PROJECT: LAN SETUP & IP ADDRESSING

BY

NTIM FRANCIS GYAN

PROJECT OVERVIEW

- Designed and configured a functional LAN using Packet Tracer
- Devices used: 1 Router, 1 Switch, 5 PCs, 1 Printer
- IPv4 addressing implemented using both static and dynamic assignments
- Router configured as DHCP server
- Connectivity verified between all devices
- Documented IP addressing, MACs, topology, and testing results.

NETWORK DESIGN OVERVIEW

TOPOLOGY: *Star*

DEVICES:

Cisco Router

Cisco 2960 Switch

5 PCs

Network Printer

CONNECTIONS (Port → Device)

Router G0/0 → Switch G0/1

Switch Fa0/1 → PC1

Switch Fa0/2 → PC2

Switch Fa0/3 → PC3

Switch Fa0/4 → PC4

Switch Fa0/5 → PC5

Switch Fa0/6 → Printer

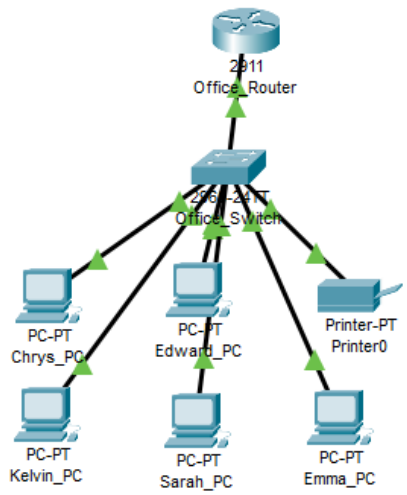

FIG 1 - Design of LAN with all end devices

IP ADDRESSING

IP ADDRESS TABLE

DEVICE	MAC ADDRESS	IP ADDRESS	TYPE	SUBNET MASK	GATEWAY
Router (G0/0)	—	192.168.10.1	Static	255.255.255.0	—
Switch VLAN1	—	192.168.10.5	Static	255.255.255.0	192.168.10.1
Chrys_PC	00E0.F9D1.095A	192.168.10.2	Static	255.255.255.0	192.168.10.1
Kelvin_PC	0009.7CE7.19A7	192.168.10.3	Static	255.255.255.0	192.168.10.1
Printer	000C.85C2.5C26	192.168.10.4	Static	255.255.255.0	192.168.10.1
Emma_PC	0009.7C3A.9E8D	DHCP (192.168.10.6)	Dynamic	255.255.255.0	192.168.10.1
Edward_PC	0002.163B.297D	DHCP (192.168.10.7)	Dynamic	255.255.255.0	192.168.10.1
Sarah_PC	0060.3EAD.56CC	DHCP (192.168.10.8)	Dynamic	255.255.255.0	192.168.10.1

CONFIGURATION STEPS

ROUTER CONFIGURATION:

Enter privileged mode:

enable

configure terminal

Set router hostname:

hostname Office_Router

Configure LAN interface:

interface g0/0

ip address 192.168.10.1 255.255.255.0

no shutdown
exit

Configure DHCP excluded addresses:
ip dhcp excluded-address 192.168.10.1 192.168.10.5
Create DHCP pool:

ip dhcp pool OFFICE
network 192.168.10.0 255.255.255.0
default-router 192.168.10.1
dns-server 8.8.8.8
domain-name local.office
exit

Save the configuration:
end
write memory

SWITCH CONFIGURATION

Enter privileged mode:
enable
configure terminal
Set switch hostname:
hostname Office_Switch
Configure VLAN 1 management interface:
interface vlan 1
ip address 192.168.10.5 255.255.255.0
no shutdown
exit

Set switch default gateway:
ip default-gateway 192.168.10.1

Save configuration:
end
write memory

END DEVICE CONFIGURATION

Static Devices

Chrys_PC:

• *IP Address: 192.168.10.2*

• *Subnet Mask: 255.255.255.0*

• *Default Gateway: 192.168.10.1*

Kelvin_PC:

• *IP Address: 192.168.10.3*

• *Subnet Mask: 255.255.255.0*

• *Default Gateway: 192.168.10.1*

Printer:

• *IP Address: 192.168.10.4*

• *Subnet Mask: 255.255.255.0*

• *Default Gateway: 192.168.10.1*

DHCP Devices (PC3–PC5)

