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Quick Configuration Guide
Configuring Legacy Dial-Backup (DBU) in AOS

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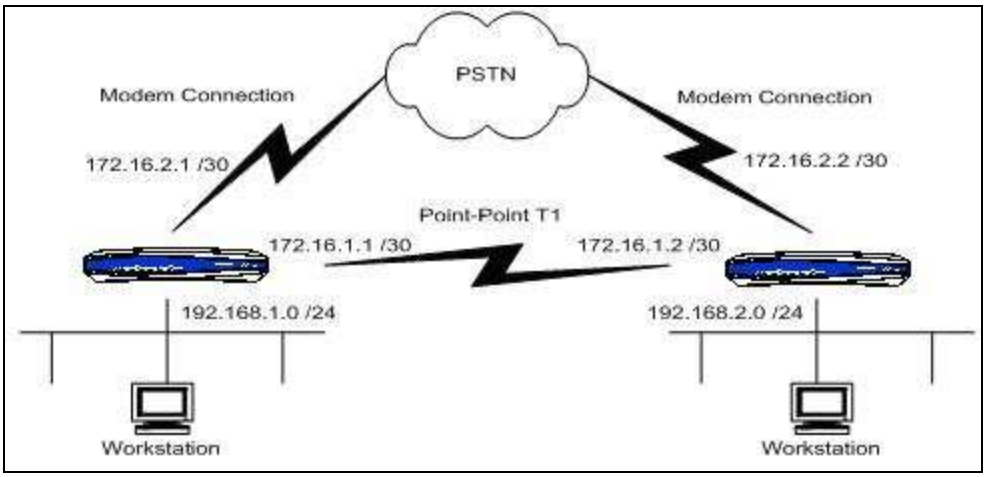


Introduction

Dial-backup allows for a dial-on-demand connection such as an analog phone line or ISDN connection. It requires minimal configuration when compared to demand routing. It is useful for a dial-up backup Internet connection, or as a means of re-establishing site-to-site connectivity should a point-to-point connection fail for any reason.

Hardware/Software Requirements

Dial-backup requires that the following criteria be met:

- Hardware must be 1000, 3000, 4000 or 7100 series router
- Device needs to run AOS 5.1 or higher
- Unless device is 3120 or 3130, hardware needed includes an Analog or an ISDN BRI DIM daughter board as well as a Netvanta NIM card or a DIM Carrier module.

Dial-Backup Notes

There are a few notes on some of the requirements and caveats to using dial-backup, which are listed here:

1) Dial-backup requires that the primary interface go down, not just lose IP connectivity. If the interface will not go down in your situation, you must use demand routing, covered in KB article #2225.
2) Dial-backup requires that caller-ID be enabled on the circuit because our configuration is based on incoming and outgoing phone numbers. If a call comes in that has no caller-ID, the router can not match it to a specific dial-backup statement.
    a. If the dial-backup will only come from one location, we have the ability to 'insert' a caller-ID to the incoming call so that all calls look like they are coming from that phone number.
3) If the backup connection is to an Internet Service Provider (ISP) that will be providing a public IP address, there are firewall settings that will need to be configured to allow for traffic to fail-over properly and still have a Network Address Translation (NAT) process to the Internet.

Analog Modem or ISDN Selection

The first choice in dial-backup situations that must be answered is what type of medium the backup connection will run across: analog modem or digital ISDN (BRI). The choice here will not limit your options later, and is primarily a determination of cost and bandwidth need. An analog modem connection can connect at speeds of up to 56000 baud, while ISDN offers up to 128000 baud (2 B channels at 64000 baud each).

Currently, the ISDN dial interface module only supports Bonding Mode 1 to use both B channels at the same time. If you are connecting to an ISDN device that does not support Bonding Mode 1, you will be limited to a single B channel, or 64000 baud. The other form of bonding utilizes a protocol known as Multi-Link Point-to-Point Protocol (MLPPP), where two separate phone calls are made and the operating system virtually links them together. This method is not currently supported in AOS for ISDN dial-backup.

