

# ISDN을 통한 백업 브리징

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## 소개

이 문서에서는 ISDN을 사용하여 백업 브리징을 구성하는 방법에 대해 설명하고 이에 대한 예를 제공합니다. 이 컨피그레이션에서는 백업 인터페이스 방법을 사용하여 기본 링크가 다운되었음을 인식합니다. 백업에 대한 자세한 내용은 [DDR 백업 구성 및 문제 해결을 참조하십시오](#).

브리징 WAN 환경에서는 비동기 브리징이 지원되지 않으므로 ISDN을 사용하는 것이 유일한 DDR(Dial-on-Demand Routing) 백업 솔루션입니다.

ISDN 연결에서 브리징은 영구적이지 않을 경우 연결을 장기간 활성 상태로 유지하는 경향이 있습니다. 전화 회사(Telco)가 연결 시간을 기준으로 ISDN에 요금을 부과하고 추적되는 직렬 링크가 오랫동안 중단되면 비용이 매우 많이 청구될 수 있습니다.

**참고:** 이 컨피그레이션은 사이트 하나와 B 채널 하나용입니다. 둘 이상의 B 채널의 경우 다이얼러 프로필을 사용해야 합니다. (ISDN 컨피그레이션을 [사용하여 브리징할 다이얼러 프로파일 구성 참조](#))

비백업 환경에서 브리징 컨피그레이션에 대한 자세한 내용은 [ISDN 간 브리징을 참조하십시오](#).

## [사전 요구 사항](#)

## [요구 사항](#)

이 구성을 시도하기 전에 다음 요구 사항을 충족해야 합니다.

- ISDN에 대한 기본적인 지식을 보유하고 있습니다.

## [사용되는 구성 요소](#)

이 문서의 정보는 다음 소프트웨어 및 하드웨어 버전을 기반으로 합니다.

- Cisco 2500 Series 라우터(WAN 직렬 인터페이스 1개 및 BRI 인터페이스 1개)
- Cisco IOS® 소프트웨어 릴리스 12.2(7b).

**참고:** 이 컨피그레이션은 WAN(직렬) 링크 및 BRI 포트가 있는 라우터와 함께 사용할 수 있습니다.

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 Cisco IOS Software를 실행하는 두 라우터와 함께 사용할 수 있으며 각 라우터에는 최소 하나의 WAN 직렬 인터페이스와 하나의 BRI 인터페이스가 있습니다.

## [표기 규칙](#)

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

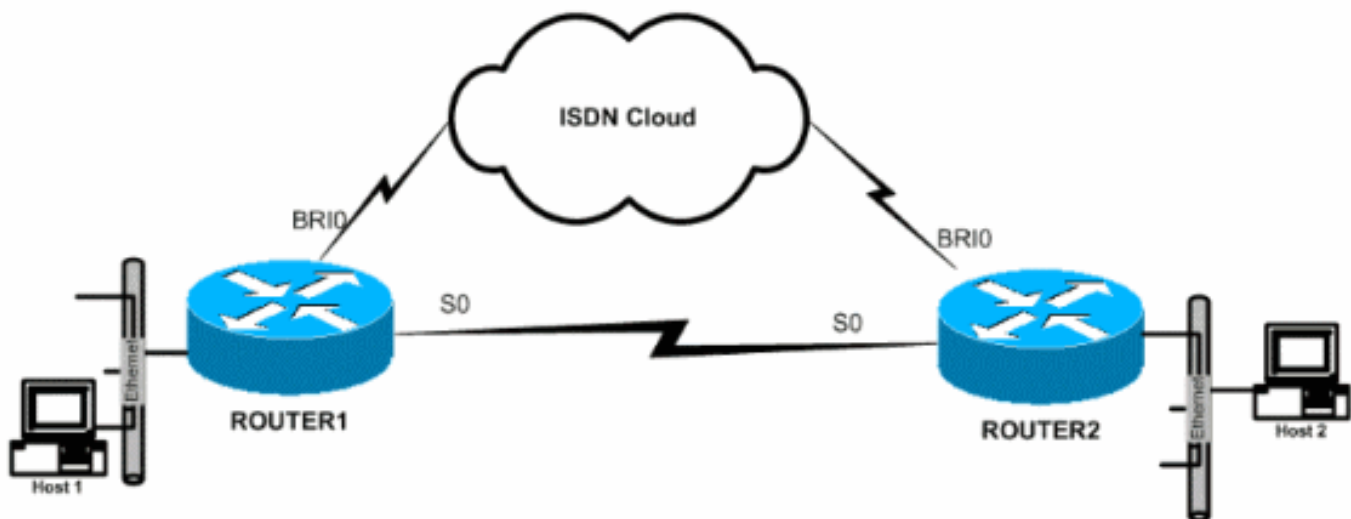
## [구성](#)

이 섹션에는 이 문서에서 설명하는 기능을 구성하기 위한 정보가 표시됩니다.

