

# Practical-7

## AIM: Understanding of Network Name Space

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Tools required:

1. Desktop Computer
2. Ubuntu Operating System

### Note:

1. While applying IP address, student need to allocate IP address as per his/her student ID. For Example, if student ID is 20ce005 then IP address allocation for first network should start with 5.0.0.0. For subsequent network, it should start with ID+1 i.e. 6.0.0.0, 7.0.0.0. and so on.

2. Give your friend or family member name as interface

**Submission:** After writing answer into this word document, Student need to change name to his ID followed by practical number. Ex 20ce005\_Pr1.docx. Upload on assignment segment.

**Rubrics:** Nicely drafted document with clarity in answers leads to full marks. Otherwise, submission carries proportional mark. Same day submission will be evaluated from 10 marks otherwise submission will be evaluated from 7 marks.

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### References

1. Iperf3: <https://iperf.fr/iperf-doc.php>
2. Wireshark Videos:

- Edit Windows
- Canvas Window
- Capturing Data
- Interpreting data in Wireshark
- Ethernet Frame
- IP Frame
- Throughput
- Flow diagram

### Understanding Require

- IP Address
- URL
- Finding IP address from URL
- Finding location from IP Address

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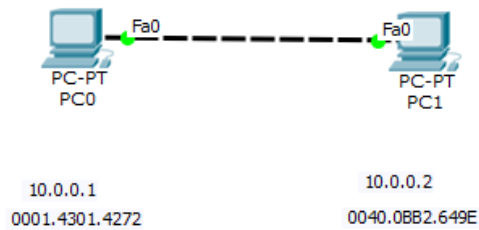
## Name Space

### Install following packages

```
sudo apt install iperf iperf3 netperf tcpdump wireshark
```

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**Experiment-1:** Emulate point-to-point topology and note the values of parameters.



### Common Code

```

sudo su
ip netns del red
ip netns del blue
ip netns add red
ip netns add blue
ip link add eth-red type veth peer name eth-blue
ip link set eth-red netns red
ip link set eth-blue netns blue
ip netns exec red ip link set lo up
ip netns exec red ip link set eth-red up
ip netns exec blue ip link set lo up
ip netns exec blue ip link set eth-blue up
ip netns exec red ip address add 10.0.0.1/24 dev eth-red
ip netns exec blue ip address add 10.0.0.2/24 dev eth-blue
#####Red#####
  
```

### **Open New Terminal**

```

sudo su
ip netns exec red bash
iperf -s
  
```

```

#####Blue#####
  
```

### **Open New Terminal**

```

sudo su
  
```

```
ip netns exec blue bash
```

```
iperf -c 10.0.0.1
```

**Start Server**

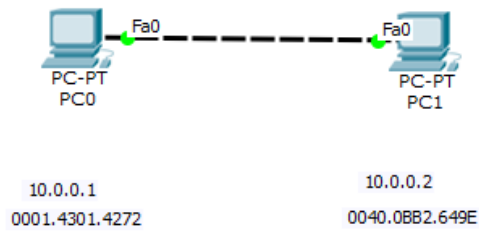
```
root@ritesh-VirtualBox:/home/ritesh# iperf -s
-----
Server listening on TCP port 5001
TCP window size: 128 KByte (default)
-----
[  4] local 10.0.0.2 port 5001 connected with 10.0.0.1 port 41234
[ ID] Interval      Transfer    Bandwidth
[  4] 0.0-10.0 sec  40.1 GBytes 34.4 Gbits/sec
```

**Start Client**

```
root@ritesh-VirtualBox:/home/ritesh# iperf -c 10.0.0.2
-----
Client connecting to 10.0.0.2, TCP port 5001
TCP window size: 85.0 KByte (default)
-----
[  3] local 10.0.0.1 port 41234 connected with 10.0.0.2 port 5001
[ ID] Interval      Transfer    Bandwidth
[  3] 0.0-10.0 sec  40.1 GBytes 34.4 Gbits/sec
```

Particulars	Answer
Server IP Address	
Client IP address	
Bandwidth between server and client	
Default port on which server listens data	
Default port on which client sends data	

**Experiment-2:** Capturing packet in point-to-point topology and records the parameters.



### Execute the Common Code

```
#####Red#####
```

#### Open New Terminal

```
sudo su
ip netns exec red bash
sudo wireshark &
##Start Capturing data
iperf -s
```

```
#####Blue#####
```

