

# Esempio di configurazione MPLS/VPN con EIGRP sul lato cliente

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## [Introduzione](#)

In questo documento viene fornita una configurazione di esempio di una rete VPN (Virtual Private Network) MPLS (Multiprotocol Label Switching) quando il protocollo EIGRP (Enhanced Interior Gateway Routing Protocol) è presente sul lato cliente.

In questo documento viene fornita una configurazione di esempio per EIGRP sul lato cliente in un ambiente MPLS/VPN. Questi scenari sono dettagliati:

- Due endpoint di connessione (CE) che appartengono allo stesso sistema autonomo EIGRP.
- Due EC appartenenti a sistemi autonomi EIGRP diversi.

In entrambi gli scenari vengono illustrati i passaggi di configurazione e verifica. Viene fornito anche un esempio di scambio di routing per entrambi i protocolli interessati, Border Gateway Protocol (BGP) e EIGRP.

Se utilizzata con MPLS, la funzionalità VPN consente a più siti di interconnettersi in modo trasparente tramite una rete di provider di servizi. Una rete di provider di servizi può supportare diverse VPN IP. Ognuna di queste reti viene visualizzata agli utenti come una rete privata, separata da tutte le altre reti. All'interno di una VPN, ogni sito può inviare pacchetti IP a qualsiasi altro sito della stessa VPN.

Ogni VPN è associata a una o più istanze di routing/inoltro VPN (VRF). Un VRF è costituito da una tabella di routing IP, una tabella CEF (Cisco Express Forwarding) derivata e un set di interfacce che utilizzano questa tabella di inoltro.

Il router gestisce un routing separato e una tabella CEF per ciascun VRF. In questo modo si evita che le informazioni vengano inviate all'esterno della VPN e si consente l'utilizzo della stessa subnet in più VPN senza causare problemi di indirizzi IP duplicati.

Il router che usa il multiprotocollo BGP (MP-BGP) distribuisce le informazioni di routing della VPN usando le community estese MP-BGP.

Per ulteriori informazioni sulla propagazione degli aggiornamenti tramite VPN, consultare i seguenti documenti:

- [Configurazione di MPLS Virtual Private Network](#)
- [Flusso di pacchetti in un ambiente VPN MPLS](#)
- [Configurazione di MPLS di base tramite OSPF](#)

## Prerequisiti

### Requisiti

Nessun requisito specifico previsto per questo documento.

### Componenti usati

Il documento può essere consultato per tutte le versioni software o hardware.

L'EIGRP tra PE e CE nell'ambiente MPLS/VPN è stato introdotto nel software Cisco IOS® versione 12.0(22)S e 12.2(15)T.

### Prodotti correlati

Questa configurazione può essere utilizzata anche con le seguenti serie di router:

- Cisco 7200
- Cisco 7500
- Cisco 10000
- Cisco 10700
- Cisco 12000
- Cisco serie 12000 Performance Route Processor (PRP)

### Convenzioni

Per ulteriori informazioni sulle convenzioni usate, consultare il documento [Cisco sulle convenzioni nei suggerimenti tecnici](#).

## Premesse

Le route EIGRP vengono convertite in route BGP sulla backbone del provider di servizi tramite i nuovi attributi della community estesa specifici di EIGRP. Il router perimetrale del provider (PE) utilizza BGP per distribuire le informazioni di routing della VPN utilizzando gli attributi della community estesa specifici di EIGRP, che vengono aggiunti alla route BGP. Le route BGP vengono riconvertite in route EIGRP dagli attributi della community estesa specifici di EIGRP quando raggiungono il router PE connesso al router CE (customer edge) di destinazione.

Questa tabella descrive gli attributi della community estesa aggiunti alle route BGP e utilizzati per trasportare le informazioni EIGRP sulla backbone del provider di servizi.

