MPLS/VPN met HTTP op het voorbeeld van de klantconfiguratie

Inhoud

Inleiding

Dit document biedt een voorbeeldconfiguratie van een Multiprotocol Label Switching (MPLS) Virtual Private Network (VPN) wanneer DHCP (Enhanced Interior Gateway Routing Protocol) aan de kant van de klant aanwezig is.

Dit document biedt een voorbeeldconfiguratie voor DHCP aan de klantzijde in een MPLS/VPN-omgeving. Deze scenario's zijn gedetailleerd:

- Twee verbinding eindpunten (CEs) die tot de zelfde autonome systemen Ecu behoren.
- Twee CE's die behoren tot verschillende autonome systemen.

Voor beide scenario's wordt u met de configuratie en de verificatiestappen weergegeven. Een steekproef van het routing exchange voor beide betrokken protocollen—Border Gateway Protocol (BGP) en egreneringsgateway-wordt ook verstrekt.

Wanneer gebruikt met MPLS, staat de VPN functie meerdere sites toe om op transparante wijze onderling te verbinden via een serviceprovider-netwerk. Eén serviceprovider-netwerk kan meerdere IP-VPN’s ondersteunen. Elk van deze schijnen aan zijn gebruikers als een privaat netwerk, los van alle andere netwerken. Binnen een VPN kan elke site IP-pakketten naar een andere site in hetzelfde VPN verzenden.

Elk VPN wordt geassocieerd met een of meer VPN Routing/Forwarding instanties (VRF's). Een VRF bestaat uit een IP-routingtabel, een afgeleid Cisco Express Forwarding (CEF)-tabel en een reeks interfaces die deze verzendingstabel gebruiken.

De router onderhoudt een afzonderlijke routing en CEF-tabel voor elke VRF. Dit voorkomt informatie die buiten VPN wordt verzonden en staat toe om zelfde SUBNET in verscheidene VPN's te worden gebruikt zonder dubbele IP adresproblemen te veroorzaken.

De router die Multiprotocol BGP (MP-BGP) gebruikt verspreidt de VPN-routinginformatie met behulp van de uitgebreide MP-BGP-gemeenschappen.

Raadpleeg deze documenten voor meer informatie over de verspreiding van updates via VPN:

- Configuratie MPLS Virtual Private Networks
- Packet Flow in een MPLS VPN-omgeving
- Basis MPLS configureren met OSPF-beperking

Voorwaarden

Vereisten

Er zijn geen specifieke vereisten van toepassing op dit document.

Gebruikte componenten

Dit document is niet beperkt tot specifieke software- en hardware-versies.

De igratie tussen PE en CE in MPLS/VPN milieu optie werd geïntroduceerd in Cisco IOS® softwarereleases 12.0(22)S en 12.2(15)T.

Verwante producten

Deze configuratie kan ook met deze routerserie worden gebruikt:

- Cisco 7200 router
- Cisco 7500 router
- Cisco 10000
- Cisco 10700-software
- Cisco 12000-software
- Cisco 12000 Series hoogwaardige routeprocessor (PRP)

Conventies

Raadpleeg Cisco Technical Tips Conventions (Conventies voor technische tips van Cisco) voor meer informatie over documentconventies.

Achtergrondinformatie

Routes worden geconverteerd naar BGP routes op de de dienstverrichter backbone door de nieuwe Eur-specifieke uitgebreide gemeenschapseigenschappen. De provider edge (PE) router gebruikt BGP om de VPN-routinginformatie te distribueren met behulp van de DHCP-specifieke uitgebreide community-eigenschappen, die aan de BGP-route worden toegevoegd. De BGP-routes worden teruggeconverteerd naar EHRM-routes door de EHW-specifieke uitgebreide gemeenschapseigenschappen wanneer ze de PE-router bereiken die is aangesloten op de bestemmingsprinter (CE) router.

Deze tabel beschrijft de uitgebreide gemeenschapseigenschappen die aan BGP routes worden toegevoegd en gebruikt om informatie te dragen over de backbone van de dienstverlener.

HTTP-kenmerk	Type	Gebruik	Waarde
Algemeen	0x8000	EINDTIJD algemene routeinformatie	Routeslag en -tag
metrisch	0x8001	metrieke informatie en autonoom systeem via EHRM	Autonoom systeem en vertraging
	0x8002	informatie over DHCP-routemetriek	Betrouwbaarheid, volgende hop en bandbreedte
	0x8003	informatie over DHCP-routemetriek	Reserveverplichtingen, lading en maximale transmissieeenheid (MTU)
Extern	0x8004	DHCP-externe routeinformatie	Afstandsbediening van systeem en afstandsbediening-id
	0x8005	DHCP-externe routeinformatie	Remote-protocol en Remote-metriek

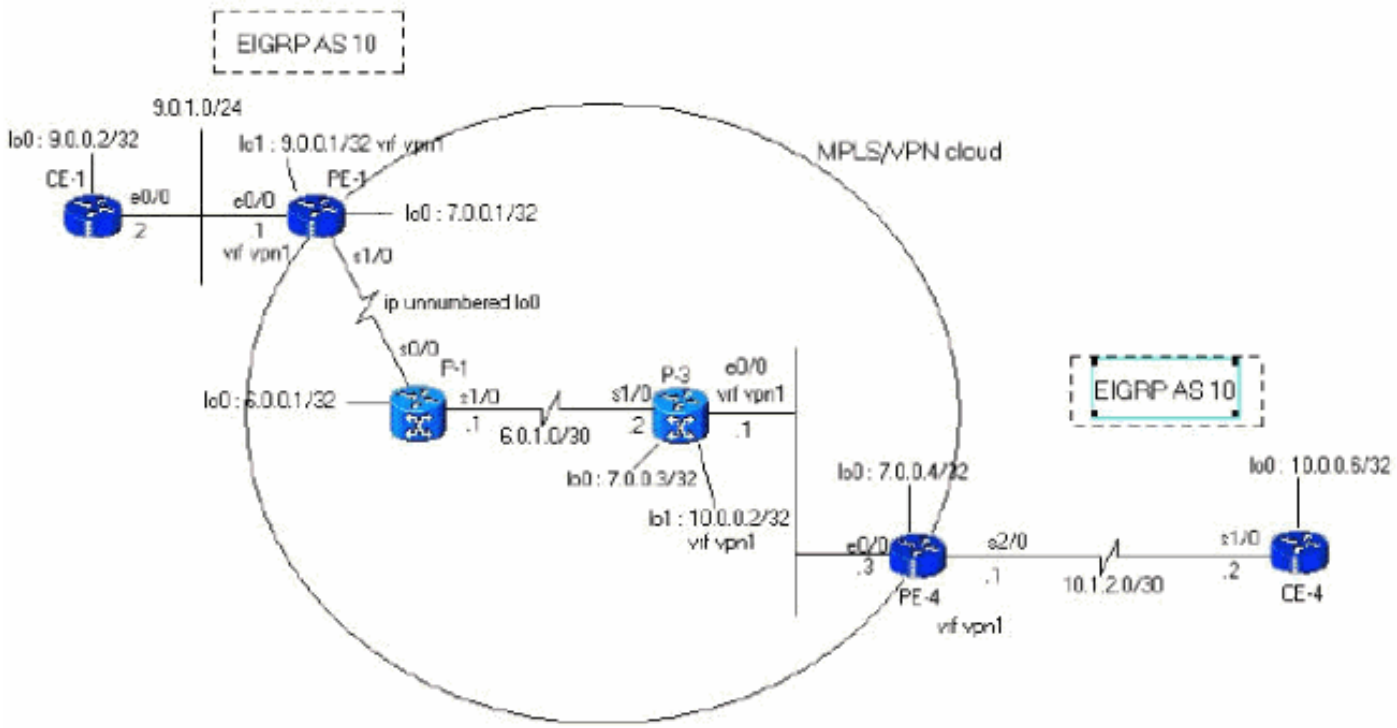
Scenario 1: Configureer een enkel Autonoom RSP-systeem

