

# CO-CPE 설정에서 Back to Back G.SHDSL Connection 구성

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## 소개

이 문서에서는 두 EHWIC-4SHDSL-EA 모듈 간에 백투백(back-to-back) Multirate Symmetric High-Speed Digital Subscriber Line(G.SHDSL) 연결을 구현하는 데 필요한 컨피그레이션 단계에 대해 설명합니다.

SHDSL 연결을 설정하려면 CO(Central Office) 모드에서 연결의 한 쪽 끝을 구성하고 CPE(Customer Premises Equipment) 모드에서 다른 쪽 끝을 구성해야 합니다. 이러한 종류의 후면 SHDSL 연결 설정은 두 DSL 라우터 간에 DSL(Digital Subscriber Line Access Multiplexer) 없이도 두 건물 간의 연결을 제공하기 위해 캠퍼스 네트워크 내에서 일반적으로 구현됩니다.

## 사전 요구 사항

### 요구 사항

다음 주제에 대한 지식을 보유하고 있으면 유용합니다.

- EHWIC-4SHDSL-EA 모듈
- C888EA-K9와 같은 ISR(Fixed Integrated Service Router) G2 라우터는 Cisco IOS® Software 15.2(2)T2 이상 릴리스와 함께 CO 및 CPE 모드에서 모두 작동합니다.

### 사용되는 구성 요소

이 문서는 특정 소프트웨어 및 하드웨어 버전으로 한정되지 않습니다.

그러나 이 설정은 다음 디바이스로 구성됩니다.

- Cisco IOS® 15.4.3M2와 함께 로드된 2개의 ISR Generation-2 라우터(CISCO2901/K9)
- 두 ISR G2 라우터에 모두 설치된 EHWIC-4SHDSL-EA 모듈 2개

- 양쪽 끝에 RJ-45 커넥터가 있는 ANSI/TIA/EIA-568-B 케이블

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.

## 구성

이 설정에서는 EHWIC-4SHDSL-EA 모듈이 설치된 동일한 라우터를 사용합니다. **CO\_Router**라는 디바이스는 CO 모드에서 작동하도록 SHDSL 컨트롤러를 구성한 반면, **CPE\_Router**라는 디바이스는 CPE 모드에서 작동하도록 SHDSL 컨트롤러를 구성합니다.

EHWIC-4SHDSL-EA 모듈은 EFM(First Mile) 및 ATM(Asynchronous Transfer Mode)의 두 이더넷 모두에 대해 구성할 수 있습니다. 이 문서에서는 EFM 모드와 ATM 모드 모두에서 백투백 SHDSL 연결을 설정하는 방법에 대해 설명합니다.

이 예에서는 ATM 모드에서 back-to-back SHDSL 연결을 설정하는 방법을 보여줍니다.

## ATM 모드

백 투 백 SHDSL 연결을 구성할 때 IP over ATM(IPoA) 또는 PPPoA(PPP over ATM) 솔루션을 구현할 수 있습니다.

### 1. IPoA 솔루션

- CO 라우터:

```
CO_Router#show running-config
```

```
Building configuration...
```

```
Current configuration : 1624 bytes
```

```
!
```

```
!
```

```
version 15.4
```

```
service config
```

```
service timestamps debug datetime msec
```

```
service timestamps log datetime msec
```

```
no service password-encryption
```

```
!
```

```
hostname CO_Router
```

```
!
```

```
boot-start-marker
```

```
boot system flash:c2900-universalk9-mz.SPA.154-3.M2.bin
```

```
boot-end-marker
```

```
!
```

```
!
```

```
!
```

```
no aaa new-model
```

```
!
```

```
!
```

```
!
```

```
ip cef
```

```
no ipv6 cef
```

```
!
```

```
multilink bundle-name authenticated
!
!
!
cts logging verbose
!
!
license udi pid CISCO2901/K9 sn FGL1622241N
license boot module c2900 technology-package securityk9
license boot module c2900 technology-package datak9
!
redundancy
!
!
!
controller SHDSL 0/1/0
  termination co
  dsl-group 0 pairs 0, 1, 2, 3 m-pair
  !
!
!
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  ip address dhcp
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface ATM0/1/0
  ip address 1.1.1.1 255.255.255.0
  no atm ilmi-keepalive
  pvc 1/10
  !
!
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!

control-plane
!
!
line con 0
line aux 0
line vty 0 4
  login
  transport input all
!
!
end
```

**CO\_Router#**

• CPE 라우터:

**CPE\_Router#show running-config**

Building configuration...

Current configuration : 1538 bytes

!

version 15.2

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname CPE\_Router

!

boot-start-marker

boot-end-marker

!

!

!

no aaa new-model

!

ip cef

!

!

!

no ipv6 cef

!

multilink bundle-name authenticated

!

