

Network Configuration Example

Configuring Routing Policy in an ISP Network



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Introduction

This document describes routing policies and the advantages of using them in an ISP network. It also provides a step-by-step example of how to configure routing policies in a typical ISP network.

Use Case for Inter-Domain Policies

Routing policies allow you to control the flow of routing information and packets.

As an ISP, you might choose to implement inter-domain policies for the following reasons:

- To implement business relationships with neighboring domains
- To provide good end-to-end performance through the network
- To improve the scalability of a routing protocol
- To protect your network from attacks

Managing Business Relationships

You can choose to manage your network traffic based on business agreements or relationships with both customers and other ISPs. For example, you and another ISP might decide to create a peer relationship where the networks are directly connected. This might allow network traffic to flow across both networks. To enable the peer relationship, you could set up a policy to export learned routes to the partner ISP. This type of relationship enables additional business and increases revenue.

Improving End-to-End Performance

You can manage traffic through the network to improve reliability and performance. For example, if you encounter congestion on an outbound link to a neighbor, you could set up a policy that enables load balancing across several outbound links. This type of load balancing reduces the amount of traffic across a single link, improves throughput, reduces downtime, and saves you money.

Improving the Scalability of a Routing Protocol

You can protect your network from instability and excessive routing table growth due to a misconfigured or otherwise problematic router. For example, you can choose to use policies to provide flap dampening to reduce the propagation of unstable routes through the network. This improves stability and reduces your costs.

Protecting the Network

Finally, you need to protect your network and your customers from malicious attacks. For example, you can use policies to filter invalid routes. This conserves resources, reduces the potential for downtime, and lowers your costs.

Related Documentation

- [Understanding Routing Policies on page 2](#)
- [Example: Using Routing Policy in an ISP Network on page 5](#)

Understanding Routing Policies

For some routing platform vendors, the flow of routes occurs between various protocols. If, for example, you want to configure redistribution from RIP to OSPF, the RIP process tells the OSPF process that it has routes that might be included for redistribution. In Junos OS, there is not much direct interaction between the routing protocols. Instead, there are central gathering points where all protocols install their routing information. These are the main unicast routing tables `inet.0` and `inet6.0`.

From these tables, the routing protocols calculate the best route to each destination and place these routes in a forwarding table. These routes are then used to forward routing protocol traffic toward a destination, and they can be advertised to neighbors.

- [Importing and Exporting Routes on page 2](#)
- [Active and Inactive Routes on page 3](#)
- [Explicitly Configured Routes on page 4](#)
- [Dynamic Database on page 4](#)

Importing and Exporting Routes

Two terms—*import* and *export*—explain how routes move between the routing protocols and the routing table.

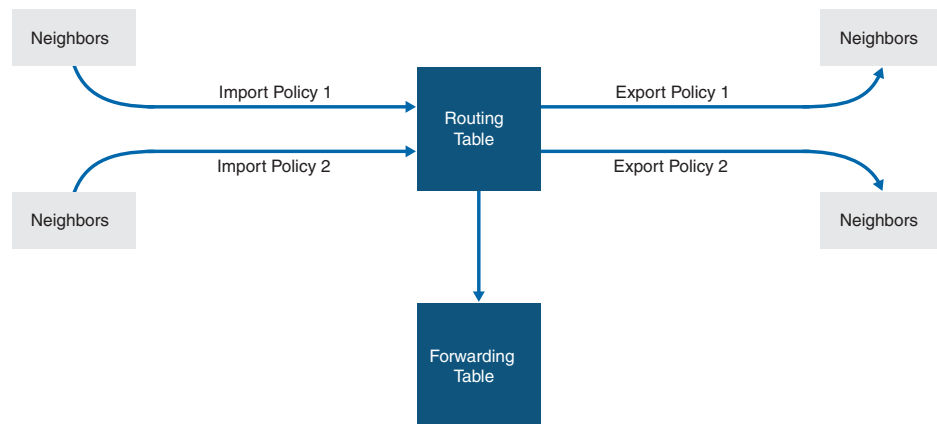
- When the Routing Engine places the routes of a routing protocol into the routing table, it is *importing* routes into the routing table.
- When the Routing Engine uses active routes from the routing table to send a protocol advertisement, it is *exporting* routes from the routing table.



