Konfigurieren von VPN MPLS über ATM mit Cisco Routern der Serie 7500 und LightStream 1010-Switches

Inhalt

Einführung
Voraussetzungen
Anforderungen
Konventionen
Konfigurieren
Netzwerkdiagramm
Netzwerkbeschreibung
Konfigurationen
Zugehörige Informationen

Einführung

In diesem Dokument wird die Konfiguration von Virtual Private Network (VPN) Multiprotocol Label Switching (MPLS) über ATM mit Cisco 7500-Routern als Label Edge Router (LERs) und LightStream 1010-Switches als Label Switch Router (LSRs) erläutert. Zwei Router mit Ethernet-Verbindung, jeder an einem Remote-Kundenstandort, sind Teil eines VPN. In diesem Dokument werden die End-to-End-Gerätekonfigurationen und hilfreiche Show-Befehle behandelt.

Voraussetzungen

Anforderungen

Für dieses Dokument bestehen keine speziellen Anforderungen.

Konventionen

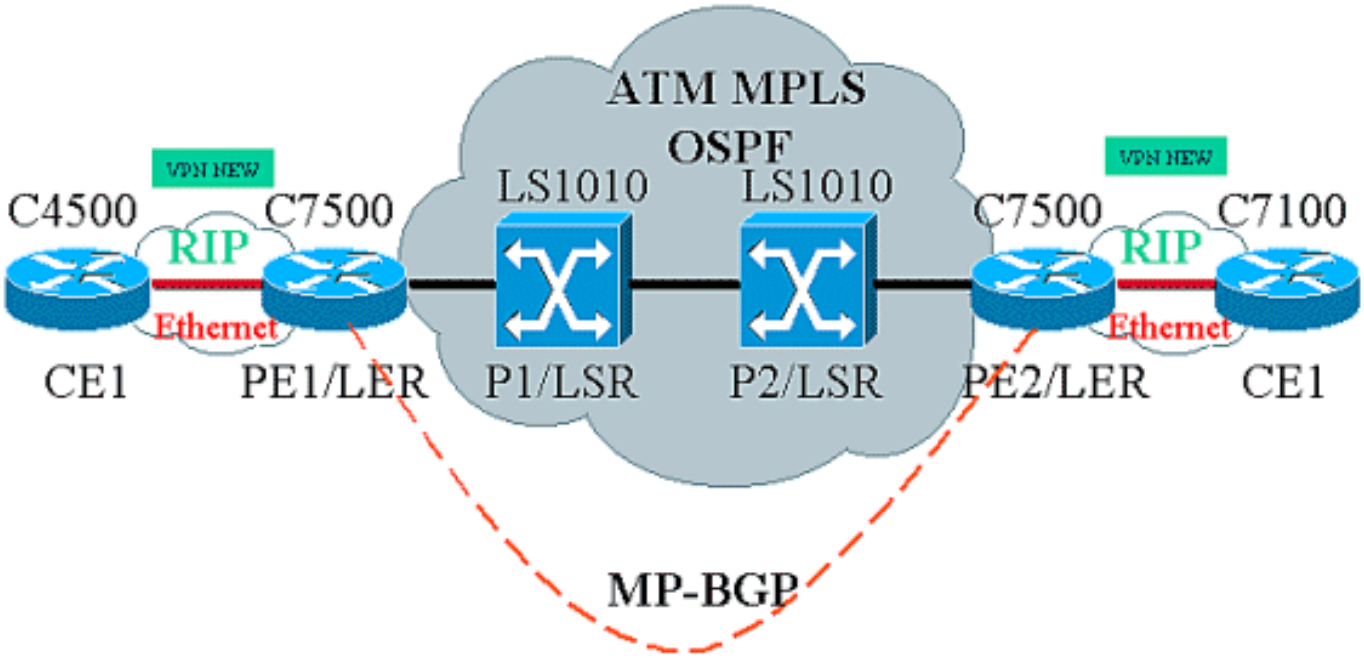
Weitere Informationen zu Dokumentkonventionen finden Sie unter Cisco Technical Tips Conventions (Technische Tipps zu Konventionen von Cisco).

