Configuring PPP Encapsulation

Enable PPP encapsulation on Cisco router Serial interfaces and verify the state of the PPP encapsulated interfaces

Lab Topology

Devices:

- R1 (Router)
- R2 (Router)

1. Assuming the devices, Router R1 and R3 are 1841 routers.

2. Configuring hostnames :

Configuring R1 :

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#
R1(config)#
R1(config)#
```

Configuring R2:

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#
R2(config)#
```

Enable Serial interfaces on R1 and R2.

The Serial0/0 interface on R2 is identified as the DCE in the topology.

```
R2>
R2>
R2>enable
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface Serial0/0/0
R2(config-if)#ip addresss 192.168.10.2 255.255.255.0
                          ^
% Invalid input detected at '^' marker.

R2(config-if)#ip address 192.168.10.2 255.255.255.0
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#write mem
Building configuration...
[OK]


Router>
Router>
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip address 192.168.10.1 255.255.255.0
                  ^
% Invalid input detected at '^' marker.

Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write mem
Building configuration...
[OK]
Router#
```

Enabling PPP Encapsulation on Router 1 and Router 2 :

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface Serial0/0/0
R2(config-if)#encapsulation ppp
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#write mem
Building configuration...
[OK]
R2#
R2#
```

```
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write mem
Building configuration...
[OK]
Router#
```

Show interface Router R2

```
R2#show interface Serial0/0/0
Serial0/0/0 is administratively down, line protocol is down (disabled)
  Hardware is HD64570
  Internet address is 192.168.10.2/24
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  LCP Closed
  Closed: LEXCP, BRIDGECP, IPCP, CCP, CDPCP, LLC2, BACP
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 96 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 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
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=down  DSR=down  DTR=down  RTS=down  CTS=down

R2#
```

Show interface Router R1

```
Router#
Router#show interface Serial0/0/0
Serial0/0/0 is administratively down, line protocol is down (disabled)
  Hardware is HD64570
  Internet address is 192.168.10.1/24
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  LCP Closed
  Closed: LEXCP, BRIDGECP, IPCP, CCP, CDPCP, LLC2, BACP
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 96 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 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
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=down  DSR=down  DTR=down  RTS=down  CTS=down

Router#
```

Verify ping connectivity

```
R2#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R2#ping 192.168.10.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/5/9 ms
```

Additional Commands used : debug ppp negotiation

```
R2#debug ppp negotiation
PPP protocol negotiation debugging is on
```

PPP Link Debug Information on Router R1 :

```
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Serial0/0/0 PPP: Using default call direction
Serial0/0/0 PPP: Treating connection as a dedicated line
Serial0/0/0 PPP: Phase is ESTABLISHING, Active Open

Serial0/0/0 LCP: State is Open

Serial0/0/0 PPP: Phase is FORWARDING, Attempting Forward
Serial0/0/0 Phase is ESTABLISHING, Finish LCP
Serial0/0/0 Phase is UP

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Serial0/0/0 LCP: State is Open

%LINK-3-UPDOWN: Interface Serial0/0/0, changed state to down

Serial0/0/0 PPP: Phase is TERMINATING
Serial0/0/0 LCP: State is Closed
Serial0/0/0 PPP: Phase is DOWN

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Serial0/0/0 PPP: Using default call direction
Serial0/0/0 PPP: Treating connection as a dedicated line
Serial0/0/0 PPP: Phase is ESTABLISHING, Active Open

Serial0/0/0 LCP: State is Open

Serial0/0/0 PPP: Phase is FORWARDING, Attempting Forward
Serial0/0/0 Phase is ESTABLISHING, Finish LCP
Serial0/0/0 Phase is UP

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

PPP Link Debug Information on Router R2 :

```
R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Serial0/0/0 PPP: Using default call direction
Serial0/0/0 PPP: Treating connection as a dedicated line
Serial0/0/0 PPP: Phase is ESTABLISHING, Active Open

Serial0/0/0 LCP: State is Open

Serial0/0/0 PPP: Phase is FORWARDING, Attempting Forward
Serial0/0/0 Phase is ESTABLISHING, Finish LCP
Serial0/0/0 Phase is UP

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Serial0/0/0 LCP: State is Open
```