NOTE: The process of moving routes between a routing protocol and the routing table is described always *from the point of view of the routing table*. That is, routes are *imported into* a routing table from a routing protocol and they are *exported from* a routing table to a routing protocol. Remember this distinction when working with routing policies.

As shown in [Figure 1 on page 3](#), you use import routing policies to control which routes are placed in the routing table, and export routing policies to control which routes are advertised from the routing table to neighbors.

Figure 1: Importing and Exporting Routes



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In general, the routing protocols place all their routes in the routing table and advertise a limited set of routes from the routing table. The general rules for handling the routing information between the routing protocols and the routing table are known as the *routing policy framework*.

The routing policy framework is composed of default rules for each routing protocol that determine which routes the protocol places in the routing table and advertises from the routing table. The default rules for each routing protocol are known as *default routing policies*.

You can create routing policies to preempt the default policies, which are always present. A *routing policy* allows you to modify the routing policy framework to suit your needs. You can create and implement your own routing policies to do the following:

- Control which routes a routing protocol places in the routing table.
- Control which active routes a routing protocol advertises from the routing table. An *active route* is a route that is chosen from all routes in the routing table to reach a destination.
- Manipulate the route characteristics as a routing protocol places the route in the routing table or advertises the route from the routing table.

You can manipulate the route characteristics to control which route is selected as the active route to reach a destination. The active route is placed in the forwarding table and is used to forward traffic toward the route's destination. In general, the active route is also advertised to a router's neighbors.

Active and Inactive Routes

When multiple routes for a destination exist in the routing table, the protocol selects an active route and that route is placed in the appropriate routing table. For equal-cost routes, the Junos[®] operating system (Junos OS) places multiple next hops in the appropriate routing table.

When a protocol is exporting routes from the routing table, it exports active routes only. This applies to actions specified by both default and user-defined export policies.

When evaluating routes for export, the Routing Engine uses only active routes from the routing table. For example, if a routing table contains multiple routes to the same destination and one route has a preferable metric, only that route is evaluated. In other words, an export policy does not evaluate all routes; it evaluates only those routes that a routing protocol is allowed to advertise to a neighbor.



NOTE: By default, BGP advertises active routes. However, you can configure BGP to advertise *inactive routes*, which go to the same destination as other routes but have less preferable metrics.

Explicitly Configured Routes

An *explicitly configured route* is a route that you have configured. *Direct routes* are not explicitly configured. They are created as a result of IP addresses being configured on an interface.

Explicitly configured routes include aggregate, generated, local, and static routes.

- An *aggregate route* is a route that distills groups of routes with common addresses into one route.
- A *generated route* is a route used when the routing table has no information about how to reach a particular destination.
- A *local route* is an IP address assigned to a router interface. A *static route* is an unchanging route to a destination.

The policy framework software treats direct and explicitly configured routes as if they are learned through routing protocols; therefore, they can be imported into the routing table. Routes cannot be exported from the routing table to the pseudoprotocol, because this protocol is not a real routing protocol. However, aggregate, direct, generated, and static routes can be exported from the routing table to routing protocols, whereas local routes cannot.

Dynamic Database

In Junos OS Release 9.5 and later, you can configure routing policies and certain routing policy objects in a dynamic database that is not subject to the same verification required by the standard configuration database. As a result, you can quickly commit these routing policies and policy objects, which can be referenced and applied in the standard configuration as needed. BGP is the only protocol to which you can apply routing policies that reference policies configured in the dynamic database. After a routing policy based on the dynamic database is configured and committed in the standard configuration, you can quickly make changes to existing routing policies by modifying policy objects in the dynamic database. Because Junos OS does not validate configuration changes to the dynamic database, when you use this feature, you should test and verify all configuration changes before committing them.

