3/1 unit 0 family inet policer input policer_IFL
```

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1. □□□□□ □□□ □□□□□□□.

```
[edit]
user@host# edit interfaces ge-1/3/1
```

2. □□ □□□ □□□□□.

```
[edit interfaces ge-1/3/1]
user@host# set vlan-tagging
```

3. □□□ □□□□□□□ ge-1/3/1.0□□□□□.

```
[edit interfaces ge-1/3/1]
user@host# set unit 0 vlan-id 100
user@host# set unit 0 family inet address 10.10.10.1/30
```

4. □□□ □□□□□□□ ge-1/3/1.0□□□□□.

```
[edit interfaces ge-1/3/1]
user@host# set unit 1 vlan-id 101
user@host# set unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac 00:00:11:22:33:44
```

??

?? ?? ??? ???? show interfaces ??? ??????? ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???? ??.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.10.10.1/30;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

?? ?? 2? ???? ??? ????? ???? ??

??? ??

?? ?? 2? ???? ??? ????? ???? ?????:

1. ?? ?? 2? ???? ??? ???????.

```
[edit]
user@host# edit firewall policer policer_IFL
```

2. [illegible]([illegible]) [illegible].

```
[edit firewall policer policer_IFL]
user@host# set logical-interface-policer
```

[illegible].

3. [illegible].

- [illegible].
  - [illegible] 8,000[illegible] 50,000,000,000[illegible] bandwidth-limit *bps* .
  - [illegible] bandwidth-percent *percent* .

  [illegible] CLI [illegible].

  ```
  [edit firewall policer policer_IFL]
  user@host# set if-exceeding bandwidth-percent 90
  ```

- [illegible] 1,500[illegible] 100,000,000,000[illegible].

  ```
  [edit firewall policer policer_IFL]
  user@host# set if-exceeding burst-size-limit 300k
  ```

4. [illegible].

- [illegible] discard .
- [illegible] loss-priority (low | medium-low | medium-high | high) .
- [illegible] forwarding-class (*forwarding-class* | assured-forwarding | best-effort | expedited-forwarding | network-control) .

[illegible] CLI [illegible].

```
[edit firewall policer policer_IFL]
user@host# set then loss-priority high
user@host# set then forwarding-class best-effort
```

??

?? ?? ??? ???? ???? show firewall ??? ??????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show firewall
policer policer_IFL {
    logical-interface-policer;
    if-exceeding {
        bandwidth-percent 90;
        burst-size-limit 300k;
    }
    then {
        loss-priority high;
        forwarding-class best-effort;
    }
}
```

??? ???????? IPv4 ??? ??? ??? ?????? ??? ??

??? ??

?? IPv4 ???? 2? ??? ?????? ???? ?????? ??? ??????? ???? ???.

1. ??? ??????? ??? ???????.

   ```
   [edit]
   user@host# edit interfaces ge-1/3/1 unit 0
   ```

2. ?? ??? ?? ?? ??? ??????? ?? ??? ??? ???? ?????.

   - ???? ???? ???? ?? ??? ??? ???? ?????? ?? ???? ???? [edit interfaces *interface-name* unit *number*] ??
     ???policer (input | output) *policer-name*.
   - ???? ?? ???? ???? ???? ?????? ?? ???? ???? [edit interfaces *interface-name* unit *unit-number*
     family *family-name*] ??????policer (input | output) *policer-name*.

   ?? ??? ??? ?????? ???? ?????? ?? ?????? policer input *policer-name* . ??? ??? ??? ?????? ???? ?????? ?? ?
   ???? policer output *policer-name* .

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```
[edit interfaces ge-1/3/1 unit 0]
user@host# set family inet policer input policer_IFL
```

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□□ □□ □□□ □□□□ show interfaces □□□□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            policer input policer_IFL;
            address 10.10.10.1/30;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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show interfaces □□□ □□□□□□□ ge-1/3/1.0□□ □□ □□ □□□ □□□□□, □□ extensive □□□ detail □□□□□□. □ □□ **Traffic statistics** □□ □□ □□□ □□□ □□□□□□□□ □□ □ □□□ □□□ □ □□ □□ □□□□□□. □□□□□□□ **Protocol inet** □□□ □□ □□□□□ policer_IFL □□ □□ □□ □□□ □□□□□□ □□□□□ □□□□□ □□□ □□□□□ **Policer** □□□□□.

- **Input: policer_IFL-ge-1/3/1.0-log_int-i**
- **Output: policer_IFL-ge-1/3/1.0-log_int-o**

log_int-i □□□□□ □□ □□□□□ □□□□□ □□□□ □□□□□□ □□□□□ □□□□□, **log_int-o** □□□□□ □□ □□□□□ □□□□□ □□□□ □□□□□□ □□□□□ □□□□□□. □ □□□□ □□□□ □□□□□□ □□□□□ □□ □□□□□□ □□□□□□.

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- **policer_IFL-ge-1/3/1.0-log_int-i**
- **policer_IFL-ge-1/3/1.0-log_int-o**

log_int-i □□□□□ □□ □□□□□ □□□□□ □□□□ □□□□□□ □□□□□ □□□□□, **log_int-o** □□□□□ □□ □□□□□ □□□□□ □□□□ □□□□□□ □□□□□ □□□□□□. □ □□□□ □□□□ □□□□□□ □□□□□ □□ □□□□□□ □□□□□□.

SEE ALSO

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- □□ | 2051

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□: □□□ 2 □□□□ □□□ □□□□ □□ 3□ □□□□ □□□ □□, □□ □□ □□□□ □□ □□□□□ □□□ □ □□□□.

□□□□ □□□ □□□□ □□ 100KB□ □□□□ 40Mbps□ □□□ □□□ □□□□ □□□(token-bucket □□□ □□)□ □□□□ □□□□□ □□□ □□□ □□ □□□ □□□□□. □□□□ □□ □□□□ □□□□□ □□ □□□ □□□ □□□□□ □□ □□ □□□ low □□□ □□ □□□□□.

60Mbps □□□ □□ □ □□□ □□□□ □□ 200KB □□□(token-bucket □□ □□)□ □□ □□□ □□ □□ □□□□ □□□ □□□□ □□□□□ □□□□ □. □□□ □□□ □□□ □□□ □□□□□ □□ □□□□□ medium-high □□□ □□ □□□□□.

□□ □□□ □□□ □□□□ □□□ □□□□ □□□□□ □□□□□. □□□ □□□ □□□ □□□ □□□□□ □□ □□ □□□ high □□□□□. □ □□□□ □□□ □□□ (loss-priority high then discard)□ □□ □□□ □□□ □□□ □□□□□ □□□ □□□ □□□ □□□ □□□□ □□ □□□□□.

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```
set interfaces ge-1/3/1 vlan-tagging
set interfaces ge-1/3/1 unit 0 vlan-id 100
set interfaces ge-1/3/1 unit 0 family inet address 10.10.10.1/30
set interfaces ge-1/3/1 unit 1 vlan-id 101
set interfaces ge-1/3/1 unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac
```

```
00:00:11:22:33:44
set firewall three-color-policer trTCM2-cb logical-interface-policer
set firewall three-color-policer trTCM2-cb two-rate color-blind
set firewall three-color-policer trTCM2-cb two-rate committed-information-rate 40m
set firewall three-color-policer trTCM2-cb two-rate committed-burst-size 100k
set firewall three-color-policer trTCM2-cb two-rate peak-information-rate 60m
set firewall three-color-policer trTCM2-cb two-rate peak-burst-size 200k
set firewall three-color-policer trTCM2-cb action loss-priority high then discard
set interfaces ge-1/3/1 unit 0 layer2-policer input-three-color trTCM2-cb
```

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1. □□□□□ □□□ □□□□□□□.

```
[edit]
user@host# edit interfaces ge-1/3/1
```

2. □□ □□□ □□□□□.

```
[edit interfaces ge-1/3/1]
user@host# set vlan-tagging
```

3. □□□ □□□□□□□ ge-1/3/1.0□□□□□.

```
[edit interfaces ge-1/3/1]
user@host# set unit 0 vlan-id 100
user@host# set unit 0 family inet address 10.10.10.1/30
```

4. □□□ □□□□□□□ ge-1/3/1.0□□□□□.

```
[edit interfaces ge-1/3/1]
user@host# set unit 1 vlan-id 101
user@host# set unit 1 family inet address 20.20.20.1/30 arp 20.20.20.2 mac 00:00:11:22:33:44
```

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□□ □□ □□□ □□□□ show interfaces □□□ □□□□□□□ □□□ □□□□□. □□ □□□ □□□ □□□ □□□□ □□□ □ □□□ □□□ □□□□ □□□ □□□□ □□.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        family inet {
            address 10.10.10.1/30;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

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1. 3□ □□□□ □□□ □□□□□□.

```
[edit]
user@host# edit firewall three-color-policer trTCM2-cb
```

2. ????? ???? ??????(???????) ?????? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set logical-interface-policer
```

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3. ????? 2-rate ? ????? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set two-rate color-blind
```

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4. ?? ??? ????? ????? ? ????? ??? ??? ??? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set two-rate committed-information-rate 40m
user@host# set two-rate committed-burst-size 100k
```

5. ??? ?? ??? ??? ??? ????? ? ????? ?? ??? ??? ??? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set two-rate peak-information-rate 60m
user@host# set two-rate peak-burst-size 200k
```

6. (?? ??) ??? ??? ??? ??? ?? ??? ??? ??? ??????.

```
[edit firewall three-color-policer trTCM2-cb]
user@host# set action loss-priority high then discard
```

?? ?? ????? 3? ??? ?? ??? ??? PLP(Packet Loss Priority) ??? ?? ? ??? ????? ?? ?????. ?? ??, ?? ?? 3? ? ??? ?? PLP ??? ?? ??? ?????? ?? PLP ??? ????? ?? ? ??? PLP ??? ?? ?? ?? ?????.

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?? ?? ??? ???? 3? ???? show firewall ??? ?????. ?? ??? ??? ??? ???? ??? ? ??? ??? ???? ??? ???????.

```
[edit]
user@host# show firewall
three-color-policer trTCM2-cb {
    logical-interface-policer;
    action {
        loss-priority high then discard;
    }
    two-rate {
        color-blind;
        committed-information-rate 40m;
        committed-burst-size 100k;
        peak-information-rate 60m;
        peak-burst-size 200k;
    }
}
```

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1. ??? 2 ??? ?????? ???? ??? ???????.

