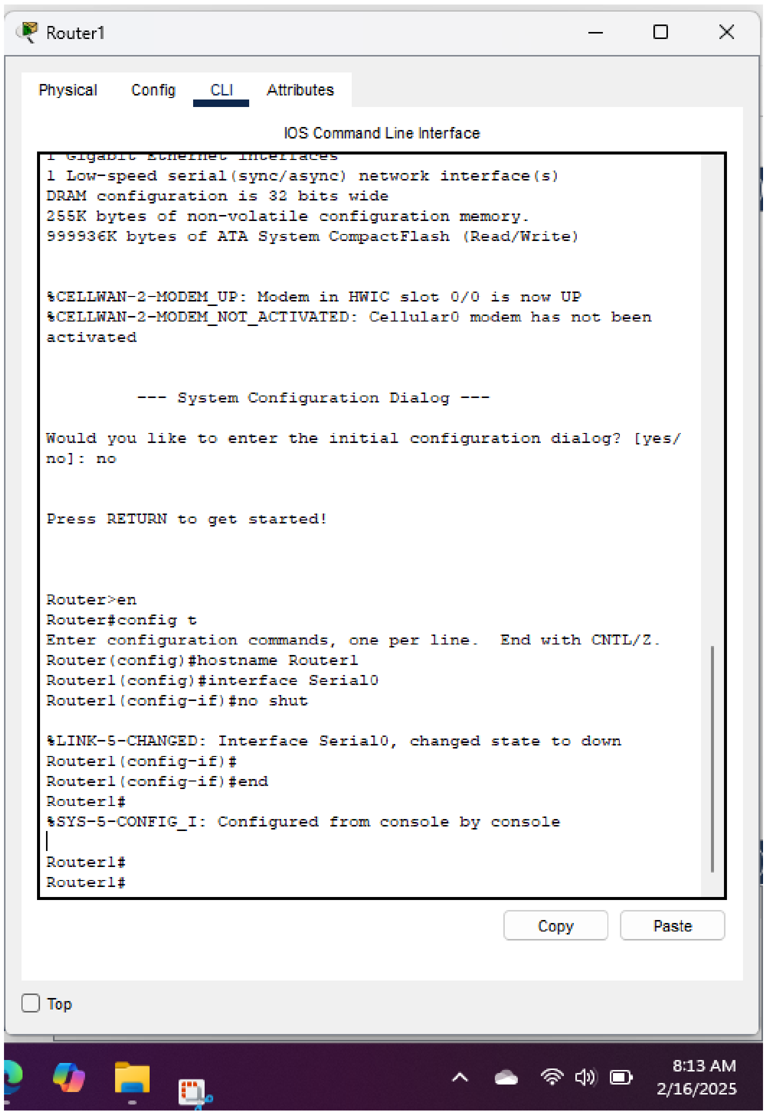
Confirming Cisco HDLC Encapsulation

Ronique Young

2/16/2025


Router1

Physical Config CLI Attributes

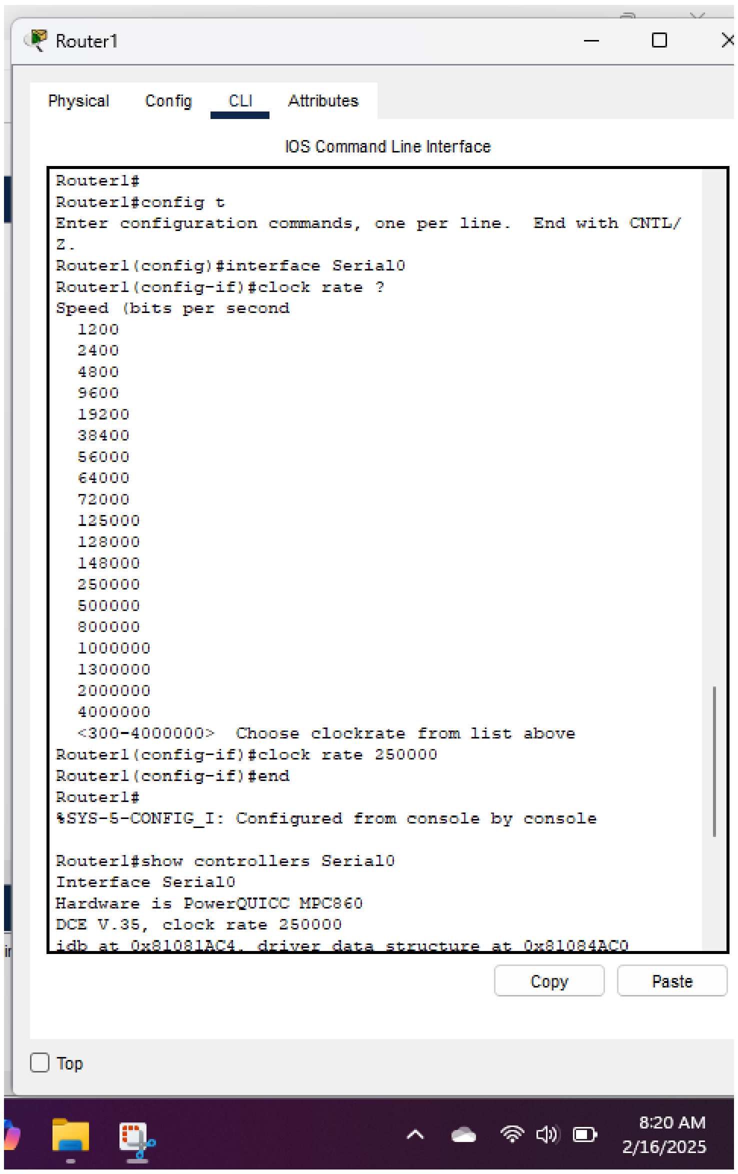
IOS Command Line Interface

```
1 Gigabit Ethernet interfaces
1 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 32 bits wide
255K bytes of non-volatile configuration memory.
999936K bytes of ATA System CompactFlash (Read/Write)


%CELLWAN-2-MODEM_UP: Modem in HWIC slot 0/0 is now UP
%CELLWAN-2-MODEM_NOT_ACTIVATED: Cellular0 modem has not been
activated


         --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/
no]: no


Press RETURN to get started!



Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router1
Router1(config)#interface Serial0
Router1(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0, changed state to down
Router1(config-if)#
Router1(config-if)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#
Router1#
```

In this task, I started by accessing the router in user EXEC mode and then entered privileged EXEC mode with the command `en`. Once in privileged mode, I moved to global configuration mode using the shorthand `config t`. My first action was to rename the router to "Router1" for easier network management using the `hostname Router1` command.

I then proceeded to configure the Serial0 interface, entering interface configuration mode with `interface Serial0`. Here, I attempted to bring up this interface by administratively enabling it with the `no shut` command. However, upon enabling, I received a notification indicating that the Serial0 interface had changed its state to "down". This suggests that while the interface was no longer administratively disabled, there might be issues with physical connectivity or, if this router is set to be the DCE, a lack of clock rate configuration.

After setting these configurations, I exited back to privileged EXEC mode with the `end` command, leaving the router's interface in a state where further checks or configurations would be needed to get it fully operational. This process was aimed at preparing the router for serial communication, but clearly, more work is required to resolve the "down" state of the Serial0 interface.



Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
Router1#
Router1#config t
Enter configuration commands, one per line.  End with CNTL/
Z.
Router1(config)#interface Serial0
Router1(config-if)#clock rate ?
Speed (bits per second
  1200
  2400
  4800
  9600
  19200
  38400
  56000
  64000
  72000
  125000
  128000
  148000
  250000
  500000
  800000
  1000000
  1300000
  2000000
  4000000
  <300-4000000>  Choose clockrate from list above
Router1(config-if)#clock rate 250000
Router1(config-if)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#show controllers Serial0
Interface Serial0
Hardware is PowerQUICC MPC860
DCE V.35, clock rate 250000
idb at 0x81081AC4, driver data structure at 0x81084AC0
```

Copy Paste

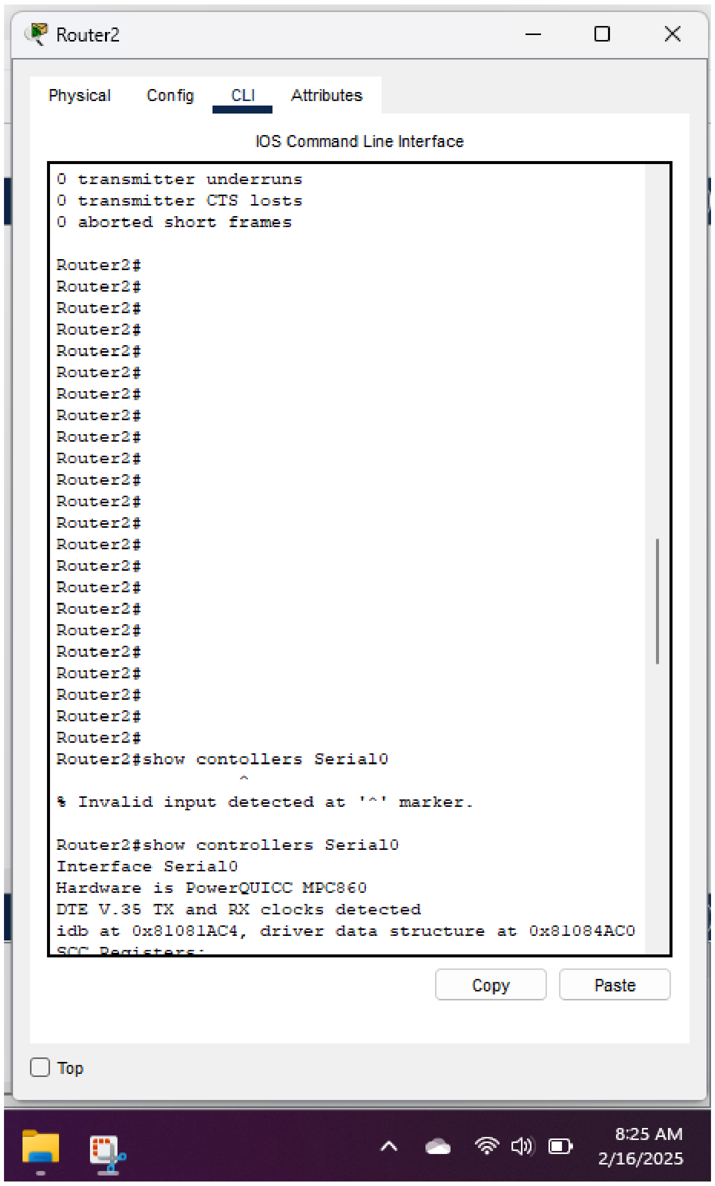
Top

8:20 AM 2/16/2025

