

Configuring NM-8AM to NM-8AM Multilink Calls

Document ID: 24670

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Introduction

Multilink PPP (MP) allows devices to send data over multiple point-to-point data links to the same destination by implementing a virtual link. The MP connection has a maximum bandwidth equal to the sum of the bandwidths of the component links. MP can be configured for either multiplexed links, such as ISDN and Frame Relay, or for multiple async lines. Refer to RFC 1990 for more information on MP.

Note: RFC 1990 refers to Multilink PPP as MP. Other names by which MP is known include MPPP, MLP, and Multilink.

This setup explains setting up bandwidth aggregation using the NM-xAM cards routers connected through a plain old telephone service (POTS) line. Because multiple phone lines are often cheaper than ISDN Basic Rate Interface (BRI) service, async MP provides an effective way to increase connection speeds between remote sites while controlling costs. Async MP is also an effective way to obtain higher access speeds for remote areas that cannot be serviced by ISDN.

Async MP bundles together separate modem connections between end routers. PPP software on each peer fragments the packets and then transmits the pieces to the other side through the multiple analog connections. The receiving end gathers these pieces from the separate connections and, based on MP information embedded in them, reassembles the pieces into valid data packets, thus providing an end-to-end virtual link with higher bandwidth.

Before You Begin

Conventions

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

Prerequisites

There are no specific prerequisites for this document.

Components Used

The information in this document is based on the software and hardware versions below.

- Cisco 2650 running Cisco IOS® Software Release 12.2(8)T5
- Cisco 3640 running Cisco IOS Software Release 12.2(8)T

Note: MP was first introduced in Cisco IOS Software Release 11.0(3).

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

Configure

This configuration describes a remote Cisco 2650XM with an internal 8 port analog modem card (NM-8AM) dialing into a Cisco 3640 with NM-8AM. The configuration describes a multilink connection composed of three analog phone lines at either site. More phone lines can be configured for MP if they are available.

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 Command Lookup Tool (registered customers only).

Network Diagram

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



The Cisco 3600 and 2600 are a modular chassis. The line numbers for the NM-8AM card will depend on which slot its inserted in. Refer to How Async Lines are Numbered in Cisco 3600 Series Routers for more information.

Configurations

This document uses the configurations shown below.

- Cisco 2650XM Router (calling router)
- Cisco 3640 Router (called router)

Cisco 2650XM Router (calling router)

```
cisco2650#show running-config
Building configuration...
Current configuration : 1411 bytes!
version 12.2
service timestamps debug datetime msec
service timestamps log uptime msec
no service password-encryption
!
hostname cisco2650
!
username cisco3640 password 0 cisco

!--- Username used for the outbound call.

ip subnet-zero
!

!--- Unused configuration omitted.

!
interface Loopback0
ip address 100.1.1.1 255.255.255.0
!
interface FastEthernet0/0
ip address x.x.x.x x.x.x.x
duplex auto
speed auto
!
interface Group-Async1

!--- Group-async interface for outbound calls.

no ip address
encapsulation ppp
dialer in-band
dialer pool-member 10

!--- Group-async is a member of dialer pool 10.
!--- In this example, the dialout side uses dialer
!--- profile, but the dialin side
!--- uses dialer rotary. You can choose either
!--- method for each side.

async mode interactive
no ppp microcode
ppp authentication chap callin
ppp multilink
group-range 33 40

!--- Modems 33 through 40 are members of this group-async.

!

interface Dialer1
ip address negotiated
encapsulation ppp
dialer pool 10

!--- Dialer pool 10. Group-async 1 is a member of this pool.

dialer idle-timeout 600
dialer string 5269473

!--- Dial 5269473 first.

dialer string 5269756
```

```

!--- If 5269473 fails, dial 5269756.
!--- Both numbers are required or else the second call
!--- encounters a busy signal.

dialer string 5269753

!--- If the first two numbers fail, dial 5269753.
!--- Add a dialer string for each peer phone number
!--- (in the order the connection
!--- should be established).

dialer load-threshold 2 outbound

!--- Load level for either inbound or outbound
!--- traffic at which additional lines
!--- will be added to the MP bundle.
!--- Load level values range from 1 (unloaded) to 255 (fully loaded).

ppp timeout multilink link remove 300

!--- Keeps the multilink connections up for 300 seconds.
!--- after the load drops below the threshold.
!--- This command should be used to control flapping.

dialer-group 1
no cdp enable
ppp authentication chap callin
ppp multilink
!
ip classless
ip route 0.0.0.0 0.0.0.0 Dialer1
no ip http server
!
dialer-list 1 protocol ip permit
!

!--- Unused configuration omitted.

!
line con 0
line 33 40
modem InOut
transport input all
autoselect ppp
flowcontrol hardware
line aux 0
line vty 5 15
!
no scheduler allocate
!
end

```

Note: There is a dialer string for every peer phone number. The router will try each in sequence until one is successful. Hence, if all eight lines must be used in a multilink connection, then you need eight dialer strings. For the last connection the router will make seven unsuccessful calls before a successful eighth call.

In this configuration, only two lines are used for simplicity.

Cisco 3640 Router (called router)

```

cisco3640#show running-config
Building configuration...

```

```
Current configuration : 1409 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log uptime msec
no service password-encryption
!
hostname cisco3640
!
boot system flash:c3640-i-mz.122-8.T
enable secret 5 <deleted>
!
username cisco2650 password 0 cisco

!---- Usernames for local authentication of the call.
!---- The client presents the username/password and the NAS
!---- authenticates the peer. To use AAA with RADIUS or TACACS+, refer to
!---- Implementing the Server-Based AAA Subsystem.

ip subnet-zero
!
no ip domain-lookup
ip domain-name cisco.com
!
async-bootp dns-server 5.5.5.1 5.5.5.2

!---- Specifies (for async clients) the IP address of
!---- the domain name server.

!
interface Loopback0
ip address 1.1.1.1 255.255.255.0
!
interface Ethernet2/0
no ip address
half-duplex
!
interface Ethernet2/1
ip address x.x.x.x x.x.x.x
half-duplex
!
interface Group-Async1

!---- Group-async interface for dialin.
!---- This group-async interface is the configuration template
!---- for all modems.
!---- Individual async interfaces do not have to be configured
!---- since they can be cloned from one managed copy.

no ip address
dialer in-band
dialer rotary-group 1

!---- Group-async 1 is a member of rotary group 1.
!---- The rotary group configuration is in interface dialer 1.

async mode interactive

!---- If the async interface is to answer different
!---- connection types (exec, ppp, slip)
!---- use this command in conjunction with autoselect ppp
!---- under the line configuration to auto detect the connection type.
!---- To prevent users from establishing an "EXEC session"
!---- to the router, use the command async modem dedicated instead.

peer default ip address pool DIALIN
```

```
!--- Clients are assigned addresses from the IP address
!--- pool named "DIALIN".

ppp authentication chap
ppp multilink

!--- Enable multilink on the async interface.
!--- Multlink should be enabled on the async
!--- and dialer interface.

group-range 1 8

!--- Modems/lines 1 through 8 are members of this
!--- group async interface. For example, use only 4 modems for the call
!--- then configure the group range for any set of 4 consecutive modems
!--- in the module.
!--- Note: This range must be included within the line configuration below.

!
interface Dialer1

!--- Configuration for rotary group 23.
!--- The dialer interface number must exactly match rotary group number
!--- configured on the physical interface.

ip unnumbered Loopback0
encapsulation ppp
dialer in-band dialer idle-timeout 600
dialer-group 1

!--- Apply interesting traffic definition from dialer-list 1.
!--- Note: The specified dialer-group number must be the same as
!--- the dialer-list number; in this example, defined to be 1.
!--- Interesting traffic specifies the packets that should reset the idle timer.

peer default ip address pool DIALIN

!--- Clients are assigned addresses from the IP
!--- address pool named DIALIN.

ppp authentication chap
ppp multilink

!--- Enable multilink on the async interface.
!--- Multlink should be enabled on the async
!--- and dialer interface.

!
ip local pool DIALIN 10.1.1.1 10.1.1.10

!--- IP address pool for dialin clients.

ip classless
ip http server
ip pim bidir-enable
!
!
dialer-list 1 protocol ip permit

!--- Specifies all IP traffic as interesting. Interesting traffic
!--- specifies the packets that should reset the idle timer.
!--- This is applied to interface group-async 1 using dialer-group 1.
!--- Note: The specified dialer-list number must be the same as the
!--- dialer-group number; in this example, defined to be 1.
```

```

!
line con 0
line 1 8

!--- TTY lines for the NM-8AM modems.

modem InOut

!--- Support incoming and outgoing modem calls.

transport input all
autoselect ppp

!--- Launch ppp if ppp packets are detected. This is
!--- used in conjunction with async mode interactive under
!--- the group-async configuration.

flowcontrol hardware
line aux 0
line vty 0 4
login
!
!
end

