UNIVERSITY OF CHAKWAL
DEPARTMENT OF COMPUTER SCIENCE
(Computer Communication Networks CS-324)(LAB)

LAB 07

IP ROUTING WITH
SERIAL CABLE

1. Introduction

1.1. Why we use serial cables:

Serial links are indeed commonly used over WAN links, largely for historical reasons and the fact that it can be used over a whole variety of different infrastructure mediums and methodologies. Regardless of how the WAN operates, which is usually not under your control, the routers at either end just see a straight forward serial link between them. Hence the labs you are doing, and the image posted, are usually. Simply representing a WAN link using a back-to-back serial cable

The fact that there could be 10,000 miles and a variety of 3rd party networks between those two sites matters little it still appears to each end as a straightforward serial connection. At the risk of confusing the issue, whilst the example image represents what is likely to be two sites separate by a WAN link the implementation of it differs from reality (i.e. a real WAN connection) in that a serial connection requires one end to act as the DTE, and one the DCE (which provides the clocking amongst other things).

The WAN provider provides the DCE hence your router at each end would both act as DTE's. In the lab case you don't have a real WAN hence one end must take on the role of the DCE and one the DTE. The end result is near enough the same, but it is still worth pointing out this difference as compared to what it is trying to emulate.

1.2. Difference between DTE and DCE:

DCE = Data Circuit-terminating Equipment.

1. In a data station, the equipment that performs functions, such as signal conversion and coding, at the network end of the line between the data terminal equipment (DTE) and the line, and that may be a separate or an integral part of the DTE or of intermediate equipment.

2. The interfacing equipment that may be required to couple the data terminal equipment (DTE) into a transmission circuit or channel and from a transmission circuit or channel into the DTE.

Synonyms Data Communications Equipment (deprecated) and data set (deprecated).

DTE = Data Terminal Equipment
1. An end instrument that converts user information into signals for transmission or reconverts the received signals into user information.
2. The functional unit of a data station that serves as a data source or a data sink and provides for the data communication control function to be performed in accordance with link protocol.

1.3. Clock rate:
Clock rate is to be used in DCE in serial link to configure the clock speed for the link.

2. Tools required:

- CISCO Packet tracer

3. Objective of the Experiment:

- After completing this Lab student should able to:
- Configure router in cisco packet tracer.
- Do IP static routing using CLI.
- Do static routing using GUI.
- Configure multiple routers having multiple networks.
- Configure DCE and DTE devices.
- Configure router using serial cable.

4. Commands used:
- Enable
- Configure terminal
- Ip route
- Ip address
- Interface s0/2/0
- Exit
- No shut
- Hostname

4. Walk-through Tasks:

5.1. Create a topology that have 2 routers, connecting together with serial port, having three networks and do IP routing in it.

For creating this topology, we have to execute these steps:

1. Open cisco packet tracer.
2. Go in network devices tab and add two 2811 routers.
3. Then add two switches by entering in the switches tabs.
4. After adding these routers, click on the router, and in physical view, first power off router and add WIT serial port from the given module.
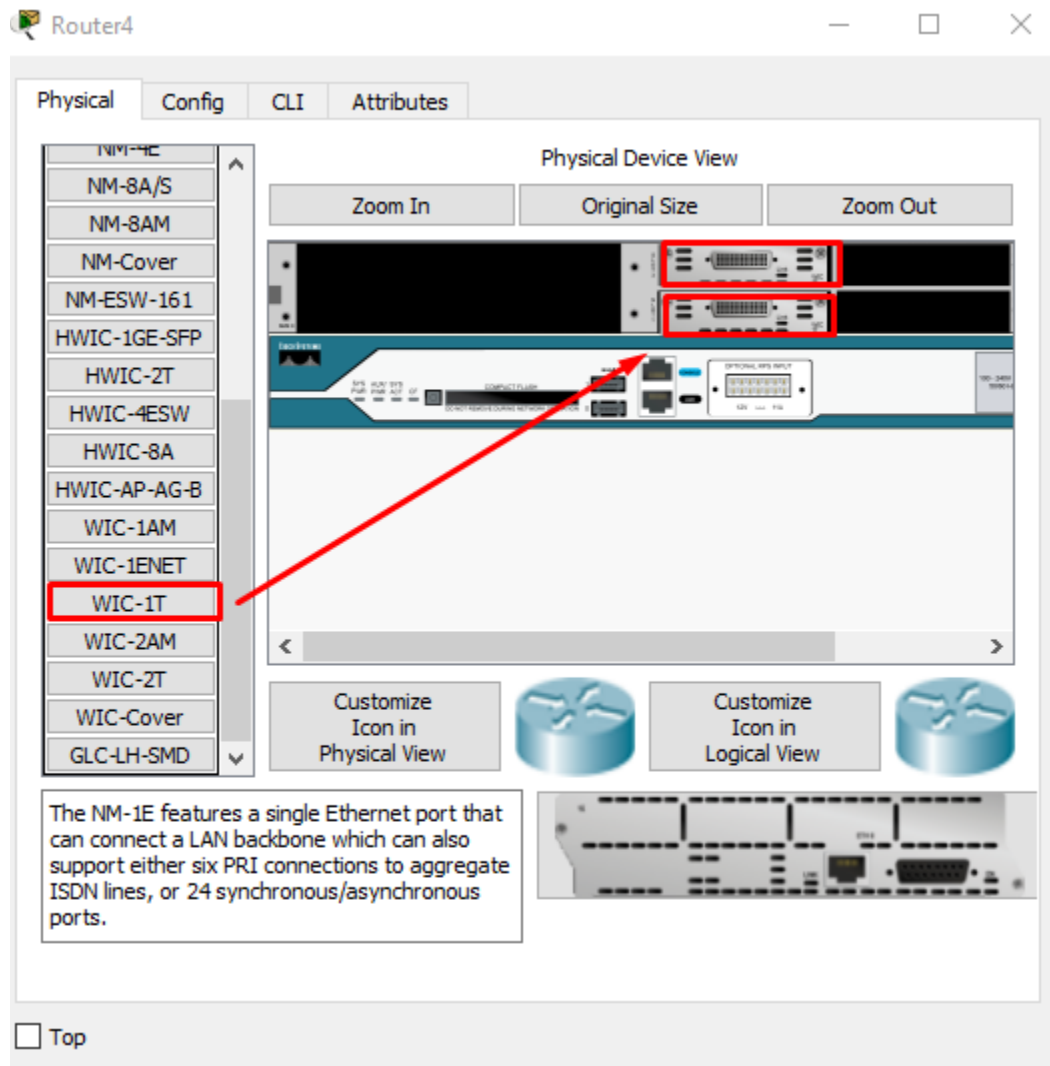
Figure 1: the addition of WIC IT port.

