

# 수신 멀티링크 비동기 및 ISDN 통화에 대해 PRI를 사용하여 액세스 서버 구성

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## [소개](#)

많은 환경에서 비동기 및 ISDN 사용자 모두의 수신 통화를 수락할 수 있는 액세스 서버를 구성해야 합니다. 그러면 이러한 사용자는 마치 물리적으로 존재하는 것처럼 네트워크에 원활하게 연결할 수 있습니다. 이러한 설정은 일반적으로 출장을 가거나 재택 근무자이거나 SOHO(Small Office-Home Office) 사이트용 네트워크 연결을 제공하는 데 사용됩니다.

이 문서에서는 ISDN T1 PRI 회로에서 수신 비동기 및 ISDN 호출을 허용하도록 액세스 서버를 구성하는 방법에 대해 설명합니다. 컨피그레이션은 NAS(Network Access Server)가 통화를 수락하는 데 필요한 최소 설정을 제공합니다. 필요에 따라 이 구성에 추가 기능을 추가할 수 있습니다.

## [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® Software Release 12.2(5)를 실행하는 192개의 MICA 모뎀과 8개의 T1 포트가 포함된 Cisco AS5300
- T1 PRI 2개
- Microsoft Windows를 실행하는 PC입니다. 이 PC에는 아날로그 모뎀과 공용 스위치 전화 네트워크에 대한 전화 연결이 있습니다. PC는 AS5300에 연결된 T1 PRI에 전화를 겁니다.
- ISDN BRI 회로가 있는 Cisco 800 및 1600 Series 라우터 이러한 라우터는 ISDN 전화 접속 클라이언트입니다. Cisco 1600에 대한 컨피그레이션이 제공됩니다. BRI 인터페이스가 있는 모든 라우터에 이 클라이언트 컨피그레이션을 적용할 수 있습니다.
- AAA(Local Authentication, Authorization and Accounting). AAA Radius 또는 Tacacs+ 서버가 있는 경우 둘 중 하나를 사용하여 수신 통화에 대해 AAA를 제공할 수 있습니다.

**참고:** Cisco 800 라우터의 컨피그레이션은 Cisco 1600 라우터의 컨피그레이션과 유사하며 이 문서에는 포함되지 않습니다.

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

T1 또는 PRI 카드와 내부 디지털 모뎀(예: MICA, NextPort 또는 Microcom)이 있는 모든 라우터에서 이 컨피그레이션을 사용할 수 있습니다. T1 또는 PRI 카드와 디지털 모뎀이 있는 모든 AS5xxx 시리즈 라우터는 이 컨피그레이션의 개념을 사용할 수 있습니다.

Cisco 2600 Series 라우터는 내부 디지털 모뎀을 지원하지 않습니다. 라우터에 T1 또는 PRI WIC 또는 네트워크 모듈이 있는 경우 ISDN 통화만 허용하도록 Cisco 2600 Series 라우터를 구성할 수 있습니다.

Cisco 3600 Series 라우터는 ISDN 및 모뎀 통화를 모두 지원할 수 있습니다. 그러나 Cisco 3600 Series 라우터에는 T1 또는 PRI WIC 또는 Network Module과 NM-xDM Digital Modem Network Module이 필요합니다.

E1 또는 PRI Ports에서 이 구성을 사용하도록 수정할 수도 있습니다. E1 컨트롤러를 Telco에서 제공하는 선형코드, 프레이밍 및 기타 물리적 특성으로 구성합니다. D-channel 컨피그레이션(E1의 경우 Serial x:15 인터페이스)은 이 문서에 표시된 것과 유사합니다.

## 표기 규칙

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

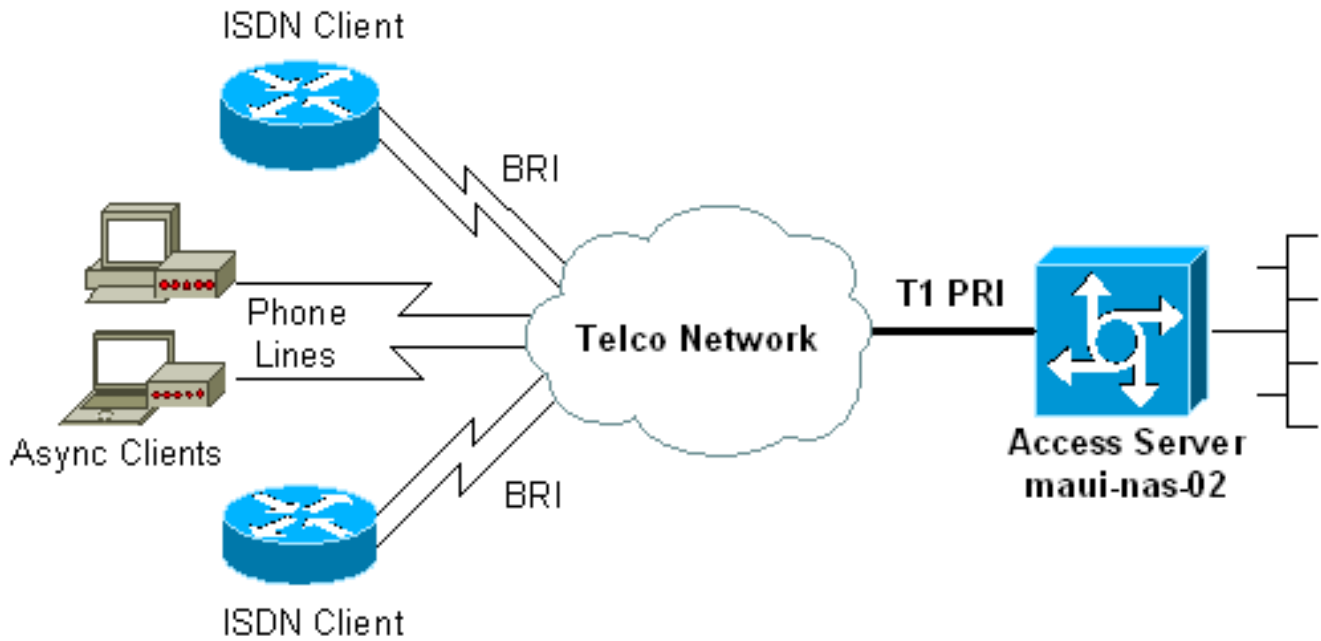
## 구성

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.

- [maui-nas-02\(5300\)](#)
- [마우이-소호-01 \(1600\)](#)

