FACULTY OF ELECTRONICS

COMPUTER ENGINEERING AND TELECOMMUNICATIONS DEPARTMENT

LABORATORY WORK #3

Introduction to Cisco LAN Equipment and Router Configuration

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1. Answers to Questions Presented in Part 1

This lab work aimed to introduce the Network Laboratory's Cisco LAN equipment, specifically the Cisco 1941 router, its basic management functions, and how to configure it to connect two LAN subnets with dynamic IP addressing

The practical work was performed using Cisco Packet Tracer software

1.

What is Cisco 1941 and what application scenarios is it intended for?

The Cisco 1941 is identified as a modular Integrated Services Router (ISR G2)It is intended for small to medium-sized businesses and enterprise branch offices. Its application scenarios include supporting high-performance routing, secure WAN connectivity, and integrated services like voice, video, security, and wireless. Common uses include secure branch office connectivity, internet access, VPN termination, and acting as a platform for network services. The lab environment includes Cisco 1941 routers as part of its standard 19-inch telecom equipment rack setup

2.

The Cisco 1941 has two Ethernet ports, as shown in Figure 3. Please answer what is the maximum data transmission speed of these ports and what physical layer media/standard is used in them?

The Cisco 1941 router has two built-in Gigabit Ethernet port, labeled GigabitEthernet0/0 and GigabitEthernet0/1. These ports have a maximum data transmission speed of 1 Gbps (10/100/1000 Mbps). They utilize twisted-pair copper cables (Cat5e/Cat6) with RJ-45 connectors, adhering to Ethernet standards such as IEEE 802.3ab (1000BASE-T). These operate at the OSI Layers 1 and 2.

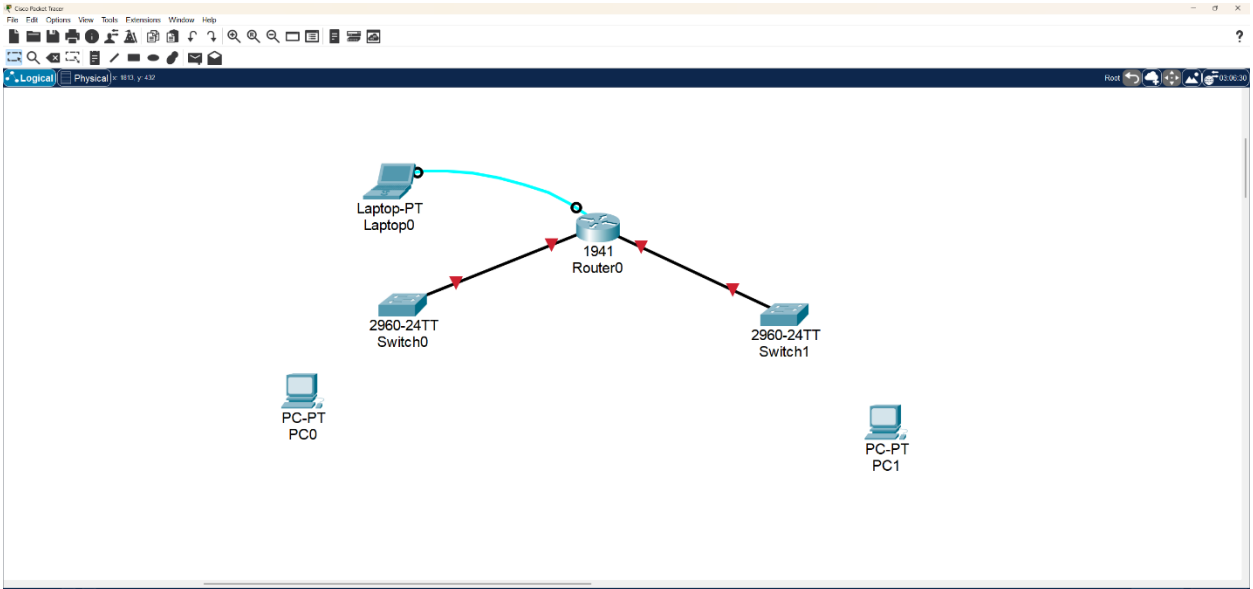
The lab involved setting up a simulated LAN with two subnets connected by a Cisco 1941 router, following a specific connection diagram and IP numbering scheme

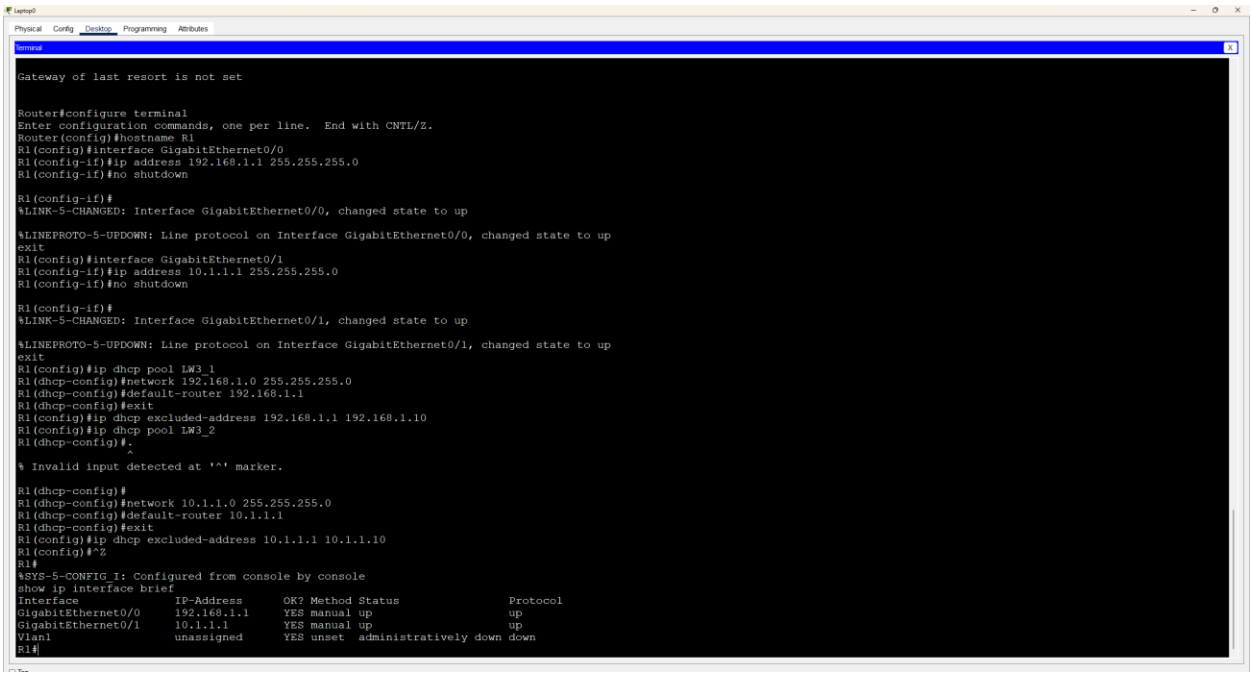
Part 2.

Initial Steps: Access to the router's Command Line Interface (CLI) was established, simulating a serial console connection via PuTTY

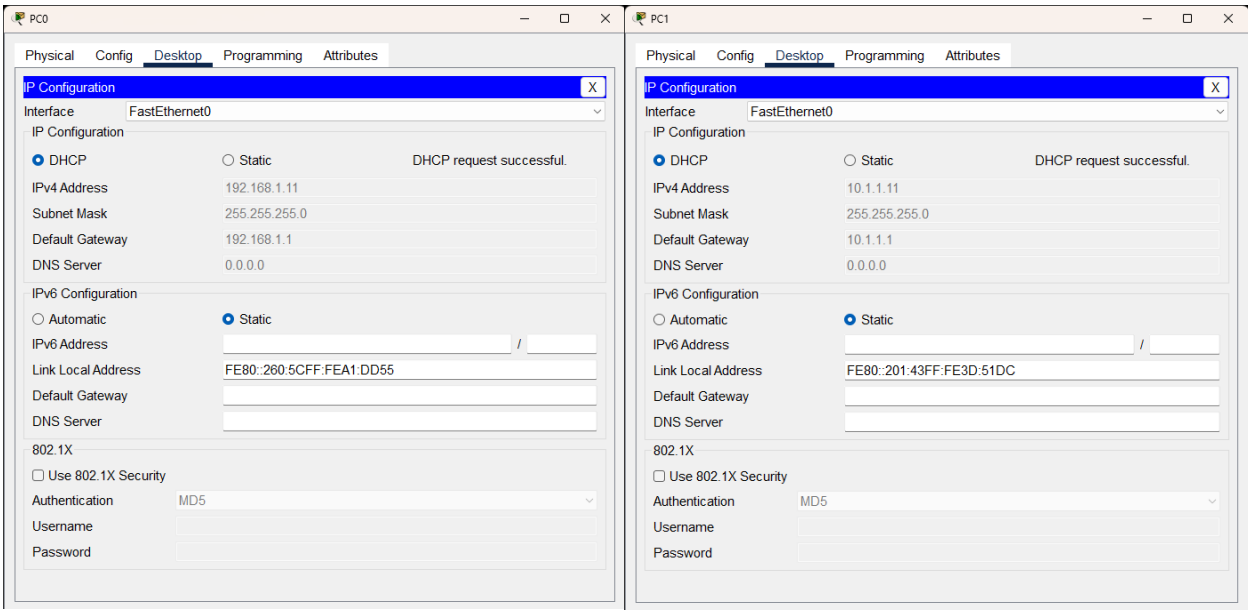
Upon booting the simulated router, the initial setup prompt was bypassed by typing 'no'. The initial status of the router interfaces and IOS version was checked using show ip interface brief and show version commands
I ran all of the needed commands to get interfaces up and running, created dhcp pools,

etc.





```
Gateway of last resort is not set


Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#interface GigabitEthernet0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
exit
R1(config)#interface GigabitEthernet0/1
R1(config-if)#ip address 10.1.1.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
exit
R1(config)#ip dhcp pool LW3_1
R1(dhcp-config)#network 192.168.1.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.1.1
R1(dhcp-config)#exit
R1(config)#ip dhcp excluded-address 192.168.1.1 192.168.1.10
R1(config)#ip dhcp pool LW3_2
R1(dhcp-config)#.
                 ^
% Invalid input detected at '^' marker.

R1(dhcp-config)#
R1(dhcp-config)#network 10.1.1.0 255.255.255.0
R1(dhcp-config)#default-router 10.1.1.1
R1(dhcp-config)#exit
R1(config)#ip dhcp excluded-address 10.1.1.1 10.1.1.10
R1(config)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         192.168.1.1     YES manual up                    up
GigabitEthernet0/1         10.1.1.1        YES manual up                    up
Vlan1                      unassigned      YES unset  administratively down down
R1#
```



Part 3: Network Implementation and Testing

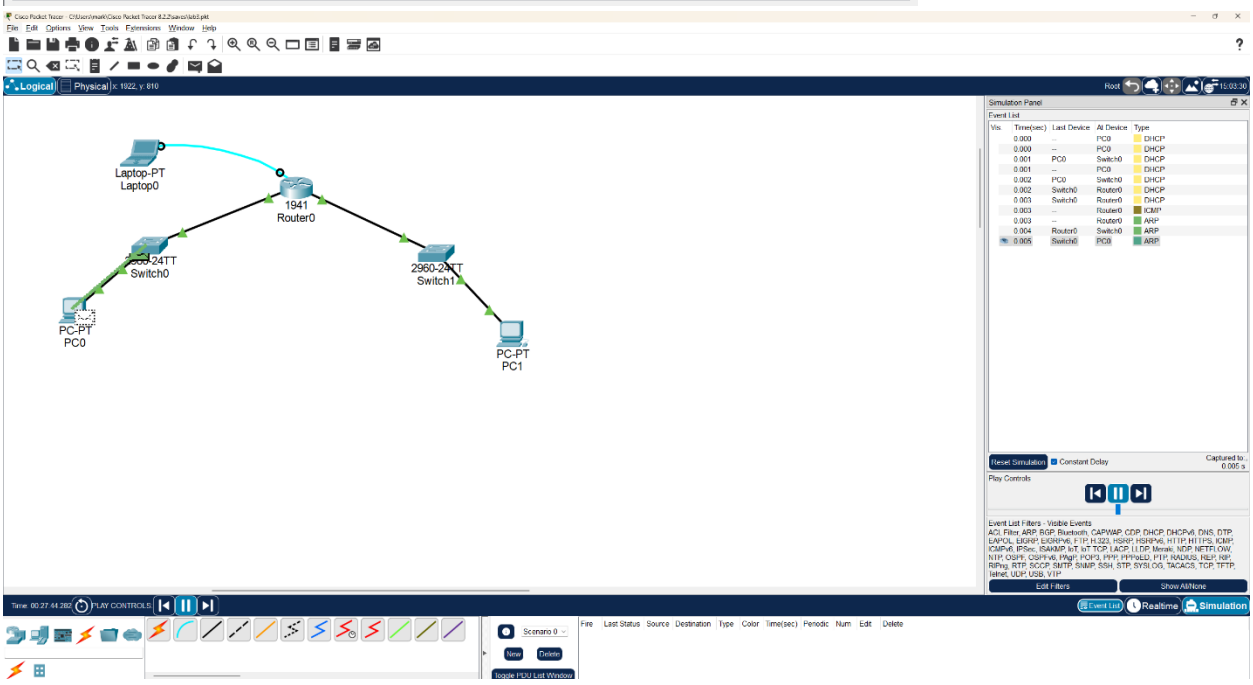
I used ipconfig /renew and Cisco Packet Tracer gui in order to get new ip for each pc, tested whether the devices can ping each other, used simulation tab instead of wireshark, which allowed me to closely inspect dhcp and ping processes.