5. Add two PC's from the end devices tab in the cisco packet tracer.
6. Connect these routers with serial cable.

Figure 2: two routers connected with serial cable

7. Connect router with switches using copper straight-through cable from connections tab.

8. Connect PC's with switches using copper straight-through cable from connection tab.
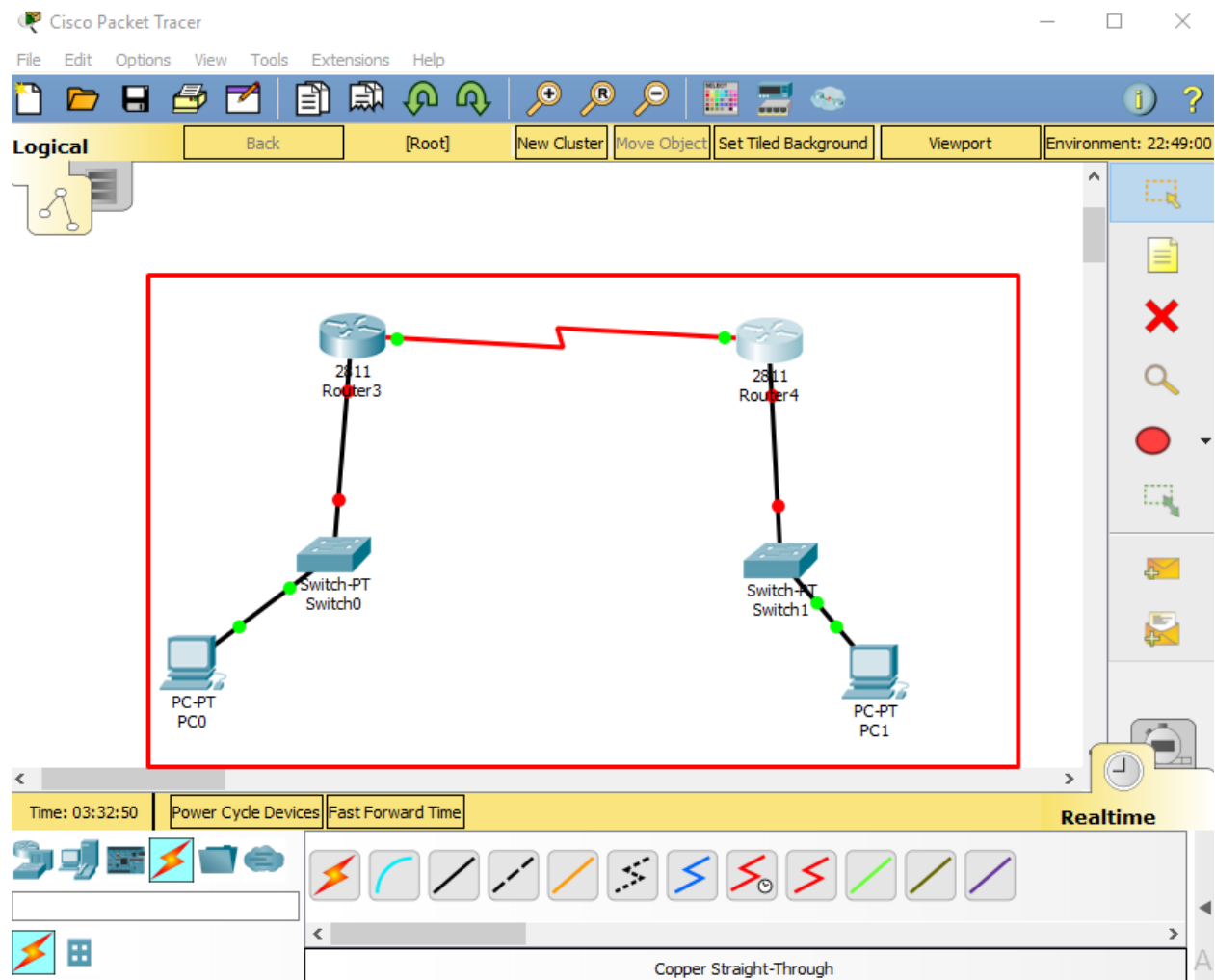

Figure 3: showing connection with overall topology.