• *Go to Desktop → IP Configuration → Click DHCP*

• *Emma_PC automatically received 192.168.10.6*

• *Edward_PC received 192.168.10.7 automatically*

• *Sarah_PC received 192.168.10.8 automatically*

TESTING & VERIFICATION

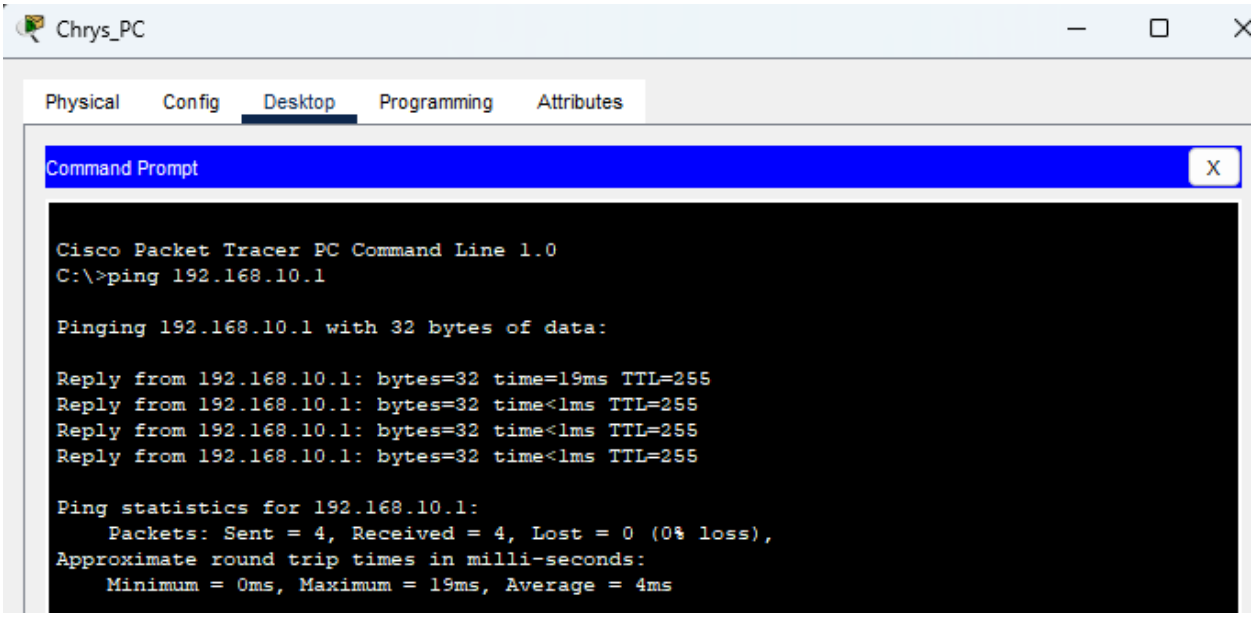

FIG 2 - pinging the router gateway: ***ping 192.168.10.1***

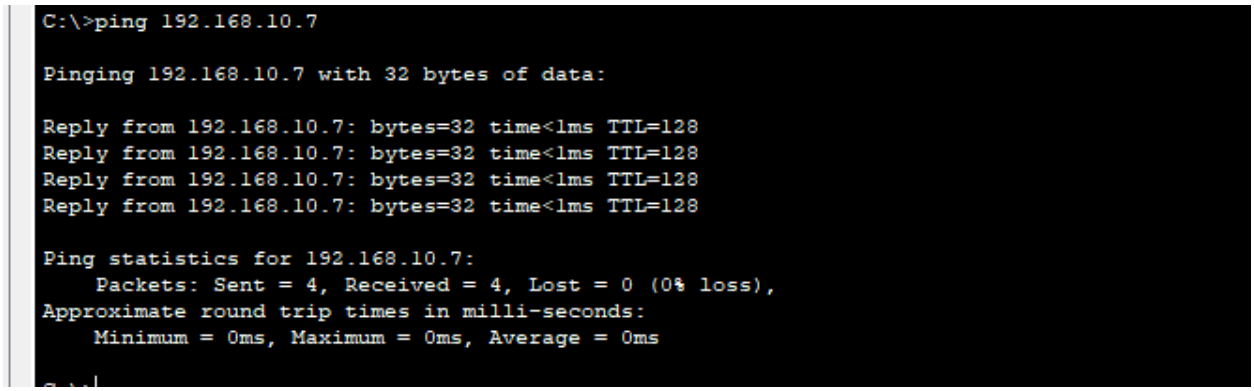

FIG 3 - pinging Edward PC on Chrys PC: ***ping 192.168.10.7***

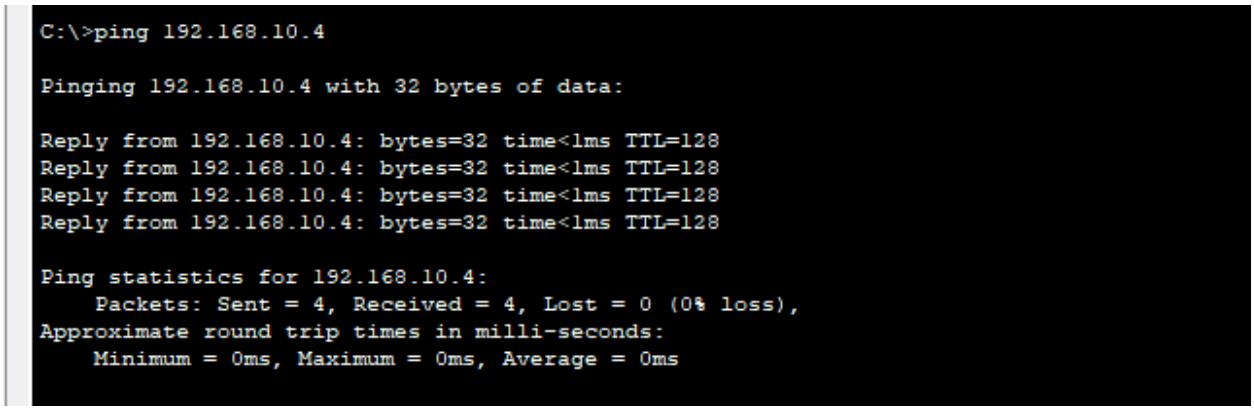

FIG 4 - pinging the printer: ***ping 192.168.10.4***

```
C:\> ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::2E0:F9FF:FED1:95A
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.10.2
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.10.1
```

*FIG 5 - **ipconfig***

```
OFFICE_Router>
OFFICE_Router>en
OFFICE_Router#show ip dhcp binding
IP address       Client-ID/              Lease expiration        Type
                 Hardware address
192.168.10.6     0009.7C3A.9E8D           --                     Automatic
192.168.10.8     0060.3EAD.56CC           --                     Automatic
192.168.10.7     0002.163B.297D           --                     Automatic
OFFICE_Router#
```

*FIG 6 - Checking DHCP bindings on router: **show ip dhcp binding***

```
OFFICE_Switch#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0002.163b.297d    DYNAMIC     Fa0/3
   1    0009.7c3a.9e8d    DYNAMIC     Fa0/5
   1    0009.7ce7.19a7    DYNAMIC     Fa0/2
