

Table of Contents

<u>Configuring Dialout with the NM–8AM or NM–16AM Analog Modem Module</u>	1
<u>Document ID: 10316</u>	1
<u>Introduction</u>	1
<u>Prerequisites</u>	1
<u>Requirements</u>	1
<u>Components Used</u>	1
<u>Conventions</u>	1
<u>Configure</u>	2
<u>Network Diagram</u>	2
<u>Configurations</u>	2
<u>Verify</u>	4
<u>Troubleshooting the Analog Connection</u>	4
<u>Common Errors</u>	5
<u>debug Commands</u>	5
<u>Sample Debug Output</u>	6
<u>Related Information</u>	8

Configuring Dialout with the NM-8AM or NM-16AM Analog Modem Module

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Introduction

Prerequisites

Requirements

Components Used

Conventions

Configure

Network Diagram

Configurations

Verify

Troubleshooting the Analog Connection

Common Errors

debug Commands

Sample Debug Output

Related Information

Introduction

This document shows how to configure dialout using a modem with the NM-AM analog modem network module. In this scenario, a router with the NM-8AM modem module dials the Primary Rate Interface (PRI) of the central site router.

This document assumes you have a good understanding of the various issues associated with modem configurations. If you need more information on these issues, please refer to the Modem-Router Connection Guide.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This configuration was developed and tested using the software and hardware versions below:

- A Cisco 3640 router with the NM-8AM card running Cisco IOS® Software Release 12.1(5)T.

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

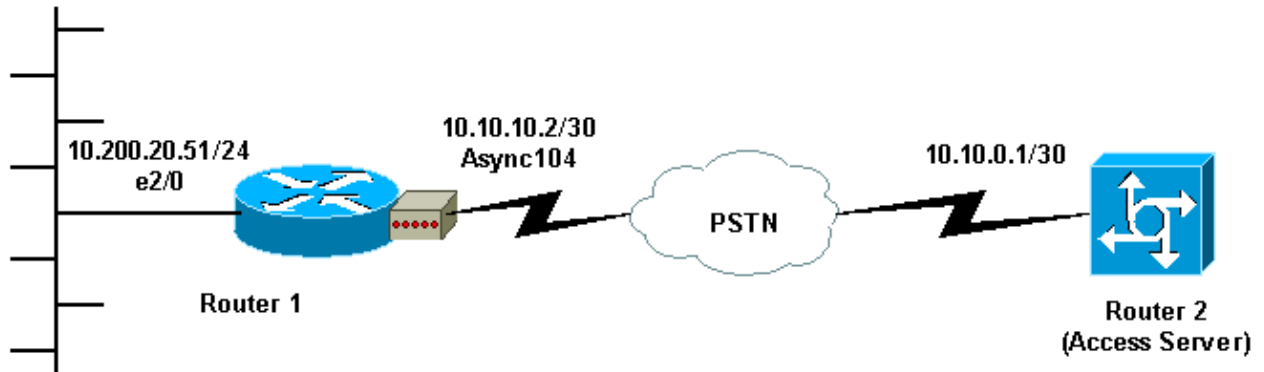
Configure

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the IOS Command Lookup tool (registered customers only) .

Network Diagram

This document uses the network setup shown in the diagram below.



Configurations

This document uses the configurations shown below.

```
Router 1 (Cisco 3640)
Current configuration : 1676 bytes
!
version 12.1
no service single-slot-reload-enable
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname router1
!
enable password ww
!
username router2 password 0 ww

!--- username for remote router (Router 2) and shared secret
!--- shared secret(used for CHAP authentication) must be the same on both sides

ip subnet-zero
!
chat-script async "" "AT" OK "ATDT\T" TIMEOUT 30 CONNECT \c

!--- chat script "async" used for the dialout connection

!
!
interface Ethernet2/0
```

```

ip address 10.200.20.51 255.255.255.0
half-duplex
!
interface Async104

!--- async interface corresponding to the modem
!--- This was determined using the show line command.

ip address 10.10.0.2 255.255.255.252

!--- IP address of this async interface

encapsulation ppp
dialer in-band
dialer wait-for-carrier-time 180
dialer map ip 10.10.0.1 name router2 modem-script async 8214

!--- dialer map statements for the remote router
!--- The name must match the one used by the remote router to identify itself.
!--- use modem chat script "async" for this connection

dialer-group 1
!--- apply interesting traffic definition from dialer-list 1
async mode dedicated

!--- Place the line into dedicated asynchronous network mode.
!--- This interface is now automatically configured for PPP connections.

ppp authentication chap
!--- use chap authentication
!
ip classless
ip route 10.10.0.0 255.255.0.0 10.10.0.1

!--- Traffic for the 10.10.0.0/16 network uses a next hop of 10.10.0.1

ip route 10.10.0.1 255.255.255.255 Async104

!--- the next hop for 10.10.0.1/32 (which is also the next hop for the
!--- previous route) is interface Async104.

!
dialer-list 1 protocol ip permit

!--- All IP traffic is defined interesting.
!--- This is applied to Async104 using dialer-group 1.

!
!
line con 0
exec-timeout 0 0
password ww transport input none
line 33 38
line 97 103
modem InOut transport input all
line 104

!--- line interface configuration for Async 104

modem InOut

!--- allow incoming and outgoing modem calls on this line

transport input all

