M.Sc C.S - I
SEM I
E-Journal

Roll No.	027
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Subject	ADVANCED COMPUTER NETWORK

Thakur Educational Trust's (Regd.)
Thakur College of Science & Commerce
UGC Recognised • Affiliated to University Of Mumbai
(NAAC Accredited with Grade "A" [3rd Cycle] & ISO 9001:2015 Certified)

CERTIFICATE

This is here to certify that Mr. **OJHA ABHISHEK DEVMANI**, Seat Number **027** of M.Sc. I Computer Science, has satisfactorily completed the required number of experiments prescribed by the UNIVERSITY OF MUMBAI during the academic year 2021 – 2022.

Date:

Place: Mumbai

Teacher In-Charge Head of Department

External Examiner

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2	Create a network with three routers with OSPF algorithm and each router associated network will have minimum three PC. Show connectivity.	
3	Create a network with three routers with BGP algorithm and each router associated network will have minimum three PC. Show connectivity.	
4	Configure DHCP server and client for DHCP service.	
5	Create virtual PC based network using virtualization software and virtual NIC. Show connectivity to Internet as well as connectivity to VMs in other network.	
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ADVANCED COMPUTER NETWORK

PRACTICAL NO 1

027_Abhishek_Ojha

Practical No 1

Aim: Create a network with three routers with RIPv2 and each router associated network will have minimum three PC. Show connectivity.

Show PC Connectivity:

Machine name	IP Address
PC_PT_PC0	10.0.0.2
PC_PT_PC1	10.0.0.3
PC_PT_PC2	10.0.0.4
PC_PT_PC3	20.0.0.2
PC_PT_PC4	20.0.0.3
PC_PT_PC5	20.0.0.4
PC_PT_PC6	30.0.0.2
PC_PT_PC7	30.0.0.3
PC_PT_PC8	30.0.0.4

Source Code:

Flow Of Program:

1] Connect PC_PT_PC0, PC_PT_PC1 and PC_PT_PC2 with Switch 0 and Switch 0 with Router 0 and configure it as follows:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
```

```
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#ip address 70.70.70.1 255.0.0.0
Router(config-if)#ip address 70.70.70.1 255.0.0.0
Router(config-if)#ip address 70.70.70.2 255.0.0.0
Router(config-if)#ip address 70.70.70.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
```

RIPv2 Configuration:

```
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#network 70.0.0.0
Router(config-router)#
%SYS-5-CONFIG_I: Configured from console by console
```

2] Connect PC_PT_PC3, PC_PT_PC4 and PC_PT_PC5 with Switch 1 and Switch 1 with Router 1 and configure it as follows:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 50.50.50.2 255.0.0.0
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#ip address 60.60.60.2 255.0.0.0
Router(config-if)#ip address 60.60.60.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
```

RIPv2 Configuration:

```
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#network 60.0.0.0
Router(config-router)#
%SYS-5-CONFIG_I: Configured from console by console
```

3] Connect PC_PT_PC6, PC_PT_PC7 and PC_PT_PC8 with Switch 2 and Switch 2 with Router 2 and configure it as follows:

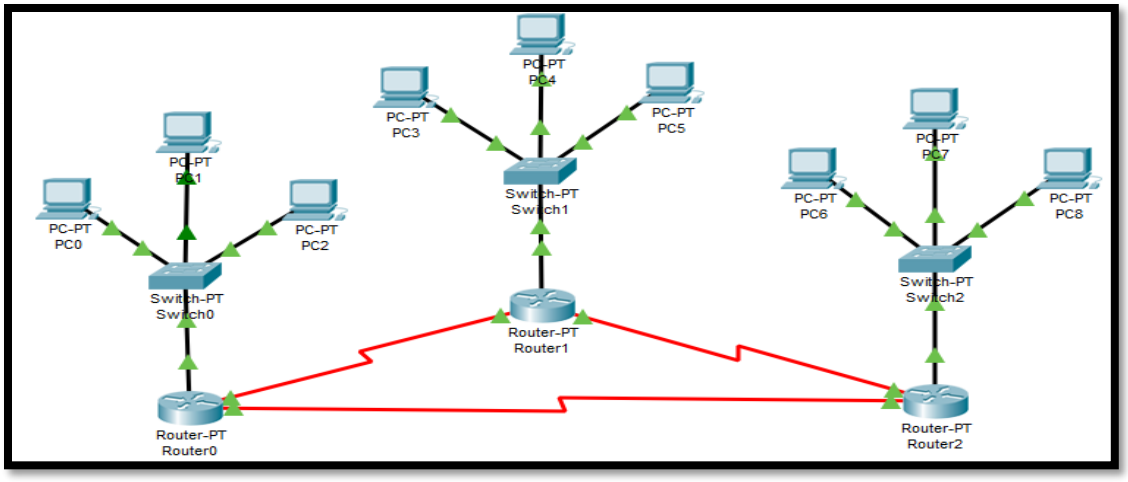
```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 60.60.60.3 255.0.0.0
Router(config-if)#ip address 60.60.60.3 255.0.0.0
Router(config-if)#
```

```
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
ip address 70.70.70.3 255.0.0.0
Router(config-if)#ip address 70.70.70.3 255.0.0.0
Router(config-if)#ip address 70.70.70.2 255.0.0.0
Router(config-if)#ip address 70.70.70.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
```

RIPv2 Configuration:

```
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#network 60.0.0.0
Router(config-router)#network 70.0.0.0
Router(config-router)#
%SYS-5-CONFIG_I: Configured from console by console
```

Output:


PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
Switch-PT
Switch0
Router-PT
Router0
PC-PT
PC3
PC-PT
PC4
PC-PT
PC5
Switch-PT
Switch1
Router-PT
Router1
PC-PT
PC6
PC-PT
PC7
PC-PT
PC8
Switch-PT
Switch2
Router-PT
Router2

ADVANCED COMPUTER NETWORK

PRACTICAL NO 2

027_Abhishek_Ojha

Practical No 2

Aim: Create a network with three routers with OSPF and each router associated network will have minimum three PC. Show connectivity.

Show PC Connectivity:

Machine name	IP Address
PC_PT_PC0	10.0.0.2
PC_PT_PC1	10.0.0.3
PC_PT_PC2	10.0.0.4
PC_PT_PC3	20.0.0.2
PC_PT_PC4	20.0.0.3
PC_PT_PC5	20.0.0.4
PC_PT_PC6	30.0.0.2
PC_PT_PC7	30.0.0.3
PC_PT_PC8	30.0.0.4

Source Code:

Flow Of Program:

1] Connect PC_PT_PC0, PC_PT_PC1 and PC_PT_PC2 with Switch 0 and Switch 0 with Router 0 and configure it as follows:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
```

```
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#ip address 70.70.70.3 255.0.0.0
Router(config-if)#ip address 70.70.70.3 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
```

OSPF Configuration:

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 50.0.0.0 0.255.255.255 area 0
Router(config-router)#network 70.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
```

2] Connect PC_PT_PC3, PC_PT_PC4 and PC_PT_PC5 with Switch 1 and Switch 1 with Router 1 and configure it as follows:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 50.50.50.2 255.0.0.0
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#ip address 60.60.60.2 255.0.0.0
Router(config-if)#ip address 60.60.60.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

OSPF Configuration:

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 2
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#network 50.0.0.0 0.255.255.255 area 0
Router(config-router)#network 60.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#

3] Connect PC_PT_PC6, PC_PT_PC7 and PC_PT_PC8 with Switch 2 and Switch 2 with Router 2 and configure it as follows:

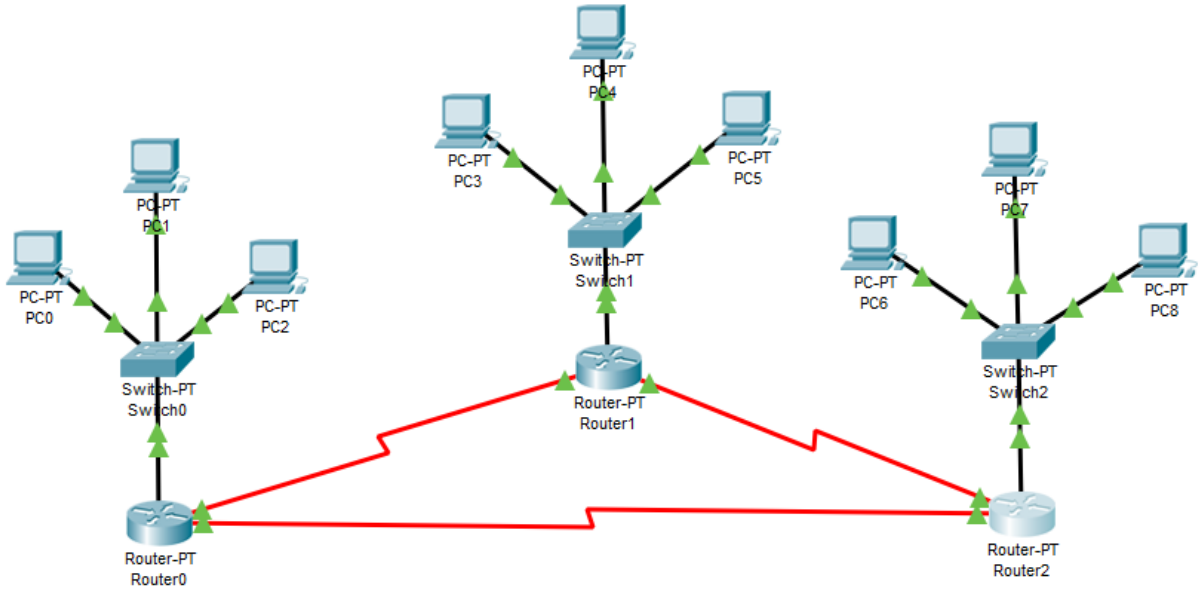
```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state
to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 60.60.60.3 255.0.0.0
Router(config-if)#ip address 60.60.60.3 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
ip address 70.70.70.3 255.0.0.0
Router(config-if)#ip address 70.70.70.3 255.0.0.0
Router(config-if)#
```