Related Documentation

- [Use Case for Inter-domain Policies on page 1](#)
- [Example: Using Routing Policy in an ISP Network on page 5](#)

Example: Using Routing Policy in an ISP Network

This example is a case study in how routing policies might be used in a typical ISP network.

- [Requirements on page 5](#)
- [Overview on page 5](#)
- [Set Commands for All Devices in the Topology on page 6](#)
- [Configuring Device Customer-1 on page 13](#)
- [Configuring Device Customer-2 on page 14](#)
- [Configuring Devices ISP-1 and ISP-2 on page 18](#)
- [Configuring Device ISP-3 on page 23](#)
- [Configuring Device Exchange-2 on page 28](#)
- [Configuring Device Private-Peer-2 on page 30](#)
- [Verification on page 34](#)

Requirements

This example uses the following hardware and software:

- M Series Multiservice Edge Routers, MX Series 3D Universal Edge Routers, T Series Core Routers, or PTX Series Packet Transport Routers.
- Junos OS Release 13.2 or later.



NOTE: This configuration example has been tested using the software release listed and is assumed to work on all later releases.

Overview

In this network example, the ISP's AS number is 64510. The ISP has two transit peers (AS 64514 and AS 64515) to which it connects at an exchange point. The ISP is also connected to two private peers (AS 64513 and AS 64516) with which it exchanges specific customer routes. The ISP has two customers (AS 64511 and AS 64512).

The ISP policies are configured in an outbound direction. That is, the example focuses on the routes that the ISP announces to its peers and customers, and includes the following:

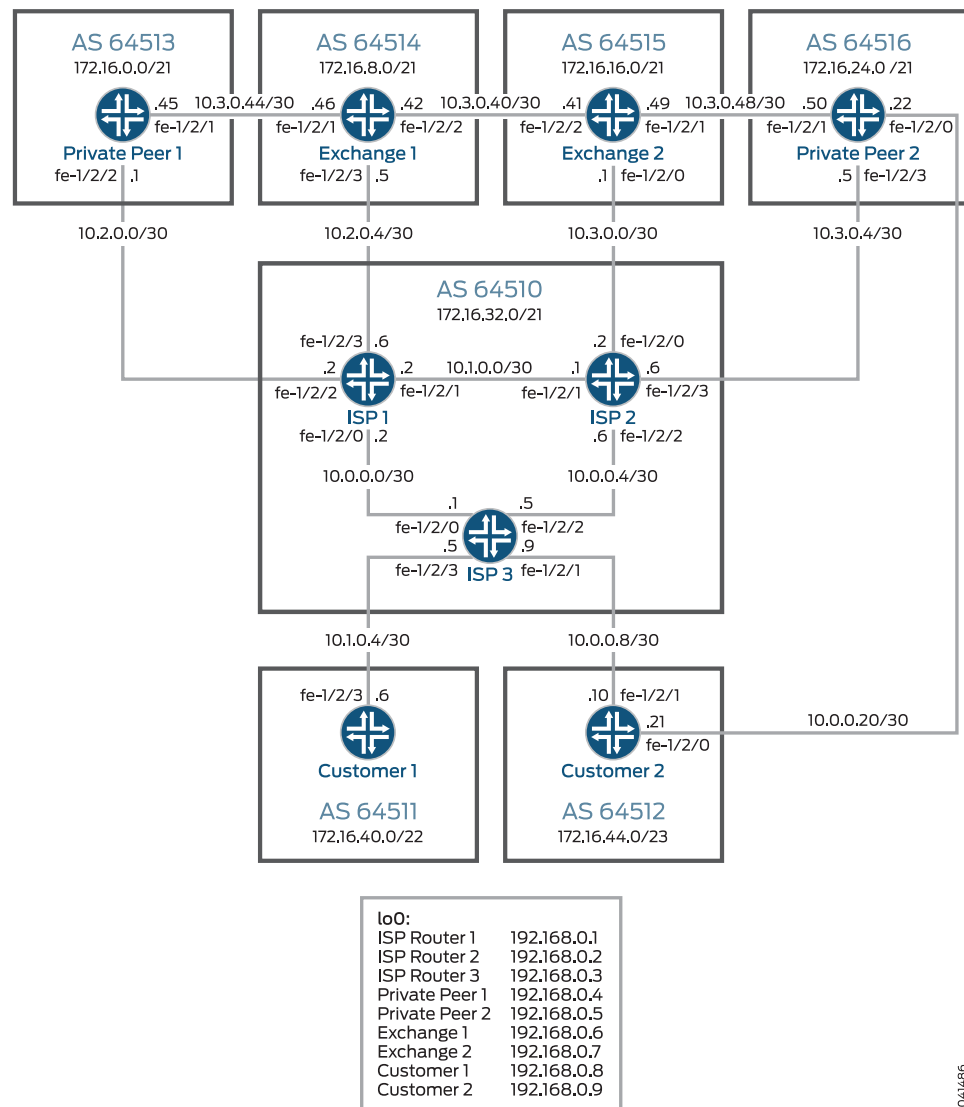
- The ISP has been assigned AS 64510 and the routing space of 172.16.32.0/21. With the exception of the two customer networks, all other customer routes are simulated with static routes.
- The exchange peers are used for transit service to other portions of the Internet. This means that the ISP is accepting all routes (the full Internet routing table) from those BGP peers. To help maintain an optimized Internet routing table, the ISP is configured to advertise only two aggregate routes to the transit peers.