!

!

voice-card 0

!

!

!

!

license udi pid CISCO2901/K9 sn FGL151625KN

license boot module c2900 technology-package securityk9

license boot module c2900 technology-package uck9

license boot module c2900 technology-package datak9

!

!

!

redundancy

!

**controller SHDSL 0/1/0**

**dsl-group 0 pairs 0, 1, 2, 3 m-pair**

!

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

```

interface GigabitEthernet0/0
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  ip address dhcp
  duplex auto
  speed auto
!
interface ATM0/1/0
  ip address 1.1.1.2 255.255.255.0
  no atm ilmi-keepalive
  pvc 1/10
  !
!
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
control-plane
!
!
gatekeeper
  shutdown
!
!
!
line con 0
line aux 0
line vty 0 4
  login
  transport input all

!
end

```

**CPE\_Router#**

## 2. PPPoA 솔루션

- CO 라우터:

**CO\_Router#show running-config**

Building configuration...

Current configuration : 1779 bytes

```

!
!
version 15.4
service config
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname CO_Router
!
boot-start-marker

```

```
boot system flash:c2900-universalk9-mz.SPA.154-3.M2.bin
boot-end-marker
!
!
!
no aaa new-model
!

!
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
!
!
cts logging verbose
!
!
license udi pid CISCO2901/K9 sn FGL1622241N
license boot module c2900 technology-package securityk9
license boot module c2900 technology-package datak9
!

!
redundancy
!
!
controller SHDSL 0/1/0
  termination co
  dsl-group 0 pairs 0, 1, 2, 3 m-pair
  !
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  ip address dhcp
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface ATM0/1/0
  no ip address
  no atm ilmi-keepalive
  pvc 1/10
    encapsulation aal5snap
    protocol ppp dialer
    dialer pool-member 1
  !
!
interface Dialer1
  ip address 1.1.1.1 255.255.255.0
  encapsulation ppp
  dialer pool 1
  dialer-group 1
!
!
ip forward-protocol nd
```

```
!  
no ip http server  
no ip http secure-server  
!  
  
!  
!  
control-plane  
!  
!  
!  
line con 0  
line aux 0  
line vty 0 4  
  login  
  transport input all  
  
!  
end
```

**CO\_Router#**

• CPE 라우터:

**CPE\_Router#show running-config**

```
Building configuration...  
  
Current configuration : 1693 bytes  
!  
  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
no service password-encryption  
!  
hostname CPE_Router  
!  
boot-start-marker  
boot-end-marker  
!  
!  
!  
no aaa new-model  
!  
ip cef  
!  
  
!  
no ipv6 cef  
!  
multilink bundle-name authenticated  
!  
  
!  
!  
license udi pid CISCO2901/K9 sn FGL151625KN  
license boot module c2900 technology-package securityk9  
license boot module c2900 technology-package uck9  
license boot module c2900 technology-package datak9  
!
```

```

!
!
redundancy
!
!
controller SHDSL 0/1/0
  dsl-group 0 pairs 0, 1, 2, 3 m-pair
  !
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  ip address dhcp
  duplex auto
  speed auto
!
interface ATM0/1/0
  no ip address
  no atm ilmi-keepalive
  pvc 1/10
    encapsulation aal5snap
    protocol ppp dialer
    dialer pool-member 1
  !
!
interface Dialer1
  ip address 1.1.1.2 255.255.255.0
  encapsulation ppp
  dialer pool 1
  dialer-group 1
!
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
control-plane
!
gatekeeper
  shutdown
!
line con 0
line aux 0
line vty 0 4
  login
  transport input all

!
end

```

**CPE\_Router#**

### 3. PPPoE over ATM 솔루션

- CO 라우터:

```
CO_Router#show running-configuration
Building configuration...
```

```
Current configuration : 2299 bytes
!
```

```
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname CO_Router
!
boot-start-marker
boot-end-marker
!

no aaa new-model

username cisco password 0 cisco
!
redundancy
!
!
controller SHDSL 0/1/0
termination co dsl-group 0 pairs 0, 1, 2, 3 m-pair
!
!

bba-group pppoe global
virtual-template 1
!
!
interface Loopback0
ip address 10.1.1.1 255.255.255.255
!
interface Embedded-Service-Engine0/0
no ip address
shutdown
!
interface GigabitEthernet0/0
no ip address
shutdown
duplex auto
speed auto

!
interface GigabitEthernet0/1
no ip address
shutdown
duplex auto
speed auto
!

!
interface ATM0/1/0
no ip address
no atm ilmi-keepalive
!
interface ATM0/1/0.1 point-to-point
```

```

pvc 1/100
  protocol pppoe group global
!
!
interface Virtual-Template1
  ip unnumbered Loopback0
  ip mtu 1492
  peer default ip address pool PPPOE
!
!
ip local pool PPPOE 10.1.1.2 10.1.1.254

!
line con 0
line aux 0
line vty 0 4
  login
  transport input all

end

```

**CO\_Router#**

**Verification:**

**CO\_Router#show caller ip**

Line	User	IP Address	Local Number	Remote Number	<->
Vil.1	-	10.1.1.2	-	-	in

CO\_Router#

- CPE 라우터:

**CPE\_Router#show running-config**

Building configuration...