OSPF Configuration:

```
Router>en
Router#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 3
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#network 60.0.0.0 0.255.255.255 area 0
Router(config-router)#network 70.0.0.0 0.255.255.255 area 0
Router(config-router)#exi
00:55:44: %OSPF-5-ADJCHG: Process 3, Nbr 60.60.60.2 on Serial2/0 from LOADING to FULL, Loading Done

Output:



ADVANCED COMPUTER NETWORK

PRACTICAL NO 3

027_Abhishek_Ojha

Practical No 3

Aim: Create a network with three routers with BGP and each router associated network will have minimum three PC. Show Connectivity

Show PC. Connectivity:

Machine Name	IP Address
PC-PT-PC0	10.10.10.2
PC-PT-PC1	10.10.10.3
PC-PT-PC2	10.10.10.4
PC-PT-PC3	20.20.20.2
PC-PT-PC4	20.20.20.3
PC-PT-PC5	20.20.20.4
PC-PT-PC6	30.30.30.2
PC-PT-PC7	30.30.30.3
PC-PT-PC8	30.30.30.4

Flow of Program:

1] Connect PC-PT-PC0, PC-PT-PC1 and PC-PT-PC2 with Switch 0 and Switch 0 with Router0 and configure it as follows:

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 10.10.10.1 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface serial2/0
Router(config-if)#ip address 50.50.50.2 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface serial3/0
Router(config-if)#ip address 70.70.70.3 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

BGP Configuration:

Router1(config-router)#router bgp 100
Router1(config-router)#neighbor 50.50.50.3 remote-as 200
Router1(config-router)#neighbor 70.70.70.3 remote-as 300
Router1(config-router)#network 10.10.10.1 mask 255.0.0.0
Router1(config-router)#exit

2] Connect PC-PT-PC3, PC-PT-PC4 and PC-PT-PC5 with Switch 1 and Switch 1 with Router1 and configure it as follows:

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 20.20.20.1 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#interface serial2/0
Router(config-if)#ip address 50.50.50.3 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface serial3/0
Router(config-if)#ip address 60.60.60.2 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

Router(config)#

%LINK-5-CHANGED: Interface Serial3/0, changed state to up

BGP Configuration:

Router2(config-router)#router bgp 200
Router2(config-router)#neighbor 50.50.50.2 remote-as 100
Router2(config-router)#neighbor 60.60.60.3 remote-as 300
Router2(config-router)#network 20.20.20.1 mask 255.0.0.0
Router2(config-router)#exit

3] Connect PC-PT-PC6, PC-PT-PC7 and PC-PT-PC8 with Switch 2 and Switch 2 with Router2 and configure it as follows:

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet0/0
Router(config-if)#ip address 30.30.30.1 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface serial2/0
Router(config-if)#ip address 60.60.60.3 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

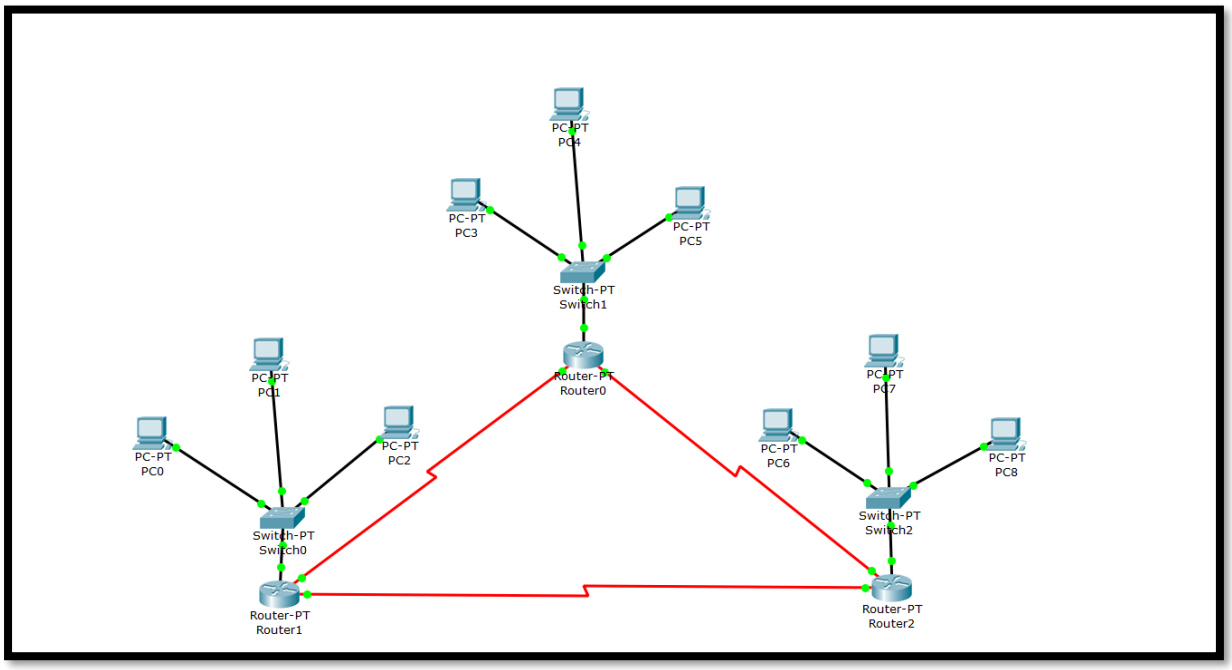
Router(config)#interface serial3/0
Router(config-if)#ip address 70.70.70.3 255.0.0.0
Router(config-if)#no shutdown

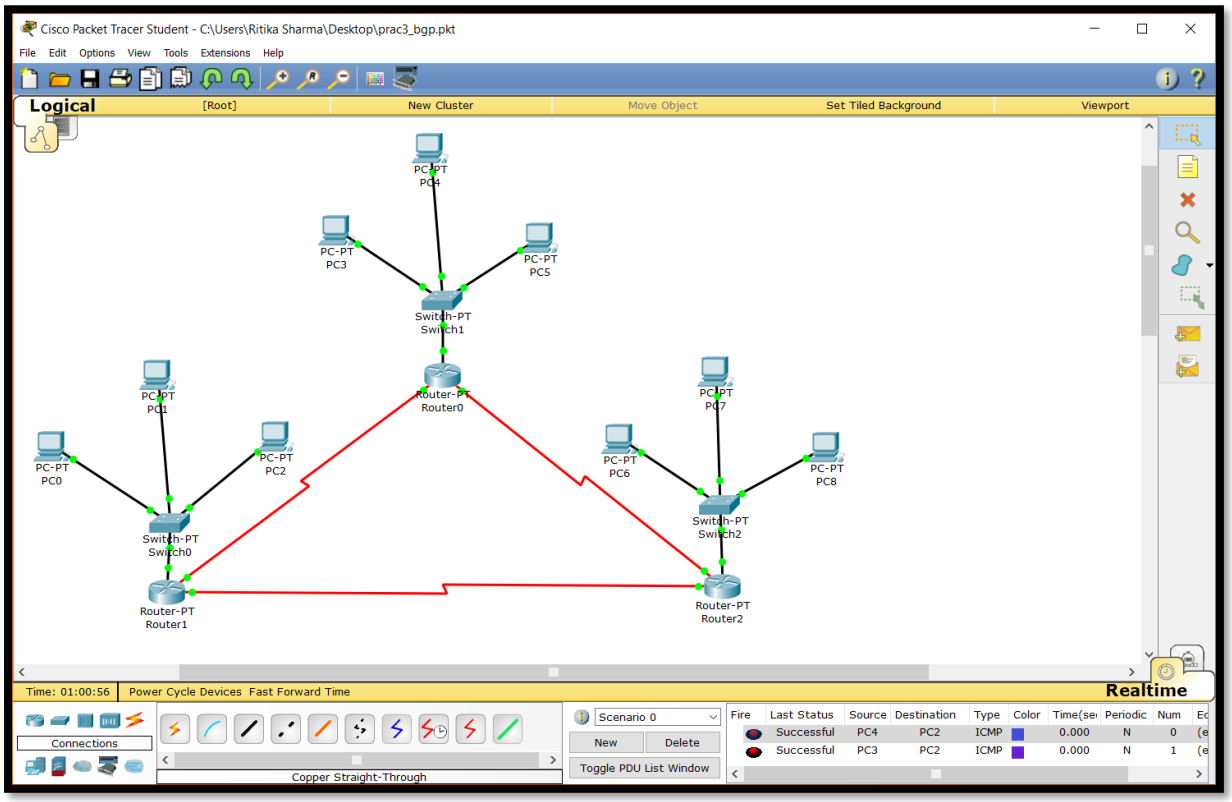
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

BGP Configuration:

Router(config)#router bgp 300