**참고:** 이 문서에 사용된 명령에 대한 추가 정보를 찾으려면 [명령 조회 도구\(등록된 고객만 해당\)](#)를 사용합니다.

## [네트워크 다이어그램](#)

이 문서에서는 다음 네트워크 설정을 사용합니다.



## 구성

이 문서에서는 다음 구성을 사용합니다.

- [라우터 1](#)
- [라우터 2](#)

### 라우터 1

```

!
hostname ROUTER1
!
!
username ROUTER2 password 0 same
!--- This is required for PPP Challenge Handshake
Authentication Protocol !--- (CHAP) authentication
during dial backup. !! isdn switch-type basic-5ess !---
The ISDN switch type for this circuit. !--- Obtain this
information from the Telco. !--- This ISDN switch type
is specific to the United States, !--- and could change
based on the requirements of the country and Telco. !
interface Ethernet0 ip address 172.16.55.33
255.255.255.240 no ip directed-broadcast no ip mroute-
cache bridge-group 1 !--- Assign this interface to
bridge-group 1. !--- Frames are bridged only among
interfaces in the same group. !--- Note that the BRI
interface and serial interface are also !--- in this
bridge-group 1. ! interface Serial0 description Serial
link to ROUTER2 backup interface BRI0 !--- This defines
the backup interface. !--- Cisco IOS Software tracks the
Serial0 interface, and !--- uses BRI0 if Serial0 fails.
ip address 172.16.54.1 255.255.255.0 no ip directed-
broadcast no ip mroute-cache no fair-queue bridge-group
1 !--- Enable bridging on Serial0 for normal operation.
! interface BRI0 description ISDN to ROUTER2 ip address
172.16.53.19 255.255.255.240 no ip directed-broadcast
encapsulation ppp no ip mroute-cache dialer map bridge
name ROUTER2 broadcast 5552000 !--- The broadcast
keyword is required to initiate the ISDN call. !---
Dialer map bridge to the remote router. The statement
includes !--- the name of the remote router and the

```

```

phone number to be dialed. !--- Note that this dialer
map statement includes the keyword bridge, !--- and does
not include the IP address of the peer, as required for
!--- IP routing-based dialer maps.
dialer-group 1
!--- Defines the interesting traffic as configured in
the dialer-list. isdn switch-type basic-5ess !--- Check
with your Telco for the correct values. ppp
authentication chap bridge-group 1 !--- Enable bridging
on BRI0. ! dialer-list 1 protocol bridge permit !---
Defines the interesting traffic. In this case, all
bridged traffic. bridge 1 protocol ieee !--- Defines the
type of Spanning Tree Protocol (STP) used for the !---
interface in bridge-group 1. Here, the IEEE STP is used.
!--- The IEEE 802.1D STP is the preferred way to run the
bridge. !

```

## 라우터 2

```

hostname router2
!
!
username ROUTER1 password 0 same
!--- Required for PPP CHAP Authentication during dial
backup. ! isdn switch-type basic-5ess !--- Check with
your Telco at the Router2 side for the correct values. !
interface Ethernet0 ip address 172.16.55.2
255.255.255.240 bridge-group 1 !--- Enable bridging on
Ethernet0. ! interface Serial0 description Serial link
to ROUTER1 !--- The backup interface bri0 command is not
required on this side, !--- because it is sufficient if
one side tracks the serial interface.
ip address 172.16.54.2 255.255.255.0
no fair-queue
bridge-group 1
!--- Enable bridging on Serial0 for normal operation.
interface BRI0 description ISDN to ROUTER1 ip address
172.16.53.17 255.255.255.240 encapsulation ppp no ip
mroute-cache dialer map bridge name ROUTER1 broadcast
5551000 !--- The broadcast keyword is required to
initiate the ISDN call.

dialer-group 1
!--- Defines the interesting traffic as configured in
the dialer-list. isdn switch-type basic-5ess !--- Check
with your Telco at the Router2 side for the correct
values. ppp authentication chap bridge-group 1 !---
Enable bridging on BRI0. ! dialer-list 1 protocol bridge
permit !--- Defines the interesting traffic. In this
case, all bridged traffic. bridge 1 protocol ieee !---
Defines the type of STP used for the interface in !---
bridge-group 1. Here the IEEE STP is used. !--- The IEEE
802.1D STP is the preferred way to run the bridge. !

```

## 다음을 확인합니다.

이 섹션에서는 컨피그레이션이 제대로 작동하는지 확인하는 데 사용할 수 있는 정보를 제공합니다.

일부 **show** 명령은 [출력 인터프리터 툴](#) 에서 지원되는데(등록된 고객만), 이 툴을 사용하면 **show** 명령 출력의 분석 결과를 볼 수 있습니다.