Current configuration : 2554 bytes

```

!
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname CPE_Router
!
boot-start-marker
boot-end-marker
!
!
!
no aaa new-model
!

ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
controller SHDSL 0/1/0
dsl-group 0 pairs 0, 1, 2, 3 m-pair
!
!

```

```

!
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  ip address dhcp
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  no ip address
  duplex auto
  speed auto
!
interface GigabitEthernet0/2
  ip address dhcp
  duplex auto
  speed auto
!
interface ATM0/1/0
  no ip address
  no atm ilmi-keepalive
!
interface ATM0/1/0.1 point-to-point
  pvc 1/100
  pppoe-client dial-pool-number 1
!
!
interface Dialer1
  ip address negotiated
  encapsulation ppp
  dialer pool 1
  ppp chap hostname cisco
  ppp chap password 0 cisco
!
!

control-plane
!
!

line con 0
line aux 0
line vty 0 4
  login
  transport input all
!
!
end

```

**CPE\_Router#**

**Verification:**

**CPE\_Router#show ip interface brief**

Interface	IP-Address	OK?	Method	Status	Protocol
Embedded-Service-Engine0/0	unassigned	YES	NVRAM	administratively down	down
ATM0/1/0	unassigned	YES	unset	up	up
ATM0/1/0.1	unassigned	YES	unset	up	up
<b>Dialer1</b>	<b>10.1.1.2</b>	<b>YES</b>	<b>IPCP</b>	<b>up</b>	<b>up</b>

```
Virtual-Access1          unassigned      YES unset  up
CPE_Router#
```

## EFM 모드

백 투 백 SHDSL 연결을 구성할 때 IPoE 또는 PPPoE 솔루션을 구현할 수 있습니다.

### 1. IPoE 솔루션

- CO 라우터:

```
C0_Router#show running-config
```

```
Building configuration...
```

```
Current configuration : 2194 bytes
```

```
!
! Last configuration change at 14:56:53 UTC Thu Mar 10 2016
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname CO_Router
!
boot-start-marker
boot system flash:c2900-universalk9-mz.SPA.154-3.M2.bin
boot-end-marker
!

!
ip cef
no ipv6 cef
multilink bundle-name authenticated
!

!
cts logging verbose
!

!
redundancy
!

!
controller SHDSL 0/3/0
  termination co
  mode efm
  dsl-group 0 pairs 0, 1, 2, 3 efm-bond
!

!
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  no ip address
  duplex auto
```

```

speed auto
!
interface GigabitEthernet0/1
no ip address
duplex auto
speed auto
!
!
interface Ethernet0/3/0
ip address 1.1.1.1 255.255.255.252
!
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!

!
control-plane
!

gatekeeper
shutdown
!

line con 0
line aux 0
line vty 0 4
login
transport input all
!
scheduler allocate 20000 1000
!
end

```

**CO\_Router#**

- CPE 라우터:

**CPE\_Router#show running-config**

Building configuration...

Current configuration : 1646 bytes

!
! Last configuration change at 14:50:55 UTC Thu Mar 10 2016
!

```

version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!

```

hostname CPE\_Router

```

!
boot-start-marker
boot system flash:c2900-universalk9-mz.SPA.154-3.M2.bin
boot-end-marker
!
!

```

no aaa new-model

!

ip cef

```

no ipv6 cef
!
multilink bundle-name authenticated
!

cts logging verbose
!

redundancy
!

controller SHDSL 0/3/0
  mode efm
  dsl-group 0 pairs 0, 1, 2, 3 efm-bond
  !

!
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  ip address dhcp
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  no ip address
  duplex auto
  speed auto
!
interface Ethernet0/3/0
  ip address 1.1.1.2 255.255.255.252
  !
  !
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!

control-plane
!

line con 0
line aux 0
line vty 0 4
  login
  transport input all
!
scheduler allocate 20000 1000
!
end

```

**CPE\_Router#**

## 2. PPPoE 솔루션

- CO 라우터:

**CO\_Router#show running-config**

Building configuration...

Current configuration : 1851 bytes

!

! Last configuration change at 15:00:06 UTC Thu Mar 10 2016

!

version 15.4

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname CO\_Router

!

boot-start-marker

boot system flash:c2900-universalk9-mz.SPA.154-3.M2.bin

boot-end-marker

!

ip cef

no ipv6 cef

!

multilink bundle-name authenticated

!

cts logging verbose

!