### maui-nas-02(5300)

```
maui-nas-02#show running-config
Building configuration...

Current configuration : 3671 bytes
!
! No configuration change since last restart
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname maui-nas-02
!
boot system flash:c5300-i-mz.122-5.bin
aaa new-model
aaa authentication login default local
aaa authentication login NO_AUTHEN none
aaa authentication ppp default local
aaa authorization network default local
!--- PPP authentication and network authorization are
local. !--- Replace local with radius or tacacs if you
use an AAA server.

enable secret 5 <deleted>
!
username admin password 7 <deleted>
```

```

username async_user password 7 <deleted>
username travis_isdn password 7 <deleted>
username austin_isdn password 7 <deleted>
  !--- Usernames for local authentication of the call.
  !--- The client presents the username/password and the
  NAS !--- authenticates the peer. spe 1/0 1/8 firmware
  location mica-modem-pw.2.7.3.0.bin spe 2/0 2/7 firmware
  location mica-modem-pw.2.7.3.0.bin ! ip subnet-zero ip
  domain-name maui-onions.com !--- Tells the NAS how to
  qualify DNS lookups. !--- In this example, maui-
  onions.com is appended to the end of each !--- looked-up
  name. ip name-server 172.22.53.210 !--- Specifies the
  primary name server. ! async-bootp dns-server
  172.22.53.210 !--- Specifies (for async clients) the IP
  address of domain name servers. isdn switch-type
  primary-ni !--- Switch-type for this NAS. Obtain this
  information from the Telco. ! controller T1 0 !--- First
  T1 PRI framing esf !--- Framing for this T1 is Extended
  Super Frame (ESF). !--- Obtain this information from the
  Telco. clock source line primary !--- T1 0 is the
  primary clock source for this NAS. !--- Clock source
  must be specified for the timing and synchronization !--
  - of the T1 carrier. linecode b8zs !--- Linecoding for
  this T1. Obtain this information from the Telco. pri-
  group timeslots 1-24 !--- For T1 PRI scenarios, all 24
  T1 timeslots are assigned as !--- ISDN PRI channels. The
  router now automatically creates the !--- corresponding
  D-channel: interface Serial 0:23.

!
controller T1 1
  !--- Second T1 PRI. framing esf !--- Framing for this
  T1 is Extended Super Frame (ESF). !--- Obtain this
  information from the Telco. clock source line secondary
  1 !--- T1 1 is the first secondary clock source for this
  NAS. !--- If the primary clock fails, this secondary
  clock takes over. linecode b8zs !--- Linecoding for this
  T1. Obtain this information from the Telco. pri-group
  timeslots 1-24 !--- For T1 PRI scenarios, all 24 T1
  timeslots are assigned as ISDN !--- PRI channels. The
  router now automatically creates the !--- corresponding
  D-channel: interface Serial 1:23.

!
controller T1 2
  !--- This T1 is unused. framing sf clock source line
  secondary 2 linecode ami ! !--- Unused interface
  configuration is omitted here. ! interface Loopback0 ip
  address 172.22.60.1 255.255.255.0 !--- The IP pool for
  async users is in this subnet. !--- The routes for all
  async clients are summarized and !--- propagated to the
  backbone instead of 254 routes. ! interface Loopback1 ip
  address 172.22.61.1 255.255.255.0 !--- The IP pool for
  ISDN users is in this subnet. !--- The routes for all
  ISDN clients are summarized and !--- propagated to the
  backbone instead of 254 routes. ! interface Ethernet0 ip
  address 172.22.53.140 255.255.255.0 ! !--- Unused
  interface configuration is omitted here. ! interface
  Serial0:23 !--- D-channel configuration for T1 0. no ip
  address encapsulation ppp !--- PPP encapsulation on this
  interface. dialer rotary-group 10 !--- T1 0 is a member
  of rotary group 10. !--- The rotary group configuration
  is in interface Dialer 10. isdn switch-type primary-ni
  isdn incoming-voice modem !--- All incoming voice calls

```

on this T1 are sent to the modems. !--- This command is required if this T1 is to accept async calls. no cdp enable ppp authentication chap ppp multilink ! interface Serial1:23 !--- D-channel configuration for T1 1. no ip address encapsulation ppp !--- PPP encapsulation on this interface. dialer rotary-group 10 !--- T1 1 is a member of rotary group 10. !--- The rotary group configuration is in interface Dialer 10. isdn switch-type primary-ni isdn incoming-voice modem !--- All incoming voice calls on this T1 are sent to the modems. !--- This command is required if this T1 is to accept async calls. no cdp enable ppp authentication chap ppp multilink ! interface Group-Async0 !--- This group-async interface is the configuration template for all modems. !--- You need not configure individual async interfaces because you can !-- clone the interfaces from one managed copy. ip unnumbered Loopback0 !--- A Loopback interface is always up/up. So, unnumber the loopback interface !--- for stability. encapsulation ppp dialer in-band dialer idle-timeout 900 dialer-group 5 !--- Interesting traffic is defined in dialer-list 5. !--- **Note:** The specified **dialer-group** number must be the same as the !--- **dialer-list** number. In this example, the number is defined as "5".

async mode interactive

!--- Users can dial in and get to a shell or PPP session on that line. !--- You can use this command in conjunction with **autoselect ppp** !--- under the line configuration to automatically detect the connection type.

peer default ip address pool ASYNC

!--- Clients are assigned addresses from the IP address pool named ASYNC. no fair-queue ppp authentication chap !--- Use CHAP authentication. ppp multilink group-range 1 192 !--- Modems 1 through 192 are members of this group async interface. ! interface Dialer10 !--- Configuration for rotary group 10. !--- The Dialer interface number (10) must exactly match rotary !--- group number configured on the physical interfaces. ip unnumbered Loopback1 !--- A Loopback interface is always up/up. So, unnumber the loopback interface !--- for stability. encapsulation ppp dialer in-band !--- Enable V.25bis on this interface. dialer idle-timeout 900 !--- Idle timeout for incoming calls is 900 seconds (15 mins). dialer-group 5 !--- Apply interesting traffic definition from dialer-list 5. !--- **Note:** The specified **dialer-group** number must be the same !--- as the **dialer-list** number. !--- In this example, the number is defined as "5".

peer default ip address pool ISDN

!--- Clients are assigned addresses from the IP address pool named ISDN. ppp authentication chap ppp multilink ! router eigrp 69 network 172.22.0.0 auto-summary no eigrp log-neighbor-changes ! ip local pool ASYNC 172.22.60.2 172.22.60.254 ip local pool ISDN 172.22.61.2 172.22.61.254 !--- IP address pools for dialin clients. ip classless no ip http server ! access-list 101 remark Interesting Traffic Definition to be used in dialer-list 5 access-list 101 deny eigrp any any access-list 101 permit ip any any dialer-list 5 protocol ip list 101 !--- Access-list 101 defines interesting

traffic. This definition is applied !--- to interface Dialer 10 and Group-Async 0 through dialer-group 5. !---  
**Note:** The specified **dialer-list** number must be the same as the !--- **dialer-group** number. In this example, the number is defined as "5".

```
!  
line con 0  
  exec-timeout 0 0  
  login authentication NO_AUTHEN  
  !--- Apply AAA list NO_AUTHEN configured previously.  
  !--- That list has method "none". !--- There is no  
  authentication on the console port. line 1 192 modem  
InOut !--- Support incoming and outgoing modem calls.  
transport input all autoselect during-login ! ---  
Displays the username:password prompt after modems  
connect. autoselect ppp !--- Automatically launches PPP  
if the router detects incoming PPP packets. !--- Without  
this command the dialin client must manually !--- launch  
PPP (from Exec mode). line aux 0 line vty 0 4 ! ntp  
clock-period 17180107 ntp server 172.22.53.1 end
```