- The ISP administrators want all data to the private peers to use the direct links. As a result, all the customer routes from the ISP are advertised to those private peers. These peers then advertise all their customer routes to the ISP.
- Each customer has a different set of requirements. Customer-1 requires a single default route. Customer-2 requires specific routes.

Topology

Figure 2 on page 6 shows the sample network.

Figure 2: ISP Network Example



Set Commands for All Devices in the Topology

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network

configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device Customer-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
```

Device Customer-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
```

Device 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 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
```

Device 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

```

Device 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 default-route from route-filter
  0.0.0.0/0 exact
set policy-options policy-statement customer-1-peer term default-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

```

	<pre> 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 </pre>
Device Exchange-1	<pre> 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 </pre>
Device Exchange-2	<pre> 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 </pre>
Device Private-Peer-1	<pre> 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 </pre>
Device Private-Peer-2	<pre> 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 </pre>

```
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
```

Configuring Device Customer-1

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

Device Customer-1 has multiple static routes configured to simulate customer routes. These routes are sent to the ISP.

To configure Device Customer-1:

1. Configure the device interfaces.

```
[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. Configure the static routes.

```
[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. Configure the policy to send static routes.

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

4. Configure the external BGP (EBGP) connection to the ISP.

```
[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. Configure the autonomous system (AS) number.

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

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
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;
```

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

Configuring Device Customer-2

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

Device Customer-2 has two static routes configured to simulate customer routes. These routes are sent to the ISP. Customer-2 has a link to the ISP, as well as a link to AS 8000. This customer has requested specific customer routes from the ISP, as well as from AS 64516. Customer-2 wants to use the ISP for transit service to the Internet, and has requested a default route from the ISP.

To configure Device Customer-2:

1. Configure the device interfaces.

[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. Configure the static routes.

```
[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. Configure the import routing policy.

The route with the highest local preference value is preferred. Routes from the ISP are preferred over the same routes from Device Private-Peer-2

```
[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. Configure the export routing policy.

