Practical No:4

Description:

- Simulator used : Omnet++
- Simulator can be downloaded from below link:

https://omnetpp.org/omnetpp (recommended version is omnet++ 4.2.2).

- After installing Omnet++, we need to install inet framework which is specially designed for wireless simulation. You can download inet framework from below link.

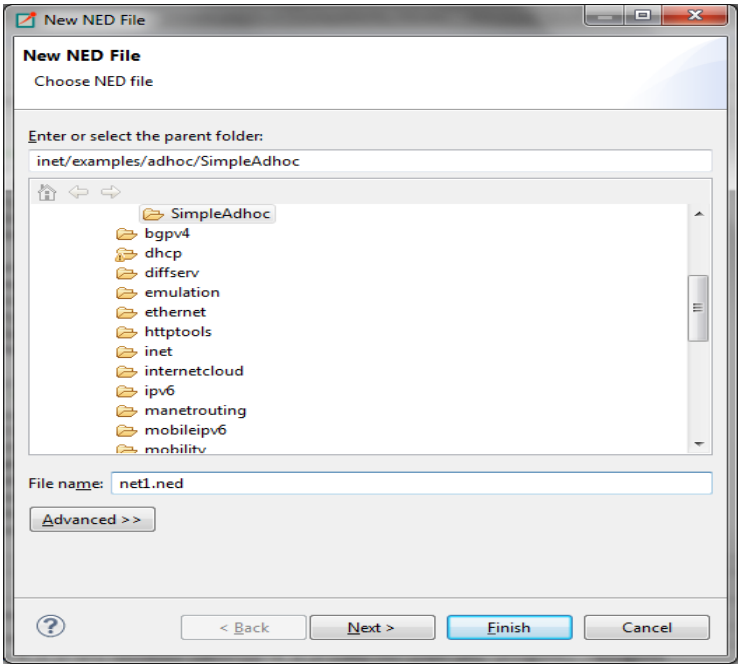
https://inet.omnetpp.org/Download.html

- After downloading there are certain steps to be followed to include this framework in omnet++ as follows:

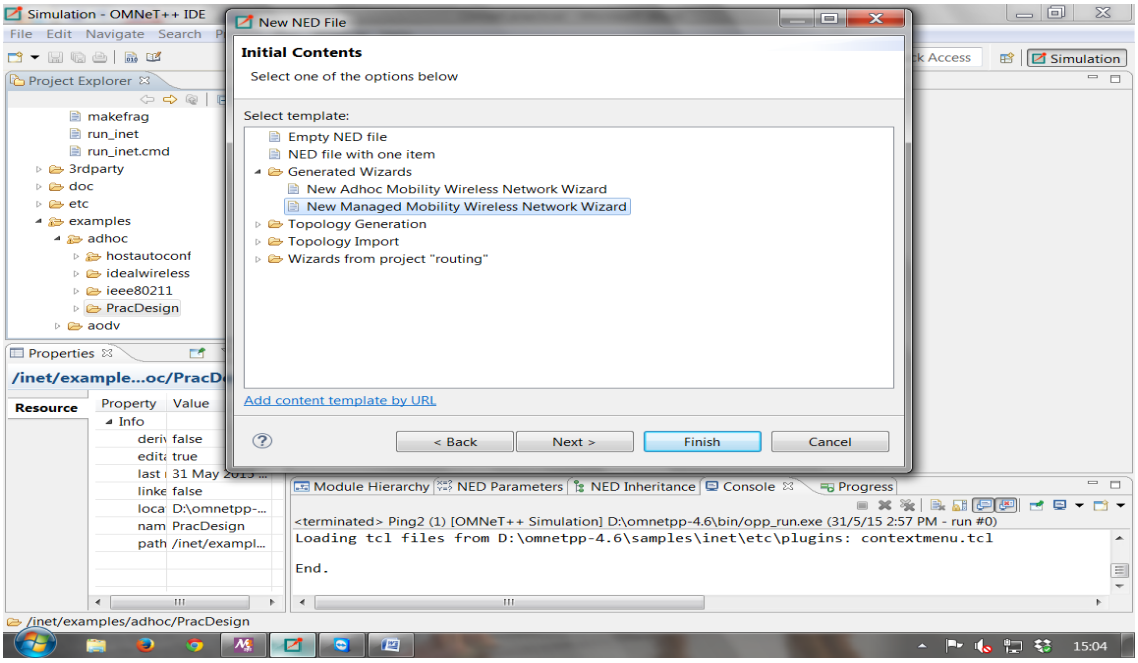
- **Download the INET sources.**
- **Unpack it into the directory of your choice: (tar xvfz inet-<version>.tgz)(recommended is tar or .tgz)**
- **Recommeded version is inet 2.1**
- **Start the Omnet++ IDE, and import the project via *File -> Import -> Existing Projects to the Workspace*. A project named inet should appear.**
- **Build with *Project -> Build*, or hit ctrl+b**
- **Now you should be able to launch example simulations.**

Steps for practical:

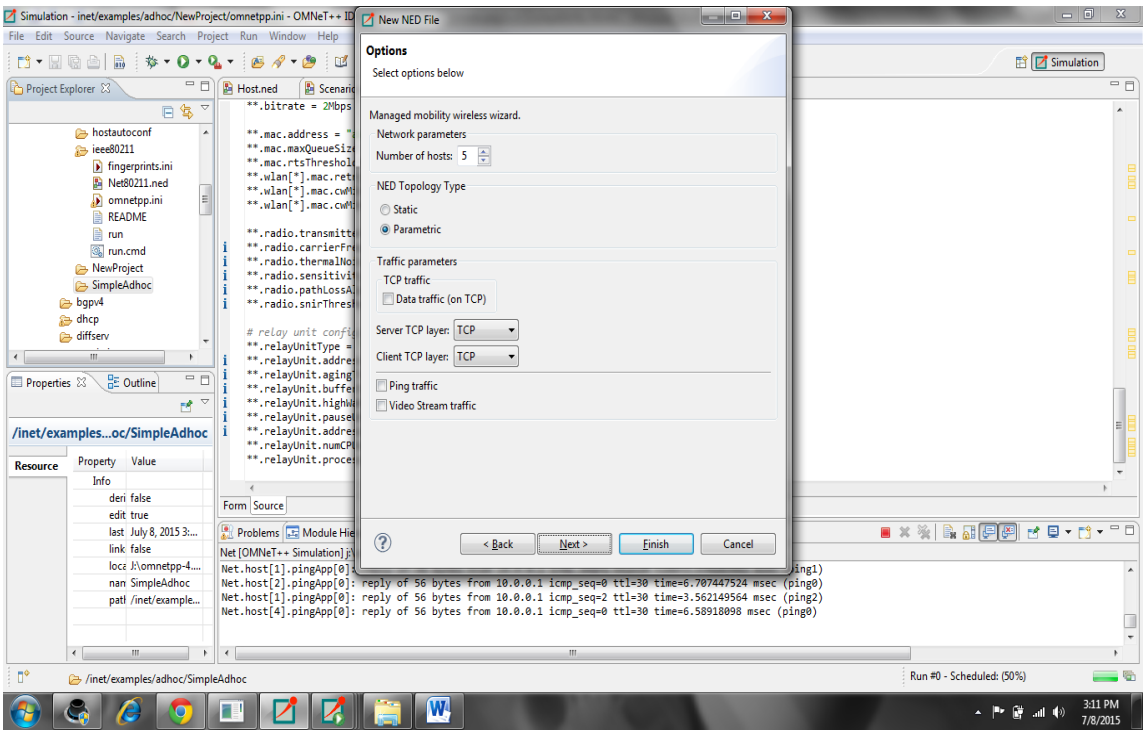
- **Then open inet/examples/**
- **Right click on adhoc -create new folder as SimpleAdhoc.**
- **Right click on your newly created folder and select NED file. Give name as Net1.**



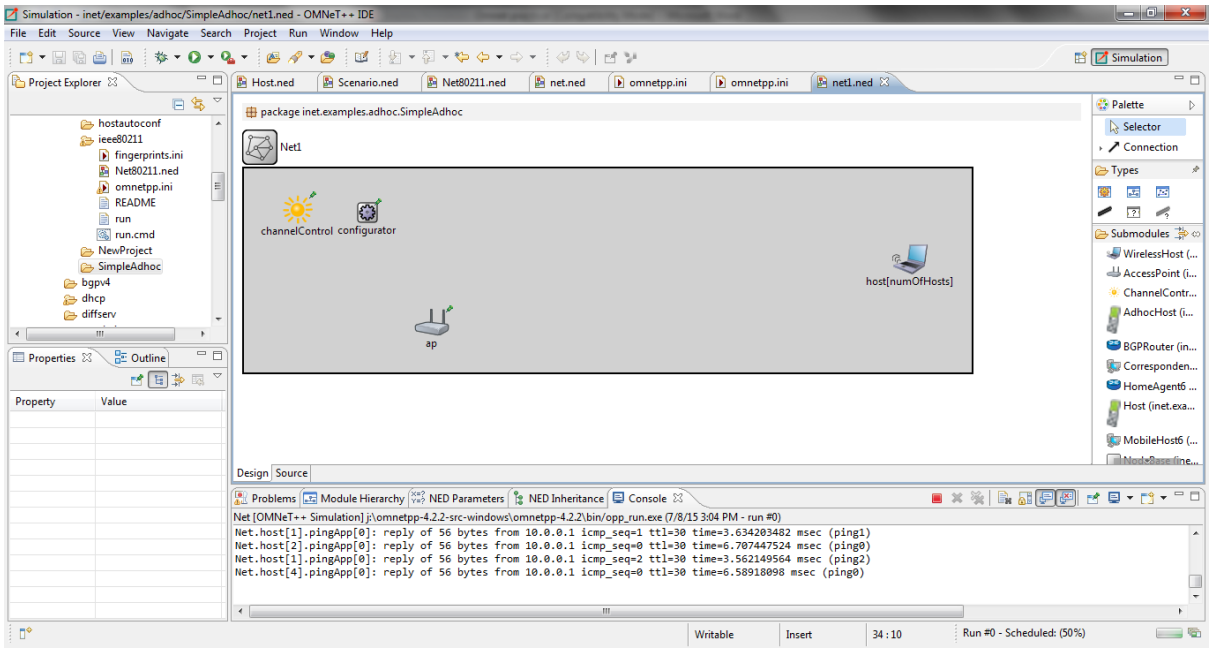
click on new manages mobility wireless network wizard.



then configure as follows



then click on finish.



below is the code that will be available in source part of net1.ned once configured.

```
package inet.examples.adhoc.SimpleAdhoc;

// numOfHosts: 5

import inet.networklayer.autorouting.ipv4.IPv4NetworkConfigurator;
import inet.nodes.inet.WirelessHost;
import inet.nodes.wireless.AccessPoint;
import inet.world.radio.ChannelControl;

network Net
{
    parameters:
        int numOfHosts;

    submodules:
        host[numOfHosts]: WirelessHost
        {
            @display("r=,,#707070");
        }

        ap: AccessPoint
        {
            @display("p=213,174;r=,,#707070");
        }

        channelControl: ChannelControl
        {
            numChannels = 2;
            @display("p=61,46");
        }

        configurator: IPv4NetworkConfigurator
        {
             @display("p=140,50");
         }
```

On design part you will find components appearing according to the code as the above snapshot.