Router(config-router)#neighbor 70.70.70.2 remote-as 100
Router(config-router)#neighbor 60.60.60.2 remote-as 200
Router(config-router)#network 30.30.30.1 mask 255.0.0.0
Router(config-router)#exit

Output:


PC-PT
PC4
PC-PT
PC3
PC-PT
PC5
Switch-PT
Switch1
Router-PT
Router0
PC-PT
PC1
PC-PT
PC7
PC-PT
PC0
PC-PT
PC2
PC-PT
PC6
PC-PT
PC8
Switch-PT
Switch0
Switch-PT
Switch2
Router-PT
Router1
Router-PT
Router2


Cisco Packet Tracer Student - C:\Users\Ritika Sharma\Desktop\prac3_bgp.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
PC-PT
PC4
PC-PT
PC3
PC-PT
PC5
Switch-PT
Switch1
Router-PT
Router0
PC-PT
PC1
PC-PT
PC7
PC-PT
PC0
PC-PT
PC2
PC-PT
PC6
PC-PT
PC8
Switch-PT
Switch0
Switch-PT
Switch2
Router-PT
Router1
Router-PT
Router2
Time: 01:00:56
Power Cycle Devices Fast Forward Time
Realtime
Connections
Copper Straight-Through
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(se
Periodic
Num
Successful
PC4
PC2
ICMP
0.000
N
0
Successful
PC3
PC2
ICMP
0.000
N
1

ADVANCED COMPUTER NETWORK

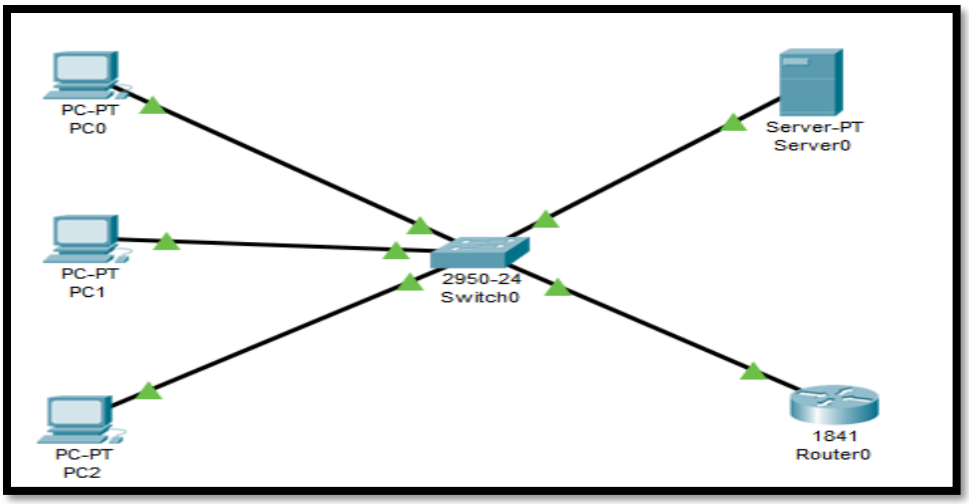
PRACTICAL NO 4

027_Abhishek_Ojha

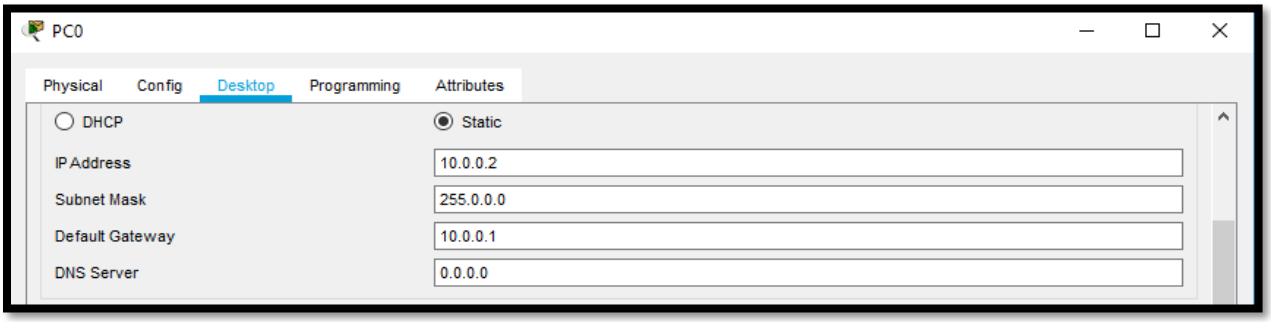
Practical No 4

Aim: Create DHCP server and client for DHCP service.

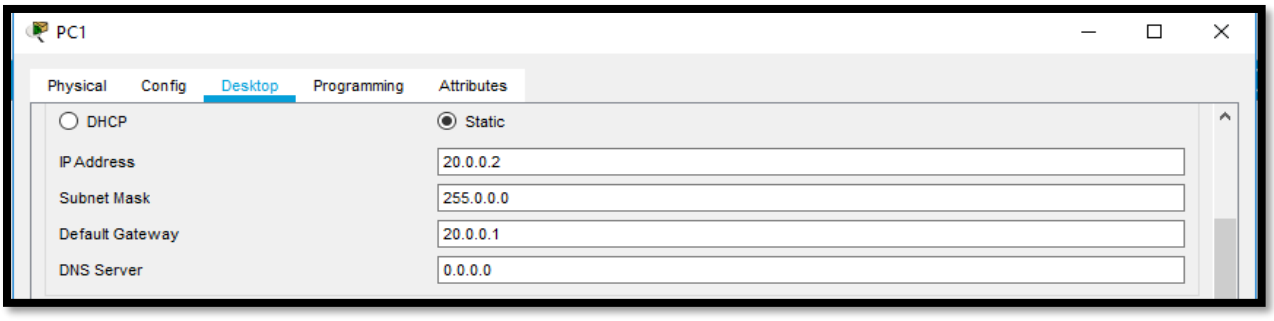
Configuration of DHCP Client and Server



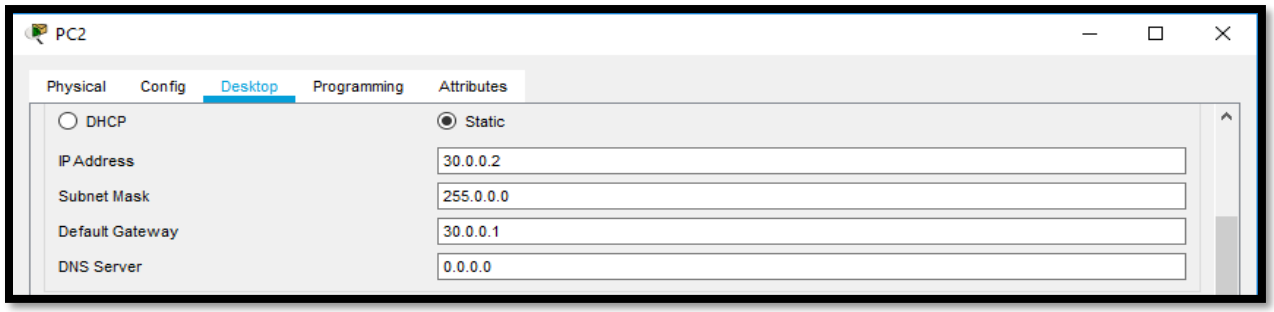
On PC0:



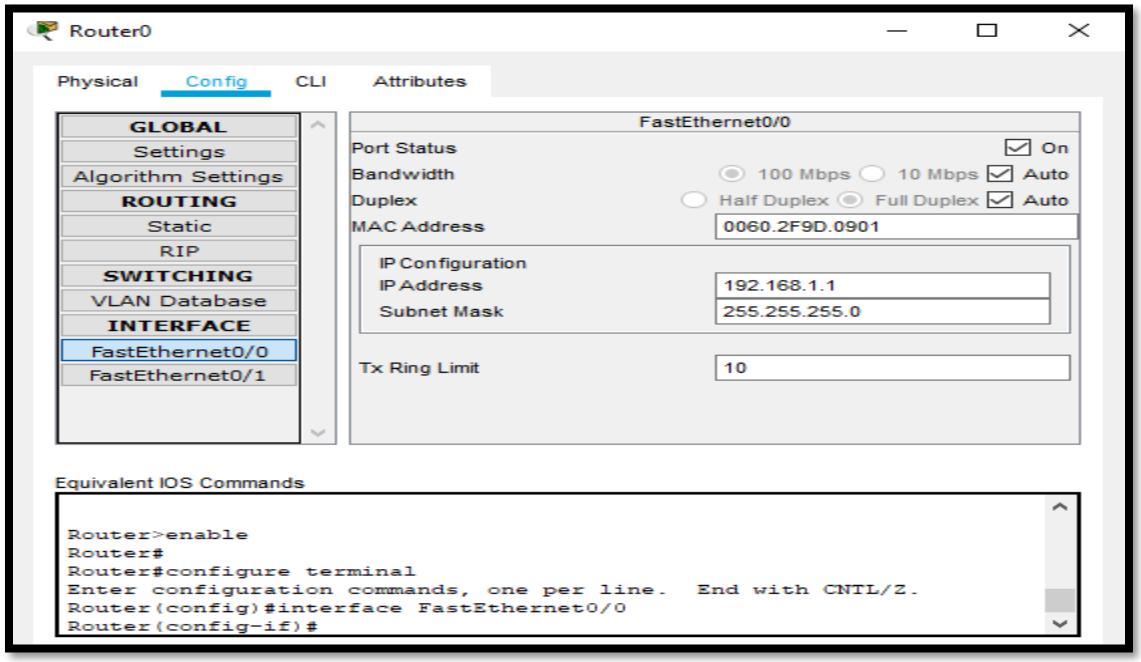
On PC1:



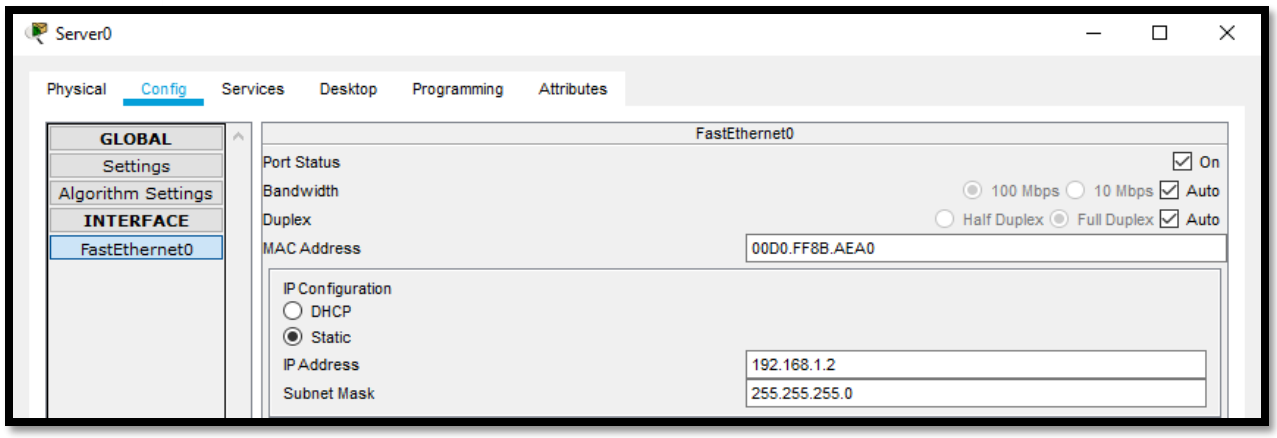
On PC2:


PC2
Physical
Config
Desktop
Programming
Attributes
DHCP
Static
IP Address
30.0.0.2
Subnet Mask
255.0.0.0
Default Gateway
30.0.0.1
DNS Server
0.0.0.0

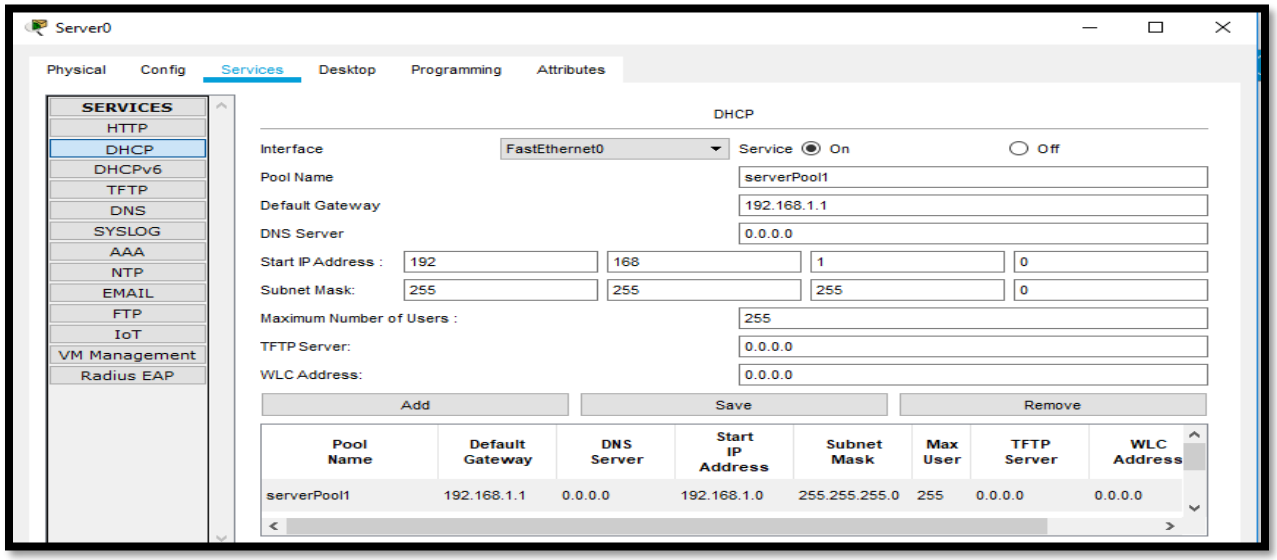
On Router0:


Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0060.2F9D.0901
IP Configuration
IP Address
192.168.1.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#

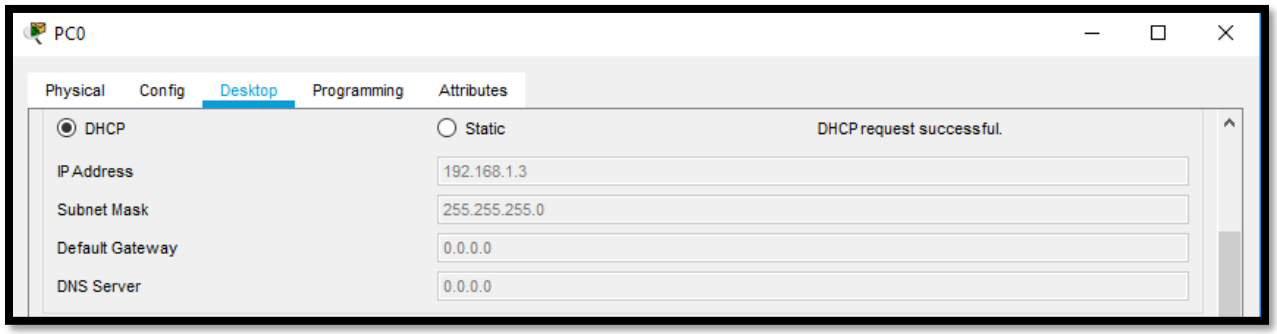
Setup IP on Server0:



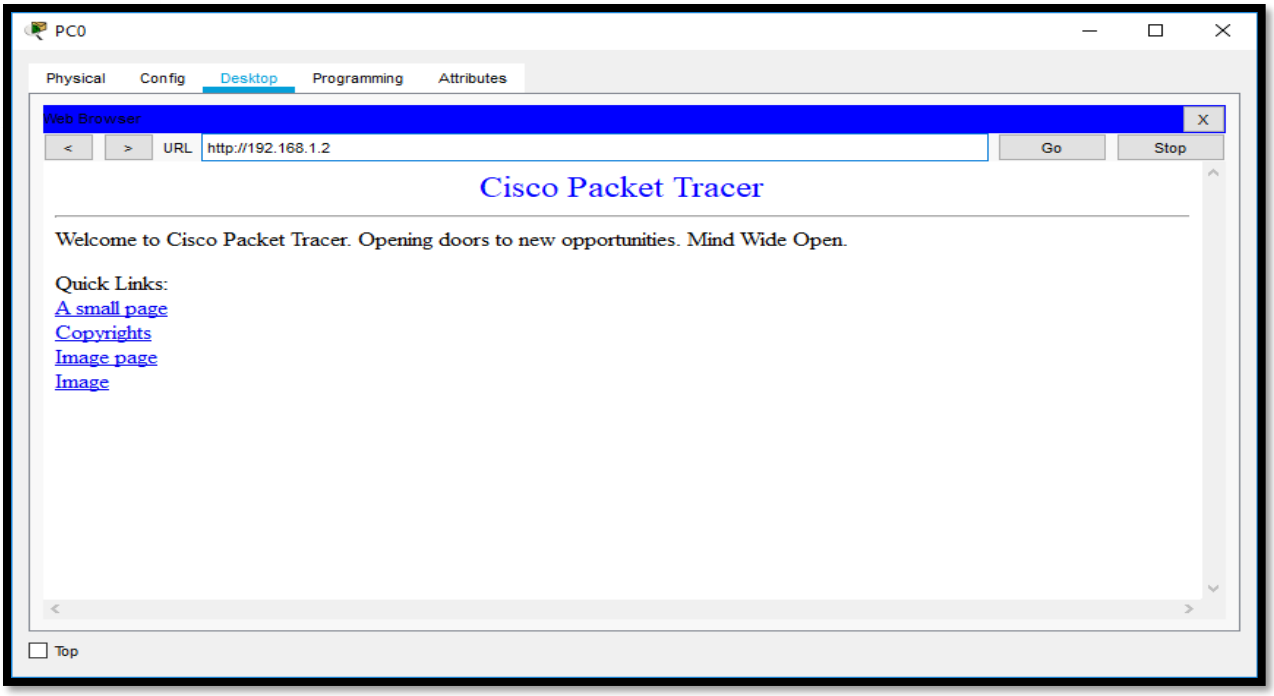
Setup DHCP on Server0:



Now go to PC0 and select DHCP:



Now, open web browser on PC0 and enter the Server IP Address:


PC0
Physical
Config
Desktop
Programming
Attributes
Web Browser
URL
http://192.168.1.2
Go
Stop
Cisco Packet Tracer
Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.
Quick Links:
A small page
Copyrights
Image page
Image
Top

ADVANCED COMPUTER NETWORK

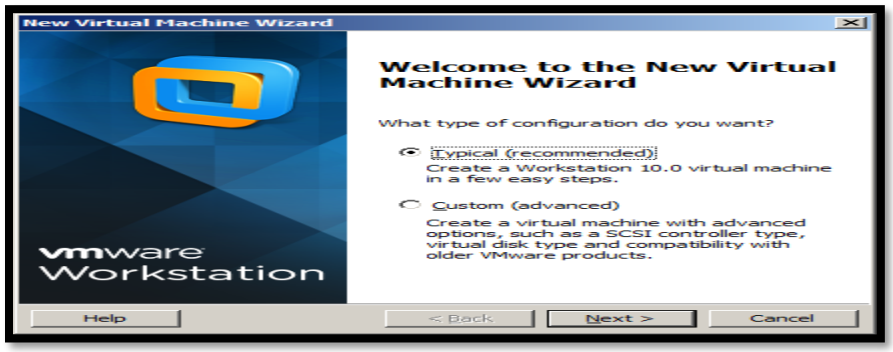
PRACTICAL NO 5

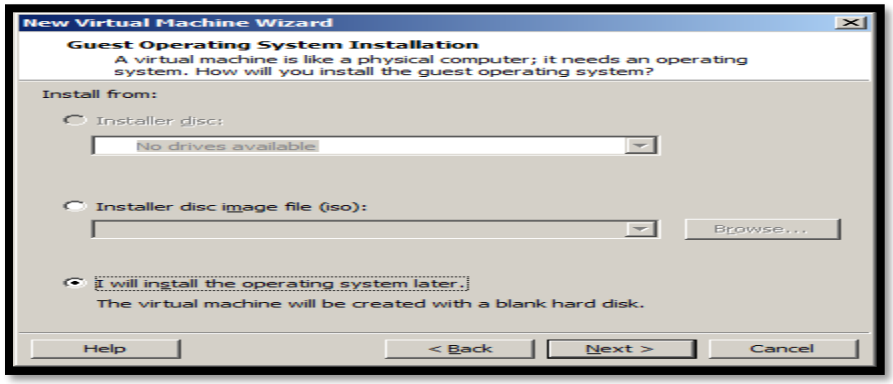
027_Abhishek_Ojha

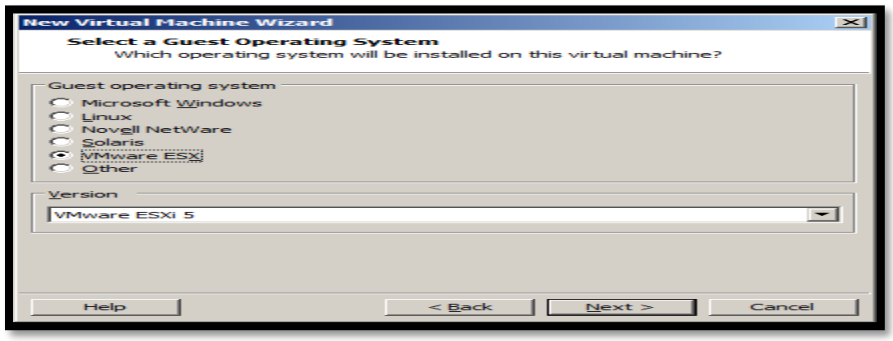
Practical No 5

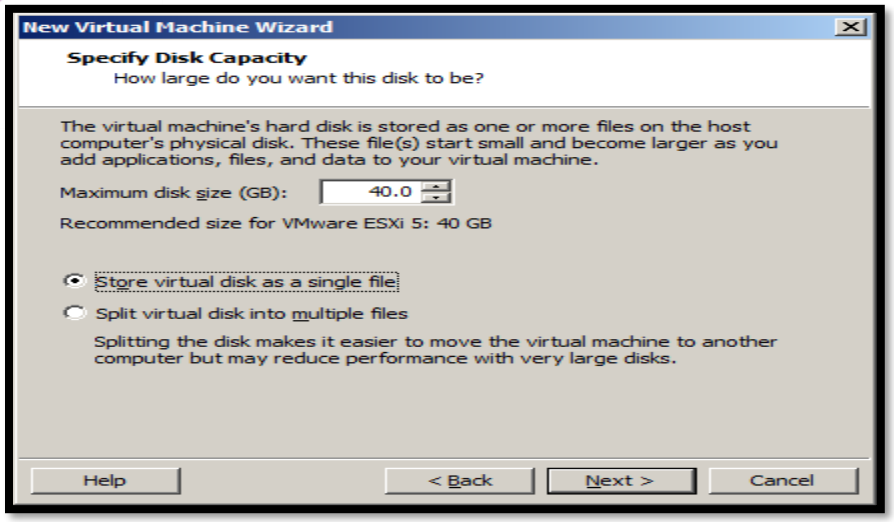
Aim: Create virtual PC based network using virtualization software and virtual NIC

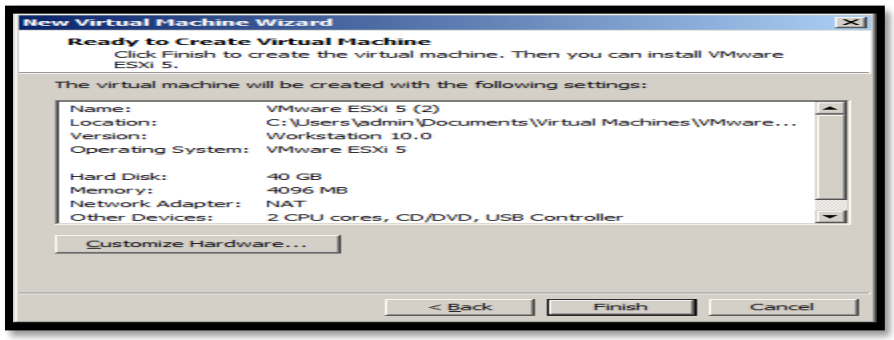
Virtual Machine Installation



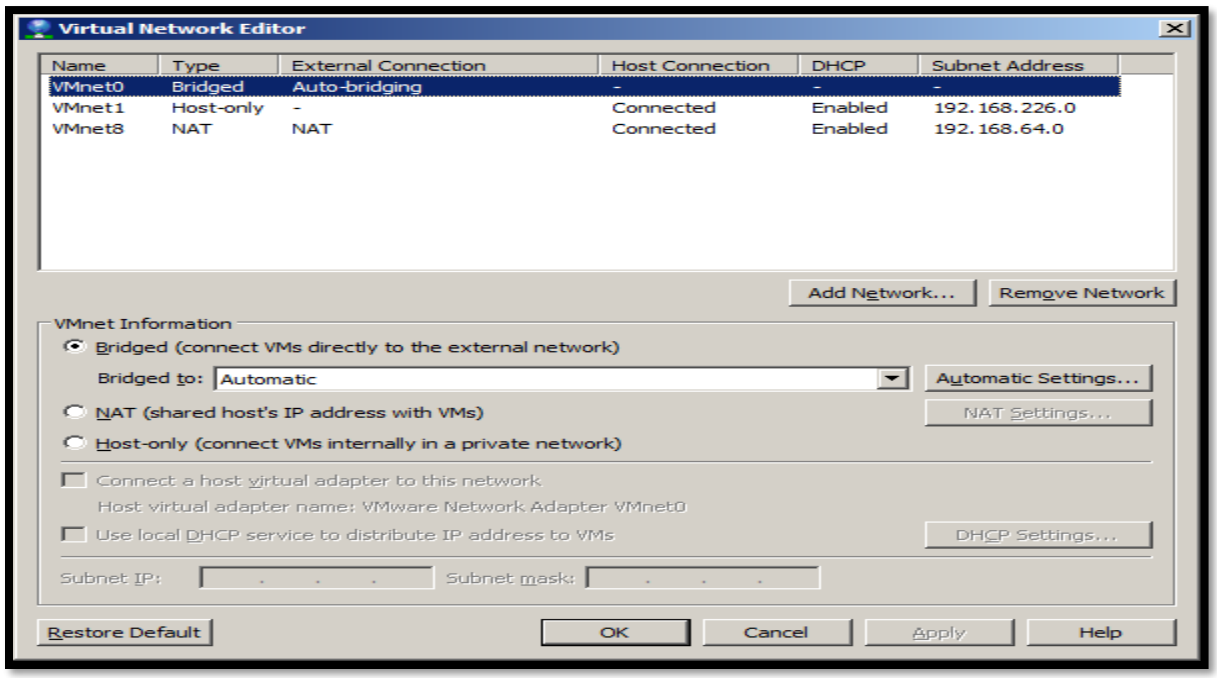


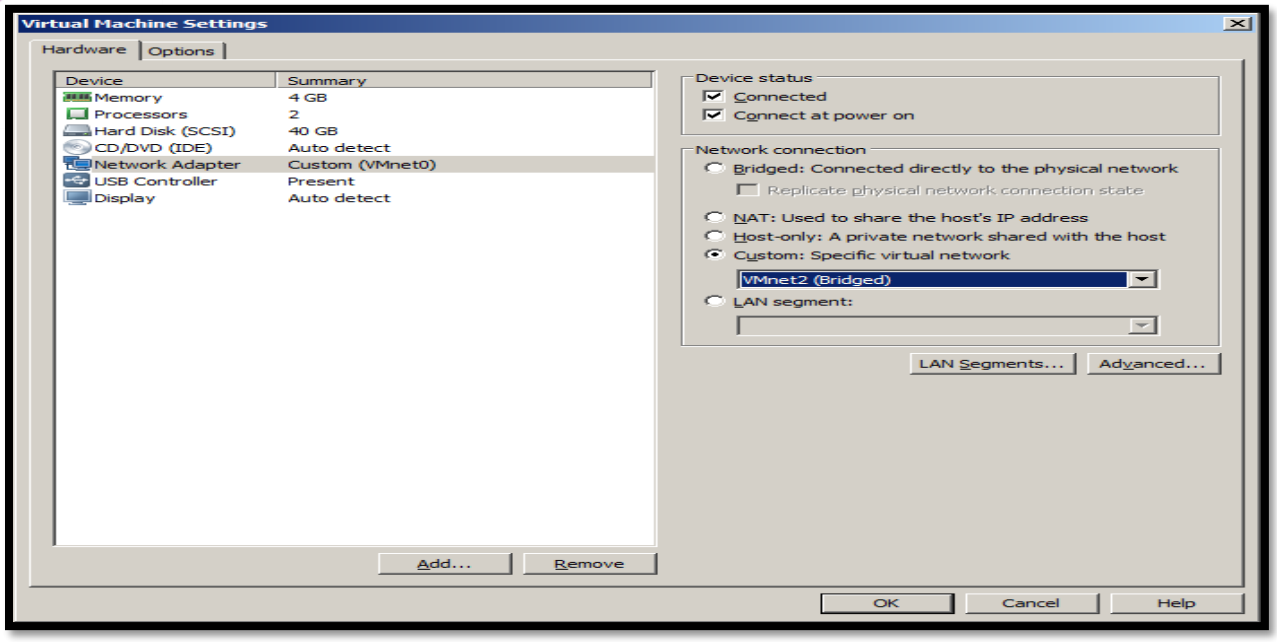


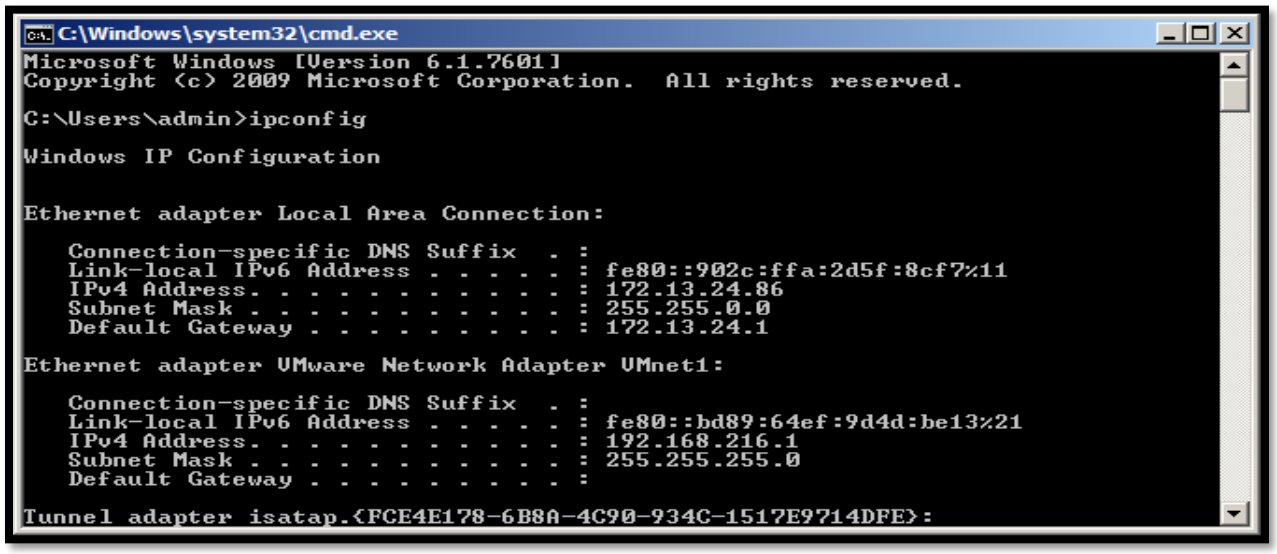




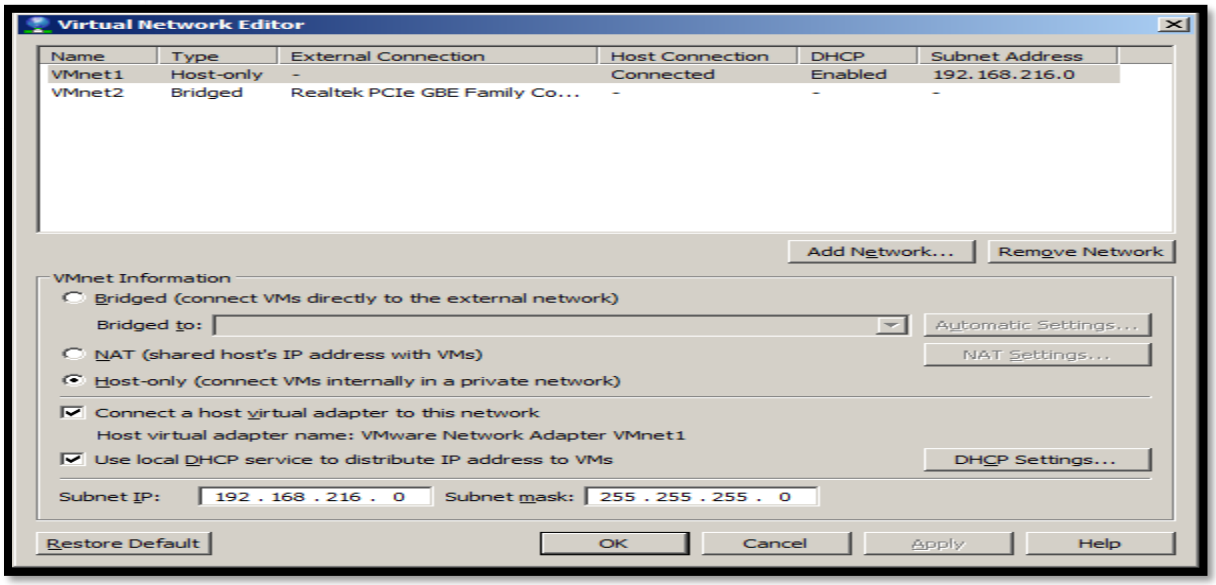
Bridged Connection Delivery:

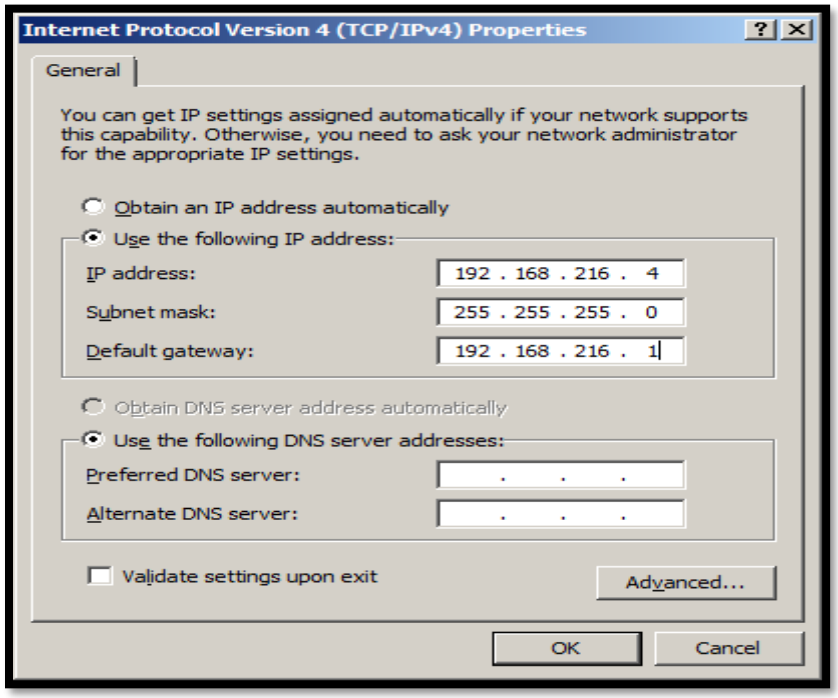


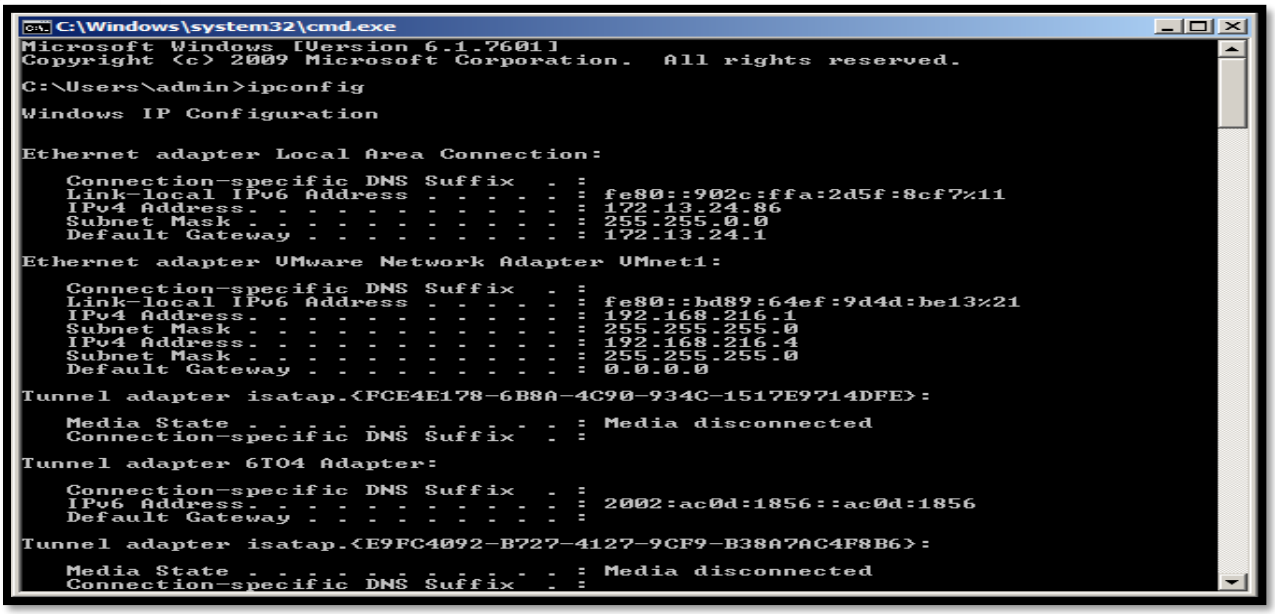


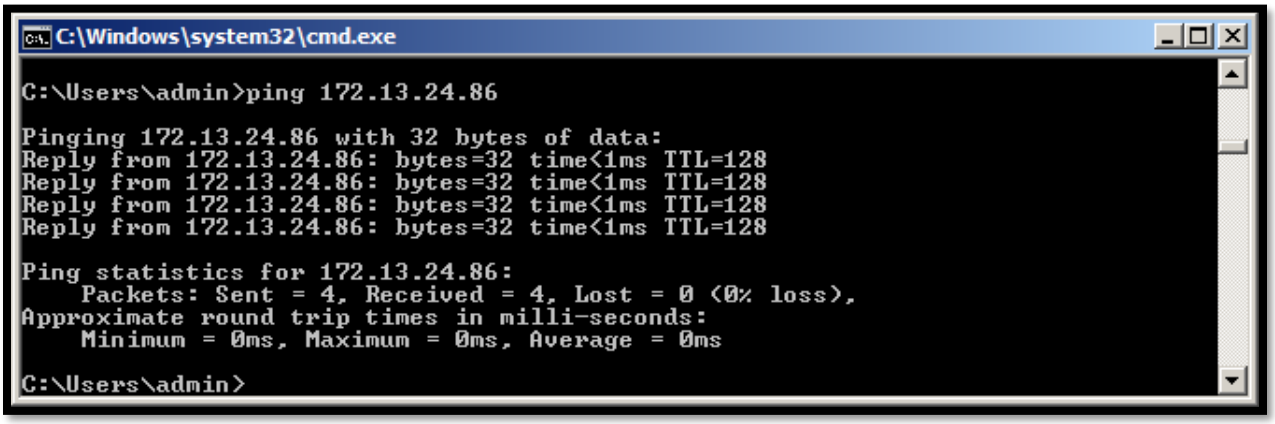


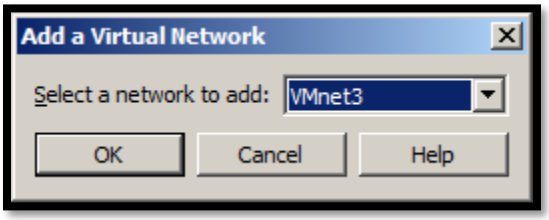
Host – Host Connection Delivery:

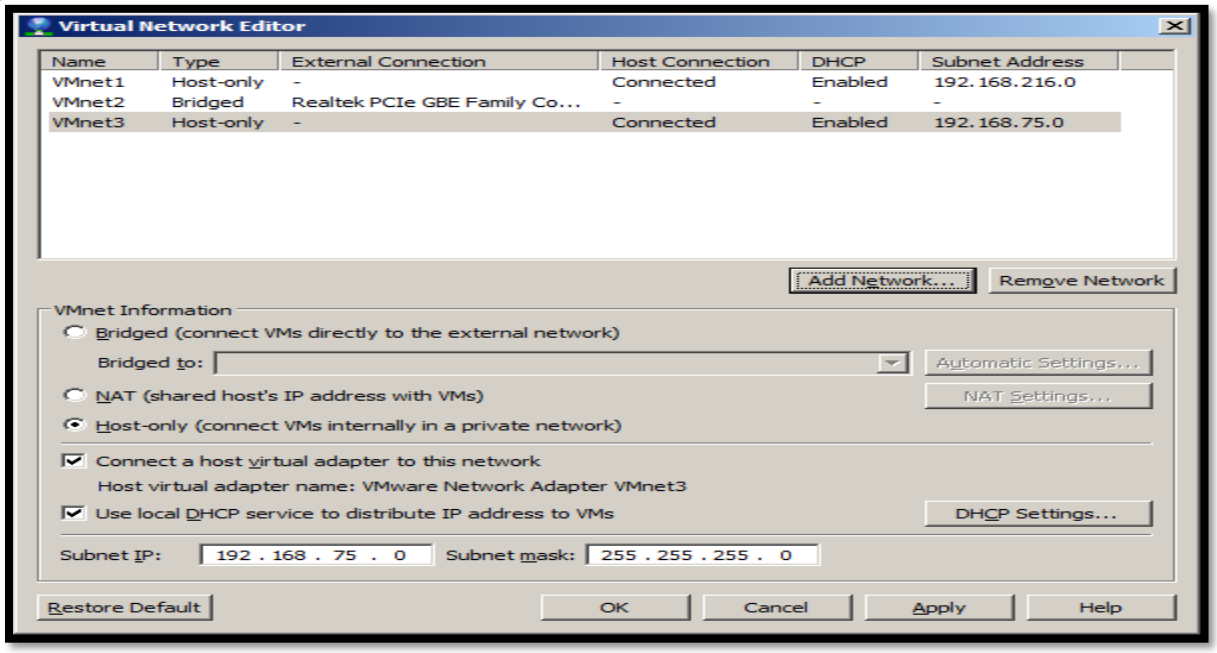

Virtual Network Editor
Name Type External Connection Host Connection DHCP Subnet Address
VMnet1 Host-only - Connected Enabled 192.168.216.0
VMnet2 Bridged Realtek PCIe GBE Family Co... - - -
Add Network... Remove Network
VMnet Information
Bridged (connect VMs directly to the external network)
Bridged to:
Automatic Settings...
NAT (shared host's IP address with VMs)
NAT Settings...
Host-only (connect VMs internally in a private network)
Connect a host virtual adapter to this network
Host virtual adapter name: VMware Network Adapter VMnet1
Use local DHCP service to distribute IP address to VMs
DHCP Settings...
Subnet IP: 192 . 168 . 216 . 0
Subnet mask: 255 . 255 . 255 . 0
Restore Default
OK
Cancel
Apply
Help

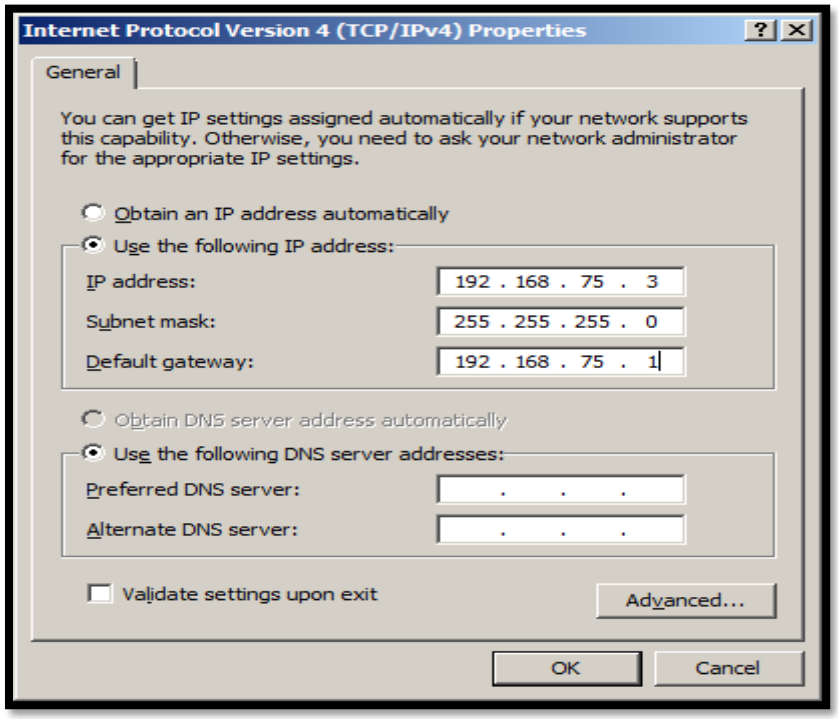

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 216 . 4
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 216 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

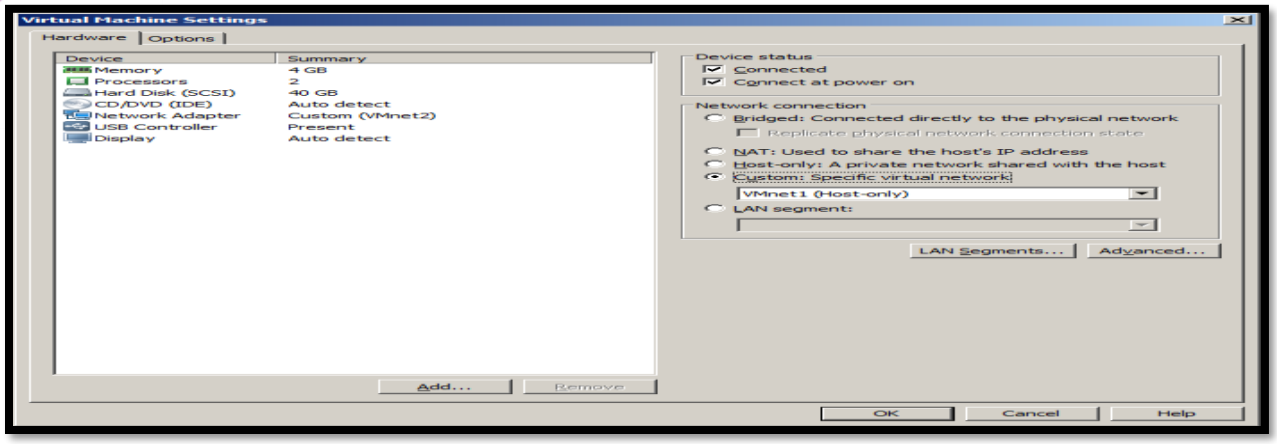

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\admin>ipconfig
Windows IP Configuration
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::902c:ffa:2d5f:8cf7%11
IPv4 Address. . . . . : 172.13.24.86
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . : 172.13.24.1
Ethernet adapter VMware Network Adapter VMnet1:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::bd89:64ef:9d4d:be13%21
IPv4 Address. . . . . : 192.168.216.1
Subnet Mask . . . . . : 255.255.255.0
IPv4 Address. . . . . : 192.168.216.4
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 0.0.0.0
Tunnel adapter isatap.{FCE4E178-6B8A-4C90-934C-1517E9714DFE}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Tunnel adapter 6TO4 Adapter:
Connection-specific DNS Suffix . :
IPv6 Address. . . . . : 2002:ac0d:1856::ac0d:1856
Default Gateway . . . . . :
Tunnel adapter isatap.{E9FC4092-B727-4127-9CF9-B38A7AC4F8B6}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

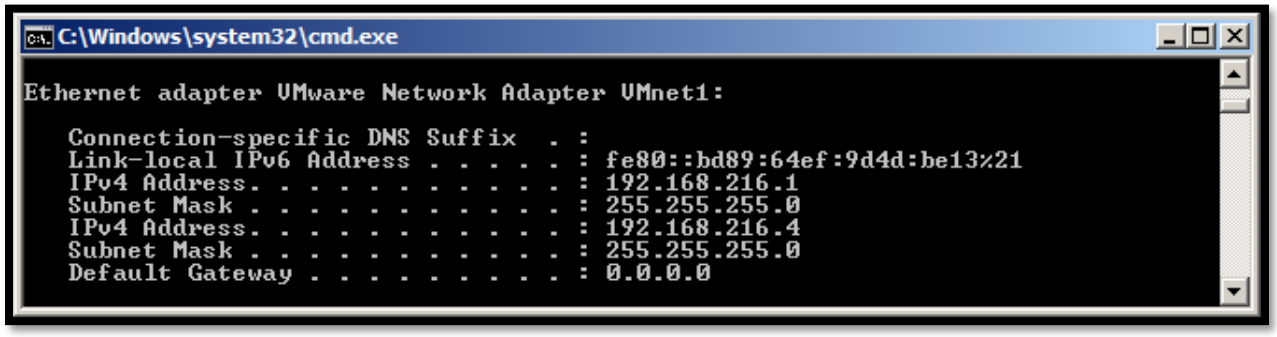

C:\Windows\system32\cmd.exe
C:\Users\admin>ping 172.13.24.86
Pinging 172.13.24.86 with 32 bytes of data:
Reply from 172.13.24.86: bytes=32 time<1ms TTL=128
Reply from 172.13.24.86: bytes=32 time<1ms TTL=128
Reply from 172.13.24.86: bytes=32 time<1ms TTL=128
Reply from 172.13.24.86: bytes=32 time<1ms TTL=128
Ping statistics for 172.13.24.86:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Users\admin>

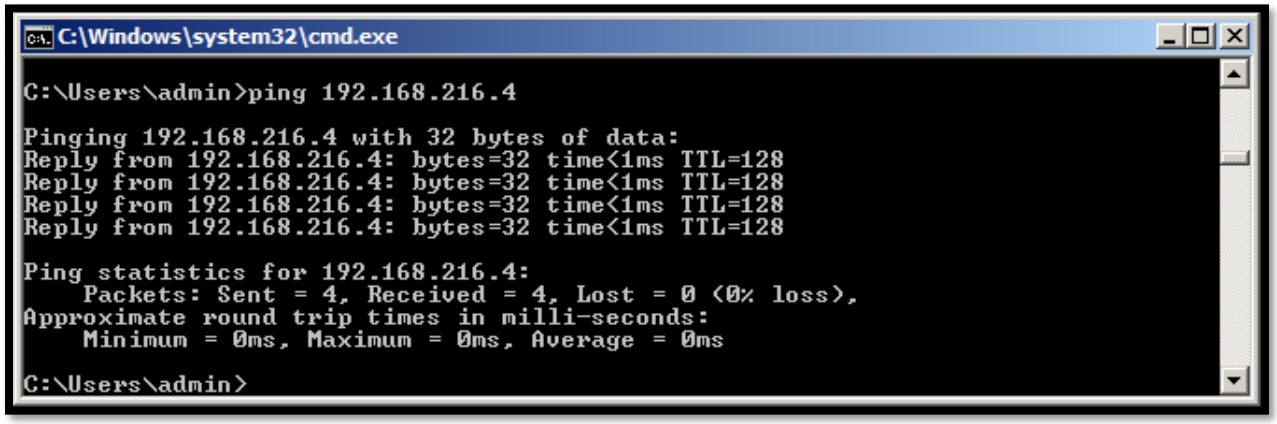

Add a Virtual Network
Select a network to add:
VMnet3
OK
Cancel
Help


Virtual Network Editor
Name Type External Connection Host Connection DHCP Subnet Address
VMnet1 Host-only - Connected Enabled 192.168.216.0
VMnet2 Bridged Realtek PCIe GBE Family Co... - - -
VMnet3 Host-only - Connected Enabled 192.168.75.0
Add Network...
Remove Network
VMnet Information
Bridged (connect VMs directly to the external network)
Bridged to:
Automatic Settings...
NAT (shared host's IP address with VMs)
NAT Settings...
Host-only (connect VMs internally in a private network)
Connect a host virtual adapter to this network
