COMPUTER NETWORKS

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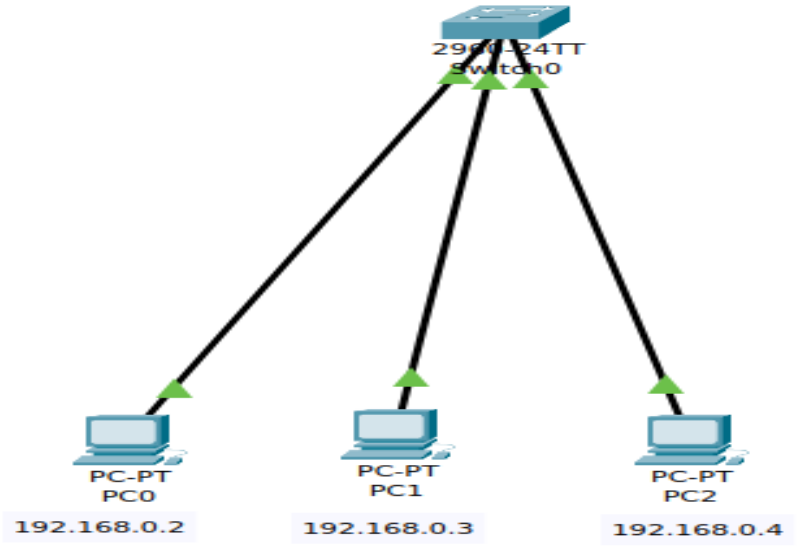
COMPUTER SCIENCE AND ENGINEERING
ID - 2022UCP1700
SECTION- A4

ASSIGNMENT – 4.1

Task 1:Establish a LAN network with switches and end devices. Configure IP addresses and verify connectivity between devices.
Generate and transmit

- unicast packets from one device to another,



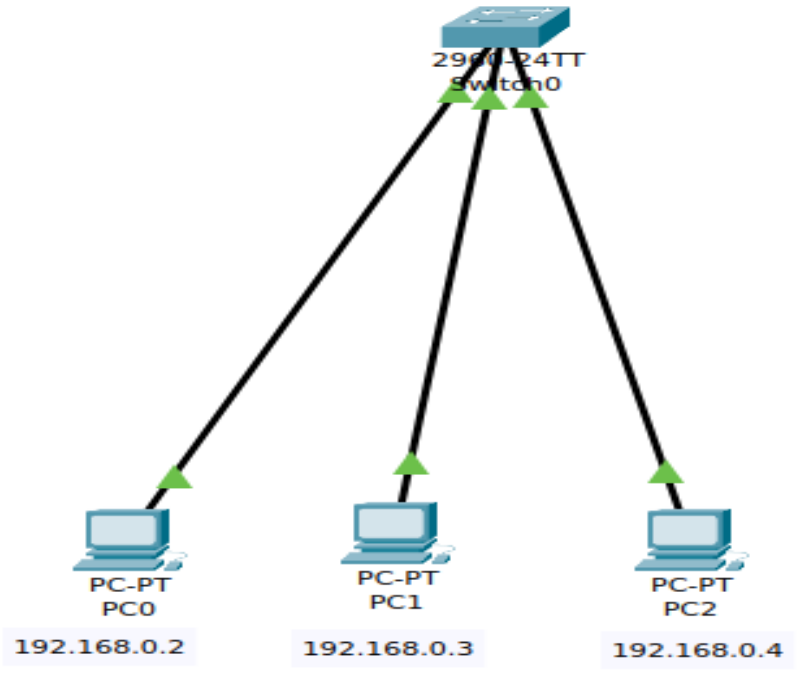

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.........: FE80::260:47FF:FE32:2451
   IPv6 Address....................: ::
   IPv4 Address....................: 192.168.0.2
   Subnet Mask.....................: 255.255.255.0
   Default Gateway.................: ::
                                     192.168.0.1

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

C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time=1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

- broadcast packets to all devices within the LAN.

