

Chapter 3

VPN Examples

The following examples illustrate how to configure BGP route target filtering for VPNs:

BGP Route Target Filtering for VPNs Overview on page 39

BGP Route Target Filtering for VPNs on page 41

BGP Route Target Filtering for VPNs Overview

BGP route target filtering is enabled by configuring the family route-target statement at the appropriate BGP hierarchy level. This statement enables the exchange of a new route-target address family, which is stored in the `bgp.rtarget.0` routing table.

The following configuration illustrates how you could configure BGP route target filtering for a BGP group titled `to_vpn04`:

```
[edit protocols]
bgp {
  group to_vpn04 {
    type internal;
    local-address 10.255.14.182;
    peer-as 200;
    neighbor 10.255.14.174 {
      family inet-vpn {
        unicast;
      }
      family route-target;
    }
  }
}
```

The following configuration illustrates how you could configure a couple of local VRF routing instances to take advantage of the functionality provided by BGP route target filtering. Based on this configuration, BGP would automatically generate local routes corresponding to the route targets referenced in the VRF import policies (note the targets defined by the vrf-target statements).

```
[edit routing-instances]
vpn1 {
  instance-type vrf;
  interface t1-0/1/2.0;
  vrf-target target:200:101;
  protocols {
    ospf {
      export bgp-routes;
      area 0.0.0.0 {
        interface t1-0/1/2.0;
      }
    }
  }
}
vpn2 {
  instance-type vrf;
  interface t1-0/1/2.1;
  vrf-target target:200:102;
  protocols {
    ospf {
      export bgp-routes;
      area 0.0.0.0 {
        interface t1-0/1/2.1;
      }
    }
  }
}
```

Issue the `show route table bgp.rtarget.0 show` command to verify the BGP route target filtering configuration:

```
user@host> show route table bgp.rtarget.0

bgp.rtarget.0: 4 destinations, 6 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

200:200:101/96
    *[RTarget/5] 00:10:00
    Local
200:200:102/96
    *[RTarget/5] 00:10:00
    Local
200:200:103/96
    *[BGP/170] 00:09:48, localpref 100, from 10.255.14.174
    AS path: I
    > t3-0/0/0.0
200:200:104/96
    *[BGP/170] 00:09:48, localpref 100, from 10.255.14.174
    AS path: I
    > t3-0/0/0.0
```

The show command display format for route target prefixes is:

AS number:route target extended community/length

The first number represents the autonomous system of the router that sent this advertisement. The remainder of the display follows the JUNOS “show” command convention for extended communities.

The output from the show route table bgp-rtarget.0 command displays the locally generated and remotely generated routes.

The first two entries correspond to the route targets configured for the two local VRF routing instances (vpn1 and vpn2):

200:200:101/96—Community 200:101 in the vpn1 routing instance

200:200:102/96—Community 200:102 in the vpn2 routing instance

The last two entries are prefixes received from a BGP peer:

200:200:103/96—Tells the local router that routes tagged with this community (200:103) should be advertised to peer 10.255.14.174 through t3-0/0/0.0

200:200:104/96—Tells the local router that routes tagged with this community (200:104) should be advertised to peer 10.255.14.174 through t3-0/0/0.0

BGP Route Target Filtering for VPNs

The following sections describe how to configure BGP route target filtering for a group of VPNs based on the topology illustrated in Figure :

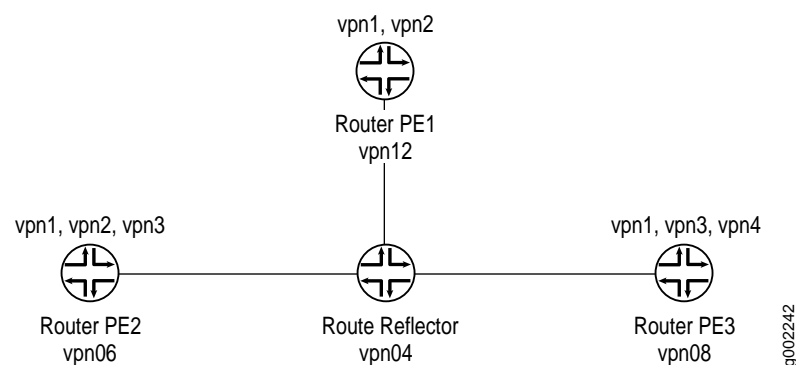
Configure BGP Route Target Filtering on Router PE1 on page 42

Configure BGP Route Target Filtering on Router PE2 on page 44

Configure BGP Route Target Filtering on the Route Reflector on page 47

Configure BGP Route Target Filtering on Router PE3 on page 49

Figure 3: BGP Route Target Filtering Enabled for a Group of VPNs



Configure BGP Route Target Filtering on Router PE1

This section describes how to enable BGP route target filtering on router PE1 for this example.

