**Lab No: 1**

**Title: Introduction to Networking Devices and Physical layer connection**

**OBJECTIVE:**

- To be familiar with basic components of networking.
- To be familiar with cable wiring standards.
- To prepare students to design RG-45 jacks and testing them using multimeter and LAN tester.

**Components Required:**

- Hub
- Switches
- Cables (Optical Fiber, Coaxial cables, twisted pair cables)
- LAN TESTER
- Clamper

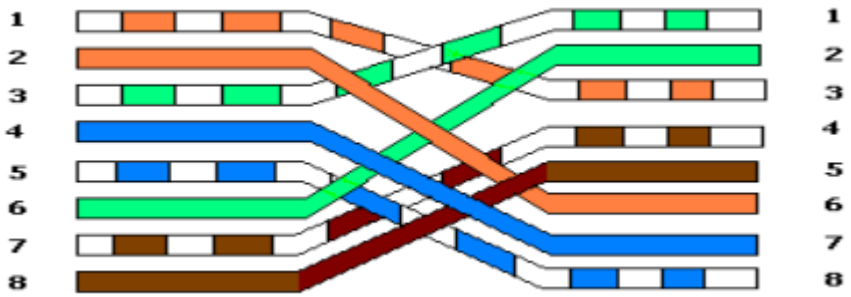
**Wiring Standards Used**

1. **Straight Through cable**
   The straight-through cable is used to connect
   - Host to switch or hub
   - Router to switch or hub
     Or in a different types of device.
2. **Cross over cable**
   The cross over cable is used to connect
   - Switch to switch
   - Hub to hub
   - Host to host
   - Hub to switch
   - Router direct to host.
     Or in same types of devices

**Pin Configuration:**

Straight-through cable standard


Cross-over cable standard



**Lab No: 2**

**Title: Creating and configuring simple peer-to-peer network having two pc's and testing the connectivity between them.**

**OBJECTIVES:**

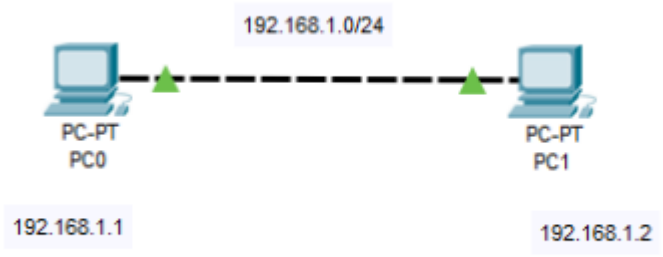
- Implement peer-to-peer network using packet tracer
- Testing connectivity between different computer present in the network.

**BACKGROUND THEORY**

A collection of computer joined together with equal permission and responsibilities for data processing in peer-to-peer (P2P) networking . In contrast to traditional client-server networking, no device in a P2P network is completely dedicated to serving on receiving data. Each linked machine has the same permission and can be used for the same purpose as its "peers"

**OBSERVATION AND FINDINGS:**

Implement peer-to-peer network in between two pc's and testing connectivity between them.




**Peer-to-peer Network**

**Output:**

```
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=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

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 = 1ms, Average = 0ms
```

**CONCLUSION:**

The aim of this lab is to become familiar with peer-to-peer network using to PC's.

**Lab-3**

**Title: Create a local area network and testing the connectivity within the network.**

**OBJECTIVES:**

- To create local area network using packet tracer and testing connectivity within network.
- To study in detail about local area network

**BACKGROUND THEORY:**

The term “Local Area Network” refers to a network that is limited to a single location. A LAN is a network that is contained inside a small geographic region, usually within the same building, and is made up of two or more connected computers. LANs are commonly used in home WIFI networks and small business networks.

**OBSERVATION AND FINDINGS:**

Implement a local area network and testing the connectivity within the network.