```
[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. Configure the external BGP (EBGP) connection to the ISP and to Device Private-Peer-2.

```
[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. Configure the autonomous system (AS) number.

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

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
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;

```

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

Configuring Devices ISP-1 and ISP-2

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

Device ISP-1 and Device ISP-2 each have two policies configured: The **private-peer** policy and the **exchange-peer** policy. Because of their similar configurations, this example shows the step-by-step configuration only for Device ISP-2.

On Device ISP-2, the private-peer policy sends the ISP customer routes to Device Private-Peer-2. The policy accepts all local static routes (local Device ISP-2 customers) and all BGP routes in the 172.16.32.0/21 range (advertised by other ISP routers). These two policy terms represent the ISP customer routes. The final policy term rejects all other routes, which includes the entire Internet routing table sent by the exchange peers. These routes do not need to be sent to Device Private-Peer-2 for two reasons:

- The peer already maintains a connection to Device Exchange-2 in our example, so the routes are redundant.
- The private peer wants customer routes only. The **private-peer** policy accomplishes this goal. The **exchange-peer** policy sends routes to Device Exchange-2.

In the example, only two routes need to be sent to Device Exchange-2:

- The aggregate route that represents the AS 64510 routing space of 172.16.32.0/21. This route is configured as an aggregate route locally and is advertised by the **exchange-peer** policy.
- The address space assigned to Customer-2, 172.16.44.0/23. This smaller aggregate route needs to be sent to Device Exchange-2 because the customer is also attached to the AS 64516 peer (Device Private-Peer-2).

Sending these two routes to Device Exchange-2 allows other networks in the Internet to reach the customer through either the ISP or the private peer. If just the private peer were to advertise the /23 network while the ISP maintained only its /21 aggregate, all traffic destined for the customer would transit AS 64516 only. Because the customer also wants routes from the ISP, the 172.16.44.0/23 route is announced by Device ISP-2. Like the larger aggregate route, the 172.16.44.0/23 route is configured locally and is advertised by the exchange-peer policy. The final term in that policy rejects all routes, including the specific customer networks of the ISP, the customer routes from Device Private-Peer-1, the customer routes from Device Private-Peer-2, and the routing table from Device Exchange-1. In essence, this final term prevents the ISP from performing transit services for the Internet at large.

To configure Device ISP-2:

1. Configure the device interfaces.

```
[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. Configure the interior gateway protocol (IGP).

```
[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. Configure the static and aggregate routes.

```
[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. Configure the routing policies for the exchange peers.

```
[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. Configure the routing policies for the internal peers.

```
[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. Configure the routing policies for the private peer.

```
[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. Configure the internal BGP (IBGP) connections to the other ISP devices.

```
[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. Configure the EBGP connections to the exchange peer and the private peer.

```
[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. Configure the autonomous system (AS) number and the router ID.

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

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
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;
```

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

Configuring Device ISP-3

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

On Device ISP-3, a separate policy is in place for each customer. The default route for Customer-1 is being sent by the **customer-1-peer** policy. This policy finds the 0.0.0.0/0 default route in inet.0 and accepts it. The policy also rejects all other routes, thereby not sending all BGP routes on the ISP router. The **customer-2-peer** policy is for Customer-2 and contains the same policy terms, which also send the default route and no other transit BGP routes. The additional terms in the **customer-2-peer** policy send the ISP customer routes to Customer-2. Because there are local static routes on Device ISP-3 that represent local customers, these routes are sent as well as all other internal routes announced to the local router by the other ISP routers.

If the upstream route from Device Exchange-1 (172.16.8.0/21) is present, Device ISP-3 generates a default route.

To configure Device ISP-3:

1. Configure the device interfaces.

```
[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. Configure the interior gateway protocol (IGP).

```
[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. Configure the static routes.

```
[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. Configure a routing policy that generates a default static route only if a certain upstream route exists.

```
[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. Configure the routing policy for Customer-1.

