



Dialing to Destinations with the Same IP Address for MPLS VPNs

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The dialer software in Cisco IOS prior to Release 12.2(8)T had no way to dial two different destinations with the same IP address. More specifically, in networks where a network access server (NAS) supports dialing clients with overlapping addresses, dial-out attempts fail. This module explains how to dial to more than one destination with the same IP address.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for Dialing to Destinations with the Same IP Address for MPLS VPNs

Before configuring this feature, you should understand how to configure the following network features:

- Virtual profiles with two-way AAA authentication



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- MPLS VPNs

Refer to the documents listed in the [Additional References](#), page 11 section for information about configuring these features.

Restrictions for Dialing to Destinations with the Same IP Address for MPLS VPNs

When configuring static routes in an MPLS or MPLS VPN environment, some variations of the **ip route** and **ip route vrf** commands are not supported. These variations of the commands are not supported in Cisco IOS releases that support the Tag Forwarding Information Base (TFIB), specifically Cisco IOS Releases 12.xT, 12.xM, and 12.0S. The TFIB cannot resolve prefixes when the recursive route over which the prefixes travel disappears and then reappears. However, the command variations are supported in Cisco IOS releases that support the MPLS Forwarding Infrastructure (MFI), specifically Cisco IOS Release 12.2(25)S and later. Use the following guidelines when configuring static routes.

Supported Static Routes in an MPLS Environment

The following **ip route** command is supported when you configure static routes in MPLS environment:

ip route *destination-prefix mask interface next-hop-address*

The following **ip route** commands are supported when you configure static routes in an MPLS environment and configure load sharing with static nonrecursive routes and a specific outbound interface:

ip route *destination-prefix mask interface1 next-hop1*

ip route *destination-prefix mask interface2 next-hop2*

Unsupported Static Routes in an MPLS Environment that Uses the TFIB

The following **ip route** command is not supported when you configure static routes in an MPLS environment:

ip route *destination-prefix mask next-hop-address*

The following **ip route** command is not supported when you configure static routes in an MPLS environment and enable load sharing where the next hop can be reached through two paths:

ip route *destination-prefix mask next-hop-address*

The following **ip route** command is not supported when you configure static routes in an MPLS environment and enable load sharing where the destination can be reached through two next hops:

ip route *destination-prefix mask next-hop1*

ip route *destination-prefix mask next-hop2*

Use the *interface* and *next-hop* arguments when specifying static routes.

Supported Static Routes in an MPLS VPN Environment

The following **ip route vrf** commands are supported when you configure static routes in a MPLS VPN environment, and the next hop and interface are in the same VRF:

- **ip route vrf** *vrf-name destination-prefix mask next-hop-address*
- **ip route vrf** *vrf-name destination-prefix mask interface next-hop-address*
- **ip route vrf** *vrf-name destination-prefix mask interface1 next-hop1*

- **ip route vrf** *vrf-name destination-prefix mask interface2 next-hop2*

The following **ip route vrf** commands are supported when you configure static routes in a MPLS VPN environment, and the next hop is in the global table in the MPLS cloud in the global routing table. For example, these commands are supported when the next hop is pointing to the Internet Gateway.

- ◦ **ip route vrf** *vrf-name destination-prefix mask next-hop-address global*
- **ip route vrf** *vrf-name destination-prefix mask interface next-hop-address* (This command is supported when the next hop and interface are in the core.)

The following **ip route** commands are supported when you configure static routes in a MPLS VPN environment and enable load sharing with static nonrecursive routes and a specific outbound interfaces:

ip route *destination-prefix mask interface1 next-hop1*

ip route *destination-prefix mask interface2 next-hop2*

Unsupported Static Routes in an MPLS VPN Environment that Uses the TFIB

The following **ip route** command is not supported when you configure static routes in a MPLS VPN environment, the next hop is in the global table in the MPLS cloud within the core, and you enable load sharing where the next hop can be reached through two paths:

ip route vrf *vrf-name destination-prefix mask next-hop-address global*

The following **ip route** commands are not supported when you configure static routes in a MPLS VPN environment, the next hop is in the global table in the MPLS cloud within the core, and you enable load sharing where the destination can be reached through two next hops:

ip route vrf *destination-prefix mask next-hop1 global*

ip route vrf *destination-prefix mask next-hop2 global*

The following **ip route vrf** commands are not supported when you configure static routes in an MPLS VPN environment, and the next hop and interface are in the same VRF:

ip route vrf *vrf-name destination-prefix mask next-hop1*

ip route vrf *vrf-name destination-prefix mask next-hop2*

Supported Static Routes in an MPLS VPN Environment Where the Next Hop Resides in the Global Table on the CE Router

