



# Dialer Map VRF-Aware for an MPLS VPN

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## Feature History

Release	Modification
12.2(8)T	This feature was introduced.

This document describes the Asynchronous Line Monitoring feature feature in Cisco IOS Release 12.2(8)T and includes the following sections:

- [Feature Overview, page 1](#)
- [Supported Platforms, page 3](#)
- [Supported Standards, MIBs, and RFCs, page 3](#)
- [Prerequisites, page 4](#)
- [Configuration Tasks, page 4](#)
- [Configuration Example, page 6](#)
- [Command Reference, page 12](#)

## Feature Overview

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 would fail. The Asynchronous Line Monitoring feature feature solves this problem.

A VRF—virtual routing and forwarding instance—is a per-Virtual Private Network (VPN) routing information repository that defines the VPN membership of a customer site attached to the NAS. A VRF consists of an IP routing table, a derived Cisco Express Forwarding (CEF) table, a set of interfaces that use the forwarding table, and a set of rules and routing protocol parameters that control the information that is included in the routing table. A separate set of routing and CEF tables is maintained for each VPN customer.

The Multiprotocol Label Switching (MPLS) distribution protocol is a high-performance packet forwarding technology that integrates the performance and traffic management capabilities of data link layer switching with the scalability, flexibility, and performance of network-layer routing.



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. 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 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

The Asynchronous Line Monitoring 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.

For additional benefits and information about MPLS, VPNs, and VRF, refer to the documents listed in the “[Related Documents](#)” section.

## Related Documents

Additional information about configuring networks that can take advantage of the Asynchronous Line Monitoring feature can be found in the following Cisco IOS documentation:

- *Cisco IOS Dial Technologies Command Reference*, Release 12.2.
- *Cisco IOS Dial Technologies Configuration Guide*, Release 12.2. Refer to the chapter “Configuring Virtual Profiles” in the part “Virtual Templates, Profiles, and Networks.”
- *Cisco IOS Switching Services Command Reference*, Release 12.2.
- *Cisco IOS Switching Services Configuration Guide*, Release 12.2. Refer to the chapters “Multiprotocol Label Switching Overview” and “Configuring Multiprotocol Label Switching” in the part “Multiprotocol Label Switching.”

## Supported Platforms

The Asynchronous Line Monitoring feature is supported on the following Cisco router and access server platforms:

- Cisco 1600 series
- Cisco 1720
- Cisco 1721
- Cisco 1750
- Cisco 1751
- Cisco 3600 series
- Cisco 3631
- Cisco 3725
- Cisco 3745
- Cisco 7200 series
- Cisco 7500 series
- Cisco 802
- Cisco 820
- Cisco 828
- Cisco uBR7200

### Determining Platform Support Through Feature Navigator

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Feature Navigator. Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image.

To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to [cco-locksmith@cisco.com](mailto:cco-locksmith@cisco.com). An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions at <http://www.cisco.com/register>.

Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Feature Navigator home page at the following URL:

<http://www.cisco.com/go/fn>

## Supported Standards, MIBs, and RFCs

### Standards

None

### MIBs

None

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

#### RFCs

None

## Prerequisites

Before beginning the tasks described in this document, you need to understand how to configure the following network features:

- Virtual profiles with two-way AAA authentication
- MPLS VPNs

Refer to the documents listed in the “[Related Documents](#)” section for information about configuring these features.

## Configuration Tasks

See the following sections for the configuration tasks for this feature. Each task in the list is identified as either required or optional.

- [Configuring Asynchronous Line Monitoring feature](#) (required)
- [Verifying Asynchronous Line Monitoring feature](#) (optional)

## Configuring Asynchronous Line Monitoring feature

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, use the following commands beginning in global configuration mode.