```

Tuning and Optional Commands

The following commands can be used to adjust the behavior of the MP connection. Careful adjustment of such parameters can help control costs by avoiding wasteful and unnecessary use of data links.

dialer load-threshold load [outbound | inbound | either]

MP can be configured so that additional channels come up immediately after the primary channel is established. To setup this scenario, set the load threshold value in the **dialer load-threshold load** command very low (ideal is around 3). In this case, the additional channels are brought up and continue to stay up (that is, they do not flap). If the load-threshold is set to any other value, the multiple channels may flap depending on the load across the link. If you want to have additional channels added as necessary, depending on the traffic, set the load-threshold to the appropriate value between 1 and 255. For example, for additional channels to come up at 50 percent, the threshold should be set to 128 (0.50×255). When determining the threshold, consideration must be given to the setup time for async calls because longer setup times may necessitate lower thresholds.

The load can be calculated based on outbound, inbound, or either the higher of the inbound or outbound traffic on the interface. If you base the load on inbound or either, ensure that the central site has **passive-interface group-async1** configured so routing updates from the core are not sent via the async line. Preventing routing traffic from passing on the link provides more bandwidth for other data on the line.

ppp timeout multilink link remove seconds

This command may be used to prevent the multilink connections from flapping when the load varies. For example, when the load threshold is set to 15 (that is, $15/255=6\%$) and the traffic exceeds the threshold, additional lines are brought up. When the traffic falls below the threshold, the additional lines are dropped. In situations where data rates are highly variable, it is advantageous for the multiple channels to stay up for a specified period of time even if the load-threshold falls below the specified value. Assign this multilink timeout to be less than that specified for dialer idle-timeout which controls the timeout for all links.

ppp timeout multilink link add seconds

This command can be used to prevent multiple links from being added to the MP bundle until high traffic is received for a specified interval. This can prevent bursts of traffic from unnecessarily bringing up additional lines.

Verify and Troubleshoot

This section provides information you can use to confirm your configuration is working properly and troubleshoot any problems.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

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

- **show ppp multilink** – Displays information on multilink bundles that are active. This command should be used to verify the multilink connection.
- **debug ppp multilink events** – Displays information about events affecting multilink bundles.
- **debug ppp negotiation** – Displays information on the PPP traffic and exchanges while negotiating 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. Multilink parameters such as Maximum Receive Reconstructed Unit (MRRU) are established during LCP negotiation.
- **debug modem** – Displays modem line activity on an access server.
- **debug dialer** – Verifies that the the dialer is dialing correctly.
- **debug chat** – Verifies that the the dialer is dialing correctly.

Verify that PPP negotiation and authentication is successful. Pay attention to the LCP negotiation where MP parameters line MRRU and the Endpoint Discriminator (EndpointDisc) are negotiated. Verify that the link is virtualized correctly. A Virtual Access interface will be created by the Cisco IOS Software to represent the MP bundle. Verify that Internet Protocol Control Protocol (IPCP) negotiation was successful. Note whether correct IP addresses were assigned and whether the proper routes were installed.

When testing your MP configuration, ensure that you are generating enough traffic across the link to trigger the load threshold. You can adjust the load–threshold value during your test as necessary.

```
cisco3640#show ppp multilink
Virtual-Access1, bundle name is cisco2650
Bundle up for 00:02:50
Dialer interface is Dialer1
0 lost fragments, 5 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0xA received sequence, 0xA sent sequence
Member links: 2 (max not set, min not set)
Async1, since 00:02:50, last rcvd seq 000008
Async2, since 00:00:25, last rcvd seq 000009

!--- There are two connections in the multilink bundle. As more connections
!--- are established, the member links will increase.
```

The following outputs are from the Cisco 3640 (only for the first two calls in). They show the Cisco 3640 receiving a call from the Cisco 2650XM and establishing an MP connection.

```
cisco3640#debug modem
cisco3640#debug ppp negotiation
```

cisco3640#debug ppp multilink events

cisco3640#

*Mar 1 00:07:14.003: Modem 0/0 Mcom: in modem state 'Dialing/Answering'

!--- Incoming call.

*Mar 1 00:07:14.655: Modem 0/0 Mcom: in modem state 'Incoming ring'

*Mar 1 00:07:16.927: Modem 0/0 Mcom: in modem state 'Waiting for Carrier'

*Mar 1 00:07:27.367: Modem 0/0 Mcom: in modem state 'Connected'

*Mar 1 00:07:28.359: Call Handle failed for Modem 0/0

*Mar 1 00:07:28.359: Modem 0/0 Mcom: CONNECT at 26400/26400(Tx/Rx), V34, MNP, V42bis, Answer

*Mar 1 00:07:28.643: TTY1: DSR came up

*Mar 1 00:07:28.643: tty1: Modem: IDLE->(unknown)

*Mar 1 00:07:28.643: TTY1: Autoselect started

*Mar 1 00:07:28.643: TTY1: create timer type 0, 120 seconds

*Mar 1 00:07:30.559: TTY1: Autoselect sample 7E

*Mar 1 00:07:30.559: TTY1: Autoselect sample 7EFF

*Mar 1 00:07:30.559: TTY1: Autoselect sample 7EFF7D

*Mar 1 00:07:30.559: TTY1: Autoselect sample 7EFF7D23

*Mar 1 00:07:30.559: TTY1 Autoselect cmd: ppp negotiate

*Mar 1 00:07:30.559: TTY1: destroy timer type 0

*Mar 1 00:07:30.559: TTY1: EXEC creation

*Mar 1 00:07:30.559: TTY1: create timer type 1, 600 seconds

*Mar 1 00:07:30.567: TTY1: destroy timer type 1

*Mar 1 00:07:30.567: TTY1: no timer type 0 to destroy

*Mar 1 00:07:30.567: Di1 IPCP: Install route to 10.1.1.1

*Mar 1 00:07:30.567: As1 IPCP: Add link info for cef entry 10.1.1.1

00:07:32: %LINK-3-UPDOWN: Interface Async1, changed state to up

*Mar 1 00:07:32.567: As1 PPP: Treating connection as a callin

*Mar 1 00:07:32.567: As1 PPP: Phase is ESTABLISHING, Passive Open

*Mar 1 00:07:32.567: As1 LCP: State is Listen

!--- PPP LCP phase begins.

