

2개의 직렬 인터페이스에서 가상 템플릿을 통한 멀티링크

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MLP(Multilink PPP)는 ISDN, 동기 및 비동기 인터페이스와 같은 다이얼러 인터페이스를 통해 로드 밸런싱을 수행합니다. MLP는 패킷을 분할하고 병렬 회로를 통해 프래그먼트를 전송합니다. 이렇게 하면 MLP는 처리량을 향상시키고 시스템 간 레이턴시를 줄입니다. MLP는 여러 논리적 데이터 링크에 걸쳐 데이터그램을 분할, 재결합 및 시퀀싱하는 방법을 제공합니다. MLP를 사용하면 패킷을 프래그먼트화할 수 있으며, 동일한 원격 주소에 대한 여러 포인트-투-포인트 링크를 통해 동시에 프래그먼트를 전송할 수 있습니다.

이 문서에서는 가상 템플릿 컨피그레이션을 통해 직렬 인터페이스 간의 멀티링크 연결을 보여줍니다.

[사전 요구 사항](#)

[요구 사항](#)

이 문서에 대한 특정 요건이 없습니다.

[사용되는 구성 요소](#)

이 문서의 정보는 다음 소프트웨어 및 하드웨어 버전을 기반으로 합니다.

- Cisco IOS® 소프트웨어 릴리스 11.2 이상
- 각각 2개의 WAN 직렬 인터페이스가 있는 2개의 Cisco 2503 라우터 이러한 라우터는 Cisco IOS Software 릴리스 12.2(7b)를 실행합니다.

이 문서의 정보는 특정 랩 환경의 디바이스를 토대로 작성되었습니다. 이 문서에 사용된 모든 디바이스는 초기화된(기본) 컨피그레이션으로 시작되었습니다. 현재 네트워크가 작동 중인 경우, 모든 명령어의 잠재적인 영향을 미리 숙지하시기 바랍니다.

관련 제품

이 컨피그레이션은 이러한 하드웨어 및 소프트웨어 버전과 함께 사용할 수도 있습니다.

- 2개의 WAN 직렬 인터페이스가 있는 2개의 라우터 WIC-1T, WIC-2T 및 고정 WAN 직렬 인터페이스를 사용할 수 있습니다.

표기 규칙

문서 규칙에 대한 자세한 내용은 [Cisco 기술 팁 표기 규칙을 참고하십시오](#).

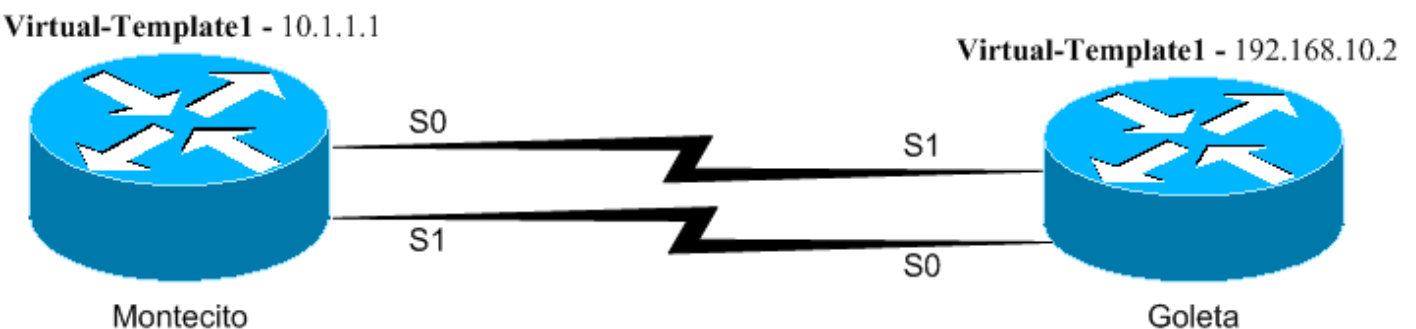
구성

이 섹션에는 이 문서에서 설명하는 기능을 구성하기 위한 정보가 표시됩니다.