   1    000b.be58.4701    DYNAMIC     Gig0/1
   1    0060.3ead.56cc    DYNAMIC     Fa0/4
   1    00e0.f9d1.095a    DYNAMIC     Fa0/1
OFFICE_Switch#
```

*FIG 7 - Checking mac address table on the switch: **show mac address-table***

LESSONS LEARNED

1. Proper IP planning (including excluded addresses) prevents conflicts and reserves space for infrastructure devices.
2. Printers and other shared/service devices must use static IPs for reliability and ease of management.
3. Switches learn MAC addresses dynamically only when traffic flows; pings are required to populate the MAC address table in Packet Tracer.
4. Basic router commands (interface config, DHCP pool, default-gateway) are sufficient to turn a router into a fully functional gateway for a small LAN.
5. Systematic testing (ping, show ip dhcp binding, show mac address-table) is essential to prove the network works as intended.

CONCLUSION

This project successfully designed, configured, and verified a small office network using a Cisco router, Layer-2 switch (2960), 5 PCs, and a shared printer. All devices were able to communicate within the 192.168.10.0/24 subnet, with the router providing DHCP services and Internet-bound connectivity, while static addressing was correctly applied to critical devices (router, switch management, and printer).
Connectivity and Layer-2/Layer-3 functionality were confirmed through successful pings and populated MAC address and DHCP binding tables.