INSTITUTE OF ENGINEERING

ADVANCED COLLEGE OF ENGINEERING AND MANAGEMENT
Kupondole, Lalitpur
(AFFILIATED TO TRIBHUVAN UNIVERSITY)

Lab no:7
Subject: Computer Network

Submitted By:

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Date: 09/07/2021

Submitted To:

Department of Computer
and
Electronics Engineering

Lab 7

Title: Internet Protocol Address Version 6

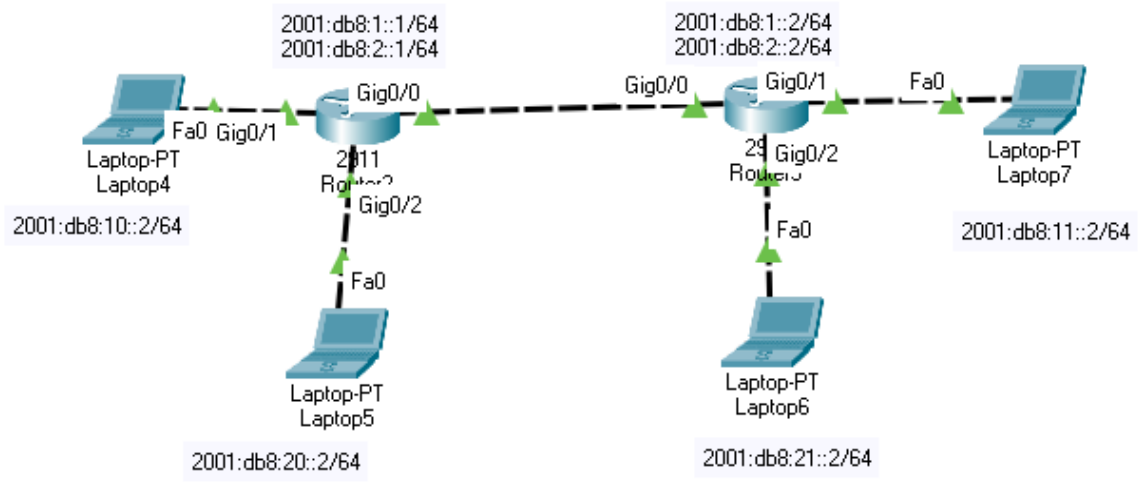
Objective:

- To learn about configuration of internet protocol version 6

Theory:

Internet Protocol version 6 (IPv6) is the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet. The main advantage of IPv6 over IPv4 is its larger address space. The size of an IPv6 address is 128 bits, compared to 32 bits in IPv4. IPv6 specifies a new packet format, designed to minimize packet header processing by routers. Because the headers of IPv4 packets and IPv6 packets are significantly different, the two protocols are not interoperable. However, most transport and application-layer protocols need little or no change to operate over IPv6; exceptions are application protocols that embed Internet-layer addresses, such as File Transfer Protocol (FTP) and Network Time Protocol (NTP), where the new address format may cause conflicts with existing protocol syntax.

Design:



Procedure:

1. First the required tools are selected.
2. The required ports of the routers were turned on.
3. Then Ip and subnet mask of the routers and laptops were set
    a. For each laptop this was done by going to the desktop and Ip configurations on Ipv6
    b. For routers this was done by going to the configuration and selecting the required port
4. Required connections were made between the routers and laptops.
5. VLAN were set in the router for the secure connection.
6. Then Static routing is done for the connection of the devices in different network.

Code:

Router 1

```
Router>enable
Router#vlan database
Router(vlan)#vlan 10 name exam
Router(vlan)#vlan 20 name account
Router(vlan)#exit
Router#config terminal
Router(config)#ipv6 unicast-routing
Router(config)#interface gig0/0
Router(config-if)#no ip address
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface gig0/0.10
Router(config-subif) # ipv6 address 2001:db8:1::1/64
Router(config-subif)#encapsulation dot1q 10
Router(config-subif)#ipv6 enable
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#interface gig0/0.20
Router(config-subif)#ipv6 address 2001:db8:2::1/64
Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#interface gig0/1
Router(config-if)#ipv6 address 2001:db8:10::1/64
Router(config-if)#no shutdown
Router(config-if)#interface gig0/2
Router(config-if)#ipv6 address 2001:db8:20::1/64
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ipv6 route 2001:db8:11::/64 2001:db8:1::2
Router(config)#ipv6 route 2001:db8:11::/64 2001:db8:2::2
Router(config)#ipv6 route 2001:db8:21::/64 2001:db8:2::2
Router(config)#ipv6 route 2001:db8:21::/64 2001:db8:1::2
Router(config)#exit
Router#  wr
```