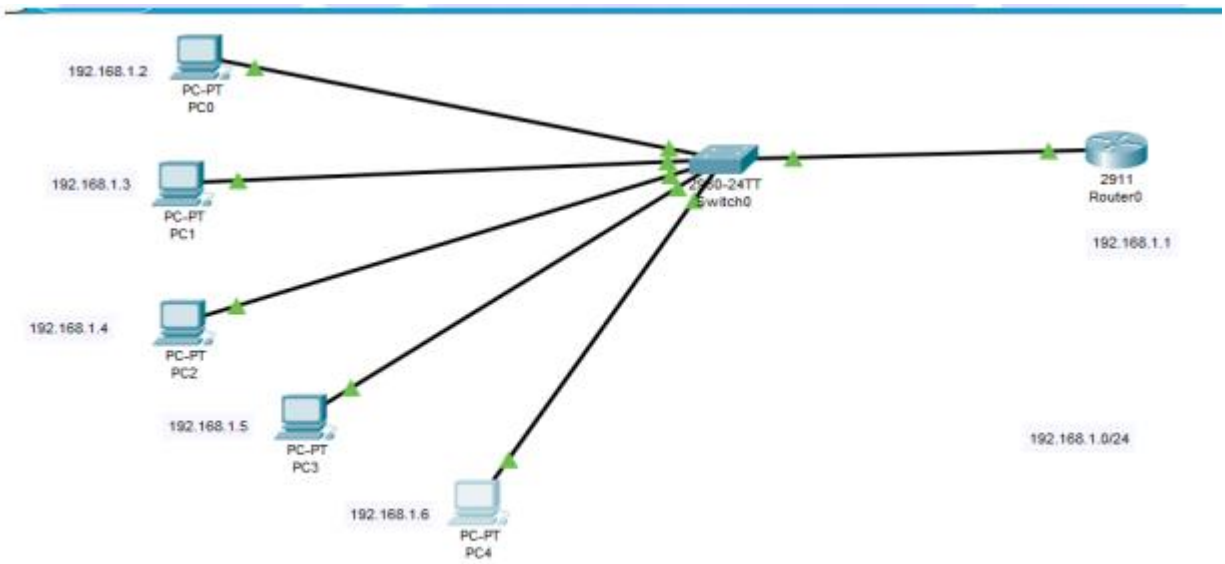



**Figure 4: Local Area Network**

**OUTPUT:**

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:

Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

**CONCLUSINON:**

The Aim of the lab is to become familiar with Local Area Network.

**Lab:4**

**Title: Connecting two different LAN and testing connectivity between them.**

**OBJECTIVES:**

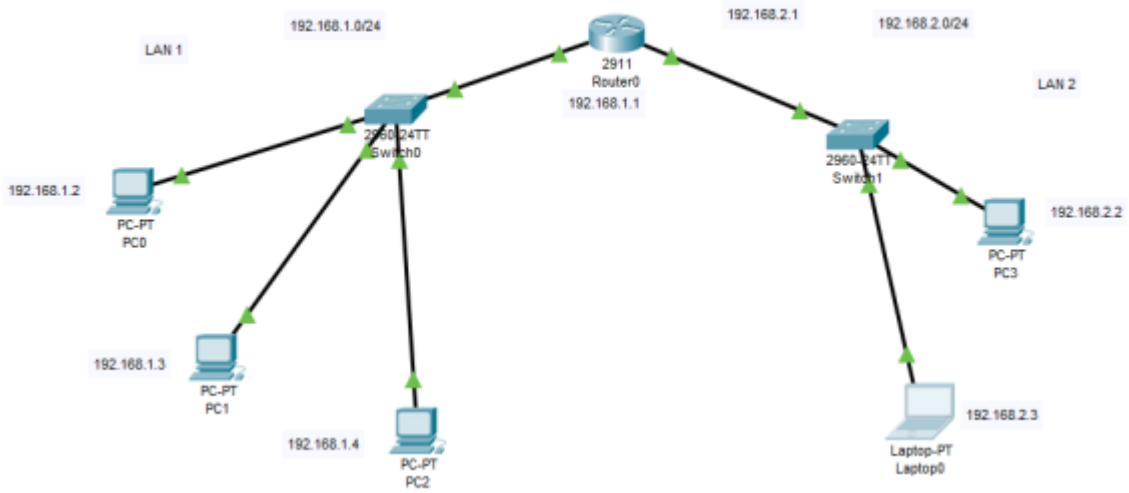
- To connect different LANs using router.
- To send data from one lan to another lan.

**BACKGROUND THEROY:**

LAN interconnection or internetworking is the process of interconnecting two different LANs using router. In this Lab two different LANs are used to test the connectivity between them LANs are commonly used in home WIFI networks and small business networks.

**OBSERVATION AND FINDINGS:**

Interconnecting two different LANs and testing the connectivity between them.




**Interconnecting of Local Area Network**

**OUTPUT:**

```
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=10ms 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 = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 3ms
```

**CONCLUSION:**

The aim of the lab is to become familiar with LANs and their internetworking.

**Lab-5**

**Title: Creating different VLAN and testing connectivity them.**

**OBJECTIVES:**

- Implement VLAN using packet tracer
- Testing connectivity between different VLANs

**BACKGROUND THEORY:**

A virtual LAN (VLAN) is a logical overlay network that groups together a subset of devices that share a physical LAN, isolating the traffic for each group. A LAN is a group of computers or other devices in the same place -- e.g., the same building or campus -- that share the same physical network. A LAN is usually associated with an Ethernet (Layer 2) broadcast domain, which is the set of network devices an Ethernet broadcast packet can reach

**CONFIGURING VLAN:**

```
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan vlan-10
                    ^
% Invalid input detected at '^' marker.

Switch(config)#vlan 10
Switch(config-vlan)#name CSIT
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#exit
Switch#
```