Same as do this in omnetpp.ini file :

Source code for omnetpp.ini:

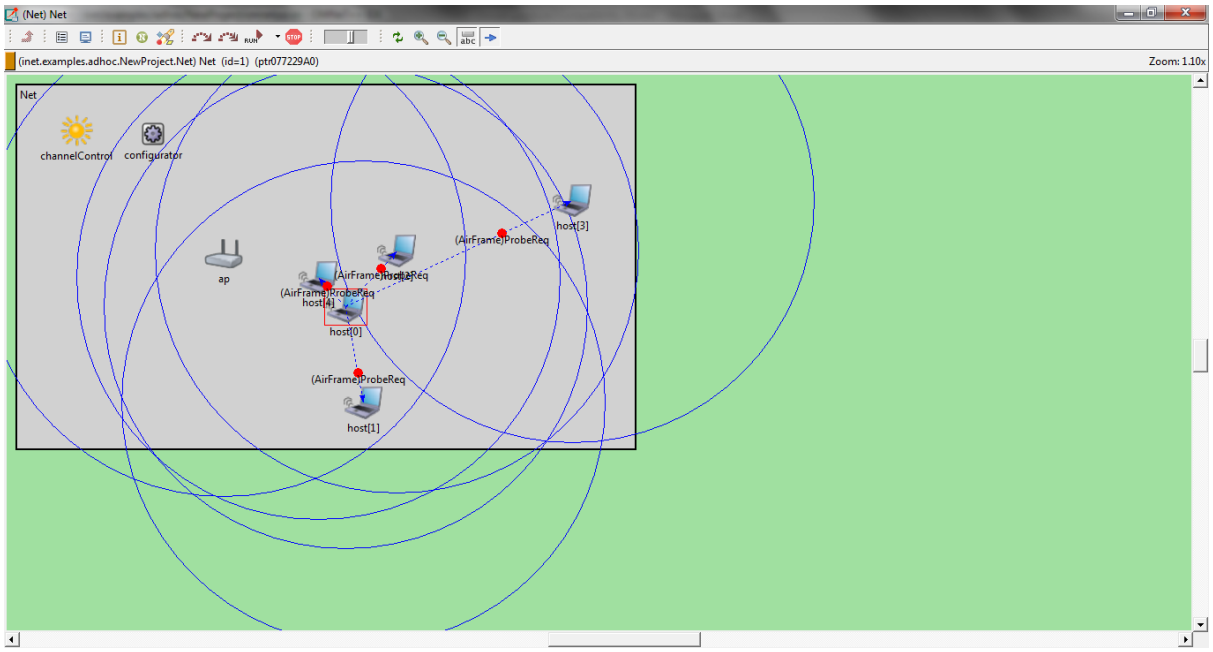
```
[General]
network = Net1

*.numOfHosts = 5

#debug-on-errors = true
tkenv-plugin-path = ../../../etc/plugins


**.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

# 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

# ping app (host[0] pinged by others)
*.host[0].numPingApps = 0
*.host[*].numPingApps = 2
*.host[*].pingApp[*].destAddr = "host[0]"
**.pingApp[0].startTime = uniform(1s,5s)
**.pingApp[1].startTime = 5s+uniform(1s,5s)
**.pingApp[*].printPing = true

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

```
[Config Ping1]
description = "host1 pinging host0"

[Config Ping2] # __interactive__
description = "n hosts"
# leave numHosts undefined here


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

**.channelNumber = 0

# channel physical parameters
*.channelControl.carrierFrequency = 2.4GHz
*.channelControl.pMax = 20.0mW
*.channelControl.sat = -110dBm
*.channelControl.alpha = 2

# mobility

**.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 = 100ms

# nic settings
**.bitrate = 2Mbps

**.mac.address = "auto"
**.mac.maxQueueSize = 14
**.mac.rtsThresholdBytes = 3000B
**.wlan[*].mac.retryLimit = 7
**.wlan[*].mac.cwMinData = 7
**.wlan[*].mac.cwMinMulticast = 31

**.radio.transmitterPower = 20.0mW
**.radio.carrierFrequency = 2.4GHz
**.radio.thermalNoise = -110dBm
**.radio.sensitivity = -85dBm
**.radio.pathLossAlpha = 2
**.radio.snirThreshold = 4dB

# relay unit configuration
**.relayUnitType = "MACRelayUnitNP"
**.relayUnit.addressTableSize = 100
**.relayUnit.agingTime = 120s
**.relayUnit.bufferSize = 1MiB
**.relayUnit.highWatermark = 512KiB
**.relayUnit.pauseUnits = 300  # pause for 300*512 bit (19200 byte) time
**.relayUnit.addressTableFile = ""
**.relayUnit.numCPUs = 2
**.relayUnit.processingTime = 2us
```

EXECUTION:

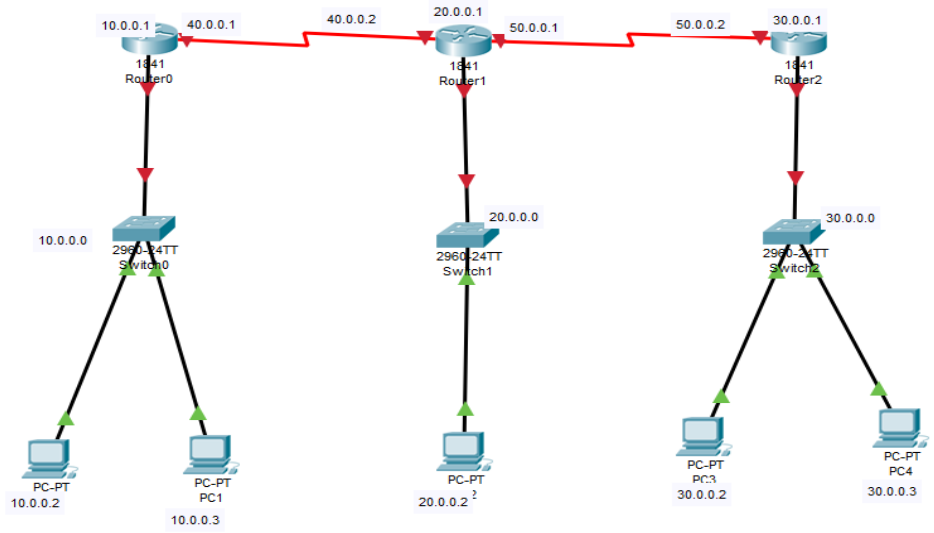
Now try to execute by right click on ned file Run as-1-Omnet++ simulation.

OUTPUT :

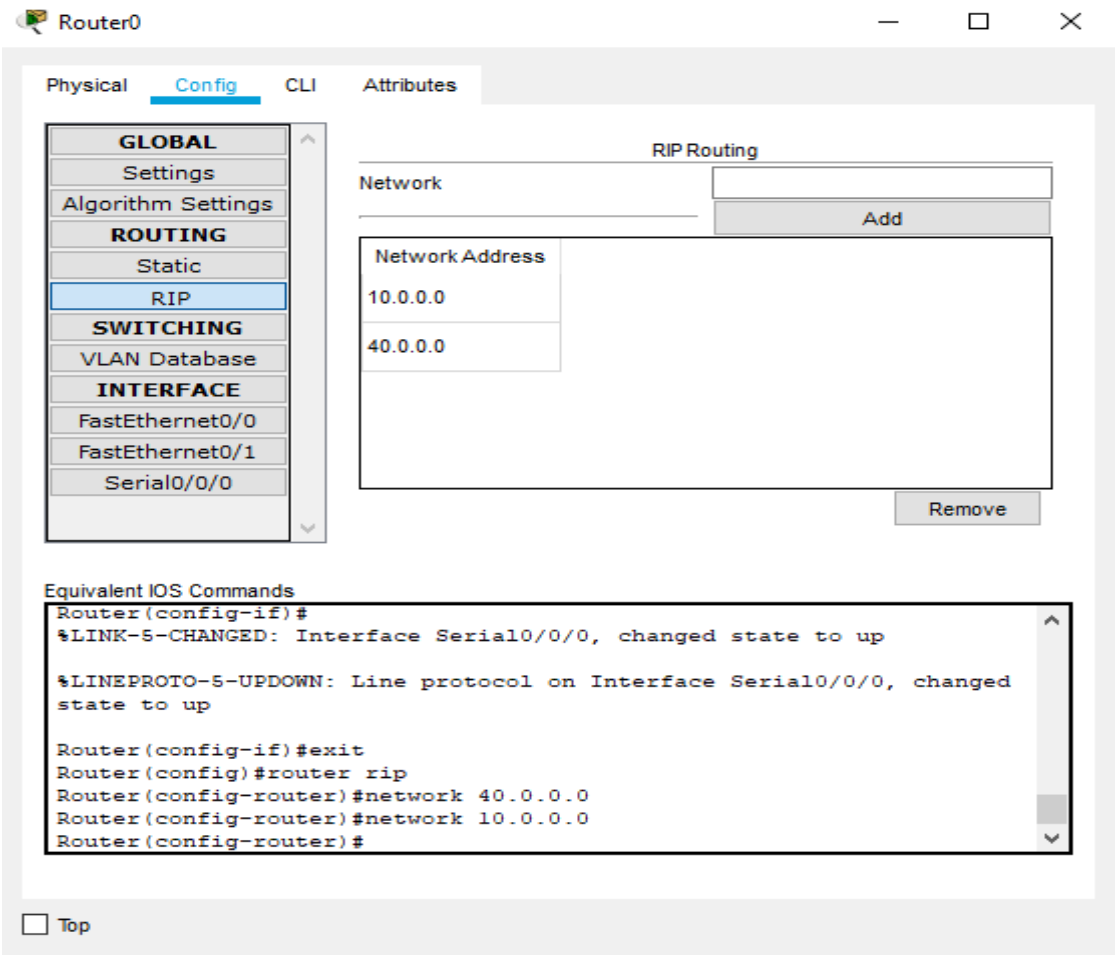

(Net) Net
(inet.examples.adhoc.NewProject.Net) Net (id=1) (ptr077229A0)
Zoom: 1.10x
Net
channelControl
configurator
ap
host[3]
(AirFrame)ProbeReq
(AirFrame)ProbeReq
(AirFrame)ProbeReq
host[4]
host[0]
(AirFrame)ProbeReq
host[1]

Practical No:5

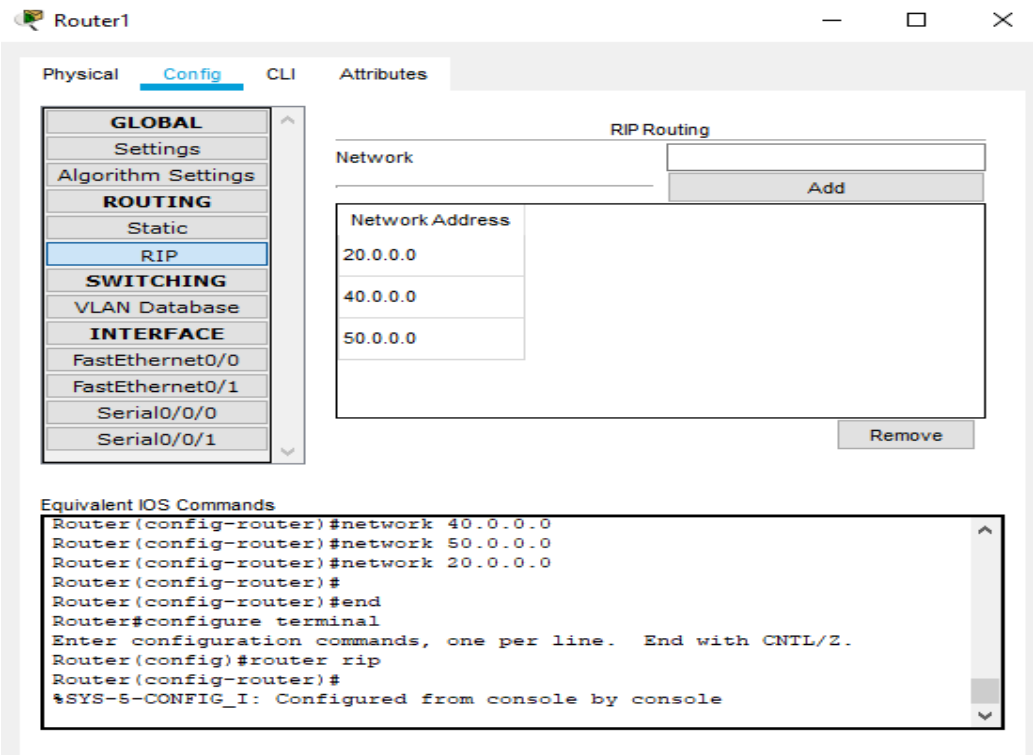
Connect the Routers Using Serializable Wire and give ip address



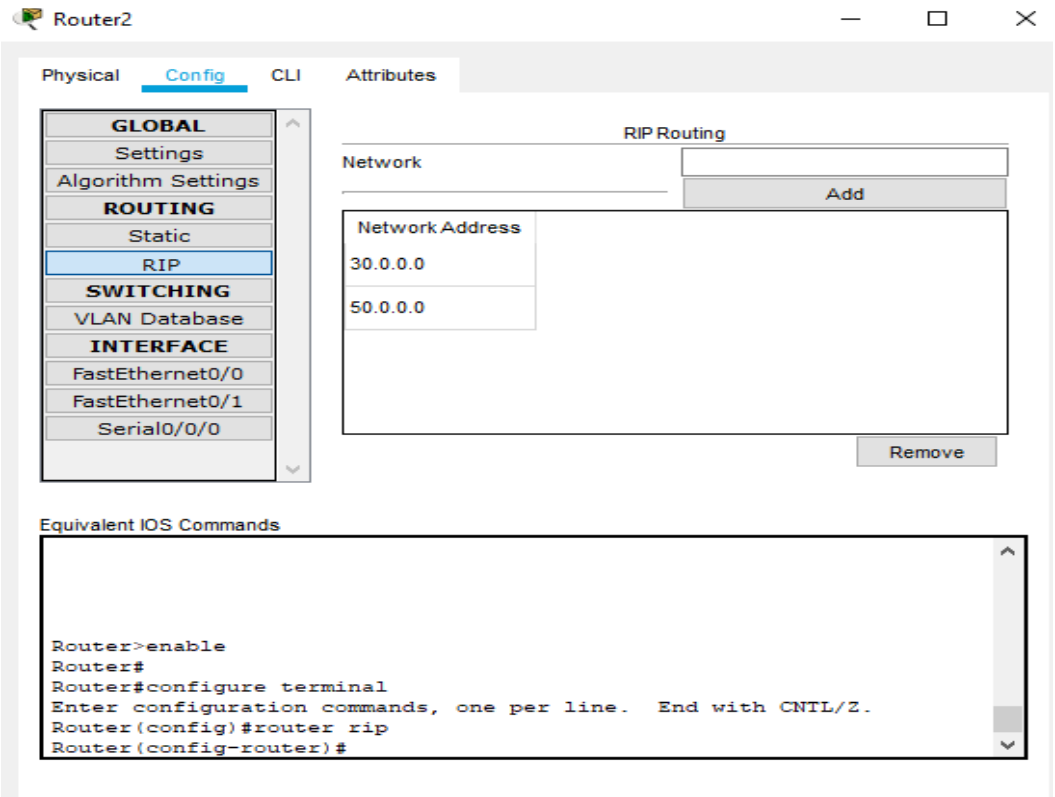
Router0→Config→RIP→Add Networks



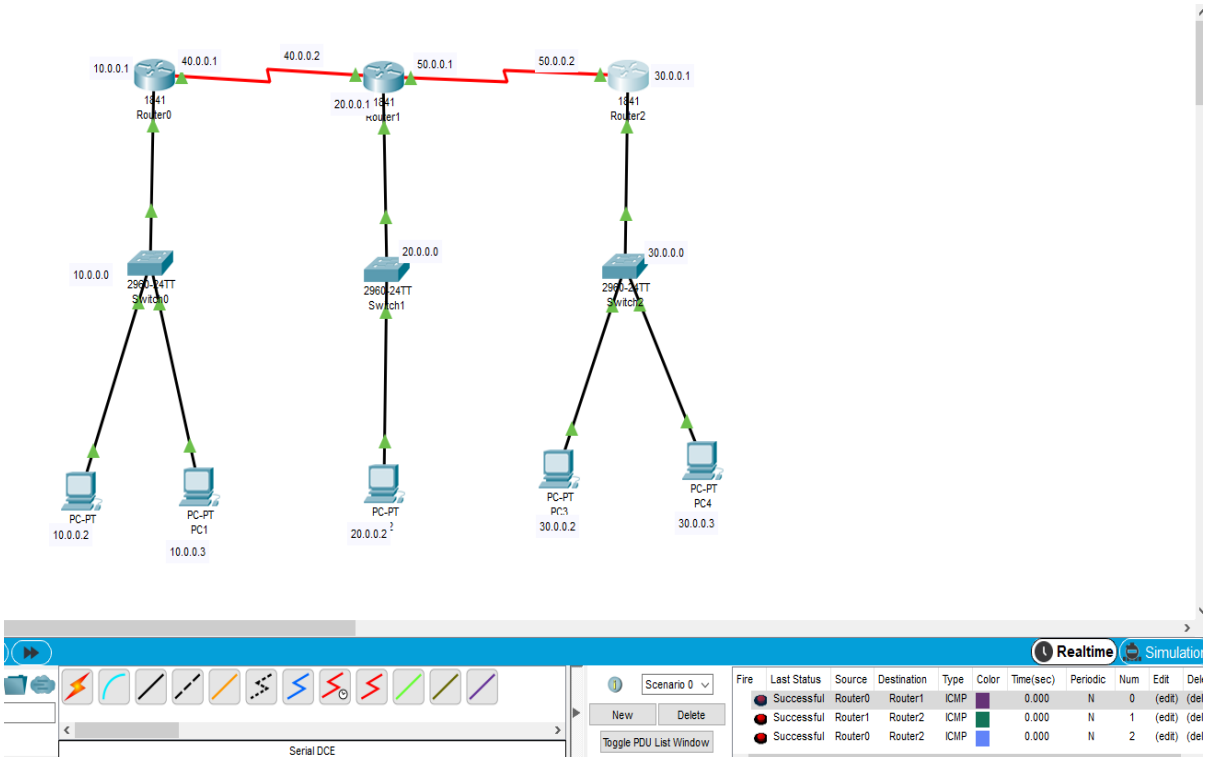
Router1→Config→RIP→Add Networks



Router2→Config→RIP→Add Networks



Final Output:



Practical No: 6

Steps for practical:

1. **open inet/examples/adhoc/manetrouting**
2. **Right click on manetrouting -create new folder as MobileNet.**
3. **Right click on your newly created folder and select NED file. Give name as Net1.**
   select new adhoc mobility wireless network wizard

Net1.ned

