

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

Roll No.	006
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Subject	ADVANCED COMPUTER NETWORKING



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./~~Ms.~~ HEMAN SHAKTHI MOHAN UDAIYAR, Seat Number 006 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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PRACTICAL NO: 1

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

```

```

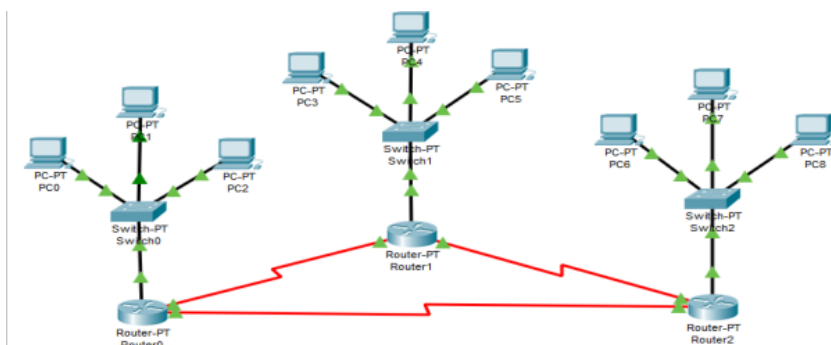
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
ip address 70.70.70.3 255.0.0.0
Router(config-if)#ip address 70.70.70.3 255.0.0.0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



PRACTICAL NO: 2

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

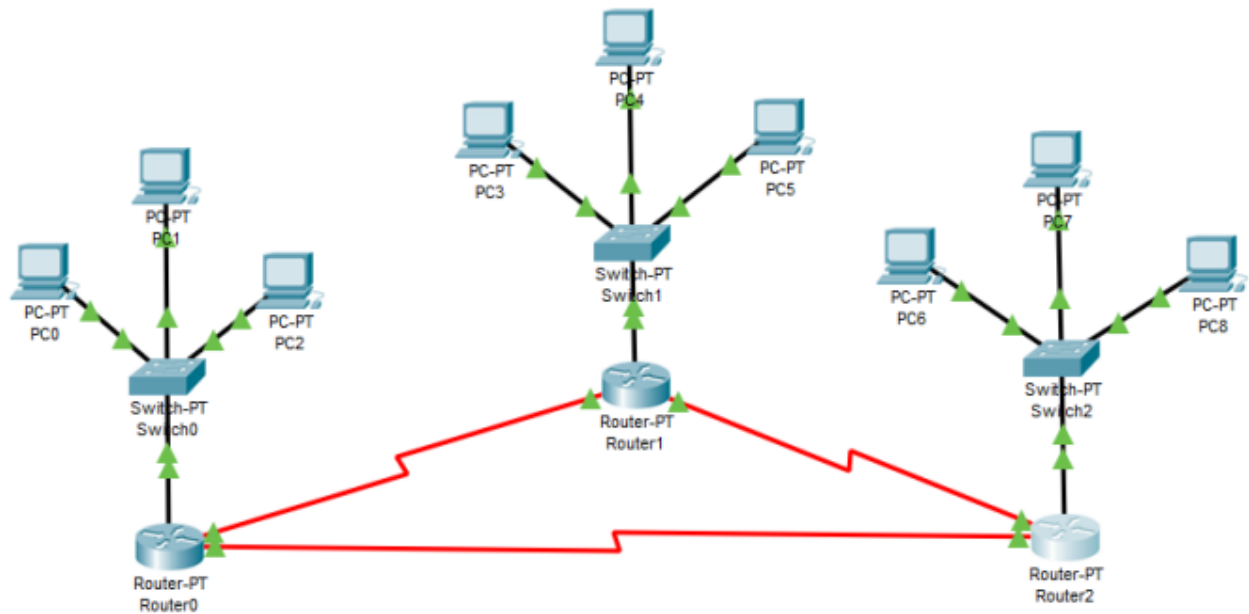
Router(config-router)#network 60.0.0.0 0.255.255.255 area 0

```
Router(config-router)#network 70.0.0.0 0.255.255.255 area 0
```

```
Router(config-router)#exit
```

```
00:55:44: %OSPF-5-ADJCHG: Process 3, Nbr 60.60.60.2 on Serial2/0 from LOADING to FULL, Loading Done
```

Output:



PRACTICAL NO: 3

Aim: Create a network with three routers with BGP and each router associated network will have a minimum of three PCs. 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

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
```

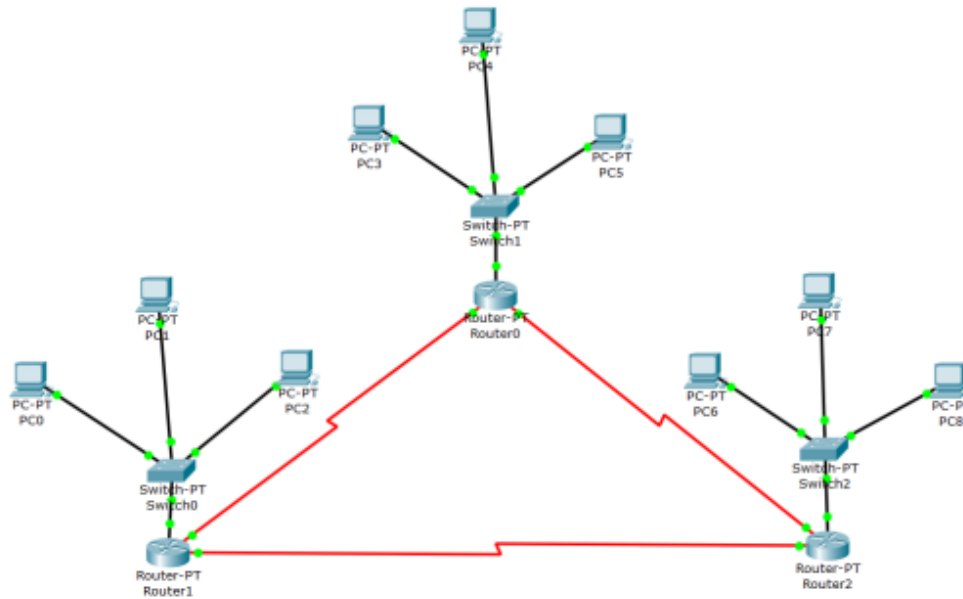
```
Router(config-router)#neighbor 70.70.70.2 remote-as 100
```