```

```
transport output lat pad v120 lapb-ta telnet rlogin udptn
flowcontrol hardware
line aux 0
line vty 0 4
password ww
login
!
end
```

In this 3600 chassis, the NM-8AM card is installed in slot 3. Referring to How Async Lines are Numbered in Cisco 3600 Series Routers document, we ascertain that slot 3 has line 97 through 128 reserved. To determine which specific async interface you should configure, use the **show line** command to find out the available lines. In this configuration, note that only lines 97-104 (8 lines) are available within that range. Hence, to configure the first modem in the card configure line 97 (and interface async97) while the last modem is line/async104.

Verify

There is currently no verification procedure available for this configuration.

Troubleshooting the Analog Connection

Perform the following steps to troubleshoot the dialout connection:

1. Check the modem configuration.

Verify the configuration of the modem. You should check both the line configuration corresponding to the modem as well as the interface async.

2. Reverse telnet to the modem and initiate a dialout.

Reverse telnet out the port to the modem, and use the AT command set to dial and connect to the remote device. This can be used to verify that the modem hardware and telephone circuit are functioning. In this example, since the modem port is on line 104, reverse telnet to port 2104 on the router. For more information on reverse telnets, refer to Establishing a Reverse Telnet Session to a Modem.

```
router1#telnet 10.200.20.51 2104
Trying 10.200.20.51, 2104 ... Open
User Access Verification
Username: admin
Password:

!--- Authentication performed by local router for the reverse telnet

at
OK
atdt 81690

!--- The modem dials (81690) and connects.
!--- This takes approximately 30-45 seconds.

CONNECT 31200/ARQ/V34/LAPM/V42BIS

!--- Connect speed and protocols that were negotiated
```

```

User Access Verification
Username: admin
Password:

!--- Authentication performed by remote router for the incoming call

router2>

!--- Remote router's prompt

```

You can also apply other AT commands to verify the modem settings. Refer to AT Command Set and Register Summary for Analog Modem Network Modules for more information on the AT command available for the analog modem modules.

3. Activate the chat script manually and initiate a dial.

Use the **start-chat** command to activate the chat script and initiate a dial. The **start-chat** command requires you to specify the name of the chat script to be activated, the phone number to be dialed, and the modem interface to dial out on.

4. Verify that there is a route to the async interface.

Use the **show ip route** command to check whether there is a route to the async interface. If there is no route, create a static route. An example is shown below:

```
ip route 10.10.0.1 255.255.255.255 Async104
```

5. Generate a ping destined for the next-hop network specified in step 4.

A ping for the remote router (which is specified using the next-hop network from step 4) will cause the router to dial the remote device.

```
router1#ping 10.10.0.1
```

For more information on troubleshooting your connection, refer to Troubleshooting Outbound Calls.

Common Errors

- Verify that the chat script name is identical to the one specified in the dialer map statement. Also verify that the phone number to be dialed is correctly specified.
- Check to see that interesting traffic is correctly defined. Interesting traffic is specified with the **dialer-list** command.
- Ensure that the interesting traffic definition is applied to the async interface. This is done using the **dialer-group** command, where the group number must match the interesting traffic definition specified with the **dialer-list** command.
- Verify that the username and passwords for PAP/CHAP authentication are correct.
- Check to make sure that the dialer map statement has the correct name, IP address, and phone number to dial.

debug Commands

Before issuing **debug** commands, please see Important Information on Debug Commands.