```
package inet.examples.manetrouting.mobilenet;

// numOfHosts: 10
// parametric: true
// static:     false

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

network Manet
{
    parameters:
        int numHosts;
    submodules:
        host[numHosts]: AdhocHost
        {
            parameters:
                @display("r=,,#707070");
        }

        channelControl: ChannelControl
        {
            parameters:
                @display("p=60,50");
        }

        configurator: IPv4NetworkConfigurator
        {
            @display("p=140,50");
        }
```

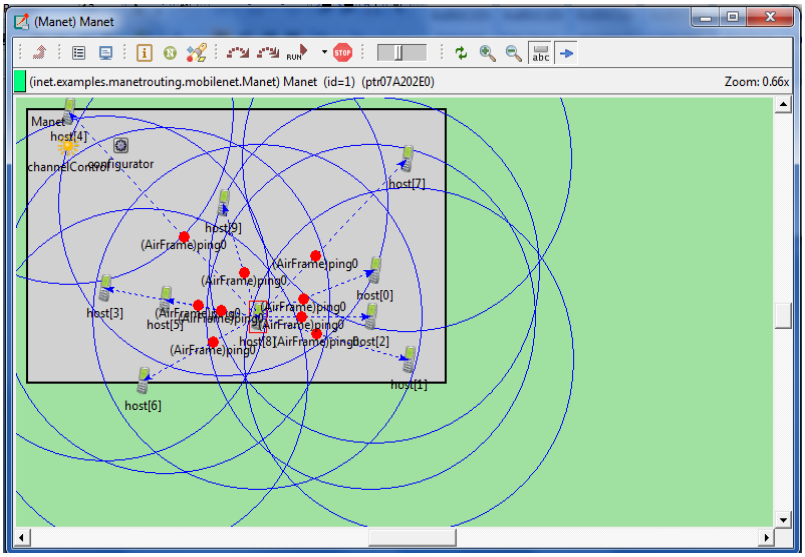
a file omnetpp.ini will be created with the following code :

omnetpp.ini :-

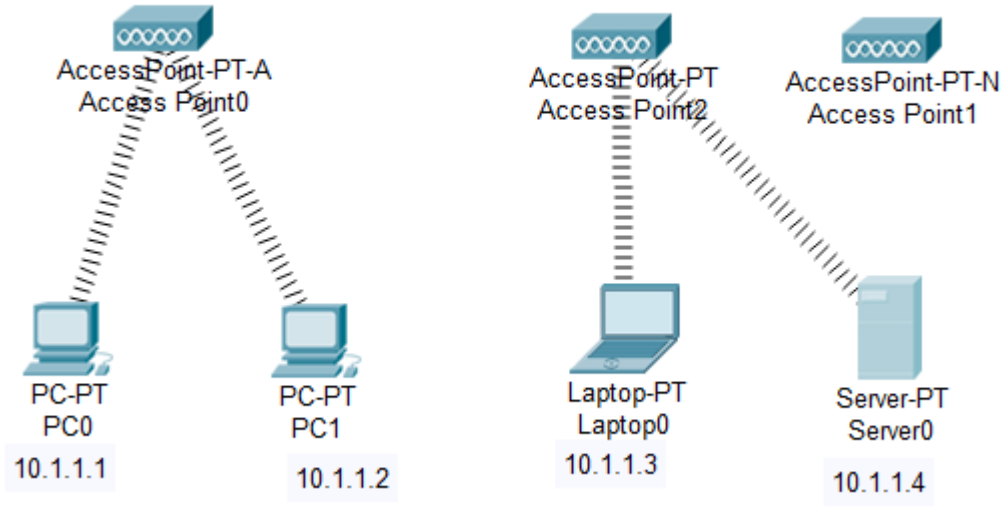
```
[General]
network = Manet
#record-eventlog = true
#eventlog-message-detail-pattern = *:(not declaredOn(cMessage) and not
declaredOn(cNamedObject) and not declaredOn(cObject))

*.numHosts = 10

num-rngs = 3
**.mobility.rng-0 = 1
**.wlan[*].mac.rng-0 = 2
#debug-on-errors = true

tkenv-plugin-path = ../../../etc/plugins

**.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"
**.mobility.constraintAreaMinZ = 0m
**.mobility.constraintAreaMaxZ = 0m
**.mobility.constraintAreaMinX = 0m
**.mobility.constraintAreaMinY = 0m
**.mobility.constraintAreaMaxX = 600m
**.mobility.constraintAreaMaxY = 400m
**.mobility.changeInterval = truncnormal(2s, 0.5s)
**.mobility.changeAngleBy = normal(0deg, 30deg)
**.mobility.speed = truncnormal(20mps, 8mps)
**.mobility.updateInterval = 100ms