참고: [명령 조회 도구](#) ([등록된](#) 고객만 해당)를 사용하여 이 문서에 사용된 명령에 대한 자세한 내용을 확인하십시오.

네트워크 다이어그램

이 문서에서는 다음 네트워크 설정을 사용합니다.



라우터 Montecito와 Goleta는 Serial0 및 Serial1 인터페이스를 통해 다시 연결됩니다. 이 구성에서는 각 측의 Virtual-Template, PPP(Multilink Point-to-Point Protocol), 브리지 및 라우터 간 IP 및 IPX를 라우팅합니다.

구성

이 문서에서는 다음 구성을 사용합니다.

- [몬테시토](#)

- [골레타](#)

몬테시토

```
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-1.122-7b.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
```

골레타

```
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-Templatel !---
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 Serial11 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

```

다음을 확인합니다.

이 섹션을 사용하여 컨피그레이션이 제대로 작동하는지 확인합니다.

Output [Interpreter 도구](#) (등록된 고객만 해당)(OIT)는 특정 **show** 명령을 지원합니다. OIT를 사용하여 **show** 명령 출력의 분석을 봅니다.

- **show ppp multilink** - 활성 상태인 멀티링크 번들에 대한 정보를 표시합니다. 멀티링크 연결을 확인하려면 이 명령을 사용합니다.
- **show interface virtual-access** - 특정 가상 액세스 인터페이스에 대한 상태, 트래픽 데이터 및 컨피그레이션 정보를 표시합니다.
- **show interface serial**—직렬 인터페이스에서 문제를 해결할 수 있습니다.

샘플 show 출력

연결 후 Montecito에 명령 표시

```

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-Templatel) of bridge group 1 is down
Montecito#

연결 후 골레타에 명령 표시

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-Templatel) of bridge group 1 is down
```

문제 해결

이 섹션에서는 컨피그레이션 문제를 해결할 수 있습니다.

문제 해결 리소스

필요에 따라 다음 문제 해결 리소스를 사용하십시오.

- [직렬 회선 문제 해결](#)
- [HDLC 백투백 연결](#)
- [임대 회선 문제 해결](#)

문제 해결 명령

Output [Interpreter 도구\(등록된 고객만 해당\)](#)(OIT)는 특정 **show** 명령을 지원합니다. OIT를 사용하여 **show** 명령 출력의 분석을 봅니다.

참고: debug 명령을 사용하기 전에 디버그 [명령에 대한 중요 정보](#)를 참조하십시오.

- **debug ppp negotiation** - 클라이언트가 PPP 협상을 통과할지 여부를 나타냅니다. 주소 협상도 확인합니다.

- **debug ppp authentication** - 클라이언트가 인증을 통과할지 여부를 나타냅니다. Cisco IOS Software Release 11.2 이상 버전을 사용하는 경우 이 명령을 사용합니다.
- **debug ppp chap** - 클라이언트가 인증을 통과할지 여부를 나타냅니다. 릴리스 11.2 이전의 Cisco IOS Software 릴리스를 사용하는 경우 이 명령을 사용합니다.
- **debug ppp error**—PPP 연결 협상 및 작업과 관련된 프로토콜 오류 및 오류 통계를 표시합니다.
- **debug vtemplate**—어떤 가상 템플릿 컨피그레이션이 사용되는지 볼 수 있습니다.
- **debug vprofile**—virtual-access 인터페이스에 적용되는 구성 옵션을 볼 수 있습니다.

[디버그 출력 샘플](#)

다음은 성공한 통화에 대한 디버그 출력입니다. 굵게 글꼴로 된 섹션에 주의하십시오. 가져온 출력을 여기에 표시된 결과와 비교합니다.

[Montecito의 PPP 디버깅](#)

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#

골레타의 PPP 디버깅

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
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

[**관련 정보**](#)

- [액세스 기술 지원 페이지](#)
- [기술 지원 및 문서 - Cisco Systems](#)