	Command	Purpose
Step 1	Router(config)# <b>interface dialer</b> <i>number</i>	Enters configuration mode and begins dialer configuration.
Step 2	Router(config-if)# <b>dialer map ip</b> <i>protocol-next-hop-address vrf vrf-name</i> <b>name</b> <i>host-name dial-string</i>	Maps a VRF and next hop address combination to a dial string (telephone number).
Step 3	Router(config-if)# <b>exit</b>	Exit to global configuration mode.
Step 4	Router(config)# <b>ip route vrf</b> <i>vrf-name</i> <i>ip-address mask interface-type</i> <i>interface-number</i>	Configures a VRF and next hop address combination that points to the interface where the dialer software should make the connection.

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 section “[Related Documents](#)” and the example in the “[Configuration Example](#)” section, for details on where to include these commands in the network configuration.

## Verifying Asynchronous Line Monitoring feature

The verification process described in this section is based on the following configuration:

```
interface dialer 1
  dialer map ip 10.0.0.1 vrf blue name peer1 peer1_number
ip route vrf blue 10.0.0.1 255.255.255.255 Dialer0
```

To verify correct operation of the Asynchronous Line Monitoring feature feature, on the customer edge NAS, use the **ping** command in EXEC mode to place a call to peer. The expected result is that the NAS successfully dials out to peer1. If the call fails, use the **show adjacency** EXEC command to check CEF adjacency table information.

## Troubleshooting Tips

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

- **debug ppp authentication**
- **debug ppp negotiation**
- **debug aaa authentication**
- **debug aaa authorization**
- **debug radius**
- **debug dialer**

## Monitoring and Maintaining Asynchronous Line Monitoring feature

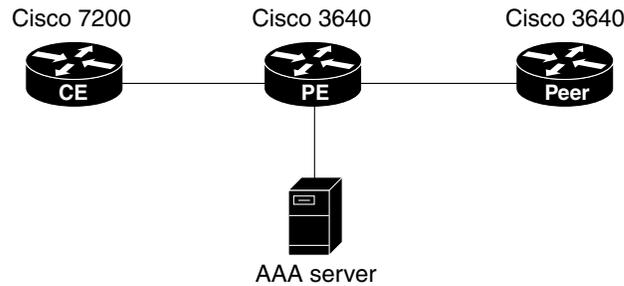
To monitor and maintain the Asynchronous Line Monitoring feature feature, use the following EXEC commands:

Command	Purpose
Router# <b>show adjacency</b>	Displays CEF adjacency table information.
Router# <b>show ip route</b>	Displays all static IP routes, or those installed using the AAA route download function.
Router# <b>show users</b>	Displays information about the active lines on the router.

# Configuration Example

This section provides a configuration example of the Asynchronous Line Monitoring feature on the simple network topology shown in [Figure 1](#).

**Figure 1** CE-to-PE-to-Peer MPLS VPN Topology



## Note

The network addresses and telephone numbers used in the following configuration are examples only and will not work if tried 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 Serial3/0
  no ip address
  no ip mroute-cache
  shutdown
  !
interface Serial3/1
  no ip address
  no ip mroute-cache
  shutdown
  !
interface Serial3/2
  no ip address
  no ip mroute-cache
  shutdown
  !
interface Serial3/3
  no ip address
  no ip mroute-cache
  shutdown
  !
interface Serial3/4
  no ip address
  no ip mroute-cache
  shutdown
  !
```

```

interface Serial3/5
 no ip address
 no ip mroute-cache
 shutdown
!
interface Serial3/6
 no ip address
 no ip mroute-cache
 shutdown
!
interface Serial3/7
 no ip address
 no ip mroute-cache
 shutdown
!
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's 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$7KlA$xpC814dJCZogbzZvGUtFl/
!
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 Serial4/1
no ip address
shutdown
!
interface Serial4/2
no ip address
shutdown
!
interface Serial4/3
no ip address
shutdown
!
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 Serial0
  no ip address
  no ip route-cache
  shutdown
!
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"

```

## Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Dial Technologies Command Reference* at [http://www.cisco.com/en/US/docs/ios/dial/command/reference/dia\\_book.html](http://www.cisco.com/en/US/docs/ios/dial/command/reference/dia_book.html). For information about all Cisco IOS commands, go to the Command Lookup Tool at <http://tools.cisco.com/Support/CLILookup> or to the *Cisco IOS Master Commands List*

- **dialer map**

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