9. Click on the router and go in the CLI tab.

10. Press N from the question asked by the router CLI and press enter.

11. Connection lights are red because until now router is not configured.

12. Write **En** or **enable** command to get privileged for router configuration and press enter.

13. Write **config t** or **configure terminal** command for get into configuration mode.

14. Now before of routers, add note on your workspace on both sides of the router indicating IP address, Subnet mask and default gateway, which will look like:
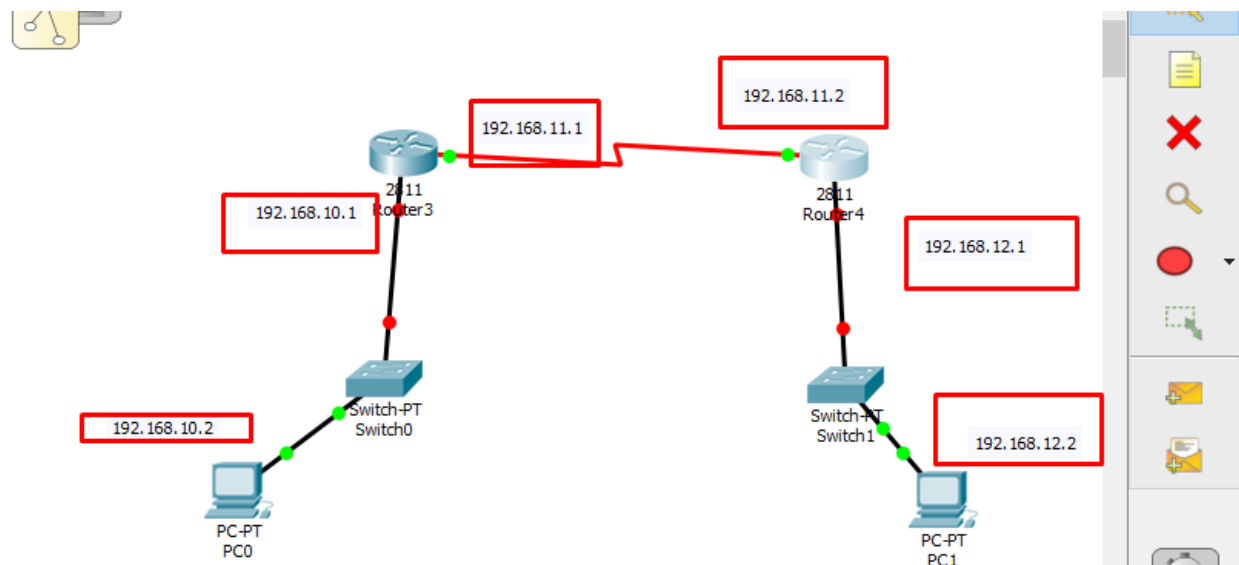
Figure 4: IP addresses on the workspace.

15. Open CLI and write command **interface serial 0/3/0** for telling interface of router you want to configure.

16. Then write command **ip add 192.168.11.1 255.255.255.0** to provide IP address along with subnet mask of the interface.

17. Also give clock rate of the DCE port by command **clock rate 56000** and then press enter.

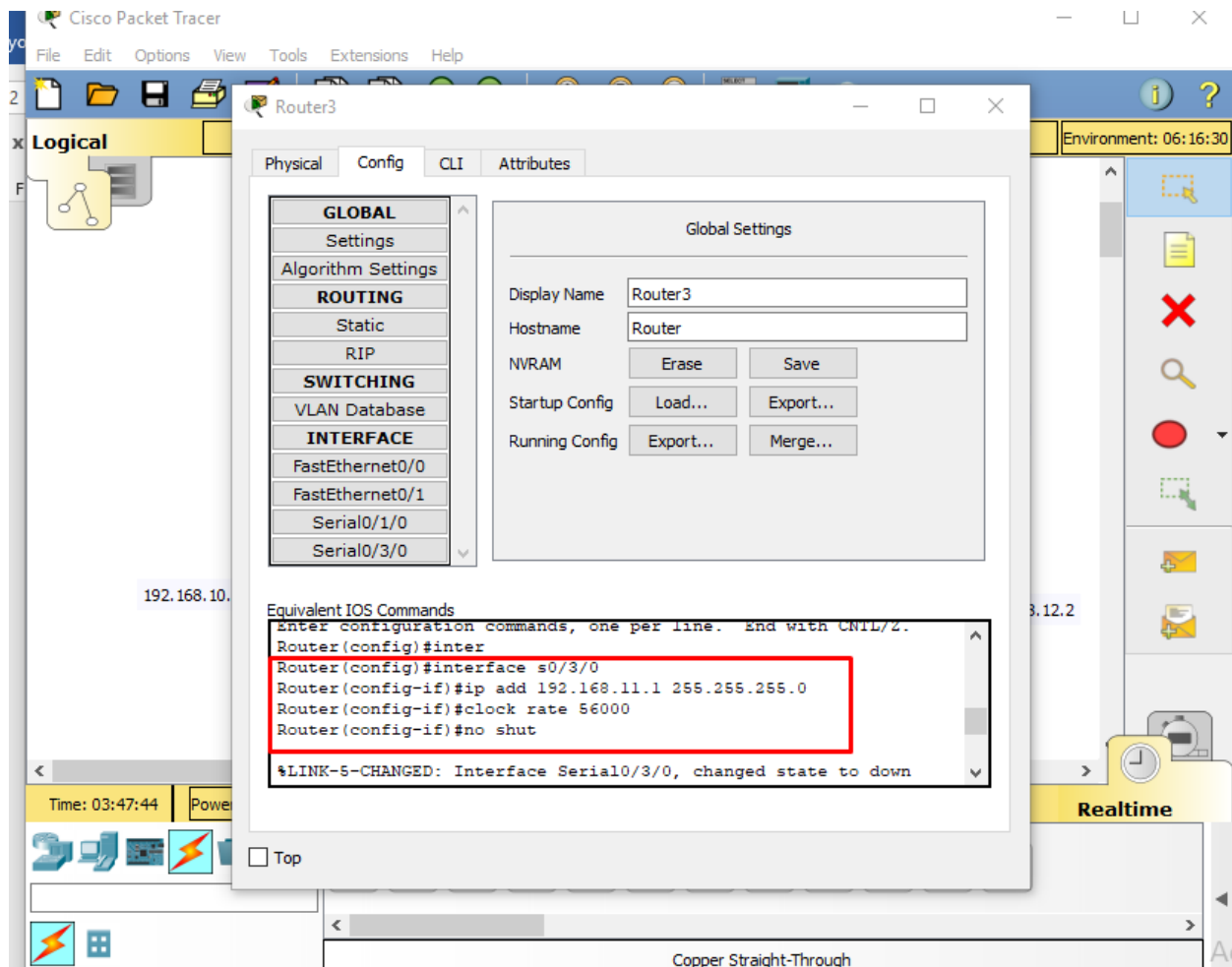18. Write command **no shut** to up the link state of the router.