# ping app (host[0] pinged by others)
*.host[0].pingApp[0].destAddr = ""
*.host[*].numPingApps = 1
*.host[*].pingApp[0].destAddr = "host[0]"
*.host[*].pingApp[0].startTime = uniform(1s,5s)
*.host[*].pingApp[0].printPing = true

# nic settings
**.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.cwMinMulticast = 31

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

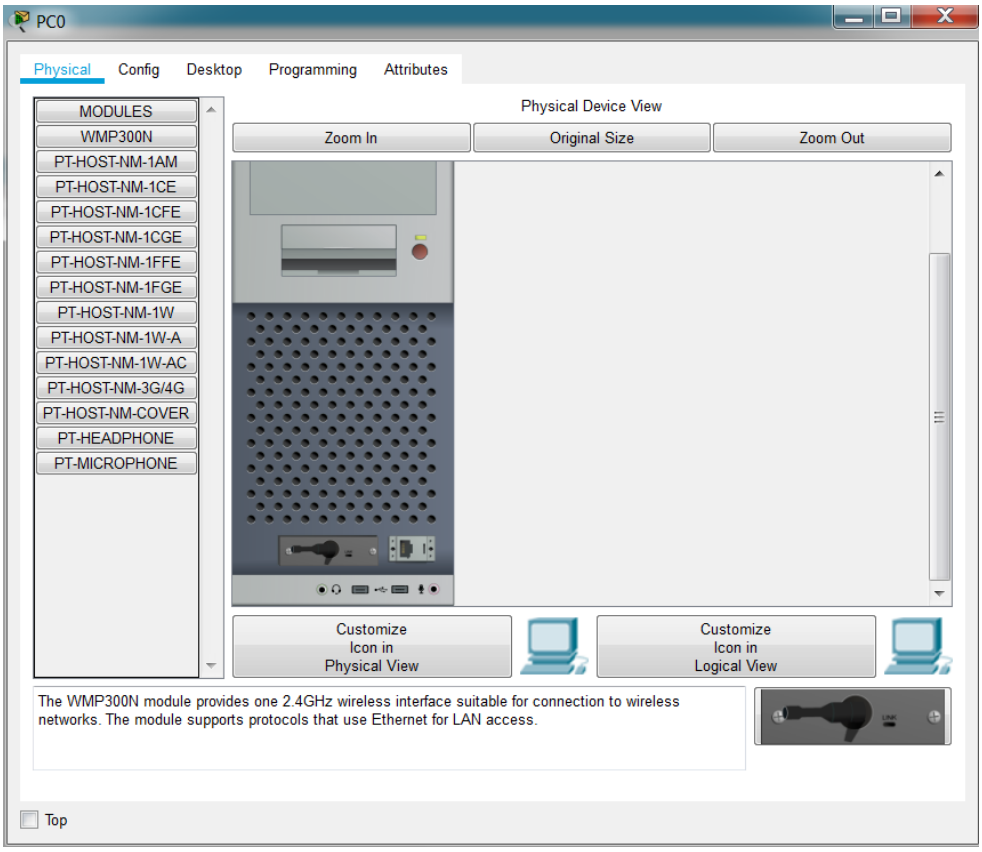
Right click on ned file and run it as omnetpp simulation



Practical No:7

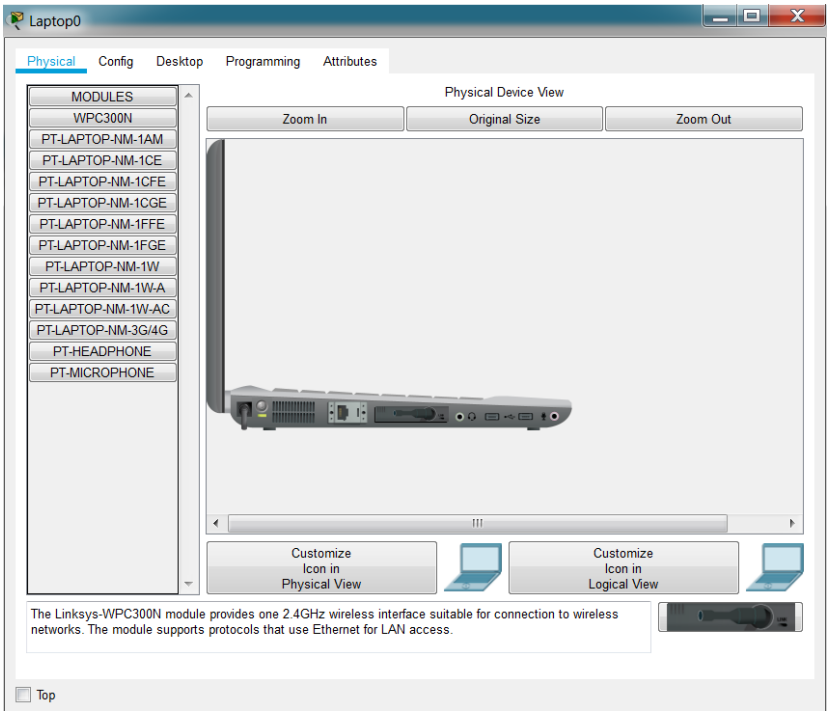


1.PC0→Physical→Drag and Drop PT-HOST-NM-1W-A module



2.Do same for PC1

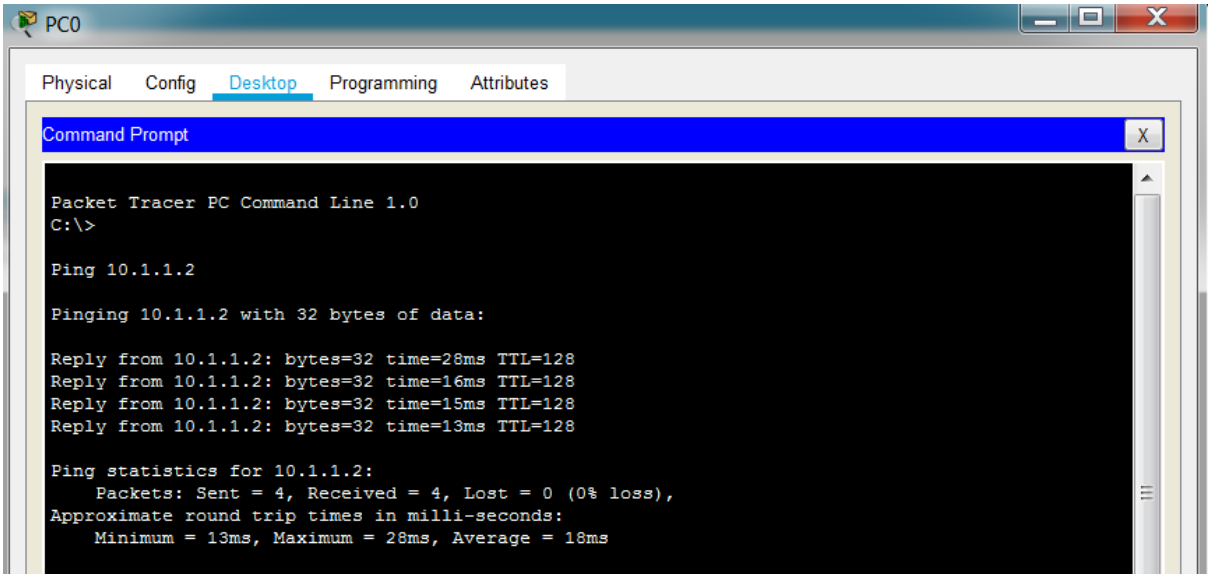
3.Laptop0→Physical→Drag and Drop PT-HOST-NM-1W module



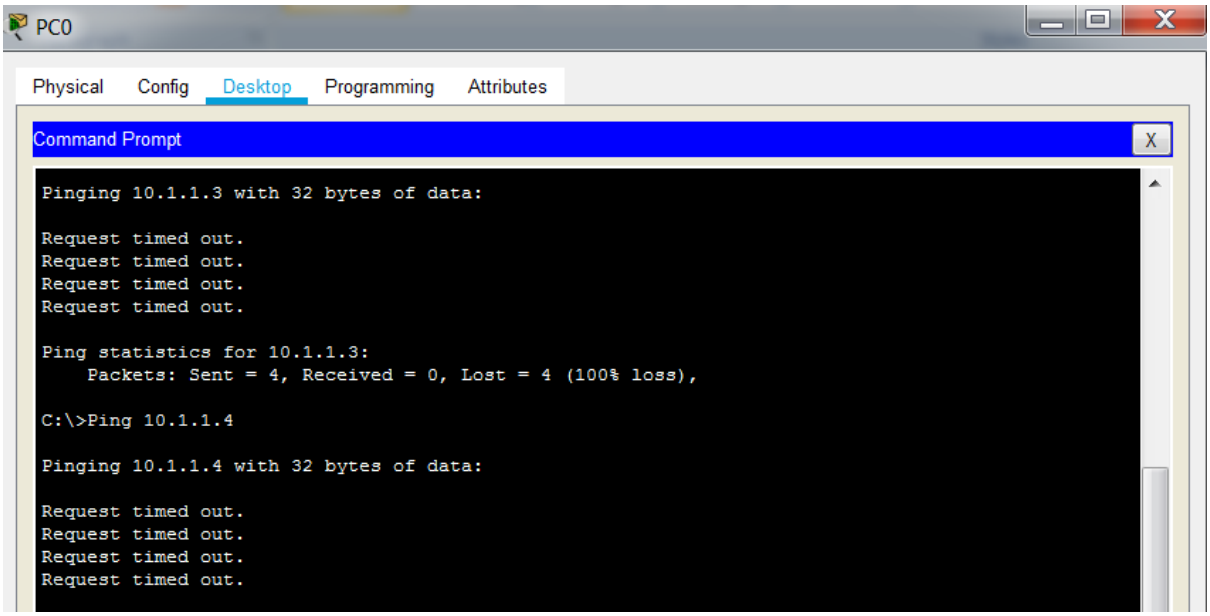
4.Server0-same as laptop0

5.Test Access PointA

a)Ping PC1(10.1.1.2) from PC0.The ping should succeed.