- **show isdn status** - ISDN 인터페이스의 레이어 1(L1), 레이어 2(L2) 및 레이어 3(L3) 상태를 표시합니다.
- **show dialer** - 다이얼러의 상태와 ISDN 채널의 개별 상태를 표시합니다.
- **show bridge** - 브리지 전달 데이터베이스의 항목 클래스를 표시합니다.
- **show interface** - 직렬 및 BRI 인터페이스와 같은 다양한 인터페이스의 상태를 표시합니다.
- **show spanning-tree**—라우터에 알려진 스패닝 트리 토폴로지를 표시합니다.

## Serial0이 작동 중일 때 ROUTER1의 명령 표시

```
ROUTER1# show isdn status
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
DEACTIVATED
Layer 2 Status:
Layer 2 NOT Activated
Layer 3 Status:
0 Active Layer 3 Call(s)
Activated dsl 0 CCBs = 0
The Free Channel Mask: 0x80000003
Number of L2 Discards = 36, L2D_Task Discards = 35
Total Allocated ISDN CCBs = 0
```

```
ROUTER1# show dialer
```

```
BRI0 - dialer type = ISDN
```

```
Dial String Successes Failures Last DNIS Last status
5552000 29 977 00:45:08 successful
0 incoming call(s) have been screened.
0 incoming call(s) rejected for callback.
```

```
BRI0:1 - dialer type = ISDN
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is shutdown
```

```
BRI0:2 - dialer type = ISDN
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is shutdown
```

```
ROUTER1# show bridge
```

```
Total of 300 station blocks, 298 free
Codes: P - permanent, S - self
```

```
Bridge Group 1:
```

```
Address Action Interface Age RX count TX count
0000.0c76.2882 forward Serial0 0 5 4
!--- Bridging traffic goes through Serial0. 00d0.58ad.ae13 forward Ethernet0 0 42 5
```

## serial0이 다운된 경우 ROUTER1의 명령 표시

```
ROUTER1# show isdn status
Global ISDN Switchtype = basic-5ess
```

```
ISDN BRI0 interface
dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
ACTIVE
Layer 2 Status:
TEI = 114, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
!--- ISDN L1 and L2 will be up (when Serial0 fails) !--- even if interesting traffic is not
present. Layer 3 Status: 1 Active Layer 3 Call(s)
Activated dsl 0 CCBs = 1
CCB:callid=8484, sapi=0, ces=1, B-chan=1, calltype=DATA
The Free Channel Mask: 0x80000002
Total Allocated ISDN CCBs = 1
```

```
ROUTER1# show dialer
```

```
BRI0 - dialer type = ISDN
```

```
Dial String Successes Failures Last DNIS Last status
5552000 30 977 00:00:16 successful
0 incoming call(s) have been screened.
0 incoming call(s) rejected for callback.
```

```
BRI0:1 - dialer type = ISDN
```

```
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is data link layer up
Dial reason: bridge (0xFFFF)
Time until disconnect 106 secs
Connected to 5552000 (ROUTER2)
```

```
BRI0:2 - dialer type = ISDN
```

```
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is idle
```

```
ROUTER1# show bridge
```

```
Total of 300 station blocks, 298 free
Codes: P - permanent, S - self
```

```
Bridge Group 1:
```

```
Address Action Interface Age RX count TX count
0000.0c76.2882 forward BRI0 0 5 4
!--- Bridging traffic now goes through BRI0. 00d0.58ad.ae13 forward Ethernet0 0 5 5
```

## 문제 해결

이 섹션에서는 컨피그레이션 문제를 해결하는 데 사용할 수 있는 정보를 제공합니다.

### 문제 해결 리소스

필요에 따라 다음 리소스를 사용합니다.

- [ISDN 기술 지원](#)
- [직렬 회선 문제 해결](#)
- [HDLC 백투백 연결](#)

### 문제 해결 명령

일부 show 명령은 [출력 인터프리터 툴](#) 에서 지원되는데(등록된 고객만), 이 툴을 사용하면 show 명령 출력의 분석 결과를 볼 수 있습니다.

참고: debug 명령을 실행하기 전에 [디버그 명령에 대한 중요 정보를 참조하십시오](#).

- **debug dialer** - 다이얼러 인터페이스 이벤트에 대한 정보를 제공합니다.
- **debug isdn event** - ISDN 인터페이스의 사용자 측에서 발생하는 ISDN 활동과 관련된 디버그 메시지를 표시합니다.
- **debug isdn q931** - 로컬 라우터(사용자측)와 네트워크 간의 ISDN 네트워크 연결(L3)의 통화 설정 및 해제 정보를 제공합니다.
- **debug isdn q921** - ISDN 인터페이스의 LAPD(D-channel)에서 라우터에서 발생하는 L2(data link layer) 액세스 절차와 관련된 디버그 메시지를 표시합니다.
- **debug ppp negotiation**—PPP 옵션 및 NCP(Network Control Protocol) 매개변수의 협상과 관련된 디버그 메시지를 표시합니다.
- **debug ppp authentication** — CHAP 및 PAP(Password Authentication Protocol) 패킷의 교환과 관련된 디버그 메시지를 표시합니다.

## [직렬0이 중단되고 ISDN이 당겨질 때 ROUTER1의 출력 디버그](#)

```
ROUTER1# show debug
```

```
Dial on demand:
Dial on demand events debugging is on
PPP:
PPP authentication debugging is on
PPP protocol negotiation debugging is on
ISDN:
ISDN events debugging is on
ISDN Q921 packets debugging is on
ISDN Q931 packets debugging is on
```

```
ROUTER1#
```

```
!--- Interface serial0 goes down. ROUTER1# 00:56:53: %LINK-3-UPDOWN: Interface Serial0, changed
state to down *Mar 1 00:56:53.103: ISDN BR0 EVENT: isdn_sw_cstate: State = 0, Old State = 6
00:56:53: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down *Mar 1 00:56:53.107: BR0:1
LCP: State is Closed *Mar 1 00:56:53.111: BR0:1 DDR: disconnecting call 00:56:53: %LINK-3-
UPDOWN: Interface BRI0:2, changed state to down *Mar 1 00:56:53.119: BR0:2 LCP: State is Closed
*Mar 1 00:56:53.119: BR0:2 DDR: disconnecting call *Mar 1 00:56:53.127: ISDN BR0 EVENT:
isdn_sw_cstate: State = 4, Old State = 6 *Mar 1 00:56:53.135: ISDN BR0 EVENT: isdn_sw_cstate:
State = 4, Old State = 6 *Mar 1 00:56:53.567: ISDN BR0: RX <- IDCKRQ ri=0 ai=127 *Mar 1
00:56:53.567: ISDN Recvd L1 prim 3 dsl 0 state 3 ctrl_state 0 *Mar 1 00:56:53.571: ISDN BR0: L1
persistent Deactivated *Mar 1 00:56:53.571: ISDN Recvd L1 prim 7 dsl 0 state 3 ctrl_state 0 *Mar
1 00:56:53.575: ISDN BR0: Recvd MPH_IIC_IND from L1 *Mar 1 00:56:53.575: ISDN Recvd L1 prim 7
dsl 0 state 3 ctrl_state 0 *Mar 1 00:56:53.579: ISDN BR0: Recvd MPH_IIC_IND from L1 *Mar 1
00:56:53.579: ISDN Recvd L1 prim 1 dsl 0 state 3 ctrl_state 0 *Mar 1 00:56:53.583: ISDN BR0: L1
is IF_ACTIVE *Mar 1 00:56:53.583: ISDN BR0 EVENT: isdn_sw_cstate: State = 4, Old State = 6 *Mar
1 00:56:53.587: ISDN BR0: L2-TERM: ces/tei=1/0 AWAIT_ESTABLISH->TERM_DOWN *Mar 1 00:56:53.591:
ISDN BR0: Incoming call id = 0x0010, dsl 0 *Mar 1 00:56:53.595: ISDN BR0: L2-TERM: ces/tei=1/0
TERM_DOWN->AWAIT_ESTABLISH 00:56:53: %LINK-3-UPDOWN: Interface BRI0, changed state to up *Mar 1
00:56:53.631: ISDN BR0 EVENT: isdn_sw_cstate: State = 4, Old State = 6 *Mar 1 00:56:53.655: ISDN
BR0: TX -> IDREQ ri=48769 ai=127 00:56:54: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0, changed state to down *Mar 1 00:56:54.387: ISDN BR0: RX <- IDCKRQ ri=0 ai=127 *Mar 1
00:56:55.655: ISDN BR0: TX -> IDREQ ri=42642 ai=127 *Mar 1 00:56:55.699: ISDN BR0: RX <- IDASSN
ri=42642 ai=68 *Mar 1 00:56:55.791: ISDN BR0: TX -> SABMEp c/r=0 sapi=0 tei=68 *Mar 1
00:56:55.823: ISDN BR0: RX <- Uaf c/r=0 sapi=0 tei=68 00:56:55: %ISDN-6-LAYER2UP: Layer 2 for
Interface BR0, TEI 68 changed to up *Mar 1 00:56:55.831: ISDN BR0: L2-TERM: ces/tei=1/68
AWAIT_ESTABLISH->ESTABLISHED !--- Interesting traffic has not arrived yet from Host1, !--- but
ISDN L1 and L2 are up now. ROUTER1# show isdn stat
```

Global ISDN Switchtype = basic-5ess

ISDN BRI0 interface

dsl 0, interface ISDN Switchtype = basic-5ess

Layer 1 Status:

**ACTIVE**

Layer 2 Status:

TEI = 68, Ces = 1, SAPI = 0, State = **MULTIPLE\_FRAME\_ESTABLISHED**

I\_Queue\_Len 0, UI\_Queue\_Len 0

Layer 3 Status:

**0 Active** Layer 3 Call(s)

Active dsl 0 CCBs = 0

The Free Channel Mask: 0x80000003

Number of L2 Discards = 0, L2 Session ID = 34

Total Allocated ISDN CCBs = 0

ROUTER1#

\*Mar 1 00:57:25.839: ISDN BR0: TX -> RRp sapi=0 tei=68 nr=0

\*Mar 1 00:57:25.871: ISDN BR0: RX <- RRf sapi=0 tei=68 nr=0

ROUTER1#

*!--- Interesting traffic arrives now, !--- which triggers ISDN Dialup (see below).* \*Mar 1 00:57:32.519: BR0 DDR: **Dialing cause bridge (0xFFFF)**

\*Mar 1 00:57:32.519: BR0 DDR: Attempting to dial 5552000

\*Mar 1 00:57:32.523: ISDN BR0: Outgoing call id = 0x800E, dsl 0

\*Mar 1 00:57:32.527: ISDN BR0: Event: Call to 5552000 at 64 Kb/s

\*Mar 1 00:57:32.527: ISDN BR0: process\_bri\_call(): call id 0x800E, called\_number 5552000, speed 64, call type DATA

\*Mar 1 00:57:32.531: CCBRI\_Go Fr Host InPkgInfo (Len=22) :

\*Mar 1 00:57:32.535: 1 0 1 80 E 0 4 2 88 90 18

1 83 2C 7 35 35 35 32 30 30 30

\*Mar 1 00:57:32.543:

\*Mar 1 00:57:32.547: CC\_CHAN\_GetIdleChanbri: dsl 0

\*Mar 1 00:57:32.547: Found idle channel B1

\*Mar 1 00:57:32.563: ISDN BR0: TX -> INFOc sapi=0 tei=68 ns=0 nr=0

i=0x08010E05040288901801832C0735353532303030

\*Mar 1 00:57:32.583: SETUP pd = 8 callref = 0x0E

\*Mar 1 00:57:32.591: Bearer Capability i = 0x8890

\*Mar 1 00:57:32.599: Channel ID i = 0x83

\*Mar 1 00:57:32.603: Keypad Facility i = '5552000'

\*Mar 1 00:57:32.867: ISDN BR0: RX <- INFOc sapi=0 tei=68 ns=0 nr=1

i=0x08018E02180189

\*Mar 1 00:57:32.875: CALL\_PROC pd = 8 callref = 0x8E

\*Mar 1 00:57:32.883: Channel ID i = 0x89

\*Mar 1 00:57:32.899: ISDN BR0: TX -> RRr sapi=0 tei=68 nr=1

\*Mar 1 00:57:32.907: CCBRI\_Go Fr L3 pkt (Len=7) :

\*Mar 1 00:57:32.907: 2 1 E 98 18 1 89

\*Mar 1 00:57:32.911:

\*Mar 1 00:57:32.915: ISDN BR0: LIF\_EVENT: ces/callid 1/0x800E

HOST\_PROCEEDING

\*Mar 1 00:57:32.919: ISDN BR0: HOST\_PROCEEDING

\*Mar 1 00:57:32.919: ISDN BR0: HOST\_MORE\_INFO

\*Mar 1 00:57:33.159: ISDN BR0: RX <- INFOc sapi=0 tei=68 ns=1

nr=1 i=0x08018E07

\*Mar 1 00:57:33.167: CONNECT pd = 8 callref = 0x8E

\*Mar 1 00:57:33.183: ISDN BR0: TX -> RRr sapi=0 tei=68 nr=2

\*Mar 1 00:57:33.191: CCBRI\_Go Fr L3 pkt (Len=4) :

\*Mar 1 00:57:33.191: 7 1 E 91

\*Mar 1 00:57:33.195:

\*Mar 1 00:57:33.199: ISDN BR0: LIF\_EVENT: ces/callid 1/0x800E

HOST\_CONNECT

00:57:33: %LINK-3-UPDOWN: **Interface BRI0:1, changed state to up**

\*Mar 1 00:57:33.215: ISDN: get\_isdn\_service\_state():

idb 0x19F4D8 bchan 2 is\_isdn 1 Not a Pri

\*Mar 1 00:57:33.215: BR0:1 PPP: Treating connection as a callout

\*Mar 1 00:57:33.219: BR0:1 PPP: Phase is ESTABLISHING,



```
Active Open [0 sess, 1 load]
*Mar 1 00:57:33.223: BR0:1 LCP: O CONFREQ [Closed] id 27 len 15
*Mar 1 00:57:33.227: BR0:1 LCP:   AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.231: BR0:1 LCP:   MagicNumber 0x6091A5F6
(0x05066091A5F6)
*Mar 1 00:57:33.235: ISDN BR0: Event: Connected to 5552000
on B1 at 64 Kb/s
*Mar 1 00:57:33.247: ISDN BR0: TX -> INFOc sapi=0 tei=68 ns=1 nr=2
i=0x08010E0F
*Mar 1 00:57:33.251:   CONNECT_ACK pd = 8 callref = 0x0E
*Mar 1 00:57:33.267: BR0:1 LCP: I CONFREQ [REQsent] id 4 len 15
*Mar 1 00:57:33.271: BR0:1 LCP:   AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.275: BR0:1 LCP:   MagicNumber 0x6062D6EA
(0x05066062D6EA)
*Mar 1 00:57:33.279: BR0:1 LCP: O CONFACK [REQsent] id 4 len 15
*Mar 1 00:57:33.283: BR0:1 LCP:   AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.287: BR0:1 LCP:   MagicNumber 0x6062D6EA
(0x05066062D6EA)
*Mar 1 00:57:33.291: BR0:1 LCP: I CONFACK [ACKsent] id 27 len 15
*Mar 1 00:57:33.291: BR0:1 LCP:   AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.295: BR0:1 LCP:   MagicNumber 0x6091A5F6
(0x05066091A5F6)
*Mar 1 00:57:33.299: BR0:1 LCP: State is Open
*Mar 1 00:57:33.303: BR0:1 PPP: Phase is AUTHENTICATING,
by both [0 sess, 1 load]
*Mar 1 00:57:33.307: BR0:1 CHAP: O CHALLENGE id 14
len 28 from "ROUTER1"
*Mar 1 00:57:33.319: BR0:1 CHAP: I CHALLENGE id 4
len 28 from "ROUTER2"
*Mar 1 00:57:33.327: BR0:1 CHAP: O RESPONSE id 4
len 28 from "ROUTER1"
*Mar 1 00:57:33.335: ISDN BR0: RX <- RRr sapi=0
tei=68 nr=2
*Mar 1 00:57:33.351: BR0:1 CHAP: I SUCCESS id 4
len 4
*Mar 1 00:57:33.367: BR0:1 CHAP: I RESPONSE id 14
len 28 from "ROUTER2"
*Mar 1 00:57:33.371: BR0:1 CHAP: O SUCCESS id 14
len 4
*Mar 1 00:57:33.375: BR0:1 PPP: Phase is UP [0 sess, 0 load]
*Mar 1 00:57:33.379: BR0:1 BNCP: O CONFREQ [Closed] id 14
len 4
*Mar 1 00:57:33.387: BR0:1 CDPCP: O CONFREQ [Closed] id 14
len 4
*Mar 1 00:57:33.395: BR0:1 BNCP: I CONFREQ [REQsent] id 4
len 4
*Mar 1 00:57:33.399: BR0:1 BNCP: O CONFACK [REQsent] id 4
len 4
*Mar 1 00:57:33.403: BR0:1 IPCP: I CONFREQ [Not negotiated] id 4
len 10
*Mar 1 00:57:33.407: BR0:1 IPCP:   Address 172.16.53.17
(0x0306AC103511)
*Mar 1 00:57:33.415: BR0:1 LCP: O PROTREJ [Open] id 28
len 16 protocol IPCP
(0x80210104000A0306AC103511)
*Mar 1 00:57:33.419: BR0:1 CDPCP: I CONFREQ [REQsent] id 4
len 4
*Mar 1 00:57:33.423: BR0:1 CDPCP: O CONFACK [REQsent] id 4
len 4
*Mar 1 00:57:33.427: BR0:1 BNCP: I CONFACK [ACKsent] id 14
```

```
len 4
*Mar 1 00:57:33.431: BR0:1 BNCP: State is Open
*Mar 1 00:57:33.435: BR0:1 CDPCP: I CONFACK [ACKsent] id 14
len 4
*Mar 1 00:57:33.439: BR0:1 CDPCP: State is Open
*Mar 1 00:57:33.443: BR0:1 DDR: dialer protocol up
00:57:34: %LINEPROTO-5-UPDOWN:
Line protocol on Interface BRI0:1, changed state to up
00:57:39: %ISDN-6-CONNECT: Interface BRI0:1 is now connected
to 5552000 ROUTER2
ROUTER1#
```

```
ROUTER1# show isdn status
```

```
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
    dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
    ACTIVE
Layer 2 Status:
    TEI = 68, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    I_Queue_Len 0, UI_Queue_Len 0
Layer 3 Status:
    1 Active Layer 3 Call(s)
    CCB:callid=800E, sapi=0, ces=1, B-chan=1, calltype=DATA
Active dsl 0 CCBs = 1
The Free Channel Mask: 0x80000002
Number of L2 Discards = 0, L2 Session ID = 34
Total Allocated ISDN CCBs = 1
*Mar 1 00:58:03.343: ISDN BR0: TX -> RRp sapi=0 tei=68 nr=2
*Mar 1 00:58:03.379: ISDN BR0: RX <- RRf sapi=0 tei=68 nr=2pann
ROUTER1# show spanning-tree
```

```
Bridge group 1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0060.5cf4.a9a8
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address 0060.5cf4.a955
Root port is 3 (BRI0), cost of root path is 15625
Topology change flag set, detected flag not set
Number of topology changes 10 last change occurred 00:01:15 ago
from Serial0
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 15
```

```
Port 2 (Ethernet0) of Bridge group 1 is forwarding
Port path cost 100, Port priority 128, Port Identifier 128.2.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a9a8
Designated port id is 128.2, designated path cost 15625
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 2
BPDU: sent 751, received 0
```

```
Port 3 (BRI0) of Bridge group 1 is forwarding
```

```
!--- BRI Interface forwards the bridged traffic now. Port path cost 15625, Port priority 128,
Port Identifier 128.3. Designated root has priority 32768, address 0060.5cf4.a955 Designated
bridge has priority 32768, address 0060.5cf4.a955 Designated port id is 128.3, designated path
cost 0 Timers: message age 2, forward delay 0, hold 0 Number of transitions to forwarding state:
3 BPDU: sent 1014, received 608 Port 6 (Serial0) of Bridge group 1 is down
Port path cost 647, Port priority 128, Port Identifier 128.6.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a9a8
Designated port id is 128.6, designated path cost 15625
Timers: message age 0, forward delay 0, hold 0
```