Konfigurieren

In diesem Abschnitt erhalten Sie Informationen zum Konfigurieren der in diesem Dokument beschriebenen Funktionen.

Netzwerkdiagramm

In diesem Dokument wird die folgende Netzwerkeinrichtung verwendet:



Netzwerkbeschreibung

Die aktuelle Konfiguration enthält folgende Elemente in der VPN-Terminologie:

- CE = Customer Edge Router
- PE = Provider Edge Router
- P=Provider-Router

Die aktuelle Konfiguration enthält folgende Elemente in der MPLS-Terminologie:

- LER = Label Edge Router
- LSR = Label Switch Router
- TDP/LDP = Tag Distribution Protocol/Label Distribution Protocol

Konfigurationen

In diesem Dokument werden folgende Konfigurationen verwendet:

- PE1 und PE2 sind die LERs in unserem ATM-Netzwerk.
- P1 und P2 sind die LSRs.
- CE1 und CE2 sind Customer Edge-Router, die nicht bekannt sind und kein VPN oder MPLS ausführen.
- CE1 und CE2 sind jeweils Ethernet mit PE1 und PE2 verbunden und führen Routing Information Protocol (RIP) aus.
- PE1, PE2, P1 und P2 verwenden Open Shortest Path First (OSPF) und befinden sich alle in Bereich 0. OSPF ist das Interior Gateway Protocol (IGP), das im ATM-Netzwerk verwendet wird. Tag-Switching wird auf den ATM-Schnittstellen aller vier ATM-Geräte verwendet. Das

Tag Distribution Protocol (TDP) weist den OSPF-Routen Tags zu.

- PE1 und PE2 sind MP-BGP-Peers (Multiprotocol-Border Gateway Protocol).
- RIP-Routen werden in das MP-BGP neu verteilt. MP-BGP-Routen werden auf PE1- und PE2-Routern in RIP neu verteilt.
- Die Einrichtung verwaltet separate VRF-Routing-Tabellen in den PE1- und PE2-Routern.
- Der in diesem Beispiel verwendete VPN-Name ist NEU.

CE1

```
!
version 12.1
service timestamps debug datetime msec
service timestamps log datetime msec

!
boot system flashow c4500-js-mz.121-5
!

ip subnet-zero

!
interface Loopback0
 ip address 10.1.1.1 255.255.255.0
!
interface Loopback1
 ip address 10.2.2.2 255.255.255.0
!
interface Loopback2
 ip address 10.3.3.3 255.255.255.0
!
interface Ethernet0
 ip address 100.1.1.2 255.255.255.0
 media-type 10BaseT

!

router rip
 version 2
 network 10.0.0.0
 network 100.0.0.0
 no auto-summary
!
ip classless
!
```

PE1

```
!
version 12.1

service timestamps debug uptime
service timestamps log uptime

!
boot system flashow slot1:rsp-jsv-mz.121-5a.bin
!

ip subnet-zero

!
ip vrf NEW
```

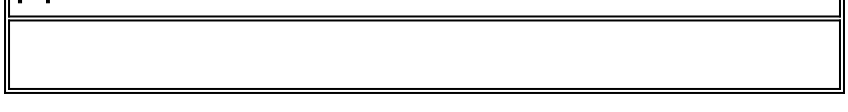
```
 rd 200:1
 route-target export 200:1
 route-target import 200:1
ip cef distributed

!
interface Loopback0
 ip address 1.1.1.1 255.255.255.255
!
interface ATM2/0/0
 mtu 1500
 no ip address
!
interface ATM2/0/0.10 tag-switching
 ip unnumbered Loopback0
 tag-switching ip
!
interface Ethernet2/1/0
 ip vrf forwarding NEW
 ip address 100.1.1.1 255.255.255.0

!
router ospf 100
 no log-adjacency-changes
 network 1.0.0.0 0.255.255.255 area 0
 network 100.1.1.0 0.0.0.255 area 0
!
router rip
 version 2
 network 100.0.0.0
 no auto-summary
 !
 address-family ipv4 vrf NEW
 version 2
 redistribute bgp 200 metric 0
 network 100.0.0.0
 no auto-summary
 exit-address-family
!
router bgp 200
 bgp log-neighbor-changes
 neighbor 2.2.2.2 remote-as 200

 neighbor 2.2.2.2 update-source Loopback0
 no auto-summary
 !
 address-family ipv4 vrf NEW
 redistribute rip
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor 2.2.2.2 activate
 neighbor 2.2.2.2 send-community extended
 no auto-summary
 exit-address-family
!
ip classless
!
```

P1



```
!

service timestamps debug uptime
service timestamps log uptime
!

ip subnet-zero
!

interface Loopback0
 ip address 4.4.4.4 255.255.255.255
 no ip directed-broadcast
!
interface ATM12/0/0
 ip unnumbered Loopback0
 no ip directed-broadcast

 tag-switching ip
!
interface ATM12/0/1
 ip unnumbered Loopback0
 no ip directed-broadcast

 tag-switching ip

!
router ospf 100
 network 4.0.0.0 0.255.255.255 area 0
!
ip classless
!
```

P2

```

!
service timestamps debug uptime
service timestamps log uptime

!
ip subnet-zero

!
interface Loopback0
 ip address 3.3.3.3 255.255.255.255
 no ip directed-broadcast
!
interface ATM0/1/1
 ip unnumbered Loopback0
 no ip directed-broadcast

 tag-switching ip
!
interface ATM0/1/3
 ip unnumbered Loopback0
 no ip directed-broadcast

 tag-switching ip

!
router ospf 100
 network 3.0.0.0 0.255.255.255 area 0
!
ip classless

```

```
!
```

PE2

```
!
version 12.1
service timestamps debug datetime msec
service timestamps log datetime msec

!
boot system flashow slot0:rsp-jsv-mz.121-5a
!

ip subnet-zero

!
ip vrf NEW
 rd 200:1
 route-target export 200:1
 route-target import 200:1
ip cef distributed

!
interface Loopback0
 ip address 2.2.2.2 255.255.255.255
!

interface FastEthernet3/0/0
 ip vrf forwarding NEW
 ip address 110.1.1.1 255.255.255.0

 half-duplex
!

interface ATM3/1/0.1 tag-switching
 ip unnumbered Loopback0
 tag-switching ip
!
router ospf 100
 log-adjacency-changes
 network 2.0.0.0 0.255.255.255 area 0

!
router rip
 version 2
 network 110.0.0.0
 no auto-summary
 !
 address-family ipv4 vrf NEW
 version 2
 redistribute bgp 200 metric 0
 network 110.0.0.0
 no auto-summary
 exit-address-family
!
router bgp 200
 bgp log-neighbor-changes
 neighbor 1.1.1.1 remote-as 200

 neighbor 1.1.1.1 update-source Loopback0

 no auto-summary
 !
```

```
 address-family ipv4 vrf NEW
 redistribute rip
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor 1.1.1.1 activate
 neighbor 1.1.1.1 send-community extended
 no auto-summary
 exit-address-family
!
ip classless
!
```

CE2

```
!
version 12.1

service timestamps debug uptime
service timestamps log uptime

!

boot system disk0:c7100-jo3s56i-mz.121-5.T.bin

!
ip subnet-zero

!
interface Loopback0
 ip address 30.1.1.1 255.255.255.0
!
interface Loopback1
 ip address 30.2.2.2 255.255.255.0
!
interface Loopback2
 ip address 30.3.3.3 255.255.255.0
!
interface FastEthernet0/0
 ip address 110.1.1.2 255.255.255.0

!
router rip
 version 2
 network 30.0.0.0
 network 110.0.0.0
 no auto-summary
!
```

Befehle **anzeigen**

Verwenden Sie die folgenden Befehle, um zu testen, ob Ihr Netzwerk ordnungsgemäß funktioniert:

- **show ip route** - Zeigt Einträge der IP-Routing-Tabelle an.
- **show ip rip database vrf** - Zeigt Informationen in der RIP-Datenbank für eine bestimmte VRF-Instanz an.
- **show ip bgp vpnv4 vrf** - Zeigt VPN-Adressinformationen aus der BGP-Tabelle an.
- **show tag-switching-Schnittstellen detail** - Zeigt Informationen über eine oder mehrere

Schnittstellen an, für die die MPLS-Funktion aktiviert ist.

- **show tag-switching tdp bindings** - Zeigt die angeforderten Einträge aus der ATM LDP-Labelbindungsdatenbank an.
- **show tag-switching Forwarding-Table VRF** - Überprüft den für eine bestimmte Route verwendeten Label-Stack.

Die unten dargestellte Ausgabe ist das Ergebnis dieser eingegebenen Befehle auf den Geräten, die im Netzwerkdiagramm angezeigt werden. Diese Ausgabe zeigt, dass das Netzwerk ordnungsgemäß funktioniert.

CE1

```
Cisco4500#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
       P - periodic downloaded static route

Gateway of last resort is not set

     100.0.0.0/24 is subnetted, 1 subnets
C       100.1.1.0 is directly connected, Ethernet0
     110.0.0.0/24 is subnetted, 1 subnets
R       110.1.1.0 [120/1] via 100.1.1.1, 00:00:14, Ethernet0
     10.0.0.0/24 is subnetted, 3 subnets
C       10.3.3.0 is directly connected, Loopback2
C       10.2.2.0 is directly connected, Loopback1
C       10.1.1.0 is directly connected, Loopback0
     30.0.0.0/24 is subnetted, 3 subnets
R       30.3.3.0 [120/1] via 100.1.1.1, 00:00:14, Ethernet0
R       30.2.2.0 [120/1] via 100.1.1.1, 00:00:15, Ethernet0
R       30.1.1.0 [120/1] via 100.1.1.1, 00:00:15, Ethernet0
```

PE1

```
Cisco7500a#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
       P - periodic downloaded static route

Gateway of last resort is not set

     1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback0
     2.0.0.0/32 is subnetted, 1 subnets
O       2.2.2.2 [110/4] via 4.4.4.4, 18:17:37, ATM2/0/0.10
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/3] via 4.4.4.4, 18:17:37, ATM2/0/0.10
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/2] via 4.4.4.4, 18:17:37, ATM2/0/0.10
```

```
Cisco7500a#show ip route vrf NEW
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
       P - periodic downloaded static route

Gateway of last resort is not set

     100.0.0.0/24 is subnetted, 1 subnets
C       100.1.1.0 is directly connected, Ethernet2/1/0
     110.0.0.0/24 is subnetted, 1 subnets
B       110.1.1.0 [200/0] via 2.2.2.2, 00:26:11
     10.0.0.0/24 is subnetted, 3 subnets
R       10.3.3.0 [120/1] via 100.1.1.2, 00:00:11, Ethernet2/1/0
R       10.2.2.0 [120/1] via 100.1.1.2, 00:00:11, Ethernet2/1/0
R       10.1.1.0 [120/1] via 100.1.1.2, 00:00:11, Ethernet2/1/0
     30.0.0.0/24 is subnetted, 3 subnets
B       30.3.3.0 [200/1] via 2.2.2.2, 00:26:12
B       30.2.2.0 [200/1] via 2.2.2.2, 00:26:12
B       30.1.1.0 [200/1] via 2.2.2.2, 00:26:12

Cisco7500a#show ip rip database vrf NEW
10.0.0.0/8    auto-summary
10.1.1.0/24
    [1] via 100.1.1.2, 00:00:18, Ethernet2/1/0
10.2.2.0/24
    [1] via 100.1.1.2, 00:00:18, Ethernet2/1/0
10.3.3.0/24
    [1] via 100.1.1.2, 00:00:18, Ethernet2/1/0
30.0.0.0/8    auto-summary
30.1.1.0/24    redistributed
    [1] via 2.2.2.2,
30.2.2.0/24    redistributed
    [1] via 2.2.2.2,
30.3.3.0/24    redistributed
    [1] via 2.2.2.2,
100.0.0.0/8    auto-summary
100.1.1.0/24    directly connected, Ethernet2/1/0
110.0.0.0/8    auto-summary
110.1.1.0/24    redistributed
    [1] via 2.2.2.2,

Cisco7500a#show ip bgp vpnv4 vrf NEW
BGP table version is 17, local router ID is 1.1.1.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 200:1 (default for vrf NEW)
*> 10.1.1.0/24      100.1.1.2                1         32768 ?
*> 10.2.2.0/24      100.1.1.2                1         32768 ?
*> 10.3.3.0/24      100.1.1.2                1         32768 ?
*>i30.1.1.0/24      2.2.2.2                  1    100      0 ?
*>i30.2.2.0/24      2.2.2.2                  1    100      0 ?
*>i30.3.3.0/24      2.2.2.2                  1    100      0 ?
*> 100.1.1.0/24     0.0.0.0                  0         32768 ?
*>i110.1.1.0/24     2.2.2.2                  0    100      0 ?

Cisco7500a#show tag-switching interfaces
Interface              IP    Tunnel   Operational
ATM2/0/0.10            Yes   No       Yes         (ATM tagging)
```

```
Cisco7500a#show tag-switching interfaces detail
Interface ATM2/0/0.10:
        IP tagging enabled
        TSP Tunnel tagging not enabled
        Tagging operational
        Tagswitching turbo vector
        MTU = 4470
        ATM tagging:
                Tag VPI = 1
                Tag VCI range = 33 - 65535
                Control VC = 0/32

Cisco7500a#show tag-switching ?
  atm-tdp           ATM Tagging Protocol information
  cos-map           Show Tag CoS ATM Multi-VC CoS Map
  forwarding-table  Show the Tag Forwarding Information Base (TFIB)
  interfaces        Show per-interface tag switching
  prefix-map        Show Tag CoS Prefix Map
  tdp               Tag Distribution Protocol information

Cisco7500a#show tag-switching tdp bindings
  tib entry: 1.1.1.1/32, rev 2
        local binding:  tag: imp-null
  tib entry: 2.2.2.2/32, rev 23
        local binding:  tag: 27
  tib entry: 3.3.3.3/32, rev 21
        local binding:  tag: 26
  tib entry: 4.4.4.4/32, rev 10
        local binding:  tag: 28

Cisco7500a#show tag-switching atm-tdp bindings
 Destination: 4.4.4.4/32
    Headend Router ATM2/0/0.10 (1 hop) 1/33  Active, VCD=24
 Destination: 3.3.3.3/32
    Headend Router ATM2/0/0.10 (2 hops) 1/43  Active, VCD=25
 Destination: 2.2.2.2/32
    Headend Router ATM2/0/0.10 (3 hops) 1/42  Active, VCD=26
 Destination: 1.1.1.1/32
    Tailend Router ATM2/0/0.10 1/33 Active, VCD=24

Cisco7500a#show tag-switching forwarding-table vrf NEW
Local  Outgoing    Prefix            Bytes tag  Outgoing   Next Hop
tag    tag or VC   or Tunnel Id      switched   interface
29     Aggregate   100.1.1.0/24[V]   2080
30     Untagged    10.3.3.0/24[V]    0          Et2/1/0    100.1.1.2
31     Untagged    10.2.2.0/24[V]    0          Et2/1/0    100.1.1.2
32     Untagged    10.1.1.0/24[V]    0          Et2/1/0    100.1.1.2
```

P1

```
LS1010#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, * - candidate default
       U - per-user static route, o - ODR
       T - traffic engineered route

Gateway of last resort is not set
```

```
     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/2] via 1.1.1.1, 19:00:12, ATM12/0/0
     2.0.0.0/32 is subnetted, 1 subnets
O       2.2.2.2 [110/3] via 3.3.3.3, 19:00:12, ATM12/0/1
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/2] via 3.3.3.3, 19:00:12, ATM12/0/1
     4.0.0.0/32 is subnetted, 1 subnets
C       4.4.4.4 is directly connected, Loopback0

LS1010#show tag-switching atm-tdp bindings
 Destination: 4.4.4.4/32
    Tailend Switch ATM12/0/0 1/33 Active -> Terminating Active
    Tailend Switch ATM12/0/1 1/34 Active -> Terminating Active
 Destination: 2.2.2.2/32
    Transit ATM12/0/0 1/42 Active -> ATM12/0/1 1/35 Active
 Destination: 1.1.1.1/32
    Transit ATM12/0/1 1/33 Active -> ATM12/0/0 1/33 Active
 Destination: 3.3.3.3/32
    Transit ATM12/0/0 1/43 Active -> ATM12/0/1 1/34 Active
```

P2

```
LS1010#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, * - candidate default
       U - per-user static route, o - ODR

Gateway of last resort is 10.118.1.21 to network 0.0.0.0

     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/3] via 4.4.4.4, 19:46:00, ATM0/1/1
     2.0.0.0/32 is subnetted, 1 subnets
O       2.2.2.2 [110/2] via 2.2.2.2, 19:46:00, ATM0/1/3
     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3 is directly connected, Loopback0
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/2] via 4.4.4.4, 19:46:00, ATM0/1/1
     10.0.0.0/24 is subnetted, 1 subnets
C       10.118.1.0 is directly connected, Ethernet2/0/0
S*   0.0.0.0/0 [1/0] via 10.118.1.21

LS1010#show tag-switching atm-tdp bindings
 Destination: 1.1.1.1/32
    Transit ATM0/1/3 1/33 Active -> ATM0/1/1 1/33 Active
 Destination: 3.3.3.3/32
    Tailend Switch ATM0/1/3 1/34 Active -> Terminating Active
    Tailend Switch ATM0/1/1 1/34 Active -> Terminating Active
 Destination: 4.4.4.4/32
    Transit ATM0/1/3 1/35 Active -> ATM0/1/1 1/34 Active
 Destination: 2.2.2.2/32
    Transit ATM0/1/1 1/35 Active -> ATM0/1/3 1/33 Active
```

PE2

```
Cisco7500#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
       P - periodic downloaded static route

Gateway of last resort is not set

     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/4] via 3.3.3.3, 02:58:46, ATM3/1/0.1
     2.0.0.0/32 is subnetted, 1 subnets
C       2.2.2.2 is directly connected, Loopback0
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/2] via 3.3.3.3, 02:58:46, ATM3/1/0.1
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/3] via 3.3.3.3, 02:58:46, ATM3/1/0.1

Cisco7500#show ip route vrf NEW
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
       P - periodic downloaded static route

Gateway of last resort is not set

     100.0.0.0/24 is subnetted, 1 subnets
B       100.1.1.0 [200/0] via 1.1.1.1, 01:16:13
     110.0.0.0/24 is subnetted, 1 subnets
C       110.1.1.0 is directly connected, FastEthernet3/0/0
     10.0.0.0/24 is subnetted, 3 subnets
B       10.3.3.0 [200/1] via 1.1.1.1, 01:16:13
B       10.2.2.0 [200/1] via 1.1.1.1, 01:16:13
B       10.1.1.0 [200/1] via 1.1.1.1, 01:16:13
     30.0.0.0/24 is subnetted, 3 subnets
R       30.3.3.0 [120/1] via 110.1.1.2, 00:00:16, FastEthernet3/0/0
R       30.2.2.0 [120/1] via 110.1.1.2, 00:00:17, FastEthernet3/0/0
R       30.1.1.0 [120/1] via 110.1.1.2, 00:00:17, FastEthernet3/0/0

Cisco7500#show ip rip database vrf NEW
10.0.0.0/8    auto-summary
10.1.1.0/24    redistributed
    [1] via 1.1.1.1,
10.2.2.0/24    redistributed
    [1] via 1.1.1.1,
10.3.3.0/24    redistributed
    [1] via 1.1.1.1,
30.0.0.0/8    auto-summary
30.1.1.0/24
    [1] via 110.1.1.2, 00:00:09, FastEthernet3/0/0
30.2.2.0/24
    [1] via 110.1.1.2, 00:00:09, FastEthernet3/0/0
30.3.3.0/24
    [1] via 110.1.1.2, 00:00:09, FastEthernet3/0/0
100.0.0.0/8    auto-summary
100.1.1.0/24    redistributed
    [1] via 1.1.1.1,
110.0.0.0/8    auto-summary
110.1.1.0/24    directly connected, FastEthernet3/0/0
Cisco7500#show ip bgp vpnv4 vrf NEW
BGP table version is 17, local router ID is 2.2.2.2
```

```
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 200:1 (default for vrf NEW)
*>i10.1.1.0/24      1.1.1.1                  1    100      0 ?
*>i10.2.2.0/24      1.1.1.1                  1    100      0 ?
*>i10.3.3.0/24      1.1.1.1                  1    100      0 ?
*> 30.1.1.0/24      110.1.1.2                1         32768 ?
*> 30.2.2.0/24      110.1.1.2                1         32768 ?
*> 30.3.3.0/24      110.1.1.2                1         32768 ?
*>i100.1.1.0/24     1.1.1.1                  0    100      0 ?
*> 110.1.1.0/24     0.0.0.0                  0         32768 ?

Cisco7500#show tag-switching interfaces
Interface              IP    Tunnel   Operational
ATM3/1/0.1             Yes   No       Yes         (ATM tagging)

Cisco7500#show tag-switching interfaces detail
Interface ATM3/1/0.1:
        IP tagging enabled
        TSP Tunnel tagging not enabled
        Tagging operational
        Tagswitching turbo vector
        MTU = 4470
        ATM tagging:
                Tag VPI = 1
                Tag VCI range = 33 - 65535
                Control VC = 0/32

Cisco7500#show tag-switching ?
  atm-tdp           ATM Tagging Protocol information
  cos-map           Show Tag CoS ATM Multi-VC CoS Map
  forwarding-table  Show the Tag Forwarding Information Base (TFIB)
  interfaces        Show per-interface tag switching
  prefix-map        Show Tag CoS Prefix Map
  tdp               Tag Distribution Protocol information

Cisco7500#show tag-switching tdp bindings
  tib entry: 1.1.1.1/32, rev 25
        local binding:  tag: 26
  tib entry: 2.2.2.2/32, rev 2
        local binding:  tag: imp-null
  tib entry: 3.3.3.3/32, rev 27
        local binding:  tag: 27
  tib entry: 4.4.4.4/32, rev 29
        local binding:  tag: 28

Cisco7500#show tag-switching atm-tdp bindings
 Destination: 1.1.1.1/32
    Headend Router ATM3/1/0.1 (3 hops) 1/33  Active, VCD=8
 Destination: 3.3.3.3/32
    Headend Router ATM3/1/0.1 (1 hop) 1/34  Active, VCD=6
 Destination: 4.4.4.4/32
    Headend Router ATM3/1/0.1 (2 hops) 1/35  Active, VCD=7
 Destination: 2.2.2.2/32
    Tailend Router ATM3/1/0.1 1/33 Active, VCD=8

Cisco7500#show tag-switching forwarding-table vrf NEW
Local  Outgoing    Prefix            Bytes tag  Outgoing   Next Hop
tag    tag or VC   or Tunnel Id      switched   interface
33     Aggregate   110.1.1.0/24[V]   0
34     Untagged    30.3.3.0/24[V]    0          Fa3/0/0    110.1.1.2
35     Untagged    30.2.2.0/24[V]    0          Fa3/0/0    110.1.1.2
```

```
36      Untagged    30.1.1.0/24[V]    0          Fa3/0/0    110.1.1.2
```

CE2

```
Cisco7100#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
       P - periodic downloaded static route

Gateway of last resort is not set

     100.0.0.0/24 is subnetted, 1 subnets
R       100.1.1.0 [120/1] via 110.1.1.1, 00:00:19, FastEthernet0/0
     110.0.0.0/24 is subnetted, 1 subnets
C       110.1.1.0 is directly connected, FastEthernet0/0
     10.0.0.0/24 is subnetted, 3 subnets
R       10.3.3.0 [120/1] via 110.1.1.1, 00:00:19, FastEthernet0/0
R       10.2.2.0 [120/1] via 110.1.1.1, 00:00:19, FastEthernet0/0
R       10.1.1.0 [120/1] via 110.1.1.1, 00:00:19, FastEthernet0/0
     30.0.0.0/24 is subnetted, 3 subnets
C       30.3.3.0 is directly connected, Loopback2
C       30.2.2.0 is directly connected, Loopback1
C       30.1.1.0 is directly connected, Loopback0
```

Zugehörige Informationen

- MPLS Virtual Private Networks
- Konfigurieren eines einfachen MPLS-VPN
- Paketfluss in einer MPLS-VPN-Umgebung
- Technischer Support und Dokumentation - Cisco Systems