Host virtual adapter name: VMware Network Adapter VMnet3
Use local DHCP service to distribute IP address to VMs
DHCP Settings...
Subnet IP: 192 . 168 . 75 . 0
Subnet mask: 255 . 255 . 255 . 0
Restore Default
OK
Cancel
Apply
Help

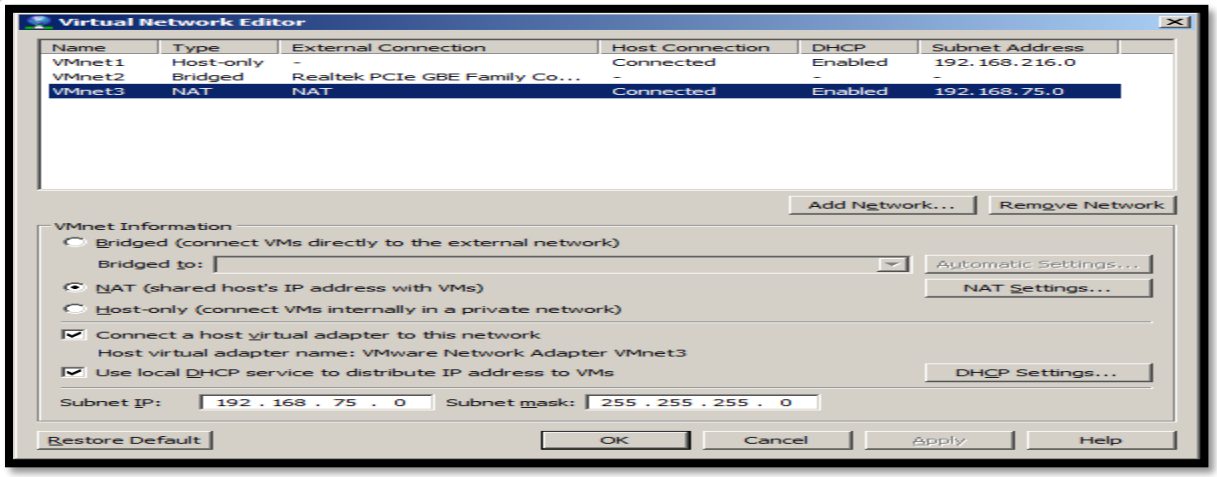

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 75 . 3
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 75 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

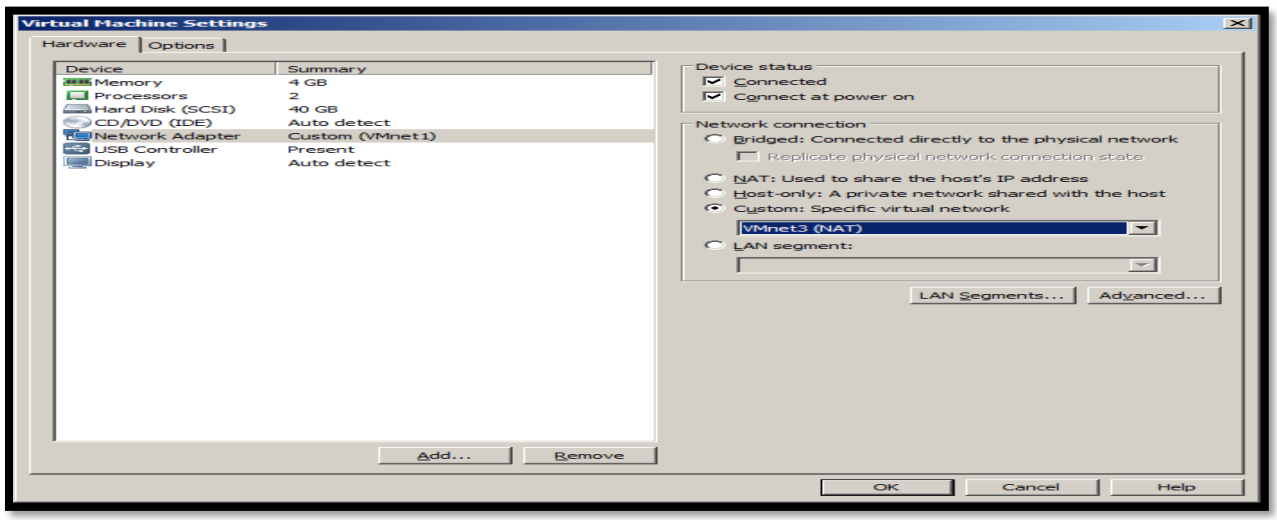


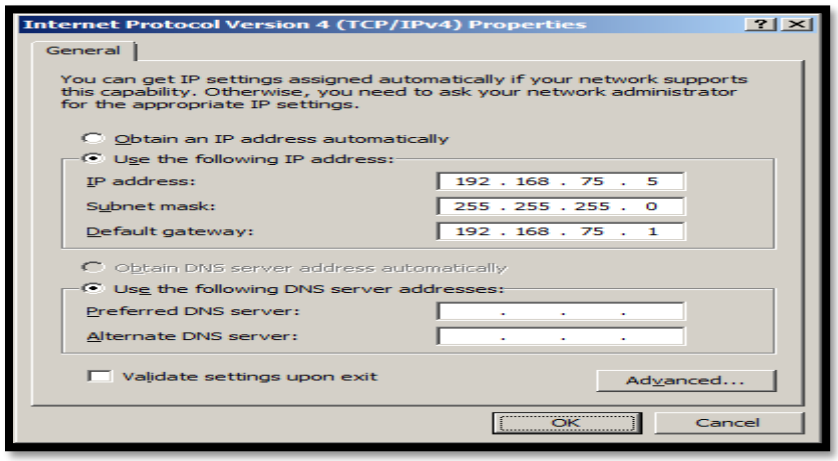


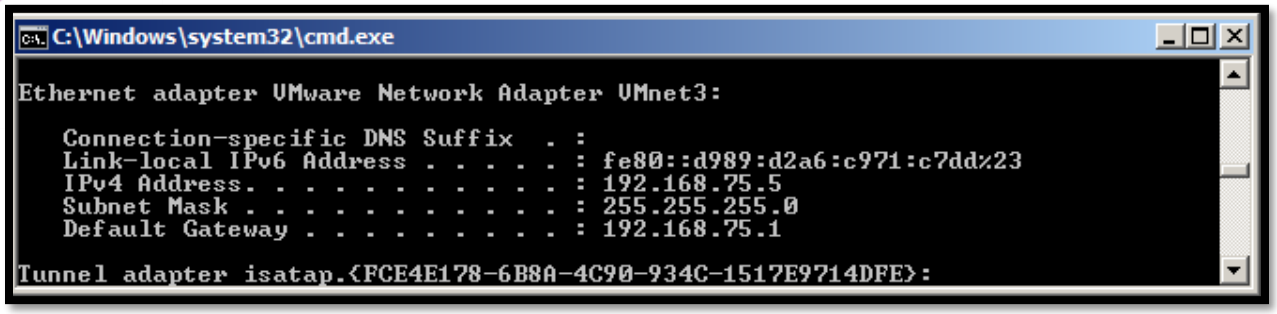


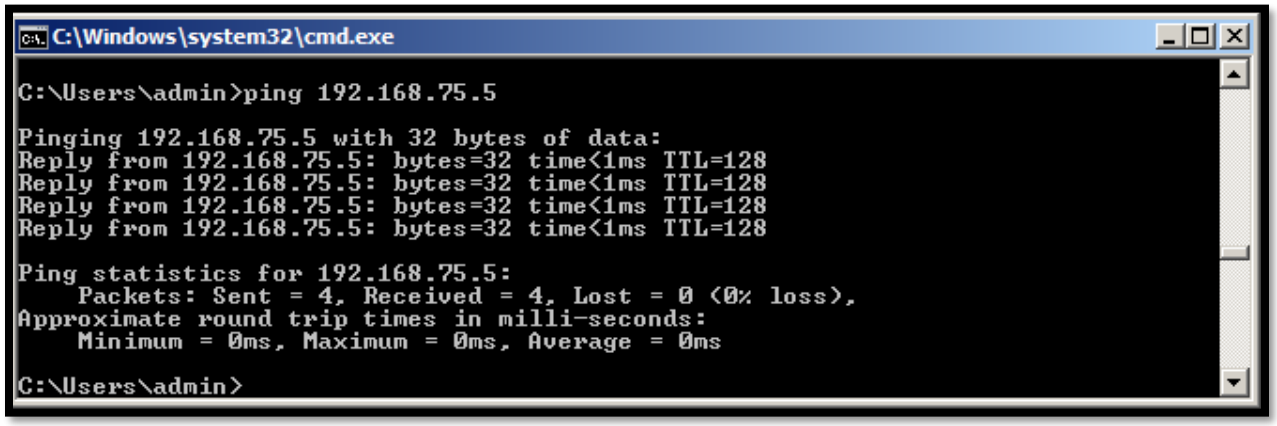
NAT Connection Delivery:


Virtual Network Editor
Name Type External Connection Host Connection DHCP Subnet Address
VMnet1 Host-only - Connected Enabled 192.168.216.0
VMnet2 Bridged Realtek PCIe GBE Family Co... - - -
VMnet3 NAT NAT Connected Enabled 192.168.75.0
Add Network... Remove Network
VMnet Information
Bridged (connect VMs directly to the external network)
Bridged to:
Automatic Settings...
NAT (shared host's IP address with VMs)
NAT Settings...
Host-only (connect VMs internally in a private network)
Connect a host virtual adapter to this network
Host virtual adapter name: VMware Network Adapter VMnet3
Use local DHCP service to distribute IP address to VMs
DHCP Settings...
Subnet IP: 192 . 168 . 75 . 0 Subnet mask: 255 . 255 . 255 . 0
Restore Default OK Cancel Apply Help


Virtual Machine Settings
Hardware Options
Device Summary
Memory 4 GB
Processors 2
Hard Disk (SCSI) 40 GB
CD/DVD (IDE) Auto detect
Network Adapter Custom (VMnet1)
USB Controller Present
Display Auto detect
Add... Remove
Device status
Connected
Connect at power on
Network connection
Bridged: Connected directly to the physical network
Replicate physical network connection state
NAT: Used to share the host's IP address
Host-only: A private network shared with the host
Custom: Specific virtual network
VMnet3 (NAT)
LAN segment:
LAN Segments... Advanced...
OK Cancel Help


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 75 . 5
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 75 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK Cancel


C:\Windows\system32\cmd.exe
Ethernet adapter VMware Network Adapter VMnet3:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::d989:d2a6:c971:c7dd%23
IPv4 Address. . . . . : 192.168.75.5
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.75.1
Tunnel adapter isatap.{FCE4E178-6B8A-4C90-934C-1517E9714DFE}:


C:\Windows\system32\cmd.exe
C:\Users\admin>ping 192.168.75.5
Pinging 192.168.75.5 with 32 bytes of data:
Reply from 192.168.75.5: bytes=32 time<1ms TTL=128
Reply from 192.168.75.5: bytes=32 time<1ms TTL=128
Reply from 192.168.75.5: bytes=32 time<1ms TTL=128
Reply from 192.168.75.5: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.75.5:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Users\admin>

ADVANCED COMPUTER NETWORK

PRACTICAL NO 6

027_Abhishek_Ojha

Practical No 6

Aim: Create network cloud and hosts.

Source Code:

CloudAndHosts.ned