*Mar 1 00:07:32.583: As1 LCP: I CONFREQ [Listen] id 2 len 36

*Mar 1 00:07:32.583: As1 LCP: ACCM 0x000A0000 (0x0206000A0000)

*Mar 1 00:07:32.583: As1 LCP: MagicNumber 0x0980D8CC (0x05060980D8CC)

*Mar 1 00:07:32.583: As1 LCP: PFC (0x0702)

*Mar 1 00:07:32.583: As1 LCP: ACFC (0x0802)

*Mar 1 00:07:32.583: As1 LCP: MRRU 1524 (0x110405F4)

*Mar 1 00:07:32.583: As1 LCP: EndpointDisc 1 cisco2650 (0x130C01636973636F32363530)

*Mar 1 00:07:32.583: Modem 0/0 Mcom: switching to PPP mode

*Mar 1 00:07:32.587: Modem 0/0 Mcom: PPP escape map:

Tx map = FFFFFFFF, Rx map = 0

*Mar 1 00:07:32.587: As1 LCP: O CONFREQ [Listen] id 1 len 41

*Mar 1 00:07:32.587: As1 LCP: ACCM 0x000A0000 (0x0206000A0000)

*Mar 1 00:07:32.587: As1 LCP: AuthProto CHAP (0x0305C22305)

*Mar 1 00:07:32.587: As1 LCP: MagicNumber 0x014901E6 (0x0506014901E6)

*Mar 1 00:07:32.587: As1 LCP: PFC (0x0702)

*Mar 1 00:07:32.587: As1 LCP: ACFC (0x0802)

*Mar 1 00:07:32.587: As1 LCP: MRRU 1524 (0x110405F4)

*Mar 1 00:07:32.587: As1 LCP: EndpointDisc 1 cisco3640

(0x130C01636973636F33363430)

*Mar 1 00:07:32.591: As1 LCP: O CONFACK [Listen] id 2 len 36

*Mar 1 00:07:32.591: As1 LCP: ACCM 0x000A0000 (0x0206000A0000)

*Mar 1 00:07:32.591: As1 LCP: MagicNumber 0x0980D8CC (0x05060980D8CC)

*Mar 1 00:07:32.591: As1 LCP: PFC (0x0702)

*Mar 1 00:07:32.591: As1 LCP: ACFC (0x0802)

*Mar 1 00:07:32.591: As1 LCP: MRRU 1524 (0x110405F4)

*Mar 1 00:07:32.591: As1 LCP: EndpointDisc 1 cisco2650

(0x130C01636973636F32363530)

```
*Mar 1 00:07:32.815: As1 LCP: I CONFACK [ACKsent] id 1 len 41
*Mar 1 00:07:32.815: As1 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:07:32.815: As1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:07:32.815: As1 LCP: MagicNumber 0x014901E6 (0x0506014901E6)
*Mar 1 00:07:32.815: As1 LCP: PFC (0x0702)
*Mar 1 00:07:32.815: As1 LCP: ACFC (0x0802)
*Mar 1 00:07:32.815: As1 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:07:32.815: As1 LCP: EndpointDisc 1 cisco3640
(0x130C01636973636F33363430)
*Mar 1 00:07:32.815: As1 LCP: State is Open
```

!--- LCP phase is complete.

```
*Mar 1 00:07:32.815: Modem 0/0 Mcom: PPP escape map:
Tx map = A0000, Rx map = 0
*Mar 1 00:07:32.815: As1 PPP: Phase is AUTHENTICATING, by this end
*Mar 1 00:07:32.815: As1 CHAP: O CHALLENGE id 1 len 30 from "cisco3640"
*Mar 1 00:07:32.987: As1 CHAP: I RESPONSE id 1 len 30 from "cisco2650"
*Mar 1 00:07:32.991: As1 CHAP: O SUCCESS id 1 len 4
*Mar 1 00:07:32.991: As1 MLP: Request add link to bundle
*Mar 1 00:07:32.991: As1 PPP: Phase is VIRTUALIZED
*Mar 1 00:07:32.991: As1 MLP: Adding link to bundle
*Mar 1 00:07:32.995: Vi1 PPP: Phase is DOWN, Setup
*Mar 1 00:07:33.019: Vi1 PPP: Phase is DOWN, Setup
*Mar 1 00:07:33.019: Vi1 MLP: Added to huntgroup Dil
*Mar 1 00:07:33.019: Vi1 MLP: Clone from Dil
00:07:33: %LINK-3-UPDOWN: Interface Virtual-Access1,
changed state to up
*Mar 1 00:07:33.023: As1 IPCP: Remove link info for cef
entry 10.1.1.1
*Mar 1 00:07:33.023: Vi1 MLP: Added first link As1
to bundle cisco2650
*Mar 1 00:07:33.023: Vi1 PPP: Phase is UP
*Mar 1 00:07:33.023: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10
*Mar 1 00:07:33.023: Vi1 IPCP: Address 1.1.1.1 (0x030601010101)
*Mar 1 00:07:33.027: Vi1 CDPCP: O CONFREQ [Closed] id 1 len 4
*Mar 1 00:07:33.027: Dil IPCP: Remove route to 10.1.1.1
*Mar 1 00:07:33.239: As1 LCP: I PROTREJ [Open] id 2 len
10 protocol CDPCP (0x820701010004)
*Mar 1 00:07:33.239: Vi1 CDPCP: State is Listen
*Mar 1 00:07:33.243: Vi1 IPCP: I CONFREQ [REQsent] id 1 len 10
*Mar 1 00:07:33.243: Vi1 IPCP: Address 0.0.0.0 (0x030600000000)
*Mar 1 00:07:33.243: Vi1 IPCP: Pool returned 10.1.1.1
*Mar 1 00:07:33.247: Vi1 IPCP: O CONFNAK [REQsent] id 1 len 10
*Mar 1 00:07:33.247: Vi1 IPCP: Address 10.1.1.1 (0x03060A010101)
*Mar 1 00:07:33.407: Vi1 IPCP: I CONFREQ [REQsent] id 2 len 10
*Mar 1 00:07:33.407: Vi1 IPCP: Address 10.1.1.1 (0x03060A010101)
*Mar 1 00:07:33.407: Vi1 IPCP: O CONFACK [REQsent] id 2 len 10
*Mar 1 00:07:33.411: Vi1 IPCP: Address 10.1.1.1 (0x03060A010101)
00:07:33: %LINEPROTO-5-UPDOWN: Line protocol on Interface Async1,
changed state to up
00:07:34: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Virtual-Access1, changed state to up
*Mar 1 00:07:35.015: Vi1 IPCP: TIMEOUT: State ACKsent
*Mar 1 00:07:35.015: Vi1 IPCP: O CONFREQ [ACKsent] id 2 len 10
*Mar 1 00:07:35.015: Vi1 IPCP: Address 1.1.1.1 (0x030601010101)
*Mar 1 00:07:35.175: Vi1 IPCP: I CONFACK [ACKsent] id 2 len 10
*Mar 1 00:07:35.175: Vi1 IPCP: Address 1.1.1.1 (0x030601010101)
*Mar 1 00:07:35.175: Vi1 IPCP: State is Open
*Mar 1 00:07:35.175: Dil IPCP: Install route to 10.1.1.1
```

