

**Cisco – Connecting Routers Back-to-Back Through the AUX P**

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# Connecting Routers Back-to-Back Through the AUX Ports

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## Introduction

### Before You Begin

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- Prerequisites
- Components Used
- Background Theory
- Routers with DB-25 AUX Ports

### Configure

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- Configurations

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## Introduction

This sample configuration shows you how to directly connect two routers without using a modem or other data communication equipment (DCE) devices. For more information on how to configure modems on auxiliary (AUX) or console ports, refer to [Modem-Router Connection Guide](#) or [Access-Dial Technical Tips](#)

## 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

This document is not restricted to specific software and hardware versions.

## Background Theory

In this configuration, two Cisco routers are connected back-to-back through the asynchronous AUX ports using a null modem cable (rollover cable). The AUX ports of the two routers are directly connected using a rollover cable with Point-to-Point Protocol (PPP) running on the link. The AUX ports are data terminal equipment (DTE) devices. Connecting DTE to DTE devices requires a null modem cable (rollover cable).

A flat-satin rollover (null modem) cable (part number CAB-500RJ= ) is usually provided with every Cisco router to allow for RJ-45 console connectivity. If the AUX port is a DB-25, use a RJ-45-to-DB-25 adapter marked "terminal" with the null modem cable (rollover cable).

**Note:** Ensure that the length of the cable is less than 50 feet due to EIA/TIA–232 (formerly known as RS–232) limitations.

For more information on cabling, refer to Cabling Guide for RJ–45 Console and AUX Ports and RJ–45 Cables.

## Routers with DB–25 AUX Ports

For routers with a DB–25 AUX port (for example, Cisco 4500, 7200 and 7500) you need a DB–25–to–DB–25 Null Modem cable. This cable can be purchased from most retail electronic outlet stores.

**Note:** A rolled RJ–45–to–RJ–45 flat satin cable with RJ–45–to–DB–25 adapters (part number CAB–25AS–MMOD) on both ends CANNOT be used due to incorrect signal pairs.

Verify that your DB–25–to–DB–25 null modem cable has the following pin connections:

DB–25		DB–25	
RxD	2	3	TXD
TxD	3	2	RxD
CTS	4	5	RTS
RTS	5	4	CTS
DTR	6		
DSR	8	20	CD
CD	20	6	DTR
		8	DSR
GND	7	7	GND

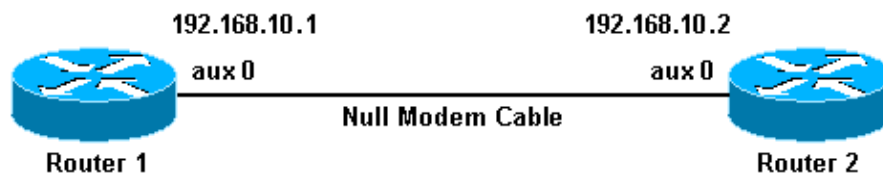
## Configure

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 Command Lookup tool

## Network Diagram

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



## Configurations

This connection has been configured with IP addresses on the AUX ports for a permanent ("nailed up") connection.

```
Router 1

version 11.1
service udp-small-servers
service tcp-small-servers
!
hostname Router1
!
interface Ethernet0
  no ip address
  shutdown
!
interface Serial0
  no ip address
  shutdown
!
interface Serial1
  no ip address
  shutdown
!
interface Async1

  !--- Async interface corresponding to the AUX port.
  !--- Use the show line command to determine which async interface corresponds to the
  !--- AUX port.

  ip address 192.168.10.1 255.255.255.0

  !--- The IP address on the AUX ports of both routers are in the same subnet.

  encapsulation ppp

  !--- Aets PPP as the encapsulation.

  async dynamic routing

  !--- Allows routing protocols on the link.

  async mode dedicated
!
no ip classless
ip route 0.0.0.0 0.0.0.0 Async1

!--- The default route points to the Async1 (AUX port) interface.

logging buffered
!
line con 0
  exec-timeout 0 0
line aux 0

!--- Line configuration for the AUX port

modem InOut
transport input all

!--- Allow all protocols to use the line
```

```

rxspeed 38400

!--- Set the Rx speed (identical to the other router's TX speed).

txspeed 38400

!--- Set the Tx speed (identical to the other router's RX speed).

flowcontrol hardware
line vty 0 4
  login
!
end

```

## Router 2

```

version 11.1

service udp-small-servers
service tcp-small-servers
!
hostname Router2
!
interface Ethernet0
  ip address 10.1.1.1 255.255.255.0
!
interface Serial0
  no ip address
  shutdown
!
interface Serial1
  no ip address
  shutdown
!
interface Async1

!--- Async interface corresponding to the AUX port.
!--- Use the show line command to determine which async interface corresponds to the
!--- AUX Port.

  ip address 192.168.10.2 255.255.255.0

  !--- The IP address on the AUX ports of both routers are in the same subnet.

  encapsulation ppp

  !--- Aets PPP as encapsulation.

  async dynamic routing

!--- Allows routing protocols on the link.

  async mode dedicated
!
  no ip classless
  ip route 0.0.0.0 0.0.0.0 Ethernet0

!--- This default route points to interface Ethernet0.

  logging buffered
!
  line con 0
    exec-timeout 0 0

```

```

line aux 0

!--- Line configuration for the AUX port.

modem InOut
transport input all

!--- Allow all protocols to use the line.

rxspeed 38400

!--- set the Rx speed(identical to the other router's TX speed).

txspeed 38400

!--- set the Tx speed(identical to the other router's RX speed).

flowcontrol hardware
line vty 0 4
 login
!
end

```

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

This section provides information you can use to troubleshoot your configuration.

## Troubleshooting Procedure

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

1. Use the **show line** command to determine the asynchronous interface of the AUX ports.

Though most routers have the AUX port as **interface async 1**, Access servers have the AUX port interface after the tty lines. For example, if your router has 16 async/modem lines, then the AUX port is line 17. In such a case, the AUX port must be configured on **interface async 17**. Configure the AUX port based on the **show line** outputs. The example below verifies that on your routers, the AUX port configuration is on **interface Async1**.

```

Router1#show line

```

Tty	Typ	Tx/Rx	A	Modem	Roty	AccO	AccI	Uses	Noise	Overruns
*	0	CTY	-	-	-	-	-	0	0	0/0
<b>A</b>	<b>1</b>	<b>AUX</b>	<b>38400/38400</b>	<b>-</b>	<b>inout</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>0/0</b>
	2	VTY	-	-	-	-	-	0	0	0/0
	3	VTY	-	-	-	-	-	0	0	0/0
	4	VTY	-	-	-	-	-	0	0	0/0
	5	VTY	-	-	-	-	-	0	0	0/0
	6	VTY	-	-	-	-	-	0	0	0/0

2. Issue the **show line aux 0** command.
3. Verify that all signals are up (for example, Clear To Send (CTS), Request To Send (RTS), data terminal ready (DTR), and Carrier Detect (CD)).

If nothing appears next to them, they are up. If a "No" appears next to them (for example, No-CTS), it means they are down. If they are down, verify the configuration on each side. Verify that you have the AUX port's asynchronous interface as well as the line configured (as shown above).

**Note:** If the show line output indicates that DSR is not up (noDSR) then verify that the each end on the DB-25-to-DB-25 null modem cable has pins 6 and 8 physically wired to pin 20 on the other end. Refer to the table above for the correct pinouts.

```
Router1#show line aux 0
  Tty Typ      Tx/Rx      A Modem  Roty AccO AccI  Uses   Noise  Overruns
A  1 AUX   38400/38400  - inout   -    -    -     0       0       0/0

Line 1, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 38400/38400, no parity, 2 stopbits, 8 databits
Status: Ready, Active, Async Interface Active
Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out
  Modem Callout, Modem RI is CD, Line is permanent async interface
Modem state: Ready
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
                ^^x   none  -    -        none
Timeouts:      Idle EXEC  Idle Session  Modem Answer  Session  Dispatch
                00:10:00          never              none        not set

Modem type is unknown.
Session limit is not set.
Time since activation: 00:00:30
Editing is enabled.
History is enabled, history size is 10.
Full user help is disabled
Allowed transports are pad v120 telnet. Preferred is telnet.
No output characters are padded
No special data dispatching characters
Line is running PPP for address 192.168.10.2.
0 output packets queued, 1 input packets.
  Async Escape map is 00000000000000000101000000000000
Modem hardware state: CTS* DSR* DTR RTS
```

4. If the configuration appears correct, replace the rollover cable between the router.
5. Use **shutdown** and **no shutdown** commands on the async interface to reset the connection.

Use these **debug** commands to verify that the link comes up correctly:

- ◆ **debug ppp negotiation** – To display information on 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. If CONFREQs are being sent out, but no CONFACKs being received, check that the cabling is correct and whether the correct line (**interface async x**) is configured.
  - ◆ **debug ppp authentication** – To display PPP authentication protocol messages(if authentication is configured), including Challenge Handshake Authentication Protocol (CHAP) packet exchanges and Password Authentication Protocol (PAP) exchanges. In this configuration authentication is not configured, hence this debug command is not necessary
  - ◆ **debug ppp error** – To display protocol errors and error statistics associated with PPP connection negotiation and operation.
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## Related Information

- **Modem–Router Connection Guide**
  - **Dialup Technology: Troubleshooting Techniques**
  - **Configuring Dialout using a Modem on the AUX Port**
  - **Technical Support – Cisco Systems**
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