```
package inet.examples.internetcloud.cloudandhosts;

import inet.networklayer.autorouting.ipv4.IPv4NetworkConfigurator;
import inet.nodes.inet.StandardHost;
import inet.nodes.internetcloud.InternetCloud;
import ned.DatarateChannel;


network CloudAndHosts
{
    parameters:
        int numSenders;

    types:
        channel C extends DatarateChannel
        {
            delay = 10ms;
            datarate = 5Mbps;
        }
    submodules:
        configurator: IPv4NetworkConfigurator {
            parameters:
                @display("p=61,163");
        }

        sender[numSenders]: StandardHost {
            @display("p=516,250");
        }
        recip: StandardHost {
            @display("p=320,102");
        }
        internet: InternetCloud {
            @display("p=516,102");
        }
    connections:
        recip.pppg++ <--> C <--> internet.pppg++;
        for i=0..numSenders-1 {
            sender[i].pppg++ <--> C <--> internet.pppg++;
        }
}
```

omnetpp.ini

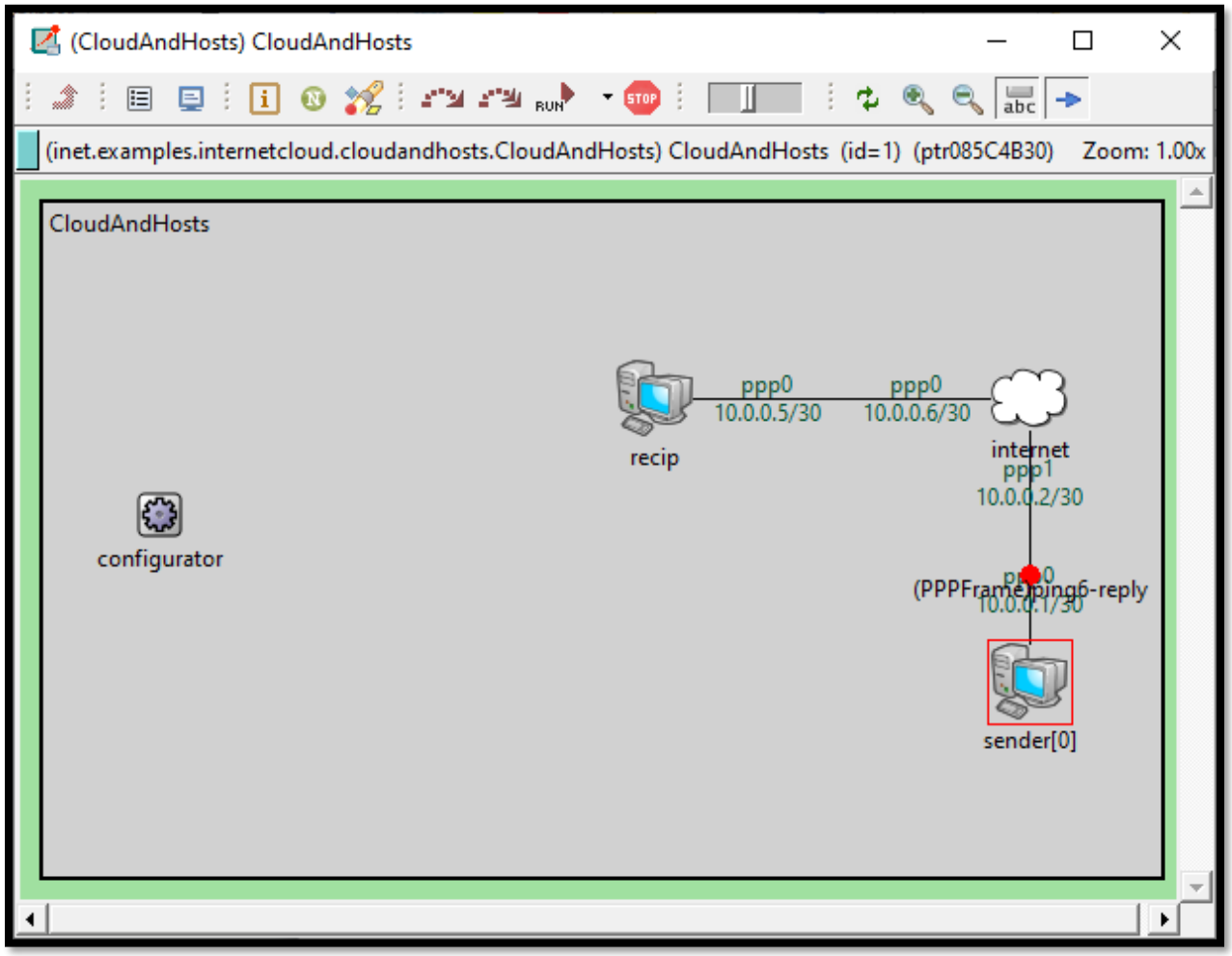
```
[General]
network = CloudAndHosts
tkenv-plugin-path = ../../../etc/plugins

*.sender[*].numPingApps = 1
*.sender[*].pingApp[0].destAddr = "recip"
*.sender[*].pingApp[0].stopTime = 10000s
**.pingApp[*].sendInterval = 1000ms

**.internet.networkLayer.delayer.config = xmldoc("internetCloud.xml")

[Config simple]
description = "one host pings another"
**.numSenders = 1

[Config two_senders]
description = "two senders with 100ms sendInterval"
**.numSenders = 2
**.pingApp[*].sendInterval = 100ms

[Config ten_senders]
description = "ten senders"
**.numSenders = 10
```

internetCloud.xml

```
<internetCloud symmetric="true">
  <parameters name="good">
    <traffic src="sender[0]" dest="recip" delay="20ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.01" />
    <traffic src="sender[1]" dest="recip" delay="30ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.02" />
    <traffic src="sender[2]" dest="recip" delay="40ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.03" />
    <traffic src="sender[3]" dest="recip" delay="50ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.04" />
    <traffic src="sender[4]" dest="recip" delay="60ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.05" />
    <traffic src="sender[5]" dest="recip" delay="70ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.06" />
    <traffic src="sender[6]" dest="recip" delay="80ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.07" />
```

```
   <traffic src="sender[7]" dest="recip" delay="90ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.08" />
   <traffic src="sender[8]" dest="recip" delay="100ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.09" />
   <traffic src="sender[9]" dest="recip" delay="110ms+truncnormal(200ms,60ms)"
datarate="uniform(100kbps,1Mbps)" drop="uniform(0,1) &lt; 0.10" />
<!--
   <traffic src="**" dest="**" delay="10ms+truncnormal(100ms,20ms)"
datarate="uniform(100kbps,500kbps)" drop="uniform(0,1) &lt; uniform(0.01, 0.05)" />
-->
 </parameters>
</internetCloud>
```

Output:



ADVANCED COMPUTER NETWORK

PRACTICAL NO 7

027_Abhishek_Ojha

Practical 7:

Aim: Create Simple Adhoc Network.

Source Code:

Scenario.ned

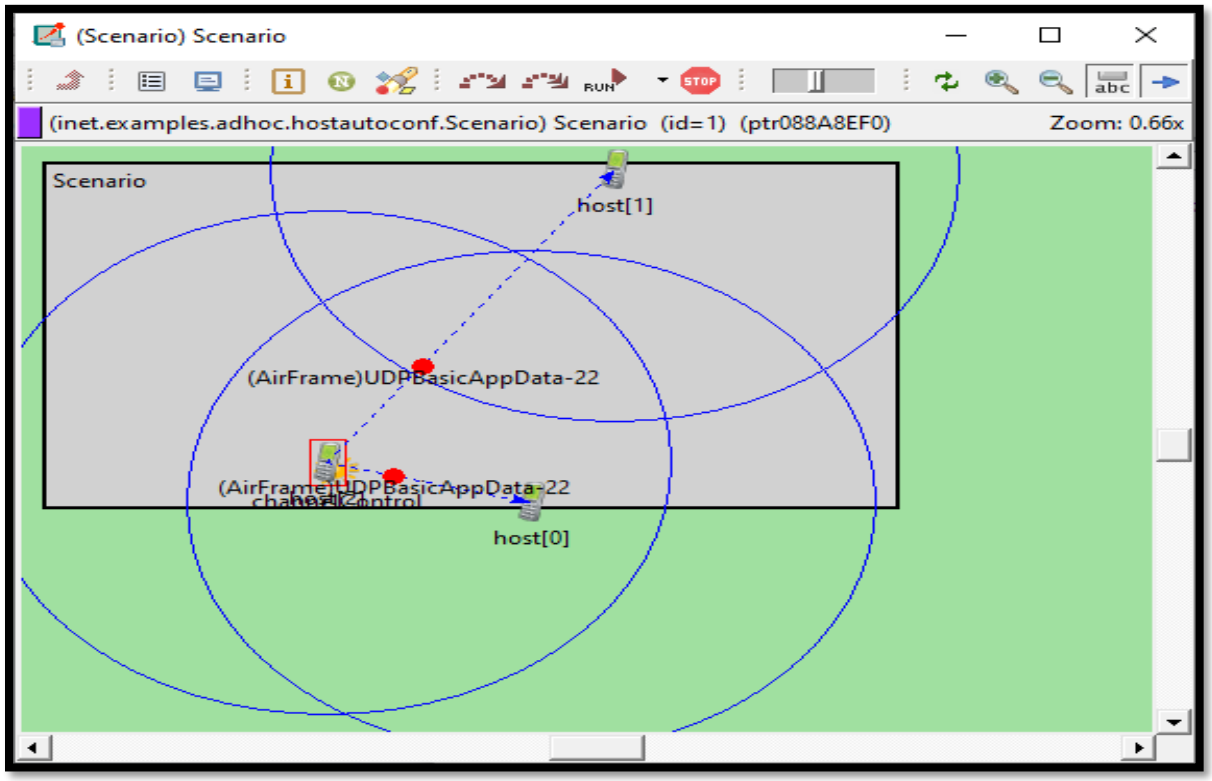
```
package inet.examples.adhoc.hostautoconf;

import inet.world.radio.ChannelControl;


network Scenario
{
    parameters:
        double hosts;

    submodules:
        channelControl: ChannelControl;
        host[hosts]: Host;
}
```

omnetpp.ini

```
[General]
debug-on-errors = true

network = Scenario
sim-time-limit = 60min

cmdenv-express-mode = true

*.hosts = 3

**.constraintAreaMinX = 0m
**.constraintAreaMinY = 0m
**.constraintAreaMinZ = 0m
**.constraintAreaMaxX = 600m
**.constraintAreaMaxY = 400m
**.constraintAreaMaxZ = 0m
**.debug = true
**.coreDebug = false
**.host*.**.channelNumber = 0

# channel physical parameters
*.channelControl.carrierFrequency = 2.4GHz
```

```
*.channelControl.pMax = 2.0mW
*.channelControl.sat = -110dBm
*.channelControl.alpha = 2
*.channelControl.numChannels = 1

# mobility
**.host*.mobilityType = "MassMobility"
**.host*.mobility.initFromDisplayString = false
**.host*.mobility.changeInterval = truncnormal(2s, 0.5s)
**.host*.mobility.changeAngleBy = normal(0deg, 30deg)
**.host*.mobility.speed = truncnormal(20mps, 8mps)
**.host*.mobility.updateInterval = 100ms
**.host*.ac_wlan.interfaces = "wlan0"