**SHOW VLAN:**

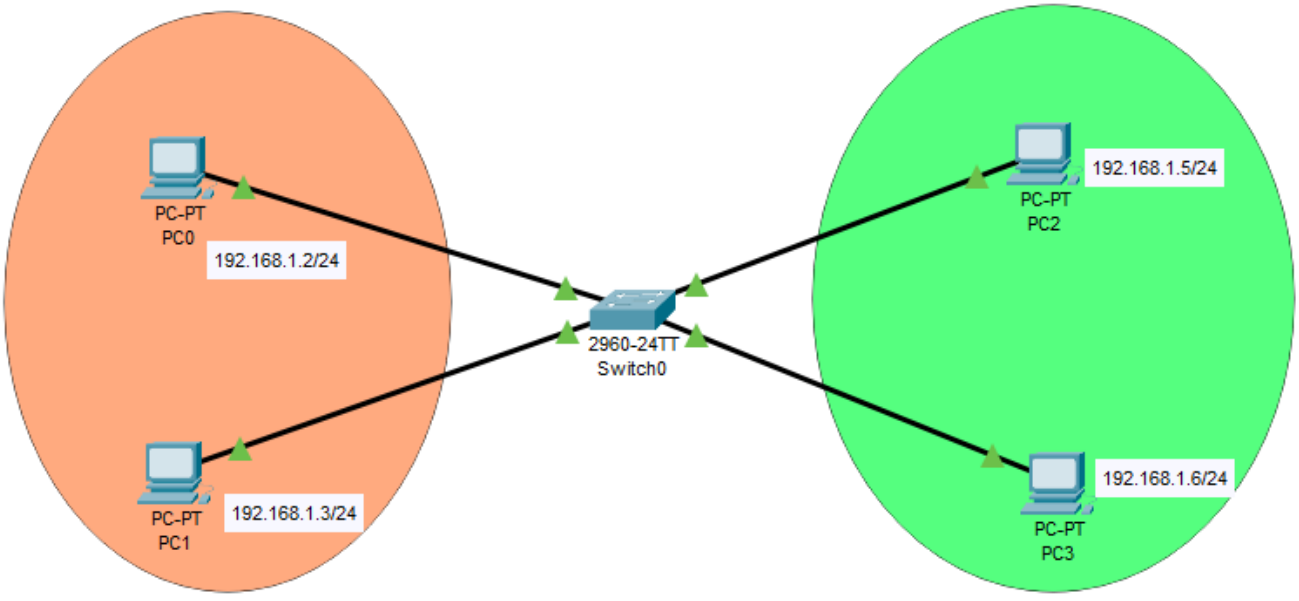
```
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
10   CSIT                              active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

**ASSIGNED VLAN**

```
Switch#
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                 Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                 Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                 Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                 Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                 Fa0/23, Fa0/24, Gig0/1, Gig0/2
10   CSIT                              active    Fa0/1, Fa0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
10   enet  100010     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
```

**OBSERVATION AND FINDINGS:**

Implementing VLAN using switch and testing connectivity between different VLANs.



Output:

Within same vlan:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128

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

C:\>
```

Different VLAN:

```
C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

**CONSLUSION:**

The aim of this lab is to familiar with VLAN and working of VLAN

**LAB-6**

**TITLE: Router Configuration using command line interface.**

**OBJECTIVES:**

- To know about router configuration
- To know about command used for router configuration

**BACKGROUND THEORY:**

Communication between networks would not be possible a router determining the best path to the destination and forwarding traffic to the next router along that path. The router is responsible for the routing of traffic between networks. You need to configure the router so that it can communicate your network components.

**PROCESS FOR ROUTER CONFIGURATION USING CLI**

1. Enable router using command enable or en
2. Enter command configure terminal.
3. Enter command line console 0
4. Set the password you like.
5. Exit
6. Enable router using password
7. Go to the terminal using configure t command
8. Set a IP address and subnet mask for GIgabitEthernet of a Router.
9. Enable the ports of a router using no shutdown command
10. Enable IP address of a computer.

**Output:**

```
Router>en
Router#configure t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#enable password class
Router(config)#ecit
               ^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
exit
```

```
Router>en
Password:
Password:
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#exit
Router(config)#int gig0/1
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#exit
Router(config)#int gig0/2
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2,
changed state to up
```

**CONCLUSION**

The aim of this lab is to become familiar with command line interface.

**LAB-7**

**TITLE: STATIC ROUTING**

**OBJECTIVES**

- To know about static routing
- To know how to give IP route to a router.

**BACKGROUND THEORY**

Static routing is a type of network routing technique. Static routing is not a routing protocol instead, it is the manual configuration and selection of a network route, usually managed by the network administrator. It is employed in scenario where the network parameters and environment are expected to remain constant.

**PROCESS FOR STATIC ROUTING**

1. Set a router with static IP address
2. Setup switch and desktop for communication with IP address
3. Set an another router with IP address
4. Enable ports of a router
5. Set a static route for router one and two
6. Communicate from one network to another.

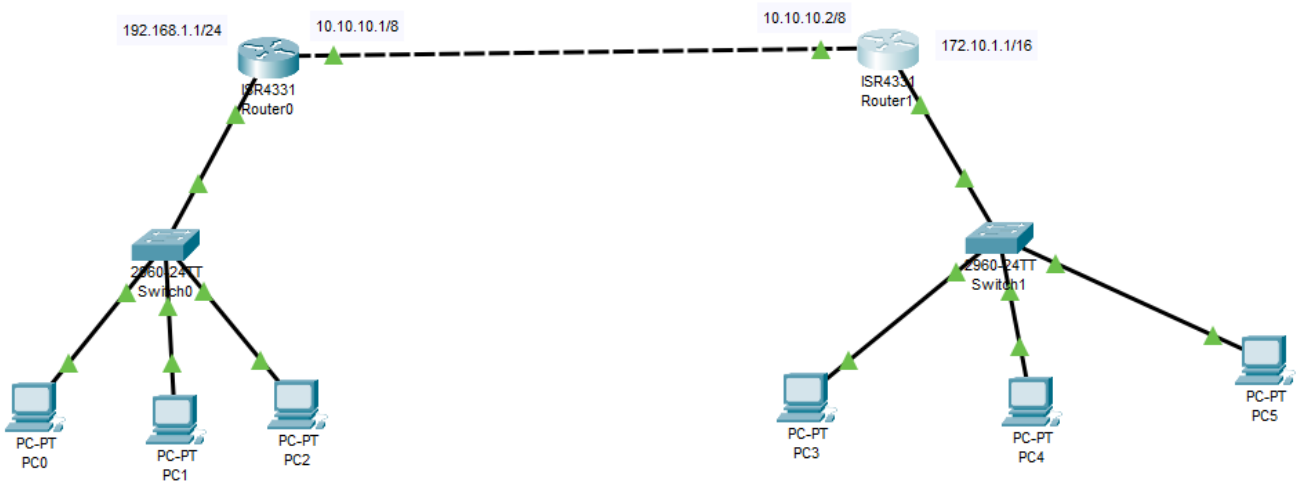
**Router 0**