- **debug dialer** – To display debugging information about the packets received on a dialer interface. When Dial on Demand Routing (DDR) is enabled on the interface, information concerning the cause of any call (called the dialing cause) is also displayed. For more information, see the **debug dialer**

information in the Debug Commands documentation.

- **debug modem** – To display the modem line activity, modem control, and process activation messages on the router.
- **debug chat** – To monitor the execution of the chat script when async/POTS dialing is initiated. Refer to Dialup Technology: Troubleshooting Techniques for more information.
- **debug ppp negotiation** – To display information on PPP traffic and exchanges while negotiating the PPP components including Link Control Protocol (LCP), authentication, and Network Control Protocol (NCP). A successful PPP negotiation will first open the LCP state, then authenticate, and finally negotiate NCP.
- **debug ppp authentication** – To display the PPP authentication protocol messages, including Challenge Authentication Protocol (CHAP) packet exchanges and Password Authentication Protocol (PAP) exchanges.

Sample Debug Output

```
router1#show debug
General OS:
  Modem control/process activation debugging is on
Dial on demand:
  Dial on demand events debugging is on
Generic IP:
  ICMP packet debugging is on
PPP:
  PPP protocol negotiation debugging is on
Chat Scripts:
  Chat scripts activity debugging is on
router1#
router1#ping 10.10.0.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.0.1, timeout is 2 seconds:
*Mar  1 00:22:58.663: As104 DDR: Dialing cause ip (s=10.10.0.2, d=10.10.0.1)

!--- Dialing reason is the ping for 10.10.10.1
!--- The dialout is using Async104.

*Mar  1 00:22:58.663: As104 DDR: Attempting to dial 8214

!--- Phone number to be dialed

*Mar  1 00:22:58.663: CHAT104: Attempting async line dialer script
*Mar  1 00:22:58.663: CHAT104: Dialing using Modem script: async & System script: none

!--- Use chat script named "async"

*Mar  1 00:22:58.663: CHAT104: process started
*Mar  1 00:22:58.667: CHAT104: Asserting DTR
*Mar  1 00:22:58.667: CHAT104: Chat script async started

!--- Chat-script "async" is started.

*Mar  1 00:22:58.667: CHAT104: Sending string: AT
*Mar  1 00:22:58.667: CHAT104: Expecting string: OK
*Mar  1 00:22:58.739: CHAT104: Completed match for expect: OK
*Mar  1 00:22:58.739: CHAT104: Sending string: ATDT\T<8214>
*Mar  1 00:22:58.739: CHAT104: Expecting string: CONNECT
*Mar  1 00:22:58.751: Modem 3/7 Mcom: in modem state 'Dialing/Answering'
*Mar  1 00:23:10.775: Modem 3/7 Mcom: in modem state 'Waiting for Carrier'
*Mar  1 00:23:21.903: Modem 3/7 Mcom: in modem state 'Connected'
*Mar  1 00:23:22.323: Modem 3/7 Mcom: CONNECT at 26400/24000(Tx/Rx), V34, LAPM, V42bis,
  Originate
```

*!--- Connect speeds, protocols and so forth, and so on negotiated for the connection
!--- Note that the modem used is 3/7 which is equivalent to line 104.
!--- Refer to How Async Lines are Numbered in Cisco 3600 Series Routers.*

```
*Mar 1 00:23:22.375: CHAT104: Completed match for expect: CONNECT
*Mar 1 00:23:22.375: CHAT104: Sending string: \c
*Mar 1 00:23:22.375: CHAT104: Chat script async finished, status = Success
```

!--- Chat script is successful. Notice the Expect/Send attributes and the time elapsed.

```
*Mar 1 00:23:22.375: Modem 3/7 Mcom: switching to PPP mode
*Mar 1 00:23:22.379: TTY104: no timer type 1 to destroy
*Mar 1 00:23:22.379: TTY104: no timer type 0 to destroy
*Mar 1 00:23:22.379: As104 IPCP: Install route to 10.10.0.1
*Mar 1 00:23:24.379: %LINK-3-UPDOWN: Interface Async104, changed state to up
*Mar 1 00:23:24.379: As104 DDR: Dialer statechange to up
*Mar 1 00:23:24.379: As104 DDR: Dialer call has been placed
*Mar 1 00:23:24.379: As104 PPP: Treating connection as a callout
```