Number of transitions to forwarding state: 1  
BPDU: sent 15, received 27

ROUTER1#

\*Mar 1 00:58:33.387: ISDN BR0: TX -> RRp sapi=0 tei=68 nr=2  
\*Mar 1 00:58:33.423: ISDN BR0: RX <- RRf sapi=0 tei=68 nr=2

## Serial0이 다시 오고 ISDN이 통화를 끊으면 ROUTER1의 디버그 출력

```
00:58:37: %LINK-3-UPDOWN: Interface Serial10, changed state to up
*Mar 1 00:58:37.671: BR0:1 DDR: disconnecting call
*Mar 1 00:58:37.675: BR0:2 DDR: disconnecting call
*Mar 1 00:58:37.675: ISDN BR0: Event: Hangup call to call id 0x800E
*Mar 1 00:58:37.679: ISDN BR0: process_disconnect(): call id 0x800E,
call type is DATA, b_idb 0x19F4D8, ces 1, cause Normal call
clearing(0x10)
00:58:37: %ISDN-6-DISCONNECT: Interface BRI0:1 disconnected from
5552000 ROUTER2, call lasted 64 seconds
*Mar 1 00:58:37.691: ISDN: get_isdn_service_state(): idb 0x19F4D8
bchan 2 is_isdn 1 Not a Pri
*Mar 1 00:58:37.695: CCBRI_Go Fr Host InPkgInfo (Len=13) :
*Mar 1 00:58:37.699: 5 0 1 80 E 3 8 1 90 8 2 80 90
*Mar 1 00:58:37.703:
*Mar 1 00:58:37.719: ISDN BR0: TX -> INFOc sapi=0 tei=68 ns=2 nr=2
i=0x08010E4508028090
*Mar 1 00:58:37.727: DISCONNECT pd = 8 callref = 0x0E
*Mar 1 00:58:37.735: Cause i = 0x8090 - Normal call clearing
*Mar 1 00:58:37.743: ISDN BR0 EVENT: isdn_sw_cs!!!!!!!!!!!!!!!!!!!!tate:
State = 6, Old State = 4
00:58:37: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar 1 00:58:37.751: BR0:1 BNCP: State is Closed
*Mar 1 00:58:37.755: BR0:1 CDPCP: State is Closed
*Mar 1 00:58:37.755: BR0:1 PPP: Phase is TERMINATING [0 sess, 1 load]
*Mar 1 00:58:37.759: BR0:1 LCP: State is Closed
*Mar 1 00:58:37.763: BR0:1 PPP: Phase is DOWN [0 sess, 1 load]
*Mar 1 00:58:37.763: BR0:1 DDR: disconnecting call
*Mar 1 00:58:37.775: ISDN Recvd L1 prim 3 dsl 0 state 1 ctrl_state 0
*Mar 1 00:58:37.779: ISDN BR0: Physical layer is IF_DOWN
*Mar 1 00:58:37.783: ISDN BR0: Shutting down ME
00:58:37: %ISDN-6-LAYER2DOWN: Layer 2 for Interface BRI0,
TEI 68 changed to down
*Mar 1 00:58:37.791: ISDN BR0: L2-TERM: ces/tei=1/68
ESTABLISHED->TERM_DOWN
*Mar 1 00:58:37.795: ISDN BR0: LIF_EVENT: ces/callid 1/0x800E
HOST_DISCONNECT_ACK
*Mar 1 00:58:37.803: ISDN: get_isdn_service_state(): idb 0x19F4D8
bchan 2 is_isdn 1 Not a Pri
*Mar 1 00:58:37.807: ISDN BR0: HOST_DISCONNECT_ACK: call type is DATA
00:58:37: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar 1 00:58:37.815: BR0:1 LCP: State is Closed
*Mar 1 00:58:37.815: BR0:1 DDR: disconnecting call
*Mar 1 00:58:37.819: ISDN BR0: Shutting down ISDN Layer 3
00:58:37: %ISDN-6-LAYER2DOWN: Layer 2 for Interface BR0,
TEI 68 changed to down
00:58:37: %LINK-5-CHANGED: Interface BRI0, changed state to standby mode
*Mar 1 00:58:37.847: ISDN BR0 EVENT: isdn_sw_cstate: State = 6,
Old State = 4
00:58:37: %LINK-3-UPDOWN: Interface BRI0:2, changed state to down
*Mar 1 00:58:37.855: BR0:2 LCP: State is Closed
*Mar 1 00:58:37.855: BR0:2 DDR: disconnecting call
*Mar 1 00:58:37.895: ISDN BR0: Incoming call id = 0x0011, dsl 0
*Mar 1 00:58:37.895: ISDN BR0: L2-TERM: ces/tei=1/0
TERM_DOWN->AWAIT_ESTABLISH
```

```
*Mar 1 00:58:37.935: ISDN BR0: Activating
00:58:38: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0,