Analog Modem Configuration

To configure your analog modem for use by the dial-backup process, simply change the modem to administratively up. The configuration will look similar to this:

```
interface modem 1/1
  no shutdown
```

ISDN (BRI) Configuration

To configure your ISDN modem for use by the dial-backup routine, you must configure the Service Profile Identifiers (SPIDs) and the Local Directory Numbers (LDNs) for each channel, as well as change its state to administratively up. The command syntax is:

isdn spid1 *<spid number> <ldn number>*
isdn spid2 *<spid number> <ldn number>*

- **spid1**
  - Specifies the primary SPID.
- **spid2**
  - Specifies the secondary SPID.
- *<spid number>*
  - Specifies the 8 to 14 digit number identifying your BRI line in the central office switch. A SPID is generally created using the area code and phone number associated with the line and a four-digit suffix. For example, the following SPIDs may be provided on a BRI line with phone numbers 555-1000 and 555-1001:
    - SPID 1: 256 555 1000 0101
    - SPID 2: 256 555 1001 0101
- *<ldn number>*
  - Optional. Specifies the LDN assigned to the circuit by the service provider. An LDN programmed using the **isdn spid1** command is automatically associated with SPID 1. An LDN programmed using the **isdn spid2** command is automatically associated with SPID 2. The LDN is the number used by remote callers to dial into the ISDN circuit. Inbound calls are not accepted on interfaces without programmed LDNs. LDNs can also be entered using the **isdn ldn** command. The **isdn spid** and **isdn ldn** commands overwrite the existing programmed LDN; therefore the last LDN programming entered takes precedence.

The configuration will look similar to this:

```
interface bri 1/1
  isdn spid1 25655510000101 5551000
  isdn spid2 25655510010101 5551001
  no shutdown
```

Layer 2 Encapsulation

Currently, only Point-to-Point Protocol (PPP) is supported for dial-backup. This is due to the nature of dial-backup connections being point-to-point, as opposed to point-to-multipoint. PPP is the best suited protocol and allows for authentication during the link negotiation.

PPP Authentication Configuration

In PPP, one side can authenticate to the other, both sides can authenticate to each other, or there can be no authentication at all. The choice of which to do is based upon the security needs of each site. There are two types of PPP authentication protocols: Password Authentication Protocol (PAP) and Challenge-Handshake Authentication Protocol (CHAP), CHAP being the more secure of the two.

To configure the side that is sending the authentication, the username and password will need to be entered in the sent username and password fields. Using PAP, it will look similar to this:

```
interface ppp 2
  ppp pap sent-username <username> password <password>
```

Using CHAP, it will look similar to this:

```
interface ppp 2
  ppp chap hostname <username>
  ppp chap password <password>
```

To configure the side that is receiving the authentication, the type of authentication must be specified, as well as the username and password being used. The configuration for PAP will look similar to this:

```
interface ppp 2
  ppp authentication pap
  username <username> password <password>
```

The configuration for CHAP will look similar to this:

```
interface ppp 2
  ppp authentication chap
  username <username> password <password>
```

PPP IP Addressing

PPP connections have the ability to statically set the IP addresses for both sides, or to have one side statically set as well as the peer IP address that the other side should have.

The other side's configuration then acts similar to a DHCP client, receiving the IP address pre-specified in the peer router's configuration. Neither approach is better than the other in any functional way. The best practice depends on the type of network that it will be placed in. Most point-to-point users will tend to statically set both sides, while ISPs will tend to give the IP to the client that is connecting, reducing the setup on the client side.

A static setup would look similar to this:

```
interface ppp 2
  ip address <IP Address> <Subnet Mask>
```

A negotiated setup would look similar to this:

Master Side

```
interface ppp 2
  ip address <IP Address> <Subnet Mask>
  peer default ip address <Peer IP Address>
```

Slave Side

```
interface ppp 2
  ip address negotiated
```

The slave side can also be setup to NOT learn a default route, which would allow the administrator to statically route or use a routing protocol as would be required in static IP addressing situations.