Deze sectie bevat informatie over het configureren van de functies die in dit document worden beschreven.

Opmerking: Gebruik het Opname Gereedschap (alleen geregistreerde klanten) om meer informatie te verkrijgen over de opdrachten die in deze sectie worden gebruikt.

Netwerkdiagram

In deze sectie wordt deze netwerkinstellingen gebruikt:



Configuraties

In dit gedeelte worden deze configuraties gebruikt:

PE-1

```
PE-1#show run
Building configuration...
ip cef
!--- vpn1 commands. ip vrf vpn1 !--- Enables the VPN
routing and forwarding (VRF) routing table. !--- This
command can be used in global or !--- router
configuration mode. rd 100:1 !--- Route distinguisher
creates routing and forwarding !--- tables for a VRF.
route-target export 100:1 !--- Creates lists of import
and export route-target extended !--- communities for
the specified VRF. route-target import 100:1 ! interface
Loopback0 ip address 7.0.0.1 255.255.255.255 no ip
directed-broadcast ! interface Ethernet0/0 ip vrf
forwarding vpn1 !--- Associates a VRF instance with an
interface or subinterface. ip address 9.0.1.1
255.255.255.0 no ip directed-broadcast ! router eigrp 1
! address-family ipv4 vrf vpn1
!--- To enter address family configuration mode !--- for
configuring EIGRP routing sessions, !--- that use
standard VPN version 4 address prefixes. redistribute
bgp 1
!--- Enables redistribution of bgp into this specific
instance of EIGRP. network 9.0.0.0 default-metric 10000
1 255 1 1500
 no auto-summary
 autonomous-system 10
!--- Defines the autonomous system number for this
specific instance of EIGRP. exit-address-family ! router
bgp 1 no bgp default ipv4-unicast bgp log-neighbor-
changes neighbor 7.0.0.4 remote-as 1 !--- Adds an entry
to the BGP or multiprotocol BGP neighbor table. neighbor
```

```
7.0.0.4 update-source Loopback0 !--- Enables BGP
sessions to use a specific operational !--- interface
for TCP connections. ! address-family vpnv4 !--- To
enter address family configuration mode !--- for
configuring routing sessions, such as BGP, !--- that use
standard VPN version 4 address prefixes. neighbor
7.0.0.4 activate neighbor 7.0.0.4 send-community both !-
-- Sends the community attribute to a BGP neighbor. no
auto-summary exit-address-family ! address-family ipv4
neighbor 7.0.0.4 activate exit-address-family ! address-
family ipv4 vrf vpn1 redistribute eigrp 10
!--- Enables redistribution of EIGRP AS 10 into BGP. no
auto-summary no synchronization exit-address-family !
end
```

PE-4

```
PE-4#show running-config
Building configuration...
Current configuration : 2439 bytes
!
ip cef
ip vrf vpn1
 rd 100:1
 route-target export 100:1
 route-target import 100:1
!
!
interface Loopback0
 ip address 7.0.0.4 255.255.255.255
 no ip directed-broadcast
!
interface Ethernet0/0
 ip address 6.0.2.3 255.255.255.0
 no ip directed-broadcast
 tag-switching ip
!
!
interface Serial2/0
 ip vrf forwarding vpn1
 ip address 10.1.2.1 255.255.255.252
 no ip directed-broadcast
!
router eigrp 1
 !
 address-family ipv4 vrf vpn1
 redistribute bgp 1
 network 10.0.0.0
 default-metric 10000 1 255 1 1500
 no auto-summary
 autonomous-system 10
 exit-address-family
!
 router bgp 1
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 7.0.0.1 remote-as 1
 neighbor 7.0.0.1 update-source Loopback0
 no auto-summary
 !
 address-family vpnv4
 neighbor 7.0.0.1 activate
 neighbor 7.0.0.1 send-community extended
```

```
 no auto-summary
 exit-address-family
 !
 address-family ipv4
 redistribute connected
 neighbor 7.0.0.1 activate
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family ipv4 vrf vpn1
 redistribute eigrp 10
 no auto-summary
 no synchronization
 network 13.0.0.1 mask 255.255.255.255
 exit-address-family
!
end
```

Verifiëren

Om uw configuratie te verifiëren, gebruik een stap-voor-stap benadering en controleer deze punten in orde. Voer de volgende stappen uit:

1. Controleer dat de instantie Ecp op de gewenste interface wordt geconfigureerd—controleer de opdracht **vrf** en de opdracht **eigrp** netwerk onder de juiste adres-familie.In dit voorbeeld wordt VRF vpn1 genoemd.

   ```
   PE-1#show ip vrf vpn1
      Name                              Default RD          Interfaces
      vpn1                              100:1               Ethernet0/0

   PE-1#show ip eigrp vrf vpn1 interfaces
    IP-EIGRP interfaces for process 10
                        Xmit Queue   Mean   Pacing Time   Multicast    Pending
   Interface    Peers  Un/Reliable  SRTT   Un/Reliable   Flow Timer   Routes
   Et0/0            1         0/0    103          0/10         416          0
   PE-1#
   ```

2. Controleer dat de Ecu buurte gevestigd is.In dit voorbeeld kun je zien dat 9.0.1.2 (CE-1) een buurman is.

   ```
   PE-1#show ip eigrp vrf vpn1 neighbors
    IP-EIGRP neighbors for process 10
   H   Address            Interface      Hold Uptime   SRTT   RTO  Q  Seq Type
                                         (sec)         (ms)       Cnt Num
   0   9.0.1.2            Et0/0            13 00:30:19  103   618  0  9
      PE-1#
   ```

3. Verifieer dat de topologietabel Eur de lokale subnetten bevat die door middel van DHCP (9.0.0.2/32) worden geleerd.

   In dit voorbeeld, kunt u zien dat de topologietabel Eur ook subnetten bevat die over de backbone MPLS/VPN (10.1.2.0/30) worden geleerd.De subnetten worden weergegeven zoals geleerd via Redistribueren en hebben een gerapporteerde afstand van 0.