changed state to up
00:58:38: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
changed state to down
*Mar 1 00:58:39.939: ISDN BR0: Could not bring up interface
*Mar 1 00:58:39.943: ISDN BR0: Shutting down ISDN Layer 3
*Mar 1 00:58:39.963: ISDN BR0: Activating
*Mar 1 00:58:41.943: ISDN BR0: Could not bring up interface
*Mar 1 00:58:41.947: ISDN BR0: Shutting down ISDN Layer 3
*Mar 1 00:58:41.947: ISDN BR0: Activating
ROUTER1#
```

```
ROUTER1# show isdn status
```

```
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
DEACTIVATED
Layer 2 Status:
Layer 2 NOT Activated
```

```
!--- ISDN L1 and L2 are back to the deactivated state. Layer 3 Status: 0 Active Layer 3 Call(s)
Active dsl 0 CCBs = 0 The Free Channel Mask: 0x80000003 Number of L2 Discards = 0, L2 Session ID
= 39 Total Allocated ISDN CCBs = 0 ROUTER1# *Mar 1 00:58:49.951: ISDN BR0: Could not bring up
interface *Mar 1 00:58:49.951: ISDN BR0: Shutting down ISDN Layer 3 ROUTER1# ROUTER1# show
spanning-tree
```

```
Bridge group 1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0060.5cf4.a9a8
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address 0060.5cf4.a955
Root port is 6 (Serial0), cost of root path is 647
Topology change flag not set, detected flag not set
Number of topology changes 13 last change occurred 00:28:23 ago
from Serial0
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300
```

```
Port 2 (Ethernet0) of Bridge group 1 is forwarding
Port path cost 100, Port priority 128, Port Identifier 128.2.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a9a8
Designated port id is 128.2, designated path cost 647
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 2
BPDU: sent 1633, received 0
```

```
Port 3 (BRI0) of Bridge group 1 is down
```

```
!--- BRI0 is in the down state when Serial 0 is up. Port path cost 15625, Port priority 128,
Port Identifier 128.3. Designated root has priority 32768, address 0060.5cf4.a955 Designated
bridge has priority 32768, address 0060.5cf4.a9a8 Designated port id is 128.3, designated path
cost 647 Timers: message age 0, forward delay 0, hold 0 Number of transitions to forwarding
state: 3 BPDU: sent 1014, received 622 Port 6 (Serial0) of Bridge group 1 is forwarding
!--- Serial0 forwards the bridged traffic now. Port path cost 647, Port priority 128, Port
Identifier 128.6. Designated root has priority 32768, address 0060.5cf4.a955 Designated bridge
has priority 32768, address 0060.5cf4.a955 Designated port id is 128.6, designated path cost 0
Timers: message age 1, forward delay 0, hold 0 Number of transitions to forwarding state: 2
BPDU: sent 18, received 896 ROUTER1#
```

## [관련 정보](#)

- [ISDN 간 브리징](#)

- [백업 인터페이스를 사용하는 BRI ISDN 백업](#)
- [다이얼러 위치를 사용하여 BRI Multilink ISDN 백업 구성](#)
- [다이얼러 위치를 사용하여 BRI ISDN 백업 구성](#)
- [부동 고정 경로를 사용하여 ISDN 백업 구성](#)
- [BRI를 사용하는 DDR 백업 및 백업 인터페이스 명령](#)
- [다이얼러 프로파일을 사용하여 BRI 백업 인터페이스 구성](#)
- [BRI 및 Dialer Watch를 사용하여 DDR 백업 구성](#)
- [부동 고정 경로를 사용하여 WAN 링크에 대한 ISDN 백업 구성](#)
- [프레임 릴레이 백업 구성](#)
- [직렬 회선에 대한 다이얼 백업 구성](#)
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