```
Router(config)#ip route 172.10.1.0 255.255.0.0 10.10.10.2
%Inconsistent address and mask
Router(config)#ip route 172.10.10.0 255.255.0.0 10.10.10.2
%Inconsistent address and mask
Router(config)#ip route 172.10.0.0 255.255.0.0 10.10.10.2
Router(config)#
```

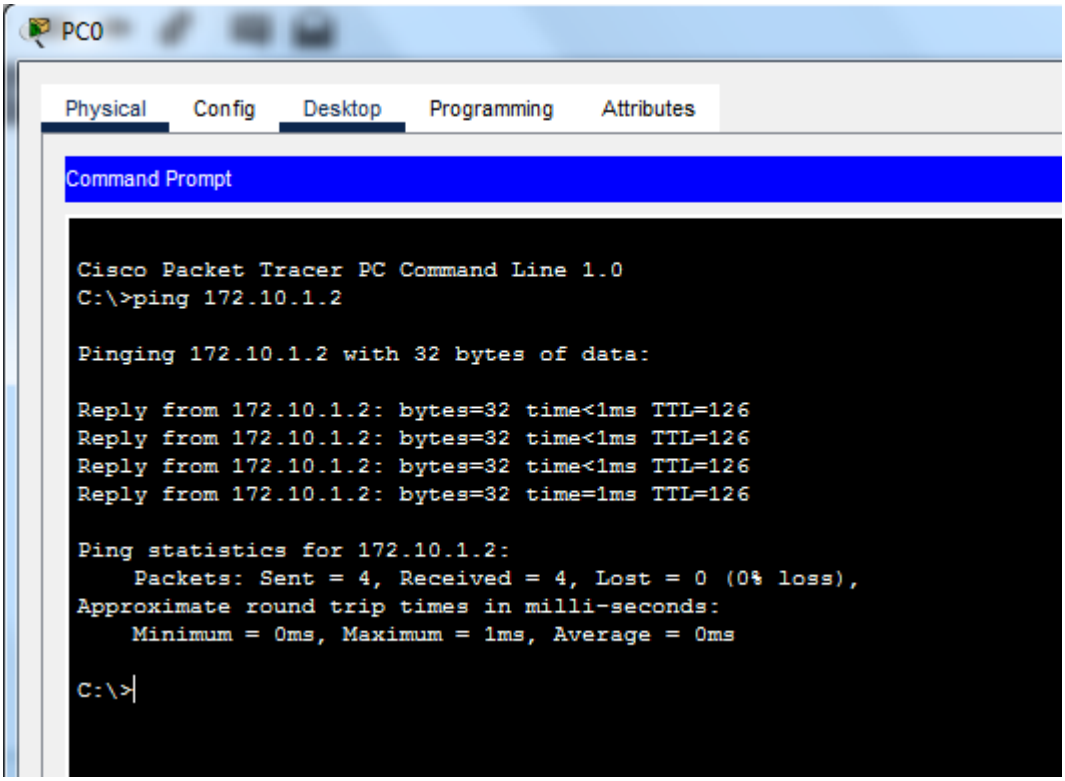
**Router 1**