#### Open New Terminal

```
sudo su
ip netns exec blue bash
iperf -c 10.0.0.1 -n 1 -b 1
```

Fill following table for any one packet

<<insert Captured packet image here>>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.1	10.0.0.2	UDP	1512	38999 → 5001 Len=1470
2	1.000383532	10.0.0.1	10.0.0.2	UDP	1512	38999 → 5001 Len=1470
3	1.000662186	10.0.0.2	10.0.0.1	UDP	1512	5001 → 38999 Len=1470
4	61.840619692	fe80::44d4:56ff:fe4...	ff02::2	ICMPv6	70	Router Solicitation fr...

▶ Frame 1: 1512 bytes on wire (12096 bits), 1512 bytes captured (12096 bits) on interface 0

▼ Ethernet II, Src: a6:44:de:c9:96:00 (a6:44:de:c9:96:00), Dst: 46:d4:56:42:e7:a3 (46:d4:56:42:e7:a3)

- ▶ Destination: 46:d4:56:42:e7:a3 (46:d4:56:42:e7:a3)
- ▶ Source: a6:44:de:c9:96:00 (a6:44:de:c9:96:00)
- Type: IPv4 (0x0800)

▼ Internet Protocol Version 4, Src: 10.0.0.1, Dst: 10.0.0.2

- 0100 .... = Version: 4
- .... 0101 = Header Length: 20 bytes (5)
- ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
- Total Length: 1498
- Identification: 0x6d45 (27973)
- ▶ Flags: 0x4000, Don't fragment
- Time to live: 64
- Protocol: UDP (17)
- Header checksum: 0xb3cb [validation disabled]
- [Header checksum status: Unverified]
- Source: 10.0.0.1
- Destination: 10.0.0.2

▼ User Datagram Protocol, Src Port: 38999, Dst Port: 5001

- Source Port: 38999
- Destination Port: 5001
- Length: 1478
- Checksum: 0x19da [unverified]
- [Checksum Status: Unverified]
- [Stream index: 0]

▼ Data (1470 bytes)

- Data: 000000006134a9bc00038d1b323334350000000030313233...
- [Length: 1470]

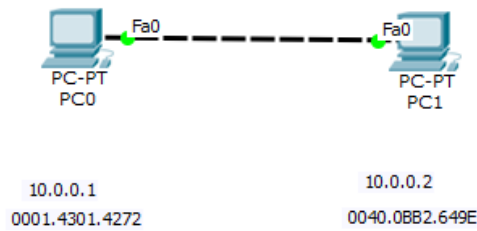
**Header fields of Ethernet**

Header field Name	Header field Value (Hex Value)
Destination MAC Address	
Source MAC Address	
Type	

**Header fields of Network**

Header field Name	Header field Value (Hex Value)
Version	
IHL	

**Experiment-3:** Capturing packet in point-to-point topology and records the parameters.



**Execute the Common Code**

#####Red#####

**Open New Terminal**

```
sudo su
ip netns exec red bash
sudo wireshark &
##Start Capturing data
iperf -s -u
```

#####Blue#####

**Open New Terminal**

```
sudo su
ip netns exec blue bash
iperf -c 10.0.0.1 -n 1 -b 1 -u
```

**Fill following table for any one packet**

<<insert Captured packet image here>>

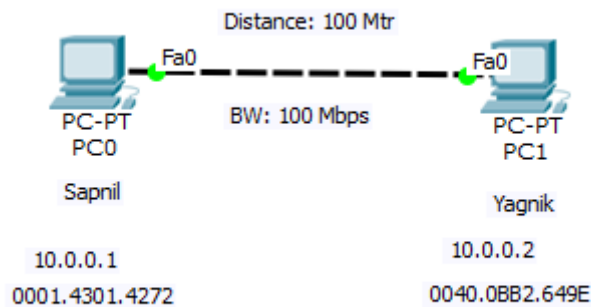
**Header fields of Network**

Header field Name	Header field Value (Hex Value)
Version	
IHL	

**Header fields of Transport Layer: TCP/UDP**

Header field Name	Header field Value (Hex Value)

**Experiment-4:** Emulate point-to-point topology as per the parameters given in following topology.



<<Student Topology with IP address and MAC address as label>>

#####Red#####

### Open New Terminal

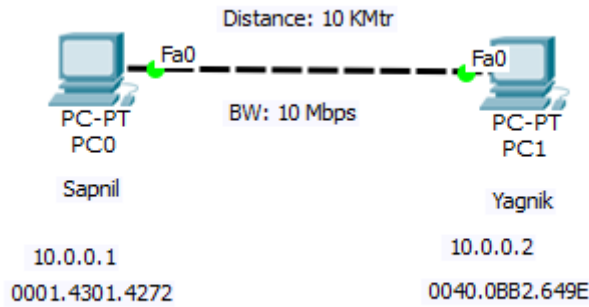
```
sudo su
ip netns exec red bash
tc qdisc show dev eth-red
tc qdisc add dev eth-red root netem delay 5ms rate 100mbit
iperf -s
```

#####Blue#####

### Open New Terminal

```
sudo su
ip netns exec blue bash
tc qdisc show dev eth-blue
tc qdisc add dev eth-blue root netem delay 5ms rate 100mbit
iperf -c 10.0.0.1 -n 1 -b 1
```

**Experiment-5:** Emulate point-to-point topology as per the parameters given in following topology and write the code below topology.

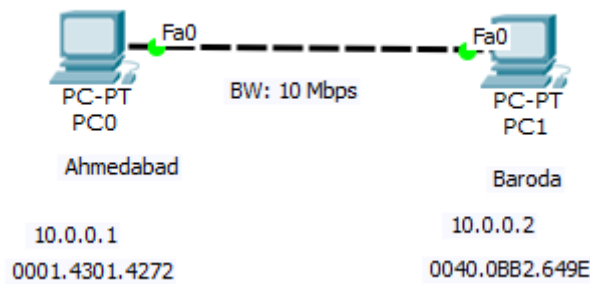


#####Red#####

**Open New Terminal**

#####Blue#####

**Open New Terminal**

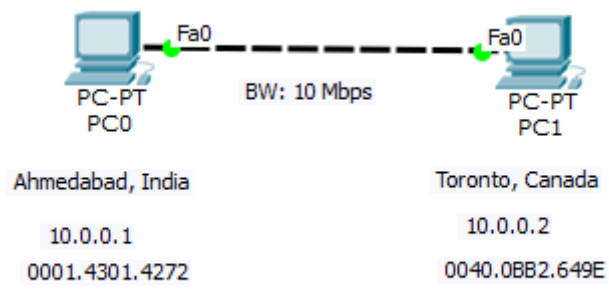


#####Red#####

**Open New Terminal**

#####Blue#####

**Open New Terminal**



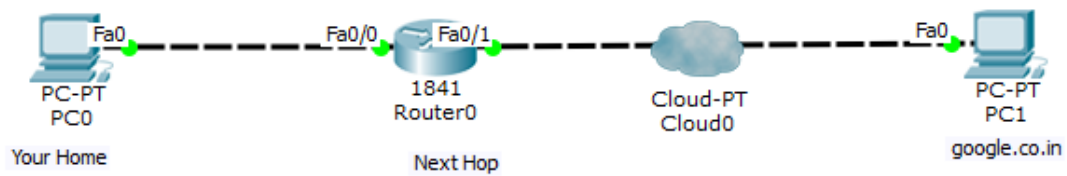
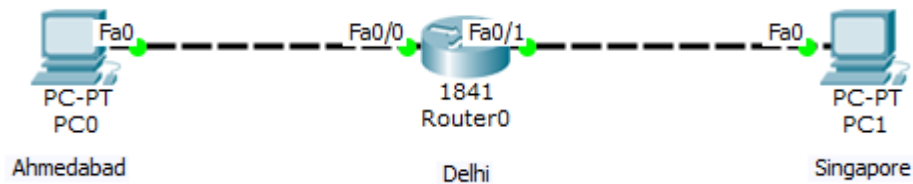
#####Red#####

**Open New Terminal**

#####Blue#####

**Open New Terminal**

**Experiment-6:** Emulate point-to-point topology as per the parameters given in following topology and write the code below topology.



Questions:

1. What do you mean by server and client?
2. When your computer becomes Server?
3. When your computer becomes Client?