Attributo EIGRP	Tipo	Utilizzo	Valore
Generale	0x8800	Informazioni generali route EIGRP	Contrassegno e contrassegno ciclo di lavorazione
Metrica	0x8801	Informazioni metriche route EIGRP e sistema autonomo	Sistema autonomo e ritardo
	0x8802	Informazioni metriche route EIGRP	Affidabilità, hop successivo e larghezza di banda
	0x8803	Informazioni metriche route EIGRP	Riserva, carico e MTU (Maximum Transmission Unit)
Esterna	0x8804	Informazioni route esterna EIGRP	ID remoto e sistema autonomo remoto
	0x8805	Informazioni route esterna EIGRP	Remote Protocol e Remote Metric

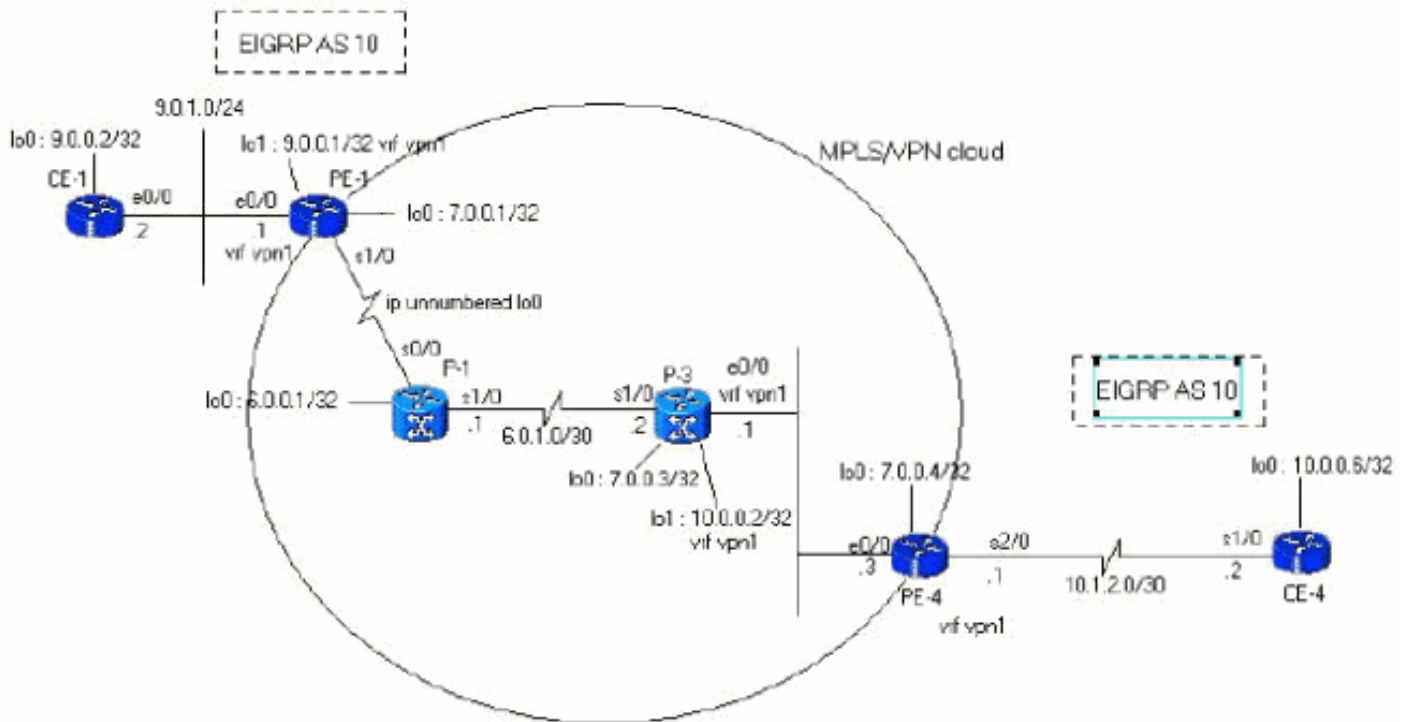
## [Scenario 1: Configurazione di un singolo sistema autonomo EIGRP](#)

In questa sezione vengono presentate le informazioni necessarie per configurare le funzionalità descritte più avanti nel documento.