```
Router(config)#
Router(config)#ip route 192.168.1.0 255.255.255.0 10.10.10.1
Router(config)#
Router(config)#
```

**OBSERVATIO FINDINGS**



**Output:**




**CONCLUSION**

The aim of this lab is to become familiar with static routing.

**LAB-8**

**TITLE: Implementing Dynamic Routing Protocol RIP**

**OBJECTIVE**

- To know about Dynamic Routing
- To know RIP dynamic protocol

**BACKGROUND THEORY:**

Routing information protocol (RIP) is a dynamic routing protocol which uses hop count as a routing metric to find the best path between the source and the destination network. It is a distance vector routing protocol which has AD value 120 and works on the application layer of the OSI model. RIP uses port number 520.

**PROCESS FOR ROP ROUTING**

1. Set a minimum of two router
2. Setup switch and desktop for communication with ip address
3. Enable ports of a router.
4. Set a RIP network for routers using CLI or GUI.
5. Communicate from one network to another.

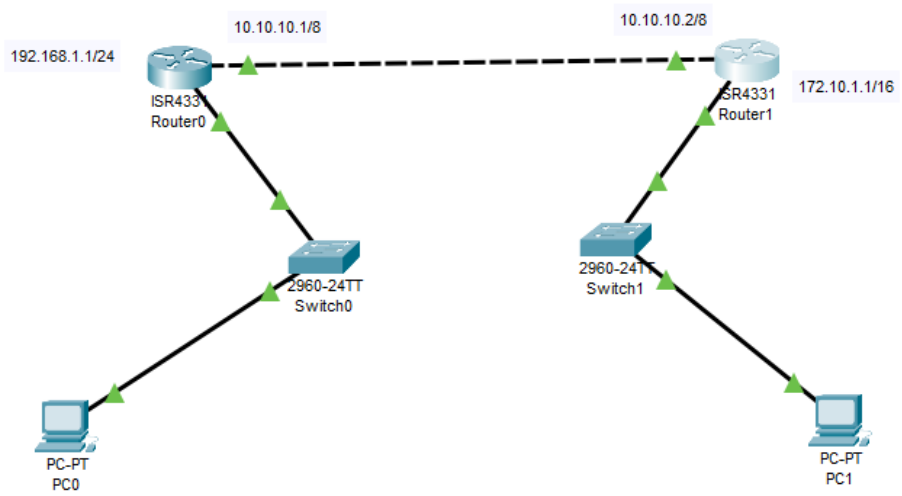
**Router 0**

```
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#network 10.0.0.0
Router(config-router)#
Router(config-router)#
```

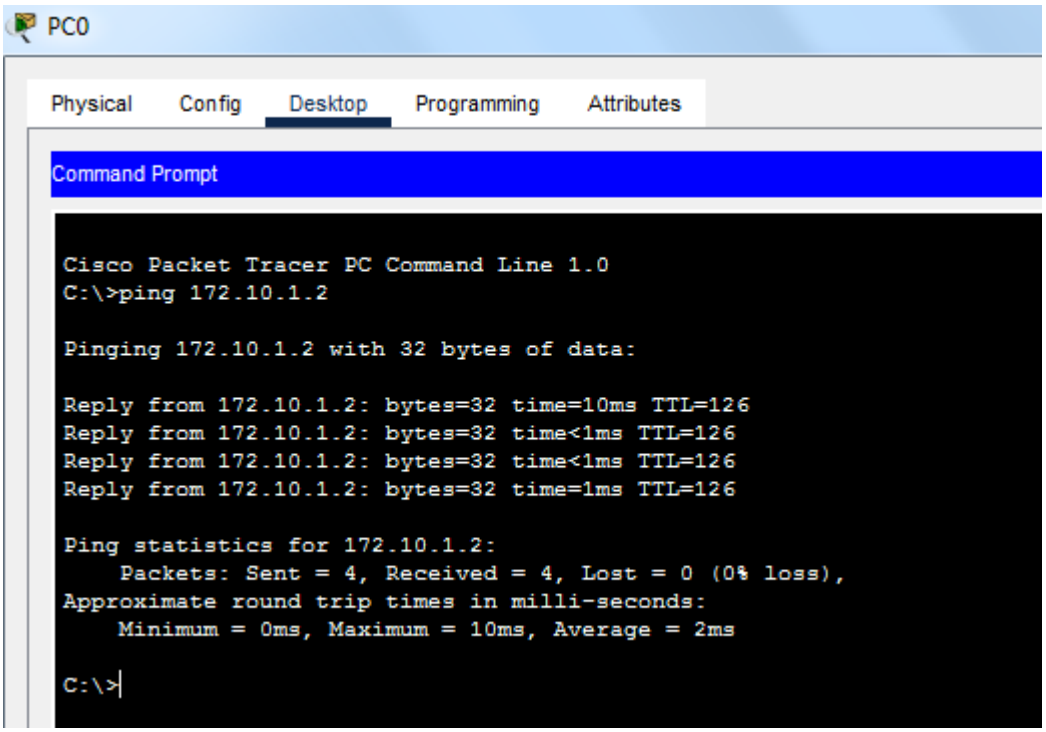
**Router 1**