## 마우이-소호-01 (1600)

```
maui-soho-01#show running-config  
Building configuration...  
  
Current configuration : 1609 bytes  
!  
version 12.1  
no service single-slot-reload-enable  
service timestamps debug datetime msec  
service timestamps log datetime msec  
service password-encryption  
!  
hostname maui-soho-01  
!  
logging rate-limit console 10 except errors  
!  
username admin password 7 <deleted>  
ip subnet-zero  
no ip finger  
!  
isdn switch-type basic-ni  
  !--- Switch-type for the BRI circuit. Obtain this  
  information from the Telco. ! interface Ethernet0 ip  
address 10.0.0.1 255.255.255.0 no keepalive ! interface  
Serial0 no ip address shutdown ! interface BRI0 !--- BRI  
physical interface configuration. no ip address !--- An  
IP address is not required on the physical BRI interface  
because !--- this is a dialer pool. !--- The IP  
addressing functionality is in interface Dialer 1  
(dialer pool). encapsulation ppp dialer pool-member 1 !-  
-- Places the interface into dialer pool 1 from which  
Dialer interfaces !--- can draw channels as needed. !---  
Links the physical interface with the logical dialer  
interfaces. !--- Dialer Pool 1 is defined in interface  
Dialer 1. isdn switch-type basic-ni isdn spid1  
51255511110101 5551111 isdn spid2 512555111120101 5551112  
!--- Service Profile IDentifiers (SPIDs) are found  
primarily in North America. !--- SPIDs are not required  
for certain switch types. Confirm with your Telco. !---  
If the Telco informs you that you do not need SPIDs, do
```

```
not use these !--- two SPID commands. ppp authentication
chap callin !--- Perform one way CHAP authentication.
ppp multilink !--- Permit multilink on this BRI
interface. ! interface Dialer1 !--- This dialer is the
logical interface for the dialer pool. ip address
negotiated !--- IP address for this interface is
obtained from the NAS during !--- IPCP negotiation.
Alternatively, you can also unnumber this interface !---
to a working interface (example, ethernet 0).
encapsulation ppp dialer pool 1 !--- Defines Dialer pool
1. !--- BRI 0 is a member of this pool. dialer idle-
timeout 900 !--- Idle-timout for this link is 900
seconds (15 minutes). !--- The link is disconnected if
there is no interesting traffic for 900 secs. dialer
string 81560 class 56k !--- Dial 81560 and use the map-
class named "56k". dialer load-threshold 1 outbound !---
Sets the outbound load level for traffic at which !---
additional connections are added to the MP bundle load
level. !--- Values range from 1 (unloaded) to 255 (fully
loaded). !--- With a threshold of 1, the additional
links are immediately !--- brought up and added to the
bundle. dialer-group 1 !--- Apply interesting traffic
definition from dialer-list 1. ppp authentication chap
callin !--- Use one way PPP CHAP authentication. ppp
chap hostname austin_isdn !--- Use the CHAP username
austin_isdn to authenticate to the other router. ppp
chap password 7 <deleted> !--- Use this CHAP password to
authenticate to the other router. ppp multilink !---
Allow multilink for the dialer profile. !--- Without
this command multilink is NOT negotiated. ! ! ip
classless ip route 0.0.0.0 0.0.0.0 Dialer1 !--- Set the
default route to be interface Dialer 1 (the dialer
pool). !--- Traffic sent to int Dialer1 causes the
dialer pool member (int BRI 0) !--- to be dialed. no ip
http server ! ! map-class dialer 56k !--- Map-class
named "56k" that you used with the dialer string in int
Dialer1. dialer isdn speed 56 !--- Set the speed of the
call to be 56k (the default speed is 64k). !--- This
setting is optional for your connection. !--- Consult
your Telco to find out if you need to configure the dial
!--- speed to 56k. access-list 101 remark Interesting
traffic for dialer-list 1 access-list 101 deny udp any
any eq ntp access-list 101 permit ip any any !--- Define
NTP traffic as NOT interesting to prevent periodic NTP
traffic !--- from keeping the link up indefinitely. !---
All other IP traffic is interesting. !--- Change this
depending on your traffic needs. dialer-list 1 protocol
ip list 101 !--- Access-list 101 defines interesting
traffic. !--- Apply this to interface Dialer 1 through
the command dialer-group 1. !--- Note: The specified
dialer-list number must be the same as the !--- dialer-
group number. In this example, the number is defined as
"1"

!
line con 0
  transport input none
line vty 0 4
  login
!
ntp clock-period 17042429
ntp server 172.22.53.1
end
```

## 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** - 라우터가 ISDN 스위치와 제대로 통신하는지 확인합니다. 출력에서 1 가 ACTIVE이고 2 = MULTIPLE\_FRAME\_ESTABLISHED가 나타나는지 확인합니다. 이 명령은 활성 통화 수도 표시합니다. 자세한 내용은 [BRI 문제 해결을 위해 show isdn status 명령 사용](#)을 참조하십시오.
- **show ppp multilink** - 활성 멀티링크 번들에 대한 정보를 표시합니다. 멀티링크 연결을 확인하려면 이 명령을 사용합니다.
- **show dialer [interface type number]**—DDR용으로 구성된 인터페이스에 대한 일반 진단 정보를 표시합니다. 다이얼러가 제대로 작동하면 다이얼러 메시지가 나타나야 합니다. 가 위로 나타나면 그 라인 프로토콜이 작동했지만 NCP(Network Control Protocol)는 나타나지 않았다는 의미입니다. 다이얼링을 시작한 패킷의 소스 및 목적지 주소가 회선에 표시됩니다. 이 **show** 명령은 타이머의 컨피그레이션 및 연결이 시간 초과되기 전의 시간도 표시합니다.
- **show caller user username detail**—특정 사용자에게 대한 매개변수(예: 할당된 IP 주소, PPP 및 PPP 번들 매개변수)를 표시합니다. 사용 중인 버전의 Cisco IOS 소프트웨어가 이 명령을 지원하지 않는 경우 **show user** 명령을 사용합니다.
- **show dialer map** - 구성된 동적 및 정적 다이얼러 맵을 표시합니다. 이 명령을 사용하여 동적 다이얼러 맵이 생성되었는지 확인할 수 있습니다. 다이얼러 맵이 없으면 패킷을 라우팅할 수 없습니다.

## 샘플 show 출력

다음은 성공한 통화에 대한 show 명령 출력입니다. 굵게 표시된 부분과 출력에 제공된 주석에 유의하십시오. 가져온 출력을 여기에 표시된 결과와 비교합니다.

### 일반 보기

```
maui-nas-02#show users
  Line      User      Host(s)      Idle      Location
*  0 con 0          idle          00:00:00
  97 tty 97   async_user Async interface 00:06:36  PPP: 172.22.60.2
!--- Async User. The IP address of the peer is indicated. Interface User Mode Idle Peer Address
Vi1          austin_isd Virtual PPP (Bundle) 00:03:35 172.22.61.2
Vi2          travis_isd  Virtual PPP (Bundle) 00:00:20 172.22.61.3
!--- Virtual-Access Interface for the two multilink PPP users. Se0:1          austin_isd Sync PPP
- Bundle: Vi1
  Se0:2          austin_isd Sync PPP          - Bundle: Vi1
!--- User austin_isdn is connected through two B-channels(Multilink PPP). !--- Interface
Virtual-Access 1 (Vi1) controls the two B-channels. Se0:3          travis_isd Sync PPP
- Bundle: Vi2
  Se0:4          travis_isd Sync PPP          - Bundle: Vi2
!--- User travis_isdn is connected through two B-channels (Multilink PPP). !--- Interface
Virtual-Access 2 (Vi2) controls the two B-channels. maui-nas-02#show dialer map
!--- Observe the Dynamic Dialer Maps created for each dialin client. Dynamic dialer map ip
172.22.60.2 name async_user () on As97 Dynamic dialer map ip 172.22.61.2 name austin_isdn () on
Di10 Dynamic dialer map ip 172.22.61.3 name travis_isdn () on Di10
```



```

maui-nas-02#show users
  Line      User      Host(s)      Idle      Location
* 0 con 0      idle      00:00:00
  97 tty 97   async_user Async interface 00:06:36 PPP: 172.22.60.2
!--- Async User. The IP address of the peer is indicated. Interface User Mode Idle Peer Address
Vi1      austin_isd Virtual PPP (Bundle) 00:03:35 172.22.61.2
  Vi2      travis_isd Virtual PPP (Bundle) 00:00:20 172.22.61.3
!--- Virtual-Access Interface for the two multilink PPP users. Se0:1      austin_isd Sync PPP
- Bundle: Vi1
  Se0:2      austin_isd Sync PPP      - Bundle: Vi1
!--- User austin_isdn is connected through two B-channels(Multilink PPP). !--- Interface
Virtual-Access 1 (Vi1) controls the two B-channels. Se0:3      travis_isd Sync PPP
- Bundle: Vi2
  Se0:4      travis_isd Sync PPP      - Bundle: Vi2

!--- User travis_isdn is connected through two B-channels (Multilink PPP). !--- Interface
Virtual-Access 2 (Vi2) controls the two B-channels. maui-nas-02#show dialer map
!--- Observe the Dynamic Dialer Maps created for each dialin client. Dynamic dialer map ip
172.22.60.2 name async_user () on As97 Dynamic dialer map ip 172.22.61.2 name austin_isdn () on
Di10 Dynamic dialer map ip 172.22.61.3 name travis_isdn () on Di10

```

```

maui-nas-02#show users
  Line      User      Host(s)      Idle      Location
* 0 con 0      idle      00:00:00
  97 tty 97   async_user Async interface 00:06:36 PPP: 172.22.60.2
!--- Async User. The IP address of the peer is indicated. Interface User Mode Idle Peer Address
Vi1      austin_isd Virtual PPP (Bundle) 00:03:35 172.22.61.2
  Vi2      travis_isd Virtual PPP (Bundle) 00:00:20 172.22.61.3
!--- Virtual-Access Interface for the two multilink PPP users. Se0:1      austin_isd Sync
PPP      - Bundle: Vi1
  Se0:2      austin_isd Sync PPP      - Bundle: Vi1
!--- User austin_isdn is connected through two B-channels(Multilink PPP). !--- Interface
Virtual-Access 1 (Vi1) controls the two B-channels. Se0:3      travis_isd Sync PPP
- Bundle: Vi2
  Se0:4      travis_isd Sync PPP      - Bundle: Vi2

!--- User travis_isdn is connected through two B-channels (Multilink PPP). !--- Interface
Virtual-Access 2 (Vi2) controls the two B-channels. maui-nas-02#show dialer map
!--- Observe the Dynamic Dialer Maps created for each dialin client. Dynamic dialer map ip
172.22.60.2 name async_user () on As97 Dynamic dialer map ip 172.22.61.2 name austin_isdn () on
Di10 Dynamic dialer map ip 172.22.61.3 name travis_isdn () on Di10