I entered configuration mode on Router1 with the command `config t`, preparing to set up the Serial0 interface. Upon entering this mode, I was reminded to enter commands one per line and end with CNTL/Z. I then navigated to the Serial0 interface configuration with `interface Serial0`. My next step was to configure the clock rate, as this router would act as the DCE (Data Circuit-terminating Equipment). I checked the available clock rates by typing `clock rate ?`, which displayed a list of standard speeds in bits per second, from 1200 up to 4000000, with the option to choose a custom rate between 300 and 4000000.

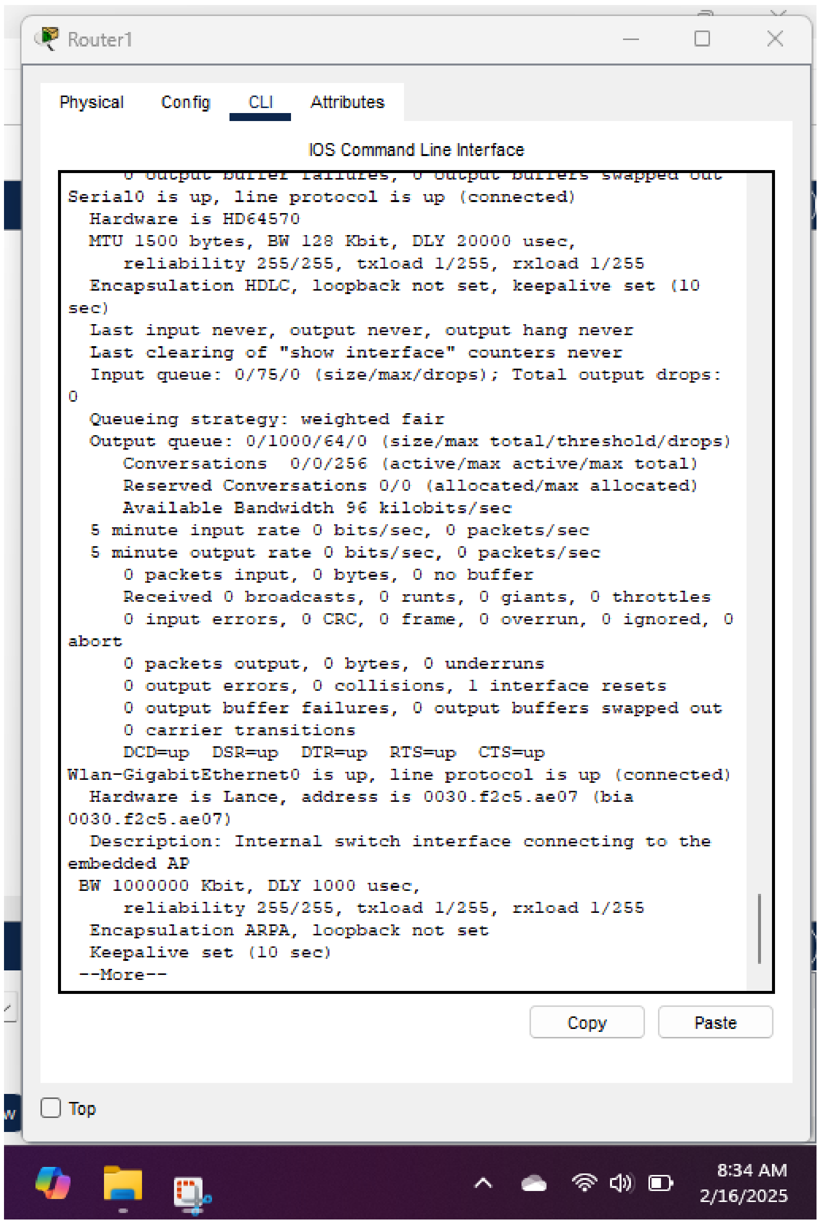
I decided on a clock rate of 250000 bps, setting it with `clock rate 250000`, which is suitable for the connection I intended to