A slave setup to NOT learn a default route would be setup similar to this:

```
interface ppp 2
  ip address negotiated no-default
```

Primary Interface Configuration

Up to this point, this article has focused on configuring the connection that will be created when the backup is initiated. This section will cover the configuration for initiating the dial-backup.

Dial-backup will be configured entirely on the primary interface, because the use of the backup connection is controlled by the primary interface. In most cases, the dial-backup will not function unless the primary interface is down.

The configuration will be placed on the Layer 3 interface, which in most cases will be the PPP, HDLC, or Frame-Relay Sub-Interface. The most basic dial-backup requires only two lines of configuration that need to be added, but there are numerous options that will not be covered in this document including creating a delay-before-dial, delay-before-redial, delay-before-restore, timer randomization, scheduling, connection-timeout, and maximum-retries.

The first option that needs to be defined is the type of call-mode that each site will be assigned. This command will determine which site will be initiating the call and which will be receiving the call, or both. The best practice is to have one site originate the call and the other answer the call, to avoid the possibility that both sites attempt to call the other at the same time and continue to get busy signals. The command syntax is:

dial-backup call-mode <*call-mode*>

- <*call-mode*>
  - **answer**
    - Answers and backs up primary link on failure.
  - **answer-always**
    - Answers and backs up regardless of primary link state.
  - **originate**
    - Originates backup call on primary link failure.
  - **originate-answer**
    - Originates or answers call on primary link failure.
  - **originate-answer-always**
    - Originates on failure; answers and backs up always.

The second option that needs to be defined is the peer site's telephone number, type of medium that will be used, and corresponding PPP interface to use with that number. The command syntax is:

dial-backup number <*number*> **analog ppp** <*interface*>
dial-backup number <*number*> **digital-56k** <*isdn min channels*> <*isdn max channels*> **ppp** <*interface ID*>
dial-backup number <*number*> **digital 64k** <*isdn min channels*> <*isdn max channels*> **ppp** <*interface ID*>

- <*number*>
  - Specifies the phone number to call when the backup is initiated.

- **analog**
  - Indicates the number connects to an analog modem.
- **digital-56k**
  - Indicates the number belongs to a digital 56 kbps per DS0 connection.
- **digital-64k**
  - Indicates the number belongs to a digital 64 kbps per DS0 connection.
- *<isdn min channels>*
  - Specifies the minimum number of DS0s required for a digital 56 or 64 kbps connection. Range is 1 to 2 DS0s.
- *<isdn max channels>*
  - Specifies the maximum number of DS0s desired for a digital 56 or 64 kbps connection. Range is 1 to 2 DS0s.
- **ppp** *<interface ID>*
  - Specifies the PPP interface to use as the backup for this interface. For example, **ppp 1**.

A router setup to initiate a dial back up connection over an analog line would look similar to this:

```
interface ppp 1
  ip address  172.16.1.1  255.255.255.252
  dial-backup call-mode originate
  dial-backup number 5551000 analog ppp 2
  no shutdown
  cross-connect 1 t1 1/1 1 ppp 1
```