The following **ip route vrf** command is supported when you configure static routes in a MPLS VPN environment, and the next hop is in the global table on the CE side. For example, the following command is supported when the destination-prefix is the CE router's loopback address, as in EBGp multihop cases.

ip route vrf *vrf-name destination-prefix mask interface next-hop-address*

The following **ip route** commands are supported when you configure static routes in a MPLS VPN environment, the next hop is in the global table on the CE side, and you enable load sharing with static non-recursive routes and a specific outbound interfaces:

ip route *destination-prefix mask interface1 nexthop1*

ip route *destination-prefix mask interface2 nexthop2*

Information About Dialing to Destinations with the Same IP Address for MPLS VPNs

- [Introduction to Dialing to Destinations with the Same IP Address for MPLS VPNs, page 4](#)
- [Benefits of this Feature, page 4](#)

Introduction to Dialing to Destinations with the Same IP Address for MPLS VPNs

The Cisco IOS dialer software can distinguish between two destinations with the same IP address using information stored in the VRF. This capability is provided to the dialer software by two existing Cisco IOS commands, **dialer map** and **ip route**, which have been enhanced to include VPN routing and forwarding (VRF) information.

In previous Cisco IOS releases, the dialer software obtained the telephone number for dial-out based on the destination IP address configured in the **dialer map** command. Now, the enhanced **dialer map** command supplies the name of the VRF so that the telephone number to be dialed is based on the VRF name and the destination IP address. The VRF is identified based on the incoming interface of the packet, and is used with the destination IP address defined in the **dialer map** command to determine the telephone number to be dialed.

The **ip route** configuration command also includes the VRF information. When a packet arrives in an incoming interface that belongs to a particular VRF, only those **ip route** commands that correspond to that particular VRF are used to determine the destination interface.

Benefits of this Feature

This feature allows the dialer software to dial out in an MPLS-based VPN. The MPLS VPN model simplifies network routing. For example, rather than needing to manage routing over a complex virtual network backbone composed of many virtual circuits, an MPLS VPN user can employ the backbone of the service provider as the default route in communicating with all other VPN sites.

This default route capability allows several sites to transparently interconnect through the service provider network. One service provider network can support several different IP VPNs, each of which appears to its users as a separate, private network. Within a VPN, each site can send IP packets to any other site in the same VPN, because each VPN is associated with one or more VRFs. The VRF is a key element in the VPN technology, because it maintains the routing information that defines a customer VPN site.

How to Enable Dialing to Destinations with the Same IP Address for MPLS VPNs

- [Mapping the VRF and Next-Hop Address to a Dial String, page 5](#)
- [Verifying the Configuration, page 6](#)

Mapping the VRF and Next-Hop Address to a Dial String

Use the following procedure to map a VRF and next-hop address combination to a dial string and thereby allow the dialer software to be VRF-aware for an MPLS VPN.

These commands are only part of the required configuration and show how to map a VRF and next-hop address combination to a dial string. Refer to the documents listed in the [Additional References, page 11](#) section and the example in the [Configuration Examples for Dialing to Destinations with the Same IP Address, page 7](#) section for details on where to include these commands in the network configuration.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface dialer *number***
4. **dialer map ip *protocol-next-hop-address* vrf *vrf-name* name *host-name* *dial-string***
5. **end**
6. **ip route vrf *vrf-name* *ip-address* *mask* *interface-type* *interface-number***

DETAILED STEPS

Command or Action	Purpose
Step 1 enable Example: <pre>Router> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2 configure terminal Example: <pre>Router# configure terminal</pre>	Enters global configuration mode.
Step 3 interface dialer <i>number</i> Example: <pre>Router(config)# interface dialer 1</pre>	Enters interface configuration mode and begins dialer configuration.
Step 4 dialer map ip <i>protocol-next-hop-address</i> vrf <i>vrf-name</i> name <i>host-name</i> <i>dial-string</i> Example: <pre>Router(config-if)# dialer map ip 60.0.0.12 vrf yellow name rubbertree02 5552171</pre>	Maps a VRF and next-hop address combination to a dial string (telephone number).

Command or Action	Purpose
Step 5 <code>end</code> Example: <pre>Router(config-if)# end</pre>	(Optional) Exits interface configuration mode.
Step 6 <code>ip route vrf vrf-name ip-address mask interface-type interface-number</code> Example: <pre>Router(config)# ip route vrf blue 10.0.0.1 255.255.255.255 Dialer0</pre>	Configures a VRF and next hop address combination that points to the interface where the dialer software should make the connection.

Verifying the Configuration

To verify the configuration, use the following procedure.