```
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 172.10.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#
Router(config-router)#
```

**OBSERVARTIO FINDINGS**



**OUTPUT**




**CONSLUSION**

The aim of the lab is to become familiar with dynamic routing protocol RIP.

**LAB-9**

**TITLE: Implementing Dynamic routing protocol OSPF.**

**OBJECTIVE:**

- To know about dynamic routing
- To know OSPF dynamic routing protocol

**BACKGROUND THEORY:**

The OSPF stands for open shortest path first. IT is a widely used and supported routing protocol. It is an intra domain protocol, which means that it is used within an area or a network. It is an interior gateway protocol that has been designed within a single autonomous system. It is based on a link state routing algorithm in which each router contains the information of every domain, and based on this information, it determines the shortest path. The goal of routing is to learn routes.

**PROCESS FOR OSPF ROUTING:**

1. Set a minimum three router
2. Setup switch and desktop for communication with IP
3. Enable ports of a routers
4. Set a OSPF network for routers which are not directly connected first and then set connected networks using CLI.
5. Communicate from one network to another.

**Router 9**

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#exit
```

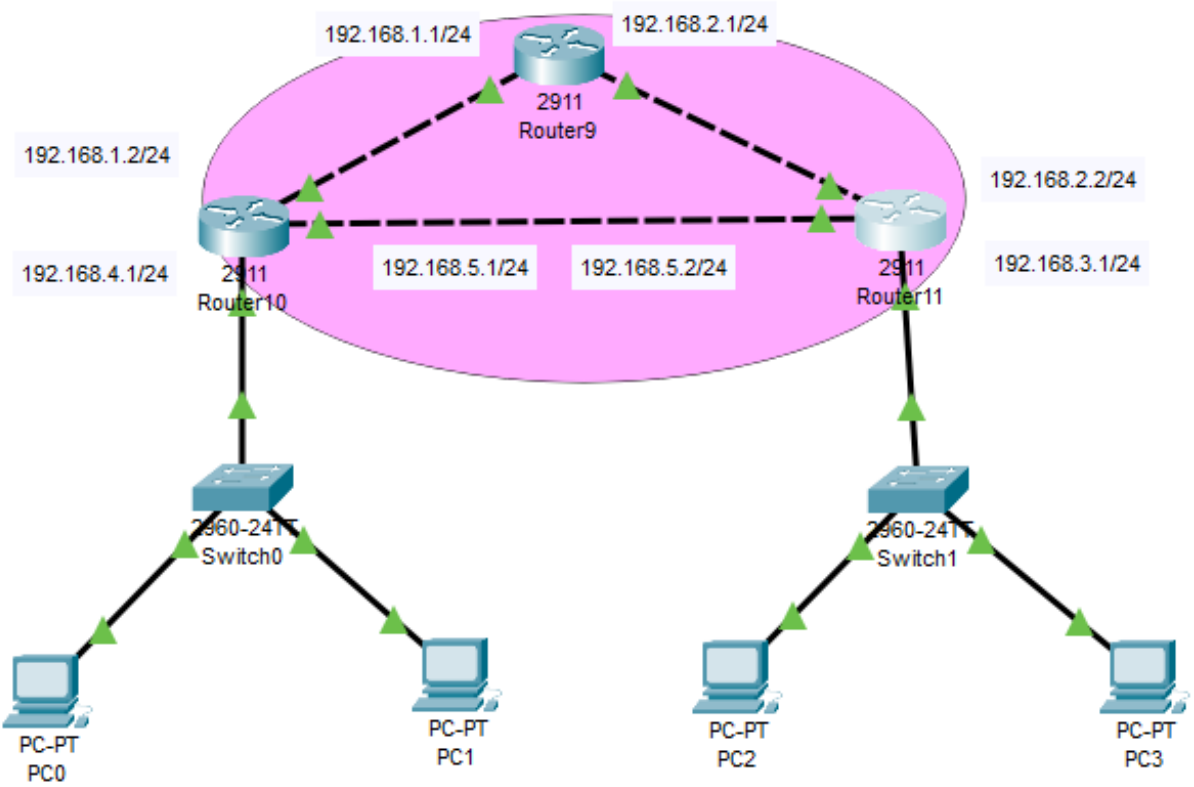
**Router 10**

```
Router>
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 192.168.4
00:48:25: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/0 from LOADING
to FUnetwork 192.168.4.
                        ^
% Invalid input detected at '^' marker.

Router(config-router)#network 192.168.4.0 0.0.0.255 area 0
Router(config-router)#network 192.168.5.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#
Router(config)#
00:51:15: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.5.2 on GigabitEthernet0/1 from LOADING
to FULL, Loading Done
```