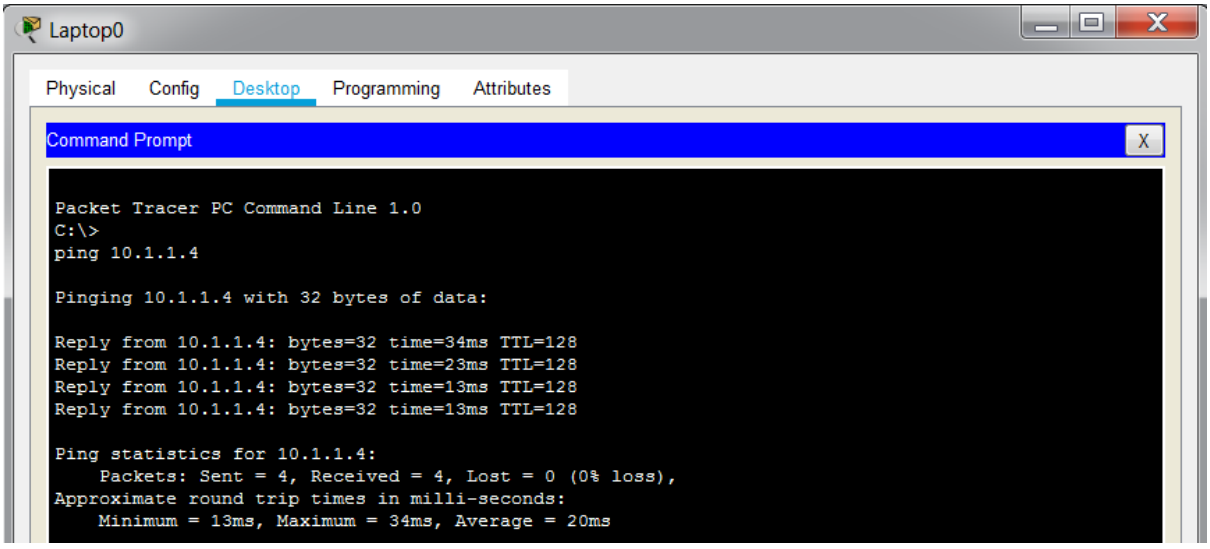


b) Ping Laptop0(10.1.1.3) and Server0(10.1.1.4) from PC0.The pings should fail.

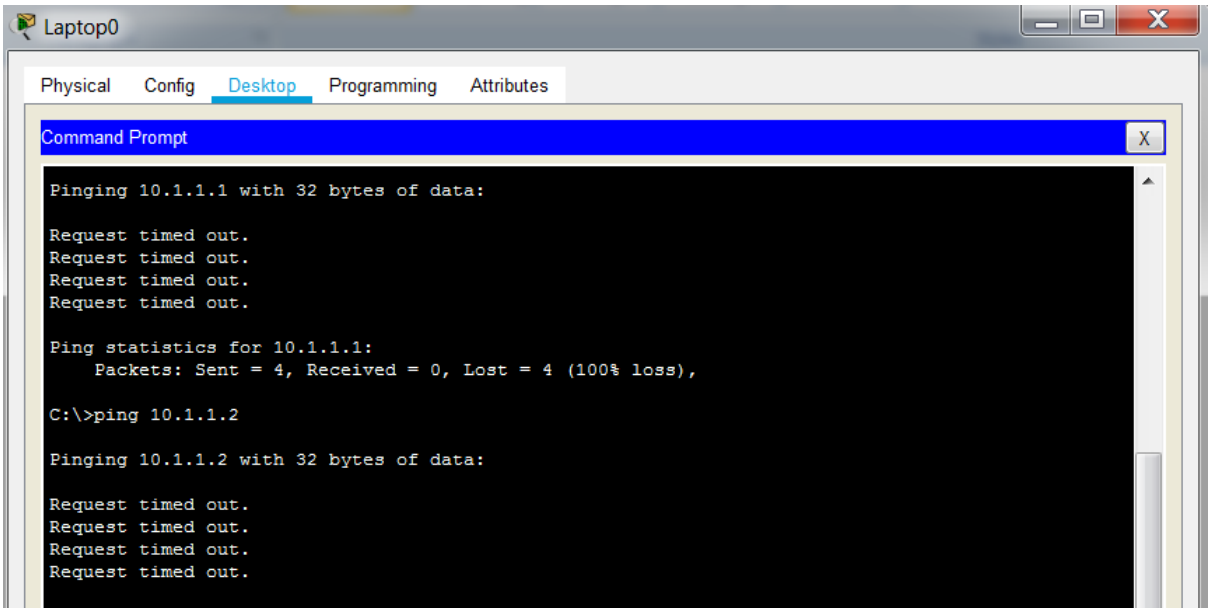


6.Test Access PointN

a) Ping Server0(10.1.1.4) from Laptop0.The pings should succeed.



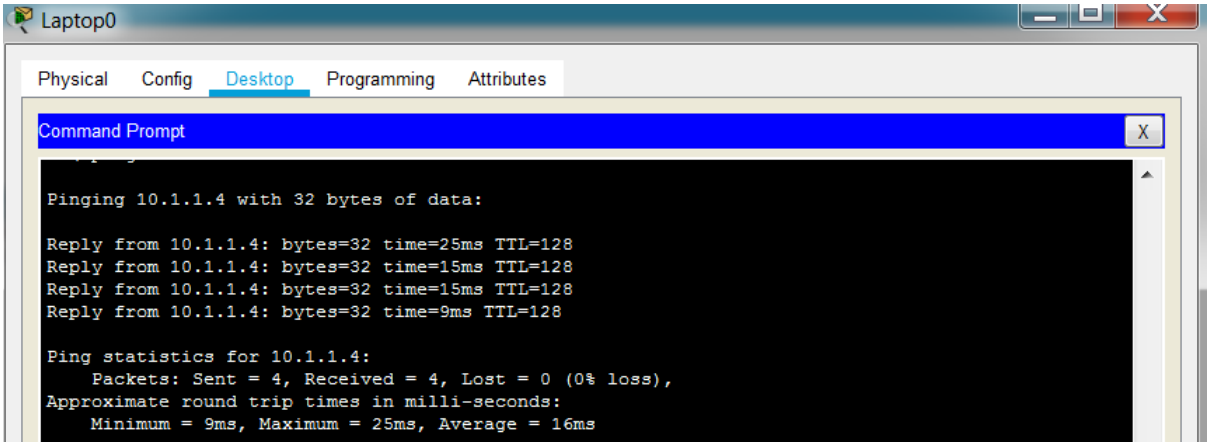
b) Ping PC0(10.1.1.1) and PC1(10.1.1.2) from Laptop0.Pings should fail.



7.Test Access Point_B_G

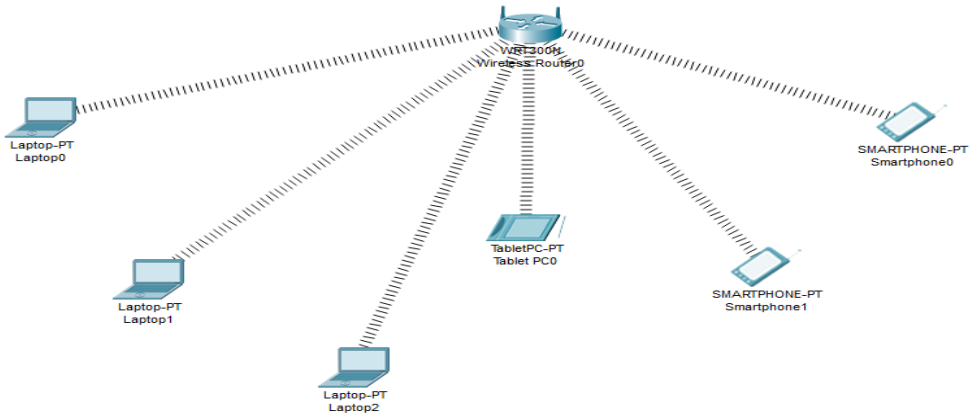
a) Turn on Port1 on Access Point_B_G and turn off Port1 on Access PointN.Laptop0 and Server0 should associate with Access Point_B_G.

b) Ping Server0 from Laptop0.The Ping should succeed.

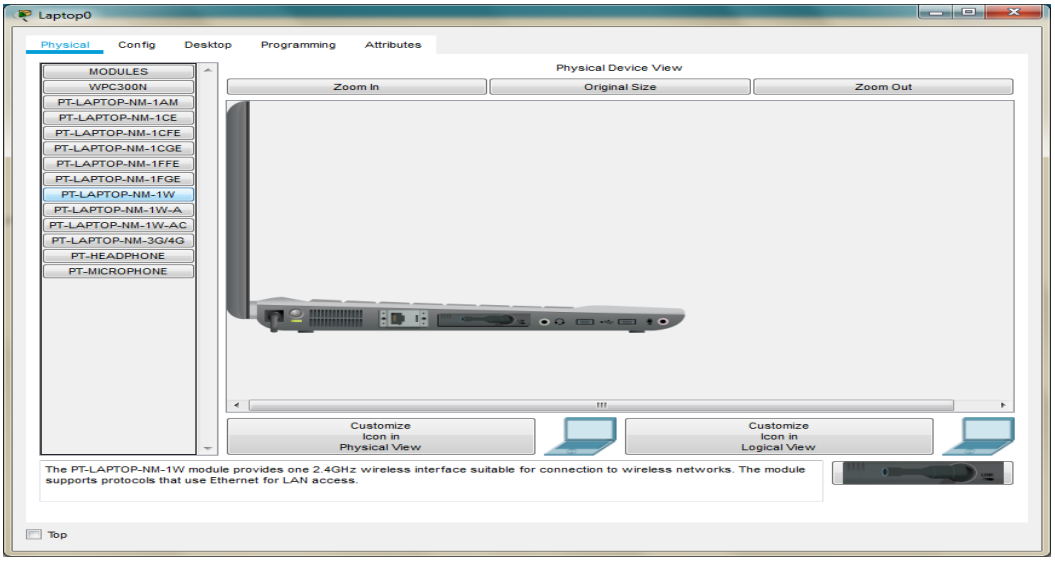


Practical No:8

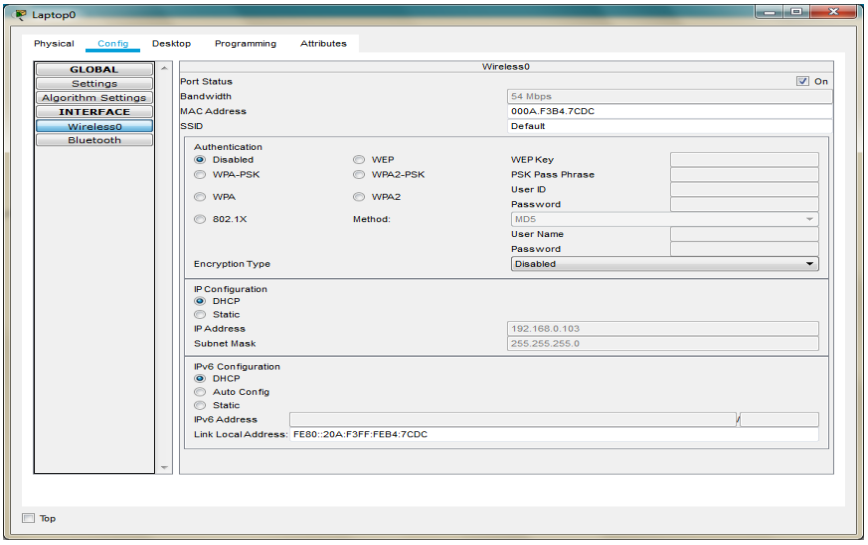
Consider the following topology

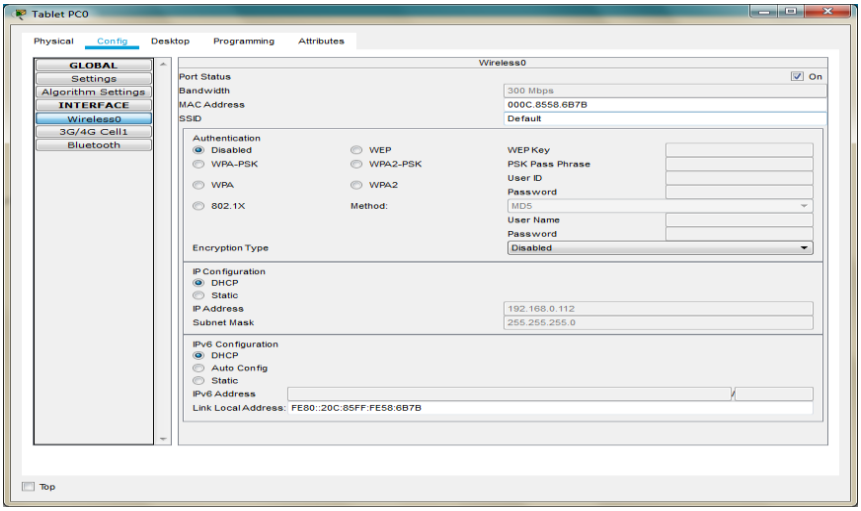


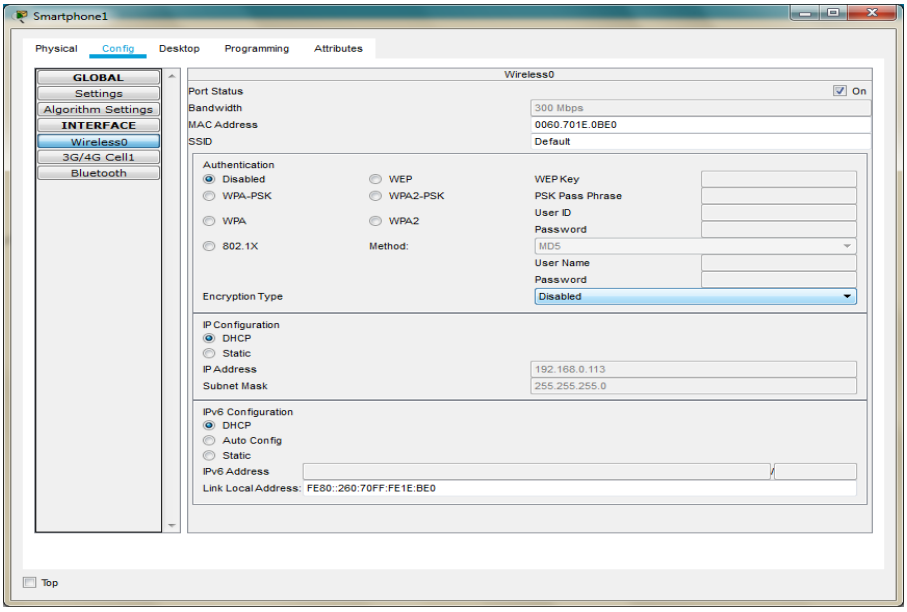
Adding the wireless interface to each Laptops



Copy the MAC address of each component as follows



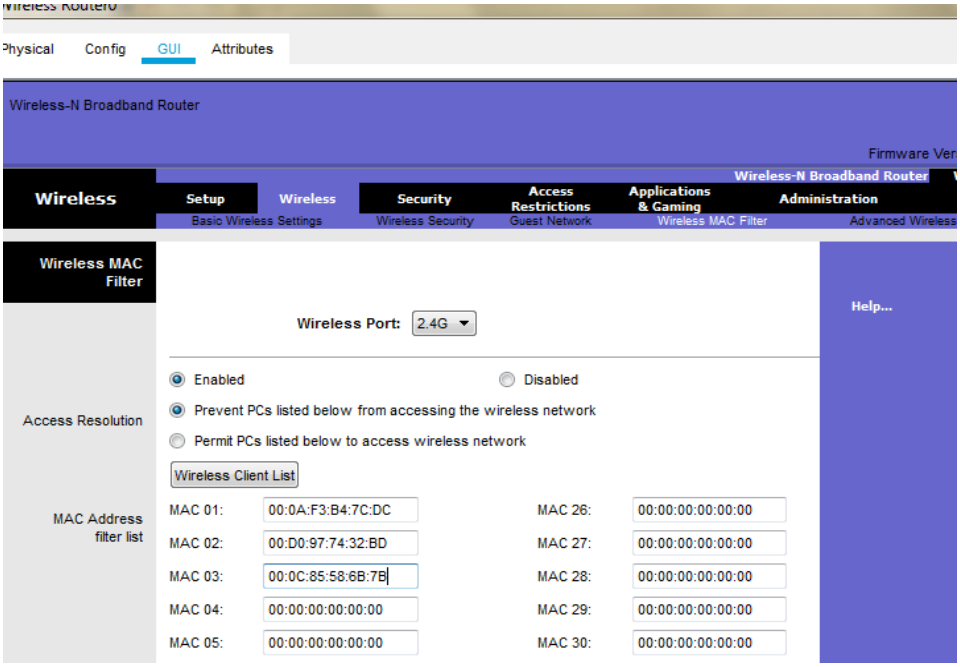




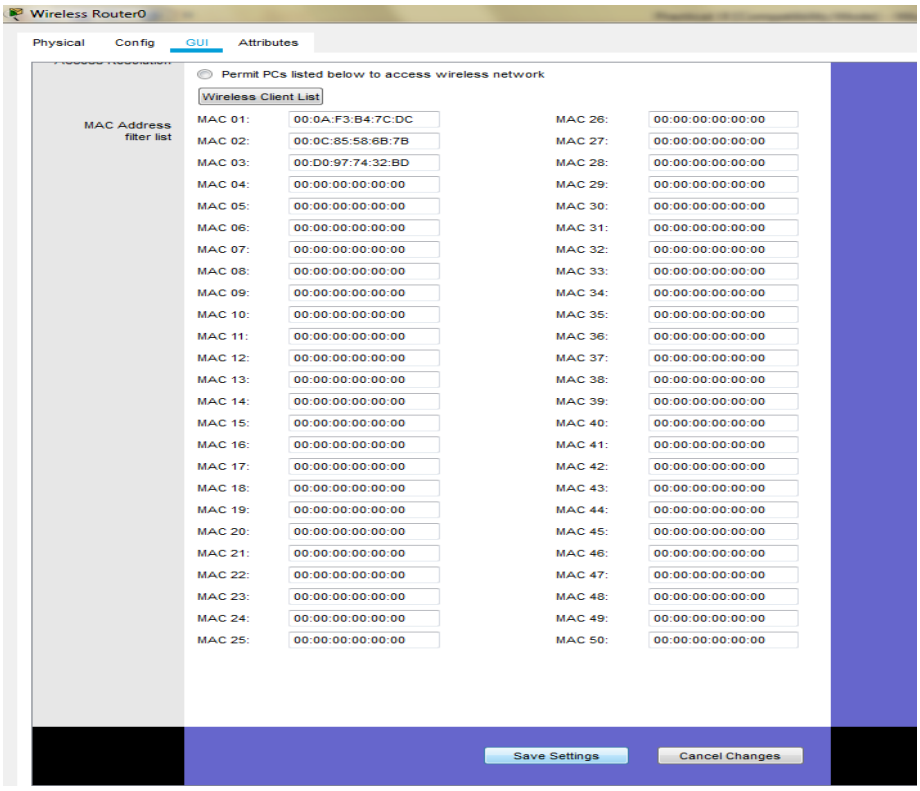
We note the following MAC addresses and convert them to the following form

Component	MAC Address	Converted MAC address
Laptop0	000A.F3B4.7CDC	00:0A:F3:B4:7C:DC
Laptop1	0001.4269.6539	00:01:42:69:65:39
Laptop2	0060.5CB8.B919	00:60:5C:B8:B9:19
TabletPC	000C.8558.6B7B	00:0C:85:58:6B:7B
SmartPhone0	00D0.9774.32BD	00:D0:97:74:32:BD
SmartPhone1	0060.701E.0BE0	00:60.70:1E:0B:E0

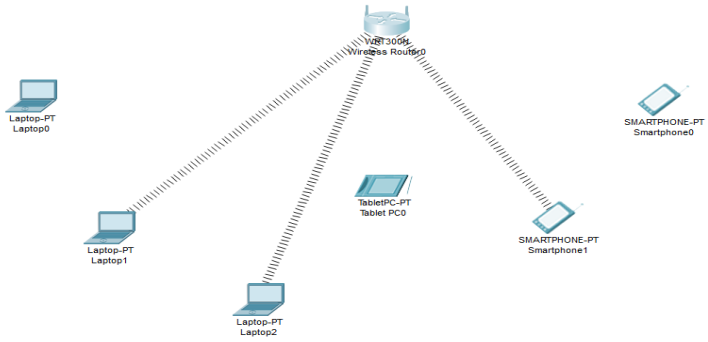
Now we add few addresses in the wireless MAC filter of the Wireless Router and then use the given options for either allow or deny the Wireless access



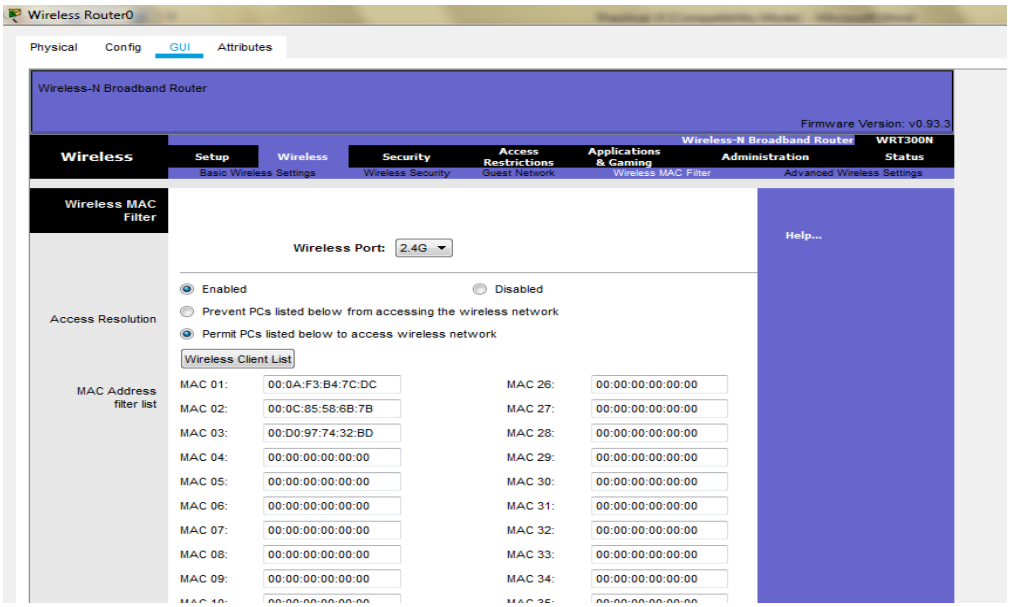
As seen in above screen shot we add the MAC address of Laptop0, TabletPC SmartPhone0 in the list so as to deny them accessing the Wireless network and then save the settings



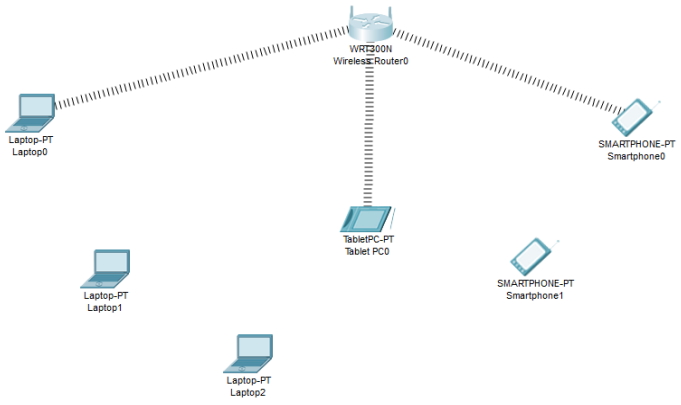
The result so obtained is as shown, the three devices denied any wireless connectivity



Similarly we can change the setting so that the above devices get wireless connectivity and the remaining devices do not get the wireless connectivity

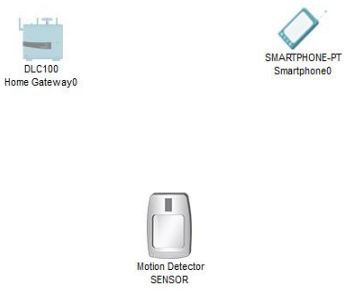


And save the setting and get the following

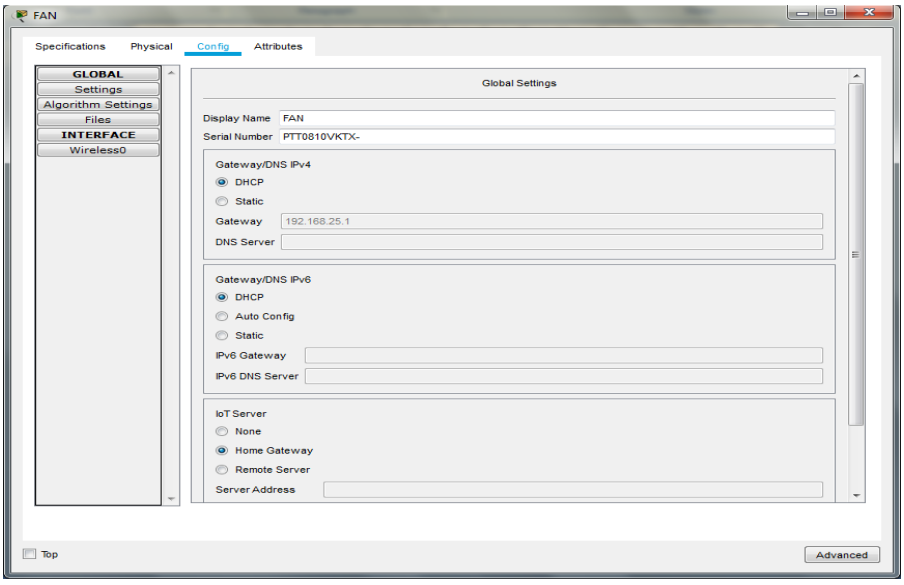


Practical No:9

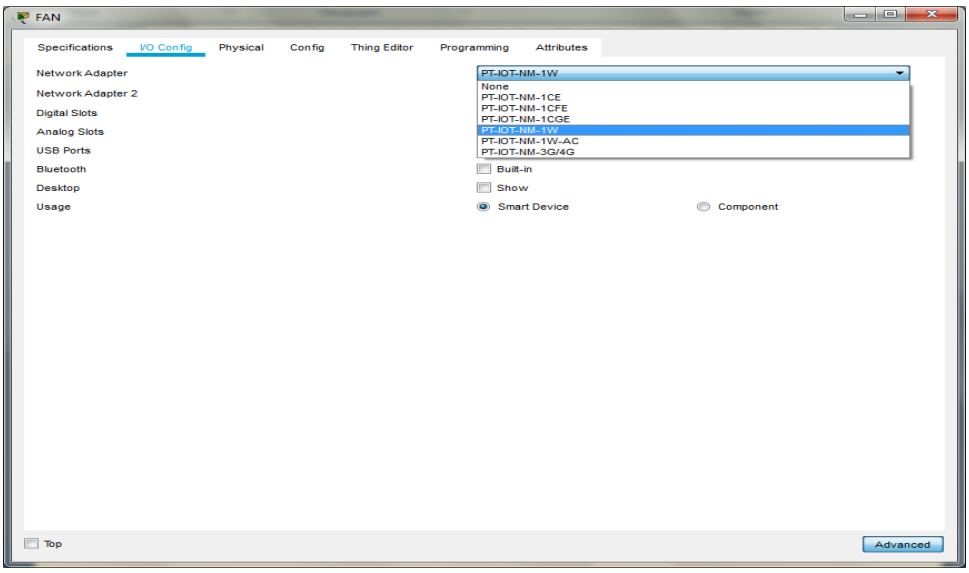
Consider the following topology



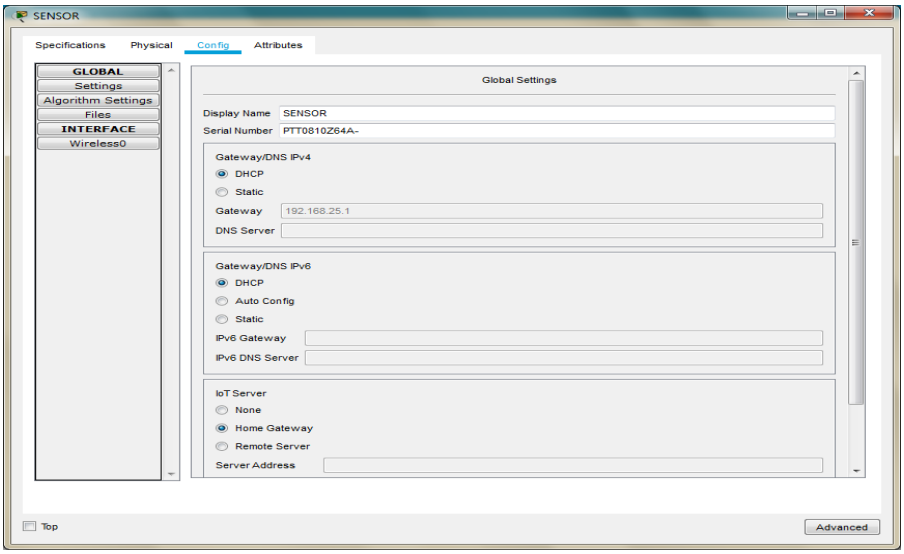
Click on the Fan and do the following



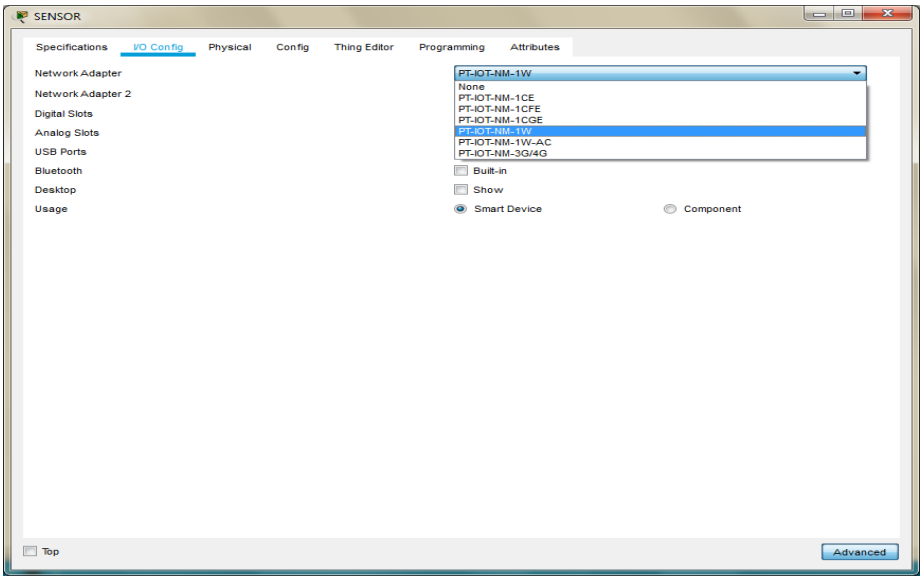
In the Advanced setting do the following for the Network adapter



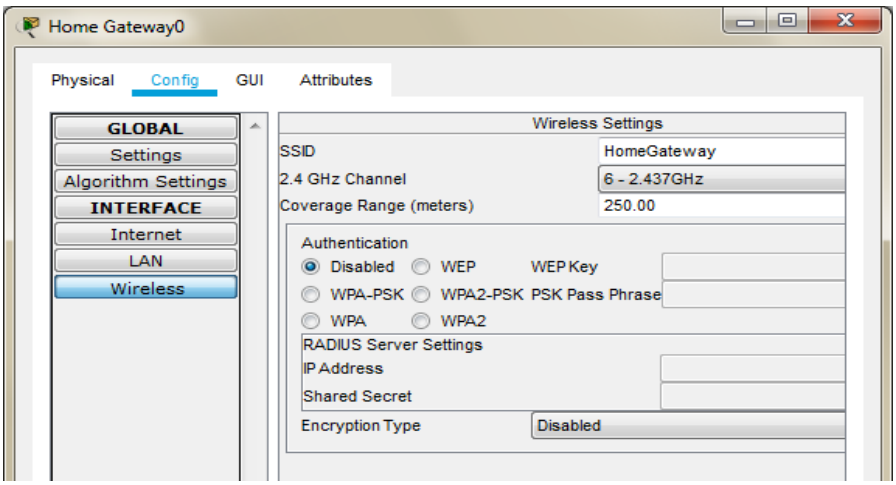
For the motion Detector sensor do the following



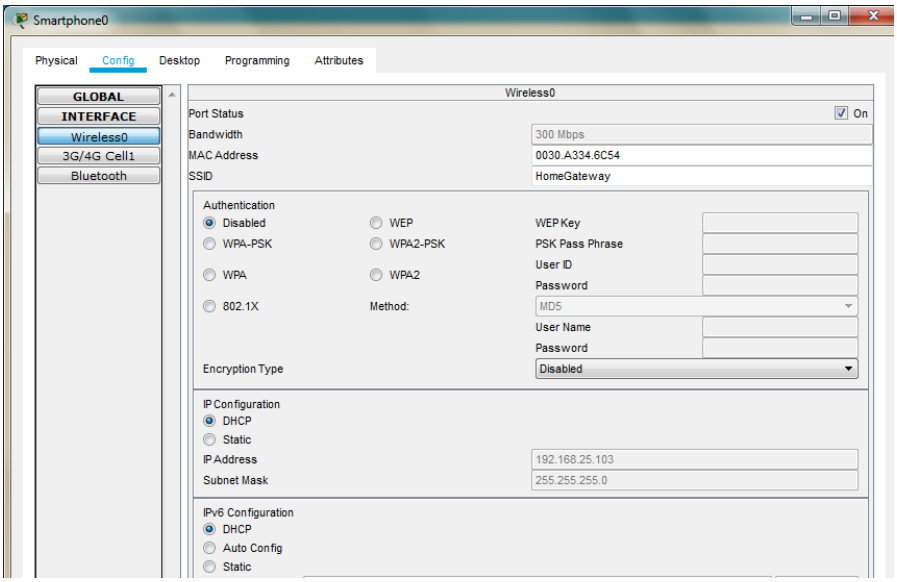
In the Advanced setting do the following for the Network adapter



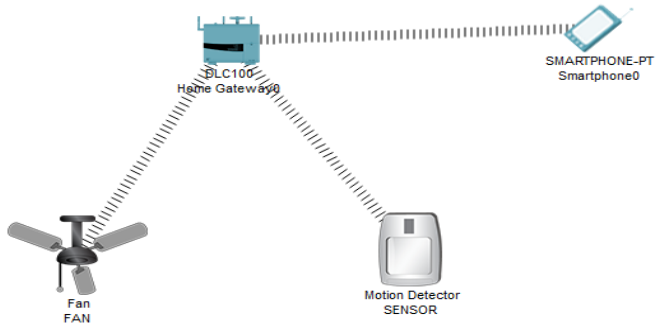
For the smartphone change the SSID to the SSID in the Home Gateway0