```

## 아날로그 통화의 경우

```

maui-nas-02#show caller user async_user detail

  User: async_user, line tty 97, service Async
!--- Shows hardware-level settings for the user named async_user. Active time 00:00:34,
Idle time 00:00:16 Timeouts: Absolute Idle Idle Session Exec Limits: - - 00:10:00 Disconnect in:
- - - TTY: Line 97, running PPP on As97
!--- The call is terminated on interface Async 97. !--- This interface is included in the
Group-Async configuration. Location: PPP: 172.22.60.2
!--- IP address for the peer. This address is obtained from the IP pool "ASYNC". DS0:
(slot/unit/channel)=0/0/2
!--- T1 channel on which the call arrived. !--- The call arrived on channel 0 in T1 0.
Line: Baud rate (TX/RX) is 115200/115200, no parity, 1 stopbits, 8 databits Status: Ready,
Active, No Exit Banner, Async Interface Active HW PPP Support Active Capabilities: Hardware
Flowcontrol In, Hardware Flowcontrol Out Modem Callout, Modem RI is CD, Line usable as async
interface, Integrated Modem Modem State: Ready User: async_user, line As97, service PPP
!--- PPP setting for the user named async_user. !--- Notice that the call is terminated on
int Async97. Active time 00:00:32, Idle time 00:00:30 Timeouts: Absolute Idle Limits: - 00:15:00
Disconnect in: - 00:14:28 PPP: LCP Open, multilink Closed, CHAP (<- AAA), IPCP

```

*!--- LCP state is OPEN. If LCP state is not OPEN, !--- use debug ppp negotiation to isolate LCP issues.*

LCP: -> peer, ACCM, AuthProto, MagicNumber, PCompression, ACCompression  
<- peer, ACCM, MagicNumber, PCompression, ACCompression

**NCP: Open IPCP**

*!--- IPCP state is open. If IPCP state is not OPEN, !--- use debug ppp negotiation to isolate IPCP issues.*

IPCP: <- peer, Address  
-> peer, Address

Dialer: Connected, inbound  
Idle timer 900 secs, idle 31 secs  
Type is IN-BAND ASYNC, group As97

**IP: Local 172.22.60.1, remote 172.22.60.2**

*!--- NAS IP address and the IP address assigned to the peer. Counts: 27 packets input, 1545 bytes, 0 no buffer*

1 input errors, 1 CRC, 0 frame, 0 overrun  
**14 packets output, 347 bytes**, 0 underruns  
0 output errors, 0 collisions, 0 interface resets

*!--- Packets pass through the connection.*

## ISDN 통화의 경우

maui-nas-02#show caller user austin\_isdn detail

*!--- The user named austin\_isdn has two PPP links, !--- and one virtual interface bundle.*

**User: austin\_isdn, line Se0:3, service PPP**

*!--- Shows PPP layer settings for the first channel !--- that belongs to the user named austin\_isdn.* Active time 00:04:01, Idle time 00:00:00 Timeouts: Absolute Idle Limits: - - Disconnect in: - - PPP: **LCP Open**, multilink Open, CHAP (<- AAA)

*!--- LCP state is OPEN. If LCP state is not OPEN, !--- use debug ppp negotiation to isolate LCP issues.*

LCP: -> peer, AuthProto, MagicNumber, MRRU, EndpointDisc  
<- peer, MagicNumber, MRRU, EndpointDisc

Dialer: **Connected, inbound**  
**Type is ISDN, group Di10**

*!--- Incoming call used rotary group of int Dialer 10. IP: Local 172.22.61.1*

*!--- IP address of the int Loopback 1. !--- Remember that int Dialer 1 was unnumbered to Loop 1. !--- The remote IP address is indicated under the virtual-interface.* Bundle: Member of austin\_isdn, last input 00:00:00 Counts: 55 packets input, 1635 bytes, 0 no buffer 0 input errors, 0 CRC, 0 frame, 0 overrun 82 packets output, 3479 bytes, 0 underruns 0 output errors, 0 collisions, 0 interface resets **User: austin\_isdn, line Se0:4, service PPP**

*!--- Shows PPP layer settings for the second channel !--- that belongs to the user named austin\_isdn.* Active time 00:03:59, Idle time 00:00:00 Timeouts: Absolute Idle Limits: - - Disconnect in: - - PPP: LCP Open, multilink Open, CHAP (<- AAA) LCP: -> peer, AuthProto, MagicNumber, MRRU, EndpointDisc <- peer, MagicNumber, MRRU, EndpointDisc Dialer: Connected to , inbound Type is ISDN, group Di10 IP: Local 172.22.61.1 Bundle: Member of austin\_isdn, last input 00:00:00 Counts: 50 packets input, 1589 bytes, 0 no buffer 0 input errors, 0 CRC, 0 frame, 0 overrun 77 packets output, 3429 bytes, 0 underruns 0 output errors, 0 collisions, 0 interface resets **User: austin\_isdn, line Vi1, service PPP Bundle**

*!--- Shows Virtual-Access Interface Bundle that controls the connections.* Active time 00:04:02, Idle time 00:04:01 Timeouts: Absolute Idle Limits: - 00:15:00 Disconnect in: - 00:10:58 PPP: LCP Open, multilink Open, IPCP, CDPCP LCP: -> peer, MagicNumber, MRRU, EndpointDisc <- peer NCP: **Open IPCP**, CDPCP

*!--- IPCP State is open. If IPCP state is not OPEN, !--- use debug ppp negotiation to isolate IPCP issues.*

IPCP: <- peer, Address  
-> peer, Address

Dialer: Connected, inbound  
Idle timer 900 secs, idle 1 secs  
Type is IN-BAND SYNC, group Di10

IP: Local 172.22.61.1, remote 172.22.61.2

!--- Dialer interface (Local) IP address !--- and the IP address assigned to the peer.

Bundle: First link of austin\_isdn, 2 links, last input 00:00:01 Counts: 12 packets input, 1712 bytes, 0 no buffer 0 input errors, 0 CRC, 0 frame, 0 overrun 67 packets output, 5030 bytes, 0 underruns 0 output errors, 0 collisions, 0 interface resets

## 문제 해결

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

### 문제 해결 리소스

필요에 따라 다음 리소스를 사용합니다.

- [수신 모뎀 통화 문제 해결](#) - 이 문서를 사용하여 아날로그 통화 오류를 해결합니다.
- [PRI Async Modem Callin\(PRI 비동기 모뎀 호출\)](#) - 아날로그 통화 오류를 해결하기 위한 추가 정보에 이 문서를 사용합니다.
- [Incoming ISDN Call Troubleshooting\(수신 ISDN 통화 문제 해결\)](#) - 이 문서를 사용하여 ISDN 통화 실패 문제를 해결합니다.
- [PRI ISDN Call\(PRI ISDN 호출\)](#) - ISDN 통화 실패 문제를 해결하기 위한 추가 정보에 이 문서를 사용합니다.
- [T1 문제 해결 순서도](#) - T1 회로가 제대로 작동하지 않는다고 생각되면 이 순서도를 사용합니다.
- [T1/56K 회선에 대한 루프백 테스트](#) - 이 문서를 사용하여 라우터의 T1 포트가 올바르게 작동하는지 확인합니다.