```
[edit policy-options policy-statement customer-1-peer]  
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
```

6. Configure the routing policy for 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. Configure the routing policies for the internal peers.

```
[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. Configure the internal BGP (IBGP) connections to the other ISP devices.

```
[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. Configure the EBGP connections to the customer peers.

```
[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. Configure the autonomous system (AS) number and the router ID.

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

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
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 default-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;

```

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

Configuring Device Exchange-2

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

Device Exchange-1 and Device Exchange-2 have similar configurations. This example shows the step-by-step configuration only for Device Exchange-2.

Device Exchange-2 exchanges all BGP routes with all BGP peers. The outbound-routes policy for Device Exchange-2 advertises locally defined static routes using BGP. The exclusion of a final **then reject** term causes the default BGP export policy to take effect, which is to send all BGP routes to all external BGP peers.

To configure Device Exchange-2:

1. Configure the device interfaces.

```
[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. Configure the static routes.

```
[edit routing-options static]
user@Exchange-2# set route 172.16.16.0/21 reject
```

3. Configure a routing policy that generates a default static route only if certain internal routes exist.

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

4. Configure the EBGP connections to the customer peers.

```
[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. Configure the autonomous system (AS) number.

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

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
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;
```

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

Configuring Device Private-Peer-2

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

Device Private-Peer-1 and Device Private-Peer-2 have similar configurations. This example shows the step-by-step configuration only for Device Private-Peer-2.

Device Private-Peer-2 performs two main functions:

- Advertises routes local to AS 64516 to both the exchange peers and the ISP routers. The **outbound-routes** policy advertises the local static routes (that is, customers) on the router, and also advertises all routes learned by BGP that originated in either AS 64516 or AS 64512. These routes include other AS 64516 customer routes in addition to the AS 64512 customer. The AS routes are identified by an AS path regular expression match criteria in the policy.
- Advertises the 0.0.0.0/0 default route to the AS 64512 customer router. To accomplish this, the private peer creates a generated route for 0.0.0.0/0 locally on the router. This generated route is further assigned a policy called **if-upstream-routes-exist**, which allows only certain routes to contribute to the generated route, making it an active route in the routing table. Once the route is active, it can be sent to the AS 64512 router using BGP and the configured policies. The **if-upstream-routes-exist** policy accepts only the 172.16.32.0/21 route from Device Exchange-2, and rejects all other routes. If the 172.16.32.0/21 route is withdrawn by the exchange peer, the private peer loses the 0.0.0.0/0 default route and withdraws the default route from the AS 64512 customer router.

To configure Device Private-Peer-2:

1. Configure the device interfaces.

```
[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. Configure the static routes.

```
[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. Configure a routing policy that generates a default static route only if certain internal routes exist.

```
[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. Configure the routing policy that advertises local static routes and the default route.

```
[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. Configure the routing policy that advertises local customer routes.

```
[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. Configure the EBGP connection to Customer-2.

```
[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. Configure the EBGP connection to Device Exchange-2.

```
[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. Configure the EBGp connections to the ISP.

```
[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. Configure the autonomous system (AS) number.

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

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show protocols**, **show policy-options**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
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;
```

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

Verification

Confirm that the configuration is working properly.

- [Verifying the Routes on Device Customer-1 on page 34](#)
- [Verifying the Routes on Device Customer-2 on page 35](#)
- [Verifying the Routes on Device ISP-1 on page 37](#)
- [Verifying the Routes on Device ISP-2 on page 40](#)
- [Verifying the Routes on Device ISP-3 on page 43](#)
- [Verifying the Routes on Device Exchange-1 on page 45](#)
- [Verifying the Routes on Device Exchange-2 on page 47](#)
- [Verifying the Routes on Device Private-Peer-1 on page 49](#)
- [Verifying the Routes on Device Private-Peer-2 on page 50](#)

Verifying the Routes on Device Customer-1

Purpose On Device Customer-1, check the routes in the routing table.

Action 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
```

Meaning Device Customer-1 has its four static routes, and it has learned the default route through BGP.

Verifying the Routes on Device Customer-2

Purpose On Device Customer-2, check the routes in the routing table.

```

Action 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
```

Meaning Device Customer-2 has learned the default route through its session with the ISP and also through its session with the private peer. The route learned from the ISP is preferred because it has a higher local preference.

Verifying the Routes on Device ISP-1

Purpose On Device ISP-1, check the routes in the routing table.

```

Action 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

```

```

172.16.44.64/26      > to 10.2.0.5 via fe-1/2/3.0
                    *[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
172.16.44.128/26    > to 10.2.0.5 via fe-1/2/3.0
                    *[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
172.16.44.192/26    > to 10.2.0.5 via fe-1/2/3.0
                    *[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
192.168.0.1/32      > to 10.2.0.5 via fe-1/2/3.0
                    *[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

224.0.0.5/32        > to 10.2.0.5 via fe-1/2/3.0
                    *[OSPF/10] 23:52:07, metric 1
                    MultiRecv

```

Verifying the Routes on Device ISP-2

Purpose On Device ISP-2, check the routes in the routing table.

```

Action 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

172.16.44.64/26 > to 10.3.0.1 via fe-1/2/0.0
                *[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

172.16.44.128/26 > to 10.3.0.1 via fe-1/2/0.0
                 *[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

172.16.44.192/26 > to 10.3.0.1 via fe-1/2/0.0
                  *[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

192.168.0.1/32 > to 10.3.0.1 via fe-1/2/0.0
                *[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

224.0.0.5/32   *[OSPF/10] 23:53:25, metric 1
                MultiRecv

```

Verifying the Routes on Device ISP-3

Purpose On Device ISP-3, check the routes in the routing table.

Action 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
224.0.0.5/32     *[OSPF/10] 23:53:58, metric 1
                  MultiRecv

```

Verifying the Routes on Device Exchange-1

Purpose On Device Exchange-1, check the routes in the routing table.

Action 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
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
```

```
172.16.44.128/26    > to 10.3.0.41 via fe-1/2/2.0
                   *[BGP/170] 23:00:24, localpref 100
                   AS path: 64515 64516 64512 I, validation-state: unverified

172.16.44.192/26    > to 10.3.0.41 via fe-1/2/2.0
                   *[BGP/170] 23:00:24, localpref 100
                   AS path: 64515 64516 64512 I, validation-state: unverified

192.168.0.5/32      > to 10.3.0.41 via fe-1/2/2.0
                   *[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
```

Verifying the Routes on Device Exchange-2

Purpose On Device Exchange-2, check the routes in the routing table.

```

Action 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

```

```
172.16.44.128/26    > to 10.3.0.50 via fe-1/2/1.0
                   *[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
```

Meaning On Device Exchange-2, the default route 0/0 is hidden because the next hop for the route is its own interface to Device Private-Peer-2, from which the route was received. The route is hidden to avoid a loop.

Verifying the Routes on Device Private-Peer-1

Purpose On Device Private-Peer-1, check the routes in the routing table.

Action 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
```

Verifying the Routes on Device Private-Peer-2

Purpose On Device Private-Peer-2, check the routes in the routing table.

Action 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
```

```
172.16.40.0/22      > to 10.3.0.6 via fe-1/2/3.0
                    *[BGP/170] 22:51:57, localpref 100
                    AS path: 64515 64514 64510 64511 I, validation-state:
unverified
172.16.44.0/23      > to 10.3.0.49 via fe-1/2/1.0
                    *[BGP/170] 22:46:51, localpref 100
                    AS path: 64515 64510 64512 I, validation-state: unverified
172.16.44.0/26      > to 10.3.0.49 via fe-1/2/1.0
                    *[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
```

Related Documentation

- [Use Case for Inter-domain Policies on page 1](#)
- [Understanding Routing Policies on page 2](#)