establish. After configuring the clock rate, I exited the interface configuration mode with `end`, which returned me to privileged EXEC mode. The router then confirmed the configuration change with the message `%SYS-5-CONFIG_I: Configured from console by console`.

To verify that the clock rate was correctly set, I ran the command `show controllers Serial0`. The output confirmed that the Serial0 interface was now using the Power QUICC MPC860 hardware in DCE mode with V.35 signaling, and importantly, it was set to the clock rate of 250000 as I had configured. This completed the basic setup for the Serial0 interface to provide timing for communication on this router.



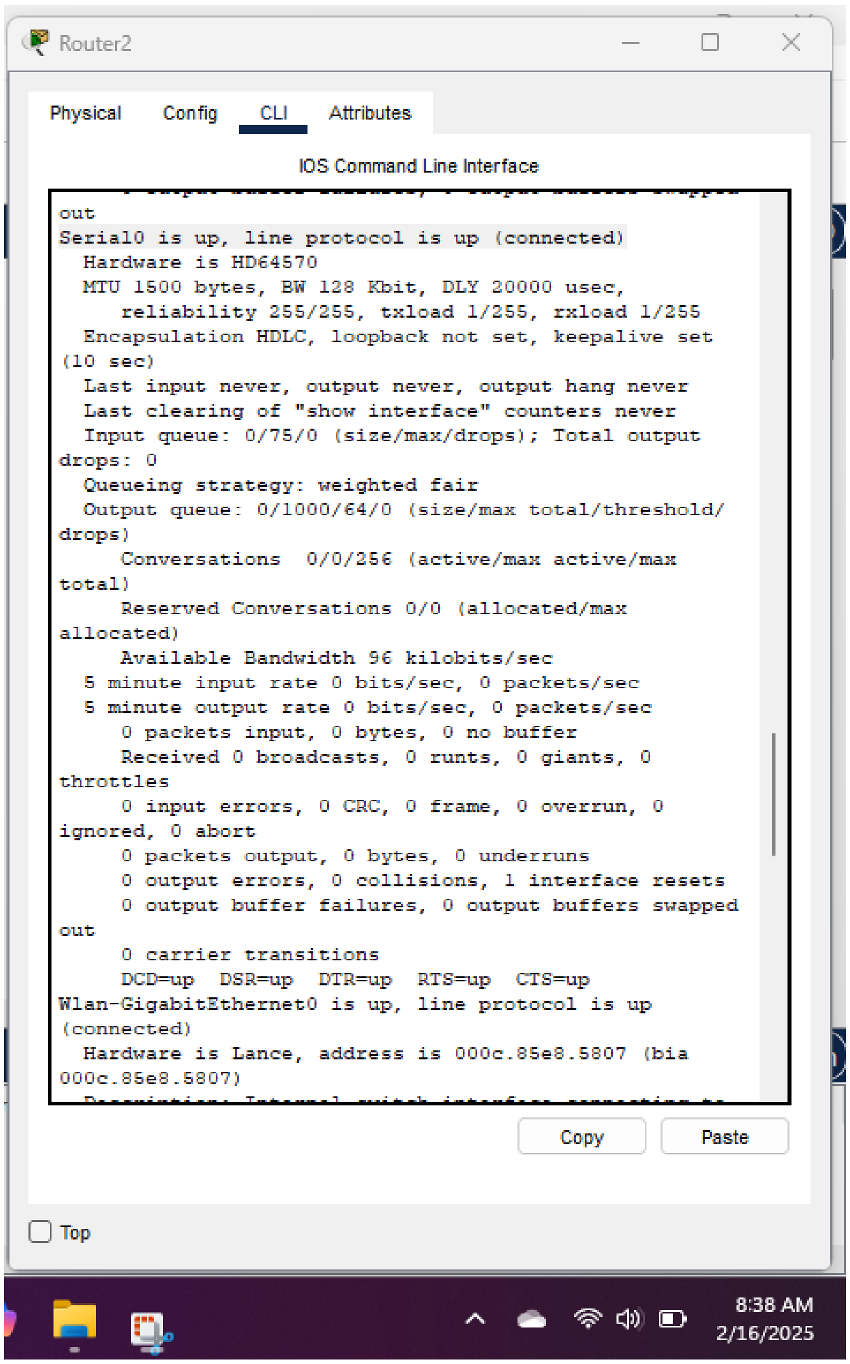
```
0 transmitter underruns
0 transmitter CTS losts
0 aborted short frames

Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#
Router2#show contollers Serial0
                 ^
% Invalid input detected at '^' marker.

Router2#show controllers Serial0
Interface Serial0
Hardware is PowerQUICC MPC860
DTE V.35 TX and RX clocks detected
idb at 0x81081AC4, driver data structure at 0x81084AC0
SCC Registers:
```

Upon executing the command `show controllers Serial0` on Router2, I checked the status of the Serial0 interface. The output revealed that the hardware for this interface is Power QUICC MPC860, configured as DTE (Data Terminal Equipment) using V.35 signaling. Importantly, it detected both transmit (TX) and receive (RX) clocks, indicating that Router2 is successfully receiving the clocking signal from the DCE (Router1 in this setup). This confirms that the serial link between Router1 and Router2 is now synchronized and ready for communication.



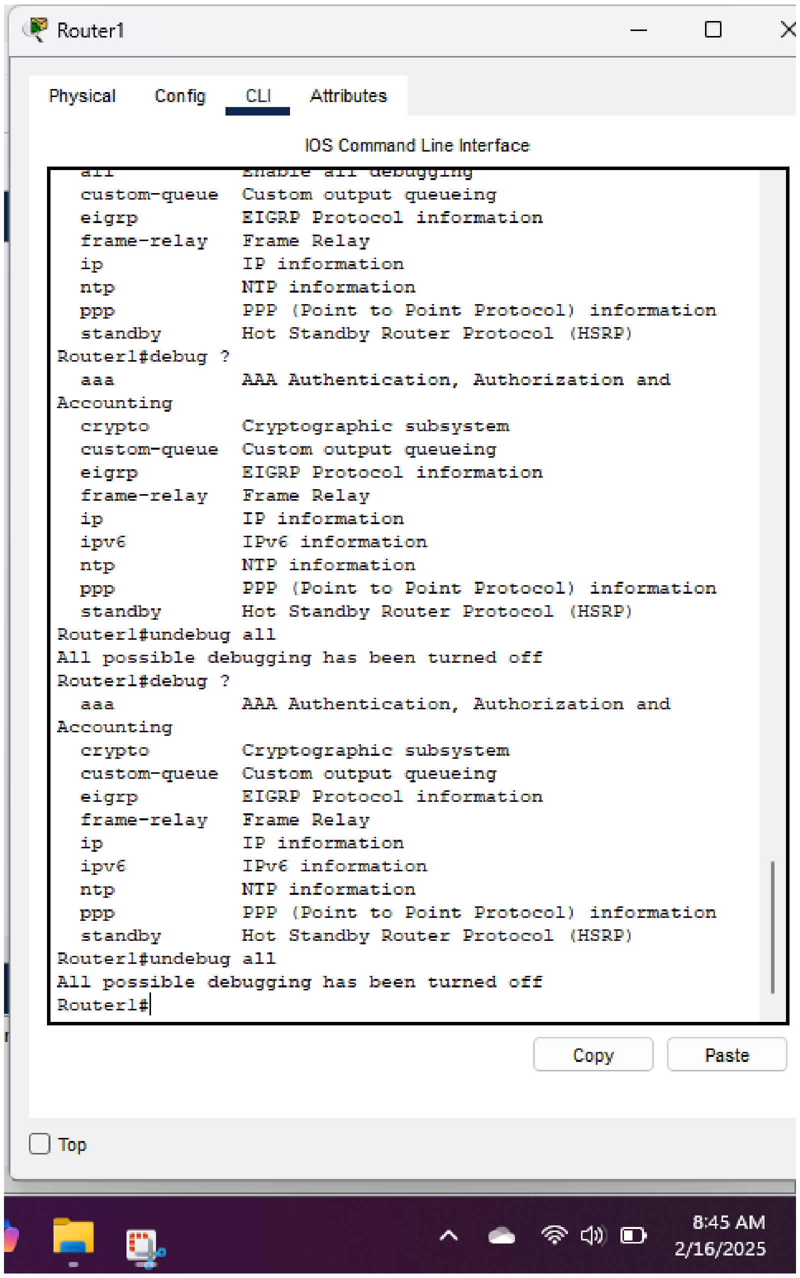
```
     0 output buffer failures, 0 output buffers swapped out
Serial0 is up, line protocol is up (connected)
  Hardware is HD64570
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10
sec)
  Last input 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=up  DSR=up  DTR=up  RTS=up  CTS=up
Wlan-GigabitEthernet0 is up, line protocol is up (connected)
  Hardware is Lance, address is 0030.f2c5.ae07 (bia
0030.f2c5.ae07)
  Description: Internal switch interface connecting to the
embedded AP
 BW 1000000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
 --More--
```

When you check the status of Serial0 with commands like ` show interfaces` , receiving the message "Serial0 is up, line protocol is up (connected)" indicates a successful connection. This output means that both the physical layer (Layer 1) and the data link layer (Layer 2) of the OSI model are functioning correctly for this interface. "Serial0 is up" confirms that the hardware is operational and physically connected, while "line protocol is up" signifies that the data link protocol, like HDLC or PPP, is also up and running, allowing for data transmission. The "(connected)" part further assures that the interface has an active connection to another device, likely another router in this context.