   ```
   PE-1#show ip eigrp vrf vpn1 topology
    IP-EIGRP Topology Table for AS(10)/ID(9.0.0.1) Routing Table: vpn1
   Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
          r - Reply status
   P 10.1.3.0/24, 1 successors, FD is 2195456
            via Redistributed (2195456/0)
   P 9.0.1.0/24, 1 successors, FD is 281600
   ```

```
         via Connected, Ethernet0/0
P 9.0.0.1/32, 1 successors, FD is 128256
         via Connected, Loopback1
P 10.1.2.0/30, 1 successors, FD is 2169856
         via Redistributed (2169856/0)
P 9.1.0.2/32, 1 successors, FD is 45867776
         via 9.0.1.2 (45867776/45842176), Ethernet0/0
P 9.0.0.2/32, 1 successors, FD is 409600
         via 9.0.1.2 (409600/128256), Ethernet0/0
P 10.0.0.6/32, 1 successors, FD is 2297856
         via Redistributed (2297856/0)
P 13.0.0.1/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
PE-1#
```

4. Als er subnetten ontbreken, controleer of ze in de BGP-tabel staan met deze show opdrachten voor één specifieke VRF.Als de herverdeling tussen BGP en EIRGP niet correct is ingesteld, kunt u het net in één tabel zien en niet in het andere.

```
PE-1#show ip bgp vpnv4 vrf vpn1
BGP table version is 45, local router ID is 7.0.0.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 100:1 (default for vrf vpn1)
*> 9.0.0.1/32       0.0.0.0                  0         32768 ?
*> 9.0.0.2/32       9.0.1.2             409600         32768 ?
*> 9.0.1.0/24       0.0.0.0                  0         32768 ?
*> 9.1.0.2/32       9.0.1.2           45867776         32768 ?
*>i10.0.0.6/32      7.0.0.4            2297856    100      0 ?
*>i10.1.2.0/30      7.0.0.4                  0    100      0 ?
*>i10.1.3.0/24      7.0.0.4            2195456    100      0 ?
*>i13.0.0.1/32      7.0.0.4                  0    100      0 i
PE-1#

PE-1#show ip bgp vpnv4 vrf vpn1 9.0.0.1 255.255.255.255
BGP routing table entry for 100:1:9.0.0.1/32, version 12
Paths: (1 available, best #1, table vpn1)
  Advertised to update-groups:
     1
          Local
    0.0.0.0 (via vpn1) from 0.0.0.0 (7.0.0.1)
      Origin incomplete, metric 0, localpref 100, weight 32768,
valid, sourced, best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:10:128000
 0x8802:65280:256 0x8803:65281:1514
PE-1#

PE-1# show ip bgp vpnv4 vrf vpn1 10.1.2.0 255.255.255.252
BGP routing table entry for 100:1:10.1.2.0/30, version 40
Paths: (1 available, best #1, table vpn1)
  Not advertised to any peer
  Local
    7.0.0.4 (metric 139) from 7.0.0.4 (7.0.0.4)
      Origin incomplete, metric 0, localpref 100, valid, internal,
 best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:10:512000
 0x8802:65280:1657856 0x8803:65281:1500
```

Dezelfde **show** opdrachten moeten op de externe PE worden gebruikt.In dit voorbeeld is PE-4 op afstand:

```
PE-4#show ip eigrp vrf vpn1 interfaces
 IP-EIGRP interfaces for process 10
```

```
                    Xmit Queue   Mean   Pacing Time   Multicast    Pending
Interface    Peers  Un/Reliable  SRTT   Un/Reliable   Flow Timer   Routes
Se1/0            0        0/0         0       0/10           0           0
Se2/0            1        0/0       100       0/15         415           0

PE-4#show ip eigrp vrf vpn1 neighbors
 IP-EIGRP neighbors for process 10
H   Address            Interface      Hold Uptime   SRTT   RTO  Q  Seq Type
                                      (sec)         (ms)       Cnt Num
0   10.1.2.2           Se2/0            10 00:18:57  100   600  0  2

PE-4#show ip eigrp vrf vpn1 topology
 IP-EIGRP Topology Table for AS(10)/ID(13.0.0.1) Routing Table: vpn1
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status
P 10.1.3.0/24, 1 successors, FD is 2195456
         via 10.1.2.2 (2195456/281600), Serial2/0
P 9.0.0.1/32, 1 successors, FD is 128256
         via Redistributed (128256/0)
P 9.0.1.0/24, 1 successors, FD is 281600
         via Redistributed (281600/0)
P 10.1.2.0/30, 1 successors, FD is 2169856
         via Connected, Serial2/0
P 9.1.0.2/32, 1 successors, FD is 45867776
         via Redistributed (45867776/0)
P 9.0.0.2/32, 1 successors, FD is 409600
         via Redistributed (409600/0)
P 10.0.0.6/32, 1 successors, FD is 2297856
         via 10.1.2.2 (2297856/128256), Serial2/0
P 13.0.0.1/32, 1 successors, FD is 256256
         via Redistributed (256256/0)

PE-4#show ip bgp vpnv4 vrf vpn1
 BGP table version is 61, local router ID is 7.0.0.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 100:1 (default for vrf vpn1)
*>i9.0.0.1/32       7.0.0.1                  0    100      0 ?
*>i9.0.0.2/32       7.0.0.1             409600    100      0 ?
*>i9.0.1.0/24       7.0.0.1                  0    100      0 ?
*>i9.1.0.2/32       7.0.0.1           45867776    100      0 ?
*> 10.0.0.6/32      10.1.2.2           2297856         32768 ?
*> 10.1.2.0/30      0.0.0.0                  0         32768 ?
*> 10.1.3.0/24      10.1.2.2           2195456         32768 ?
*> 13.0.0.1/32      0.0.0.0                  0         32768 i

PE-4#show ip bgp vpnv4 vrf vpn1 9.0.0.1 255.255.255.255
BGP routing table entry for 100:1:9.0.0.1/32, version 45
Paths: (1 available, best #1, table vpn1)
  Not advertised to any peer
  Local
    7.0.0.1 (metric 139) from 7.0.0.1 (7.0.0.1)
      Origin incomplete, metric 0, localpref 100, valid, internal,
 best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:10:128000
 0x8802:65280:
256 0x8803:65281:1514

PE-4#show ip bgp vpnv4 vrf vpn1 10.1.2.0 255.255.255.252
BGP routing table entry for 100:1:10.1.2.0/30, version 56
Paths: (1 available, best #1, table vpn1)
  Advertised to update-groups:
```

```
     1
           Local
    0.0.0.0 (via vpn1) from 0.0.0.0 (7.0.0.4)
      Origin incomplete, metric 0, localpref 100, weight 32768,
valid, sourced,
 best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:10:512000
 0x8802:65280:
1657856 0x8803:65281:1500

PE-4#
CE-1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
Gateway of last resort is not set
     9.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C       9.0.1.0/24 is directly connected, Ethernet0/0
D       9.0.0.1/32 [90/409600] via 9.0.1.1, 1d02h, Ethernet0/0
C       9.1.0.2/32 is directly connected, Loopback1
C       9.0.0.2/32 is directly connected, Loopback0
     10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
D       10.1.3.0/24 [90/2221056] via 9.0.1.1, 1d02h, Ethernet0/0
D       10.1.2.0/30 [90/2195456] via 9.0.1.1, 1d02h, Ethernet0/0
D       10.0.0.6/32 [90/2323456] via 9.0.1.1, 1d02h, Ethernet0/0
     13.0.0.0/32 is subnetted, 1 subnets
D EX    13.0.0.1 [170/281856] via 9.0.1.1, 1d02h, Ethernet0/0
```