!--- Route to peer is installed.

```
*Mar 1 00:07:35.175: Vi1 IPCP: Add link info for cef entry 10.1.1.1
```

Use the **show modem** command to check which modem picked up the call. In this case, the modem 0/0 is connected (indicated by * in the output).

```
cisco3640#show modem
```

```
Codes:
```

```
* - Modem has an active call
```

```
R - Modem is being Reset
```

```
D - Download in progress
```

```
B - Modem is marked bad and cannot be used for taking calls
```

```
b - Modem is either busied out or shut-down
```

Mdm	Avg Hold Time	Inc calls Succ	Inc calls Fail	Out calls Succ	Out calls Fail	Busied Out	Failed Dial	No Answer	Succ Pct.
* 0/0	00:01:07	1	0	0	0	0	0	0	100%
0/1	00:00:00	0	0	0	0	0	0	0	0%
0/2	00:00:00	0	0	0	0	0	0	0	0%
0/3	00:00:00	0	0	0	0	0	0	0	0%
0/4	00:00:00	0	0	0	0	0	0	0	0%
0/5	00:00:00	0	0	0	0	0	0	0	0%
0/6	00:00:00	0	0	0	0	0	0	0	0%
0/7	00:00:00	0	0	0	0	0	0	0	0%
Total:	00:01:07	1	0	0	0	0	0	0	100%

The **show ppp multilink** command can be used to verify if a multilink bundle has been created for the connection. Even if only one connection is active, a multilink connection is created with the assumption that more connections will be established.

```
cisco3640#show ppp multilink
```

```
Virtual-Access1, bundle name is cisco2650
```

```
Bundle up for 00:00:52
```

```
Dialer interface is Dialer1
```

```
0 lost fragments, 0 reordered, 0 unassigned
```

```
0 discarded, 0 lost received, 1/255 load
```

```
0x0 received sequence, 0x0 sent sequence
```

```
Member links: 1 (max not set, min not set)
```

```
Asyncl, since 00:00:52, no frags rcvd
```

Now, the second call is received.

```
*Mar 1 00:09:26.663: Vi1 PPP: Outbound cdp packet dropped,
```

```
CDPCP state is Listen
```

```
*Mar 1 00:09:38.255: Modem 0/1 Mcom: in modem state 'Dialing/Answering'
```

```
!--- Incoming call.
```

```
*Mar 1 00:09:38.903: Modem 0/1 Mcom: in modem state 'Incoming ring'
```

```
*Mar 1 00:09:41.175: Modem 0/1 Mcom: in modem state 'Waiting for Carrier'
```

```
*Mar 1 00:09:52.095: Modem 0/1 Mcom: in modem state 'Connected'
```

```
*Mar 1 00:09:53.075: Call Handle failed for Modem 0/1
```

```
*Mar 1 00:09:53.075: Modem 0/1 Mcom: CONNECT at 24000/24000(Tx/Rx),
```

```
V34, MNP, V42bis, Answer
```

```
*Mar 1 00:09:53.647: TTY2: DSR came up
```

```
*Mar 1 00:09:53.647: tty2: Modem: IDLE->(unknown)
```

```
*Mar 1 00:09:53.647: TTY2: Autoselect started
```

```
*Mar 1 00:09:53.647: TTY2: create timer type 0, 120 seconds
```

```
*Mar 1 00:09:55.291: TTY2: Autoselect sample 7E
```

```
*Mar 1 00:09:55.291: TTY2: Autoselect sample 7EFF
```

```
*Mar 1 00:09:55.291: TTY2: Autoselect sample 7EFF7D
```

```
*Mar 1 00:09:55.291: TTY2: Autoselect sample 7EFF7D23
```

```
*Mar 1 00:09:55.291: TTY2 Autoselect cmd: ppp negotiate
```

```
*Mar 1 00:09:55.291: TTY2: destroy timer type 0
```

```
*Mar 1 00:09:55.295: TTY2: EXEC creation
```

```
*Mar 1 00:09:55.295: TTY2: create timer type 1, 600 seconds
```

```

*Mar 1 00:09:55.295: TTY2: destroy timer type 1
*Mar 1 00:09:55.295: TTY2: no timer type 0 to destroy
*Mar 1 00:09:55.299: Di1 IPCP: Install route to 10.1.1.2
*Mar 1 00:09:55.299: As2 IPCP: Add link info for cef entry 10.1.1.2
*Mar 1 00:09:57.291: As2 LCP: I CONFREQ [Closed] id 2 len 36
*Mar 1 00:09:57.291: As2 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:09:57.291: As2 LCP: MagicNumber 0x09830E20 (0x050609830E20)
*Mar 1 00:09:57.291: As2 LCP: PFC (0x0702)
*Mar 1 00:09:57.291: As2 LCP: ACFC (0x0802)
*Mar 1 00:09:57.291: As2 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:09:57.291: As2 LCP: EndpointDisc 1 cisco2650 (0x130C01636973636F32363530)
*Mar 1 00:09:57.291: Modem 0/1 Mcom: switching to PPP mode
*Mar 1 00:09:57.295: As2 LCP: Lower layer not up, Fast Starting
*Mar 1 00:09:57.295: As2 PPP: Treating connection as a callin
*Mar 1 00:09:57.295: As2 PPP: Phase is ESTABLISHING, Passive Open
*Mar 1 00:09:57.295: As2 LCP: State is Listen
*Mar 1 00:09:57.295: Modem 0/1 Mcom: PPP escape map:
Tx map = FFFFFFFF, Rx map = 0
*Mar 1 00:09:57.295: As2 LCP: O CONFREQ [Listen] id 1 len 41
*Mar 1 00:09:57.295: As2 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:09:57.295: As2 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:09:57.295: As2 LCP: MagicNumber 0x014B372D (0x0506014B372D)
*Mar 1 00:09:57.295: As2 LCP: PFC (0x0702)
*Mar 1 00:09:57.299: As2 LCP: ACFC (0x0802)
*Mar 1 00:09:57.299: As2 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:09:57.299: As2 LCP: EndpointDisc 1 cisco3640 (0x130C01636973636F33363430)
*Mar 1 00:09:57.299: As2 LCP: O CONFACK [Listen] id 2 len 36
*Mar 1 00:09:57.299: As2 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:09:57.299: As2 LCP: MagicNumber 0x09830E20 (0x050609830E20)
*Mar 1 00:09:57.299: As2 LCP: PFC (0x0702)
*Mar 1 00:09:57.299: As2 LCP: ACFC (0x0802)
*Mar 1 00:09:57.299: As2 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:09:57.299: As2 LCP: EndpointDisc 1 cisco2650 (0x130C01636973636F32363530)
00:09:57: %LINK-3-UPDOWN: Interface Async2, changed state to up
*Mar 1 00:09:57.527: As2 LCP: I CONFACK [ACKsent] id 1 len 41
*Mar 1 00:09:57.527: As2 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:09:57.527: As2 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:09:57.527: As2 LCP: MagicNumber 0x014B372D (0x0506014B372D)
*Mar 1 00:09:57.527: As2 LCP: PFC (0x0702)
*Mar 1 00:09:57.527: As2 LCP: ACFC (0x0802)
*Mar 1 00:09:57.527: As2 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:09:57.527: As2 LCP: EndpointDisc 1 cisco3640 (0x130C01636973636F33363430)
*Mar 1 00:09:57.527: As2 LCP: State is Open

!--- LCP negotiation is complete.

*Mar 1 00:09:57.527: Modem 0/1 Mcom: PPP escape map: Tx map = A0000, Rx map = 0
*Mar 1 00:09:57.527: As2 PPP: Phase is AUTHENTICATING,
by this end
*Mar 1 00:09:57.531: As2 CHAP: O CHALLENGE id 1 len 30
from "cisco3640"
*Mar 1 00:09:57.707: As2 CHAP: I RESPONSE id 1 len 30
from "cisco2650"
*Mar 1 00:09:57.707: As2 CHAP: O SUCCESS id 1 len 4
*Mar 1 00:09:57.707: As2 MLP: Request add link to bundle

!--- The additional link is added to the multilink bundle.

*Mar 1 00:09:57.707: As2 PPP: Phase is VIRTUALIZED
*Mar 1 00:09:57.711: As2 MLP: Adding link to bundle
*Mar 1 00:09:57.711: As2 IPCP: Remove link info for cef entry 10.1.1.2
*Mar 1 00:09:57.711: Vi1 MLP: Added link As2 to bundle cisco2650

!--- Link is added to the bundle.

*Mar 1 00:09:57.711: Di1 IPCP: Remove route to 10.1.1.2