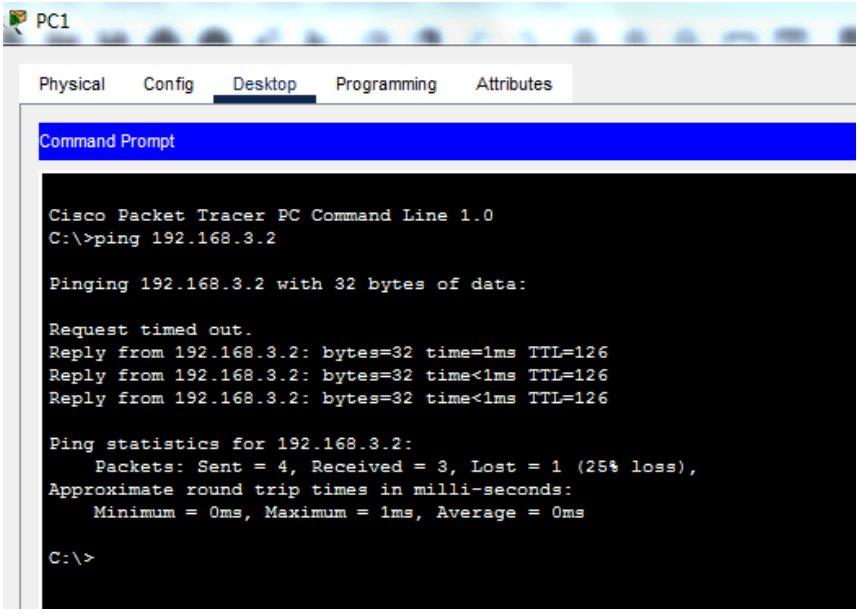
**Router 11**

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#network 192.1
00:50:17: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/0 from LOADING
to FULL, Loading Done

                                  ^
% Invalid input detected at '^' marker.

Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
Router(config-router)#network 192.168.5.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#
Router(config)#
00:51:12: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.5.1 on GigabitEthernet0/1 from LOADING
to FULL, Loading Done