Probleemoplossing

In dit deel wordt informatie verstrekt over de eigrp query die door de PE wordt ontvangen en de corresponderende BGP update die door de MPLS/VPN-cloud wordt verstuurd. Dit wordt gedaan voor het net 10.0.0.6/32 dat direct op de router CE-4 in de rechterhand van het diagram wordt aangesloten. Een 'dicht' en 'nee dicht' uitgevoerd op de loopback interface op CE-4 samen met de juiste debug opdracht helpt u om de tijgers te begrijpen.

Doorgifte bijwerken in één enkel autonoom systeem

Deze **debug** opdrachten worden gebruikt om subster 10.0.0.6/32 (loopback adres van CE-4) updates te volgen:

- **debug eigrp fsm**
- **debug eigrp-pakketten vraag om update**
- **debug ip eigrp 10.0.0.6 255.255.255.255**
- **deken ip bgp vpnv4**
- **ip bgp-update debug**

Dit voorbeeld toont een ingang Ecu teruggetrokken nadat een **gesloten** opdracht op de loopback0 interface op CE-4 wordt uitgevoerd:

```
PE-4
*Apr 30 08:36:59.913: DUAL: dual_rcvquery():10.0.0.6/32 via 10.1.2.2
metric 4294967295/4294967295, RD is 2297856
*Apr 30 08:36:59.913: DUAL: Find FS for dest 10.0.0.6/32. FD is 2297856,
```

```
RD is 2297856
*Apr 30 08:36:59.913: DUAL:     10.1.2.2 metric 4294967295/4294967295 not
 found Dmin is 4294967295
*Apr 30 08:36:59.913: DUAL: Dest 10.0.0.6/32 (Split Horizon) not entering
 active state.
*Apr 30 08:36:59.913: DUAL: Send reply about 10.0.0.6/32 to 10.1.2.2
*Apr 30 08:36:59.965: vpn: bgp_router, vpn ipv4 redistQ len = 1
*Apr 30 08:36:59.965: BGP(2): route 100:1:10.0.0.6/32 down
*Apr 30 08:36:59.965: BGP(2): no valid path for 100:1:10.0.0.6/32
*Apr 30 08:36:59.965: BGP(2): nettable_walker 100:1:10.0.0.6/32 no best path
*Apr 30 08:37:00.085: DUAL: Removing dest 10.0.0.6/32, nexthop 10.1.2.2
*Apr 30 08:37:00.085: DUAL: No routes.  Flushing dest 10.0.0.6/32
*Apr 30 08:37:00.961: vpn: bgp_router, vpn ipv4 redistQ len = 1
*Apr 30 08:37:00.961: BGP(2): route 100:1:10.0.0.6/32 down
*Apr 30 08:37:01.993: BGP(2): 7.0.0.1 computing updates, afi 2, neighbor
version 73, table version 74, starting at 0.0.0.0
*Apr 30 08:37:01.993: BGP(2): 7.0.0.1 send unreachable 100:1:10.0.0.6/32
*Apr 30 08:37:01.993: BGP(2): 7.0.0.1 send UPDATE 100:1:10.0.0.6/32 --
unreachable
*Apr 30 08:37:01.993: BGP(2): 1 updates (average = 45, maximum = 45)
*Apr 30 08:37:01.993: BGP(2): 7.0.0.1 updates replicated for neighbors:
*Apr 30 08:37:01.993: BGP(2): 7.0.0.1 update run completed, afi 2, ran for
 0ms, neighbor version 74, start version 74, throttled to 74
*Apr 30 08:37:05.925: BGP: Import walker start version 73, end version
74*Apr 30 08:37:05.925: BGP: ... start import cfg version = 0

PE-1
*Apr 30 08:35:04.069: BGP(2): 7.0.0.4 rcv UPDATE about 100:1:10.0.0.6/32
 -- withdrawn
*Apr 30 08:35:04.069: BGP: Withdraw path from 7.0.0.4
*Apr 30 08:35:04.069: BGP(2): no valid path for 100:1:10.0.0.6/32
*Apr 30 08:35:04.089: BGP(2): nettable_walker 100:1:10.0.0.6/32 no best path
*Apr 30 08:35:04.109: DUAL: dual_rcvupdate(): 10.0.0.6/32 via Redistributed
metric 4294967295/4294967295
*Apr 30 08:35:04.109: DUAL: Find FS for dest 10.0.0.6/32. FD is 2297856,
 RD is 2297856
*Apr 30 08:35:04.109: DUAL:     0.0.0.0 metric 4294967295/4294967295 not
 found Dmin is 4294967295
*Apr 30 08:35:04.109: DUAL: Dest 10.0.0.6/32 entering active state.
*Apr 30 08:35:04.109: DUAL: Set reply-status table. Count is 1.
*Apr 30 08:35:04.109: DUAL: Not doing split horizon
*Apr 30 08:35:04.137: EIGRP: Enqueueing QUERY on Ethernet0/0 iidbQ un/rely
 0/1 serno 35-35
*Apr 30 08:35:04.169: EIGRP: Sending QUERY on Ethernet0/0
*Apr 30 08:35:04.169:   AS 10, Flags 0x0, Seq 17/0 idbQ 0/0 iidbQ un/rely
 0/0 serno 35-35
*Apr 30 08:35:04.349: EIGRP: Received REPLY on Ethernet0/0 nbr 9.0.1.2
*Apr 30 08:35:04.349:   AS 10, Flags 0x0, Seq 16/17 idbQ 0/0 iidbQ un/rely
 0/0 peerQ un/rely 0/0
*Apr 30 08:35:04.349: DUAL: dest(10.0.0.6/32) active
*Apr 30 08:35:04.349: DUAL: dual_rcvreply(): 10.0.0.6/32 via 9.0.1.2 metric
 4294967295/4294967295
*Apr 30 08:35:04.349: DUAL: Count is 1*Apr 30 08:35:04.349: DUAL: Clearing
 handle 0, count is now 0
*Apr 30 08:35:04.349: DUAL: Freeing reply status table
*Apr 30 08:35:04.349: DUAL: Find FS for dest 10.0.0.6/32. FD is 4294967295,
 RD is 4294967295 found
*Apr 30 08:35:04.349: DUAL: Removing dest 10.0.0.6/32, nexthop 0.0.0.0
*Apr 30 08:35:04.349: DUAL: Removing dest 10.0.0.6/32, nexthop 9.0.1.2
*Apr 30 08:35:04.349: DUAL: No routes.  Flushing dest 10.0.0.6/32

PE-1#
CE-1
*Apr 30 08:26:30.813: EIGRP: Received QUERY on Ethernet0/0 nbr 9.0.1.1
```

```
*Apr 30 08:26:30.813:   AS 10, Flags 0x0, Seq 13/0 idbQ 0/0 iidbQ un/rely
 0/0 peerQ un/rely 0/0
*Apr 30 08:26:30.813: DUAL: dual_rcvquery():10.0.0.6/32 via 9.0.1.1 metric
 4294967295/4294967295, RD is 2323456
*Apr 30 08:26:30.813: DUAL: Find FS for dest 10.0.0.6/32. FD is 2323456,
 RD is 2323456
*Apr 30 08:26:30.813: DUAL:     9.0.1.1 metric 4294967295/4294967295 not
 found Dmin is 4294967295
*Apr 30 08:26:30.813: DUAL: Dest 10.0.0.6/32 (Split Horizon) not entering
 active state.
*Apr 30 08:26:30.813: DUAL: Send reply about 10.0.0.6/32 to 9.0.1.1
*Apr 30 08:26:30.849: EIGRP: Enqueueing REPLY on Ethernet0/0 nbr 9.0.1.1
iidbQ un/rely 0/1 peerQ un/rely 0/0 serno 31-31
*Apr 30 08:26:30.877: EIGRP: Sending REPLY on Ethernet0/0 nbr 9.0.1.1
*Apr 30 08:26:30.877:   AS 10, Flags 0x0, Seq 12/13 idbQ 0/0 iidbQ un/rely
 0/0 peerQ un/rely 0/1 serno 31-31
*Apr 30 08:26:30.989: DUAL: Removing dest 10.0.0.6/32, nexthop 9.0.1.1
*Apr 30 08:26:30.989: DUAL: No routes.  Flushing dest 10.0.0.6/32
```