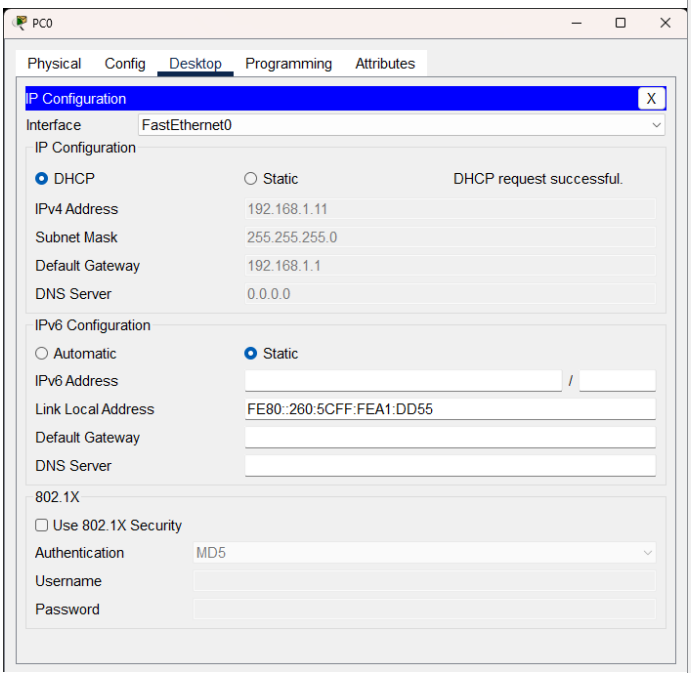
PC0

Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>
ipconfig /all

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Physical Address................: 0060.5CA1.DD55
   Link-local IPv6 Address.........: FE80::260:5CFF:FEA1:DD55
   IPv6 Address....................: ::
   IPv4 Address....................: 192.168.1.11
   Subnet Mask.....................: 255.255.255.0
   Default Gateway.................: ::
                                     192.168.1.1
   DHCP Servers....................: 192.168.1.1
   DHCPv6 IAID.....................:
   DHCPv6 Client DUID..............: 00-01-00-01-CB-56-C5-93-00-60-5C-A1-DD-55
   DNS Servers.....................: ::
                                     0.0.0.0

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Physical Address................: 0001.42EA.06A5
   Link-local IPv6 Address.........: ::
 --More--
```




PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
DHCP request successful.
IPv4 Address
192.168.1.11
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::260:5CFF:FEA1:DD55
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password


Command Prompt
Ping statistics for 192.168.1.1:
Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\>ping 10.1.1.11
Pinging 10.1.1.11 with 32 bytes of data:
Reply from 10.1.1.11: bytes=32 time<1ms TTL=127
Reply from 10.1.1.11: bytes=32 time<1ms TTL=127
Reply from 10.1.1.11: bytes=32 time<1ms TTL=127
Ping statistics for 10.1.1.11:
Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\>ifconfig
Invalid Command.
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::260:5CFF:FEA1:DD55
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.11
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
192.168.1.1
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0


Laptop0
Physical
Config
Desktop
Programming
Attributes
Terminal
R1>ping 192.168.1.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.11, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
R1>ping 10.1.1.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.11, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
R1>show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 10.1.1.0/24 is directly connected, GigabitEthernet0/1
L 10.1.1.1/32 is directly connected, GigabitEthernet0/1
192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0
R1>

Conclusion

This Packet Tracer lab successfully provided practical experience in basic Cisco device configuration and wired LAN setup simulation

Key activities included configuring router interfaces with IP addresses, enabling DHCP services, and testing connectivity within and between two simulated subnets. Using simulated packet capture helped analyze the DHCP process. Connectivity tests using ping confirmed the configuration, though potential challenges like PC firewalls were noted as a factor in inter-subnet communication outcomes. Overall, the lab offered valuable hands-on experience applying networking knowledge in a simulated environment