13(D). Serial Troubleshooting

P R O B L E M   I S O L A T I O N

LINE / PROTOCOL STATUS	PROBLEM
Down / Down	Layer 1
Up / Down	Layer 2
Up / Up	Layer 3

The important thing to realize in the above table is that a serial link can be up/up and completely incapable of passing traffic at OSI layer 3. That's because serial links are defined at L1 and L2 to be used by L3. For example, a link that has no IP address but isn't shutdown will be quite happily up/up.

Layer 1 Problems (down/down)

The author emphasizes checking the status at both ends of the link—fine for a lab or exam, but in real life, you may not control the devices at both ends of a link.

If your own interface has a shutdown command, it'll show "administratively down/down" On the other end of the link, it'll just be "down/down," exactly the same as if you had unplugged the cable. The "show controllers" command may tell you which end is unplugged, based on whether it senses DCE, DTE, or no cable at all.

R1	R2
1 R1# **show controllers s0/2/1**	R2# **show controllers s0/2/1**
2 Interface Serial0/2/1	Interface Serial0/2/1
3 Hardware is GT96K	Hardware is GT96K
4 DTE V.35idb at 0x4988BFF8, …	No serial cable attached

Layer 2 Problems (up/down)

- Both Sides Protocol Down (up/down)
    - mismatched encapsulations (e.g. HDLC vs. PPP)—show interfaces s0/0
    - PAP / CHAP authentication failure
        - show interfaces
        - show ppp all
        - debug ppp authentication (the author explains an example of this)
- One end up/up (HDLC only)—one side (the "up" side) has disabled keepalives

    —show interfaces

```
R1# show interfaces s0/0
Serial0/0 is up, line protocol is up
  Hardware is PowerQUICC Serial
  Internet address is 10.0.0.1/30
  MTU 1500 bytes, BW 64 Kbit/sec, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, LCP Open
  Open: IPCP, CDPCP, loopback not set          These are NCPs
  Keepalive set (10 sec)
```

Layer 3 Problems (up/up)

- Are your ip addresses in the same subnet?
  - HDLC pings won't work
  - PPP pings will work because PPP learns the address of its counterpart during the handshake and puts a /32 in its routing table, but EIGRP/OSPF neighbor relationships won't form. Pings even work for 10.0.0.1 /30 to 192.168.2.87 /24!

If you have trouble believing that your L3 configuration is to blame, try an L2 protocol, like CDP. If it shows the neighbor at the other side of the link, the link is fine at layers 1 and 2. CDP even has a holdtime counter to tell you that the success is recent (by default, 180 seconds - holdtime).

```
 1 R1# show ip interface brief
 2 Interface              IP-Address      OK? Method Status                Protocol
 3 GigabitEthernet0/0     unassigned      YES NVRAM  administratively down down
 4 GigabitEthernet0/1     unassigned      YES NVRAM  administratively down down
 5 Serial0/2/0            unassigned       YES NVRAM  up                    up
 6
 7 R1# show cdp neighbors
 8 Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
 9                   S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
10                   D - Remote, C - CVTA, M - Two-port Mac Relay
11
12 Device ID       Local Intrfce     Holdtme     Capability  Platform  Port ID
13 R2              Ser 0/2/0         143            R S I    2851      Ser 0/2/0
```