Configure the routing options on router PE1 as follows:

```
[edit routing-options]
route-distinguisher-id 10.255.14.182;
autonomous-system 200;
```

Configure the BGP protocol on router PE1 as follows:

```
[edit protocols bgp]
group to_VPN_D {
  type internal;
  local-address 10.255.14.182;
  peer-as 200;
  neighbor 10.255.14.174 {
    family inet-vpn {
      unicast;
    }
    family route-target;
  }
}
```

Configure the vpn1 routing instance as follows:

```
[edit routing-instances]
vpn1 {
  instance-type vrf;
  interface t1-0/1/2.0;
  vrf-target target:200:101;
  protocols {
    ospf {
      export bgp-routes;
      area 0.0.0.0 {
        interface t1-0/1/2.0;
      }
    }
  }
}
```

Configure the vpn2 routing instance on router PE1 as follows:

```
[edit routing-instances]
vpn2 {
  instance-type vrf;
  interface t1-0/1/2.1;
  vrf-target target:200:102;
  protocols {
    ospf {
      export bgp-routes;
      area 0.0.0.0 {
        interface t1-0/1/2.1;
      }
    }
  }
}
```

Once you have implemented this configuration, you should see the following when you issue a show route table bgp.rtarget.0 command:

```
user@host> show route table bgp.rtarget.0

bgp.rtarget.0: 4 destinations, 6 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

200:200:101/96
    *[RTarget/5] 00:27:42
    Local
    [BGP/170] 00:27:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/0.0
200:200:102/96
    *[RTarget/5] 00:27:42
    Local
    [BGP/170] 00:27:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/0.0
200:200:103/96
    *[BGP/170] 00:27:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/0.0
200:200:104/96
    *[BGP/170] 00:27:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/0.0
```

Configure BGP Route Target Filtering on Router PE2

This section describes how to enable BGP route target filtering on router PE2 for this example.

Configure the routing options on router PE2 as follows:

```
[edit routing-options]
route-distinguisher-id 10.255.14.176;
autonomous-system 200;
```

Configure the BGP protocol on router PE2 as follows:

```
[edit protocols bgp]
group to_vpn04 {
  type internal;
  local-address 10.255.14.176;
  peer-as 200;
  neighbor 10.255.14.174 {
    family inet-vpn {
      unicast;
    }
    family route-target;
  }
}
```

Configure the vpn1 routing instance on router PE2 as follows:

```
[edit routing-instances]
vpn1 {
  instance-type vrf;
  interface t3-0/0/0.0;
  vrf-target target:200:101;
  protocols {
    bgp {
      group vpn1 {
        type external;
        peer-as 101;
        as-override;
        neighbor 10.49.11.2;
      }
    }
  }
}
```

Configure the vpn2 routing instance on router PE2 as follows:

```
[edit routing-instances]
vpn2 {
  instance-type vrf;
  interface t3-0/0/0.1;
  vrf-target target:200:102;
  protocols {
    bgp {
      group vpn2 {
        type external;
        peer-as 102;
        as-override;
        neighbor 10.49.21.2;
      }
    }
  }
}
```

Configure the vpn3 routing instance on router PE2 as follows:

```
[edit routing-instances]
vpn3 {
  instance-type vrf;
  interface t3-0/0/0.2;
  vrf-import vpn3-import;
  vrf-export vpn3-export;
  protocols {
    bgp {
      group vpn3 {
        type external;
        peer-as 103;
        as-override;
        neighbor 10.49.31.2;
      }
    }
  }
}
```

Once you have configured router PE2 in this manner, you should see the following when you issue the `show route table bgp.rtarget.0` command:

```

user@host> show route table bgp.rtarget.0

bgp.rtarget.0: 4 destinations, 7 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

200:200:101/96
    *[RTarget/5] 00:28:15
    Local
    [BGP/170] 00:28:03, localpref 100, from
10.255.14.174
    AS path: I
    > via t1-0/1/0.0
200:200:102/96
    *[RTarget/5] 00:28:15
    Local
    [BGP/170] 00:28:03, localpref 100, from
10.255.14.174
    AS path: I
    > via t1-0/1/0.0
200:200:103/96
    *[RTarget/5] 00:28:15
    Local
    [BGP/170] 00:28:03, localpref 100, from
10.255.14.174
    AS path: I
    > via t1-0/1/0.0
200:200:104/96
    *[BGP/170] 00:28:03, localpref 100, from
10.255.14.174
    AS path: I
    > via t1-0/1/0.0

```

Configure BGP Route Target Filtering on the Route Reflector

This section illustrates how to enable BGP route target filtering on the route reflector for this example.