```

00:09:58: %LINEPROTO-5-UPDOWN: Line protocol on Interface Async2, changed state to up

cisco3640#**show modem**

Codes:

* - Modem has an active call
R - Modem is being Reset
D - Download in progress
B - Modem is marked bad and cannot be used for taking calls
b - Modem is either busied out or shut-down

Mdm	Avg Hold Time	Inc calls Succ	Inc calls Fail	Out calls Succ	Out calls Fail	Busied Out	Failed Dial	No Answer	Succ Pct.
* 0/0	00:03:05	1	0	0	0	0	0	0	100%
* 0/1	00:00:41	1	0	0	0	0	0	0	100%
0/2	00:00:00	0	0	0	0	0	0	0	0%
0/3	00:00:00	0	0	0	0	0	0	0	0%
0/4	00:00:00	0	0	0	0	0	0	0	0%
0/5	00:00:00	0	0	0	0	0	0	0	0%
0/6	00:00:00	0	0	0	0	0	0	0	0%
0/7	00:00:00	0	0	0	0	0	0	0	0%
Total:	00:01:53	2	0	0	0	0	0	0	100%

cisco3640#**show ppp multilink**

Virtual-Access1, bundle name is cisco2650
Bundle up for 00:02:50
Dialer interface is Dialer1
0 lost fragments, 5 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0xA received sequence, 0xA sent sequence
Member links: 2 (max not set, min not set)
 Async1, since 00:02:50, last rcvd seq 000008
 Async2, since 00:00:25, last rcvd seq 000009

!--- Note that now there are two links in the multilink bundle.

The following outputs were obtained from the Cisco 2650XM . They show the Cisco 2650XM dialing out to the Cisco 3640 and establishing a MP connection.

```
cisco2650#debug dialer
cisco2650#debug chat
cisco2650#debug modem
cisco2650#debug ppp negotiation
cisco2650#debug ppp multilink events
```

cisco2650#**ping 1.1.1.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 1.1.1.1, timeout is 2 seconds:

```
*Mar 1 00:04:35.875: As35 DDR: rotor dialout [priority]
*Mar 1 00:04:35.875: As35 DDR: Dialing cause ip (s=100.1.1.1, d=1.1.1.1)
*Mar 1 00:04:35.875: As35 DDR: Attempting to dial 5269473
```

*!--- The router is dialing out to 5269473
!--- (the first dialer string configured).*

```
*Mar 1 00:04:35.875: CHAT35: Attempting async line dialer script
*Mar 1 00:04:35.875: CHAT35: no matching chat script found for 5269473
*Mar 1 00:04:35.875: CHAT35: Dialing using Modem script: d0efault-d0ials0cript
& System script: none
*Mar 1 00:04:35.879: CHAT35: process started
*Mar 1 00:04:35.879: CHAT35: Asserting DTR
*Mar 1 00:04:35.879: CHAT35: Chat script d0efault-d0ials0cript started
*Mar 1 00:04:35.879: CHAT35: Sending string: ATZ
```

```
*Mar 1 00:04:35.879: CHAT35: Expecting string: OK.
*Mar 1 00:04:37.389: CHAT35: Completed match for expect: OK
*Mar 1 00:04:37.389: CHAT35: Sending string: AT
*Mar 1 00:04:37.389: CHAT35: Expecting string: OK
*Mar 1 00:04:37.465: CHAT35: Completed match for expect: OK
*Mar 1 00:04:37.465: CHAT35: Sending string: ATDT\T<5269473>
*Mar 1 00:04:37.465: CHAT35: Expecting string: CONNECT
*Mar 1 00:04:37.481: Modem 1/2 Mcom: in modem state 'Dialing/Answering'....
Success rate is 0 percent (0/5)
cisco2650#
*Mar 1 00:04:45.891: Modem 1/2 Mcom: in modem state 'Waiting for Carrier'
*Mar 1 00:04:59.453: Modem 1/2 Mcom: in modem state 'Connected'
*Mar 1 00:04:59.858: Modem 1/2 Mcom: CONNECT at
26400/26400(Tx/Rx), V34, MNP, V42bis, Originate
```