Router(config)#exit
```

**OBSERVATION FINDINGS**



**OUTPUT**




**CONCLUSION**

The aim of the lab is to become familiar with Dynamic Routing Protocol OSPF.

**LAB-10**

**TITLE:DNS Server Configuration.**

**OBJECTIVE:**

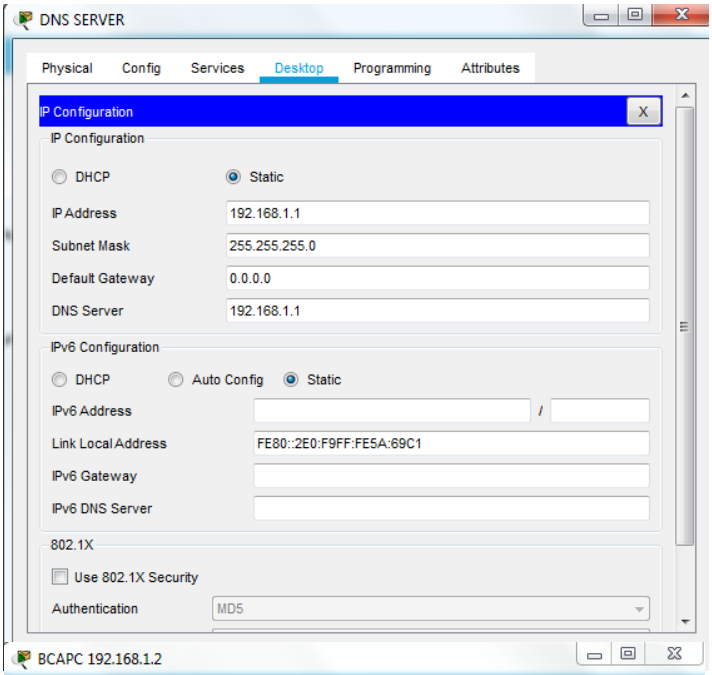
- Implementing DNS server using Packet tracer.
- To know about the working of DNS server.

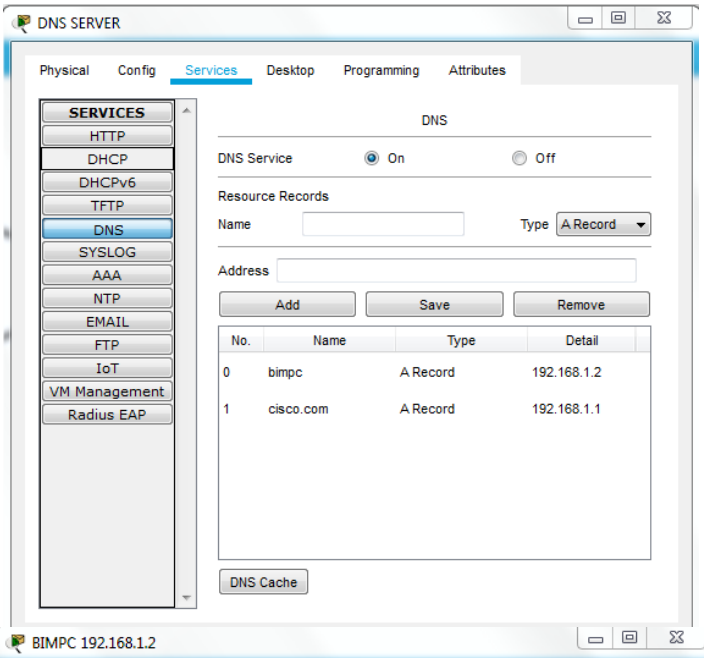
**BACKGROUND THEORY:**

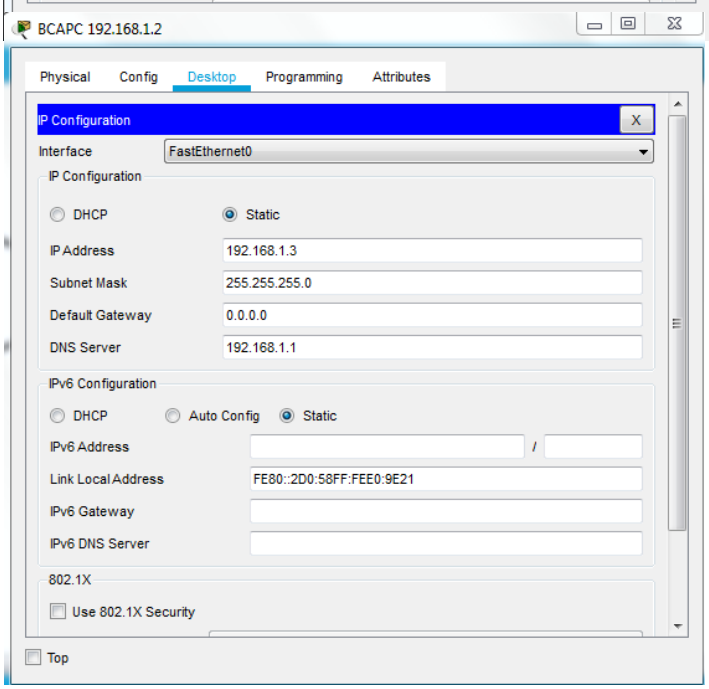
When users type domain names into the URL bar in their browser, DNS servers are responsible for translating those domain names to numeric IP addresses, leading them to the correct website.

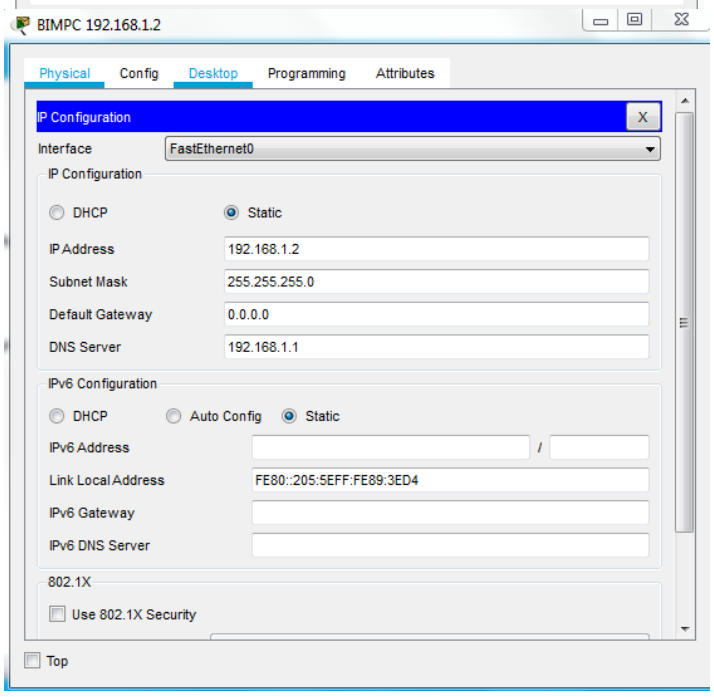
The Domain Name System (DNS) is the phonebook of the Internet. When users type domain names such as ‘google.com’ or ‘nytimes.com’ into web browsers, DNS is responsible for finding the correct IP address for those sites. Browsers then use those addresses to communicate with origin servers or CDN edge servers to access website information. This all happens thanks to DNS servers: machines dedicated to answering DNS queries.

**CONFIGURATION:**

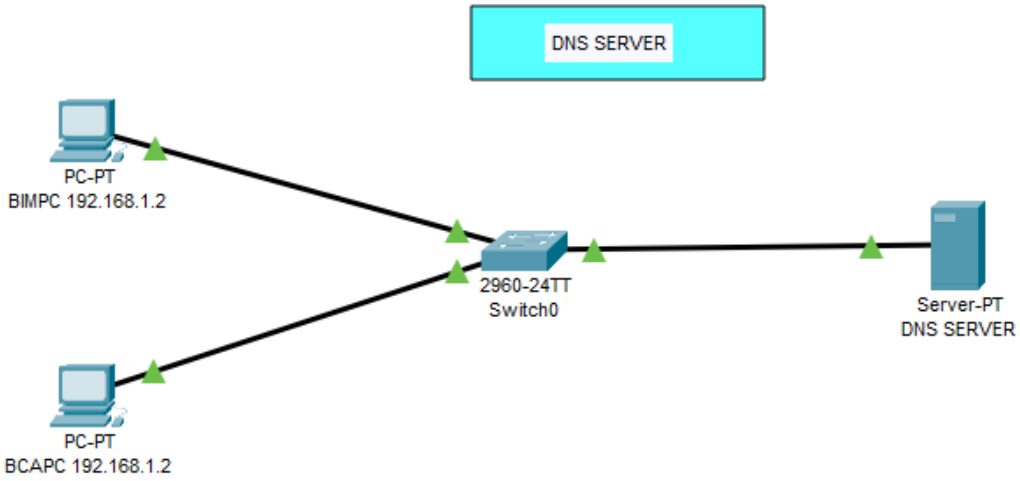


**OBSERVARTIO FINDINGS**




**Output:**