**Nota:** per ulteriori informazioni sui comandi menzionati in questa sezione, usare lo [strumento di ricerca](#) dei comandi (solo utenti [registrati](#)).

### [Esempio di rete](#)

Questa sezione utilizza questa configurazione di rete:



## Configurazioni

Questa sezione utilizza le seguenti configurazioni:

### 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 vpv4 !--- 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 vpv4
  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

```

## Verifica

Per verificare la configurazione, utilizzare un approccio graduale e verificare questi punti in ordine. Attenersi alla seguente procedura:

1. Verificare che l'istanza EIGRP sia configurata sull'interfaccia desiderata. Verificare i comandi **vrf** e **eigrp** network nella famiglia di indirizzi corretta. Nell'esempio, il VRF è denominato vpn1.

```
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
```

Interface	Peers	Xmit Queue Un/Reliable	Mean SRTT	Pacing Time Un/Reliable	Multicast Flow Timer	Pending Routes
<b>Et0/0</b>	1	0/0	103	0/10	416	0

```
PE-1#
```

2. Verificare che il vicinato EIGRP sia stabilito. In questo esempio, è possibile notare che 9.0.1.2 (CE-1) è un router adiacente.

```
PE-1#show ip eigrp vrf vpn1 neighbors
```

```
IP-EIGRP neighbors for process 10
```

H	Address	Interface	Hold (sec)	Uptime	SRTT (ms)	RTO	Q Cnt	Seq Num	Type
0	9.0.1.2	Et0/0	13	00:30:19	103	618	0	9	

```
PE-1#
```

3. Verificare che la tabella della topologia EIGRP contenga le subnet locali apprese tramite EIGRP (9.0.0.2/32).

Nell'esempio, la tabella della topologia EIGRP contiene anche le subnet impariate sulla backbone MPLS/VPN (10.1.2.0/30). Le subnet vengono visualizzate come apprese tramite Ridistribuite e hanno una distanza riportata di 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. Se le subnet non sono presenti, verificare che si trovino nella tabella BGP con questi comandi **show** per un VRF specifico. Se la redistribuzione tra BGP ed EIRGP non è configurata correttamente, è possibile che la subnet venga visualizzata in una tabella e non nell'altra.

```
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
```

È necessario utilizzare gli stessi comandi **show** nel computer remoto. In questo esempio, PE remoto è PE-4:

```
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

```

## [Risoluzione dei problemi](#)

In questa sezione vengono fornite informazioni sulla query eigrp ricevuta da PE e sull'aggiornamento BGP corrispondente inviato tramite il cloud MPLS/VPN. Questa operazione viene eseguita per la subnet 10.0.0.6/32 collegata direttamente al router CE-4 sulla destra del diagramma. Le operazioni 'shut' e 'no shut' eseguite sull'interfaccia di loopback su CE-4 insieme al comando di debug appropriato aiutano a comprendere le condizioni della connessione.

## [Propagazione degli aggiornamenti in un singolo sistema autonomo](#)

I seguenti comandi di **debug** vengono utilizzati per tenere traccia degli aggiornamenti della subnet 10.0.0.6/32 (indirizzo di loopback di CE-4):

- debug eigrp fsm
- debug eigrp packets query reply request update
- debug ip eigrp 10 10.0.0.6 255.255.255.255
- debug ip bgp vpnv4
- debug ip bgp update

Nell'esempio viene mostrata una voce EIGRP ritirata dopo l'esecuzione di un comando **shutdown** sull'interfaccia loopback0 su CE-4:

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

```

L'esempio mostra come viene creata una voce EIGRP dopo l'esecuzione di un comando no shut sull'interfaccia loopback0 su CE-4:

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

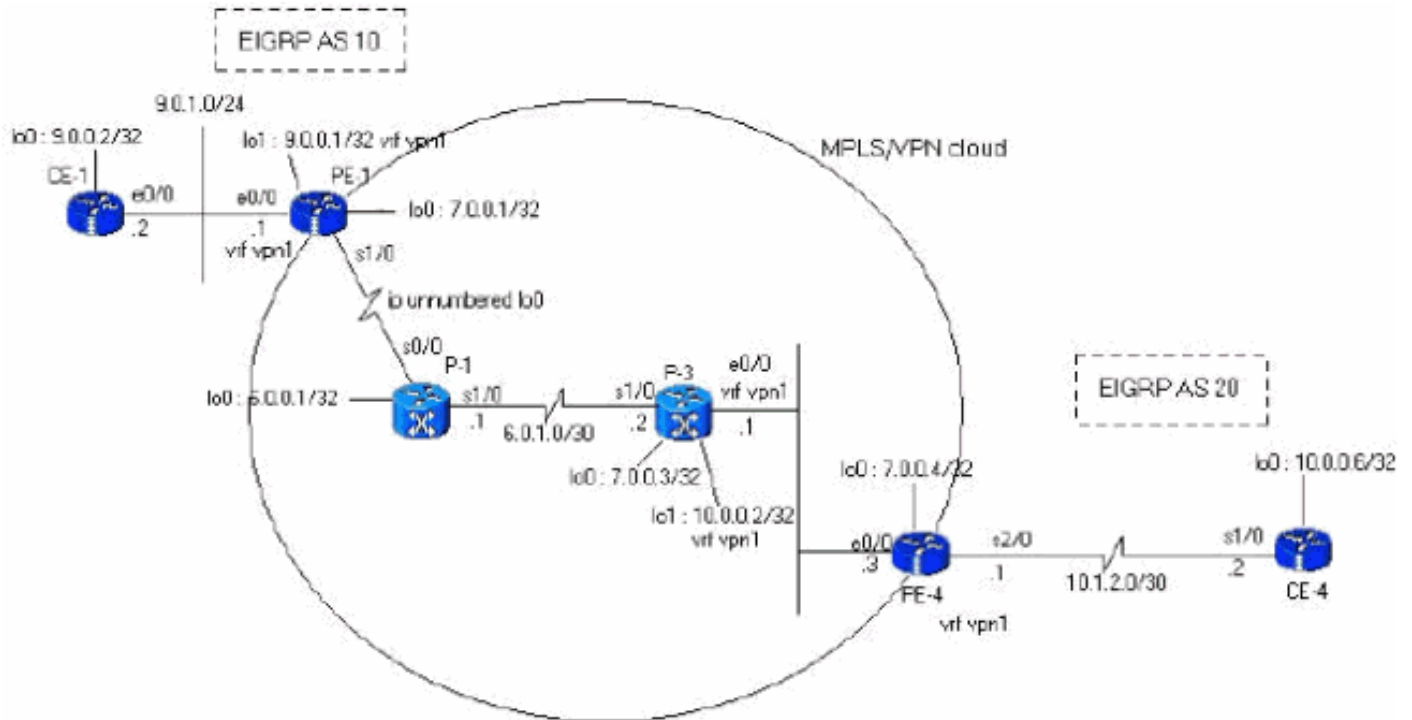
PE-1

\*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

## Scenario 2: Configurazione di un sistema autonomo EIGRP multiplo

### Esempio di rete

Questa sezione utilizza questa configurazione di rete:



### Configurazioni

Questa sezione utilizza le seguenti configurazioni:

#### **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

```

## Verifica

Utilizzare questi comandi per verificare la configurazione:

- **show ip eigrp vrf vpn1 interfacce**
- **show ip eigrp vrf vpn1 neighbors**
- **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 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#

## [Informazioni correlate](#)

- [Pagina di supporto del protocollo EIGRP](#)
- [Pagina di supporto MPLS](#)
- [Documentazione e supporto tecnico – Cisco Systems](#)