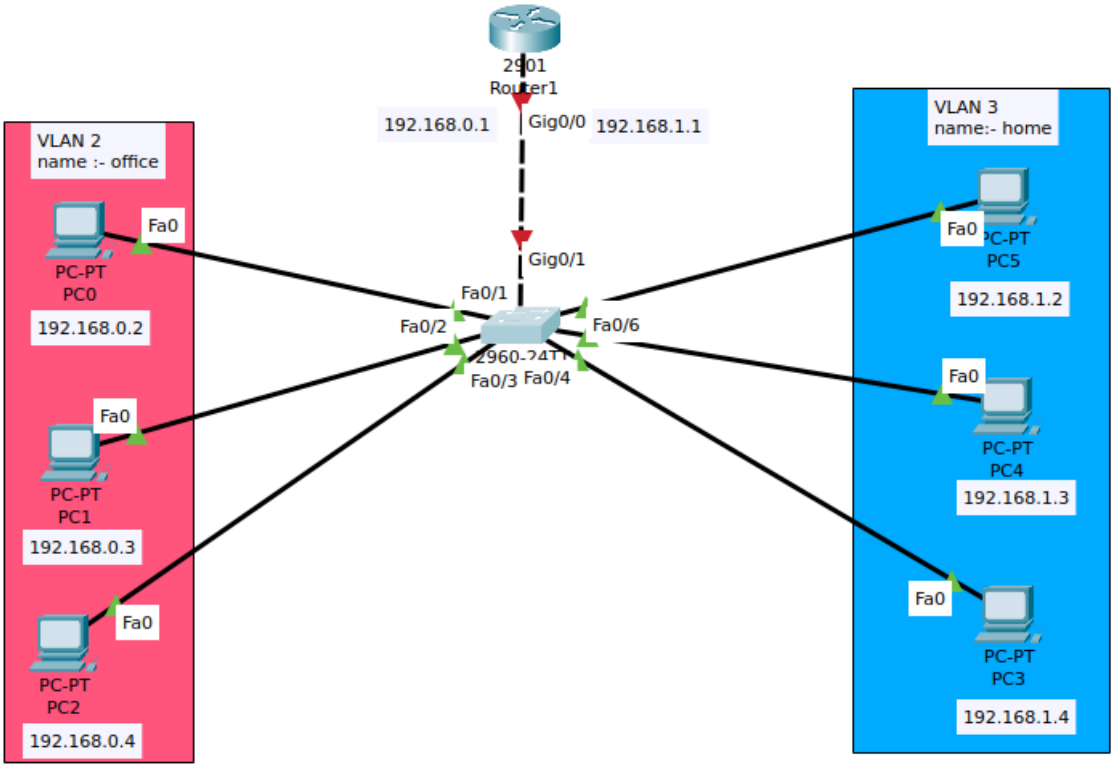
```
C:\>ping 192.168.0.255

Pinging 192.168.0.255 with 32 bytes of data:

Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.255:
    Packets: Sent = 4, Received = 8, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Task 2:

1. Create a network layout with:
   - Switch: Add at least one Cisco switch.
   - End Devices: Connect PCs or laptops to switch ports.



2. Set up VLANs:
   - Create two or more VLANs on the switch.
   - Give each VLAN a name and an ID.



3. Assign Ports to VLANs:
   - Choose which switch ports belong to each VLAN.
   - Ensure devices are correctly assigned to VLANs for traffic separation.

```
Switch(config-if)#
Switch(config-if)#switchport access vlan 2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
Switch(config-if)#
```

```
Switch(config-if)#switchport access vlan 2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/4
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/5
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 3
```

```
Switch(config-if)#switchport access vlan 3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/6
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#
Switch(config)#
Switch(config)#interface FastEthernet0/7
Switch(config-if)#
```

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface GigabitEthernet0/1
Switch(config-if)#
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Switch(config-if)#exit
```

4. Enable Inter-VLAN Communication:
    - ○ Configure a router to allow communication between VLANs.
    - ○ Create subinterfaces on the router for each VLAN.
    - ○ Assign IP addresses to subinterfaces within the VLAN subnets.

```
         --- System Configuration Dialog ---

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

Press RETURN to get started!



Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int di
Router(config)#int gi
Router(config)#int gigabitEthernet 0/0.2
Router(config-subif)#enc
Router(config-subif)#encapsulation dot1
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#ip add 192.168.0.1 255.255.255.0
Router(config-subif)#exit
Router(config)#int gigabitEthernet 0/0.3
Router(config-subif)#encapsulation dot1Q 3
Router(config-subif)#ip add 192.168.1.1 255.255.255.0
Router(config-subif)#exit
Router(config)#
```

```
!
!
!
!
interface GigabitEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0.2
 encapsulation dot1Q 2
 ip address 192.168.0.1 255.255.255.0
!
interface GigabitEthernet0/0.3
 encapsulation dot1Q 3
 ip address 192.168.1.1 255.255.255.0
!
```