# UDPBasicApp / UDPSink
**.numUdpApps = 1
**.udpApp[0].typename = "UDPBasicApp"
**.udpApp[0].destAddresses = "host[0]"
**.udpApp[0].localPort = 9001
**.udpApp[0].destPort = 9001
**.udpApp[0].messageLength = 100B
**.udpApp[0].startTime = uniform(10s, 30s)
**.udpApp[0].sendInterval = uniform(10s, 30s)

# nic settings
**.wlan[*].mgmtType = "Ieee80211MgmtAdhoc"
**.wlan[*].bitrate = 2Mbps

**.wlan[*].mgmt.frameCapacity = 10
**.wlan[*].mac.address = "auto"
**.wlan[*].mac.maxQueueSize = 14
**.wlan[*].mac.rtsThresholdBytes = 3000B
**.wlan[*].mac.retryLimit = 7
**.wlan[*].mac.cwMinData = 7
**.wlan[*].mac.cwMinBroadcast = 31

**.wlan[*].radio.transmitterPower = 2mW
**.wlan[*].radio.thermalNoise = -110dBm
**.wlan[*].radio.sensitivity = -85dBm
**.wlan[*].radio.pathLossAlpha = 2
**.wlan[*].radio.snirThreshold = 4dB

**.udpapp.*.vector-recording = true
**.vector-recording = true
```

Output:


(Scenario) Scenario
RUN
STOP
abc
(inet.examples.adhoc.hostautoconf.Scenario) Scenario (id=1) (ptr088A8EF0)
Zoom: 0.66x
Scenario
host[1]
(AirFrame)UDPBasicAppData-22
(AirFrame)UDPBasicAppData-22
host[0]

ADVANCED COMPUTER NETWORK

PRACTICAL NO 8

027_Abhishek_Ojha

Practical 8 :

Aim: Create MANET simulation for AODVUU Network

Source Code:

Net80211_control.ned

```
package inet.examples.manetrouting.net80211_control;

import inet.networklayer.autorouting.ipv4.IPv4NetworkConfigurator;
import inet.nodes.inet.AdhocHost;
import inet.world.radio.ChannelControl;


network Net80211_control
{
    parameters:
        int numHosts;
        int numFixHosts;
    submodules:
        host[numHosts]: AdhocHost {
            parameters:
                @display("i=device/pocketpc_s;r=,,#707070");
        }
        fixhost[numFixHosts]: AdhocHost {
            parameters:
                @display("i=device/pocketpc_s;r=,,#707070");
        }
        channelControl: ChannelControl {
            parameters:
                @display("p=60,50;i=misc/sun");
        }
        configurator: IPv4NetworkConfigurator {
            parameters:
                config=xml("<config><interface hosts='*' address='145.236.x.x'
netmask='255.255.0.0'/></config>");
                @display("p=140,50;i=block/cogwheel_s");
        }
    connections allowunconnected:
}
```

omnetpp.ini

```
[General]
#debug-on-errors = true
sim-time-limit = 3000s
seed-0-mt = 5
network = Net80211_control
```

```
num-rngs = 2

cmdenv-express-mode = true
tkenv-plugin-path = ../../../etc/plugins
#tkenv-default-run = 1

description = "Aodv Simple test"

**.vector-recording = false
**.constraintAreaMinX = 0m
**.constraintAreaMinY = 0m
**.constraintAreaMinZ = 0m
**.constraintAreaMaxX = 1500m
**.constraintAreaMaxY = 1500m
**.constraintAreaMaxZ = 0m
*.numFixHosts = 1
*.numHosts = 5
*.numBasic = 0
**.debug = true
**.channelNumber = 0

# channel physical parameters
*.channelControl.pMax = 2.0mW

# mobility
#**.fixhost[0].mobility.initialX = 499
#**.fixhost[0].mobility.initialY = 499

**.mobility.initFromDisplayString = false
**.basic[*].mobilityType = "StationaryMobility"
**.basic[0].mobility.nodeId = 0
**.basic[1].mobility.nodeId = 1
**.basic[2].mobility.nodeId = 2
**.basic[3].mobility.nodeId = 3
**.basic[4].mobility.nodeId = 4
**.basic[5].mobility.nodeId = 5
**.basic[6].mobility.nodeId = 6
**.basic[7].mobility.nodeId = 7
**.basic[8].mobility.nodeId = 8
**.basic[9].mobility.nodeId = 9


**.host[*].mobilityType = "StationaryMobility"
**.host*.mobility.traceFile = "escen_v5_t500-1.txt"
**.host[0].mobility.nodeId = 0
**.host[1].mobility.nodeId = 1
**.host[2].mobility.nodeId = 2
**.host[3].mobility.nodeId = 3
```

```
**.host[4].mobility.nodeId = 4
**.host[5].mobility.nodeId = 5
**.host[6].mobility.nodeId = 6
**.host[7].mobility.nodeId = 7
**.host[8].mobility.nodeId = 8
**.host[9].mobility.nodeId = 9


#**.host*.mobilityType = "MassMobility"
#**.host*.mobility.changeInterval = truncnormal(2s, 0.5s)
#**.host*.mobility.changeAngleBy = normal(0deg, 30deg)
#**.host*.mobility.speed = truncnormal(20mps, 8mps)
#**.host*.mobility.updateInterval = 0.1s

**.host*.mobility.changeInterval = truncnormal(5s, 0.5s)
**.host*.mobility.changeAngleBy = normal(0deg, 90deg)
**.host*.mobility.speed = 2mps
**.host*.mobility.updateInterval = 0.1s


# udp apps (on)
#**.host[*].udpApp[*].typename = "UDPBasicApp"
#**.host[0].numUdpApps = 1
#**.host[1].numUdpApps = 1
#**.host[2].numUdpApps = 1
#**.host[3].numUdpApps = 1
#**.host[4].numUdpApps = 1
#**.host[5].numUdpApps = 1
#**.host[6].numUdpApps = 1
#**.host[7].numUdpApps = 1
#**.host[8].numUdpApps = 1
#**.host[9].numUdpApps = 1
#**.host[*].numUdpApps = 0
#**.udpApp[0].dest_addresses = "fixhost[0]"
#**.udpApp[0].local_port = 1234
#**.udpApp[0].dest_port = 1234
#**.udpApp[0].message_length = 4096  # 32 bytes
#**.udpApp[0].message_freq = 0.2

# udp apps (on)

**.host[*].udpApp[*].typename = "UDPBasicBurst"
**.host[*].numUdpApps = 1
**.host[*].udpApp[0].startTime = uniform(20s,35s)
**.host[*].udpApp[0].destAddresses = moduleListByNedType("inet.nodes.inet.AdhocHost")


**.udpApp[0].localPort = 1234
```

```
**.udpApp[0].destPort = 1234
**.udpApp[0].messageLength = 512B  #
#**.udpApp[0].sendInterval = 0.1s
**.udpApp[0].sendInterval = 0.2s + uniform(-0.001s,0.001s)
**.udpApp[0].burstDuration = 0s
#**.udpApp[0].activeBurst = true
**.udpApp[0].chooseDestAddrMode = "perBurst"
**.udpApp[0].sleepDuration = 1s
# **.udpApp[0].burstDuration = uniform(1s,4s,1)
# **.udpApp[0].time_off = uniform(20s,40s,1)
**.udpApp[0].stopTime = 0s
##**.udpApp[0].time_begin = uniform(0s,4s,1)
**.udpApp[0].delayLimit = 1000s
**.udpApp[0].destAddrRNG = 1

**.fixhost[*].udpApp[*].typename = "UDPSink"
**.fixhost[*].numUdpApps = 0
**.fixhost[*].udpApp[0].localPort = 1234

# tcp apps (off)
**.numTcpApps = 0
**.tcpAppType = "TelnetApp"

# ping app (off)
**.numPingApps = 0
#**.numPingApps = 1
#**.pingApp[0].destAddr = "fixhost[0]"
#**.pingApp[0].printPing = true

# tcp settings
**.tcp.mss = 1024
**.tcp.advertisedWindow = 14336  # 14*mss
**.tcp.sendQueueClass = "TCPMsgBasedSendQueue"
**.tcp.receiveQueueClass = "TCPMsgBasedRcvQueue"
**.tcp.tcpAlgorithmClass = "TCPReno"
**.tcp.recordStats = true

# ip settings
**.routingFile = ""
**.ip.procDelay = 10us
# **.IPForward = false

# ARP configuration
**.arp.retryTimeout = 1s
**.arp.retryCount = 3
**.arp.cacheTimeout = 100s
#**.networklayer.proxyARP = true  # Host's is hardwired "false"
```

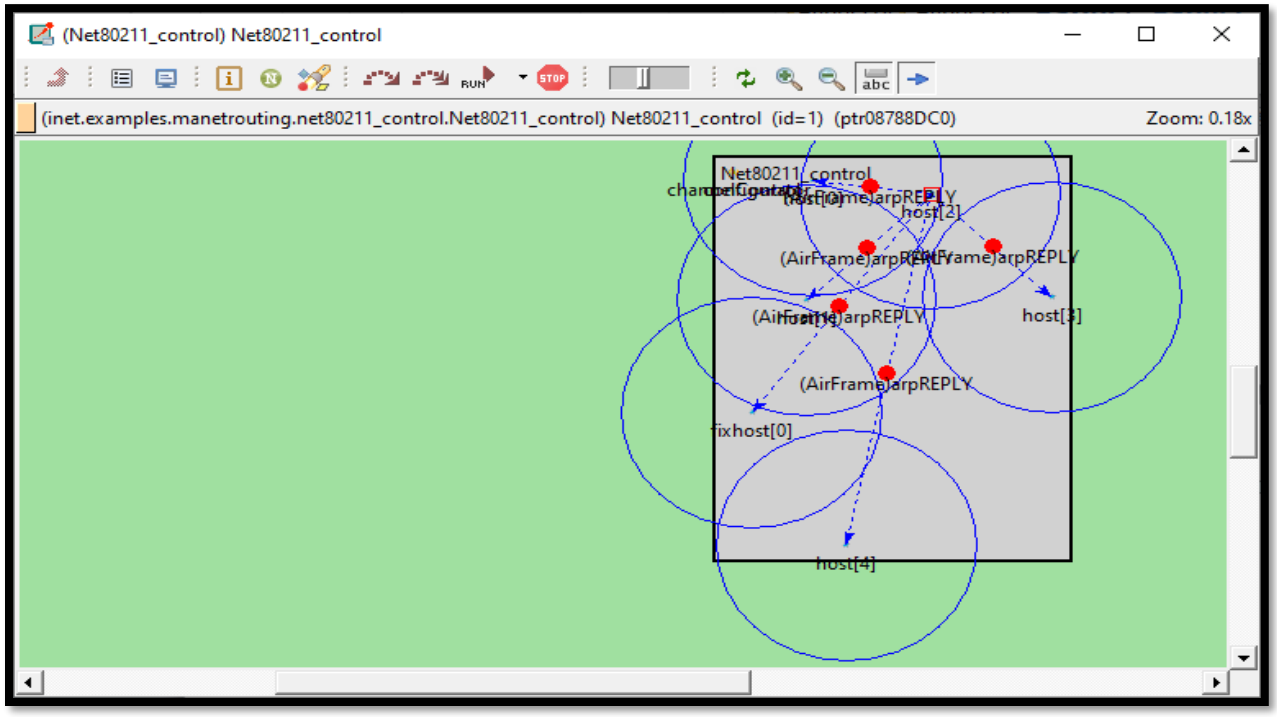
```
# manet routing
**.routingProtocol = "OLSR"
#**.routingProtocol = default


# nic settings
**.wlan[*].mgmt.frameCapacity = 10
#**.wlan[*].mgmt.Willingness = 3
#**.wlan[*].mgmt.Hello_ival = 2
#**.wlan[*].mgmt.Tc_ival = 5
#**.wlan[*].mgmt.Mid_ival = 5
#**.wlan[*].mgmt.use_mac = false

# nic settings
**.wlan[*].bitrate = 54Mbps

**.wlan[*].typename="Ieee80211Nic"
**.wlan[*].opMode="g"
**.wlan[*].mac.EDCA = false
**.wlan[*].mgmt.frameCapacity = 10
**.wlan[*].mac.address = "auto"
**.wlan[*].mac.maxQueueSize = 14
**.wlan[*].mac.rtsThresholdBytes = 3000B
**.wlan[*].mac.basicBitrate = 6Mbps  # 24Mbps
**.wlan[*].mac.retryLimit = 7
**.wlan[*].mac.cwMinData = 31
**.wlan[*].mac.cwMinBroadcast = 31
**.wlan[*].mac.slotTime = 9us #
**.wlan[*].mac.AIFSN = 2 #DIFS

# channel physical parameters
*.channelControl.carrierFrequency = 2.4GHz
*.channelControl.pMax = 2.0mW
*.channelControl.sat = -110dBm
*.channelControl.alpha = 2
*.channelControl.numChannels = 1

**.wlan[*].radio.transmitterPower = 2.0mW
**.wlan[*].radio.pathLossAlpha = 2
**.wlan[*].radio.snirThreshold = 4dB  # in dB
**.wlan[*].radio.thermalNoise = -110dBm
**.wlan[*].radio.sensitivity = -90dBm
**.wlan[*].radio.channelModel = "RAYLEIGH" #1/2  rayleigh/awgn
**.wlan[*].radio.berTableFile = "per_table_80211g_Trivellato.dat"

#** = default

**.broadcastDelay=uniform(0s,0.005s)
```

```
#/ parameters : DYMOUM
[Config DYMOUM]
**.routingProtocol="DYMOUM"
**.no_path_acc_ = false
**.reissue_rreq_ = false
**.s_bit_ = false
**.hello_ival_ = 0
**.MaxPktSec = 20 #// 10
**.promiscuous = false
**.NetDiameter = 10
**.RouteTimeOut = 3000
**.RouteDeleteTimeOut = 3000*5 #//5*RouteTimeOut
**.RREQWaitTime = 1000
**.RREQTries = 3
**.noRouteBehaviour = 1

#  // parameters: AODVUU;
[Config AODVUU]
**.routingProtocol="AODVUU"
**.log_to_file = false
**.hello_jittering = true
**.optimized_hellos = true
**.expanding_ring_search = true
**.local_repair = true
**.rreq_gratuitous = true
#**.debug = false
**.rt_log_interval = 0
**.unidir_hack = 0
**.internet_gw_mode = 0
**.receive_n_hellos = 1
**.ratelimit = 1000
**.llfeedback = false# //1000
**.wait_on_reboot = 0
**.active_timeout = 6000 # // time in ms
**.internet_gw_address = "0.0.0.0"

# // parameters: DSRUU;
[Config DSRUU]
**.routingProtocol="DSRUU"
**.PrintDebug = true
**.FlushLinkCache = true
**.PromiscOperation = false
**.UseNetworkLayerAck = false
**.BroadcastJitter = 20 # 20  ms
**.RouteCacheTimeout = 300 #300 seconds
**.SendBufferTimeout = 300# //30 s
**.SendBufferSize = -1
```

```
**.RequestTableSize = -1
**.RequestTableIds = -1
**.MaxRequestRexmt = -1 #// 16,
**.MaxRequestPeriod = 10 #//10 SECONDS
**.RequestPeriod = 500 #//500  MILLISECONDS
**.NonpropRequestTimeout = 30# //30  MILLISECONDS
**.RexmtBufferSize = -1 #//MAINT_BUF_MAX_LEN
**.MaintHoldoffTime = 250# //250 MILLISECONDS
**.MaxMaintRexmt = 2 # //2
**.TryPassiveAcks = true #//1
**.PassiveAckTimeout = 100# //100 MILLISECONDS
**.GratReplyHoldOff = 1 #, //1 SECONDS
**.MAX_SALVAGE_COUNT = 15 # //15
**.LifoSize = 20
**.PathCache = true
**.ETX_Active = false
**.ETXHelloInterval = 1 #, // Second
**.ETXWindowNumHello = 10
**.ETXRetryBeforeFail = -1
**.RREPDestinationOnly = false
**.RREQMaxVisit = 5 # // Max Number that a RREQ can be processes by a node