**controller SHDSL 0/3/0**

**mode efm**

**dsl-group 0 pairs 0, 1, 2, 3 efm-bond**

!

**bba-group pppoe global**

**virtual-template 1**

!

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

ip address dhcp

duplex auto

speed auto

!

interface GigabitEthernet0/1

no ip address

duplex auto

speed auto

!

**interface Ethernet0/3/0**

**ip address 1.1.1.2 255.255.255.252**

**pppoe enable group global**

!

**interface Virtual-Template1**

**mtu 1492**

**ip unnumbered Ethernet0/3/0**

**peer default ip address pool PPPOE**

!

!

**ip local pool PPPOE 1.1.1.1**

!

!

no ip http server

```
no ip http secure-server
!  
control-plane  
!  
line con 0  
line aux 0  
line vty 0 4  
  login  
  transport input all  
!  
scheduler allocate 20000 1000  
!  
end
```

**CO\_Router#**

- CPE 라우터:

**CPE\_Router#show running-config**

Building configuration...

```
Current configuration : 2310 bytes  
!  
! Last configuration change at 15:10:04 UTC Thu Mar 10 2016  
!  
version 15.4  
service timestamps debug datetime msec  
service timestamps log datetime msec  
no service password-encryption  
!  
hostname CPE_Router  
!  
boot-start-marker  
boot system flash:c2900-universalk9-mz.SPA.154-3.M2.bin  
boot-end-marker  
!  
!  
ip cef  
no ipv6 cef  
multilink bundle-name authenticated  
!  
!  
!  
!  
cts logging verbose  
!  
!  
voice-card 0  
!  
!  
!  
!  
redundancy  
!  
controller SHDSL 0/3/0  
termination co
```

```
mode efm
dsl-group 0 pairs 0, 1, 2, 3 efm-bond
!
!
!
!
!
interface Embedded-Service-Engine0/0
no ip address
shutdown
!
interface GigabitEthernet0/0
no ip address
duplex auto
speed auto
!
interface GigabitEthernet0/1
no ip address
duplex auto
speed auto
!
!
interface Ethernet0/3/0
no ip address
pppoe enable group global
pppoe-client dial-pool-number 1
!
interface Dialer1
ip address negotiated
encapsulation ppp
dialer pool 1
!
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
!
!
control-plane
!
!
!
!
gatekeeper
shutdown
!
!
!
line con 0
line aux 0
line vty 0 4
login
transport input all
!
scheduler allocate 20000 1000
!
end
```

CPE\_Router#

## 다음을 확인합니다.

이 섹션을 사용하여 컨피그레이션이 제대로 작동하는지 확인합니다.

1. 라우터가 CO 모드인지 확인하려면 **show** 명령을 실행합니다. 출력의 CO 종료 라인(예에서 굵게 표시됨)은 라우터가 CO 모드에 있음을 나타냅니다. 기본 모드는 CPE입니다. 일부 출력은 간결하게 여기에 나타나지 않습니다.

```
CO# show controllers shdSL 0/1/0
```

```
Controller SHDSL 0/1/0 is UP Hardware is EHWIC-4SHDSL-EA, rev 0 on slot 0, hwic slot 1
Capabilities: EFM: 2-wire, EFM-Bond, Annex A, B, F & G ATM: 2-wire, Mpair, IMA, Annex A, B, F & G
```

- CO 종료:

```
cdb=0x3CF085F0, plugin=0x21C33C1C, ds=0x21C33C68 base=0x10200000
```

```
FPGA Version is A14
```

```
NPU Source: System
```

```
NPU Firmware version: SHDSL_EA_FW_20130116053038
```

```
Vendor: Infineon, Chipset: SOCRATES-4e
```

```
PHY Source: System
```

```
IDC Firmware version: 1.7.5.0
```

```
DFE Firmware version: 1.1-1.7.5__002
```

```
Firmware reload mode: Auto
```

<Output abbreviated due to space constraints>

2. EFM 모드의 경우 **show controllers ethernet** 명령을 실행하여 확인합니다.

3. ATM 모드의 경우 확인을 위해 **show controllers atm** 명령을 실행합니다.

## 문제 해결

현재 이 컨피그레이션에 사용할 수 있는 특정 문제 해결 정보가 없습니다.

## 관련 정보

- SHDSL 연결 문제 해결에 대한 자세한 내용은 [Cisco 라우터에서 Cisco G.SHDSL EFM/ATM EHWIC 구성을 참조하십시오.](#)
- PPP 관련 문제 해결 방법은 [PPP 문제 해결 순서도를](#) 참조하십시오.
- [기술 지원 및 문서 - Cisco Systems](#)