```
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
```

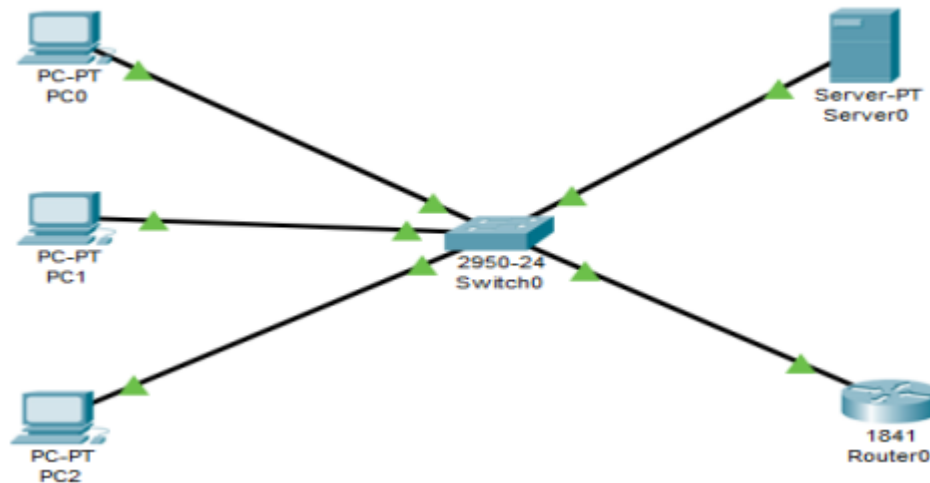

Output:



PRACTICAL NO: 4

Aim: Create DHCP server and client for DHCP service.

Configuration of DHCP Client and Server



On PC0:

PC0

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 10.0.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 0.0.0.0

On PC1:

PC1

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

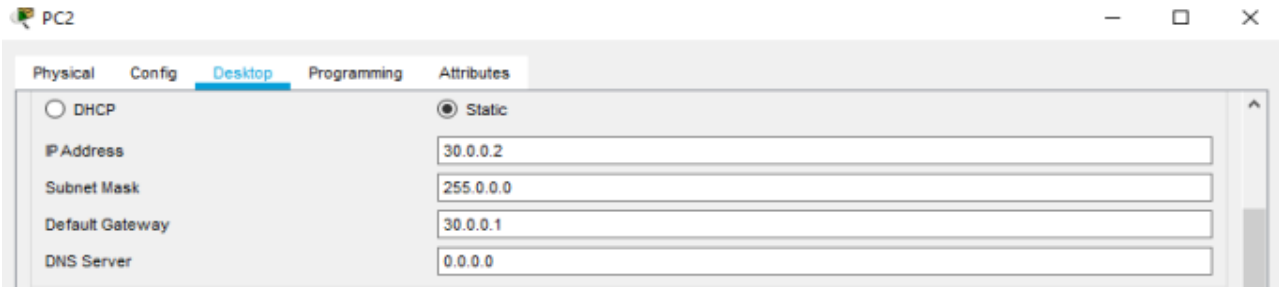
IP Address: 20.0.0.2

Subnet Mask: 255.0.0.0

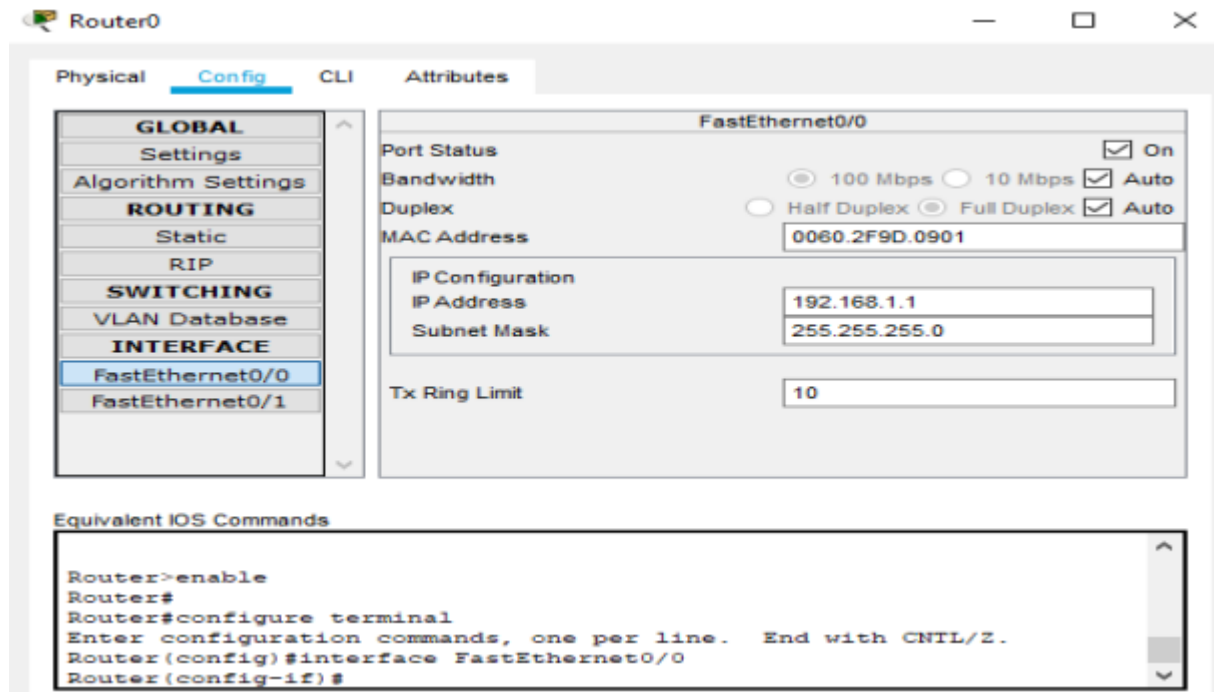
Default Gateway: 20.0.0.1

DNS Server: 0.0.0.0

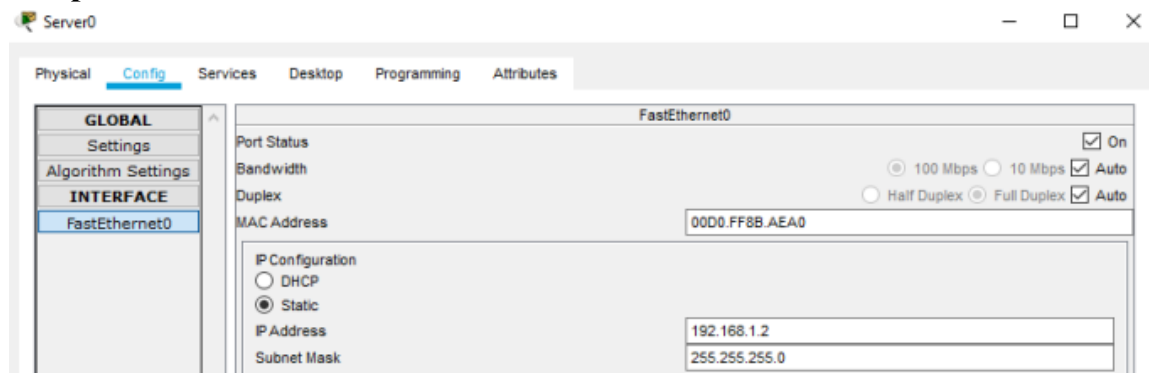
On PC2:



On Router0:

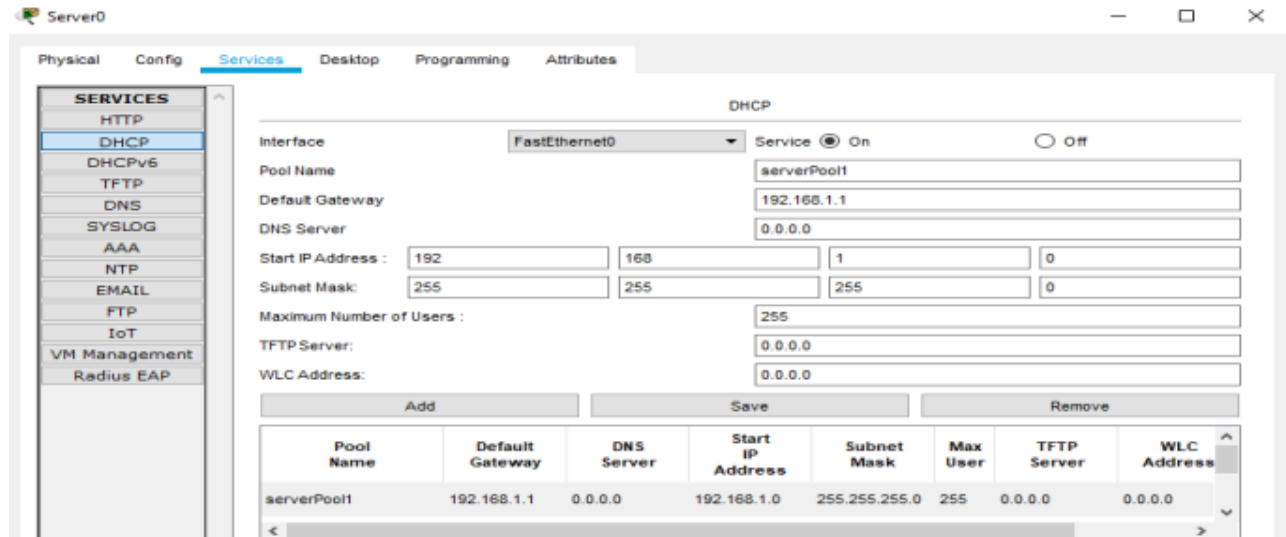


Setup IP on Server0:

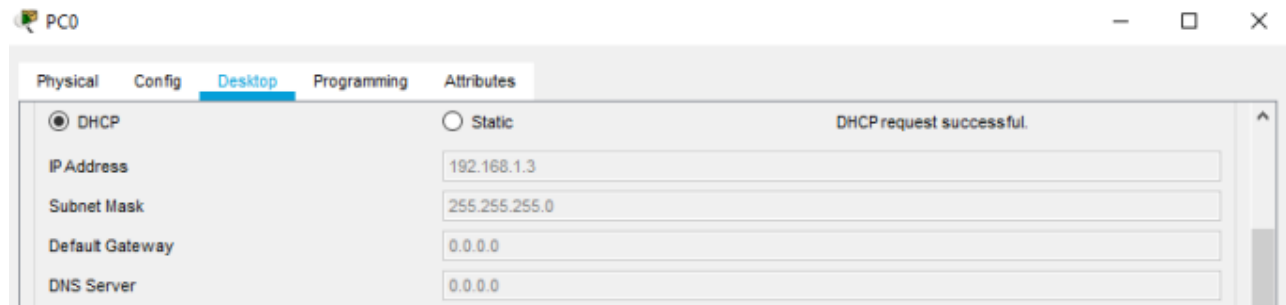


Setup DHCP on Server0:

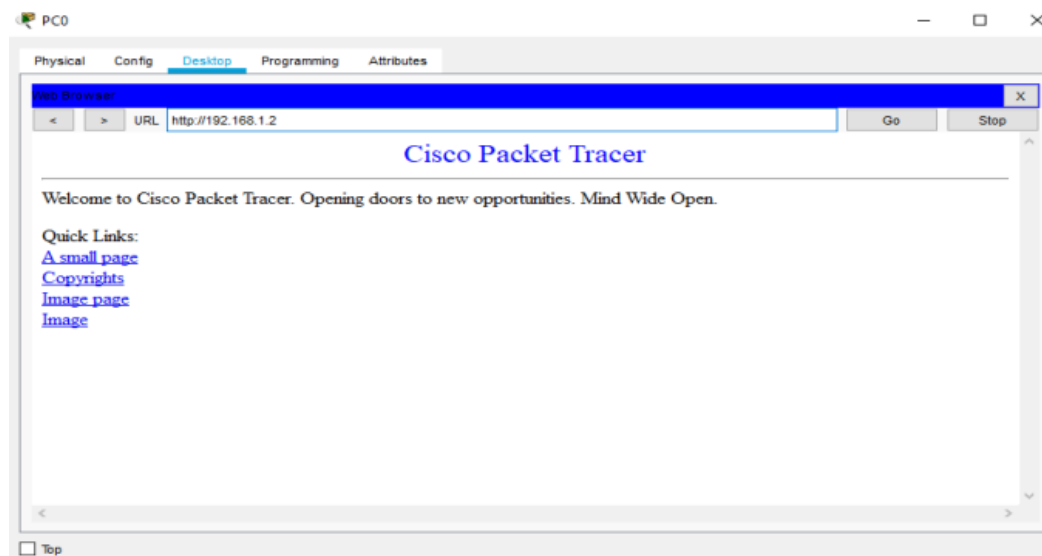
ADVANCED COMPUTER NETWORKING



Now go to PC0 and select DHCP:



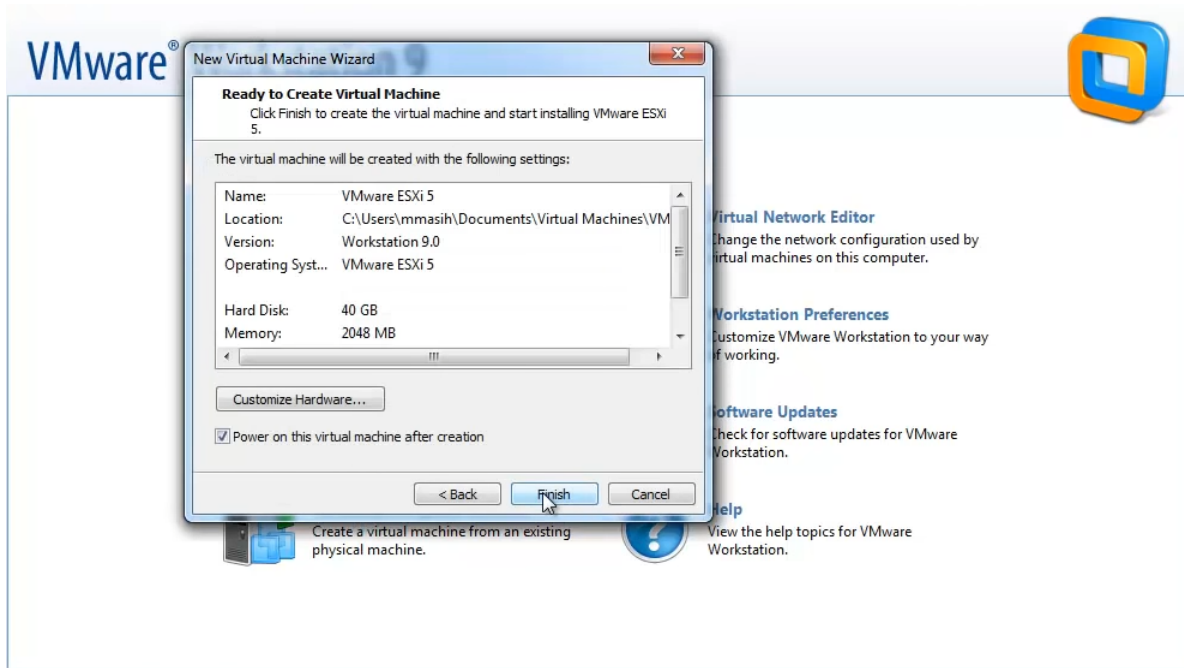
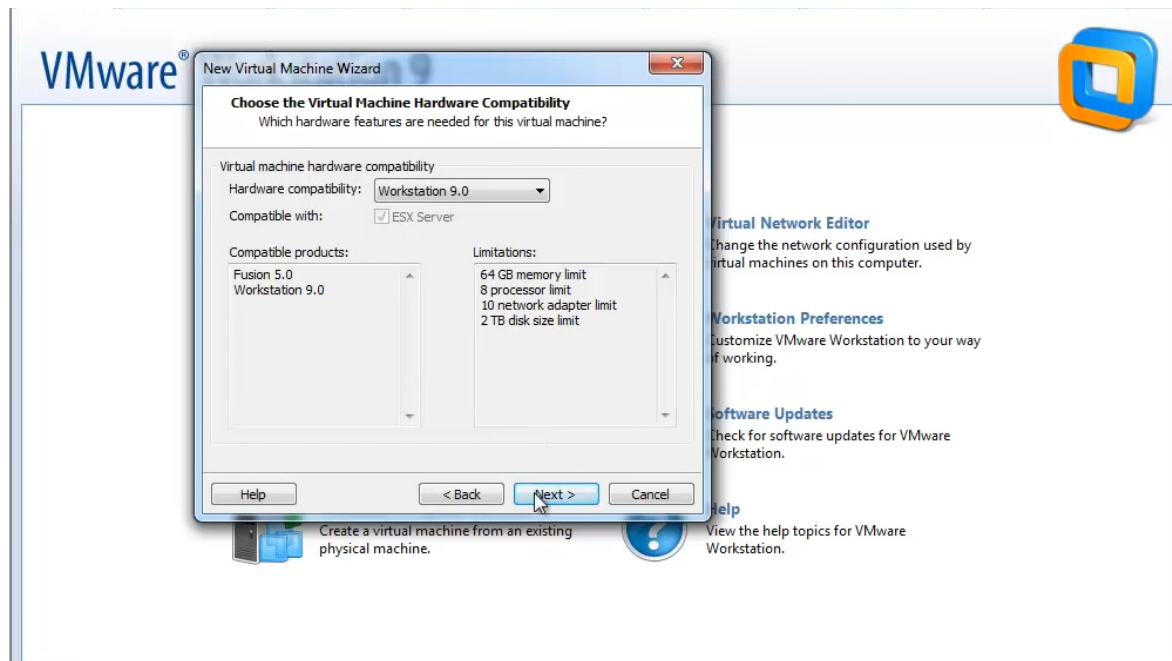
Now, open web browser on PC0 and enter the Server IP Address:

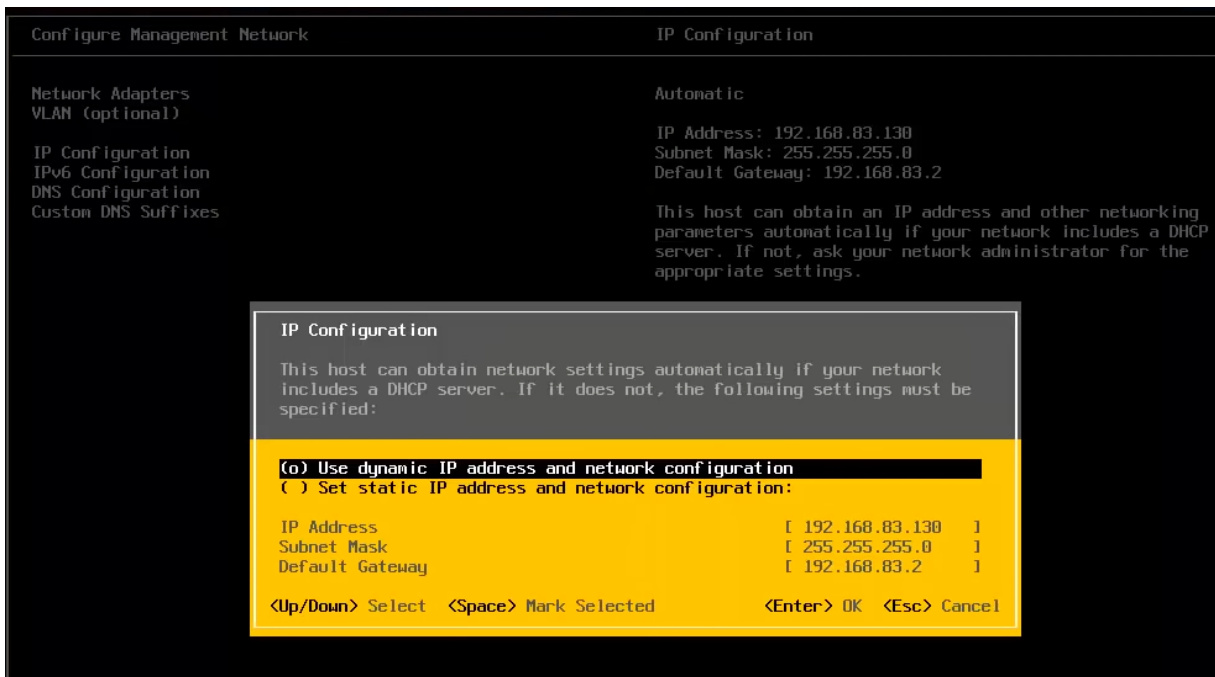
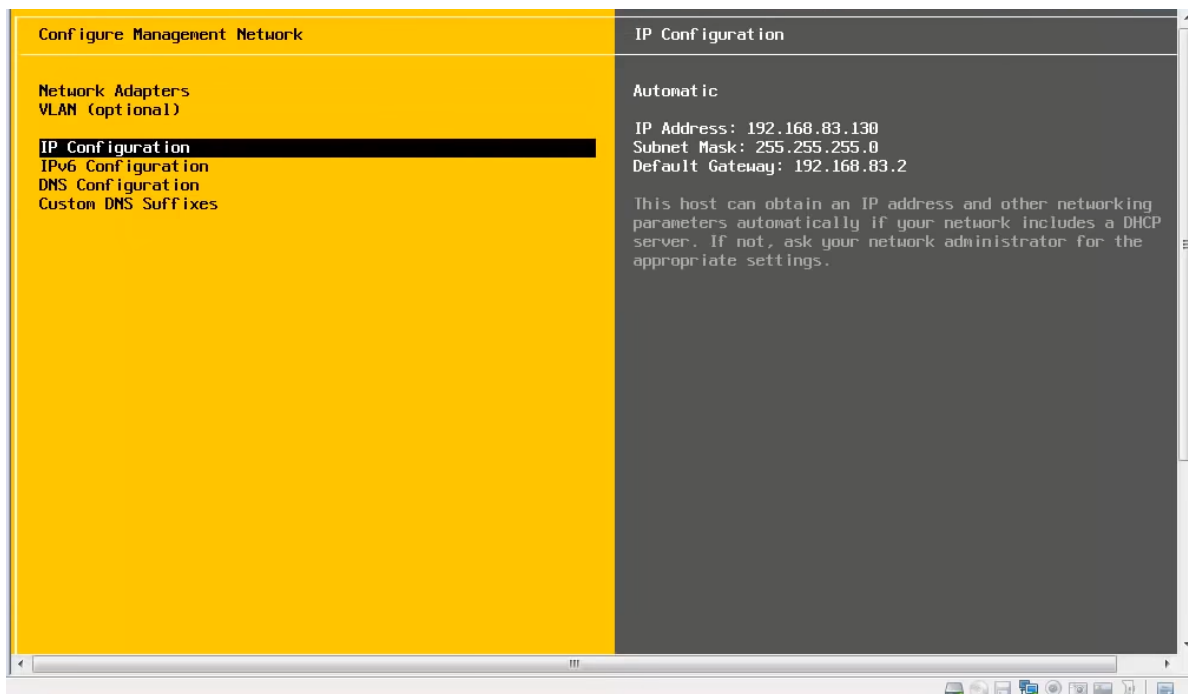


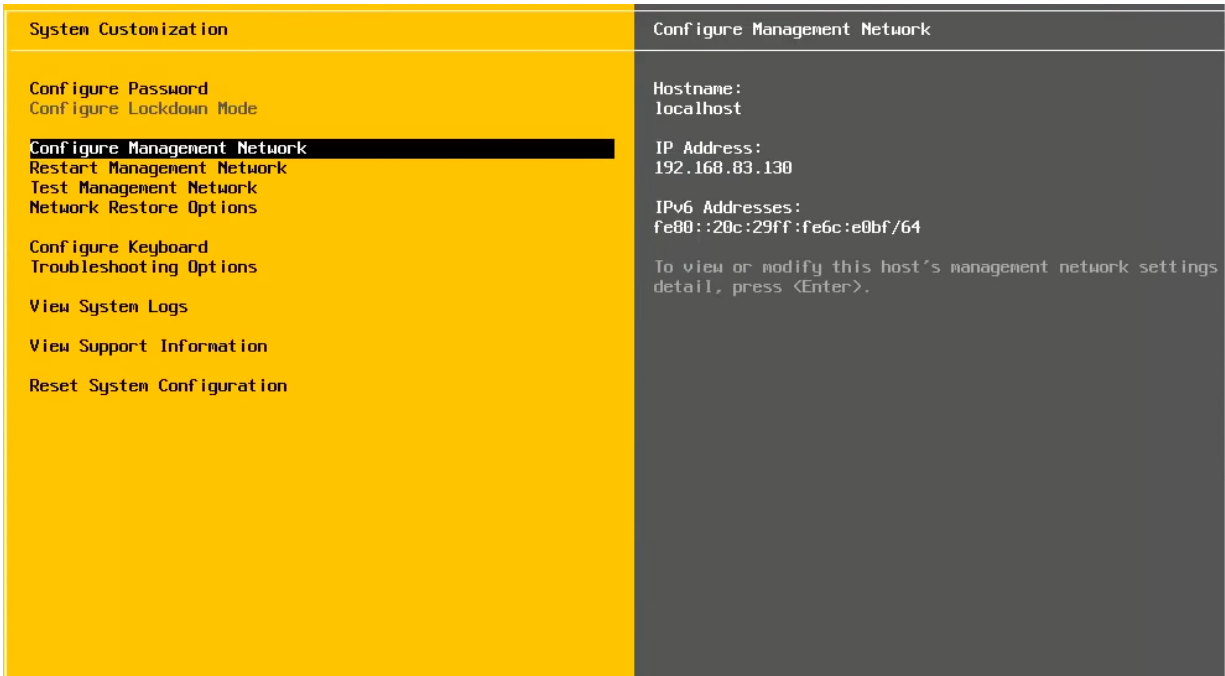
PRACTICAL NO: 5

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

Virtual Machine Installation







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" />
  [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

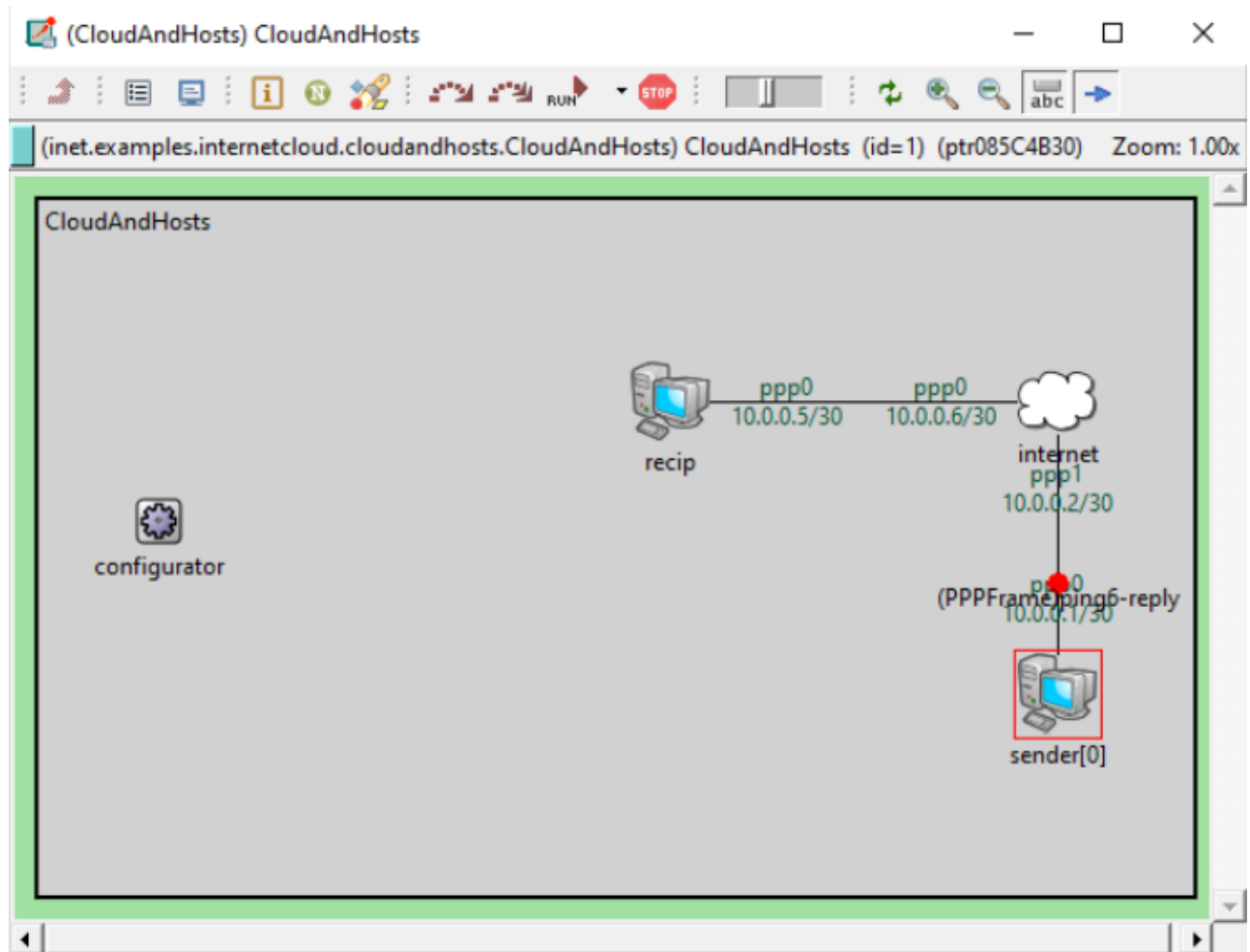
```

```

[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" />
  </parameters>
</internetCloud>

```

Output :



PRACTICAL NO: 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

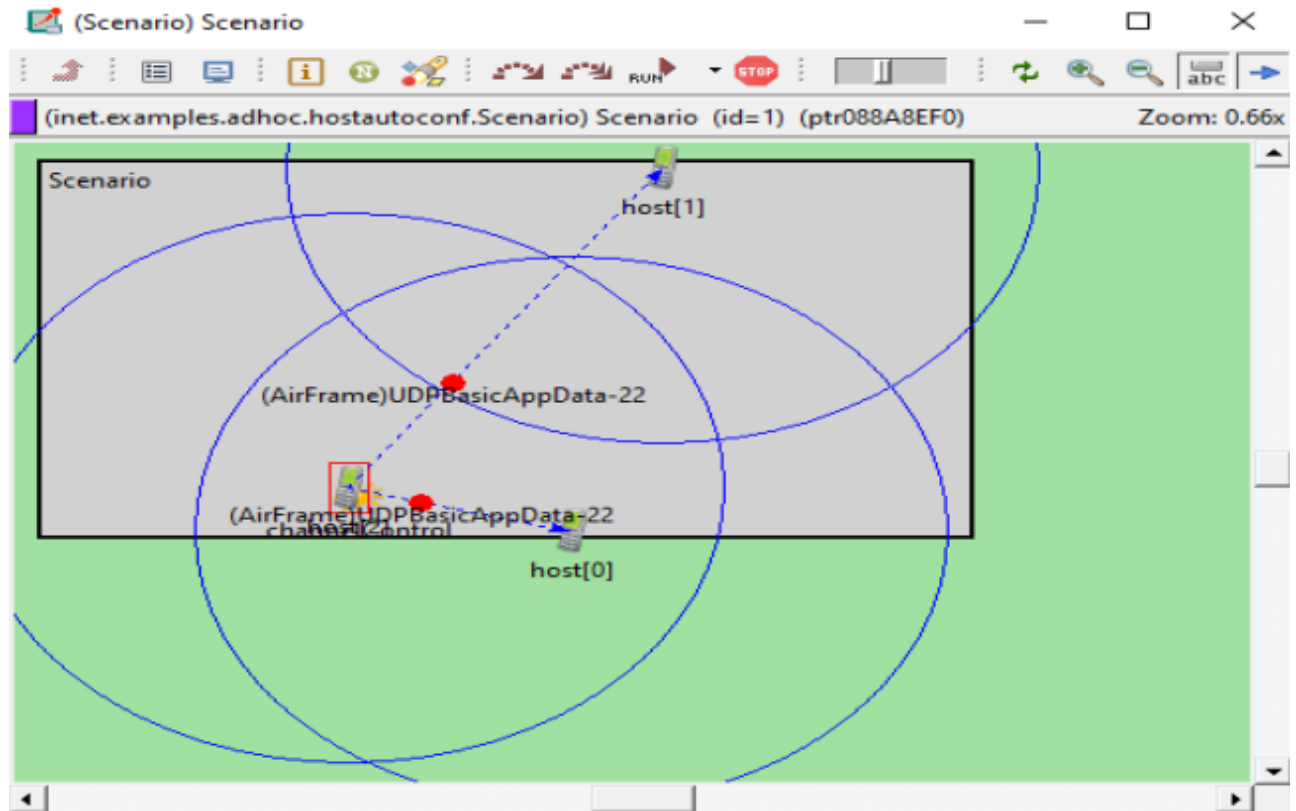
```
[General]
debug-on-errors = true
network = Scenario
sim-time-limit = 60min
cmdenv-express-mode = true
*.hosts = 3
**.constraintAreaMinX = 0m
**.constraintAreaMinY = 0m
**.constraintAreaMinZ = 0m
**.constraintAreaMaxX = 600m
**.constraintAreaMaxY = 400m
**.constraintAreaMaxZ = 0m
**.debug = true
**.coreDebug = 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 :



PRACTICAL NO: 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

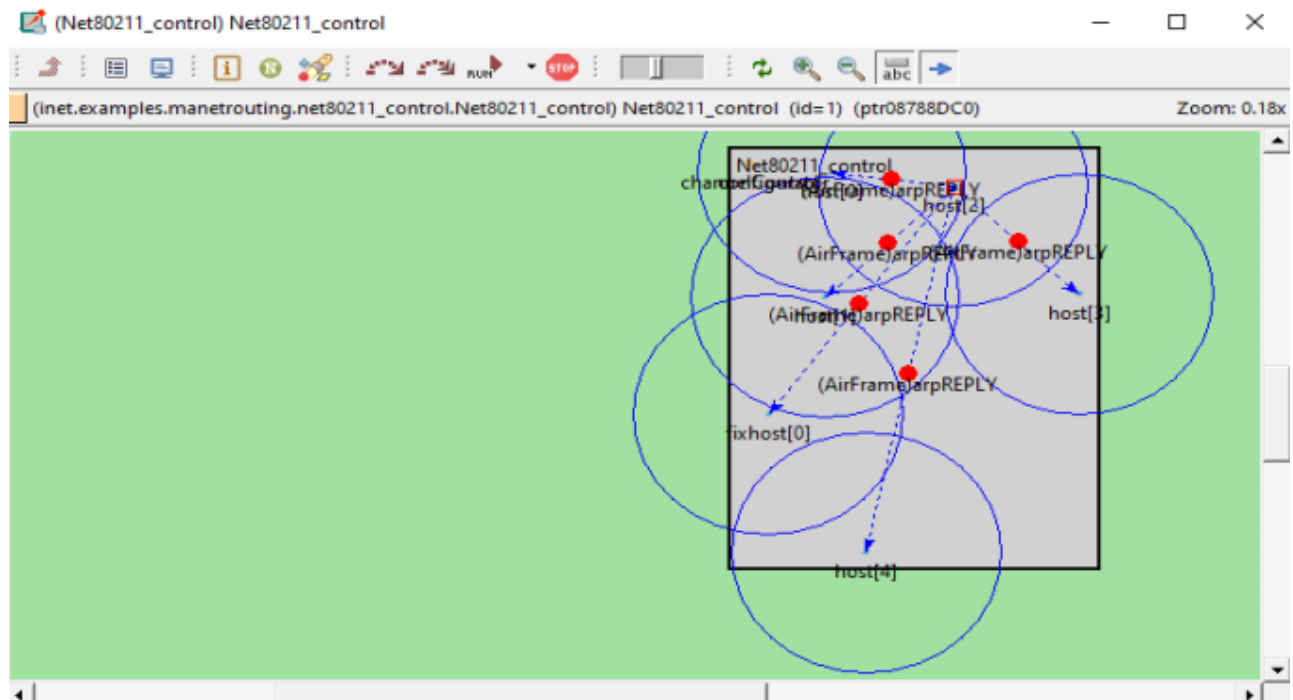
```

```
**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 :



PRACTICAL NO: 9

Aim: Create a 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

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```

***.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 :