   ```
   [edit]
   user@host# edit interfaces ge-1/3/1 unit 0
   ```

2. 3? ??? ?????? ???? ??? ?????? ??? ??????.

   ```
   [edit interfaces ge-1/3/1 unit 0]
   user@host# set layer2-policerinput-three-color trTCM2-cb
   ```

??

?? ?? ???? ????? show interfaces ???? ???????? ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ????? ???? ????? ??.

```
[edit]
user@host# show interfaces
ge-1/3/1 {
    vlan-tagging;
    unit 0 {
        vlan-id 100;
        layer2-policer {
            input-three-color trTCM2-cb;
        }
        family inet {
            address 10.10.10.1/30;
        }
    }
    unit 1 {
        vlan-id 101;
        family inet {
            address 20.20.20.1/30 {
                arp 20.20.20.2 mac 00:00:11:22:33:44;
            }
        }
    }
}
```

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□□

show interfaces □□□ □□□□□□□ ge-1/3/1.0□□ □□ □□ □□□ □□□□, □□ extensive □□□ detail □□□□□. □ □□ **Traffic statistics** □□ □□ □□□ □□□ □□□□□□□□ □□ □ □□□ □□□ □ □□ □□ □□□□, □□□□ **Protocol inet** □□□ □□ □□□□ trTCM2-cb □□ □□ □□ □□□□ □□□□ □□□ □□□□ **Policer** □□□□.

- **Input: trTCM2-cb-ge-1/3/1.0-log_int-i**
- **Output: trTCM2-cb-ge-1/3/1.0-log_int-o**

log_int-i □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□, **log_int-o** □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□□. □ □□□ □□□ □□□□□ □□□□ □□ □□□□□ □□□□□.

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□□ □□ □□□ show policer □□□□ □□□□□ □□□□ □□□ □□□□□. □□ □□□ □ □□□□ □□□ □ □□□(□□ □□□ □□□)□ □□□ □□ □□ □□□□ □. □□□ trTCM2-cb□ □□, □□ □ □□ □□□ □□□ □□□ □□ □□□□□.

- **trTCM2-cb-ge-1/3/1.0-log_int-i**
- **trTCM2-cb-e-1/3/1.0-log_int-o**

log_int-i □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□, **log_int-o** □□□□ □□ □□□□ □□□□ □□□ □□□□□ □□□□ □□□□□. □ □□□ □□□ □□□□□ □□□□ □□ □□□□□ □□□□□.

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layer2-policer (EX)

logical-interface-policer

three-color-policer (Configuring)

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?? ?? 2? ??? ?????? ????? ?????? ?? ?? ?? ? ??? ????? ?????? physical-interface-policer .

- [edit firewall policer *policer-name*]
- [edit logical-system *logical-system-name* firewall policer *policer-name*]
- [edit routing-instances *routing-instance-name* firewall policer *policer-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* firewall policer *policer-name*]

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- [edit firewall three-color-policer *policer-name*]
- [edit logical-system *logical-system-name* firewall three-color-policer *policer-name*]
- [edit routing-instances *routing-instance-name* firewall three-color-policer *policer-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* firewall three-color-policer *policer-name*]

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- □□ □□□□ □□ □□□□ physical-interface-filter □□□ □□□ */□□□ /□□□□□ /□□* [edit firewall family *family-name* filter *filter-name*] □□□□ □□□.
- □□□ □□□□□ □□□ □□□ □□□ □□□ □□□ □□□□□ □□□□ □□□ □ □□□□.
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- □□□ □□□ □□□ □□□□□ □□□ □□□□ □□□□ interface-specific □□□ □□□□□ □□□ □□□ □ □□□□.

SEE ALSO

2□ □□□ □□ □□ | 1916

3□ □□□ □□ □□ | 1992

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physical-interface-filter

physical-interface-policer

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- ?? | 2055
- ?? | 2056
- ?? | 2062

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□ □□□ shared-policer-A□□□ □□□□□ □□□□ 10,000,000bps□ □□□ □□□□ 500,000□□□□ □□ □□□ □□□□ □□□□□. □□□ □□ □□ □□□ □□□□□ □□□□ □□□□□, □□ □□□ □□□, □□ □□ □□□□(PLP) □□ □□ □ □□ □□□□ □□□ □□□□ □□ □□□□□ □□□□ □□□ □ □ □□□.

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- TCP□ □□ □□□□ IP □□□□ □□□ critical-ecp (0xa0), (0x40) immediate □□ priority (0x20)□ □□
- TCP□ □□ □□□□ IP □□□□ □□ internet-control (0xc0) □□ routine (0x00)□ □□ □□

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```
set interfaces so-1/0/0 unit 0 family inet address 192.168.1.1/24
set interfaces so-1/0/0 unit 0 family vpls
set interfaces so-1/0/0 unit 1 family mpls
set firewall policer shared-policer-A physical-interface-policer
set firewall policer shared-policer-A if-exceeding bandwidth-limit 100m burst-size-limit 500k
set firewall policer shared-policer-A then discard
```

```
set firewall family inet filter ipv4-filter physical-interface-filter
set firewall family inet filter ipv4-filter term tcp-police-1 from precedence [ critical-ecp
immediate priority ]
set firewall family inet filter ipv4-filter term tcp-police-1 from protocol tcp
set firewall family inet filter ipv4-filter term tcp-police-1 then policer shared-policer-A
set firewall family inet filter ipv4-filter term tcp-police-2 from precedence [ internet-control
routine ]
set firewall family inet filter ipv4-filter term tcp-police-2 from protocol tcp
set firewall family inet filter ipv4-filter term tcp-police-2 then policer shared-policer-A
set interfaces so-1/0/0 unit 0 family inet filter input ipv4-filter
```

[illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

1. [illegible] [illegible] [illegible].

```
[edit]
user@host# edit interfaces so-1/0/0
```

2. [illegible] O[illegible] [illegible].

```
[edit interfaces so-1/0/0]
user@host# set unit 0 family inet address 192.168.1.1/24
user@host# set unit 0 family vpls
```

3. [illegible] 1[illegible] [illegible].

```
[edit interfaces so-1/0/0]
user@host# set unit 1 family mpls
```

??

?? ?? ???? ????? ???? ???? show interfaces ???? ??????. ?? ???? ???? ???? ????? ???? ? ???? ???? ????? ???? ???????.

```
[edit]
user@host# show interfaces
so-1/0/0 {
    unit 0 {
        family inet {
            address 192.168.1.1/24;
        }
        family vpls;
    }
    unit 1 {
        family mpls;
    }
}
```

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1. 2? ????? ???? ???????.

   ```
   [edit]
   user@host# edit firewall policer shared-policer-A
   ```

2. 2? ????? ???? ??????.

   ```
   [edit firewall policer shared-policer-A]
   user@host# set physical-interface-policer
   ```

3. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit firewall policer shared-policer-A]
user@host# set if-exceeding bandwidth-limit 100m burst-size-limit 500k
user@host# set then discard
```

[illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible], PLP [illegible] [illegible], [illegible] [illegible] [illegible] PLP [illegible] [illegible] [illegible] [illegible].

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] show firewall [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# show firewall
policer shared-policer-A {
    physical-interface-policer;
    if-exceeding {
        bandwidth-limit 100m;
        burst-size-limit 500k;
    }
    then discard;
}
```

IPv4 [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

IPv4 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]:

1. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

```
[edit]
user@host# edit firewall family inet filter ipv4-filter
```

[illegible] [illegible] family any[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

2. [illegible].

```
[edit firewall family inet filter ipv4-filter]
user@host# set physical-interface-filter
```

3. TCP[illegible] IPv4 [illegible] IP [illegible] critical-ecp, immediate[illegible] priority [illegible].

```
[edit firewall family inet filter ipv4-filter]
user@host# set term tcp-police-1 from precedence [ critical-ecp immediate priority ]
user@host# set term tcp-police-1 from protocol tcp
user@host# set term tcp-police-1 then policer shared-policer-A
```

4. TCP[illegible] IPv4 [illegible] IP [illegible] internet-control [illegible] routine [illegible].

```
[edit firewall family inet filter ipv4-filter]
user@host# set term tcp-police-2 from precedence [ internet-control routine ]
user@host# set term tcp-police-2 from protocol tcp
user@host# set term tcp-police-2 then policer shared-policer-A
```

[illegible]

[illegible] show firewall [illegible].

```
[edit]
user@host# show firewall
family inet {
    filter ipv4-filter {
        physical-interface-filter;
        term tcp-police-1 {
            from {
                precedence [ critical-ecp immediate priority ];
                protocol tcp;
            }
            then policer shared-policer-A;
        }
        term tcp-police-2 {
```

```
            from {
                precedence [ internet-control routine ];
                protocol tcp;
            }
            then policer shared-policer-A;
        }
    }
}
policer shared-policer-A {
    physical-interface-policer;
    if-exceeding {
        bandwidth-limit 100m;
        burst-size-limit 500k;
    }
    then discard;
}
```

IPv4 ??? ?????? ??? ????? ??? ?????? ??? ??

??? ??

??? ?????? ??? ????? ??? ?????? ????? ?????? ??? ??? ??????.

1. ??? ???????? IPv4 ??? ???????.

```
[edit]
user@host# edit interfaces so-1/0/0 unit 0 family inet
```

2. ?? ????? IPv4 ??? ?????? ??? ??????.

```
[edit interfaces so-1/0/0 unit 0 family inet]
user@host# set filter input ipv4-filter
```

??

?? ?? ??? ????? ??? ??? show interfaces ??? ??????. ?? ??? ??? ??? ????? ??? ? ??? ??? ????? ??? ???????.

```
[edit]
user@host# show interfaces
```

```
so-1/0/0 {
    unit 0 {
        family inet {
            filter {
                input ipv4-filter;
            }
            address 192.168.1.1/24;
        }
        family vpls;
    }
    unit 1 {
        family mpls;
    }
}
```

□□□□ □□□ □□□□ □□ □□□□ commit□(□) □□□□□.

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□□□ □□□ ipv4-filter □□□ □□□□□□ so-1/0/0.0IPv4 □□ □□□□ □□□□□□ □□□□□.

??

show interfaces statistics ??? ??????? so-1/0/0.0?? ?? ?? ??? ???? ??? ??????detail. **Protocol inet** ?? ?? **Input Filters** ? ???? ??? ??? ??? ipv4-filter ?? ???? ??????? ??????.

