

# Inverse MUX Application using Multilink PPP

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## Introduction

In some environments, it may be necessary to bundle multiple serial links to act as single link with aggregated bandwidth. This document describes how to configure Cisco 4500 routers to bundle four serial interfaces using a virtual-template interface.

This configuration can be used for routers connected over leased lines or routers that have the Channel Service Unit/Data Service Unit (CSU/DSU). You can add additional features to this configuration depending on your needs.

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

The information in this document is based on the software and hardware versions below.

- Cisco 4500 routers in a lab environment with cleared configurations.
- Cisco IOS® version 12.2(10b) was running on both routers.

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

### Related Products

This configuration can also be used with the following hardware and software versions.

- Any two routers with four serial interfaces each.
- WIC-1T and WIC-2T serial interfaces can be used.

## Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

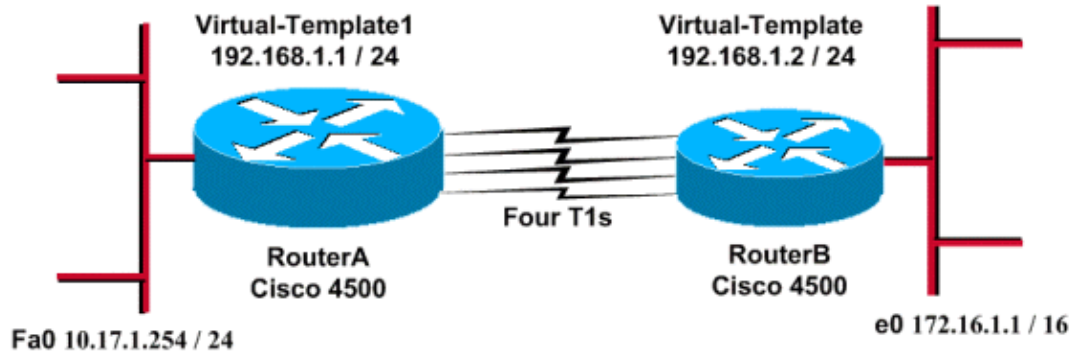
## Configure

In this section, you are presented with the information to configure the features described in this document.

**Note:** To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

## Network Diagram

This document uses the network setup shown in the diagram below.



## Configurations

This configuration was tested using Cisco IOS Software Release 12.2(10b) on 4500 series routers. The same configuration concepts apply to a similar router topology or other Cisco IOS releases.

This document uses the configurations shown below.

RouterA
<pre> version 12.2 ! hostname RouterA ! ! username RouterB password xxx ip subnet-zero multilink virtual-template 1 ! interface loopback 0 ip address 192.168.1.1 255.255.255.0 ! interface Virtual-Template1 ip unnumbered loopback0 ppp authentication chap </pre>

```
ppp multilink
!
interface Serial0
no ip address
encapsulation ppp
no fair-queue
ppp multilink
pulse-time 3
!
interface Serial1
no ip address
encapsulation ppp
no fair-queue
ppp multilink
pulse-time 3
!
interface Serial2
no ip address
encapsulation ppp
no fair-queue
ppp multilink
pulse-time 3
!
interface Serial3
no ip address
encapsulation ppp
no fair-queue
ppp multilink
pulse-time 3
!
interface FastEthernet0
ip address 10.17.1.254 255.255.255.0
!
router rip
network 10.0.0.0
network 192.168.1.0
!
end
```

### RouterB

```
version 12.2
!
hostname RouterB
!
username RouterA password xxx
ip subnet-zero
multilink virtual-template 1
!
interface loopback 0
ip address 192.168.1.2 255.255.255.0
!
!
interface Virtual-Template1
ip unnumbered loopback0
ppp authentication chap
ppp multilink
!
interface Serial0
no ip address
encapsulation ppp
no fair-queue
ppp multilink
pulse-time 3
!
```

```

interface Serial1
  no ip address
  encapsulation ppp
  no fair-queue
  ppp multilink
  pulse-time 3
!
interface Serial2
  no ip address
  encapsulation ppp
  no fair-queue
  ppp multilink
  pulse-time 3
!
interface Serial3
  no ip address
  encapsulation ppp
  no fair-queue
  ppp multilink
  pulse-time 3
!
interface Ethernet0
  ip address 172.16.1.1 255.255.0.0
!
router rip
network 172.16.0.0
network 192.168.1.0
!
end

```

Configure the following to implement the above configuration:

- multilink virtual-template
- interface virtual-template
- PPP multilink in each of the serial interfaces in which bundling has to be done.
- An RIP as the IP routing protocol

Interface loopback 0 is configured so that it never fails, and **ip unnumbered loopback 0** enhances the bundling of more than five serial interfaces with the same IP address.

When all the serial interfaces are up, and user traffic is to be sent, multilink PPP creates a virtual-access interface and the PPP negotiation takes place. The configuration for this virtual-access interface is cloned from the virtual template. The number of serial interfaces that are up are bundled in this virtual-access interface and an aggregate bandwidth is created.

## Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show ip route**
- **show ip rip database**
- **show ppp multilink**
- **show interface virtual-access 1**

```
RouterA#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

```
R      172.16.0.0/16 [120/1] via 192.168.1.2, 00:00:19, Virtual-Access1
      10.0.0.0/24 is subnetted, 1 subnets
C      10.17.1.0 is directly connected, FastEthernet0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.1.0/24 is directly connected, Loopback0
C      192.168.1.2/32 is directly connected, Virtual-Access1
```

RouterA#show ip route connected

```
      10.0.0.0/24 is subnetted, 1 subnets
C      10.17.1.0 is directly connected, FastEthernet0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.1.0/24 is directly connected, Loopback0
C      192.168.1.2/32 is directly connected, Virtual-Access1
```

RouterB#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

```
C      172.16.0.0/16 is directly connected, Ethernet0
R      10.0.0.0/8 [120/1] via 192.168.1.1, 00:00:18, Virtual-Access1
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.1.1/32 is directly connected, Virtual-Access1
C      192.168.1.0/24 is directly connected, Loopback0
```

RouterB#show ip route connected

```
C      172.16.0.0/16 is directly connected, Ethernet0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.1.1/32 is directly connected, Virtual-Access1
C      192.168.1.0/24 is directly connected, Loopback0
```

RouterA#show ip rip database

```
10.0.0.0/8    auto-summary
10.17.1.0/24  directly connected, FastEthernet0
172.16.0.0/16 auto-summary
172.16.0.0/16
    [1] via 192.168.1.2, 00:00:34, Virtual-Access1
192.168.1.0/24 auto-summary
192.168.1.0/24 directly connected, Loopback0
192.168.1.2/32 directly connected, Virtual-Access1
```

RouterB#show ip rip database

```
10.0.0.0/8    auto-summary
10.0.0.0/8
    [1] via 192.168.1.1, 00:00:13, Virtual-Access
172.16.0.0/16 auto-summary
172.16.0.0/16 directly connected, Ethernet0
192.168.1.0/24 auto-summary
192.168.1.0/24 directly connected, Loopback0
192.168.1.1/32 directly connected, Virtual-Access1
```

```
RouterA#show ppp multilink
Virtual-Access1, bundle name is RouterB
Bundle up for 17:01:59
0 lost fragments, 0 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0xD3C received sequence, 0x1180 sent sequence
Member links: 4 (max not set, min not set)
  Serial0, since 17:01:59, last rcvd seq 000D38
  Serial1, since 17:01:50, last rcvd seq 000D39
  Serial2, since 17:01:46, last rcvd seq 000D3A
  Serial3, since 17:01:41, last rcvd seq 000D3B
```

```
RouterB#show ppp multilink

Virtual-Access1, bundle name is RouterA
Bundle up for 12:47:33
0 lost fragments, 0 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0x1186 received sequence, 0xD40 sent sequence
Member links: 4 (max not set, min not set)
  Serial0, since 12:47:33, last rcvd seq 001184
  Serial1, since 12:47:27, last rcvd seq 001185
  Serial2, since 12:47:23, last rcvd seq 001182
  Serial3, since 12:47:20, last rcvd seq 001183
```

```
RouterA#show interface virtual-access 1
Virtual-Access1 is up, line protocol is up
Hardware is Virtual Access interface
Interface is unnumbered. Using address of Loopback0 (192.168.1.1)
MTU 1500 bytes, BW 6176 Kbit, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
DTR is pulsed for 5 seconds on reset
LCP Open, multilink Open
Open: IPCP
Last input 00:00:00, output never, output hang never
Last clearing of "show interface" counters 17:05:41
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
    1711 packets input, 163898 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    2256 packets output, 211897 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
```

```
RouterB#show interface virtual-access 1
Virtual-Access1 is up, line protocol is up
Hardware is Virtual Access interface
Interface is unnumbered. Using address of Loopback0 (192.168.1.2)
MTU 1500 bytes, BW 6176 Kbit, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
DTR is pulsed for 5 seconds on reset
LCP Open, multilink Open
Open: IPCP
Last input 00:00:20, output never, output hang never
Last clearing of "show interface" counters 12:54:17
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
```

```

Queueing strategy: fifo
Output queue :0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  2256 packets input, 216460 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  1714 packets output, 160624 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions

```

## Troubleshoot

This section provides information you can use to troubleshoot your configuration.

## Troubleshooting Commands

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

**Note:** Before issuing **debug** commands, please see Important Information on Debug Commands.

- **debug ppp negotiation** – To see if a client is passing PPP negotiation; this command is used to check for address negotiation.
- **debug ppp authentication** – To see if a client is passing authentication. If you are using a Cisco IOS Software Release prior to 11.2, use the **debug ppp chap** command instead.
- **debug ppp error** – To display protocol errors and error statistics associated with PPP connection negotiation and operation.
- **debug vtemplate** – To display the Virtual Template cloning to form a Virtual Access interface.
- **debug ppp multilink events** – To see PPP multilink events debugging. Displays information about events affecting multilink groups.
- **show ppp multilink** – To see the members of the multilink bundle.

The following outputs were obtained from the Cisco 4500 routers. They show the routers establishing a multilink PPP connection.

```

RouterA#debug vtemplate
  Virtual Template debugging is on

*Dec 1 17:24:16.519: Vi1 VTEMPLATE: Reuse Vi1, recycle queue size 0
*Dec 1 17:24:16.519: Vi1 VTEMPLATE: Set default settings with ip unnumbered
*Dec 1 17:24:16.539: Vi1 VTEMPLATE: Hardware address 00d0.bbfa.f579
*Dec 1 17:24:16.543: Vi1 VTEMPLATE: Has a new cloneblk vtemplate,
now it has vtemplate
*Dec 1 17:24:16.543: Vi1 VTEMPLATE: ***** CLONE VACCESS1 *****
*Dec 1 17:24:16.543: Vi1 VTEMPLATE: Clone from Virtual-Templat1
interface Virtual-Access1
default ip address
no ip address
encap ppp
ip unnumbered loopback0
end

*Dec 1 17:24:16.595: %LINK-3-UPDOWN:
Interface Virtual-Access1, changed state to up
*Dec 1 17:24:17.515: %LINEPROTO-5-UPDOWN:
Line protocol on Interface Serial0, changed state to up
*Dec 1 17:24:17.595: %LINEPROTO-5-UPDOWN:
Line protocol on Interface Virtual-Access1, changed state to up

```

RouterA#debug ppp negotiation

PPP protocol negotiation debugging is on

```
Dec 11 19:39:14.523: %LINK-5-CHANGED: Interface Serial0, changed state to reset
Dec 11 19:39:14.523: Se0 LCP: State is Closed
Dec 11 19:39:14.627: %SYS-5-CONFIG_I: Configured from console by console
Dec 11 19:39:16.523: %LINK-3-UPDOWN: Interface Serial0, changed state to up
Dec 11 19:39:16.523: Se0 PPP: Treating connection as a dedicated line
Dec 11 19:39:16.523: Se0 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
Dec 11 19:39:16.523: Se0 LCP: O CONFREQ [Closed] id 25 len 24
Dec 11 19:39:16.523: Se0 LCP: MagicNumber 0xD4CBA693 (0x0506D4CBA693)
Dec 11 19:39:16.523: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:39:16.523: Se0 LCP: EndpointDisc 1 RouterA (0x130A01506F6D65726F6C)
Dec 11 19:39:16.535: Se0 LCP: I CONFREQ [REQsent] id 33 len 25
Dec 11 19:39:16.535: Se0 LCP: MagicNumber 0x03200E36 (0x050603200E36)
Dec 11 19:39:16.535: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:39:16.539: Se0 LCP: EndpointDisc 1 RouterB (0x130B0150756C6C69676E79)
Dec 11 19:39:16.539: Se0 LCP: O CONFACK [REQsent] id 33 len 25
Dec 11 19:39:16.539: Se0 LCP: MagicNumber 0x03200E36 (0x050603200E36)
Dec 11 19:39:16.539: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:39:16.539: Se0 LCP: EndpointDisc 1 RouterB (0x130B0150756C6C69676E79)
Dec 11 19:39:16.539: Se0 LCP: I CONFACK [ACKsent] id 25 len 24
Dec 11 19:39:16.539: Se0 LCP: MagicNumber 0xD4CBA693 (0x0506D4CBA693)
Dec 11 19:39:16.539: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:39:16.543: Se0 LCP: EndpointDisc 1 RouterA (0x130A01506F6D65726F6C)
Dec 11 19:39:16.543: Se0 LCP: State is Open
Dec 11 19:39:16.543: Se0 PPP: Phase is VIRTUALIZED [0 sess, 1 load]
Dec 11 19:39:16.555: Vi1 PPP: Phase is DOWN, Setup [0 sess, 1 load]
Dec 11 19:39:16.587: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up
Dec 11 19:39:16.587: Vi1 PPP: Treating connection as a dedicated line
Dec 11 19:39:16.587: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
Dec 11 19:39:16.587: Vi1 LCP: O CONFREQ [Closed] id 1 len 29
Dec 11 19:39:16.587: Vi1 LCP: AuthProto CHAP (0x0305C22305)
Dec 11 19:39:16.587: Vi1 LCP: MagicNumber 0xD4CBA6D4 (0x0506D4CBA6D4)
Dec 11 19:39:16.587: Vi1 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:39:16.587: Vi1 LCP: EndpointDisc 1 RouterA (0x130A01506F6D65726F6C)
Dec 11 19:39:16.587: Vi1 PPP: Phase is UP [0 sess, 1 load]
Dec 11 19:39:16.591: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10
Dec 11 19:39:16.591: Vi1 IPCP: Address 192.168.1.1 (0x0306C0A80101)
Dec 11 19:39:16.591: Vi1 MLP: Added first link Se0 to bundle RouterB
Dec 11 19:39:16.623: Vi1 IPCP: I CONFREQ [REQsent] id 1 len 10
Dec 11 19:39:16.623: Vi1 IPCP: Address 192.168.1.2 (0x0306C0A80102)
Dec 11 19:39:16.623: Vi1 IPCP: O CONFACK [REQsent] id 1 len 10
Dec 11 19:39:16.623: Vi1 IPCP: Address 192.168.1.2 (0x0306C0A80102)
Dec 11 19:39:16.623: Vi1 IPCP: I CONFACK [ACKsent] id 1 len 10
Dec 11 19:39:16.627: Vi1 IPCP: Address 192.168.1.1 (0x0306C0A80101)
Dec 11 19:39:16.627: Vi1 IPCP: State is Open
Dec 11 19:39:16.627: Vi1 IPCP: Install route to 192.168.1.2
Dec 11 19:39:17.543: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0,
changed state to up
Dec 11 19:39:17.587: %LINEPROTO-5-UPDOWN:
Line protocol on Interface Virtual-Access1, changed state to up
```

RouterB#debug ppp negotiation

PPP protocol negotiation debugging is on

```
Dec 11 19:38:08.975: Se0 LCP: I CONFREQ [Closed] id 25 len 24
Dec 11 19:38:08.975: Se0 LCP: MagicNumber 0xD4CBA693 (0x0506D4CBA693)
Dec 11 19:38:08.975: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:38:08.975: Se0 LCP: EndpointDisc 1 RouterA (0x130A01506F6D65726F6C)
Dec 11 19:38:08.975: Se0 LCP: Lower layer not up, Fast Starting
Dec 11 19:38:08.975: Se0 PPP: Treating connection as a dedicated line
Dec 11 19:38:08.979: Se0 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
Dec 11 19:38:08.979: Se0 LCP: O CONFREQ [Closed] id 33 len 25
Dec 11 19:38:08.979: Se0 LCP: MagicNumber 0x03200E36 (0x050603200E36)
```




```

Dec 11 19:38:08.979: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:38:08.979: Se0 LCP: EndpointDisc 1 RouterB (0x130B0150756C6C69676E79)
Dec 11 19:38:08.979: Se0 LCP: O CONFACK [REQsent] id 25 len 24
Dec 11 19:38:08.979: Se0 LCP: MagicNumber 0xD4CBA693 (0x0506D4CBA693)
Dec 11 19:38:08.979: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:38:08.979: Se0 LCP: EndpointDisc 1 RouterA (0x130A01506F6D65726F6C)
Dec 11 19:38:08.979: %LINK-3-UPDOWN: Interface Serial0, changed state to up
Dec 11 19:38:08.987: Se0 LCP: I CONFACK [ACKsent] id 33 len 25
Dec 11 19:38:08.987: Se0 LCP: MagicNumber 0x03200E36 (0x050603200E36)
Dec 11 19:38:08.987: Se0 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:38:08.987: Se0 LCP: EndpointDisc 1 RouterB (0x130B0150756C6C69676E79)
Dec 11 19:38:08.987: Se0 LCP: State is Open
Dec 11 19:38:08.987: Se0 PPP: Phase is VIRTUALIZED [0 sess, 1 load]
Dec 11 19:38:08.999: Vi1 PPP: Phase is DOWN, Setup [0 sess, 1 load]
Dec 11 19:38:09.039: Se0 IPCP: Packet buffered while building MLP bundle interface
Dec 11 19:38:09.043: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up
Dec 11 19:38:09.043: Vi1 PPP: Treating connection as a dedicated line
Dec 11 19:38:09.043: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
Dec 11 19:38:09.043: Vi1 LCP: O CONFREQ [Closed] id 1 len 30
Dec 11 19:38:09.043: Vi1 LCP: AuthProto CHAP (0x0305C22305)
Dec 11 19:38:09.043: Vi1 LCP: MagicNumber 0x03200E78 (0x050603200E78)
Dec 11 19:38:09.043: Vi1 LCP: MRRU 1524 (0x110405F4)
Dec 11 19:38:09.043: Vi1 LCP: EndpointDisc 1 RouterB (0x130B0150756C6C69676E79)
Dec 11 19:38:09.043: Vi1 PPP: Phase is UP [0 sess, 1 load]
Dec 11 19:38:09.043: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10
Dec 11 19:38:09.043: Vi1 IPCP: Address 192.168.1.2 (0x0306C0A80102)
Dec 11 19:38:09.047: Vi1 MLP: Added first link Se0 to bundle RouterA
Dec 11 19:38:09.047: Vi1 PPP: Pending ncpQ size is 1
Dec 11 19:38:09.047: Se0 IPCP: Redirect packet to Vi1
Dec 11 19:38:09.047: Vi1 IPCP: I CONFREQ [REQsent] id 1 len 10
Dec 11 19:38:09.047: Vi1 IPCP: Address 192.168.1.1 (0x0306C0A80101)
Dec 11 19:38:09.047: Vi1 IPCP: O CONFACK [REQsent] id 1 len 10
Dec 11 19:38:09.047: Vi1 IPCP: Address 192.168.1.1 (0x0306C0A80101)
Dec 11 19:38:09.051: Vi1 IPCP: I CONFACK [ACKsent] id 1 len 10
Dec 11 19:38:09.051: Vi1 IPCP: Address 192.168.1.2 (0x0306C0A80102)
Dec 11 19:38:09.051: Vi1 IPCP: State is Open
Dec 11 19:38:09.051: Vi1 IPCP: Install route to 192.168.1.1
Dec 11 19:38:09.987: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to up
Dec 11 19:38:10.043: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up

RouterB#debug ppp multilink events
Multilink events debugging is on
Dec 11 19:41:30.239: %LINK-3-UPDOWN: Interface Serial0, changed state to up
Dec 11 19:41:30.243: Se0 MLP: Request add link to bundle
Dec 11 19:41:30.243: Se0 MLP: Adding link to bundle
Dec 11 19:41:30.255: Vi1 MLP: VP: Clone from Vtemplate 1 block=1
Dec 11 19:41:30.299: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up
Dec 11 19:41:30.299: Vi1 MLP: Added first link Se0 to bundle RouterA
Dec 11 19:41:31.243: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to up
Dec 11 19:41:31.243: Se0 MLP: cdp packet forwarded to wrong interface
Dec 11 19:41:31.299: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up

```

## Related Information

- [Virtual Profiles](#)
- [Virtual Interface Template Service](#)
- [Configuring PPP and Authentication](#)
- [Displaying Caller Statistics](#)
- [Multilink PPP RFC 1717](#) 
- [Configuring Peer to Peer DDR with Dialer Profiles](#)

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