Floating Static Route

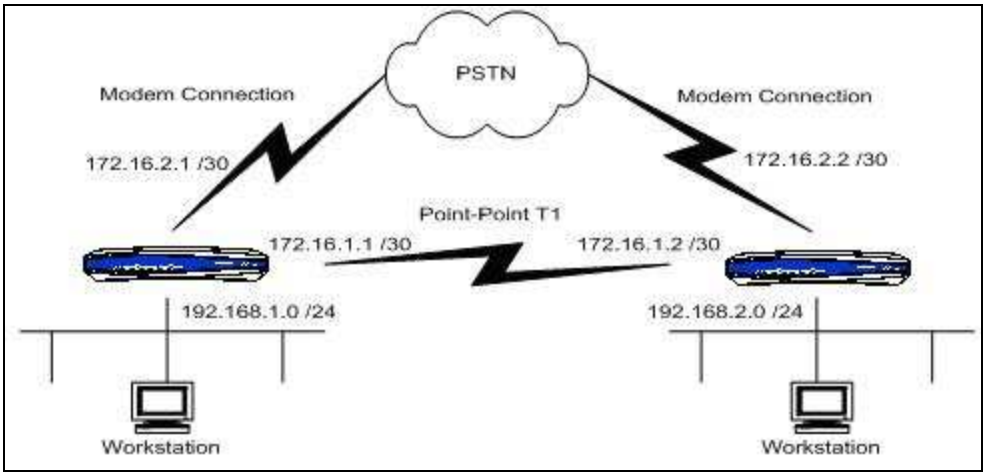
The last step to configuring a dial back up connection is adding a backup route with a higher administrative distance than the normal route used to reach the intended destination. When the primary link goes down the normal route that is statically set or learned by a dynamic routing protocol will be pulled out of the routing table due to the directly connected network associated with that interface no longer being available. At that point the floating static route will be inserted in the routing table to direct traffic over the backup link. The next hop ip address or the egress interface can be used at the end of the floating static route statement. The administrative distance must be specified so that it is higher than the normal route. The numerical value used for the administrative distance will depend on if a routing protocol is used or if routes are statically programmed in.

In this example interface ppp 1 is the normal way to reach the 192.168.2.0/24 subnet via the static route programmed in, and ppp 2 is used as a backup with an administrative distance of 10. When ppp 1 goes down the first route will be taken out of the routing table and the second route will be used:

```
ip route 192.168.2.0 255.255.255.0 ppp 1
ip route 192.168.2.0 255.255.255.0 ppp 2 10
```

Example Configuration

In this example, there is a point-to-point T1, with ISDN as a backup. The ‘main’ site is requesting authentication and the ‘remote’ site is sending it. The authentication protocol being used is CHAP. Both sites are setup with static IP addresses.



Main Site

```
interface eth 0/1
  ip address 192.168.1.1 255.255.255.0
  no shutdown
!
interface t1 1/1
  clock source internal
  tdm-group 1 timeslots 1-24 speed 64
  no shutdown
!
interface bri 1/2
  isdn spid1 25655520000101 5552000
  isdn spid2 25655520010101 5552001
  no shutdown
!
interface ppp 1
  ip address  172.16.1.1  255.255.255.252
  dial-backup call-mode originate
  dial-backup number 5551000 digital-64k 1 2 ppp 2
  no shutdown
  cross-connect 1 t1 1/1 1 ppp 1
```

```
!
interface ppp 2
  ip address  172.16.2.1  255.255.255.252
  ppp authentication chap
  username adtran password adtran
  no shutdown
!
ip route 192.168.2.0 255.255.255.0 172.16.1.2
ip route 192.168.2.0 255.255.255.0 172.16.2.2 10
```

Remote Site

```
interface eth 0/1
  ip address 192.168.2.1 255.255.255.0
  no shutdown
!
interface t1 1/1
  tdm-group 1 timeslots 1-24 speed 64
  no shutdown
!
interface bri 1/1
  isdn spid1 25655510000101 5551000
  isdn spid2 25655510010101 5551001
  no shutdown
!
interface ppp 1
  ip address 172.16.1.2  255.255.255.252
  dial-backup call-mode answer
  dial-backup number 5552000 digital-64k 1 2 ppp 2
  no shutdown
  cross-connect 1 t1 1/1 1 ppp 1
!
interface ppp 2
  ip address 172.16.2.2  255.255.255.252
  ppp chap hostname adtran
  ppp chap password adtran
  no shutdown
!
ip route 192.168.1.0 255.255.255.0 172.16.1.1
ip route 192.168.1.0 255.255.255.0 172.16.2.1 10
```