Dit voorbeeld toont de creatie van een binnenkomst Ecu nadat een geen dichte opdracht op de loopback0 interface op CE-4 wordt uitgevoerd:

```
PE-4
*Apr 30 08:38:53.685: DUAL: dest(10.0.0.6/32) not active
*Apr 30 08:38:53.685: DUAL: dual_rcvupdate(): 10.0.0.6/32 via 10.1.2.2
 metric 2297856/128256
*Apr 30 08:38:53.685: DUAL: Find FS for dest 10.0.0.6/32. FD is 4294967295,
 RD is 4294967295 found
*Apr 30 08:38:53.685: vpn: tag_vpn_find_route_tags: 100:1:10.0.0.6
*Apr 30 08:38:53.685: DUAL: RT installed 10.0.0.6/32 via 10.1.2.2
*Apr 30 08:38:53.685: DUAL: Send update about 10.0.0.6/32.  Reason: metric chg
*Apr 30 08:38:53.685: DUAL: Send update about 10.0.0.6/32.  Reason: new if
*Apr 30 08:38:53.745: vpn: bgp_router, vpn ipv4 redistQ len = 1
*Apr 30 08:38:53.745: BGP(2): route 100:1:10.0.0.6/32 up
*Apr 30 08:38:53.745: vpn: bgp allocate label: route_tag_change for
vpn1:10.0.0.6/255.255.255.255
*Apr 30 08:38:53.745: vpn: tag_vpn_find_route_tags: 100:1:10.0.0.6
*Apr 30 08:38:53.745: vpn: intag=21, outtag=unknown, outtag owner=BGP
*Apr 30 08:38:53.745: BGP(2): nettable_walker 100:1:10.0.0.6/32 route
sourced locally
*Apr 30 08:38:55.813: BGP(2): 7.0.0.1 computing updates, afi 2, neighbor
 version 77, table version 78, starting at 0.0.0.0
*Apr 30 08:38:55.813: BGP(2): 7.0.0.1 send UPDATE (format) 100:1:10.0.0.6/32,
 next 7.0.0.4, metric 2297856, path , extended community RT:100:1 0x8800:32768:0
 0x8801:10:640000 0x8802:65281:1657856 0x8803:65281:1500
*Apr 30 08:38:55.813: BGP(2): 1 updates (average = 123, maximum = 123)
*Apr 30 08:38:55.813: BGP(2): 7.0.0.1 updates replicated for neighbors:
*Apr 30 08:38:55.813: BGP(2): 7.0.0.1 update run completed, afi 2, ran
for 0ms, neighbor version 78, start version 78, throttled to 78
*Apr 30 08:39:07.053: BGP: Import walker start version 77, end version 78
*Apr 30 08:39:07.053: BGP: ... start import cfg version = 0
*Apr 30 08:39:07.053: vpn: vpn1 same RD import, do best path
*Apr 30 08:39:07.053: vpn: bgp allocate label: route_tag_change for
vpn1:10.0.0.6/255.255.255.255
*Apr 30 08:39:07.053: vpn: tag_vpn_find_route_tags: 100:1:10.0.0.6
*Apr 30 08:39:07.053: vpn: intag=21, outtag=unknown, outtag owner=BGP
*Apr 30 08:39:07.305: BGP(2): nettable_walker 100:1:10.0.0.6/32 route
sourced locally
*Apr 30 08:39:09.413: BGP(2): 7.0.0.1 computing updates, afi 2, neighbor
 version 78, table version 79, starting at 0.0.0.0
*Apr 30 08:39:09.413: BGP(2): 7.0.0.1 send UPDATE (format) 100:1:10.0.0.6/32,
```

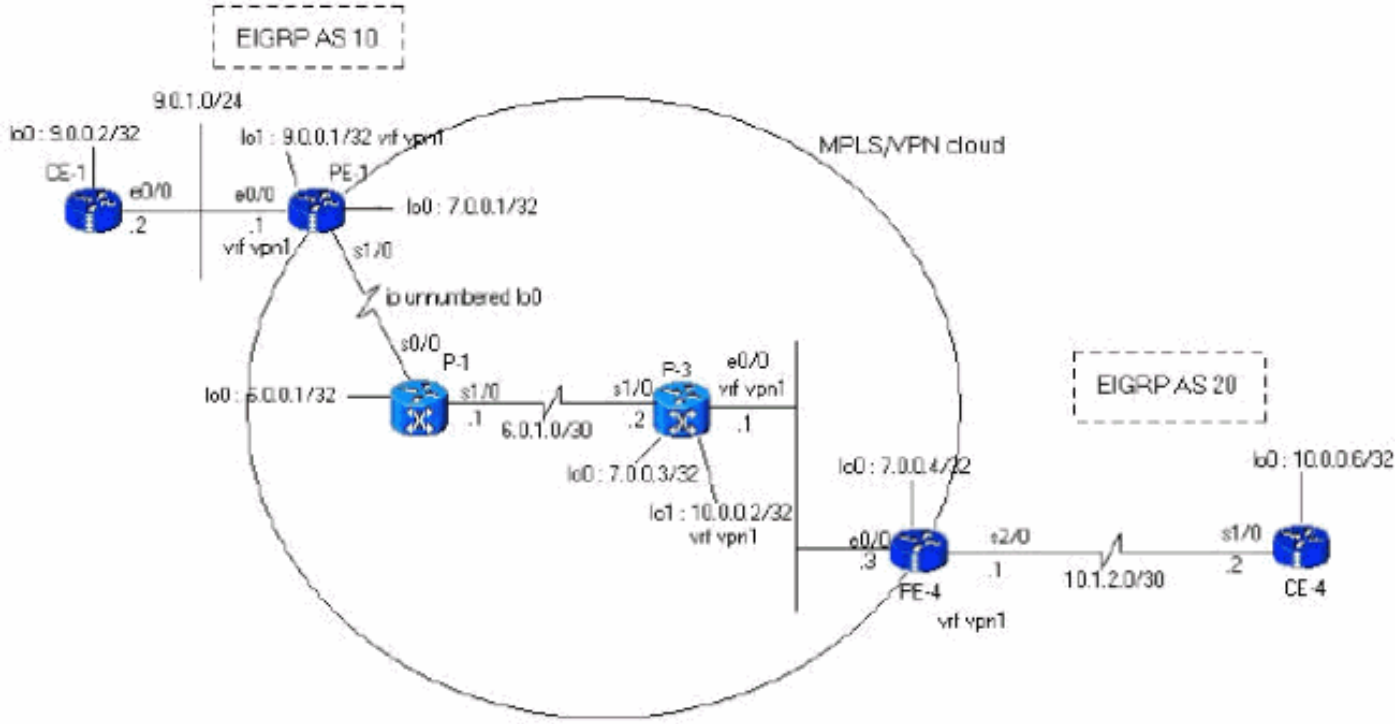
```
 next 7.0.0.4, metric 2297856, path , extended community RT:100:1 0x8800:32768:0
 0x8801:10:640000 0x8802:65281:1657856 0x8803:65281:1500
*Apr 30 08:39:09.413: BGP(2): 1 updates (average = 123, maximum = 123)
*Apr 30 08:39:09.413: BGP(2): 7.0.0.1 updates replicated for neighbors:
*Apr 30 08:39:09.413: BGP(2): 7.0.0.1 update run completed, afi 2, ran for
0ms, neighbor version 79, start version 79, throttled to 79

PE-1
*Apr 30 08:35:36.409: BGP: 7.0.0.3 multihop open delayed 15100ms (no route)
*Apr 30 08:35:37.981: BGP: Incoming path from 7.0.0.4
*Apr 30 08:35:37.981: BGP(2): 7.0.0.4 rcvd UPDATE w/ attr: nexthop 7.0.0.4,
 origin ?, localpref 100, metric 2297856, extended community RT:100:1
0x8800:32768:0 0x8801:10:640000 0x8802:65281:1657856 0x8803:65281:1500
*Apr 30 08:35:37.981: BGP(2): 7.0.0.4 rcvd 100:1:10.0.0.6/32
*Apr 30 08:35:37.981: vpn: bgp_vpnv4_bnetinit: 100:1:10.0.0.6/32
*Apr 30 08:35:37.981: BGP: Accepted path from 7.0.0.4
*Apr 30 08:35:38.001: BGP(2): nettable_walker 100:1:10.0.0.6/32 no RIB
*Apr 30 08:35:38.189: BGP(2): 7.0.0.4 computing updates, afi 2, neighbor
 version 55, table version 56, starting at 0.0.0.0
*Apr 30 08:35:38.189: BGP(2): 7.0.0.4 update run completed, afi 2,
ran for 0ms, neighbor version 56, start version 56, throttled to 56
*Apr 30 08:35:39.081: BGP: 7.0.0.2 multihop open delayed 16412ms (no route)
*Apr 30 08:35:50.437: BGP: Import walker start version 55, end version 56
*Apr 30 08:35:50.437: BGP: ... start import cfg version = 0
*Apr 30 08:35:50.437: vpn: vpn1 same RD import, do best path
*Apr 30 08:35:50.869: BGP(2): Revise route installing 1 of 1 route
for10.0.0.6/32 -> 7.0.0.4(main) to vpn1 IP table
*Apr 30 08:35:50.889: DUAL: dest(10.0.0.6/32) not active
*Apr 30 08:35:50.889: DUAL: dual_rcvupdate(): 10.0.0.6/32 via Redistributed
 metric 2297856/0
*Apr 30 08:35:50.889: DUAL: Find FS for dest 10.0.0.6/32. FD is 4294967295,
 RD is 4294967295 found
*Apr 30 08:35:50.889: DUAL: RT installed 10.0.0.6/32 via 0.0.0.0
*Apr 30 08:35:50.889: DUAL: Send update about 10.0.0.6/32.  Reason:
metric chg
*Apr 30 08:35:50.889: DUAL: Send update about 10.0.0.6/32.  Reason:
new if
*Apr 30 08:35:50.929: EIGRP: Enqueueing UPDATE on Ethernet0/0 iidbQ
un/rely 0/1 serno 36-36
*Apr 30 08:35:50.957: EIGRP: Sending UPDATE on Ethernet0/0
*Apr 30 08:35:50.957:   AS 10, Flags 0x0, Seq 18/0 idbQ 0/0 iidbQ un/rely
 0/0 serno 36-36
*Apr 30 08:35:51.149: EIGRP: Received UPDATE on Ethernet0/0 nbr 9.0.1.2
*Apr 30 08:35:51.149:   AS 10, Flags 0x0, Seq 17/0 idbQ 0/0 iidbQ un/rely
 0/0 peerQ un/rely 0/0
*Apr 30 08:35:51.417: vpn: tag_vpn_find_route_tags: 100:1:10.0.0.6
*Apr 30 08:35:51.417: vpn: intag=vpn-route, outtag=20, outtag owner=BGPCE-1
*Apr 30 08:28:17.669: EIGRP: Received UPDATE on Ethernet0/0 nbr 9.0.1.1
*Apr 30 08:28:17.669:   AS 10, Flags 0x0, Seq 14/0 idbQ 0/0 iidbQ un/rely
 0/0 peerQ un/rely 0/0
*Apr 30 08:28:17.669: DUAL: dest(10.0.0.6/32) not active
*Apr 30 08:28:17.669: DUAL: dual_rcvupdate(): 10.0.0.6/32 via 9.0.1.1
metric 2323456/2297856
*Apr 30 08:28:17.669: DUAL: Find FS for dest 10.0.0.6/32. FD is 4294967295,
 RD is 4294967295 found
*Apr 30 08:28:17.669: DUAL: RT installed 10.0.0.6/32 via 9.0.1.1
*Apr 30 08:28:17.669: DUAL: Send update about 10.0.0.6/32.  Reason:
 metric chg
*Apr 30 08:28:17.669: DUAL: Send update about 10.0.0.6/32.  Reason:
 new if
*Apr 30 08:28:17.709: EIGRP: Enqueueing UPDATE on Ethernet0/0 iidbQ
un/rely 0/1 serno 32-32
*Apr 30 08:28:17.737: EIGRP: Sending UPDATE on Ethernet0/0
*Apr 30 08:28:17.737:   AS 10, Flags 0x0, Seq 13/0 idbQ 0/0 iidbQ un/rely
```

```
0/0 serno 32-32
```