#// Olsr
[Config OLSR]
**.routingProtocol="OLSR"
**.Willingness = 3
**.Hello_ival = 2
**.Tc_ival = 5
**.Mid_ival = 5
**.use_mac = 0 #1
**.Mpr_algorithm = 1
**.routing_algorithm = 1
**.Link_quality = 2
**.Fish_eye = false
**.Tc_redundancy = 3
**.Link_delay = true #//default false
**.C_alpha = 0.2

#// Olsr_etx
[Config OLSR_ETX]
**.routingProtocol="OLSR_ETX"
**.Willingness = 3
**.Hello_ival = 2
**.Tc_ival = 5
**.Mid_ival = 5
**.use_mac = 0 #1
**.Mpr_algorithm = 1
**.routing_algorithm = 1
```

```
**.Link_quality = 2
**.Fish_eye = false
**.Tc_redundancy = 3
**.Link_delay = true #//default false
**.C_alpha = 0.2

#// DSDV
[Config DSDV_2]
**.routingProtocol="DSDV_2"
**.manetrouting.hellomsgperiod_DSDV = 1s # //Period of DSDV hello message generation [seconds]
**.manetrouting.routeLifetime = 5s # // ;[seconds]
**.manetrouting.netmask = "255.255.0.0" # //
**.manetrouting.MaxVariance_DSDV = 1
**.manetrouting.RNGseed_DSDV = 0

[Config DYMO]
**.routingProtocol="DYMO"

[Config Batman]
**.routingProtocol="Batman"
```

Output:



ADVANCED COMPUTER NETWORK

PRACTICAL NO 9

027_Abhishek_Ojha

Practical 9:

Aim:

Create Single mobile network.

Source Code:

MobileNetwork.ned

```
package inet.examples.mobility;

network MobileNetwork
{
    parameters:
        int numHosts;
        @display("bgb=600,400");
    submodules:
        host[numHosts]: MobileHost {
            parameters:
                @display("p=300,300;r=,,#707070");
        }
}
```

omnetpp.ini

```
[General]
#scheduler-class = "cRealTimeScheduler" #so that speed appears realistic
#debug-on-errors = true
tkenv-plugin-path = ../../../etc/plugins
sim-time-limit = 10day

*.numHosts = 2
**.constraintAreaMinX = 0m
**.constraintAreaMinY = 0m
**.constraintAreaMinZ = 0m
**.constraintAreaMaxX = 600m
**.constraintAreaMaxY = 400m
**.constraintAreaMaxZ = 0m
**.updateInterval = 0.1s # test with 0s too, and let getCurrentPosition update the display string
from a test module
**.debug = true

**.mobility.initFromDisplayString = false

[Config ANSimMobility]
network = MobileNetwork
**.host*.mobilityType = "ANSimMobility"
```

```
**.host*.mobility.ansimTrace = xmldoc("ansimtrace.xml")
**.host*.mobility.nodeId = -1  #means "host module's index"

[Config BonnMotionMobility1]
network = MobileNetwork
description = "2 hosts"
**.host*.mobilityType = "BonnMotionMobility"
**.host*.mobility.traceFile = "bonnmotion_small.movements"
**.host*.mobility.nodeId = -1  #means "host module's index"

[Config BonnMotionMobility2]
network = MobileNetwork
description = "100 hosts"
*.numHosts = 100
**.host*.mobilityType = "BonnMotionMobility"
**.host*.mobility.traceFile = "bonnmotion_scenario.movements"
**.host*.mobility.nodeId = -1  #means "host module's index"

[Config ChiangMobility]
network = MobileNetwork
*.numHosts = 1
**.host*.mobilityType = "ChiangMobility"
**.host*.mobility.stateTransitionUpdateInterval = 3s
**.host*.mobility.speed = 10mps

[Config CircleMobility1]
network = MobileNetwork
*.numHosts = 3
**.host*.mobilityType = "CircleMobility"
**.host*.mobility.cx = 200m
**.host*.mobility.cy = 200m
**.host*.mobility.r = 150m
**.host*.mobility.speed = 40mps
**.host[0].mobility.startAngle = 0deg
**.host[1].mobility.startAngle = 120deg
**.host[2].mobility.startAngle = 240deg

[Config CircleMobility2]
network = MobileNetwork
*.numHosts = 3
**.host*.mobilityType = "CircleMobility"
**.host[0].mobility.cx = 100m
**.host[1].mobility.cx = 300m
**.host[2].mobility.cx = 500m
**.host*.mobility.cy = 200m
**.host*.mobility.r = 150m
**.host*.mobility.speed = 40mps
**.host*.mobility.startAngle = 0deg
```

```
[Config ConstSpeedMobility]
network = MobileNetwork
**.host*.mobilityType = "ConstSpeedMobility"
**.host*.mobility.initFromDisplayString = false
**.host*.mobility.speed = 50mps

[Config ConstSpeedMobility01]
extends = ConstSpeedMobility
**.updateInterval = 0.1s

[Config ConstSpeedMobility1]
extends = ConstSpeedMobility
**.updateInterval = 1s

[Config ConstSpeedMobility10]
extends = ConstSpeedMobility
**.updateInterval = 10s

[Config ConstSpeedMobility100]
extends = ConstSpeedMobility
**.updateInterval = 100s

[Config ConstSpeedMobility1000]
extends = ConstSpeedMobility
**.updateInterval = 1000s

[Config GaussMarkovMobility]
network = MobileNetwork
*.numHosts = 1
**.host*.mobilityType = "GaussMarkovMobility"
**.host*.mobility.alpha = 0.9
**.host*.mobility.speed = 10mps
**.host*.mobility.angle = 0deg
**.host*.mobility.variance = 40
**.host*.mobility.margin = 30m

[Config LinearMobility]
network = MobileNetwork
**.host*.mobilityType = "LinearMobility"
**.host*.mobility.initFromDisplayString = false
**.host*.mobility.speed = 50mps
**.host*.mobility.angle = 30deg  # degrees
#**.host*.mobility.acceleration = -0.5

[Config LinearMobility01]
extends = LinearMobility
**.updateInterval = 0.1s
```

```
[Config LinearMobility1]
extends = LinearMobility
**.updateInterval = 1s

[Config LinearMobility10]
extends = LinearMobility
**.updateInterval = 10s

[Config LinearMobility100]
extends = LinearMobility
**.updateInterval = 100s

[Config LinearMobility1000]
extends = LinearMobility
**.updateInterval = 1000s

[Config LinearMobility_accdown]
extends = LinearMobility
**.updateInterval = 0.1s
**.host*.mobility.acceleration = -1.0  # m/s2

[Config LinearMobility_accup]
extends = LinearMobility
**.updateInterval = 0.1s
**.host*.mobility.speed = 0mps
**.host*.mobility.acceleration = 1.0  # m/s2

[Config MassMobility]
network = MobileNetwork
*.numHosts = 5
**.host*.mobilityType = "MassMobility"
**.host*.mobility.initFromDisplayString = false
**.host*.mobility.changeInterval = truncnormal(2s, 0.5s)
**.host*.mobility.changeAngleBy = normal(0deg, 30deg)
**.host*.mobility.speed = truncnormal(15mps, 5mps)

[Config MassMobilityWithScenario]
network = MobileNetworkWithScenario
*.numHosts = 5
**.host*.mobilityType = "MassMobility"
**.host*.mobility.initFromDisplayString = false
**.host*.mobility.changeInterval = truncnormal(2s, 0.5s)
**.host*.mobility.changeAngleBy = normal(0deg, 30deg)
**.host*.mobility.speed = truncnormal(15mps, 5mps)
**.scenarioManager.script = xmldoc("scenario.xml")

[Config MoBANMobility1]
```

```
network = MoBANNetwork
**.constraintAreaMaxX = 1000m
**.constraintAreaMaxY = 1000m
**.constraintAreaMaxZ = 1000m
**.numNodes = 12
**.numMoBAN = 1

**.coordinator[*].postureSpecFile = xmldoc("postures1.xml")
**.coordinator[*].configFile = xmldoc("configMoBAN1.xml")
**.coordinator[*].useMobilityPattern = false
**.coordinator[0].mobilityPatternFile = "MoBAN_Pattern_in0.txt"

**.node[*].mobilityType = "MoBANLocal"
**.node[*].mobility.coordinatorIndex = 0

[Config MoBANMobility2]
network = MoBANNetwork
**.constraintAreaMaxX = 1000m
**.constraintAreaMaxY = 1000m
**.constraintAreaMaxZ = 1000m
**.numNodes = 44
**.numMoBAN = 2

**.coordinator[*].postureSpecFile = xmldoc("postures1.xml")
**.coordinator[*].configFile = xmldoc("configMoBAN2.xml")
**.coordinator[*].useMobilityPattern = false
**.coordinator[*].mobilityPatternFile = ""

**.node[0..19].mobilityType = "ConstSpeedMobility"
**.node[0..19].mobility.speed = 30mps

**.node[20..43].mobilityType = "MoBANLocal"
**.node[20..31].mobility.coordinatorIndex = 0
**.node[32..43].mobility.coordinatorIndex = 1

**.node[0].mobility.initialX = 5m
**.node[0].mobility.initialY = 5m
**.node[0].mobility.initialZ = 4m

**.node[1].mobility.initialX = 12m
**.node[1].mobility.initialY = 10m
**.node[1].mobility.initialZ = 4m

**.node[2].mobility.initialX = 20m
**.node[2].mobility.initialY = 5m
**.node[2].mobility.initialZ = 4m

**.node[3].mobility.initialX = 30m
```

```
**.node[3].mobility.initialY = 8m
**.node[3].mobility.initialZ = 4m

**.node[4].mobility.initialX = 40m
**.node[4].mobility.initialY = 3m
**.node[4].mobility.initialZ = 4m

**.node[5].mobility.initialX = 6m
**.node[5].mobility.initialY = 18m
**.node[5].mobility.initialZ = 4m

**.node[6].mobility.initialX = 15m
**.node[6].mobility.initialY = 15m
**.node[6].mobility.initialZ = 4m

**.node[7].mobility.initialX = 20m
**.node[7].mobility.initialY = 8m
**.node[7].mobility.initialZ = 4m

**.node[8].mobility.initialX = 35m
**.node[8].mobility.initialY = 20m
**.node[8].mobility.initialZ = 4m

**.node[9].mobility.initialX = 45m
**.node[9].mobility.initialY = 15m
**.node[9].mobility.initialZ = 4m

**.node[10].mobility.initialX = 40m
**.node[10].mobility.initialY = 25m
**.node[10].mobility.initialZ = 4m

**.node[11].mobility.initialX = 16m
**.node[11].mobility.initialY = 25m
**.node[11].mobility.initialZ = 4m

**.node[12].mobility.initialX = 24m
**.node[12].mobility.initialY = 35m
**.node[12].mobility.initialZ = 4m

**.node[13].mobility.initialX = 35m
**.node[13].mobility.initialY = 32m
**.node[13].mobility.initialZ = 4m

**.node[14].mobility.initialX = 35m
**.node[14].mobility.initialY = 28m
**.node[14].mobility.initialZ = 4m

**.node[15].mobility.initialX = 45m
```

```
**.node[15].mobility.initialY = 40m
**.node[15].mobility.initialZ = 4m

**.node[16].mobility.initialX = 2m
**.node[16].mobility.initialY = 45m
**.node[16].mobility.initialZ = 4m

**.node[17].mobility.initialX = 10m
**.node[17].mobility.initialY = 40m
**.node[17].mobility.initialZ = 4m

**.node[18].mobility.initialX = 23m
**.node[18].mobility.initialY = 45m
**.node[18].mobility.initialZ = 4m

**.node[19].mobility.initialX = 37m
**.node[19].mobility.initialY = 43m
**.node[19].mobility.initialZ = 4m

[Config RandomWPMobility]
network = MobileNetwork
*.numHosts = 5
**.host*.mobilityType = "RandomWPMobility"
**.host*.mobility.initFromDisplayString = false
**.host[0].mobility.speed = 10*uniform(20mps,50mps)
**.host*.mobility.speed = uniform(20mps,50mps)
**.host*.mobility.waitTime = uniform(3s,8s)

[Config RectangleMobility]
network = MobileNetwork
**.host*.mobilityType = "RectangleMobility"
**.host*.mobility.constraintAreaMinX = 100m
**.host*.mobility.constraintAreaMinY = 100m
**.host*.mobility.constraintAreaMaxX = 500m
**.host*.mobility.constraintAreaMaxY = 300m
#**.host*.mobility.x1 = 100
#**.host*.mobility.y1 = 100
#**.host*.mobility.x2 = 500
#**.host*.mobility.y2 = 300
**.host[0].mobility.startPos = 0
**.host[1].mobility.startPos = 2.5
**.host[0].mobility.speed = 20mps
**.host[1].mobility.speed = -10mps

[Config StaticGridMobility]
network = MobileNetwork
*.numHosts = 20
**.host*.mobilityType = "StaticGridMobility"
```

```
**.host*.mobility.marginX = 100m
**.host*.mobility.marginY = 100m
**.host*.mobility.numHosts = 20

[Config StationaryMobility]
network = MobileNetwork
*.numHosts = 3
**.host*.mobilityType = "StationaryMobility"
# place it at a fixed position:
**.host[0].mobility.initialX = 50m
**.host[0].mobility.initialY = 200m
**.host[0].mobility.initFromDisplayString = false
# the second node is using the display string position (or placed randomly if position is not present
in display string)
**.host[1].mobility.initFromDisplayString = true
# place it at a random position:
**.host[2].mobility.initFromDisplayString = false

[Config TractorMobility]
network = MobileNetwork
*.numHosts = 1
**.host*.mobilityType = "TractorMobility"
**.host*.mobility.x1 = 100m
**.host*.mobility.y1 = 100m
**.host*.mobility.x2 = 500m
**.host*.mobility.y2 = 300m
**.host*.mobility.rowCount = 4
**.host*.mobility.speed = 50mps

[Config TurtleMobility1]
network = MobileNetwork
description = "square"
*.numHosts = 1
**.host*.mobilityType = "TurtleMobility"
**.host*.mobility.turtleScript = xmldoc("turtle.xml", "movements//movement[@id='1']")

[Config TurtleMobility2]
network = MobileNetwork
description = "two squares"
*.numHosts = 1
**.host*.mobilityType = "TurtleMobility"
**.host*.mobility.turtleScript = xmldoc("turtle.xml", "movements//movement[@id='2']")

[Config TurtleMobility3]
network = MobileNetwork
description = "random waypoint"
*.numHosts = 2
**.host*.mobilityType = "TurtleMobility"
```

```
**.host*.mobility.turtleScript = xmldoc("turtle.xml", "movements//movement[@id='3']")

[Config TurtleMobility4]
network = MobileNetwork
description = "mass+reflect"
*.numHosts = 2
**.host*.mobilityType = "TurtleMobility"
**.host*.mobility.turtleScript = xmldoc("turtle.xml", "movements//movement[@id='4']")

[Config TurtleMobility5]
network = MobileNetwork
description = "mass+wrap"
*.numHosts = 2
**.host*.mobilityType = "TurtleMobility"
**.host*.mobility.turtleScript = xmldoc("turtle.xml", "movements//movement[@id='5']")

[Config TurtleMobility6]
network = MobileNetwork
description = "mass+placerandomly"
*.numHosts = 2
**.host*.mobilityType = "TurtleMobility"
**.host*.mobility.turtleScript = xmldoc("turtle.xml", "movements//movement[@id='6']")
```

Output: