Multilink Via Virtual−Template on Two Serial Interfaces

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Contents

Introduction

Multilink PPP (MLP) balances load over dialer interfaces, such as ISDN, synchronous, and asynchronous interfaces. MLP splits packets and sends the fragments over parallel circuits. This way, MLP improves throughput and reduces latency between systems. MLP provides a method to split, recombine, and sequence datagrams across multiple logical data links. MLP allows packets to fragment, and the fragments to be sent at the same time over multiple point−to−point links to the same remote address.

This document illustrates a Multilink connection between serial interfaces through the virtual−template configuration.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these software and hardware versions:

- Cisco IOS® Software Release 11.2 or later.
- Two Cisco 2503 routers, which have two WAN serial interfaces each. These routers run Cisco IOS Software Release 12.2(7b).

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure

that you understand the potential impact of any command.

Related Products

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

- Any two routers that have two WAN serial interfaces. You can use WIC−1T, WIC−2T and fixed WAN serial interfaces.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

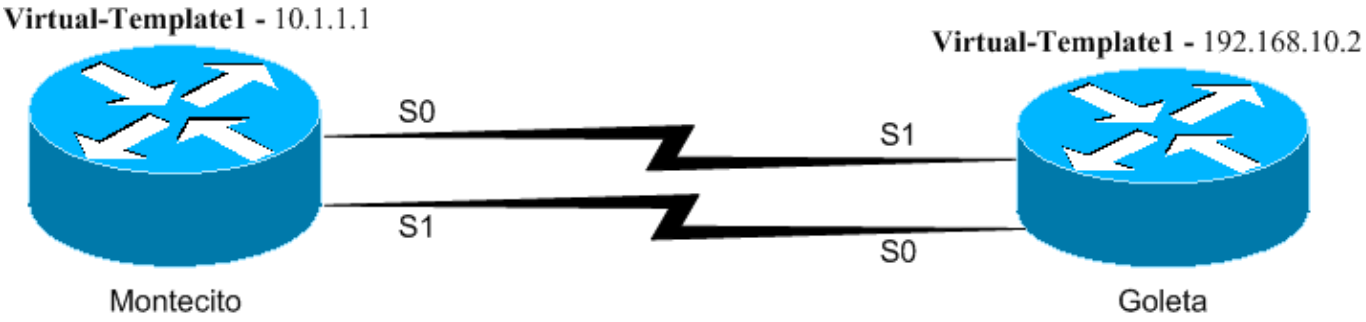
Configure

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

Note: Use the Command Lookup Tool (registered customers only) to find more information on the commands used in this document.

Network Diagram

This document uses this network setup:



Routers Montecito and Goleta are connected back−to−back through interfaces Serial0 and Serial1. This configuration uses a Virtual−Template on each side, Multilink Point−to−Point Protocol (PPP), and bridges and routes IP and IPX between the routers.

Configurations

This document uses these configurations:

- Montecito
- Goleta

Montecito

```
Montecito#write terminal
 Building configuration...
 Current configuration : 945 bytes
 !
 version 12.2
 service timestamps debug uptime
 service timestamps log uptime
```

```
 no service password-encryption
 !
 hostname Montecito
 !
 boot system flash c2500-d-l.122-7b.bin
 no logging buffered
 !
 ip subnet-zero
 no ip domain-lookup
 !
 !
 multilink virtual-template 1

!--- Applies the virtual interface template to the multilink bundle.
 !--- All multilink calls have virtual-access interfaces cloned
 !--- from virtual-template 1.

 !
 ipx routing 0000.0c31.aac2
 !
 interface Loopback0
 ip address 10.1.1.1 255.0.0.0
 ipx network BEEF
 !
 interface Ethernet0
 no ip address
 shutdown
 !
 !

!--- Virtual-template is a logical interface that creates virtual access
 !--- interfaces dynamically, and applies them to physical serial interfaces.

 interface Virtual-Template1

!--- Assumes the IP & IPX address of Loopback0.

 ip unnumbered Loopback0
 ipx ppp-client Loopback0
 ppp multilink

!--- Enables Multilink PPP on the interface.

 bridge-group 1
 !
 interface Serial0
 no ip address
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 no fair-queue

!--- Enables Multilink PPP on the interface.

 ppp multilink
 !
 interface Serial1
 no ip address
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 no fair-queue

!--- Enables Multilink PPP on the interface.

 ppp multilink
```

```
!
interface BRI0
no ip address
shutdown
!
no ip classless
!
bridge 1 protocol ieee
!
line con 0
line aux 0
line vty 0 4
login
!
end
```

Goleta

```
Goleta#write terminal
Building configuration...
Current configuration : 960 bytes
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Goleta
!
!
ip subnet-zero
no ip domain-lookup
!
!

!--- Applies the virtual interface template to the multilink bundle.
!--- Skip this step for ISDN or dialer interfaces.

multilink virtual-template 1
ipx routing 0000.0c47.4e9a
!
!
!
interface Loopback0
ip address 192.168.10.2 255.255.255.0
ipx network BEEF
!
interface Ethernet0
no ip address
shutdown
!

!--- Virtual-template is a logical interface that Creates virtual access
!--- interfaces dynamically and applies them to physical serial interfaces.

interface Virtual-Template1

!--- Assumes the IP & IPX address of Loopback0.

ip unnumbered Loopback0
ipx ppp-client Loopback0
!

!--- Enables Multilink PPP on the interface.

ppp multilink
```

```
 bridge-group 1
 !
 interface Serial0
 no ip address
 encapsulation ppp
 no fair-queue
 clockrate 1000000
 !

!--- Enables Multilink PPP on the interface.

 ppp multilink
 !
 interface Serial1
 no ip address
 encapsulation ppp
 no fair-queue
 clockrate 1000000
 !

!--- Enables Multilink PPP on the interface.

 ppp multilink
 !
 interface BRI0
 no ip address
 shutdown
 !
 ip classless
 !
 bridge 1 protocol ieee
 !
 line con 0
 line aux 0
 line vty 0 4
 !
 end
```

Verify

Use this section to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

- **show ppp multilink** displays information on multilink bundles that are active. Use this command to verify the multilink connection.
- **show interface virtual-access** displays status, traffic data, and configuration information about a specific virtual access interface.
- **show interface serial** enables you to troubleshoot any problems with the serial interface

Sample show Output

show Commands on Montecito After the Connection is Made

```
Montecito#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 (10.1.1.1)
  MTU 1500 bytes, BW 3088 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: BRIDGECP, IPCP, IPXCP
Last input 00:00:00, output never, output hang never
Last clearing of "show interface" counters 00:02:09
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
   22 packets input, 743 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
   8 packets output, 124 bytes, 0 underruns
   0 output errors, 0 collisions, 0 interface resets
   0 output buffer failures, 0 output buffers swapped out
   0 carrier transitions

Montecito#show interface serial 0
Serial0 is up, line protocol is up
Hardware is HD64570
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
LCP Open, multilink Open
Last input 00:00:00, output 00:00:06, output hang never
Last clearing of "show interface" counters 02:04:30
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
3320 packets input, 107170 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
1483 packets output, 24622 bytes, 0 underruns
0 output errors, 0 collisions, 6 interface resets
0 output buffer failures, 0 output buffers swapped out
8 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

Montecito#show interface serial 1
Serial1 is up, line protocol is up
Hardware is HD64570
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
LCP Open, multilink Open
Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters 02:04:32
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
3320 packets input, 107161 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
1482 packets output, 24646 bytes, 0 underruns
0 output errors, 0 collisions, 6 interface resets
0 output buffer failures, 0 output buffers swapped out
8 carrier transitions
```

```
DCD=up DSR=up DTR=up RTS=up CTS=up

Montecito#show ppp multilink
Virtual-Access1, bundle name is Goleta
Bundle up for 00:01:39
0 lost fragments, 0 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0x3D received sequence, 0xB sent sequence
Member links: 2 (max not set, min not set)
Serial1, since 00:01:40, last rcvd seq 00003C
Serial0, since 00:01:39, last rcvd seq 00003B

Montecito#show bridge group
Bridge Group 1 is running the IEEE compatible Spanning Tree protocol
Port 10 (Virtual-Access1) of bridge group 1 is forwarding
Port 9 (Virtual-Template1) of bridge group 1 is down
Montecito#
```

show Commands on Goleta After the Connection is Made

```
Goleta#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 (192.168.10.2)
   MTU 1500 bytes, BW 3088 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: BRIDGECP, IPCP, IPXCP
   Last input 00:00:10, output never, output hang never
   Last clearing of "show interface" counters 00:02:18
   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
   4 packets input, 52 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
   28 packets output, 892 bytes, 0 underruns
   0 output errors, 0 collisions, 0 interface resets
   0 output buffer failures, 0 output buffers swapped out
   0 carrier transitions

   Goleta#show interface serial 0
   Serial0 is up, line protocol is up
   Hardware is HD64570
   MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
   reliability 255/255, txload 1/255, rxload 1/255
   Encapsulation PPP, loopback not set
   Keepalive set (10 sec)
   LCP Open, multilink Open
   Last input 01:52:28, output 00:00:00, output hang never
   Last clearing of "show interface" counters 02:55:09
   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
   2364 packets input, 41972 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
   4465 packets output, 134689 bytes, 0 underruns
   0 output errors, 0 collisions, 148 interface resets
```

```
0 output buffer failures, 0 output buffers swapped out
294 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

Goleta#show interface serial 1
Serial1 is up, line protocol is up
Hardware is HD64570
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
LCP Open, multilink Open
Last input 01:52:38, output 00:00:00, output hang never
Last clearing of "show interface" counters 02:55:18
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
2366 packets input, 42030 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
4472 packets output, 134930 bytes, 0 underruns
0 output errors, 0 collisions, 147 interface resets
0 output buffer failures, 0 output buffers swapped out
289 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

Goleta#sh ppp multilink
Virtual−Access1, bundle name is Montecito
Bundle up for 00:01:35
0 lost fragments, 0 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0xB received sequence, 0x3B sent sequence
Member links: 2 (max not set, min not set)
Serial0, since 00:01:36, last rcvd seq 00000A
Serial1, since 00:01:35, last rcvd seq 000009

Goleta#show bridge group
Bridge Group 1 is running the IEEE compatible Spanning Tree protocol
Port 10 (Virtual−Access1) of bridge group 1 is forwarding
Port 9 (Virtual−Template1) of bridge group 1 is down
```

Troubleshoot

Use this section to troubleshoot your configuration.

Troubleshooting Resources

Use these troubleshooting resources as required:

- Troubleshooting Serial Line Problems
- HDLC Back−to−Back Connections
- Troubleshooting Leased lines

Troubleshooting Commands

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

Note: Refer to Important Information on Debug Commands before you use **debug** commands.

- **debug ppp negotiation** indicates whether a client passes PPP negotiation. Also checks for address negotiation.
- **debug ppp authentication** indicates whether a client passes authentication. Use this command if you use Cisco IOS Software Release 11.2 or later versions.
- **debug ppp chap** indicates whether a client passes authentication. Use this command if you use a Cisco IOS Software release earlier than release 11.2.
- **debug ppp error** displays protocol errors and error statistics associated with PPP connection negotiation and operation.
- **debug vtemplate** enables you to see what virtual−template configurations are used.
- **debug vprofile** enables you to see what configuration options are applied to the virtual−access interface.

Sample debug Output

Here are some debug outputs for successful calls. Pay attention to the sections in **bold** font. Compare the output that you obtain with the result shown here:

PPP debugs on Montecito

```
Montecito#debug ppp negotiation
     PPP protocol negotiation debugging is on
     Montecito#
     00:07:30: %LINK−3−UPDOWN: Interface Serial1, changed state to up
     00:07:30: Se1 PPP: Treating connection as a dedicated line
     00:07:30: Se1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 2 load]
     00:07:30: Se1 LCP: O CONFREQ [Closed] id 4 len 26
     00:07:30: Se1 LCP:    MagicNumber 0x6063D57E (0x05066063D57E)
     00:07:30: Se1 LCP:    MRRU 1524 (0x110405F4)
     00:07:30: Se1 LCP:    EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
     00:07:30: Se1 LCP: I CONFREQ [REQsent] id 101 len 23
     00:07:30: Se1 LCP:    MagicNumber 0x60944B81 (0x050660944B81)
     00:07:30: Se1 LCP:    MRRU 1524 (0x110405F4)
     00:07:30: Se1 LCP:    EndpointDisc 1 Goleta (0x130901476F6C657461)
     00:07:30: Se1 LCP: O CONFACK [REQsent] id 101 len 23
     00:07:30: Se1 LCP:    MagicNumber 0x60944B81 (0x050660944B81)
     00:07:30: Se1 LCP:    MRRU 1524 (0x110405F4)
     00:07:30: Se1 LCP:    EndpointDisc 1 Goleta (0x130901476F6C657461)
     00:07:30: Se1 LCP: I CONFACK [ACKsent] id 4 len 26
     00:07:30: Se1 LCP:    MagicNumber 0x6063D57E (0x05066063D57E)
     00:07:30: Se1 LCP:    MRRU 1524 (0x110405F4)
     00:07:30: Se1 LCP:    EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
     00:07:30: Se1 LCP: State is Open
     00:07:30: Se1 PPP: Phase is VIRTUALIZED [0 sess, 1 load]
     00:07:31: Vi1 PPP: Phase is DOWN, Setup [0 sess, 0 load]
     00:07:31: Vi1 PPP: Phase is ESTABLISHING [0 sess, 0 load]
     00:07:31: %LINK−3−UPDOWN: Interface Serial0, changed state to up
     00:07:31: Se0 PPP: Treating connection as a dedicated line
     00:07:31: Se0 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
     00:07:31: Se0 LCP: O CONFREQ [Closed] id 4 len 26
     00:07:31: Se0 LCP:    MagicNumber 0x6063D8DC (0x05066063D8DC)
     00:07:31: Se0 LCP:    MRRU 1524 (0x110405F4)
     00:07:31: Se0 LCP:    EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
     00:07:31: %LINK−3−UPDOWN: Interface Virtual−Access1, changed state to up
     00:07:31: Vi1 PPP: Treating connection as a dedicated line
     00:07:31: Vi1 LCP: O CONFREQ [Closed] id 1 len 26
     00:07:31: Vi1 LCP:    MagicNumber 0x6063D8F9 (0x05066063D8F9)
     00:07:31: Vi1 LCP:    MRRU 1524 (0x110405F4)
     00:07:31: Vi1 LCP:    EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
     00:07:31: Vi1 PPP: Phase is UP [0 sess, 0 load]
     00:07:31: Vi1 BNCP: O CONFREQ [Closed] id 1 len 4
     00:07:31: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10
     00:07:31: Vi1 IPCP:    Address 10.1.1.1 (0x03060A010101)
```

```
00:07:31: Vi1 IPXCP: O CONFREQ [Closed] id 1 len 18
00:07:31: Vi1 IPXCP:    Network 0x0000BEEF (0x01060000BEEF)
00:07:31: Vi1 IPXCP:    Node 0000.0c31.aac2 (0x020800000C31AAC2)
00:07:31: Vi1 MLP: Added first link Se1 to bundle Goleta
00:07:31: Se0 LCP: I CONFREQ [REQsent] id 101 len 23
00:07:31: Se0 LCP:    MagicNumber 0x60944EF7 (0x050660944EF7)
00:07:31: Se0 LCP:    MRRU 1524 (0x110405F4)
00:07:31: Se0 LCP:    EndpointDisc 1 Goleta (0x130901476F6C657461)
00:07:31: Se0 LCP: O CONFACK [REQsent] id 101 len 23
00:07:31: Se0 LCP:    MagicNumber 0x60944EF7 (0x050660944EF7)
00:07:31: Se0 LCP:    MRRU 1524 (0x110405F4)
00:07:31: Se0 LCP:    EndpointDisc 1 Goleta (0x130901476F6C657461)
00:07:31: Se1 BNCP: MLP bundle interface is built, process packets now
00:07:31: Se1 BNCP: Redirect packet to Vi1
00:07:31: Vi1 BNCP: I CONFREQ [REQsent] id 1 len 4
00:07:31: Vi1 BNCP: O CONFACK [REQsent] id 1 len 4
00:07:31: Vi1 IPCP: I CONFREQ [REQsent] id 1 len 10
00:07:31: Vi1 IPCP:    Address 192.168.10.2 (0x0306C0A80A02)
00:07:31: Vi1 IPCP: O CONFACK [REQsent] id 1 len 10
00:07:31: Vi1 IPCP:    Address 192.168.10.2 (0x0306C0A80A02)
00:07:31: Vi1 IPXCP: I CONFREQ [REQsent] id 1 len 18
00:07:31: Vi1 IPXCP:    Network 0x0000BEEF (0x01060000BEEF)
00:07:31: Vi1 IPXCP:    Node 0000.0c47.4e9a (0x020800000C474E9A)
00:07:31: Vi1 IPXCP: O CONFACK [REQsent] id 1 len 18
00:07:31: Vi1 IPXCP:    Network 0x0000BEEF (0x01060000BEEF)
00:07:31: Vi1 IPXCP:    Node 0000.0c47.4e9a (0x020800000C474E9A)
00:07:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1,
changed state to up
00:07:31: Se0 LCP: I CONFACK [ACKsent] id 4 len 26
00:07:31: Se0 LCP:    MagicNumber 0x6063D8DC (0x05066063D8DC)
00:07:31: Se0 LCP:    MRRU 1524 (0x110405F4)
00:07:31: Se0 LCP:    EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
00:07:31: Se0 LCP: State is Open
00:07:31: Se0 PPP: Phase is VIRTUALIZED [0 sess, 2 load]
00:07:31: Vi1 MLP: Added link Se0 to bundle Goleta
00:07:31: Vi1 BNCP: I CONFACK [ACKsent] id 1 len 4
00:07:31: Vi1 BNCP: State is Open
00:07:31: Vi1 IPCP: I CONFACK [ACKsent] id 1 len 10
00:07:31: Vi1 IPCP:    Address 10.1.1.1 (0x03060A010101)
00:07:31: Vi1 IPCP: State is Open
00:07:31: Vi1 IPXCP: I CONFACK [ACKsent] id 1 len 18
00:07:31: Vi1 IPXCP:    Network 0x0000BEEF (0x01060000BEEF)
00:07:31: Vi1 IPXCP:    Node 0000.0c31.aac2 (0x020800000C31AAC2)
00:07:31: Vi1 IPXCP: State is Open
00:07:31: Vi1 IPCP: Install route to 192.168.10.2
00:07:32: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1,
changed state to up
00:07:32: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0,
changed state to up
Montecito#

Montecito#ping  192.168.10.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/9/12 ms

Montecito#ping ipx
Target IPX address: BEEF.0000.0c47.4e9a
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Verbose [n]:
Type escape sequence to abort.
Sending 5, 100-byte IPX Novell Echoes to BEEF.0000.0c47.4e9a,
timeout is 2 seconds:
```

```
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/12 ms
Montecito#
```

PPP debugs on Goleta

```
Goleta#debug ppp negotiation
   PPP protocol negotiation debugging is on

   Goleta#
   01:00:26: Se0 PPP: Treating connection as a dedicated line
   01:00:26: Se0 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
   01:00:26: Se0 LCP: O CONFREQ [Closed] id 101 len 23
   01:00:26: Se0 LCP: MagicNumber 0x60944B81 (0x050660944B81)
   01:00:26: Se0 LCP: MRRU 1524 (0x110405F4)
   01:00:26: Se0 LCP: EndpointDisc 1 Goleta (0x130901476F6C657461)
   01:00:26: Se0 LCP: I CONFREQ [REQsent] id 4 len 26
   01:00:26: Se0 LCP: MagicNumber 0x6063D57E (0x05066063D57E)
   01:00:26: Se0 LCP: MRRU 1524 (0x110405F4)
   01:00:26: Se0 LCP: EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
   01:00:26: Se0 LCP: O CONFACK [REQsent] id 4 len 26
   01:00:26: Se0 LCP: MagicNumber 0x6063D57E (0x05066063D57E)
   01:00:26: Se0 LCP: MRRU 1524 (0x110405F4)
   01:00:26: Se0 LCP: EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
   01:00:26: Se0 LCP: I CONFACK [ACKsent] id 101 len 23
   01:00:26: Se0 LCP: MagicNumber 0x60944B81 (0x050660944B81)
   01:00:26: Se0 LCP: MRRU 1524 (0x110405F4)
   01:00:26: Se0 LCP: EndpointDisc 1 Goleta (0x130901476F6C657461)
   01:00:26: Se0 LCP: State is Open
   01:00:26: Se0 PPP: Phase is VIRTUALIZED [0 sess, 0 load]
   01:00:26: Vi1 PPP: Phase is DOWN, Setup [0 sess, 0 load]
   01:00:26: Vi1 PPP: Phase is ESTABLISHING [0 sess, 0 load]
   01:00:27: %LINK-3-UPDOWN: Interface Serial1, changed state to up
   01:00:27: Se1 PPP: Treating connection as a dedicated line
   01:00:27: Se1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
   01:00:27: Se1 LCP: O CONFREQ [Closed] id 101 len 23
   01:00:27: Se1 LCP: MagicNumber 0x60944EF7 (0x050660944EF7)
   01:00:27: Se1 LCP: MRRU 1524 (0x110405F4)
   01:00:27: Se1 LCP: EndpointDisc 1 Goleta (0x130901476F6C657461)
   01:00:27: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up
   01:00:27: Vi1 PPP: Treating connection as a dedicated line
   01:00:27: Vi1 LCP: O CONFREQ [Closed] id 1 len 23
   01:00:27: Vi1 LCP: MagicNumber 0x60944F10 (0x050660944F10)
   01:00:27: Vi1 LCP: MRRU 1524 (0x110405F4)
   01:00:27: Vi1 LCP: EndpointDisc 1 Goleta (0x130901476F6C657461)
   01:00:27: Vi1 PPP: Phase is UP [0 sess, 0 load]
   01:00:27: Vi1 BNCP: O CONFREQ [Closed] id 1 len 4
   01:00:27: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10
   01:00:27: Vi1 IPCP: Address 192.168.10.2 (0x0306C0A80A02)
   01:00:27: Vi1 IPXCP: O CONFREQ [Closed] id 1 len 18
   01:00:27: Vi1 IPXCP: Network 0x0000BEEF (0x01060000BEEF)
   01:00:27: Vi1 IPXCP: Node 0000.0c47.4e9a (0x020800000C474E9A)
   01:00:27: Vi1 MLP: Added first link Se0 to bundle Montecito
   01:00:27: Se1 LCP: I CONFREQ [REQsent] id 4 len 26
   01:00:27: Se1 LCP: MagicNumber 0x6063D8DC (0x05066063D8DC)
   01:00:27: Se1 LCP: MRRU 1524 (0x110405F4)
   01:00:27: Se1 LCP: EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
   01:00:27: Se1 LCP: O CONFACK [REQsent] id 4 len 26
   01:00:27: Se1 LCP: MagicNumber 0x6063D8DC (0x05066063D8DC)
   01:00:27: Se1 LCP: MRRU 1524 (0x110405F4)
   01:00:27: Se1 LCP: EndpointDisc 1 Montecito (0x130C014D6F6E74656369746F)
   01:00:27: Se0 BNCP: MLP bundle interface is built, process packets now
   01:00:27: Se0 BNCP: Redirect packet to Vi1
   01:00:27: Vi1 BNCP: I CONFREQ [REQsent] id 1 len 4
   01:00:27: Vi1 BNCP: O CONFACK [REQsent] id 1 len 4
   01:00:27: Se0 IPCP: MLP bundle interface is built, process packets now
```

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01:00:27: Se0 IPCP: Redirect packet to Vi1
01:00:27: Vi1 IPCP: I CONFREQ [REQsent] id 1 len 10
01:00:27: Vi1 IPCP: Address 10.1.1.1 (0x03060A010101)
01:00:27: Vi1 IPCP: O CONFACK [REQsent] id 1 len 10
01:00:27: Vi1 IPCP: Address 10.1.1.1 (0x03060A010101)
01:00:27: Se0 IPXCP: MLP bundle interface is built, process packets now
01:00:27: Se0 IPXCP: Redirect packet to Vi1
01:00:27: Vi1 IPXCP: I CONFREQ [REQsent] id 1 len 18
01:00:27: Vi1 IPXCP: Network 0x0000BEEF (0x01060000BEEF)
01:00:27: Vi1 IPXCP: Node 0000.0c31.aac2 (0x020800000C31AAC2)
01:00:27: Vi1 IPXCP: O CONFACK [REQsent] id 1 len 18
01:00:27: Vi1 IPXCP: Network 0x0000BEEF (0x01060000BEEF)
01:00:27: Vi1 IPXCP: Node 0000.0c31.aac2 (0x020800000C31AAC2)
01:00:27: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0,
changed state to up
01:00:27: Se1 LCP: I CONFACK [ACKsent] id 101 len 23
01:00:27: Se1 LCP: MagicNumber 0x60944EF7 (0x050660944EF7)
01:00:27: Se1 LCP: MRRU 1524 (0x110405F4)
01:00:27: Se1 LCP: EndpointDisc 1 Goleta (0x130901476F6C657461)
01:00:27: Se1 LCP: State is Open
01:00:27: Se1 PPP: Phase is VIRTUALIZED [0 sess, 4 load]
01:00:27: Vi1 BNCP: I CONFACK [ACKsent] id 1 len 4
01:00:27: Vi1 BNCP: State is Open
01:00:27: Vi1 MLP: Added link Se1 to bundle Montecito
01:00:27: Vi1 IPCP: I CONFACK [ACKsent] id 1 len 10
01:00:27: Vi1 IPCP: Address 192.168.10.2 (0x0306C0A80A02)
01:00:27: Vi1 IPCP: State is Open
01:00:27: Vi1 IPXCP: I CONFACK [ACKsent] id 1 len 18
01:00:27: Vi1 IPXCP: Network 0x0000BEEF (0x01060000BEEF)
01:00:27: Vi1 IPXCP: Node 0000.0c47.4e9a (0x020800000C474E9A)
01:00:27: Vi1 IPXCP: State is Open
01:00:27: Vi1 IPCP: Install route to 10.1.1.1
01:00:28: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1,
changed state to up
01:00:28: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1,
changed state to up
Goleta#

Goleta#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/12 ms

Goleta#ping ipx
Target IPX address: BEEF.0000.0c31.aac2
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Verbose [n]:
Type escape sequence to abort.
Sending 5, 100-byte IPX Novell Echoes to BEEF.0000.0c31.aac2,
timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/12 ms
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Related Information

- **Access Technology Support Page**
- **Technical Support & Documentation − Cisco Systems**

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