Configure the routing options on the route reflector as follows:

```
[edit routing-options]
route-distinguisher-id 10.255.14.174;
autonomous-system 200;
```

Configure the BGP protocol on the route reflector as follows:

```
[edit protocols bgp]
group rr-group {
  type internal;
  local-address 10.255.14.174;
  cluster 10.255.14.174;
  peer-as 200;
  neighbor 10.255.14.182 {
    description to_PE1_vpn12;
    family inet-vpn {
      unicast;
    }
    family route-target;
  }
  neighbor 10.255.14.176 {
    description to_PE2_vpn06;
    family inet-vpn {
      unicast;
    }
    family route-target;
  }
  neighbor 10.255.14.178 {
    description to_PE3_vpn08;
    family inet-vpn {
      unicast;
    }
    family route-target;
  }
}
```

Once you have configured the route reflector in this manner, you should see the following when you issue the `show route table bgp.rtarget.0` command:

```
user@host> show route table bgp.rtarget.0
```

```
bgp.rtarget.0: 4 destinations, 8 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
200:200:101/96
    *[BGP/170] 00:29:03, localpref 100, from
10.255.14.176
    AS path: I
    > via t1-0/2/0.0
    [BGP/170] 00:29:03, localpref 100, from
10.255.14.178
    AS path: I
    > via t3-0/1/1.0
    [BGP/170] 00:29:03, localpref 100, from
10.255.14.182
    AS path: I
    > via t3-0/1/3.0
200:200:102/96
    *[BGP/170] 00:29:03, localpref 100, from
10.255.14.176
    AS path: I
    > via t1-0/2/0.0
    [BGP/170] 00:29:03, localpref 100, from
10.255.14.182
    AS path: I
    > via t3-0/1/3.0
200:200:103/96
    *[BGP/170] 00:29:03, localpref 100, from
10.255.14.176
    AS path: I
    > via t1-0/2/0.0
    [BGP/170] 00:29:03, localpref 100, from
10.255.14.178
    AS path: I
    > via t3-0/1/1.0
200:200:104/96
    *[BGP/170] 00:29:03, localpref 100, from
10.255.14.178
    AS path: I
    > via t3-0/1/1.0
```

Configure BGP Route Target Filtering on Router PE3

The following section describes how to enable BGP route target filtering on router PE3 for this example.

Configure the routing options on router PE3 as follows:

```
[edit routing-options]
route-distinguisher-id 10.255.14.178;
autonomous-system 200;
```

Configure the BGP protocol on router PE3 as follows:

```
[edit protocols bgp]
group to_vpn04 {
  type internal;
  local-address 10.255.14.178;
  peer-as 200;
  neighbor 10.255.14.174 {
    family inet-vpn {
      unicast;
    }
    family route-target;
  }
}
```

Configure the vpn1 routing instance on router PE3 as follows:

```
[edit routing-instances]
vpn1 {
  instance-type vrf;
  interface t3-0/0/0.0;
  vrf-target target:200:101;
  protocols {
    rip {
      group vpn1 {
        export bgp-routes;
        neighbor t3-0/0/0.0;
      }
    }
  }
}
```

Configure the vpn3 routing instance on router PE3 as follows:

```
[edit routing-instances]
vpn3 {
  instance-type vrf;
  interface t3-0/0/0.1;
  vrf-target target:200:103;
  protocols {
    rip {
      group vpn3 {
        export bgp-routes;
        neighbor t3-0/0/0.1;
      }
    }
  }
}
```

Configure the vpn4 routing instance on router PE3 as follows:

```
[edit routing-instances]
vpn4 {
  instance-type vrf;
  interface t3-0/0/0.2;
  vrf-target target:200:104;
  protocols {
    rip {
      group vpn4 {
        export bgp-routes;
        neighbor t3-0/0/0.2;
      }
    }
  }
}
```

Once you have configured the router PE3 in this manner, you should see the following when you issue the `show route table bgp.rtarget.0` command:

```

user@host> show route table bgp.rtarget.0

bgp.rtarget.0: 4 destinations, 7 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

200:200:101/96
    *[RTarget/5] 00:29:42
    Local
    [BGP/170] 00:29:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/1.0
200:200:102/96
    *[BGP/170] 00:29:29, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/1.0
200:200:103/96
    *[RTarget/5] 00:29:42
    Local
    [BGP/170] 00:29:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/1.0
200:200:104/96
    *[RTarget/5] 00:29:42
    Local
    [BGP/170] 00:29:30, localpref 100, from
10.255.14.174
    AS path: I
    > via t3-0/0/1.0

```