!--- PPP negotiation begins.

```
*Mar 1 00:23:24.379: As104 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
*Mar 1 00:23:24.379: Modem 3/7 Mcom: PPP escape map: Tx map = FFFFFFFF, Rx map = 0
*Mar 1 00:23:24.379: As104 LCP: O CONFREQ [Closed] id 17 len 25
*Mar 1 00:23:24.379: As104 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:23:24.379: As104 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:23:24.379: As104 LCP: MagicNumber 0x1090720F (0x05061090720F)
*Mar 1 00:23:24.379: As104 LCP: PFC (0x0702)
*Mar 1 00:23:24.379: As104 LCP: ACFC (0x0802)
*Mar 1 00:23:24.543: As104 LCP: I CONFREQ [REQsent] id 1 len 25
*Mar 1 00:23:24.543: As104 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:23:24.543: As104 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:23:24.543: As104 LCP: MagicNumber 0x41B616FF (0x050641B616FF)
*Mar 1 00:23:24.543: As104 LCP: PFC (0x0702)
*Mar 1 00:23:24.543: As104 LCP: ACFC (0x0802)
*Mar 1 00:23:24.543: As104 LCP: O CONFACK [REQsent] id 1 len 25
*Mar 1 00:23:24.543: As104 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:23:24.543: As104 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:23:24.543: As104 LCP: MagicNumber 0x41B616FF (0x050641B616FF)
*Mar 1 00:23:24.543: As104 LCP: PFC (0x0702)
*Mar 1 00:23:24.543: As104 LCP: ACFC (0x0802)
*Mar 1 00:23:24.555: As104 LCP: I CONFACK [ACKsent] id 17 len 25
*Mar 1 00:23:24.555: As104 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:23:24.555: As104 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:23:24.559: As104 LCP: MagicNumber 0x1090720F (0x05061090720F)
*Mar 1 00:23:24.559: As104 LCP: PFC (0x0702)
*Mar 1 00:23:24.559: As104 LCP: ACFC (0x0802)
*Mar 1 00:23:24.559: As104 LCP: State is Open
```

!--- LCP negotiation is complete.

```
*Mar 1 00:23:24.559: Modem 3/7 Mcom: PPP escape map: Tx map = A0000, Rx map = 0
*Mar 1 00:23:24.559: As104 PPP: Phase is AUTHENTICATING, by both [0 sess, 0 load]
```

!--- Two-way PPP authentication begins.

```
*Mar 1 00:23:24.559: As104 CHAP: O CHALLENGE id 4 len 28 from "router1"
*Mar 1 00:23:24.691: As104 CHAP: I CHALLENGE id 1 len 28 from "router2"
*Mar 1 00:23:24.691: As104 CHAP: O RESPONSE id 1 len 28 from "router1"
*Mar 1 00:23:24.707: As104 CHAP: I RESPONSE id 4 len 28 from "router2"
*Mar 1 00:23:24.707: As104 CHAP: O SUCCESS id 4 len 4
*Mar 1 00:23:24.815: As104 CHAP: I SUCCESS id 1 len 4
```

!--- Incoming and outgoing CHAP authentication is successful.

```
*Mar 1 00:23:24.815: As104 PPP: Phase is UP [0 sess, 0 load]
*Mar 1 00:23:24.819: As104 IPCP: O CONFREQ [Closed] id 6 len 10
*Mar 1 00:23:24.819: As104 IPCP:   Address 10.10.0.2 (0x03060A0A0002)
*Mar 1 00:23:24.835: As104 IPCP: I CONFREQ [REQsent] id 1 len 10
*Mar 1 00:23:24.835: As104 IPCP:   Address 10.10.0.1 (0x03060A0A0001)
*Mar 1 00:23:24.839: As104 IPCP: O CONFACK [REQsent] id 1 len 10
*Mar 1 00:23:24.839: As104 IPCP:   Address 10.10.0.1 (0x03060A0A0001)
*Mar 1 00:23:24.931: As104 IPCP: I CONFACK [ACKsent] id 6 len 10
*Mar 1 00:23:24.931: As104 IPCP:   Address 10.10.0.2 (0x03060A0A0002)
*Mar 1 00:23:24.931: As104 IPCP: State is Open
```

!--- IP Control Protocol (IPCP) negotiation is complete.

```
*Mar 1 00:23:24.931: As104 DDR: dialer protocol up
*Mar 1 00:23:25.379: %LINEPROTO-5-UPDOWN: Line protocol on Interface Async104,
changed state to up
```

!--- Interface is up.

Related Information

- [Modem–Router Connection Guide](#)
- [Access Products Support Page](#)
- [Dial Technology Support Page](#)

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