!--- Modem call connects.

```
*Mar 1 00:04:59.914: CHAT35: Completed match for expect: CONNECT
*Mar 1 00:04:59.914: CHAT35: Chat script
d0efault-d0ials0cript finished, status = Success
*Mar 1 00:04:59.914: TTY35: no timer type 1 to destroy
*Mar 1 00:04:59.914: TTY35: no timer type 0 to destroy
00:05:01: %LINK-3-UPDOWN: Interface Async35, changed state to up
*Mar 1 00:05:01.917: As35 DDR: Dialer statechange to up
00:05:01: %DIALER-6-BIND: Interface As35 bound to profile Dil
*Mar 1 00:05:01.917: As35 DDR: Dialer call has been placed
*Mar 1 00:05:01.917: As35 PPP: Treating connection as a callout
*Mar 1 00:05:01.917: As35 PPP: Phase is ESTABLISHING, Active Open
```

!--- PPP negotiation begins.

```
*Mar 1 00:05:01.917: Modem 1/2 Mcom: PPP
escape map: Tx map = FFFFFFFF, Rx map = 0
*Mar 1 00:05:01.917: As35 PPP: No remote authentication for call-out
*Mar 1 00:05:01.917: As35 LCP: O CONFREQ [Closed] id 1 len 36
*Mar 1 00:05:01.917: As35 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:05:01.917: As35 LCP: MagicNumber 0x0980D8CC (0x05060980D8CC)
*Mar 1 00:05:01.921: As35 LCP: PFC (0x0702)
*Mar 1 00:05:01.921: As35 LCP: ACFC (0x0802)
*Mar 1 00:05:01.921: As35 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:05:01.921: As35 LCP: EndpointDisc 1 cisco2650
(0x130C01636973636F32363530)
*Mar 1 00:05:03.945: As35 LCP: TIMEout: State REQsent
*Mar 1 00:05:03.945: As35 LCP: O CONFREQ [REQsent] id 2 len 36
*Mar 1 00:05:03.945: As35 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:05:03.945: As35 LCP: MagicNumber 0x0980D8CC
(0x05060980D8CC)
*Mar 1 00:05:03.945: As35 LCP: PFC (0x0702)
*Mar 1 00:05:03.945: As35 LCP: ACFC (0x0802)
*Mar 1 00:05:03.945: As35 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:05:03.945: As35 LCP: EndpointDisc 1 cisco2650
(0x130C01636973636F32363530)
*Mar 1 00:05:04.229: As35 LCP: I CONFREQ [REQsent] id 1 len 41
*Mar 1 00:05:04.229: As35 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:05:04.229: As35 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:05:04.229: As35 LCP: MagicNumber 0x014901E6
(0x0506014901E6)
*Mar 1 00:05:04.229: As35 LCP: PFC (0x0702)
*Mar 1 00:05:04.229: As35 LCP: ACFC (0x0802)
*Mar 1 00:05:04.229: As35 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:05:04.229: As35 LCP: EndpointDisc 1 cisco3640
(0x130C01636973636F33363430)
*Mar 1 00:05:04.229: As35 LCP: O CONFACK [REQsent] id 1 len 41
*Mar 1 00:05:04.229: As35 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:05:04.229: As35 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:05:04.229: As35 LCP: MagicNumber 0x014901E6
```

```
(0x0506014901E6)
*Mar 1 00:05:04.229: As35 LCP: PFC (0x0702)
*Mar 1 00:05:04.229: As35 LCP: ACFC (0x0802)
*Mar 1 00:05:04.229: As35 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:05:04.233: As35 LCP: EndpointDisc 1 cisco3640
(0x130C01636973636F33363430)
*Mar 1 00:05:04.233: As35 LCP: I CONFACK [ACKsent] id 2 len 36
*Mar 1 00:05:04.233: As35 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:05:04.233: As35 LCP: MagicNumber 0x0980D8CC
(0x05060980D8CC)
*Mar 1 00:05:04.233: As35 LCP: PFC (0x0702)
*Mar 1 00:05:04.233: As35 LCP: ACFC (0x0802)
*Mar 1 00:05:04.233: As35 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:05:04.233: As35 LCP: EndpointDisc 1 cisco2650
(0x130C01636973636F32363530)
*Mar 1 00:05:04.233: As35 LCP: State is Open
*Mar 1 00:05:04.233: Modem 1/2 Mcom: PPP escape map:
Tx map = A0000, Rx map = 0
*Mar 1 00:05:04.233: As35 PPP: Phase is AUTHENTICATING, by the peer
*Mar 1 00:05:04.414: As35 CHAP: I CHALLENGE id 1 len 30 from "cisco3640"
*Mar 1 00:05:04.414: As35 CHAP: O RESPONSE id 1 len 30 from "cisco2650"
*Mar 1 00:05:04.626: As35 CHAP: I SUCCESS id 1 len 4
*Mar 1 00:05:04.630: As35 PPP: Phase is FORWARDING,
Attempting Forward
*Mar 1 00:05:04.630: As35 CDPCP: Packet buffered
while building VPDN interface
*Mar 1 00:05:04.630: As35 IPCP: Packet buffered
while building VPDN interface
*Mar 1 00:05:04.630: As35 PPP: Phase is ESTABLISHING, Finish LCP
*Mar 1 00:05:04.630: As35 MLP: Request add link to bundle
*Mar 1 00:05:04.630: As35 PPP: Phase is VIRTUALIZED
*Mar 1 00:05:04.630: As35 MLP: Adding link to bundle
*Mar 1 00:05:04.634: Vi1 PPP: Phase is DOWN, Setup
*Mar 1 00:05:04.654: Vi1 PPP: Phase is DOWN, Setup
00:05:04: %DIALER-6-BIND: Interface Vi1 bound to profile Di1
*Mar 1 00:05:04.658: Vi1 MLP: Added to dialer pool Vi1
*Mar 1 00:05:04.658: Vi1 MLP: Clone from Di1
*Mar 1 00:05:04.658: Vi1 PPP: Treating connection as a callout
*Mar 1 00:05:04.658: Vi1 PPP: Phase is ESTABLISHING, Active Open
*Mar 1 00:05:04.658: Vi1 PPP: No remote authentication for call-out
*Mar 1 00:05:04.658: Vi1 LCP: O CONFREQ [Closed] id 1 len 26
*Mar 1 00:05:04.658: Vi1 LCP:
MagicNumber 0x0980E382 (0x05060980E382)
*Mar 1 00:05:04.658: Vi1 LCP:
MRRU 1524 (0x110405F4)
*Mar 1 00:05:04.658: Vi1 LCP:
EndpointDisc 1 cisco2650 (0x130C01636973636F32363530)
*Mar 1 00:05:04.658: Vi1 PPP: Treating connection as a callout
00:05:04: %LINK-3-UPDOWN: Interface Virtual-Access1,
changed state to up
*Mar 1 00:05:04.662: Vi1 DDR: Dialer statechange to up
*Mar 1 00:05:04.662: Vi1 DDR: Dialer call has been placed
*Mar 1 00:05:04.662: Vi1 PPP: Treating connection as a callout
*Mar 1 00:05:04.662: Vi1 MLP: Added first link As35 to
bundle cisco3640
*Mar 1 00:05:04.662: Vi1 PPP: Pending ncpQ size is 2
*Mar 1 00:05:04.662: As35 CDPCP: Redirect packet to As35
*Mar 1 00:05:04.662: Vi1 CDPCP: I CONFREQ [Closed] id 1 len 4
*Mar 1 00:05:04.666: Vi1 LCP: O PROTREJ [Open] id 2
len 10 protocol CDPCP (0x820701010004)
*Mar 1 00:05:04.666: As35 IPCP: Redirect packet to As35
*Mar 1 00:05:04.666: Vi1 IPCP: I CONFREQ [Closed] id 1 len 10
*Mar 1 00:05:04.666: Vi1 IPCP:
Address 1.1.1.1 (0x030601010101)
*Mar 1 00:05:04.666: Vi1 IPCP: Lower layer not up,
discarding packet
```

```
*Mar 1 00:05:04.666: Vi1 PPP: Phase is UP
*Mar 1 00:05:04.666: Vi1 IPCP: O CONFREQ [Closed] id 1 len 10
*Mar 1 00:05:04.666: Vi1 IPCP:
Address 0.0.0.0 (0x030600000000)
*Mar 1 00:05:04.838: Vi1 IPCP: I CONFNAK [REQsent] id 1 len 10
*Mar 1 00:05:04.838: Vi1 IPCP:
Address 10.1.1.1 (0x03060A010101)
*Mar 1 00:05:04.838: Vi1 IPCP: O CONFREQ [REQsent]
id 2 len 10
*Mar 1 00:05:04.838: Vi1 IPCP:
Address 10.1.1.1 (0x03060A010101)
*Mar 1 00:05:05.003: Vi1 IPCP: I CONFACK [REQsent] id 2 len 10
*Mar 1 00:05:05.003: Vi1 IPCP: Address 10.1.1.1 (0x03060A010101)
00:05:05: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Async35, changed state to up
00:05:05: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Virtual-Access1, changed state to up
*Mar 1 00:05:06.605: Vi1 IPCP: I CONFREQ [ACKrcvd] id 2 len 10
*Mar 1 00:05:06.605: Vi1 IPCP: Address 1.1.1.1 (0x030601010101)
*Mar 1 00:05:06.605: Vi1 IPCP: O CONFACK [ACKrcvd] id 2 len 10
*Mar 1 00:05:06.605: Vi1 IPCP: Address 1.1.1.1 (0x030601010101)
*Mar 1 00:05:06.605: Vi1 IPCP: State is Open
*Mar 1 00:05:06.605: Di1 IPCP: Install
negotiated IP interface address 10.1.1.1
*Mar 1 00:05:06.605: Di1 IPCP: Install route to 1.1.1.1
*Mar 1 00:05:06.605: Vi1 IPCP: Add link info for cef entry 1.1.1.1
*Mar 1 00:05:06.605: Vi1 DDR: dialer protocol up

cisco2650#ping 1.1.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.1.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 172/187/204 ms
```

```
cisco2650#show ppp multilink
```

```
Virtual-Access1, bundle name is cisco3640
Bundle up for 00:00:43
Dialer interface is Dialer1
0 lost fragments, 0 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0x0 received sequence, 0x0 sent sequence
Member links: 1 (max not set, min not set)
  Async35, since 00:00:43, no frags rcvd
```

```
!--- Only one link is currently up. As more links are
!--- established they will be added to this bundle.
```

```
cisco2650#
```

```
*Mar 1 00:06:33.091: Vi1 MLP: Load (28)
above threshold in bundle cisco3640
```

```
!--- When there is traffic above the load threshold
!--- the additional link is dialed.
```

```
*Mar 1 00:06:33.091: As34 DDR: rotor dialout [priority]
*Mar 1 00:06:33.091: As34 DDR: Attempting to dial 5269473
*Mar 1 00:06:33.091: CHAT34: Attempting async line dialer script
*Mar 1 00:06:33.091: CHAT34: no matching chat script found for 5269473
*Mar 1 00:06:33.091: CHAT34: Dialing using Modem script:
d0efault-d0ials0cript & System script: none
*Mar 1 00:06:33.091: CHAT34: process started
*Mar 1 00:06:33.091: CHAT34: Asserting DTR
*Mar 1 00:06:33.091: CHAT34: Chat script d0efault-d0ials0cript started
```