```
user@host> show interfaces statistics so-1/0/0 detail
  Logical interface so-1/0/0.0 (Index 79) (SNMP ifIndex 510) (Generation 149)
    Flags: Hardware-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 173, Route table: 0
      Flags: Sendbcast-pkt-to-re, Protocol-Down
      Input Filters: ipv4-filter
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.39/16, Local: 10.39.1.1, Broadcast: 10.39.255.255, Generation: 163
```

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??? ??????? ??? show firewall ??? ?? ?? ?? ??? ??????.

```
user@host> show firewall filter ipv4-filter
Filter: ipv4-filter
Policers:
Name                                                Packets
shared-policer-A-tcp-police-1                         32863
shared-policer-A-tcp-police-2                          3870
```

?? ???? ??? ??(shared-policer-A), ??? ??? ??? ?? ?? ??(police-1) ? ?? ??? ???? ?? ?? ?????. ?? ??? ??? (out-of-spec) ?? ?? ?? ???, ???? ?? ???? ?? ??? ????.

SEE ALSO

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physical-interface-filter

physical-interface-policer

chapter label in part35

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- Link Aggregation Groups? ???? ??? ?? | 2085
- ?? ?? ?? ??? ?? ?? ?? ?? | 2086
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- 2??? ?? ??? ?? ?? ?? ?? | 2088
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- ?: 2? ??? ? ??? ?? ?? | 2091
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- ??? ??? ? ?? ???? ?? | 2098
- ??-?? PLP? ?? ?? ?? ??? ?? | 2100
- ??? ??? ???? ?? 2? ? 3? ??? ?? | 2100
- 2? ???? ?? ?? ?? | 2104
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?: ????? PFE ? ??? ?? ??? ????? ??????. QFX10016, QFX10002, QFX10002-60C ? QFX10008 ?????? ??????? ???(AE) ?????? ??? ?? PFE? ?? ?? ?, ????? ?? ????? ?? ?? ??? ? ??? ??? ?? ??? ??? ? ?????(??? PFE? ?? ?? ??).

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- □□ □□ xe-1/0/0(fpc1-pfe0) □ xe-1/0/30(fpc1-pfe1)□ □□ AE □□□□□□□ □□□ □□□ □□ 100mbps□ □□□. □□□ □ □□ □□□ FPC1□ □□□□ □□ □□ PFE□ □□□□. □□□□ AE □□□□□□ □□□□ □□□ □ 2□□ PFE□ □□ □□□□□ □ □□□□ 200Mbps□ □□□.

- □□ □□ xe-1/0/0(fpc1-pfe0), et-2/0/1(fpc2-pfe1) □ xe-2/0/18:0(fpc2-pfe2)□ □□ AE □□□ □□□ □□□ □□□ □□ 100mbps□ □□□. □□□ □□□ □□ □□□ □ FPC□ FPC1 □ PFE0□ □□□□. □□□ □ □□ □□□ FPC2□ □□□□ □□ □□ PFE□□□. □□□□ AE □□□□□□□ □□□□ □□□□ 3□□ PFE□ □□ □□□□□ □ □□□ □ 300Mbps□ □□□.

- □□ PFE(fpc1-pfe0)□□ □□ □□ xe-1/0/0 □ xe-1/0/1□ □□ AE □□□□□□□ □□□ □□□ □□ 100mbps □ □□□. □□□ □□ □□□ FPC1 □ □□□ PFE□ □□□□. □□□□ AE □□□□□□□ □□□□ PFE □□□ □□□□ □□□□□ □ □□□□ 100Mbps□ □□□.

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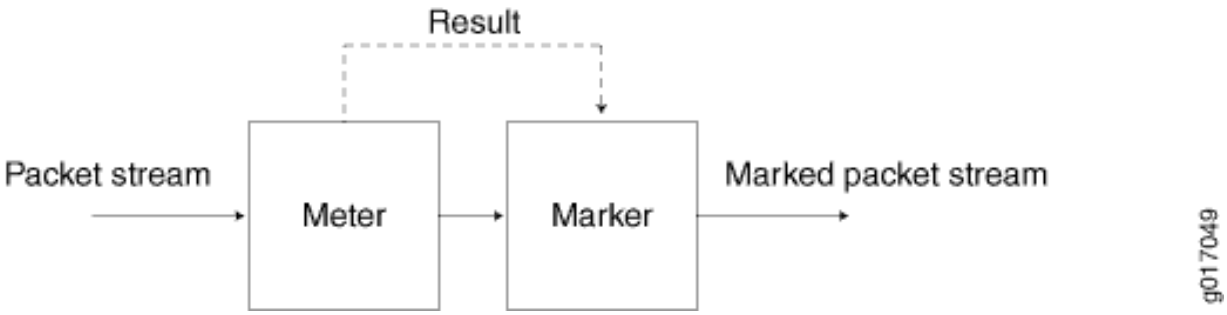
Result
Packet stream
Meter
Marker
Marked packet stream
g017049

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  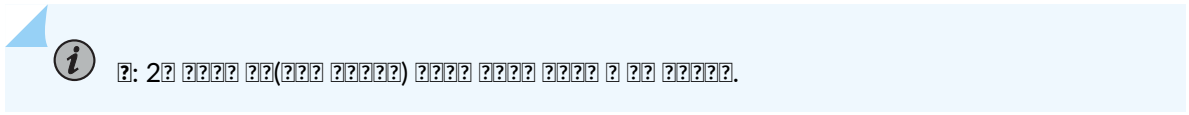

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- □□ □□ 3□ □□ - □ □□□ □□□□ RFC 2697, *□□ □□ 3□ □□* DiffServ(Differentiated Services) □□□ □□ AF(Assured Forwarding) PHB(per-hop-behavior) □□ □□□□ □□□ □□□□□. □□□ □□□ □□□□ □□□ CIR(Committed Information Rate)□ CBS(Committed Burst Size) □ EBS(Excess Burst Size)□□ □□□ □□□ □□ □□ □□□□ □□□□□. CIR□ □□□ □□□□ □□□□ □□ □□□ □□□□□. CBS□ □□□□ □□□ □□(□□□)□ □□□□ EBS□ □□ □□□ □□(□□□)□ □□□□□. EBS□ CBS□□ □□□ □□□ □□ □ □ 0□ □ □ □□□□.

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  □: □□ □□ TCM(Three-Color Marker)□ □□□□ □□ □□ □□□ □□ □□ □□□ □□ □□□□ □ □□ □□□□□.

- Two-rate three-color marker - □ □□□ □□□□ RFC 2698, *A Two Rate Three Color Marker*□ □□□□ □□□ □□□ □□ □□□ □□□ per-hop-behavior □□ □□□□ □□□ □□□□ □□□□. □□□ □□□ □□□□ CIR □ PIR(peak information rate)□ □□ □□□ □□, CBS □ PBS(peak burst size)□ □ □□ □□□ □□□□ □□□□ □□□□□. PIR□ □□□ □□□□□ □□□□ □□ □□□ □□□□ CIR□□ □□□ □□□ □□□.

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  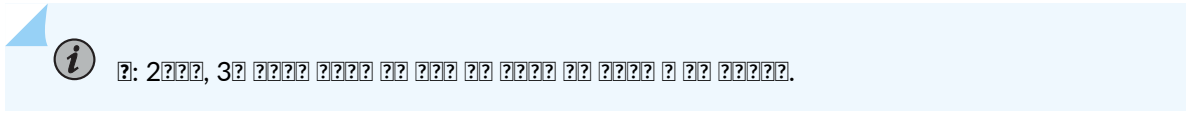

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	□□□(CIR □ CBS □)	□□-□□ □□ □□ □□ □□	□□
	□□□(EBS □)	□□ □□ □□ □□ □□	□□□
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	□□□(PIR □ PBS □)	□□ □□ □□ □□ □□	□□□

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- □□ □□ - □□ □□ □□□□ 3□ □□□□ □□□ □□ □□□ □□□ □□□□□ □□□□□□ □□□□□. □□ □□, 3□ □□□□ □□□ □□□ □ □□ □□ □□□ "□□"□□□. □□ □□ □□□□ 3□ □□□□ □□□ PLP□ □□□□ □ □□□ □□□□ □□ □□□□. □□ □□, □□ □□ 3□ □□□□ □□ PLP □□□ □□ □□□ □□□□□ □□ PLP □□□ □□□□ □□ □ □□□ PLP □□□ □□ □□ □□□□.

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□□□□ □ □□□□ 1Gbps□□□. □□□ □□□ □□□□ □□□ □□□□ □□□□ □□□ □□ □□□ TCAM□ □□□□ □□□ □□□ □□□□. □□□ □□□□ □ □□□ □□ □□□ □□ □□□ □□□□ □□, □□□ □□ □□ TCAM □□□□□ □□□□ □□□ □□□□ □□□□ □□ □□□□ □□□□□. □□ □□, 1Gbps□ □ □□□ □□□□ □□□□□ □□□□ □□□□ 3□□ □□ □□□ □□□□□ □□□ 3□□ □□ □□□ □□ □□□□ □□□□ □□, □□□ □□□□ □ □□□□ 1Gbps□ □□ 3Gbps□□□. (QFX10000 □□□□□□□ □ □□□ □□□□ □□□□.)

□□□ □□□ □□ □□□ □□□□ □□□ □□□ "□□□ □□□ □□ □ □□□" □□□ 1644 □□ □□ TCAM □□□□□ □□ □□□ □□□□ □□□ □□□ □□□ □ □□□□ □□ □□□ □□ □□□ □□□ TCAM □□□□□ □□□□□ □□ □□□ □□□□□.

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3□ □□□□ □□□ □□ *policer#* 2□ □□□□ □□□ □ □□ □□□ *policertypeTCM#-color type* □□□□ □□ □□□□. TCM□ 3□ □□□ □□□□ □. □□□□ □□ □ □□ □□□□□ □□□□ □□□□ □□ □□□ □□□ □□ □□□ □□ □□□□ □□□□ □□□□□ □ □□□□. □□ □□, □□□ □ □□ □□ □□, □ □ □□ 3□ □□□□ □□□ srTCM1-ca□□□. □□□ □ □□ 2 □□, □□ 3 □□ □□□ trTCM2-cb□□□. □ □□ □□□ □□□ □□□ □□□□ □□□□.

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- TR (2 □□□)
- TCM(□□ □□)
- 1 □□ 2(□□ □)
- CA(□□ □□)
- CB (□□)

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□□ QFX □□□□ □□□□ □ □□□□□ □□□□ □□ □□□ □□ □□□ □□□□ □□ □□ □□□□ □□□ □□□□ □□□□□. □□□ □□ □□□ □□ □□ □□□ □ □□ □□□ □□□ □□□□ □□□□ □□, □□□ □□□□ □□□ □□ □□□□ □□□□ □□ □□□ □□□□ □ □□ □□□□□. (QFX10000 □□□□□ □□□□ □□□□.) □□□ □□ □□□□□ □ □□□ □□ □□□ □□ □□ □□□□ □□ □□□ □□□□□.

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□: □□□ □□□ □□□ □□□□□ QFX5200□ □□ □□□□□ □□□ □ □ □□□ □□□□□ □□□□□□ □□□□ □□ □ □□□□. □□ □□ □□ □□□ □□□ □□□□, □□□□□ □□□□□□ □□□ □□□□ □□□□. □□ □ □□□ □□ □□□ 1□□□□ □□□ □□□□ 6k □□□□ □□□□ □□□□ □□□□□.

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QFX10000 □□□□ 8K □□□(□□ □□□ □□)□ □□□□□. QFX5100 □ QFX5200 □□□□ 1535□□ □□ □□□□ 1024□□ □□ □□□ □ □□□□□(□□□ □□ □□□ □□□ □□□□ □□). QFX5110 □□□□ 6144□□ □□ □□□□ 1024□□ □□ □□□□ □□□□□(□□□ □□ □□□ □□ □ □□□□ □□).

QFX3500 □ QFX3600 □□□ □□□□ QFabric Node □□□□□ □□□ □□ □□ □□□□ □□□□□(□□□ □□ □□□ □□□ □□□□ □□).

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- □□ □□□ □□□ □□□□ 3□ □□□: 767
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- □ 500□□ □□□□ □□□□ □□ □□□ □□□□ 1,000□□ TCAM □□□ □□□□□ □□□ □□□□□. □□□ □□ □□□ □□ □ □□ □□ □□□ □□□ □□.
  - 20□□ □□ 20□□ □□□□ A□ □□□□□□. □□ □□□□ □□□ TCAM □□□ □□ □□□ □ □□□ □□ □□□ □□□□□.
  - □□ B□ □□ A □□□ □□ 5□□ □□ 5□□ □□□□ □□□□. *□□*□□□□ □□ □□□ □□□ □□□□ □□ □□□ □ □□□ □□ □□□ □□□□ □□□ □. (5□□ TCAM □□□ □□□□□ 4□□ □□□ □ □□□□.)

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2??? 3? ??? ??? RFC 2698, *2???? 3? ??* ????? ?????. ??? ??? ????? ????? ??? ????? ? ?? ??? ? ?? ??? ??(? ?, ??? ? ???)? ??? ??? ? ?????. 2??? 3? ????? *??*? ??? ?? ? ??? ?? ??? ??? *??*??? ?? ? ??? ?? ??? ????? ?. ??? ??? ??? ????? ????? ??(??)?? ??????. ??? ??? ??? ?????? ?? ??? ?? ????? ????? ????? ?????? ??????. ?? ??? ??? ????? ????? ?????? ??????.

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CoS(Class of Service) ? ??? ?????? ?? BA(Behavior Aggregate) ??? ??????, ????? ??? ? ??? ??? ???, ?? ?? ????? ?? ?? ? ?? ????? ?? ????? ????? ??????. CoS ????? ??? ??? ????? ?? ?? ????? ??? ??????. CoS RED(Random Early Detection) ?????? ?? ?? ??, ?? ??? ?? ?? ? ?? ?? ?????? ????? ?? ????? ??? ????? ?? ?? ? ?? ??? ??????.

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- Two-rate three-color - □ □□□ □□□□ RFC 2698, A *Two Rate Three Color Marker*□ DiffServ(Differentiated Services) □□□ □□ AF(Assured Forwarding) PHB(per-hop-behavior) □□ □□□□ □□□ □□□□□. □ □□□ □□□□ □□□ CIR □ PIR(Peak Information Rate)□ □□ □□□ □□□ □□□□ □□□□ □□□□□. CBS □ □□ □□□ □□(PBS). □□□□ □□□ CIR(□□) □□(□□)□□□, CIR□ □□□□□ PIR□ □□□□ □□(□□□) □□ PIR(□□□)□ □□□□ □□□ □□ □ □□ □□ (□□, □□□ □□ □□□) □ □□□ □□□ □□□ □□□□□. 2□□□, 3□ □□□□ □□□□ □□ □□□ □□ □□□□ □□ □□□ □ □□ □□□□□.

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release heading in release-history	desc heading in release-history
17.1	Junos OS ??? 17.1?? EX4300 ????? ??? ??? `loss-priority low`, `medium-low`, `medium-high`?? ? ?? ? ? ???? `high`.

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> EX ??? ???? ??? ?? ?? | **1447**
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> ?: EX ??? ????? ??, VLAN, ??? ???? ??? ?? ???? | **1578**
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Tricolor Marking(TCM) ???? ?? ? ?? ??? ?????. ?? ? ??. ???? ? ??? ???? ??? ?? ??? ??? ?????.

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Cannot assign policers: Max policer limit reached
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   ```
   [edit firewall]
    user@switch# set policer policer-one
   ```