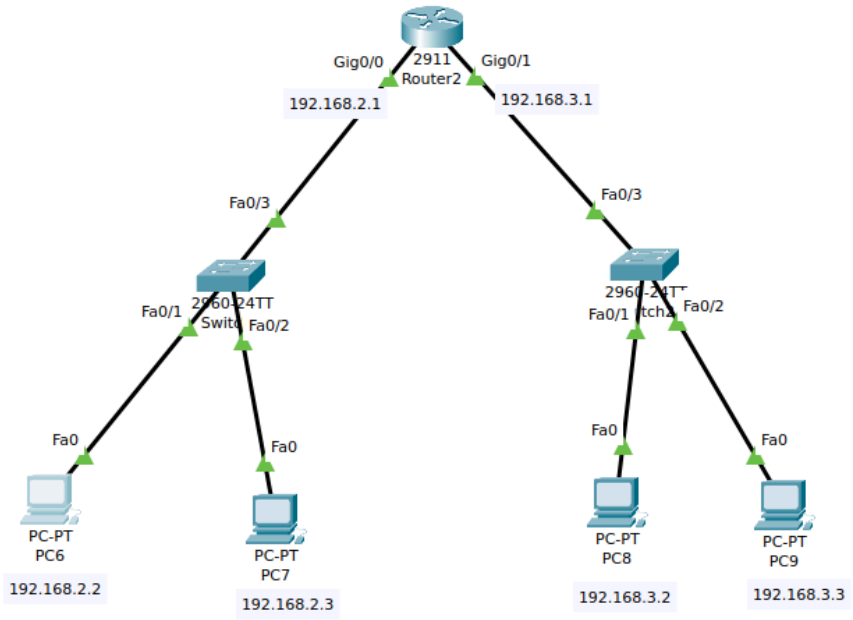
5. Test Communication:
   - ○ Check if devices in the same VLAN can communicate.
   - ○ Ensure devices from different VLANs can communicate through the router.

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::200:CFF:FE22:BC43
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.0.2
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.0.1

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

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::2E0:8FFF:FE36:DCA5
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.0.3
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.0.1

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

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.3: bytes=32 time<1ms TTL=127
Reply from 192.168.1.3: bytes=32 time<1ms TTL=127
Reply from 192.168.1.3: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Task 3 :

- 1. Build a simple network topology consisting of PCs, switches, and routers.
- 2. Assign IP addresses to each device in the network.
- 3. Use the "arp -a" command on PCs to view the ARP cache table.
- 4. Initiate communication between two PCs within the network and observe the ARP process.
- 5. Discuss how ARP resolves IP addresses to MAC addresses and facilitates communication at the data link layer.
- 6. Explore the ARP protocol's significance in troubleshooting network connectivity issues.



```
   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::209:7CFF:FE9A:5C26
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.2.3
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.2.1

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

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time<1ms TTL=128
Reply from 192.168.2.2: bytes=32 time=19ms TTL=128
Reply from 192.168.2.2: bytes=32 time<1ms TTL=128
Reply from 192.168.2.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 19ms, Average = 4ms

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.2.1           00e0.b098.cc01        dynamic
  192.168.2.2           0060.5c2b.344b        dynamic

C:\>
```

```
Reply from 192.168.2.2: bytes=32 time=19ms TTL=128
Reply from 192.168.2.2: bytes=32 time<1ms TTL=128
Reply from 192.168.2.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 19ms, Average = 4ms

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.2.1           00e0.b098.cc01        dynamic
  192.168.2.2           0060.5c2b.344b        dynamic

C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time<1ms TTL=127
Reply from 192.168.3.2: bytes=32 time<1ms TTL=127
Reply from 192.168.3.2: bytes=32 time<1ms TTL=127
Reply from 192.168.3.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.2.1           00e0.b098.cc01        dynamic
  192.168.2.2           0060.5c2b.344b        dynamic

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.2.1           00e0.b098.cc01        dynamic
  192.168.2.2           0060.5c2b.344b        dynamic
```

THE END

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