*Mar 1 00:06:33.091: CHAT34: Sending string: ATZpi 1.1.1.1
*Mar 1 00:06:33.091: CHAT34: Expecting string: OK
*Mar 1 00:06:34.597: CHAT34: Completed match for expect: OK
*Mar 1 00:06:34.597: CHAT34: Sending string: AT
*Mar 1 00:06:34.597: CHAT34: Expecting string: OK
*Mar 1 00:06:34.674: CHAT34: Completed match for expect: OK
*Mar 1 00:06:34.674: CHAT34: Sending string: ATDT\T<5269473>

!--- The router attempts to dial the first dialer string.

*Mar 1 00:06:34.674: CHAT34: Expecting string: CONNECT
*Mar 1 00:06:34.686: Modem 1/1 Mcom: in modem state 'Dialing/Answering'
*Mar 1 00:06:44.265: Modem 1/1 Mcom: in modem state 'Disconnecting'
*Mar 1 00:06:44.273: Modem 1/1 Mcom: **DISCONNECT**,
duration = 00:00:00, reason (0x4) **Busy**

*!--- The line is busy (since the first call is
!--- already on that line).*

*Mar 1 00:06:45.131: Modem 1/1 Mcom: in modem state 'Idle'
*Mar 1 00:06:45.187: CHAT34: Found abort string BUSY expecting CONNECT
*Mar 1 00:06:45.191: CHAT34: Chat script d0efault-d0ials0cript finished,
status = Connection aborted
*Mar 1 00:06:45.191: TTY34: Line reset by "Async dialer"
*Mar 1 00:06:45.191: As34 DDR: disconnecting call
*Mar 1 00:06:45.191: TTY34: Modem: (unknown)->HANGUP
*Mar 1 00:06:45.191: TTY34: no timer type 0 to destroy
*Mar 1 00:06:45.191: TTY34: no timer type 1 to destroy
*Mar 1 00:06:45.191: TTY34: no timer type 3 to destroy
*Mar 1 00:06:45.191: TTY34: no timer type 4 to destroy
*Mar 1 00:06:45.191: TTY34: no timer type 2 to destroy
*Mar 1 00:06:46.140: TTY34: dropping DTR, hanging up
*Mar 1 00:06:46.140: tty34: Modem: HANGUP->IDLE
*Mar 1 00:06:51.153: TTY34: restoring DTR
*Mar 1 00:07:00.191: As34 DDR: re-enable timeout
*Mar 1 00:07:00.191: As34 DDR: Attempting to dial **5269756**

!--- The router now attempts to dial the second dialer string.