### 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 인터페이스에서 수신된 패킷에 대한 DDR 디버깅 정보를 표시합니다. 이 정보는 다이얼러 인터페이스를 사용하는 흥미로운 트래픽이 있는지 확인하는 데 도움이 될 수 있습니다.
- **debug isdn q931** - ISDN 네트워크 연결의 통화 설정 및 해제(레이어 3)를 표시합니다.
- **debug modem** — 액세스 서버의 모뎀 회선 활동을 표시합니다. 모뎀 회선 상태가 변경되면 출력이 표시됩니다.
- **debug modem csm**—내부 디지털 모뎀이 있는 라우터에서 CSM(Call Switching Module) 문제를 해결할 수 있습니다. 이 명령을 사용하면 수신 및 발신 통화 전환의 전체 시퀀스를 추적할 수 있습니다.
- **debug ppp negotiation**—PPP 트래픽 및 교환에 대한 정보를 표시하고 LCP(Link Control Protocol), Authentication, NCP(Network Control Protocol)를 협상합니다. 성공적인 PPP 협상이 먼저 LCP 상태를 연 다음 NCP를 인증하고 마지막으로 협상합니다. LCP 협상 중에 MRRU(Maximum Receive Reguired Unit)와 같은 멀티링크 매개변수가 설정됩니다.
- **debug ppp authentication**—CHAP 패킷 교환 및 PAP>Password Authentication Protocol) 교환을 비롯한 PPP 인증 프로토콜 메시지를 표시합니다.
- **debug ppp error**—PPP 연결 협상 및 작업과 관련된 프로토콜 오류 및 오류 통계를 표시합니다.

### 디버그 출력 샘플

다음은 성공한 통화에 대한 디버그 출력입니다. 굵게 표시된 섹션과 출력에 제공된 코멘트를 확인합니다. 가져온 출력을 여기에 표시된 결과와 비교합니다.

## 아날로그 통화의 경우

```
maui-nas-02#debug isdn q931
ISDN Q931 packets debugging is on
maui-nas-02#debug modem
Modem control/process activation debugging is on
maui-nas-02#debug modem csm
Modem Management Call Switching Module debugging is on
maui-nas-02#debug ppp negotiation
PPP protocol negotiation debugging is on
maui-nas-02#debug ppp authentication
PPP authentication debugging is on

maui-nas-02#
Sep 28 13:13:28.369: ISDN Se0:23: RX <- SETUP pd = 8 callref = 0x5285

!--- Incoming Q.931 SETUP message. This indicates an incoming call. !--- For more
information on Q.931 refer to !--- Troubleshooting ISDN BRI Layer 3 using the debug isdn q931
Command.

Sep 28 13:13:28.369: Bearer Capability i = 0x9090A2
Sep 28 13:13:28.369: Channel ID i = 0xA18383
Sep 28 13:13:28.369: Progress Ind i = 0x8183 - Origination address is non-ISDN
Sep 28 13:13:28.369: Called Party Number i = 0xA1, '81560', Plan:ISDN, Type:National
Sep 28 13:13:28.373: VDEV_ALLOCATE: 2/0 is allocated
!--- The Call Switch Module (CSM) is informed about the call. !--- The CSM allocates modem
2/0 to the incoming call. Sep 28 13:13:28.373: EVENT_FROM_ISDN::dchan_idb=0x618569F4,
call_id=0x28, ces=0x0 bchan=0x2, event=0x1, cause=0x0 Sep 28 13:13:28.373: dev in call to isdn :
set dnis_collected & fap_notify Sep 28 13:13:28.373: EVENT_FROM_ISDN:(0028): DEV_INCALL at slot
2 and port 0 Sep 28 13:13:28.373: EVENT_FROM_ISDN: decode:calling 0ct3 0x0, called oct3 0xA1,
oct3a 0x0,mask 0x3C Sep 28 13:13:28.373: EVENT_FROM_ISDN: csm_call_info:calling 0ct3 0x0, called
oct3 0xA1, oct3a 0x0,mask 0x3C Sep 28 13:13:28.377: CSM_PROC_IDLE: CSM_EVENT_ISDN_CALL at slot
2, port 0 Sep 28 13:13:28.377: Mica Modem(2/0): Configure(0x1 = 0x0) Sep 28 13:13:28.377: Mica
Modem(2/0): Configure(0x23 = 0x0) Sep 28 13:13:28.377: Mica Modem(2/0): Call Setup
!--- CSM sends the Call Setup Message to Modem 2/0. !--- The modem must now go off-hook.
Sep 28 13:13:28.377: csm_connect_pri_vdev: TS allocated at bp_stream 0, bp_Ch 0, vdev_common
0x6141BB68 Sep 28 13:13:28.377: ISDN Se0:23: TX -> CALL_PROC pd = 8 callref = 0xD285
Sep 28 13:13:28.377: Channel ID i = 0xA98383
!--- The Call Proceeding Message is sent through the D-channel. Sep 28 13:13:28.377: ISDN
Se0:23: TX -> ALERTING pd = 8 callref = 0xD285 Sep 28 13:13:28.445: Mica Modem(2/0): State
Transition to Call Setup
!--- Modem transitions to state Call Setup. !--- For more information on MICA Modem States
refer to MICA Modem States. Sep 28 13:13:28.445: Mica Modem(2/0): Went offhook
!--- Modem informs the CSM that it went offhook. Sep 28 13:13:28.445: CSM_PROC_IC2_RING:
CSM_EVENT_MODEM_OFFHOOK at slot 2, port 0 Sep 28 13:13:28.445: ISDN Se0:23: TX -> CONNECT pd =
8 callref = 0xD285
!--- D-channel transmits a CONNECT. Sep 28 13:13:28.461: ISDN Se0:23: RX <- CONNECT_ACK pd
= 8 callref = 0x5285
!--- The Q.931 CONNECT_ACK message is received. Sep 28 13:13:28.461: ISDN Se0:23:
CALL_PROGRESS: CALL_CONNECTED call id 0x28, bchan 2, dsl 0 Sep 28 13:13:28.461:
EVENT_FROM_ISDN::dchan_idb=0x618569F4, call_id=0x28, ces=0x0 bchan=0x2, event=0x4, cause=0x0 Sep
28 13:13:28.461: EVENT_FROM_ISDN:(0028): DEV_CONNECTED at slot 2 and port 0 Sep 28 13:13:28.461:
CSM_PROC_IC6_WAIT_FOR_CONNECT: CSM_EVENT_ISDN_CONNECTED at slot 2, port 0 Sep 28 13:13:28.465:
Mica Modem(2/0): Link Initiate
!--- When the Q.931 CONNECT_ACK message is received, the Link initiate message !--- is sent
to the MICA modem, and negotiation with remote modem occurs. Sep 28 13:13:28.465: %ISDN-6-
CONNECT: Interface Serial0:2 is now connected to N/A N/A Sep 28 13:13:29.557: Mica Modem(2/0):
State Transition to Connect
```

*!--- Modem moves to the Connect state.* Sep 28 13:13:34.073: Mica Modem(2/0): State Transition to Link Sep 28 13:13:45.478: Mica Modem(2/0): State Transition to Trainup Sep 28 13:13:53.642: Mica Modem(2/0): State Transition to EC Negotiating Sep 28 13:13:54.122: **Mica Modem(2/0): State Transition to Steady State**

*!--- Modem transitions to the steady state.* Sep 28 13:13:54.266: TTY97: DSR came up *!--- Indicates that the modem trainup is complete.* Sep 28 13:13:54.266: tty97: Modem: IDLE->(unknown) Sep 28 13:13:54.266: TTY97: EXEC creation Sep 28 13:13:54.266: TTY97: set timer type 10, 30 seconds Sep 28 13:13:57.202: TTY97: Autoselect(2) sample 7E Sep 28 13:13:57.202: TTY97: Autoselect(2) sample 7EFF Sep 28 13:13:57.202: TTY97: Autoselect(2) sample 7EFF7D Sep 28 13:13:57.202: TTY97: Autoselect(2) sample 7EFF7D23 Sep 28 13:13:57.202: TTY97 Autoselect cmd: ppp negotiate *!--- The router detects PPP packets and automatically launches PPP.* Sep 28 13:13:57.206: TTY97: EXEC creation Sep 28 13:13:57.206: TTY97: create timer type 1, 600 seconds Sep 28 13:13:57.334: TTY97: destroy timer type 1 Sep 28 13:13:57.334: TTY97: no timer type 0 to destroy Sep 28 13:13:57.334: As97 IPCP: Install route to 172.22.60.2 Sep 28 13:13:59.334: %LINK-3-UPDOWN: Interface Async97, changed state to up Sep 28 13:13:59.334: As97 PPP: Treating connection as a callin Sep 28 13:13:59.334: As97 PPP: Phase is ESTABLISHING, Passive Open [0 sess, 0 load] Sep 28 13:13:59.334: As97 LCP: State is Listen *!--- LCP negotiation begins.* Sep 28 13:14:00.214: As97 LCP: I CONFREQ [Listen] id 3 len 23 *!--- Incoming LCP CONFREQ. !--- For more information on how to interpret PPP debugs, refer to !--- [Dialup Technology: Troubleshooting Techniques](#).* Sep 28 13:14:00.214: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:00.214: As97 LCP: MagicNumber 0x0F7CD34A (0x05060F7CD34A) Sep 28 13:14:00.214: As97 LCP: PFC (0x0702) Sep 28 13:14:00.214: As97 LCP: ACFC (0x0802) Sep 28 13:14:00.214: As97 LCP: Callback 6 (0x0D0306) Sep 28 13:14:00.214: Unthrottle 97 Sep 28 13:14:00.214: As97 LCP: O CONFREQ [Listen] id 1 len 43 Sep 28 13:14:00.214: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:00.214: As97 LCP: AuthProto CHAP (0x0305C22305) Sep 28 13:14:00.214: As97 LCP: MagicNumber 0x3090DE31 (0x05063090DE31) Sep 28 13:14:00.214: As97 LCP: PFC (0x0702) Sep 28 13:14:00.214: As97 LCP: ACFC (0x0802) Sep 28 13:14:00.214: As97 LCP: MRRU 1524 (0x110405F4) Sep 28 13:14:00.214: As97 LCP: EndpointDisc 1 Local ( 0x130E016D6175692D6E61732D3032) Sep 28 13:14:00.214: As97 LCP: O CONFREQ [Listen] id 3 len 7 Sep 28 13:14:00.214: As97 LCP: Callback 6 (0x0D0306) Sep 28 13:14:00.342: As97 LCP: I CONFREQ [REQsent] id 4 len 20 Sep 28 13:14:00.342: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:00.342: As97 LCP: MagicNumber 0x0F7CD34A (0x05060F7CD34A) Sep 28 13:14:00.342: As97 LCP: PFC (0x0702) Sep 28 13:14:00.342: As97 LCP: ACFC (0x0802) Sep 28 13:14:00.342: As97 LCP: O CONFACK [REQsent] id 4 len 20 Sep 28 13:14:00.342: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:00.342: As97 LCP: MagicNumber 0x0F7CD34A (0x05060F7CD34A) Sep 28 13:14:00.342: As97 LCP: PFC (0x0702) Sep 28 13:14:00.342: As97 LCP: ACFC (0x0802) Sep 28 13:14:02.214: As97 LCP: TIMEOUT: State ACKsent Sep 28 13:14:02.214: As97 LCP: O CONFREQ [ACKsent] id 2 len 43 Sep 28 13:14:02.214: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:02.214: As97 LCP: AuthProto CHAP (0x0305C22305) Sep 28 13:14:02.214: As97 LCP: MagicNumber 0x3090DE31 (0x05063090DE31) Sep 28 13:14:02.214: As97 LCP: PFC (0x0702) Sep 28 13:14:02.214: As97 LCP: ACFC (0x0802) Sep 28 13:14:02.214: As97 LCP: MRRU 1524 (0x110405F4) Sep 28 13:14:02.214: As97 LCP: EndpointDisc 1 Local (0x130E016D6175692D6E61732D3032) Sep 28 13:14:02.326: As97 LCP: I CONFREQ [ACKsent] id 2 len 22 Sep 28 13:14:02.326: As97 LCP: MRRU 1524 (0x110405F4) Sep 28 13:14:02.326: As97 LCP: EndpointDisc 1 Local (0x130E016D6175692D6E61732D3032) Sep 28 13:14:02.326: As97 LCP: O CONFREQ [ACKsent] id 3 len 25 Sep 28 13:14:02.326: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:02.326: As97 LCP: AuthProto CHAP (0x0305C22305) Sep 28 13:14:02.326: As97 LCP: MagicNumber 0x3090DE31 (0x05063090DE31) Sep 28 13:14:02.326: As97 LCP: PFC (0x0702) Sep 28 13:14:02.326: As97 LCP: ACFC (0x0802) Sep 28 13:14:02.518: As97 LCP: I CONFACK [ACKsent] id 3 len 25 Sep 28 13:14:02.518: As97 LCP: ACCM 0x000A0000 (0x0206000A0000) Sep 28 13:14:02.518: As97 LCP: AuthProto CHAP (0x0305C22305) Sep 28 13:14:02.518: As97 LCP: MagicNumber 0x3090DE31 (0x05063090DE31) Sep 28 13:14:02.518: As97 LCP: PFC (0x0702) Sep 28 13:14:02.518: As97 LCP: ACFC (0x0802) Sep 28 13:14:02.518: **As97 LCP: State is Open**

*!--- LCP negotiation is complete.* Sep 28 13:14:02.518: As97 PPP: Phase is AUTHENTICATING, by this end [0 sess, 0 load] Sep 28 13:14:02.518: As97 CHAP: O CHALLENGE id 1 len 32 from "maui-nas-02" Sep 28 13:14:02.646: As97 CHAP: I RESPONSE id 1 len 31 from "async\_user" Sep 28 13:14:02.646: As97 AUTH: Started process 0 pid 34 Sep 28 13:14:02.650: **As97 CHAP: O SUCCESS** id 1 len 4

*!--- CHAP authentication is successful. !--- If authentication fails, check the username and password. !--- Refer to [Dialup Technology: Troubleshooting Techniques](#) .* Sep 28 13:14:02.650: As97 PPP: Phase is UP [0 sess, 0 load] Sep 28 13:14:02.650: As97 **IPCP: O CONFREQ** [Closed] id 1 len 10

*!--- IPCP negotiation begins.* Sep 28 13:14:02.650: As97 IPCP: Address 172.22.60.1 (0x0306AC163C01) Sep 28 13:14:02.758: As97 IPCP: I CONFREQ [REQsent] id 1 len 40 Sep 28 13:14:02.758: As97 IPCP: CompressType VJ 15 slots CompressSlotID (0x0206002D0F01) Sep 28



13:14:02.758: As97 IPCP: Address 0.0.0.0 (0x030600000000) Sep 28 13:14:02.758: As97 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2) Sep 28 13:14:02.758: As97 IPCP: PrimaryWINS 0.0.0.0 (0x820600000000) Sep 28 13:14:02.758: As97 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000) Sep 28 13:14:02.758: As97 IPCP: SecondaryWINS 0.0.0.0 (0x840600000000) Sep 28 13:14:02.758: As97 AAA/AUTHOR/IPCP: Start. Her address 0.0.0.0, we want 172.22.60.2 Sep 28 13:14:02.758: As97 **AAA/AUTHOR/IPCP: Done.**