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   ```
   [edit firewall]
    user@switch# set policer policer-one filter-specific
   ```

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   a) □□□□□□□ □□□ □□□ □□□□ □□ □□ □□ □(bps)□ □□□ □□□ □□□□□.

      ```
      [edit firewall policer policer-one]
       user@switch# set if-exceeding bandwidth-limit 300k
      ```

      □□□ □□ □□□ 1k□□ 102.3g bps□□□.

   b) □□□ □□ □□(□□□ □□□ □□ □□ □□□ □□)□ □□□□ □□□ □□□ □□ □□□□□.

      ```
      [edit firewall policer policer-one]
       user@switch# set if-exceeding burst-size-limit 500k
      ```

      □□□ □□ □□ □□ □□□□□ □□□ □□□□ □□□□□□ □□□□ □□ □□□□□ □□□ □□□□ □□□ □ □□ □□□ □□□□.

burst size = (bandwidth) * (allowable time for burst traffic)

□□□ □□ □□□ □□□ 1□□□□□ 2,147,450,880□□□□□□.

4. □□ □□□ □□□□ □□□ □□□□ □□ □□□ □□□ **discard** □□□□□.

```
[edit firewall policer]
 user@switch# set policer-one then (Policer Action) discard
```

□□□ □□□□ □□□□ □□□ □□□□□.

5. EX8200 □□□□□□ □□□ □□□ □□ □□ □□□□ □□□ □□ □□□□ □□□□ □□□.

```
[edit firewall policer]
user@switch# set policer-one counter counter-id 0
```

□ □□ □□□ □□ □□ □□□ ID□ 0□□□. □□ □□ □□□□ □□□ □□ □□□□ □□□ □ □□□□. □ □□□□ □□ □□□□ □□□ □□□ □□ □□□□ □□ □ □□ □□□□ □□□ □□□□□.

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```
[edit firewall family ethernet-switching]
user@switch# set filter limit-hosts term term-one from source-address 192.0.2.0/28
users@witch# set filter limit-hosts term term-one then policer policer-one
```

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□□ □□□ □□□ □□□□□ □□ □□□ □□□ □□□□ □□□ □□□ □□□ □□, VLAN □□ □□□ 3 □□□□□□ □□□□ □□□. □□□ □□ □□□ □□ □□□ □□□ "□□□ □□ □□(CLI □□)□□ □□□ □□ □□" □□□ 1567□ □□ □□□ □□□□□□.

□□ □□

- □: EX □□□ □□□□□ □□, VLAN, □□□ □□□□ □□□ □□ □□□□ | **1578**
- □□□ □□ □□(CLI □□) | **1567**
- □□□□ □□ □□ □□ | **1624**
- □□□ □□□□ □□□ □□ □□ | **2076**

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in this section

- ?? ?? ??? ?? | 2083
- ??? ??? ?? ?? ??? ?? | 2084

EX ??? ????? ???? ???? ??? ???? ??? ?? ?? ???? ???? ??? ??? ??? ? ????. ????? ?? ??? ??? ???? ??? ? ?? Junos OS? ? ??? ?? ??? ??? ????? ???? ? ????? ?? ??? ?? ??? ????. ?? ??, 1Gbps? ???? ???? ?? ??? ???? ???? ?? ???? ? ?? ?? ??? ???? ??, ? ??? ????? 1Gbps ??? ????. ? ?? ???? ???? ? ???? 3Gbps???.

?? ???? ???? ??? ? ???, ?? ???? ???? ??? ???? Junos OS? ? ??? ??? ????? ????? ?? ????. ??? ?? ?? ??? ????? ?????, 1Gbps? ???? ???? ????? ???? ???? ?? ???? ? ?? ?? ??? ???? ?? ??? ???? ? ???? 1Gbps???.

? ????? ?? ?? ? 2 ?? 3? ??????? ?? ?? ?? ? 2 ?? ?? ??(TCM) ???? ???? ??? ?????. ?? ?? 2? ???("???"?? ? ?)? ?????? "??? ??? ????? ??? ??(CLI ??)" ??? 2080? ???????.

?? ?? ??? ??

?? ?? ???? CIR(??? ?? ??), PIR(?? ?? ??), ?? ??? ?? ? ???? ?? ??? ?? ??? ??? ??? ??? ??? ???? ???? ?? ????. ?? ??? ???? ? ?? ??(?? ? ? ??)? ?? ??? ???? ??? ? ????. ?? ????? ?? ?? ?? ????(PLP) ?? ?????. ? ? ?? ???? ???? ?? PLP ?? ????, ???? ??? ?? ?? ? ??? ?? ?? ????.

?? ??(TCM) ???? ????? ??? ?????.

1. ???? ??? ????, ?? ????(PLP)? ?? ??? ???? ???? ??(?? ??)? ?????.

```
[edit firewall]
 user@switch# set three-color-policer policer-name
 user@switch# set three-color-policer policer-name action loss-priority high then discard
```

2. ???? ?? ?? ?? 2 ??? ???? ?? ?? ?? ???? ?????.

```
[edit firewall three-color-policer policer-name]
 user@switch# set rate mode
```

□ □□ □□ □□ □□□ □□□□.

```
[edit firewall three-color-policer srTCm-1a]
 user@switch# set single-rate color-aware
[edit firewall three-color-policer trTCM2-cb]
 user@switch# set two-rate color-blind
```

3. □□ □□ TCM □□□□ □□ CIR, CBS(COMMITTED BURST SIZE) □ EBS(Excess Burst Size)□ □□□□□.

```
[edit firewall three-color-policer policer-name single-rate]
 user@switch# set committed-information-rate bps
 user@switch# set committed-burst-size bytes
 user@switch# set excess-burst-size bytes
```

4. 2□□□ TCM □□□□ □□ CIR, CBS, PIR □ PBS(Peak Burst Size)□ □□□□□.

```
[edit firewall three-color-policer policer-name single-rate]
 user@switch# set committed-information-rate bps
 user@switch# set committed-burst-size bytes
 user@switch# set peak-information-rate bps
 user@switch# set peak-burst-size bytes
```

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□□□ □□□ □□ □□(TCM) □□□□ □□□□ □□□ □□□ □□□□□ □□□ □□□□□.

```
[edit firewall family family filter filter-name term term-name then]
user@switch# set three-color-policer rate stTCM1-ca
```

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```
[edit firewall family inet filter test1 term term1 then]
user@switch# set three-color-policer single-rate policer1
```

□□□ □□ □□□□ single-rate □□□□ □□ □□□ □□□ two-rate □□ □□□□ □□, □ □□ □□□ TCM □□□□ □□□□ □□□. □□□ □□□ □□ □□ □ □□ □□□□ □□□□□.

□□ □□, □□ □□ TCM □□□□ □□□□ **srTCM1-ca** □□ 2□□□ □□□□ □□□□□ □□ □□ □□□□ □□□□□.

```
[edit firewall]
user@switch# show three-color-policer srTCM1-ca
single-rate {
    color-aware;
    . . .
}
user@switch# show filter TESTER
term A {
    then {
        three-color-policer {
            ##
            ## Warning: Referenced two-rate policer does not exist
            ##
            two-rate srTCM;
        }
    }
}
```

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□□ □□ □□□□ □□ | 2079

□□□ □□□□ □□□ □□ □□ | 2076

Link Aggregation Groups□ □□□□ □□□ □□

□□□ □□□ □□ QFabric □□□ □□ □□□□□□ □□(LAG)□ □□□□ □□□□ □□, □□□□ LAG□ □□ □□□□□□ □□□□□□□□ □□□□□. □□ □ □, □□□□ 1Gbps□ □□ □□□□□ □□□□ *□□□ □□□* □□□□ □□ □□□ □□ □□□ □ □□ □□ □□□□□□ □□ LAG□ □□□□ □□□□ □□, □ □□□ □□ □□□□ □ □□□□ 1Gbps□□.

QFabric □□□□ □□ □□ □□ □□ □□ □□ □□□ □□ □□ □□□ □□□□ □□ LAG□ □□□□ □□□□ □□, □□□ □□□ □ □□□ □□□□□□ □□□□ □. □□ □□, □□□□ 1Gbps□ □□ □□□□□ □□□□ □□ □□ A□ □ □□ □□□ □□ □□ B□ □ □□ □□□ □□ LAG□ □□□□ □□□□ □□, □ □□□ □□□□ □□□□ 1Gbps□□□ □ □□ □□□□ 2Gbps□□□.

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□□□ □□ | 2066

□□□ □□□ □□□□ □□ 2□ □ 3□ □□□ □□ | 2100

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□□ □□ □□ □□□ □□ □□□ □□□□ □□ □□□ CBS□ □□ □□□□□. □□□ CBS□ □□□□ EBS□ □□ □□□□□. □□ □□□□ □□□□ □□ □ □□ □ □ □□ □□□ □□□□□. □□, □□-□□ □ □□.

CBS□ □□□□□ EBS □□□ □□ □□□ □□□(□□-□□)□□ □□□□□. EBS□ □□□□ □□□ □ □□□ □ 136 □□□ 2086□□ □□□(□□)□□ □□□ □□.

□ 136: □□ □□ TCM □□-PLP □□

□	□□ □□ □□□	□□
□□	**low**	□□.
□□	**medium-high**	□□□ CIR □ CBS□ □□□□□ EBS□ □□□□□ □□□□.
□□	**high**	□□□ EBS□ □□□□□.

□□ □□

□□□ □□ | 2066

□□-□□ PLP□ □□ □□ □□ □□□ □□ | 2100

□□ □□ □□ □□□ □□ □□ □□ □□ □□

in this section

- PLP □□ □□ □□ | 2087

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PLP □□ □□ □□

□ 137 □□□ 2087 □(□) □□ □□ □□□ □□□ □□ □□□□□ □□□□ □□□ □□□□□.

□ 137: □□ □□ □□ □□ □□ PLP □□

□□ PLP	□□□ □□	□□□ □□	□□□ PLP
low	CIR, CBS, and EBS	□□	**low**
		□□□ CIR □ CBS□ □□□□□ EBS□ □□□□□ □□□□.	**medium-high**
		□□□ EBS□ □□□□□.	**high**
medium-low	EBS □□	□□□ EBS□ □□□□ □□□□.	**medium-low**
		□□□ EBS□ □□□□□.	**high**
medium-high	EBS □□	□□□ EBS□ □□□□ □□□□.	**medium-high**
		□□□ EBS□ □□□□□.	**high**
high	□□□□ □□□□ □□□□.	□□ □□.	**high**

□□ □□□□□ □□ □□ □□ □□ PLP □□□ □□ □□□ □□□□□.

□□ □□□ □□□ □□(□□ PLP)

green □□□□ □□□ □□□ □□ □□ PLP□ □□ □□□□ □□ □□□□□□□. □□ □□□□ PLP□ □□□□ □□ □□□ □□□ □□-□□ □□ □□□□ □□□□ □ □□□□ □□□ □□□ CBS□ EBS □□□ □□ □□□□□. □□ □□, □□ □□ □□ □□□□ □□□□ □□ PLP□ □□□ □□□□ 2□□□ TCM □□□□ □ □ □□ □□□ □□ □□, □□ □□ □□□□□ □□□ □□□□.

- □□□ □□□ □□□ CIR□□ □□□ □□□ □□ PLP□ □□□□□.
- □□□□ CBS□ □□□□□ EBS□ □□□□ □□ □□ □□ □□□ □□ □□ PLP□ □□□□ □□ □□□ □□ PLP□ □□□□□.
- □□□□ EBS□ □□□□ □□ □□ □□□ □□ PLP□ □□□□ □□ □□□ □□ PLP□ □□□□□.

□□□ □□□ □□□ □□(□□□ PLP)

□□□ □□□□ □□□ □□□ □□ □□-□□ □□ □□-□□ PLP□ □□ □□□□ □□ □□□□□□□□. □□ □□□□ PLP□ □□□□ □□ □□□ □□□ □□□□ □□ □ □□□□ □□□ □□□ EBS□ □□□□ □□□□□. □□ □□, □□ □□ □□ □□□□ □□□□ □□□ □□-□□ PLP□ □□□□ 2-rate TCM □□□□ □□ □□ □□□ □□, □□ □□ □□ □□□ □□□ □□□□.

- □□□ □□□ □□□ CBS□□ □□□ □□□ □□-□□ PLP□ □□□□□.
- □□□ □□□ □□□ CBS□□ □□□ EBS□□ □□ □□, □□□ □□-□□ PLP□ □□□ □□□ □□□□□.
- □□□ □□□ □□□ EBS□□ □□□ □□ □□□ □□ PLP□ □□□□ □□□ □□-□□ PLP□ □□□□□.

BA □□ □□□□ □□□□ □□□ □□ □□□ PLP□ □□□□ 2□□□ TCM □□□□ □□ □□ □□□ □□, □□□□ □□□ □□ □□ □□ □□□□□ □□□□□.

- □□□ □□□ □□□ CBS□□ □□□ □□□ □□ □□ PLP□ □□□□□.
- □□□ □□□ □□□ CBS□□ □□□ EBS□□ □□ □□, □□□ □□-□□ PLP□ □□□ □□□ □□□□□.
- □□□ □□□ □□□ EBS□□ □□ □□, □□ □□□ □□ PLP□ □□□□ □□□ □□-□□ PLP□ □□□□□.

□□ □□□ □□□ □□(High PLP)

□□□ □□□□ □□□ □□□ □□ □□ PLP□ □□ □□□□ □□ □□□□□□□□. □□□□ PLP□ □□ □ □□□□ □□□□ □□□ □□□ □□□ CBS □□ EBS□ □□ □□□□ □□□□.

□□ □□

> □□□ □□ | **2066**
>
> □□-□□ PLP□ □□ □□ □□ □□□ □□ | **2100**

2□□□ □□ □□□ □□ □□ □□ □□

2□□□ □□ □□□ □□ □□□ □□□□ □□ □□□ CIR(Committed Information Rate)□ □□ □□□□□. □□□ CIR□ □□□□ PIR(Peak Information Rate)□ □□ □□□□□. CIR□ □□□□□ PIR □□□ □□□ □□□(□□-□□)□□ □□□□□. PIR□ □□□□ □□□ □□□(□□)□□ □□□ □□.

□ 138: □□ □□ TCM □□-PLP □□

□	□□ □□ □□□	□□
□□	**low**	□□□ CIR□ □□□□ □□□□.
□□	**medium-high**	□□□ CIR□ □□□□□ PIR□ □□□□□ □□□□.
□□	**high**	□□□ PIR□ □□□□□.

□□ □□

□□□ □□ | **2066**

□□-□□ PLP□ □□ □□ □□ □□□ □□ | **2100**

2□□□ □□ □□□ □□ □□ □□ □□ □□

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- PLP □□ □□ □□ | **2089**
- □□ □□□ □□□ □□(□□ PLP) | **2090**
- □□□ □□□ □□□ □□(□□□ PLP) | **2090**
- □□ □□□ □□□ □□(High PLP) | **2091**

□□ □□ □□□□ □□□ □□ □□□ □□□ □□ □□□□□. □□□ □□ □□□ PLP□ □□□□ □ □□□ □□□□ □□ □□□□

PLP □□ □□ □□

□ 139 □□□ 2090 □□□ □□ □□□□□ 2□□□ □□□□ □□□□ □□□ □□□□□.

□ 139: □□ □□ □□ 2□□□ PLP □□

□□ PLP	□□□ □□	□□□ □□	□□□ PLP
low	CIR □ PIR	□□□ CIR□ □□□□ □□□□.	**low**
		□□□ CIR□ □□□□□ PIR□ □□□□ □□□□.	**medium-high**
		□□□ PIR□ □□□□□.	**high**
medium-low	PIR□ □□	□□□ PIR□ □□□□ □□□□.	**medium-low**
		□□□ PIR□ □□□□□.	**high**
medium-high	PIR□ □□	□□□ PIR□ □□□□ □□□□.	**medium-high**
		□□□ PIR□ □□□□□.	**high**
high	□□□□ □□□□ □□□□.	□□ □□.	**high**

□□ □□□□□□ □□ □□ 2□□□ PLP □□□ □□ □□□ □□□□□.

□□ □□□ □□□ □□(□□ PLP)

green □□□□ □□□ □□□ □□ □□ PLP□ □□ □□□□ □□ □□□□□□□. □□ □□□□ □□□ PLP□ □□□□ □□ □□□ □□□ PLP□ □□-□□ □□ □□□□ □□ □ □□□□. □□□ □□□ □□□ CIR □ PIR □□□ □□ □□□□□. □□ □□, □□ □□ □□ □□□□ □□□□ □□ PLP□ □□□ □□□□ 2□□□ TCM □□□□ □□ □□ □□□ □□ □□, □□ □□ □□□□□ □□□ □□□□.

- □□□ □□□ □□□ CIR□□ □□□ □□□ □□ PLP□ □□□□□.
- □□□ □□□ □□□ CIR□□ □□□ PIR□□ □□ □□, □□ □□□ □□-□□ PLP□ □□□□ □□ □□□ □□ PLP□ □□□□□.
- □□□ □□□ □□□ PIR□□ □□□ □□ □□□ □□ PLP□ □□□□ □□ □□□ □□ PLP□ □□□□□.

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- ??? ??? ??? CIR?? ??? ??? ??-?? PLP? ?????.
- ??? ??? ??? CIR?? ??? PIR?? ?? ??, ??? ??-?? PLP? ??? ??? ?????.
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BA ?? ???? ???? ??? ?? ??? PLP? ???? 2??? TCM ???? ?? ?? ??? ??, ???? ??? ?? ?? ?? ????? ?????.

- ??? ??? ??? CIR?? ??? ??? ??-?? PLP? ?????.
- ??? ??? ??? CIR?? ??? PIR?? ?? ??, ??? ??-?? PLP? ??? ??? ?????.
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```
firewall {
    policer Limit-Customer-1 {
        if-exceeding {
            bandwidth-limit 100m;
            burst-size-limit 150m;
        }
        then discard;
    }
```

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```
firewall {
    policer Class-A {
        if-exceeding {
            bandwidth-limit 100m;
            burst-size-limit 150m;
        }
        then discard;
    }
    policer Class-B {
        if-exceeding {
            bandwidth-limit 75m;
            burst-size-limit 100m;
        }
        then discard;
    }
    policer Class-C {
        if-exceeding {
            bandwidth-limit 50m;
            burst-size-limit 75m;
        }
        then discard;
    }
}
```

□□ from □□□□ □□□□ □□□□□ □□ □□ □□□□□ then □□□□□ □□ □□□□ □□□□ □□□□□ □□□□□ □□□□.

```
firewall
    family inet {
        filter Class-A-Customers {
            term term-1 {
                from {
                    destination-prefix-list {
                        Class-A-Customer-Prefixes;
                    }
                }
                then policer Class-A;
            }
```

```
        }
        filter Class-B-Customers {
            term term-1 {
                from {
                    destination-prefix-list {
                        Class-B-Customer-Prefixes;
                    }
                }
                then policer Class-B;
            }
        }
        filter Class-C-Customers {
            term term-1 {
                from {
                    destination-prefix-list {
                        Class-C-Customer-Prefixes;
                    }
                }
                then policer Class-C;
            }
        }
    }
```

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1. □ □□ □□□□ □□□□□.

```
[edit firewall]
user@switch# set policer Class-A if-exceeding bandwidth-limit 100m burst-size-limit 150m
user@switch# set policer Class-A then discard
```

2. □ □□ □□□□ □□□□□.

```
[edit firewall]
user@switch# set policer Class-B if-exceeding bandwidth-limit 75m burst-size-limit 100m
user@switch# set policer Class-B then discard
```

3. □ □□ □□□□ □□□□□.

```
[edit firewall]
user@switch# set policer Class-C if-exceeding bandwidth-limit 50m burst-size-limit 75m
user@switch# set policer Class-C then discard
```

4. □□□ A □□□ □□ □□□ □□□□.

```
[edit firewall]
user@switch# edit family inet filter Class-A-Customers
```

5. □□□ □□□ Class-A-Customer-Prefixes □□□□ □□□ □□□□ Class-A □□□□□ □□□ □□□□□.

```
[edit firewall family inet filter Class-A-Customers]
user@switch# set term term-1 from source-prefix-list Class-A-Customers
user@switch# set term term-1 then policer Class-A
```

6. □□□ B □□□ □□ □□□ □□□□.

```
[edit firewall]
user@switch# edit family inet filter Class-B-Customers
```

7. □□□ □□□ Class-B-Customer-Prefixes □□□□ □□□ □□□□ Class-B □□□□□ □□□ □□□□□.

```
[edit firewall family inet filter Class-B-Customers]
user@switch# set term term-1 from source-prefix-list Class-B-Customers
user@switch# set term term-1 then policer Class-B
```

8. □□□ C □□□ □□ □□□ □□□□.

```
[edit firewall]
user@switch# edit family inet filter Class-C-Customers
```

9. ???? ???? Class-C-Customer-Prefixes ????? ???? ????? Class-C ?????? ???? ??????.

```
[edit firewall family inet filter Class-C-Customers]
user@switch# set term term-1 from source-prefix-list Class-C-Customers
user@switch# set term term-1 then policer Class-C
```

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2. □□□□□□ □□□ □□□□ □□ □□□ □□□□ □□ □□□ □□□□□□.
3. □□ □□□ □□ □□□ □□□□ □□□□□□ □□□ □□□ □□□□ □□□□□.
4. □□□□□□ □□□ □□□□□□ □□□□ □□□□ □□□ □□□□ ▫ □□□ □□□ □□□□□.
5. □□□□□□ □□□ □□□ □□□ □□□□□□ □□□ □□□□.
6. □□□□□□ □□□ □□□□ □□ □□□ □□□ □□□ □□□□□.

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```
[edit firewall]
user@switch# set policer Database-Egress-Policer if-exceeding bandwidth-limit 400 burst-size-
limit 500m
user@switch# set policer Database-Egress-Policer then discard
```

2. □□□□□□ □□□□ □□□□□□ □□□□ □□□□ □□□□ □□□ □□□□□□□.

```
[edit firewall]
user@switch# edit family inet filter Database-Egress-Filter
```

3. □□□□□□ □□□ □□□□ □□□□□□ □□□ □□□ □□□□ □□□□ □□□□□ □□□ □□□□□.

```
[edit firewall family inet filter Database-Egress-Filter]
user@switch# set term term-1 from destination-address 10.0.0.1
user@switch# set term term-1 then policer Database-Egress-Policer
```

4. □□□ □□ □□□□□□ □□□□ □□ □□□□□ □□□□ □□□□□ □□□ □□□□□(□□□ □□□ □□□□ □□□ □□□□ □□ □□□).

```
[edit firewall family inet filter Database-Egress-Filter]
user@switch# set term term-2 then accept
```

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5. ?? ??? ??????? ??? ??? ??????? ?? ??????? ?? ??? ???????.

```
[edit interfaces]
user@switch# set xe-0/0/3 unit 0 family inet filter output Database-Egress-Filter
```

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```
firewall {
    policer Database-Egress-Policer {
        if-exceeding {
            bandwidth-limit 400;
            burst-size-limit 500m;
        }
        then discard;
    }
    family inet {
        filter Database-Egress-Filter {
            term term-1 {
                from {
                    destination-address {
                        10.0.0.1/24;
                    }
                }
                then policer Database-Egress-Policer;
            }
            term term-2 {  # If required, include this term so that traffic from the database
server to other destinations is allowed.
                then accept;
            }
        }
    }
]
```

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□: Junos OS□ □□ □□□ □□□ □□□□ PLP□ □□□□□. □□ □□□ □□□ □□□ □□ PLP□ □□□□ □□□ □□□□ □□□□.

□□ □□□ □□□□□ □□□□ 4□□ PLP □□□ □□□□□. **low**,**medium-low**,**medium-high**, □ **high**. □ □□□ □□□ □□□□ □□□ □□ □□ □□ □ 141 □□□ 2098

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□□□□□ □□□ □□□	CoS □□□ □□□ □□
be	Best-effort □□□
no-loss	TCP □□□ □□ □□
fcoe	FCoE(Fibre Channel over Ethernet) □□□ □□ □□
nc	□□□□ □□ □□□

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1. □□□ □□ □□ □ □□ □□□ □□□□□.

```
[edit]
user@switch# edit firewall family ethernet-switching filter ingress-filter
```

2. □ **loss-priority** □□ □□□□ □□□□ □□□ □□□ **forwarding-class** □□□□ □□□□□. □□ □□, □□□ □□ □ □□□ □□□ □□ □□ □□□ □□□□ □□□ □□□ □□□ □ □□ □□ □□□□□ □□□□□.

   - □ □□□ **corp-traffic** □□ □□□ □□ **10.1.1.0/24** □□ IPv4 □□□ □□□□□ □□ □□ □□□ □□□ □□□ □□□□ **no-loss** □□□□ □.**low**

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term corp-traffic from source-address 10.1.1.0/24;
```

```
user@switch# set term corp-traffic then forwarding-class no-loss
user@switch# set term corp-traffic then loss-priority low
```

- □ □□□ **data-traffic** □□ IPv4 □□□ **10.1.2.0/24** □□ □□□ □□□□□ □□ □□ □□□ □□□ □□□ □□□ **be** (□□□ □□)□ □□□□ □.**medium-high**

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term data-traffic from source-address 10.1.2.0/24;
user@switch# set term data-traffic then forwarding-class be
user@switch# set term data-traffic then loss-priority medium-high
```

- □□□□ □□ □□□ □□□ □□□ □□□□ □□□ □□□□ □ □ □□ □□□ □□□ □□□ □□□□ □□□ □□□ □□□ □□□ □ □□□□. □ □□□ **network-traffic** IP □□ **net-control** □□□ □ □□□ □□ □□ □□□ □ □□□ □□□ **nc** (□□□□ □□)□ □□□□□.**low**

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term network-traffic from precedence net-control
user@switch# set term network-traffic then forwarding-class nc
user@switch# set term network-traffic then loss-priority low
```

- □□□ □□□ **accept-traffic** □□ □□□ □□□□ □□ □□ □□□ □□□□ □□ □□ □□□ □□□ □□□ □□□□ **be** □□□□□.**high**

```
[edit firewall family ethernet-switching filter ingress-filter]
user@switch# set term accept-traffic then forwarding-class be
user@switch# set term accept-traffic then loss-priority high
```

3. □□□ **ingress-filter** □□, VLAN □□ □□□ 3 □□□□□□ □□□□□. □□ □□□ □□ □□□ □□□ "□□□ □□ □□□" □□□ 1729 □□□□□ □. (□□□ □□□ □ PLP □□□ □□ □□□□□ □□□□□.)

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```
[edit]
 user@switch# set firewall policer policer-name if-exceeding bandwidth-limit bytes burst-size-limit bytes
```

2. ?? ??? ?? ??-?? ?? ???? ??:

```
[edit]
 user@switch# set firewall policer policer-name then loss-priority medium-low;
```

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- ????? ????? ???? ?? ?? | 2103

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   ```
   [edit firewall]
    user@switch# set policer policer-name <filter-specific> if-exceeding bandwidth-limit bps
   burst-size-limit bytes
   ```

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   □□□ □□ □□□ 32,300,000,000(102,300m)bps□□ 32,300,000,000bps□□□.

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   maximum burst size = (interface bandwidth) X (allowable time for burst) / (8 bits/byte)

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2. □□□□□ □□ □□□ □□□□ □□□ □□ □□□□□ □□□□ □□□ □□□ □□□□□.

   ```
   [edit firewall policer policer-name]
    user@switch# set then (discard | loss-priority low | loss-priority high)
   ```

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1. □□□□ □□□ □□□□, □□ □□□□(PLP)□ □□ □□□ □□□□ □□□□ □□(□□ □□)□ □□□□□.

```
[edit firewall]
 user@switch# set three-color-policer policer-name
 user@switch# set three-color-policer policer-name action loss-priority high then discard
```

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```
[edit firewall three-color-policer policer-name]
 user@switch# set (single-rate | two-rate) (color-aware | color-blind)
```

3. □□ □□ 3□ □□□□ □□ CIR, CBS □ EBS□ □□□□□.

```
[edit firewall three-color-policer policer-name single-rate]
 user@switch# set committed-information-rate bps
 user@switch# set committed-burst-size bytes
 user@switch# set excess-burst-size bytes
```

4. 2□□□ 3□ □□□□ □□ CIR, CBS, PIR □ PBS□ □□□□□.

```
[edit firewall three-color-policer policer-name single-rate]
 user@switch# set committed-information-rate bps
 user@switch# set committed-burst-size bytes
 user@switch# set peak-information-rate bps
 user@switch# set peak-burst-size bytes
```

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2□ □□□□ □□□□□ □□□ policer□□□□ □□ □□□ □□□□□.

```
[edit firewall family family-name]
user@switch# set filter filter-name term name then name
```

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```
[edit firewall family family-name]
user@switch# set filter limit-hosts term term1 from source-address 192.0.2.0/24
user@switch# set filter limit-hosts term term1 then policer policer1
```

3□ □□□□ □□□□□ □□□ three-color-policer□□□□ □□ □□□ □□□□□.

```
[edit firewall family name]
user@switch# set filter name term name from match-condition
user@switch# set filter name term name then three-color-policer (single-rate | two-rate) name
```

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```
[edit firewall family name]
user@switch# set filter srTCM term term-one from interface ge-0/0/6
user@switch# set filter srTCM term term-one then three-color-policer single-rate srTCM1-ca
```

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- 3□ □□□□ □□ □□ □□ | 2105
- □□-□□ PLP□ □□ □□ □□ □□□ □□ | 2100

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□□ □□ □□□ show firewall policer □□□□ □□□□ □□□ □□□□□ □□□□□.

```
user@switch> show firewall policer
Filter: egress-vlan-watch-employee
Filter: ingress-port-filter
Filter: ingress-port-limit-tcp-icmp
Policers:
Name                                                Packets
icmp-connection-policer                                  10
tcp-connection-policer                                  539
Filter: ingress-vlan-rogue-block
Filter: ingress-vlan-limit-guest
```

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□□□ show firewall policer □□□ □□ □□□ □□ □ □□□□ □□□ □□□□□. □□ □□□ □□□ □ □□□□ □□ □□ □□□ □□□ □□ □□□ □□□□ □ □ □□□ □□ □□ □□ □□□□□.

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- show class-of-service forwarding-table classifiers
- show interfaces *interface-name* extensive
- show interfaces queue *interface-name*

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- ??? , term2, ? term3? ?? term1? ??? ?? ???? ??? ??? ???? ??? ??????. ?? ???? ??? ???? ?? ??? ?? ???? 0?? ????????.
- ??? ? term2? ??? term1 ?????. ?? ?? ?? ???? ?? ???? ??? ???? ?? 1000?? ???? ??? ?????? ?????? term2policer . ?? ???? ?? term1term2 ?? ??, ?? term2 ???? ???? ?? ???? 0?? ????????.

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- ? 512?? ????? ????? ????? ?? ?? ??? ?????? ??? ???. ??? ?? ??? 10?? ??? ?? ?? ?? ??? ?????, ? ? 1??? ??? ?? ????? ?????. ????? ?? TCAM ??? ????? ?? ??? ? ??? ?? ??? ????? ????.
- ? 500?? ????? ????? ?? ??? ????? 1,000?? TCAM ??? ?????? ??? ??????. ??? ?? ??? ?? ? ?? ?? ??? ??? ??.
  - 20?? ?? 20?? ????? A? ???????. ?? ????? ??? TCAM ??? ?? ??? ? ??? ?? ??? ??????.
  - ?? B? ?? A ??? ?? 5?? ?? 5?? ????? ?????. *??*????? ?? ??? ??? ????? ?? ??? ? ??? ?? ??? ????? ??? ?. (5?? TCAM ??? ?????? 4?? ??? ? ?????.)

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- ??? ??? ??? 1024?? ?? ??? ?? ??? ?????.
- ?? ??? ????? 10?? ??? ?? ?? ??? ?????. ?? ????? ????? ??? ? ????? ??? ?? ???? ?????.

[illegible] TCAM [illegible] 10[illegible] [illegible].

SEE ALSO

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- [illegible]: [illegible] | 2095
- [illegible]: [illegible] | 1611
- [illegible]: 2[illegible] | 2091

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- [illegible] | 2110
- [illegible] | 2111
- QFX3500 [illegible] | 2111
- QFX3500 [illegible] | 2112
- [illegible]. | 2113

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- ??? , term2, ? term3? ?? term1? ???? ?? ????? ???? ???? ????? ???? ??????. ?? ????? ???? ????? ?? ???? ?? ????? O?? ???????.
- ??? ? term2? ???? term1 ??????. ?? ?? ?? ????? ?? ????? ???? ????? ?? 1000?? ????? ???? ?????? ?????? term2policer . ?? ????? ?? term1term2 ?? ??, ?? term2 ????? ????? ?? ????? O?? ???????.

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QFX3500 ?????? ?? ????? ???? ???? ? ?? ????? ???? ? ?????

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- xe-0/0/0 - xe-0/0/23 ?? xe-0/1/1 - xe-0/1/7 ??? ????? ??????? ?? ?? ?????.
- xe-0/0/24 - xe-0/0/47 ?? xe-0/1/8 - xe-0/1/15 ??? ????? ??????? ?? ?? ?????.

□□ □□, 1Gbps□□ □□□ □□□ □□□□□ □□□□ □□□□ □□□ □□□ □□□□ □□ □□□ xe-0/0/0 □ xe-0/0/24□ □□□□ □□□□ □□, □ □□□□□□ 1Gbps□□ □□□ □□□□ □ □□ □□□□ 2Gbps□□□. □□□□ xe-0/1/1 □ xe-0/0/24□ □□□□ □□□□ □□□ □□□ □□□□, □ □□□□□□ 1Gbps□□ □□□ □□□□□.

□□ □ □□□ □□□□ □□□ □□□ □□ □□□□□□ □□□□ □□, □ *□□□* □□□ 1Gbps□ □□□□□. □□ □□, □□□□ xe-0/0/4(□□□□□ 5□)□ □□ xe-0/0/0, xe-0/0/33(□□□□□ 10□)□ □□ xe-0/0/24□ □□□□ □□, □ □□□ 1Gbps□□ □□ □□□ □□□□ □ □□ □□□□ 2Gbps □□□.

□□□ □ □□ □□□□. □□□□ xe-0/0/0□□ xe-0/0/4□□, xe-0/1/1□□ xe-0/1/5□□(□ 10□□ □□□□□)□ □□□□ □□ □□□ □ 1Gbps□ □□□ □□□□□. □□ □□□□ xe-0/0/24□ □□□□ □□, □□ □□□□□ □□□ 1Gbps□□ □□□ □□□□ □□□ 10□□ □□□ □ 1Gbps□ □□□ □□□□□.

□□□□□ xe-0/1/1□□ xe-0/1/15□□□ □□ □□□ □□ QSFP+ □□□ □□□ □□□□□ □□□□□.

- xe-0/1/1□□ xe-0/1/3□□□ Q0□ □□□□.
- xe-0/1/4□□ xe-0/1/7□ Q1□ □□□□.
- xe-0/1/8□□ xe-0/1/11□□□ Q2□ □□□□.
- xe-0/1/2□□ xe-0/1/15□□□ Q3□ □□□□.

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QFX3500 □□□□□ □□□ □□ □□□□ □□□ □□□ □ □□ □□□□ □□□ □ □□□□

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□□□ □□□□ □□□ □□□□ □□□□ □□□ □□ □□□ TCAM(Ternary Content Addressable Memory)□ □□□□ □□□ □□□ □□□□. □□□ □□□□ □□□□ □□ □□□ □□ □□□ □□□□ □□, □□□ □□ □□ TCAM □□□□□ □□□□ □□□ □□□□ □□□□ □□ □□□□ □□□□□. □□ □ □, 1Gbps□ □□□□ □□□□ □□□□□ □□□□ □□□□ 3□□ □□ □□□ □□□□□ □□□ 3□□ □□ □□□ □□ □□□□ □□□□ □□, □□□ □□□□ □ □ □□□ 1Gbps□ □□ 3Gbps□□□.

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  - □□ B□ □□ A □□□ □□ 5□□ □□ 5□□ □□□□ □□□□. *□□*□□□□ □□ □□□ □□□ □□□□ □□ □□□ □ □□□ □□ □□□ □□□□ □□□ □. (5□□ TCAM □□□ □□□□□ 4□□ □□□ □ □□□□.)

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- GTP-□□□ | **2125**
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□ 142: □□□ □□ □□ □□ □□□□ □□

□□□ □ □□	□□
family *family-name* { }	□ ***family-name*** □□□ □□ □□ □□□□□ □□ □□ □□□ □□□□□. • **any**- □□□□ □□□ □□ □□□ □□ □□□ □□□□□□□. • **ethernet-switching**- □□□ 2(□□□) □□ □ □□□ 3(IP) □□ □□ □ • **inet**- IPv4 □□ □□□ • **inet6**- IPv6 □□ □□□
filter *filter-name* { }	□□□ ***filter-name*** □□□ □□□□□. □□□ □□, □□, □□□(-)□ □□□ □ □□ □ □□ 64□ □□□□□. □□□ □□□ □□□□□ □□□ □□□(" ")□ □□□□.
interface-specific	□□□□ interface-specific □ □□□□□□ □□□ □□ □□□ □□□□ □□□ □□□ □□□□□.
term *term-name* { }	□□□ □□□ ***term-name*** □□□□□. □□□ □□, □□, □□□(-)□ □□□ □ □□ □ □□ 64□ □□□□□. □□□ □□□ □□□□□ □□ □□□ □□□(" ")□ □□□□. □ □□ □□□ □□ □□□ □□□□ □□□.

from {
match-conditions;
}
	□□ from □□ □□□□□. □□□□ □□ □□□ □□□□ □□□ □□□□□.

□ 142: □□□ □□ □□ □□ □□□□ □□ *(Continued)*

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then {
action;
action-modifiers;
}
	□ □□□ □□ ***action*** □□□ □□□ "EX □□□ □□□□ □□ □□□ □□ □□ □□, □□ □ □□ □□□□" □□□ 1466 □□□□□□. ***action-modifiers***

policer *policer-name* { }	□□□ ***policer-name*** □□□□ □□□□□. □□□ □□, □□, □□□(-)□ □□□ □ □□□ □□ 64□ □□□□□. □□□ □□□ □□□□□ □□□ □□□(" ")□ □□□□.
filter-specific	□□□□ filter-specific □□ □□ □□□ □□ □□□□ □□□□ □□□□□.

if-exceeding {
bandwidth-limit *bps*
burst-size-limit *bytes*
}
	□□□ **bandwidth-limit** ***bps*** □□□ □□□ □□ □□ □(bps)□ □□□□□.
	10□□ □ □□ 10□□ □□ □□ □□ □ □□□ □□ □□□ ***bps*** □ □□□□.
	• k (□)
	• m(□□)
	• g (10□, 10□□□□□ □)
	Range: 1000(1K)□□ 102,300,000,000(102.3G)bps
	□□□ **burst-size-limit** ***bytes*** □□□ □□□ □□ □□□□ □□ □□□□ □□ □□□ □□□ □□□□□. □□□ □□ □□□ □□ □□□□□ □□□ □□□□ □□□□□□ □□□□ □□(□)□ □□□ □□ □□□□□ □□□ □□□□ □□□ □ □□□ □ □ □□□□.

	burst size = bandwidth * allowable time for burst traffic 10□□ □ □□ 10□□ □□ k(□) □□ m(□□)□ □□□ □ □□□□. **Range**: 1 - 2,147,450,880 □□□

□ 142: □□□ □□ □□ □□ □□□□ □□ *(Continued)*

□□□ □ □□	□□

then {
policer-action
}
	policer-action □□□ □□□□ □□ □□□ □□□□ □□□□ □□□□□ □□□ **discard** □ □□□□.

EX □□□ □□□□ Junos OS□ □□ Junos OS □□□□□ □□□□ □□□ □□ □ □ □□□ □□□□ □□□□. □ 143 □□□ 2118 □(□) EX □□□ □□□□ Junos OS□□ □□□□ □□ □□□ □□ □□ □□□□□.

□ 143: EX □□□ □□□□ Junos OS□□ □□□□ □□ □□□ □□ □

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• interface-set *interface-set-name* {
}
• load-balance-group *group-name* {
}
• three-color-policer *name* {
}
• logical-interface-policer;
• single-rate {
}
• two-rate {
}
	[edit firewall]

□ 143: EX □□□ □□□□ Junos OS□□ □□□□ □□ □□□ □□ □ *(Continued)*

□□□□ □□ □	□ □□ □□

• prefix-action *name* {
}
• prefix-policer {
}
• service-filter *filter-name* {
}
• simple-filter *simple-filter-name* {
}
	[edit firewall family *family-name*]

• accounting-profile *name*;	[edit firewall family *family-name* filter *filter-name*]
• logical-bandwidth-policer; • logical-interface-policer;	[edit firewall policer *policer-name*]
bandwidth-percent *number*;	[edit firewall policer *policer-name* if-exceeding]

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EX □□□ □□□□ □□□ □□ □□ □□, □□ □ □□ □□ | 1466

□: EX □□□ □□□□□ □□, VLAN, □□□ □□□□ □□□ □□ □□□□ | 1578

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EX □□□ □□□□ □□□ □□ □□ | 1447

per-logical-interface-firewall

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```
per-logical-interface-firewall
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```
[edit chassis]
```

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```
firewall {
    family ethernet-switching {
        filter <filter-name> {
            term <rule-name> {
                from {
                    source-mac-address {
                        <mac-address>;
                    }
                }
                then {
                    count <count>;
                    policer <policer>;
                }
            }
        }
    }
    policer <policer-name> {
        if-exceeding {
            bandwidth-limit <bandwidth-limit>;
            burst-size-limit <burst-size-limit>;
        }
        then discard;
    }
}
interfaces {
    <interface-name> {
        flexible-vlan-tagging;
        encapsulation flexible-ethernet-services;
        unit <interface-unit-number> {
            vlan-id <vlan-id>;
            family ethernet-switching {
                filter {
                    input <filter-name>;
                }
            }
```

```
        }
    }
vlan {
    <vlan name> {
    interface <interface - name>
}
}
```

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- per-logical-interface-firewall ??????? ????? ??? ????????? ????? ????.
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- per-logical-interface-firewall scope? ? VxLAN ??????? ??????.
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Junos OS ??? 22.2R1(QFX5110, QFX5120-32C, QFX5120-48T, QFX5120-48Y, QFX5120-48YM, QFX5200 ? QFX5210)? ??? ?

gtp-□□

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```
gtp-header
```

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```
[edit firewall family family-name filter filter-name from]
```

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GTP □□□ □□ □□ □□□ □□□□□. □□ □□ □□□ □□□□.

```
firewall {
   family inet /inet6 {
           filter gtp_filter {
from {
       protocol udp;
       port 2123;
```

```
        gtp-header {
            gtp-teid  <TEID value/list/range>;
           ipv4/ipv6 {
                source-address <32bit for v4 and 128 bit for v6>;
                source-prefix-list <prefix-list>;
                destination-address <32bit for v4 and 128 bit for v6>;
                destination-prefix-list <prefix-list>;
                Protocol/next-header <8 bit>;
                Protocol/next-header-except <8 bit>;
                source-port <16 bit>;
                source-port-except <16 bit>;
                destination-port <16 bit>;
                destination-port-except <16 bit>;
        }
}
then {
      count gtp;
      }
```

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- firewall—□□□□ □ □□□□ □ □ □□□□.
- firewall-control - □□□ □ □□□□ □□□ □ □□□□.

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Junos 22.2R1□ □□□ □□

GTP-□□□

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```
gtp-teid list;
```

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```
[edit firewall family family-name filter filter-name from gtp-header]
```

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GTP-C □□ □□□ teid □ □□ □ □□□ □□□□□. □□□ □□□ □□□ teid □ □□ □ □□□ □□□□□□□ □□□□□.

□□

GTP-□□□ *list*

- list - GTP-TEID□ □□□□ 0□□ 4294967295□□□ □ □□□ □□□□. □□ □□, □□ □□ □□□ gtp-teid□□ □ □ □□□ □□□□□.

```
set firewall family inet filter ft term 1 from gtp-header gtp-teid [100 200]
```

□□ □□ □□□ gtp-teid□□ □□ □□ □□□□□.

```
set firewall family inet filter ft term 1 from gtp-header gtp-teid 105
```

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- firewall—□□□□ □ □□□□ □ □ □□□□.
- firewall-control - □□□ □ □□□□ □□□ □ □□□□.

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Junos 22.2R1□ □□□ □□

Junos CLI □□ □□

□□ Junos CLI □□□ □□ □□□□ □ □□ □□□□□□. □ □□□□ □□ □□ □□□ □□□□ □□□ □□□ □□ □□□□□. □□ □□□□ □□ □ □□□□ □□□ CLI □□□ □□□□ □□□ □□□□□.

- Junos CLI □□

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- □□ □□ | **2128**

chapter label in part36

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