*Mar 1 00:07:00.191: CHAT34: Attempting async line dialer script
*Mar 1 00:07:00.191: CHAT34: no matching chat script found for 5269756
*Mar 1 00:07:00.191: CHAT34: Dialing using Modem script:
d0efault-d0ials0cript & System script: none
*Mar 1 00:07:00.191: CHAT34: process started
*Mar 1 00:07:00.191: CHAT34: Asserting DTR
*Mar 1 00:07:00.191: CHAT34: Chat script d0efault-d0ials0cript started
*Mar 1 00:07:00.191: CHAT34: Sending string: ATZ
*Mar 1 00:07:00.191: CHAT34: Expecting string: OK
*Mar 1 00:07:01.702: CHAT34: Completed match for expect: OK
*Mar 1 00:07:01.702: CHAT34: Sending string: AT
*Mar 1 00:07:01.702: CHAT34: Expecting string: OK
*Mar 1 00:07:01.774: CHAT34: Completed match for expect: OK
*Mar 1 00:07:01.774: CHAT34: Sending string: ATDT\T<5269756>
*Mar 1 00:07:01.774: CHAT34: Expecting string: CONNECT
*Mar 1 00:07:01.790: Modem 1/1 Mcom: in modem state 'Dialing/Answering'
*Mar 1 00:07:09.202: Modem 1/1 Mcom: in modem state 'Waiting for Carrier'
*Mar 1 00:07:24.167: Modem 1/1 Mcom: in modem state 'Connected'
*Mar 1 00:07:24.583: Modem 1/1 Mcom: CONNECT at 24000/24000(Tx/Rx), V34,
MNP, V42bis, Originate
*Mar 1 00:07:24.639: CHAT34: Completed match for expect: CONNECT
*Mar 1 00:07:24.639: CHAT34: Chat script d0efault-d0ials0cript finished,
status = Success
*Mar 1 00:07:24.639: TTY34: no timer type 1 to destroy
*Mar 1 00:07:24.639: TTY34: no timer type 0 to destroy
00:07:26: %LINK-3-UPDOWN: Interface Async34, changed state to up
*Mar 1 00:07:26.639: As34 DDR: Dialer statechange to up

```
00:07:26: %DIALER-6-BIND: Interface As34 bound to profile Dil
*Mar 1 00:07:26.639: As34 DDR: Dialer call has been placed
*Mar 1 00:07:26.639: As34 PPP: Treating connection as a callout
*Mar 1 00:07:26.639: As34 PPP: Phase is ESTABLISHING, Active Open
*Mar 1 00:07:26.639: Modem 1/1 Mcom: PPP escape map: Tx map = FFFFFFFF,
Rx map = 0
*Mar 1 00:07:26.639: As34 PPP: No remote authentication for call-out
*Mar 1 00:07:26.639: As34 LCP: O CONFREQ [Closed] id 1 len 36
*Mar 1 00:07:26.639: As34 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:07:26.639: As34 LCP: MagicNumber 0x09830E20 (0x050609830E20)
*Mar 1 00:07:26.643: As34 LCP: PFC (0x0702)
*Mar 1 00:07:26.643: As34 LCP: ACFC (0x0802)
*Mar 1 00:07:26.643: As34 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:07:26.643: As34 LCP: EndpointDisc 1 cisco2650
(0x130C01636973636F32363530)
*Mar 1 00:07:28.658: As34 LCP: TIMEout: State REQsent
*Mar 1 00:07:28.658: As34 LCP: O CONFREQ [REQsent] id 2 len 36
*Mar 1 00:07:28.658: As34 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:07:28.658: As34 LCP: MagicNumber 0x09830E20 (0x050609830E20)
*Mar 1 00:07:28.658: As34 LCP: PFC (0x0702)
*Mar 1 00:07:28.658: As34 LCP: ACFC (0x0802)
*Mar 1 00:07:28.658: As34 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:07:28.658: As34 LCP: EndpointDisc 1 cisco2650
(0x130C01636973636F32363530)
*Mar 1 00:07:28.938: As34 LCP: I CONFREQ [REQsent] id 1 len 41
*Mar 1 00:07:28.938: As34 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:07:28.938: As34 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:07:28.938: As34 LCP: MagicNumber 0x014B372D (0x0506014B372D)
*Mar 1 00:07:28.938: As34 LCP: PFC (0x0702)
*Mar 1 00:07:28.938: As34 LCP: ACFC (0x0802)
*Mar 1 00:07:28.938: As34 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:07:28.938: As34 LCP: EndpointDisc 1 cisco3640
(0x130C01636973636F33363430)
*Mar 1 00:07:28.938: As34 LCP: O CONFACK [REQsent] id 1 len 41
*Mar 1 00:07:28.942: As34 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:07:28.942: As34 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 00:07:28.942: As34 LCP: MagicNumber 0x014B372D (0x0506014B372D)
*Mar 1 00:07:28.942: As34 LCP: PFC (0x0702)
*Mar 1 00:07:28.942: As34 LCP: ACFC (0x0802)
*Mar 1 00:07:28.942: As34 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:07:28.942: As34 LCP: EndpointDisc 1 cisco3640
(0x130C01636973636F33363430)
*Mar 1 00:07:28.942: As34 LCP: I CONFACK [ACKsent] id 2 len 36
*Mar 1 00:07:28.942: As34 LCP: ACCM 0x000A0000 (0x0206000A0000)
*Mar 1 00:07:28.942: As34 LCP: MagicNumber 0x09830E20 (0x050609830E20)
*Mar 1 00:07:28.942: As34 LCP: PFC (0x0702)
*Mar 1 00:07:28.942: As34 LCP: ACFC (0x0802)
*Mar 1 00:07:28.942: As34 LCP: MRRU 1524 (0x110405F4)
*Mar 1 00:07:28.942: As34 LCP: EndpointDisc 1 cisco2650
(0x130C01636973636F32363530)
*Mar 1 00:07:28.942: As34 LCP: State is Open
*Mar 1 00:07:28.942: Modem 1/1 Mcom: PPP escape map: Tx map = A0000, Rx map = 0
*Mar 1 00:07:28.946: As34 PPP: Phase is AUTHENTICATING, by the peer
*Mar 1 00:07:29.127: As34 CHAP: I CHALLENGE id 1 len 30 from "cisco3640"
*Mar 1 00:07:29.131: As34 CHAP: O RESPONSE id 1 len 30 from "cisco2650"
*Mar 1 00:07:29.303: As34 CHAP: I SUCCESS id 1 len 4
*Mar 1 00:07:29.303: As34 PPP: Phase is FORWARDING, Attempting Forward
*Mar 1 00:07:29.303: As34 PPP: Phase is ESTABLISHING, Finish LCP
*Mar 1 00:07:29.303: As34 MLP: Request add link to bundle
*Mar 1 00:07:29.303: As34 PPP: Phase is VIRTUALIZED
*Mar 1 00:07:29.303: As34 MLP: Adding link to bundle
```

!--- The call is added to the multilink bundle.

```
*Mar 1 00:07:29.307: Vi1 MLP: Added link As34 to bundle cisco3640
00:07:30: %LINEPROTO-5-UPDOWN: Line protocol on Interface Async34,
```

changed state to up

```
cisco2650#show ppp multilink
Virtual-Access1, bundle name is cisco3640
Bundle up for 00:02:40
Dialer interface is Dialer1
0 lost fragments, 5 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
0xA received sequence, 0xA sent sequence
Member links: 2 (max not set, min not set)
  Async35, since 00:02:40, last rcvd seq 000008
  Async34, since 00:00:15, last rcvd seq 000009
```

!--- There are now two links in the multilink bundle.

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Updated: Sep 09, 2005

Document ID: 24670