Figure 5: shows router configuration on CLI

19. In the same way click on router second router and configure its serial interface, which are s 0/3/0.

20. Now click on router 1 and configures its fast Ethernet interface with an IP address 192.168.10.1 and also give subnet mask 255.255.255.0.

21. Do same for configuring router 2 with IP address 192.168.12.1 and subnet mask 255.255.255.0, you will see all the lights that are in red so far, will turn to green, make sure that after entering Ip address you had written no shut command.

22. Also assign PC's with proper IP addresses, subnet masks and default gateways.
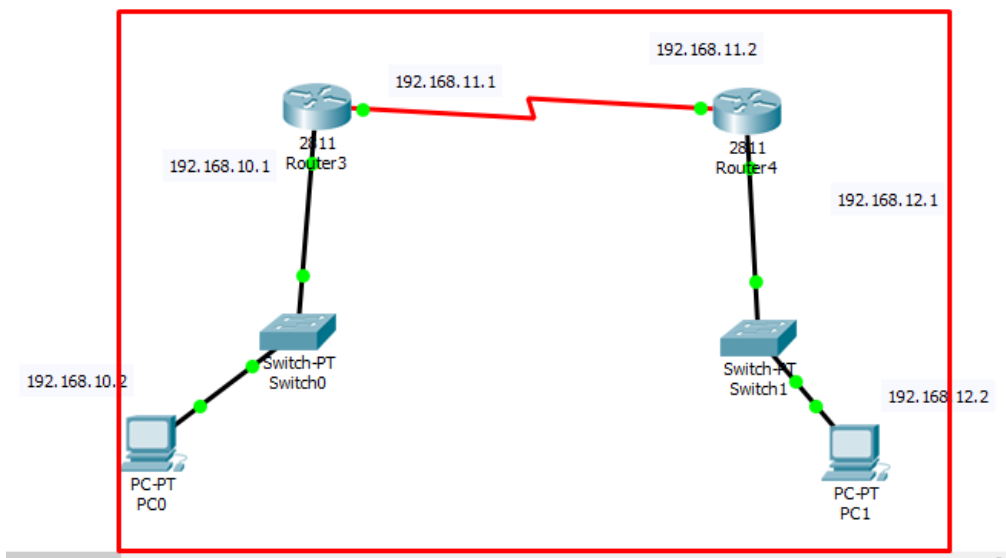
Figure 6: all the lights converted into green.

23. Now to create a route between networks, click on router, open cli, go in configuration mode and write ip route 0.0.0.0 0.0.0.0 s0/3/0, this is the default route it will handle by itself how to route the packet, so its called dynamic routing.
24. Repeat same for second router (as in point 23)

Figure 7: configuration of route.

24. Now send PDU from PC0 to other PC or router, whose result will be successful.
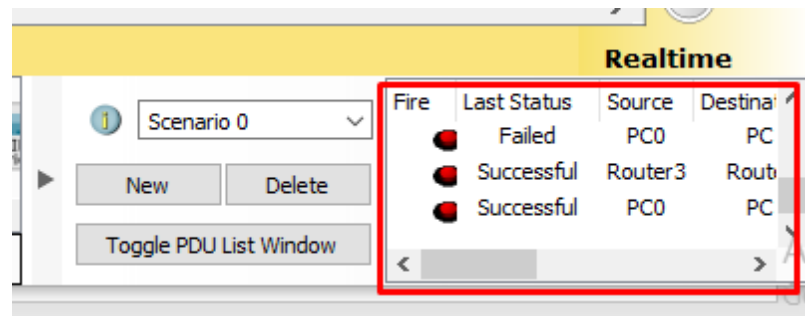

Figure 8: result is successful

5.   Practice tasks:

6.1 Task 1:
Construct a topology that have three routers connected together with serial cable, making separate 5 networks by using 2 switches and 1 Access point, first should be made of one switch with connected 2 PC with proper configuration of routers and PC's , second network should composed of 5 laptops connected with single Access point which is connected to router with Fast Ethernet cable and third network composed of a switch connected with router and Access point with Fast Ethernet cable which is further connected with 3 Laptops. Show proper IP addresses of all networks on Workspace. Configure IP routing in this network.
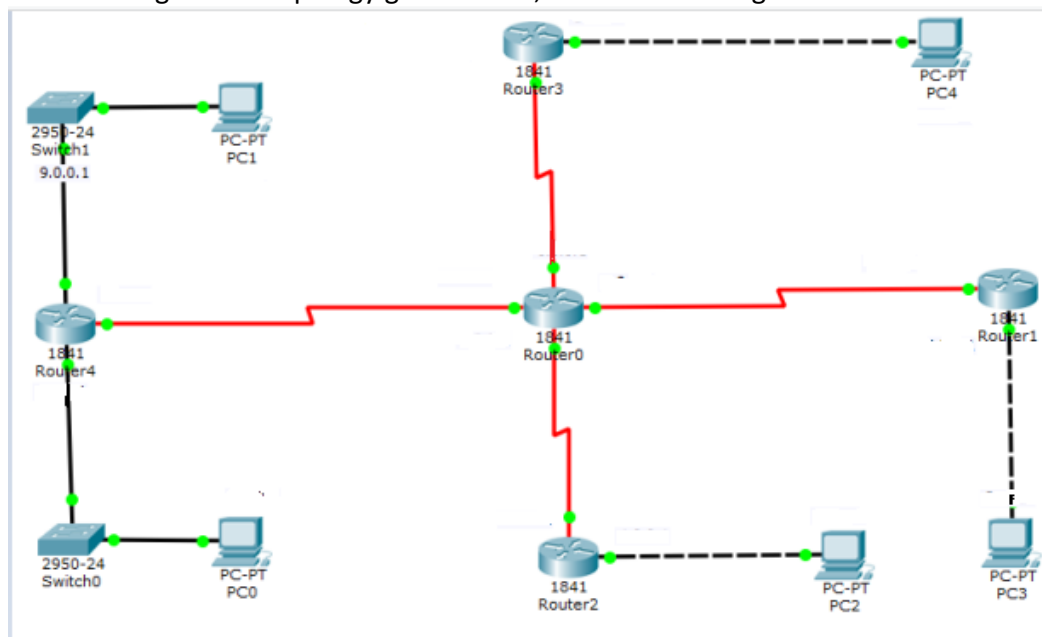
6.2 Task 2:
Construct and configure the topology given below, also do IP routing in it.

Figure 9: practice task 2

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