SUMMARY STEPS

1. `ping`
2. `show adjacency`

DETAILED STEPS

-
- Step 1** **ping**
Use this command on the customer edge NAS to place a call to a peer. The expected result is that the NAS successfully dials out to that peer.
- Step 2** **show adjacency**
Use this command if the call fails to check Cisco Express Forwarding (CEF) adjacency table information.
-

- [Troubleshooting Tips, page 6](#)

Troubleshooting Tips

If you encounter problems with the feature, use the following **debug** privileged EXEC commands on the NAS to help you determine where the problem lies:

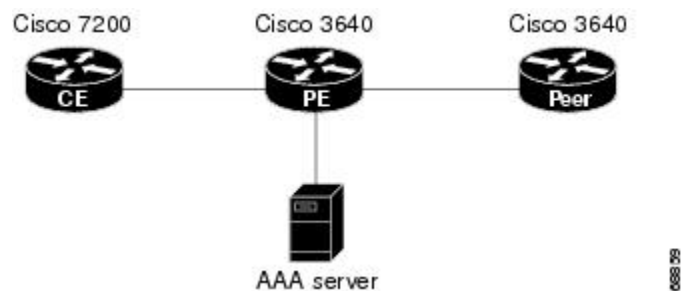
- `debug aaa authentication`
- `debug aaa authorization`
- `debug dialer`
- `debug ppp authentication`
- `debug ppp negotiation`

- `debug radius`

Configuration Examples for Dialing to Destinations with the Same IP Address

This section provides a configuration example of the feature for a simple network topology shown in the figure below.

Figure 1 *MPLS VPN Topology*



Note

The network addresses and telephone numbers used in the following configuration are examples only and will not work in an actual network configuration.

Customer Edge (CE) Router

```

!
hostname oaktree02
enable secret 5 !1!35Fg$Ep4.D8JGpg7rKxQa49BF9/
!
ip subnet-zero
no ip domain-lookup
!
controller T1 5/0
!
controller T1 5/1
!
interface FastEthernet0/0
no ip address
no ip mroute-cache
duplex auto
speed auto
!
interface FastEthernet0/1
no ip address
no ip mroute-cache
shutdown
duplex auto
speed auto
!
interface Ethernet1/0
ip address 10.0.58.11 255.255.255.0
no ip mroute-cache
half-duplex
!
interface Ethernet1/1

```

```

ip address 50.0.0.2 255.0.0.0
no ip mroute-cache
half-duplex
!
interface Ethernet1/2
no ip address
no ip mroute-cache
shutdown
half-duplex
!
interface Ethernet1/3
no ip address
no ip mroute-cache
shutdown
half-duplex
!
interface Serial2/0
no ip address
no ip mroute-cache
shutdown
no fair-queue
serial restart-delay 0
!
interface Serial2/1
no ip address
no ip mroute-cache
shutdown
serial restart-delay 0
!
interface Serial2/2
no ip address
no ip mroute-cache
shutdown
serial restart-delay 0
!
interface Serial2/3
no ip address
no ip mroute-cache
shutdown
serial restart-delay 0
!
interface FastEthernet4/0
no ip address
no ip mroute-cache
shutdown
duplex auto
speed auto
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.58.1
ip route 60.0.0.0 255.0.0.0 50.0.0.1
no ip http server
!
!
snmp-server manager
banner motd ^C AV-8B OAKTREE^C
alias exec r sh run
!
line con 0
exec-timeout 0 0
line aux 0
login
line vty 0 4
no login
!
end

```

Provider Edge (PE) Router

```

hostname pinetree02
!
aaa new-model

```



```
!  
!  
aaa authentication login con-log none  
aaa authentication ppp default group radius  
aaa authorization network default group radius  
aaa session-id common  
enable secret 5 $1$7KlA$xpC8l4dJcZogbzZvGUTf1/  
!  
username rubbertree02 password 0 Hello  
ip subnet-zero  
!  
no ip domain-lookup  
!  
ip vrf yellow  
  rd 100:1  
ip cef  
virtual-profile aaa  
isdn switch-type primary-5ess  
!  
controller T1 3/0  
  framing esf  
  linecode b8zs  
  pri-group timeslots 1-24  
!  
controller T1 3/1  
  framing esf  
  linecode b8zs  
!  
controller T1 3/2  
  framing esf  
  linecode b8zs  
!  
controller T1 3/3  
  framing esf  
  linecode b8zs  
!  
controller T1 3/4  
  framing esf  
  linecode b8zs  
!  
controller T1 3/5  
  framing esf  
  linecode b8zs  
!  
controller T1 3/6  
  framing esf  
  linecode b8zs  
!  
controller T1 3/7  
  framing esf  
  linecode b8zs  
!  
interface Loopback0  
  ip vrf forwarding yellow  
  ip address 70.0.0.1 255.0.0.0  
!  
interface FastEthernet1/0  
  no ip address  
  shutdown  
  duplex half  
!  
interface Ethernet2/0  
  ip address 10.0.58.3 255.255.255.0  
  duplex full  
!  
interface Ethernet2/1  
  ip vrf forwarding yellow  
  ip address 50.0.0.1 255.0.0.0  
  duplex half  
!  
interface Ethernet2/2  
  no ip address  
  shutdown
```

```

duplex half
!
interface Ethernet2/3
no ip address
shutdown
duplex half
!
interface Serial3/0:23
description phone# 555-3123
no ip address
encapsulation ppp
dialer rotary-group 0
dialer-group 1
isdn switch-type primary-5ess
ppp authentication chap
!
interface Serial4/0
no ip address
shutdown
no fair-queue
!
interface Dialer0
ip address negotiated
encapsulation ppp
dialer in-band
dialer map ip 60.0.0.12 vrf yellow name rubbertree02 5552171
dialer map ip 60.0.0.2 5552172
dialer-group 1
ppp authentication chap
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.58.1
ip route 60.0.0.2 255.255.255.255 Dialer0
ip route vrf yellow 60.0.0.0 255.0.0.0 Dialer0 permanent
no ip http server
ip pim bidir-enable
!
ip director cache time 60
dialer-list 1 protocol ip permit
!
radius-server host 172.19.192.89 auth-port 1645 acct-port 1646 key rad123
radius-server retransmit 3
call rsvp-sync
!
no mgcp timer receive-rtcp
!
mgcp profile default
!
dial-peer cor custom
!
gatekeeper
shutdown
!
banner motd ^C F/A-18 PINETREE ^C
!
line con 0
exec-timeout 0 0
login authentication con-log

line aux 0
line vty 5 15
!
end

```

Peer Router

```

hostname rubbertree02
!
logging buffered 32000 debugging
enable secret 5 $1$RCKC$scgtdlaDzjSyUVAi7KK5Q.
enable password Windy
!

```

```

username pinetree02 password 0 Hello
!
ip subnet-zero
no ip domain-lookup
!
isdn switch-type basic-5ess
!
interface Ethernet0
 ip address 10.0.58.9 255.255.255.0
 no ip route-cache
!
interface BRI0
 description phone# 555-2171
 ip address 60.0.0.12 255.0.0.0
 encapsulation ppp
 no ip route-cache
 dialer map ip 60.0.0.11 5553123
 dialer map ip 60.0.0.2 5552172
 dialer-group 1
 isdn switch-type basic-5ess
 isdn fast-rollover-delay 45
!
ip default-gateway 10.0.58.1
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.58.1
ip route 50.0.0.0 255.0.0.0 70.0.0.1
no ip http server
!
dialer-list 1 protocol ip permit
no cdp run
banner motd ^C F-4B RUBBERTREE^C
!
line con 0
 exec-timeout 0 0
line vty 0 4
 password Windy
 login
!
end

```

AAA Server User File

```

[aaa-serv]/usr/testing/bin> ./radiusd_1.16 -d . -a . -x
greentree-16 Password = "Hello", Expiration = "Dec 31 2005"
Service-Type = Framed-User,
Framed-Protocol = PPP
cisco-avpair = "lcp:interface-config=ip vrf forwarding yellow \nip
unnumbered Loopback0"

```

Additional References

Related Documents

Related Topic	Document Title
MPLS	MPLS Product Literature

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 1164	Application of the Border Gateway Protocol in the Internet
RFC 1171	A Border Gateway Protocol 4
RFC 1700	Assigned Numbers
RFC 1966	BGP Route Reflection: An Alternative to Full Mesh IBGP
RFC 2283	Multiprotocol Extensions for BGP-4
RFC 2547	BGP/MPLS VPNs
RFC 2842	Capabilities Advertisement with BGP-4
RFC 2858	Multiprotocol Extensions for BGP-4

Technical Assistance

Description	Link
<p>The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.</p>	<p>http://www.cisco.com/techsupport</p>
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p>	
<p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p>	
<p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	

Feature Information for Dialing to Destinations with the Same IP Address

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1 Feature Information for Dialing to Destinations with the Same IP Address

Feature Name	Releases	Feature Configuration Information
Dialer Map VRF-Aware for MPLS VPNs	12.2(8)T	The Cisco IOS dialer software is "VRF-aware for an MPLS VPN," which means that it can distinguish between two destinations with the same IP address using information stored in the VRF.

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