**Her address 0.0.0.0, we want 172.22.60.2**

*!--- Address is obtained from the Address Pool named "Async".* Sep 28 13:14:02.758: As97 IPCP: O CONFREQ [REQsent] id 1 len 28 Sep 28 13:14:02.758: As97 IPCP: CompressType VJ 15 slots CompressSlotID (0x0206002D0F01) Sep 28 13:14:02.758: As97 IPCP: PrimaryWINS 0.0.0.0 (0x820600000000) Sep 28 13:14:02.758: As97 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000) Sep 28 13:14:02.758: As97 IPCP: SecondaryWINS 0.0.0.0 (0x840600000000) Sep 28 13:14:02.802: As97 CCP: I CONFREQ [Not negotiated] id 1 len 15 Sep 28 13:14:02.802: As97 CCP: MS-PPC supported bits 0x00000001 (0x120600000001) Sep 28 13:14:02.802: As97 CCP: Stacker history 1 check mode EXTENDED (0x1105000104) Sep 28 13:14:02.802: As97 LCP: O PROTREQ [Open] id 4 len 21 protocol CCP Sep 28 13:14:02.802: As97 LCP: (0x80FD0101000F12060000000111050001) Sep 28 13:14:02.802: As97 LCP: (0x04) Sep 28 13:14:02.802: As97 IPCP: I CONFACK [REQsent] id 1 len 10 Sep 28 13:14:02.802: As97 IPCP: Address 172.22.60.1 (0x0306AC163C01) Sep 28 13:14:04.650: As97 IPCP: TIMEOUT: State ACKrcvd Sep 28 13:14:04.650: As97 IPCP: O CONFREQ [ACKrcvd] id 2 len 10 Sep 28 13:14:04.650: As97 IPCP: Address 172.22.60.1 (0x0306AC163C01) Sep 28 13:14:04.758: As97 IPCP: I CONFACK [REQsent] id 2 len 10 Sep 28 13:14:04.758: As97 IPCP: Address 172.22.60.1 (0x0306AC163C01) Sep 28 13:14:05.750: As97 IPCP: I CONFREQ [ACKrcvd] id 2 len 34 Sep 28 13:14:05.750: As97 IPCP: Address 0.0.0.0 (0x030600000000) Sep 28 13:14:05.750: As97 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2) Sep 28 13:14:05.750: As97 IPCP: PrimaryWINS 0.0.0.0 (0x820600000000) Sep 28 13:14:05.750: As97 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000) Sep 28 13:14:05.750: As97 IPCP: SecondaryWINS 0.0.0.0 (0x840600000000) Sep 28 13:14:05.750: As97 AAA/AUTHOR/IPCP: Start. Her address 0.0.0.0, we want 172.22.60.2 Sep 28 13:14:05.750: As97 AAA/AUTHOR/IPCP: Done. Her address 0.0.0.0, we want 172.22.60.2 Sep 28 13:14:05.750: As97 IPCP: O CONFREQ [ACKrcvd] id 2 len 22 Sep 28 13:14:05.750: As97 IPCP: PrimaryWINS 0.0.0.0 (0x820600000000) Sep 28 13:14:05.754: As97 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000) Sep 28 13:14:05.754: As97 IPCP: SecondaryWINS 0.0.0.0 (0x840600000000) Sep 28 13:14:05.878: As97 IPCP: I CONFREQ [ACKrcvd] id 3 len 16 Sep 28 13:14:05.878: As97 IPCP: Address 0.0.0.0 (0x030600000000) Sep 28 13:14:05.878: As97 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2) Sep 28 13:14:05.878: As97 AAA/AUTHOR/IPCP: Start. Her address 0.0.0.0, we want 172.22.60.2 Sep 28 13:14:05.878: As97 AAA/AUTHOR/IPCP: Done. Her address 0.0.0.0, we want 172.22.60.2 Sep 28 13:14:05.878: As97 IPCP: O CONFREQ [ACKrcvd] id 3 len 10 Sep 28 13:14:05.878: As97 IPCP: Address 172.22.60.2 (0x0306AC163C02) Sep 28 13:14:05.990: As97 IPCP: I CONFREQ [ACKrcvd] id 4 len 16 Sep 28 13:14:05.990: As97 IPCP: Address 172.22.60.2 (0x0306AC163C02) Sep 28 13:14:05.990: As97 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2) Sep 28 13:14:05.990: As97 AAA/AUTHOR/IPCP: Start. Her address 172.22.60.2, we want 172.22.60.2 Sep 28 13:14:05.990: As97 AAA/AUTHOR/IPCP: Reject 172.22.60.2, using 172.22.60.2 Sep 28 13:14:05.990: As97 AAA/AUTHOR/IPCP: Done. Her address 172.22.60.2, we want 172.22.60.2 Sep 28 13:14:05.994: As97 IPCP: O CONFACK [ACKrcvd] id 4 len 16 Sep 28 13:14:05.994: As97 IPCP: Address 172.22.60.2 (0x0306AC163C02) Sep 28 13:14:05.994: As97 IPCP: PrimaryDNS 172.22.53.210 (0x8106AC1635D2) Sep 28 13:14:05.994: **As97 IPCP: State is Open**

*!--- IPCP negotiation is complete. The user is now connected.*

## ISDN 통화의 경우

maui-nas-02#**debug isdn q931**

ISDN Q931 packets debugging is on

maui-nas-02#**debug ppp negotiation**

PPP protocol negotiation debugging is on

maui-nas-02#**debug ppp authentication**

PPP authentication debugging is on

Sep 28 13:25:02.630: ISDN Se0:23: **RX** <- **SETUP** pd = 8 callref = 0x5346

*!--- Incoming Q.931 Setup message.* Sep 28 13:25:02.630: Bearer Capability i = 0x8890218F  
Sep 28 13:25:02.630: Channel ID i = 0xA18384 Sep 28 13:25:02.630: Called Party Number i = 0xA1, '81560', Plan:ISDN, Type:National Sep 28 13:25:02.634: %LINK-3-UPDOWN: Interface Serial0:3, changed state to up Sep 28 13:25:02.638: Se0:3 PPP: Treating connection as a callin Sep 28 13:25:02.638: Se0:3 PPP: Phase is ESTABLISHING, Passive Open [0 sess, 1 load] Sep 28 13:25:02.638: Se0:3 LCP: State is Listen Sep 28 13:25:02.638: ISDN Se0:23: **TX** -> **CALL\_PROC** pd = 8 callref = 0xD346 Sep 28 13:25:02.638: Channel ID i = 0xA98384 Sep 28 13:25:02.638: ISDN

Se0:23: TX -> CONNECT pd = 8 callref = 0xD346 Sep 28 13:25:02.638: Channel ID i = 0xA98384 Sep 28 13:25:02.658: ISDN Se0:23: RX <- CONNECT\_ACK pd = 8 callref = 0x5346 Sep 28 13:25:02.658: ISDN Se0:23: CALL\_PROGRESS: **CALL\_CONNECTED** call id 0x2B, bchan 3, dsl 0

*!--- Call is connected.* Sep 28 13:25:02.886: Se0:3 LCP: I CONFREQ [Listen] id 61 len 28 Sep 28 13:25:02.886: Se0:3 LCP: MagicNumber 0x1EB88B1C (0x05061EB88B1C) Sep 28 13:25:02.886: Se0:3 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:02.886: Se0:3 LCP: EndpointDisc 1 Local (0x130E0161757374696E5F6973646E) Sep 28 13:25:02.886: Se0:3 LCP: O CONFREQ [Listen] id 1 len 33 Sep 28 13:25:02.886: Se0:3 LCP: AuthProto CHAP (0x0305C22305) Sep 28 13:25:02.886: Se0:3 LCP: MagicNumber 0x309AFABD (0x0506309AFABD) Sep 28 13:25:02.886: Se0:3 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:02.886: Se0:3 LCP: EndpointDisc 1 Local (0x130E016D6175692D6E61732D3032) Sep 28 13:25:02.886: Se0:3 LCP: O CONFACK [Listen] id 61 len 28 Sep 28 13:25:02.886: Se0:3 LCP: MagicNumber 0x1EB88B1C (0x05061EB88B1C) Sep 28 13:25:02.886: Se0:3 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:02.886: Se0:3 LCP: EndpointDisc 1 Local (0x130E0161757374696E5F6973646E) Sep 28 13:25:02.922: Se0:3 LCP: I CONFACK [ACKsent] id 1 len 33 Sep 28 13:25:02.922: Se0:3 LCP: AuthProto CHAP (0x0305C22305) Sep 28 13:25:02.922: Se0:3 LCP: MagicNumber 0x309AFABD (0x0506309AFABD) Sep 28 13:25:02.922: Se0:3 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:02.922: Se0:3 LCP: EndpointDisc 1 Local (0x130E016D6175692D6E61732D3032) Sep 28 13:25:02.922: Se0:3 **LCP: State is Open**

*!--- LCP negotiation is complete.* Sep 28 13:25:02.922: Se0:3 PPP: Phase is AUTHENTICATING, by this end [0 sess, 1 load] Sep 28 13:25:02.922: Se0:3 CHAP: O CHALLENGE id 1 len 32 from "maui-nas-02" Sep 28 13:25:02.954: Se0:3 CHAP: I RESPONSE id 1 len 32 from "austin\_isdn" Sep 28 13:25:02.954: Se0:3 **CHAP: O SUCCESS** id 1 len 4