Router 2

```
Router> en
Router#vlan database
Router(vlan)#vlan 10 name exam
Router(vlan)#vlan 20 name account
Router(vlan)#exit
Router#conf t
Router(config)#ipv6 unicast-routing
Router(config)#int gig0/0
Router(config-if)#no ip addr
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int gig0/0.10
Router(config-subif)#ipv6 addr 2001:db8:1::2/64
Router(config-subif)#encapsulation dot1q 10
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#int gig0/0.20
Router(config-subif)#ipv6 addr 2001:db8:2::2/64
Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#int gig0/1
Router(config-if)#ipv6 addr 2001:db8:11::1/64
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int gig0/2
Router(config-if)#ipv6 addr 2001:db8:21::1/64
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#ipv6 route 2001:db8:20::/64 2001:db8:2::1
Router(config)#ipv6 route 2001:db8:20::/64 2001:db8:1::1
Router(config)#ipv6 route 2001:db8:10::/64 2001:db8:1::1
Router(config)#ipv6 route 2001:db8:10::/64 2001:db8:2::1
Router(config)#exit
Router#wr
```

Output:

Ping from Laptop 4 to Laptop 7

```
C:\>ping 2001:db8:11::2

Pinging 2001:db8:11::2 with 32 bytes of data:

Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:11::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Ping from Laptop 4 to Laptop 6

```
C:\>ping 2001:db8:21::2

Pinging 2001:db8:21::2 with 32 bytes of data:

Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:21::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Ping from Laptop 5 to Laptop 6

```
C:\>ping 2001:db8:21::2

Pinging 2001:db8:21::2 with 32 bytes of data:

Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:21::2: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:21::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Ping from Laptop 5 to Laptop 7

```
C:\>ping 2001:db8:11::2

Pinging 2001:db8:11::2 with 32 bytes of data:

Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:11::2: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:11::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

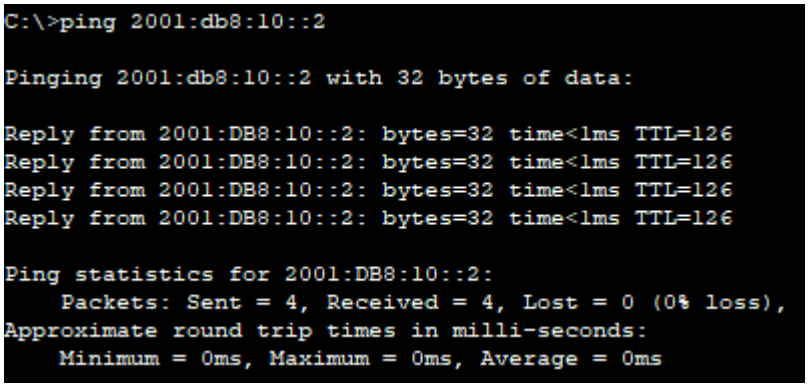
Ping from Laptop 6 to Laptop 4

```
C:\>ping 2001:db8:10::2

Pinging 2001:db8:10::2 with 32 bytes of data:

Reply from 2001:DB8:10::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:10::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:10::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:10::2: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:10::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

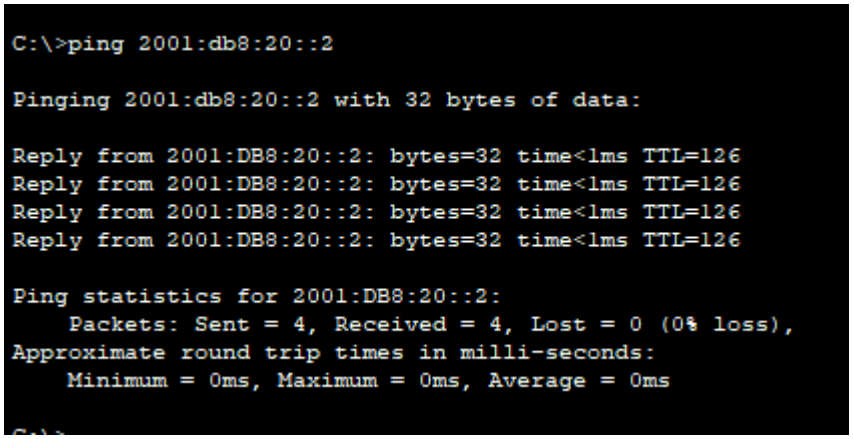
Ping from Laptop 6 to Laptop 4

```
C:\>ping 2001:db8:20::2

Pinging 2001:db8:20::2 with 32 bytes of data:

Reply from 2001:DB8:20::2: bytes=32 time=18ms TTL=126
Reply from 2001:DB8:20::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:20::2: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:20::2: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:20::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 18ms, Average = 4ms
```

Ping from Laptop 7 to Laptop 4



Ping from Laptop 7 to Laptop 4



Result and Conclusion:

In this lab we were able to configure the Ipv6 in the devices and set the VLAN on the router for the secure connection.