```
out
Serial0 is up, line protocol is up (connected)
  Hardware is HD64570
  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 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=up  DSR=up  DTR=up  RTS=up  CTS=up
Wlan-GigabitEthernet0 is up, line protocol is up
(connected)
  Hardware is Lance, address is 000c.85e8.5807 (bia
000c.85e8.5807)
```

For Router 2, the message "Serial0 is up, line protocol is up (connected)" indicates that the Serial0 interface is in a fully operational state. This means that the physical link is established and functioning, as denoted by "Serial0 is up." Additionally, the line protocol being up shows that the data link layer protocols (like HDLC or PPP) are also working correctly, allowing for data exchange. The term "(connected)" confirms that Router 2 has an active serial connection to another device, presumably Router 1, ensuring that data can flow between these two routers over this interface.



```
  custom-queue  Custom output queueing
  eigrp         EIGRP Protocol information
  frame-relay   Frame Relay
  ip            IP information
  ntp           NTP information
  ppp           PPP (Point to Point Protocol) information
  standby       Hot Standby Router Protocol (HSRP)
Router1#debug ?
  aaa           AAA Authentication, Authorization and
Accounting
  crypto        Cryptographic subsystem
  custom-queue  Custom output queueing
  eigrp         EIGRP Protocol information
  frame-relay   Frame Relay
  ip            IP information
  ipv6          IPv6 information
  ntp           NTP information
  ppp           PPP (Point to Point Protocol) information
  standby       Hot Standby Router Protocol (HSRP)
Router1#undebug all
All possible debugging has been turned off
Router1#debug ?
  aaa           AAA Authentication, Authorization and
Accounting
  crypto        Cryptographic subsystem
  custom-queue  Custom output queueing
  eigrp         EIGRP Protocol information
  frame-relay   Frame Relay
  ip            IP information
  ipv6          IPv6 information
  ntp           NTP information
  ppp           PPP (Point to Point Protocol) information
  standby       Hot Standby Router Protocol (HSRP)
Router1#undebug all
All possible debugging has been turned off
Router1#
```

When you execute the command `Router1#undebug all` and receive the message "All possible debugging has been turned off", it means that all active debug operations on Router1 have been disabled. This command is useful for clearing the console from being overwhelmed by debug output, especially when you've turned on multiple debug processes. Now, no additional debug information will be displayed until you explicitly re-enable debugging for specific functions or interfaces.