*!--- PPP CHAP authentication is successful.* Sep 28 13:25:02.958: Se0:3 PPP: Phase is VIRTUALIZED [0 sess, 1 load] Sep 28 13:25:02.958: Vi1 PPP: Phase is DOWN, Setup [0 sess, 1 load] Sep 28 13:25:02.982: Vi1 PPP: Phase is DOWN, Setup [0 sess, 1 load] Sep 28 13:25:02.982: Se0:3 IPCP: Packet buffered while building MLP bundle interface Sep 28 13:25:02.986: **%LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up**

*!--- Virtual-Access Interface is up. !--- This interface controls the incoming call.* Sep 28 13:25:02.986: Vi1 PPP: Treating connection as a callin Sep 28 13:25:02.986: Vi1 PPP: Phase is ESTABLISHING, Passive Open [0 sess, 1 load] Sep 28 13:25:02.986: Vi1 LCP: State is Listen Sep 28 13:25:02.986: Vi1 PPP: Phase is UP [0 sess, 1 load] Sep 28 13:25:02.986: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10 Sep 28 13:25:02.986: Vi1 IPCP: Address 172.22.61.1 (0x0306AC163D01) Sep 28 13:25:02.990: Vi1 MLP: Added first link Se0:3 to bundle austin\_isdn Sep 28 13:25:02.990: Vi1 PPP: Pending ncpQ size is 1 Sep 28 13:25:02.990: Se0:3 IPCP: Redirect packet to Vi1 Sep 28 13:25:02.990: Vi1 IPCP: I CONFREQ [REQsent] id 45 len 10 Sep 28 13:25:02.990: Vi1 IPCP: Address 10.0.0.1 (0x03060A000001) Sep 28 13:25:02.990: Vi1 AAA/AUTHOR/IPCP: Start. Her address 10.0.0.1, we want 0.0.0.0 Sep 28 13:25:02.990: Vi1 AAA/AUTHOR/IPCP: Reject 10.0.0.1, using 0.0.0.0 Sep 28 13:25:02.990: Vi1 AAA/AUTHOR/IPCP: Done. Her address 10.0.0.1, we want 0.0.0.0 Sep 28 13:25:02.990: Vi1 IPCP: O CONFNAK [REQsent] id 45 len 10 Sep 28 13:25:02.990: Vi1 IPCP: **Address 172.22.61.2** (0x0306AC163D02)

*!--- Peer IP address is assigned from IP Pool named "ISDN".* Sep 28 13:25:02.990: Se0:3 CDPCP: MLP bundle interface is built, process packets now Sep 28 13:25:02.990: Se0:3 CDPCP: Redirect packet to Vi1 Sep 28 13:25:02.990: Vi1 CDPCP: I CONFREQ [Not negotiated] id 23 len 4 Sep 28 13:25:02.990: Vi1 LCP: O PROTREJ [Open] id 1 len 10 protocol CDPCP (0x820701170004) Sep 28 13:25:03.010: Vi1 IPCP: I CONFACK [REQsent] id 1 len 10 Sep 28 13:25:03.010: Vi1 IPCP: Address 172.22.61.1 (0x0306AC163D01) Sep 28 13:25:03.010: Vi1 IPCP: I CONFREQ [ACKrcvd] id 46 len 4 Sep 28 13:25:03.010: Vi1 IPCP: O CONFACK [ACKrcvd] id 46 len 4 Sep 28 13:25:03.010: **Vi1 IPCP: State is Open**

*!--- IPCP negotiation is complete. The call is now connected.* Sep 28 13:25:03.014: Di10 IPCP: Install route to 172.22.61.2 Sep 28 13:25:03.958: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0:3, changed state to up Sep 28 13:25:03.986: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up Sep 28 13:25:04.146: ISDN Se0:23: **RX <- SETUP** pd = 8 callref = 0x5409

*!--- The second link in the multilink connection arrives.* Sep 28 13:25:04.150: Bearer Capability i = 0x8890218F Sep 28 13:25:04.150: Channel ID i = 0xA18385 Sep 28 13:25:04.150: Called Party Number i = 0xA1, '81560', Plan:ISDN, Type:National Sep 28 13:25:04.154: %LINK-3-UPDOWN: Interface Serial0:4, changed state to up Sep 28 13:25:04.154: %ISDN-6-CONNECT: Interface Serial0:3 is now connected to austin\_isdn Sep 28 13:25:04.154: Se0:4 PPP: Treating connection as a callin Sep 28 13:25:04.154: Se0:4 PPP: Phase is ESTABLISHING, Passive Open [0 sess, 1 load] Sep 28 13:25:04.154: Se0:4 LCP: State is Listen Sep 28 13:25:04.158: ISDN Se0:23: TX -> CALL\_PROC pd = 8 callref = 0xD409 Sep 28 13:25:04.158: Channel ID i = 0xA98385 Sep 28 13:25:04.158: ISDN Se0:23: TX -> CONNECT pd = 8 callref = 0xD409 Sep 28 13:25:04.158: Channel ID i = 0xA98385 Sep 28 13:25:04.178: ISDN Se0:23: RX <- CONNECT\_ACK pd = 8 callref = 0x5409 Sep 28

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13:25:04.178: ISDN Se0:23: CALL_PROGRESS: CALL_CONNECTED call id 0x2C, bchan 4, dsl 0 Sep 28
13:25:04.394: Se0:4 LCP: I CONFREQ [Listen] id 51 len 28 Sep 28 13:25:04.394: Se0:4 LCP:
MagicNumber 0x1EB8910D (0x05061EB8910D) Sep 28 13:25:04.394: Se0:4 LCP: MRRU 1524 (0x110405F4)
Sep 28 13:25:04.394: Se0:4 LCP: EndpointDisc 1 Local (0x130E0161757374696E5F6973646E) Sep 28
13:25:04.394: Se0:4 LCP: O CONFREQ [Listen] id 1 len 33 Sep 28 13:25:04.394: Se0:4 LCP:
AuthProto CHAP (0x0305C22305) Sep 28 13:25:04.394: Se0:4 LCP: MagicNumber 0x309B00A6
(0x0506309B00A6) Sep 28 13:25:04.394: Se0:4 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:04.394:
Se0:4 LCP: EndpointDisc 1 Local (0x130E016D6175692D6E61732D3032) Sep 28 13:25:04.394: Se0:4 LCP:
O CONFACK [Listen] id 51 len 28 Sep 28 13:25:04.394: Se0:4 LCP: MagicNumber 0x1EB8910D
(0x05061EB8910D) Sep 28 13:25:04.394: Se0:4 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:04.394:
Se0:4 LCP: EndpointDisc 1 Local (0x130E0161757374696E5F6973646E) Sep 28 13:25:04.430: Se0:4 LCP:
I CONFACK [ACKsent] id 1 len 33 Sep 28 13:25:04.430: Se0:4 LCP: AuthProto CHAP (0x0305C22305)
Sep 28 13:25:04.430: Se0:4 LCP: MagicNumber 0x309B00A6 (0x0506309B00A6) Sep 28 13:25:04.430:
Se0:4 LCP: MRRU 1524 (0x110405F4) Sep 28 13:25:04.430: Se0:4 LCP: EndpointDisc 1 Local
(0x130E016D6175692D6E61732D3032) Sep 28 13:25:04.430: Se0:4 LCP: State is Open Sep 28
13:25:04.430: Se0:4 PPP: Phase is AUTHENTICATING, by this end [0 sess, 1 load] Sep 28
13:25:04.430: Se0:4 CHAP: O CHALLENGE id 1 len 32 from "maui-nas-02" Sep 28 13:25:04.462: Se0:4
CHAP: I RESPONSE id 1 len 32 from "austin_isdn" Sep 28 13:25:04.466: Se0:4 CHAP: O SUCCESS id 1
len 4 Sep 28 13:25:04.466: Se0:4 PPP: Phase is VIRTUALIZED [0 sess, 1 load] Sep 28 13:25:04.466:
Vi1 MLP: Added link Se0:4 to bundle austin_isdn
  !--- An additional Link is now added to exiting Virtual Interface Bundle. Sep 28
13:25:05.466: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0:4, changed state to up Sep
28 13:25:10.154: %ISDN-6-CONNECT:
  Interface Serial0:4 is now connected to austin_isdn
  !--- The second call is connected. The multilink Bundle is complete. maui-nas-02#
```

## 관련 정보

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