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Lab 8.1.3 Simulating WAN Connectivity
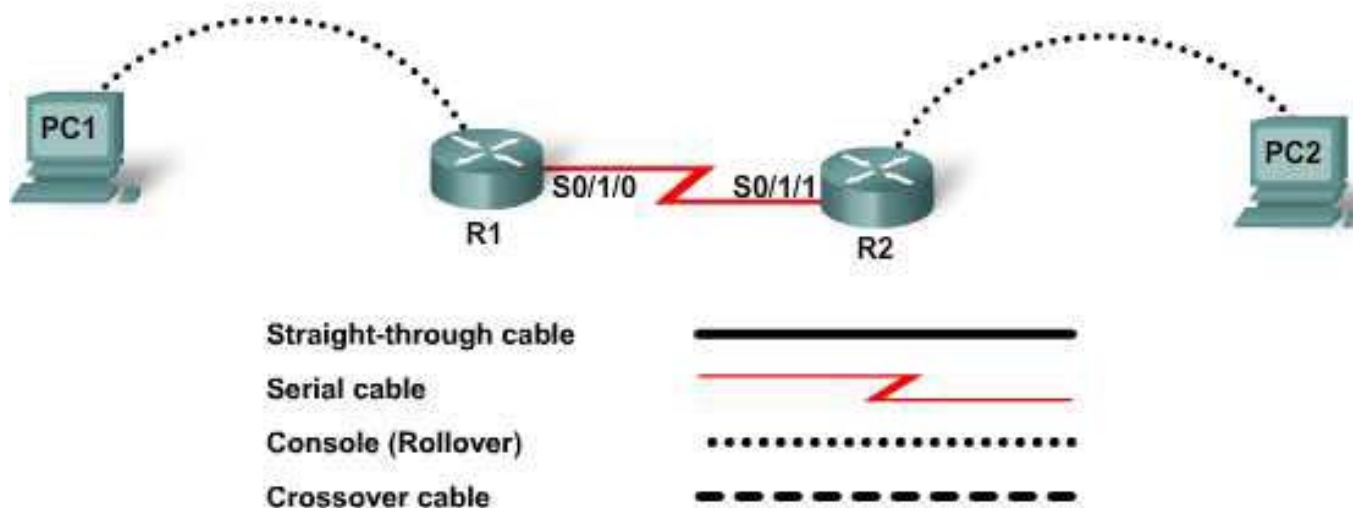
Device Designation	Device Name	Address	Subnet Mask
R1	Router1	S0/1/0 192.168.1.1	255.255.255.0
R2	Router2	S0/1/1 192.168.1.2	255.255.255.0

Objective

- Describe ways to simulate WAN connectivity in a prototype lab.

640-802 CCNA Exam Objectives

This lab contains skills that relate to the following CCNA exam objectives:

- Configure and verify a basic WAN serial connection.

- Troubleshoot WAN implementation issues.

- Configure and verify a PPP connection between Cisco routers.

Expected Results and Success Criteria

Before starting this lab, read through the tasks that you are expected to perform. What do you expect the result of performing these tasks will be?

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What different issues need to be considered when configuring a WAN connection compared to a LAN connection?

_____

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Background / Preparation

In this lab, you will review the configuration of WAN links. Cable the network shown in the topology diagram.

Step 1: Connect the PCs to the router console ports

NOTE: If the PCs used in this lab are also connected to your Academy LAN or to the Internet, ensure that you record the cable connections and TCP/IP settings so that these can be restored at the conclusion of the lab.

  a. Referring to the topology diagram, connect a console cable from PC1 to the console port on R1. Connect a console cable from PC2 to the console port on R2.

  b. Apply power to all PCs and routers.

  c. Open a HyperTerminal session on each PC and establish a session to the respective router.

Step 2: Configure the serial interface on R1

Within the global configuration mode of R1, enter the following commands:

```
Router(config)#hostname Router1
Router1(config)#interface serial 0/1/0
Router1(config-if)#ip address 192.168.1.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#end
Router1#
```

Step 3: Configure the serial interface on R2

Within the global configuration mode of R2, enter the following commands:

```
Router(config)#hostname Router2
Router2(config)#interface serial 0/1/1
Router2(config-if)#ip address 192.168.1.2 255.255.255.0
Router2(config-if)#clock rate 56000
Router2(config-if)#no shutdown
Router2(config-if)#end
Router2#
```

Step 4: View the `show interface` output

  a. On Router1, issue the `show interface serial 0/1/0` command from the privileged EXEC mode to view the encapsulation type.

```
Router1#show interface serial 0/1/0
Serial0/1/0 is up, line protocol is up
  Hardware is GT96K Serial
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  Keepalive set (10 sec)
```

```
Last input 00:00:09, output 00:00:08, output hang never
Last clearing of "show interface" counters 00:19:54
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
   14 packets input, 980 bytes, 0 no buffer
   Received 9 broadcasts, 0 runts, 0 giants, 0 throttles
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
   14 packets output, 1026 bytes, 0 underruns
   0 output errors, 0 collisions, 8 interface resets
   0 output buffer failures, 0 output buffers swapped out
   0 carrier transitions
   DCD=up  DSR=down  DTR=up  RTS=up  CTS=up
```

What is the encapsulation type? _____

b. On Router2, issue the `show interface serial 0/1/1` command from the privileged EXEC mode to view the encapsulation type.

```
Router2#show interface serial 0/1/1
Serial0/1/1 is up, line protocol is up
  Hardware is HD64570
  Internet address is 192.168.1.2/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 00:00:05, output 00:00:06, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     9 packets input, 616 bytes, 0 no buffer
     Received 4 broadcasts, 0 runts, 0 giants, 0 throttles
     2673 input errors, 2673 CRC, 0 frame, 0 overrun, 0 ignored, 1 abort
     101 packets output, 4001 bytes, 0 underruns
     0 output errors, 0 collisions, 43 interface resets
     0 output buffer failures, 0 output buffers swapped out
     5 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

What is the encapsulation type? _____

Step 5: Test router connectivity

From Router2, ping Router1 to test connectivity.

```
Router2#ping 192.168.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 32/32/36 ms
```

If the ping is unsuccessful, troubleshoot the routers until connectivity is attained.

Step 6: Change the encapsulation type to PPP

From the privileged EXEC mode, issue the following commands to change the encapsulation type on the connecting serial interfaces of both routers to PPP.

```
Router1#config terminal
Router1(config)#interface serial 0/1/0
Router1(config-if)#encapsulation ppp
Router1(config-if)#end
Router1#

Router2#config terminal
Router2(config)#interface serial 0/1/1
Router2(config-if)#encapsulation ppp
Router2(config-if)#end
Router2#
```

Step 7: View the `show interface` output

a. On Router1, issue the `show interface serial 0/1/0` command from the privileged EXEC mode to view the encapsulation type.

```
Router1#show interface serial 0/1/0
Serial0/1/0 is up, line protocol is up
  Hardware is GT96K Serial
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
      reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, LCP Open
  Open: IPCP, CDPCP, loopback not set
  Keepalive set (10 sec)
  Last input 00:00:18, output 00:00:03, output hang never
  Last clearing of "show interface" counters 00:01:49
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     31 packets input, 1837 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     40 packets output, 2960 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 output buffer failures, 0 output buffers swapped out
     8 carrier transitions
     DCD=up  DSR=down  DTR=up  RTS=up  CTS=up
```

b. On Router2, issue the `show interface serial 0/1/1` command from privileged EXEC mode to view the encapsulation type.

```
Router2#show interface serial 0/1/1
Serial0/1/1 is up, line protocol is up
  Hardware is HD64570
  Internet address is 192.168.1.2/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load
1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  LCP Open
  Open: IPCP, CDPCP
```

```
        Last input 00:00:01, output 00:00:01, output hang never
        Last clearing of "show interface" counters never
        Queueing strategy: fifo
        Output queue 0/40, 0 drops; input queue 0/75, 0 drops
        5 minute input rate 0 bits/sec, 0 packets/sec
        5 minute output rate 0 bits/sec, 0 packets/sec
           54 packets input, 4042 bytes, 0 no buffer
           Received 28 broadcasts, 0 runts, 0 giants, 0 throttles
           2673 input errors, 2673 CRC, 0 frame, 0 overrun, 0 ignored, 1 abort
           137 packets output, 6252 bytes, 0 underruns
           0 output errors, 0 collisions, 47 interface resets
           0 output buffer failures, 0 output buffers swapped out
           5 carrier transitions
           DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

Can the serial interface on Router2 be pinged from Router1? _____

Can the serial interface on Router1 be pinged from Router2? _____

If the answer is **no** for either question, troubleshoot the router configurations to find the error.

Then issue the pings again until the answer to both questions is **yes**.

Step 8: Configure PPP authentication on R1 with CHAP

a. Configure the CHAP username and password on the R1 router. The username must be identical to the hostname of the other router. Both the password and usernames are case-sensitive. Define the username and password to expect from the remote router. On Cisco routers, the secret password must be the same for both routers.

```
Router1(config)#username Router2 password cisco
Router1(config)#interface serial 0/1/0
Router1(config-if)#ppp authentication chap
Router1(config-if)#end
Router1#
```

Step 9: Configure PPP authentication on R2 with CHAP

a. Configure the CHAP username and password on the R2 router. The passwords must be the same on both routers. The username must be identical to the hostname on the other router. Both the password and user names are case-sensitive. Define the username and password to expect from the remote router.

```
Router2(config)#username Router1 password cisco
Router2(config)#interface serial 0/1/1
Router2(config-if)#ppp authentication chap
Router2(config-if)#end
Router2#
```

Step 10: Verify that the serial connection is functioning

Verify that the serial connection is functioning by pinging the serial interface of R1.

Was it successful? _____

Why or why not?

_____

_____

Step 12: Clean up

    a. Erase the configurations and reload the routers.

    b. Disconnect and store the cabling.

    c. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

Challenge

Determine why it is necessary to set the encapsulation types when configuring a network.

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