Scenario 2: Een meervoudig EHRM Autonoom Systeem configureren

Netwerkdiagram

In deze sectie wordt deze netwerkinstellingen gebruikt:



Configuraties

In dit gedeelte worden deze configuraties gebruikt:

PE-1

```
PE-1#show run
Building configuration...
ip cef
ip vrf vpn1
 rd 100:1
 route-target export 100:1
 route-target import 100:1
!
interface Loopback0
 ip address 7.0.0.1 255.255.255.255
 no ip directed-broadcast
!
interface Ethernet0/0
 ip vrf forwarding vpn1
 ip address 9.0.1.1 255.255.255.0
 no ip directed-broadcast
!
router eigrp 1
 !
 address-family ipv4 vrf vpn1
```

```
 redistribute bgp 1
 network 9.0.0.0
 default-metric 10000 1 255 1 1500
 no auto-summary
 autonomous-system 10
 exit-address-family
!
router bgp 1
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 7.0.0.4 remote-as 1
 neighbor 7.0.0.4 update-source Loopback0
!
 address-family vpnv4
 neighbor 7.0.0.4 activate
 neighbor 7.0.0.4 send-community both
 no auto-summary exit-address-family
!
 address-family ipv4
 neighbor 7.0.0.4 activate
 exit-address-family
!
 address-family ipv4 vrf vpn1
 redistribute eigrp 10
 no auto-summary
 no synchronization
 exit-address-family
!
end
```

PE-4

```
PE-4#show running-config
Building configuration...
Current configuration : 2439 bytes
!
ip cef
ip vrf vpn1
 rd 100:1
 route-target export 100:1
 route-target import 100:1
!
!
interface Loopback0
 ip address 7.0.0.4 255.255.255.255
 no ip directed-broadcast
!
interface Ethernet0/0
 ip address 6.0.2.3 255.255.255.0
 no ip directed-broadcast
 tag-switching ip
!
!
interface Serial2/0
 ip vrf forwarding vpn1
 ip address 10.1.2.1 255.255.255.252
 no ip directed-broadcast
!
router eigrp 1
 !
 address-family
 ipv4 vrf vpn1
 redistribute bgp 1
```

```
 network 10.0.0.0
 default-metric 10000 1 255 1 1500
 no auto-summary
 autonomous-system 20
!--- The autonomous system is different from Scenario 1.
exit-address-family ! router bgp 1 no bgp default ipv4-
unicast bgp log-neighbor-changes neighbor 7.0.0.1
remote-as 1 neighbor 7.0.0.1 update-source Loopback0 no
auto-summary ! address-family vpnv4 neighbor 7.0.0.1
activate neighbor 7.0.0.1 send-community extended no
auto-summary exit-address-family ! address-family ipv4
redistribute connected neighbor 7.0.0.1 activate no
auto-summary no synchronization exit-address-family !
address-family ipv4 vrf vpn1 redistribute eigrp 20
!--- The autonomous system is different from Scenario 1.
no auto-summary no synchronization network 13.0.0.1 mask
255.255.255.255 exit-address-family ! end
```

Verifiëren

Gebruik deze opdrachten om de configuratie van het apparaat te controleren:

- ip eigrp vrf vpn1-interfaces tonen
- tonen ip eigrp vrf vpn1 - buren
- toon ip eigrp vrf vpn1 topologie

```
IP-EIGRP Topology Table for AS(10)/ID(9.0.0.1) Routing Table: vpn1
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status
P 10.1.3.0/24, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 9.0.1.0/24, 1 successors, FD is 281600
         via Connected, Ethernet0/0
P 9.0.0.1/32, 1 successors, FD is 128256
         via Connected, Loopback1
P 10.1.2.0/30, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 9.1.0.2/32, 1 successors, FD is 45867776
         via 9.0.1.2 (45867776/45842176), Ethernet0/0
P 9.0.0.2/32, 1 successors, FD is 409600
         via 9.0.1.2 (409600/128256), Ethernet0/0
P 13.0.0.1/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 10.0.0.6/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 10.0.0.7/32, 1 successors, FD is 256256
         via Redistributed (256256/0)

PE-1#show ip bgp vpnv4 vrf vpn1
 BGP table version is 99, local router ID is 7.0.0.1
Status codes: s suppressed, d damped, h history, * valid, > best,
 i - internal,

              S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 100:1 (default for vrf vpn1)
*> 9.0.0.1/32       0.0.0.0                  0         32768 ?
*> 9.0.0.2/32       9.0.1.2             409600         32768 ?
*> 9.0.1.0/24       0.0.0.0                  0         32768 ?
```

```
*> 9.1.0.2/32       9.0.1.2           45867776         32768 ?
*>i10.0.0.6/32      7.0.0.4            2297856    100      0 ?
*>i10.0.0.7/32      7.0.0.4            2323456    100      0 ?
*>i10.1.2.0/30      7.0.0.4                  0    100      0 ?
*>i10.1.3.0/24      7.0.0.4            2195456    100      0 ?
*>i13.0.0.1/32      7.0.0.4                  0    100      0 i

PE-1#show ip bgp vpnv4 vrf vpn1 9.0.0.1 255.255.255.255
BGP routing table entry for 100:1:9.0.0.1/32, version 12
Paths: (1 available, best #1, table vpn1)
  Advertised to update-groups:
     1
           Local
    0.0.0.0 (via vpn1) from 0.0.0.0 (7.0.0.1)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid,
 sourced, best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:10:128000
 0x8802:65280:256 0x8803:65281:1514

PE-1#show ip bgp vpnv4 vrf vpn1 10.1.2.0 255.255.255.252
BGP routing table entry for 100:1:10.1.2.0/30, version 95
Paths: (1 available, best #1, table vpn1)
  Not advertised to any peer
  Local
    7.0.0.4 (metric 139) from 7.0.0.4 (7.0.0.4)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:20:512000
 0x8802:65280:1657856 0x8803:65281:1500

PE-1#
PE-4#show ip eigrp vrf vpn1 interfaces <output removed>
PE-4#show ip eigrp vrf vpn1 neighbors <output removed>
PE-4#show ip eigrp vrf vpn1 topology
IP-EIGRP Topology Table for AS(20)/ID(13.0.0.1) Routing Table: vpn1
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status
P 9.0.1.0/24, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 9.0.0.1/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 10.1.3.0/24, 1 successors, FD is 2195456
         via 10.1.2.2 (2195456/281600), Serial2/0
P 10.1.2.0/30, 1 successors, FD is 2169856
         via Connected, Serial2/0
P 9.1.0.2/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 9.0.0.2/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 13.0.0.1/32, 1 successors, FD is 256256
         via Redistributed (256256/0)
P 10.0.0.6/32, 1 successors, FD is 2297856
         via 10.1.2.2 (2297856/128256), Serial2/0
P 10.0.0.7/32, 1 successors, FD is 2323456
         via 10.1.2.2 (2323456/409600), Serial2/0

PE-4#show ip bgp vpnv4 vrf vpn1
BGP table version is 23, local router ID is 7.0.0.4
Status codes: s suppressed, d damped, h history, * valid, > best,
 i - internal,
              S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 100:1 (default for vrf vpn1)
*>i9.0.0.1/32       7.0.0.1                  0    100      0 ?
```

```
*>i9.0.0.2/32       7.0.0.1             409600    100      0 ?
*>i9.0.1.0/24       7.0.0.1                  0    100      0 ?
*>i9.1.0.2/32       7.0.0.1           45867776    100      0 ?
*> 10.0.0.6/32      10.1.2.2           2297856         32768 ?
*> 10.0.0.7/32      10.1.2.2           2323456         32768 ?
*> 10.1.2.0/30      0.0.0.0                  0         32768 ?
*> 10.1.3.0/24      10.1.2.2           2195456         32768 ?
*> 13.0.0.1/32      0.0.0.0                  0         32768 i

PE-4#show ip bgp vpnv4 vrf vpn1 9.0.0.1 255.255.255.255
BGP routing table entry for 100:1:9.0.0.1/32, version 13
Paths: (1 available, best #1, table vpn1)
  Not advertised to any peer
  Local
    7.0.0.1 (metric 139) from 7.0.0.1 (7.0.0.1)
      Origin incomplete, metric 0, localpref 100, valid, internal, best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:10:128000
 0x8802:65280:256 0x8803:65281:1514

PE-4#show ip bgp vpnv4 vrf vpn1 10.1.2.0 255.255.255.252
BGP routing table entry for 100:1:10.1.2.0/30, version 19
Paths: (1 available, best #1, table vpn1)
  Advertised to update-groups:
     1
           Local
    0.0.0.0 (via vpn1) from 0.0.0.0 (7.0.0.4)
      Origin incomplete, metric 0, localpref 100, weight 32768, valid,
 sourced, best
      Extended Community: RT:100:1 0x8800:32768:0 0x8801:20:512000
 0x8802:65280:1657856 0x8803:65281:1500

PE-4#
CE-1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
Gateway of last resort is not set
     9.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C       9.0.1.0/24 is directly connected, Ethernet0/0
D       9.0.0.1/32 [90/409600] via 9.0.1.1, 1d06h, Ethernet0/0
C       9.1.0.2/32 is directly connected, Loopback1
C       9.0.0.2/32 is directly connected, Loopback0
     10.0.0.0/8 is variably subnetted, 4 subnets, 3 masks
D EX    10.1.3.0/24 [170/281856] via 9.0.1.1, 00:27:15, Ethernet0/0
D EX    10.1.2.0/30 [170/281856] via 9.0.1.1, 00:27:15, Ethernet0/0
D EX    10.0.0.6/32 [170/281856] via 9.0.1.1, 00:27:15, Ethernet0/0
D EX    10.0.0.7/32 [170/281856] via 9.0.1.1, 00:27:15, Ethernet0/0
     13.0.0.0/32 is subnetted, 1 subnets
D EX    13.0.0.1 [170/281856] via 9.0.1.1, 00:27:15, Ethernet0/0

CE-1#show ip eigrp topology 10 10.1.2.0 255.255.255.252
IP-EIGRP topology entry for 10.1.2.0/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 281856
  Routing Descriptor Blocks:
  9.0.1.1 (Ethernet0/0), from 9.0.1.1, Send flag is 0x0
      Composite metric is (281856/256256), Route is External
      Vector metric:
        Minimum bandwidth is 10000 Kbit
        Total delay is 1010 microseconds
        Reliability is 255/255
        Load is 1/255
```

```
        Minimum MTU is 1500
        Hop count is 1
      External data:
        Originating router is 9.0.0.1
        AS number of route is 1
        External protocol is BGP, external metric is 0
        Administrator tag is 0 (0x00000000)
CE-1#
```

Gerelateerde informatie

- Categoriepagina voor EKE-ondersteuning
- MPLS-ondersteuningspagina
- Technische ondersteuning en documentatie – Cisco Systems