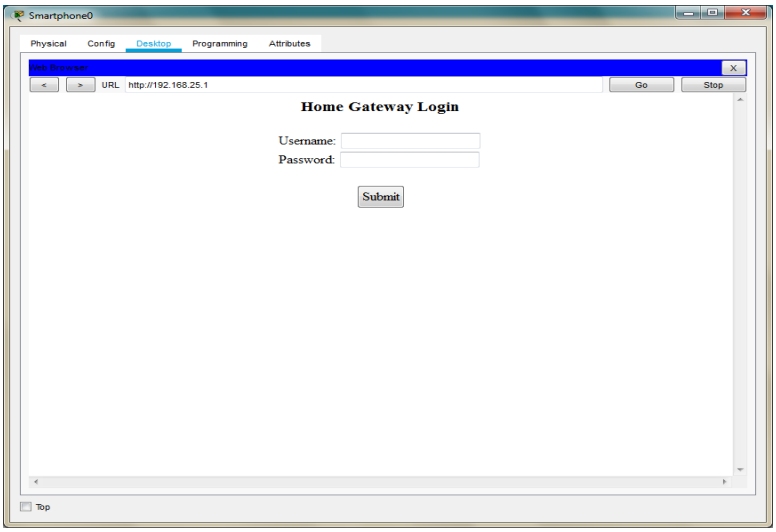
As seen above the SSID is HomeGateway, we use the same and set the SSID in the Smartphone



All the devices are now connected to the Home Gateway

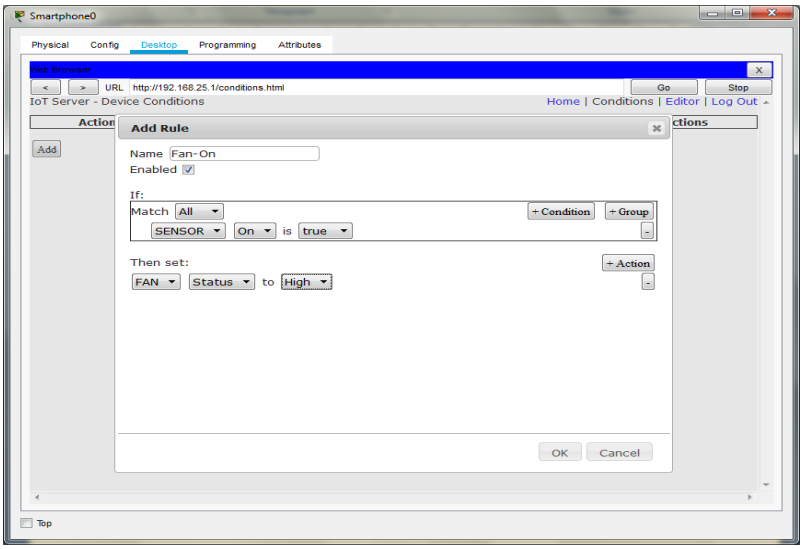


Now open the Web browser of the SmartPhone and type the IP address of the HomeGateway

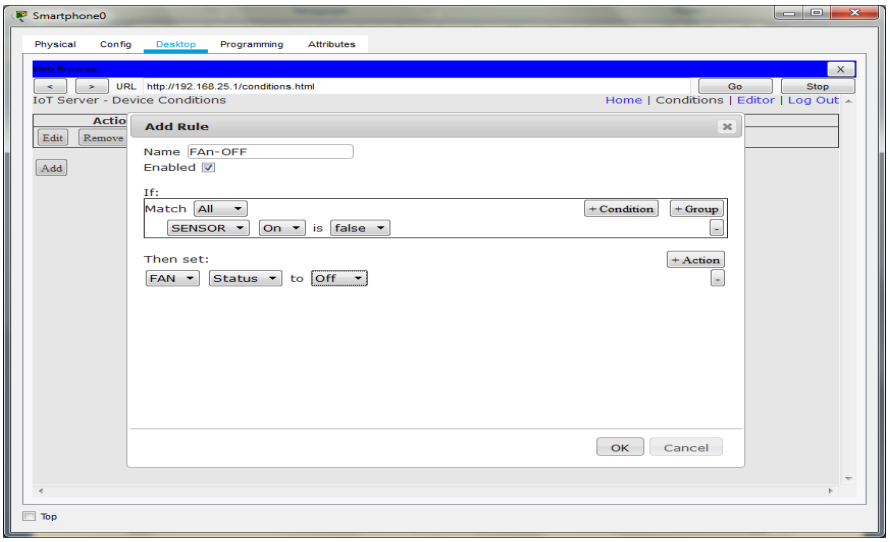


Username : admin **Password : admin**

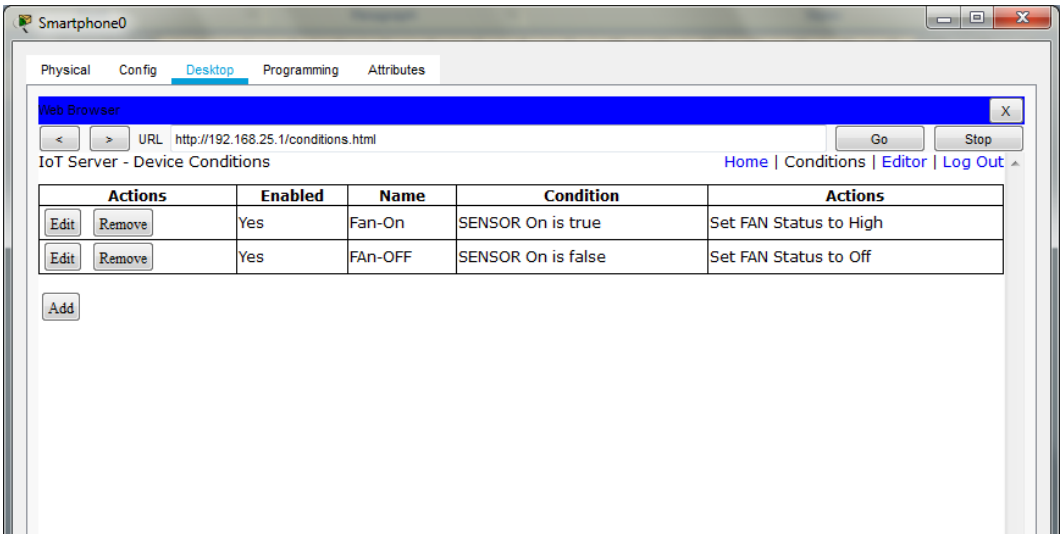
After logging click on conditions and do the following



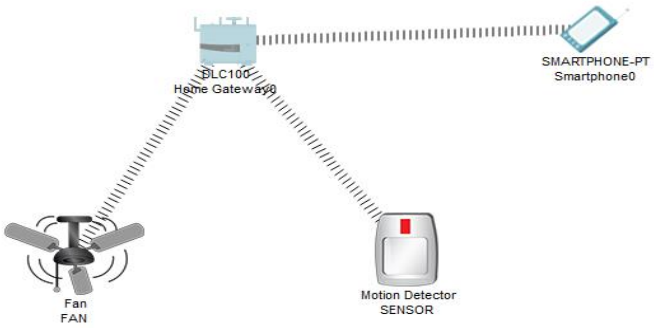
Add another condition as follows



Press the go button after adding the two conditions



In order to turn ON the fan Press the ALT key and left-click the mouse over the Sensor



Practical No:10

Steps :-

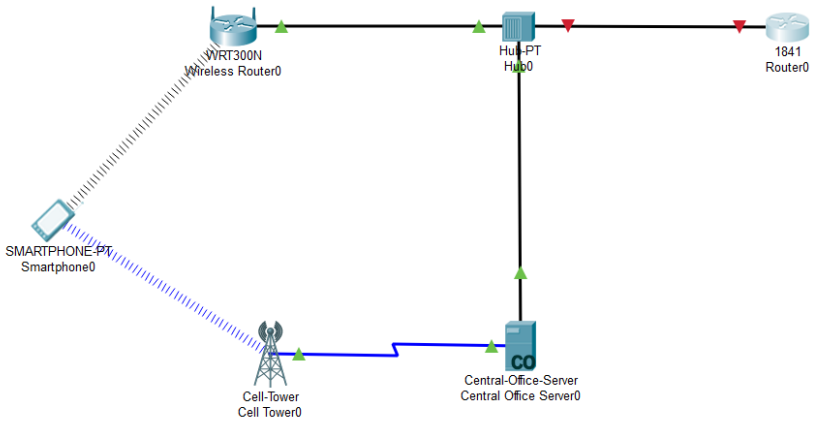
1) Create a network using smartphone, wireless router WRT300N, Hub-pt, 1841 Router,

central-office-server, Cell-Tower.

2) Connect cell tower and central office server using coaxial cable.

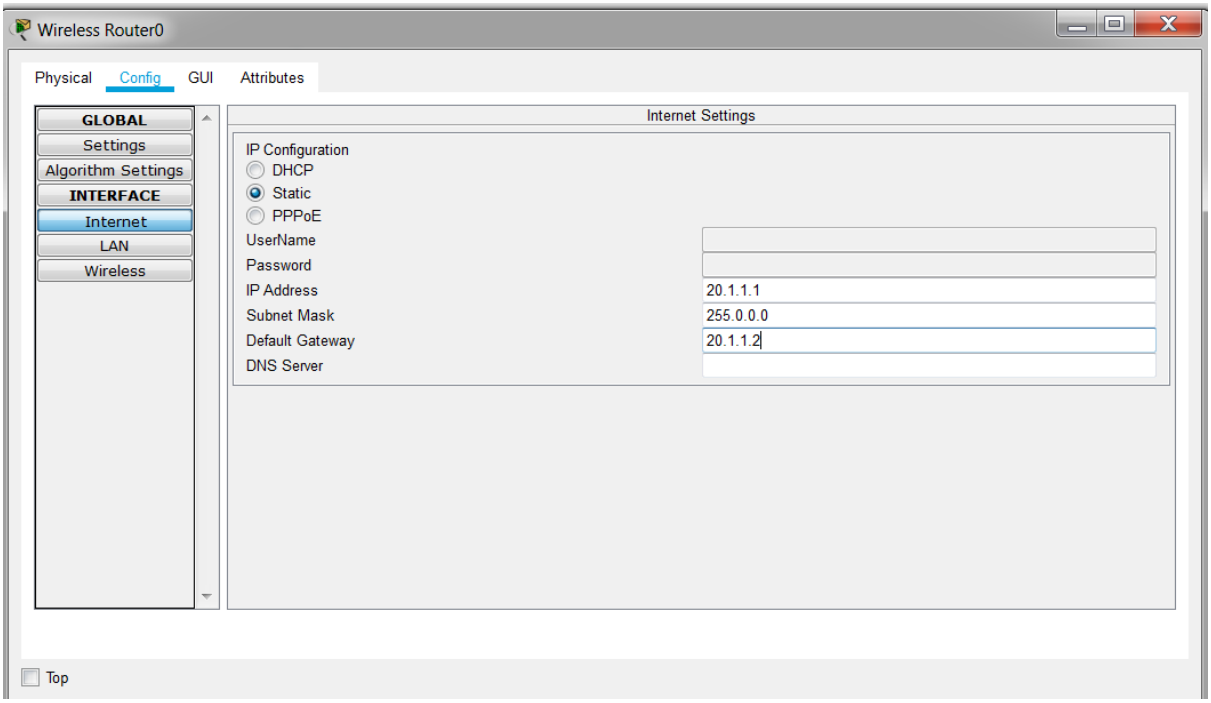
3) Connect wireless router WRT300N, Hub-pt, 1841 Router, central-office-server using

copper straight through wire.

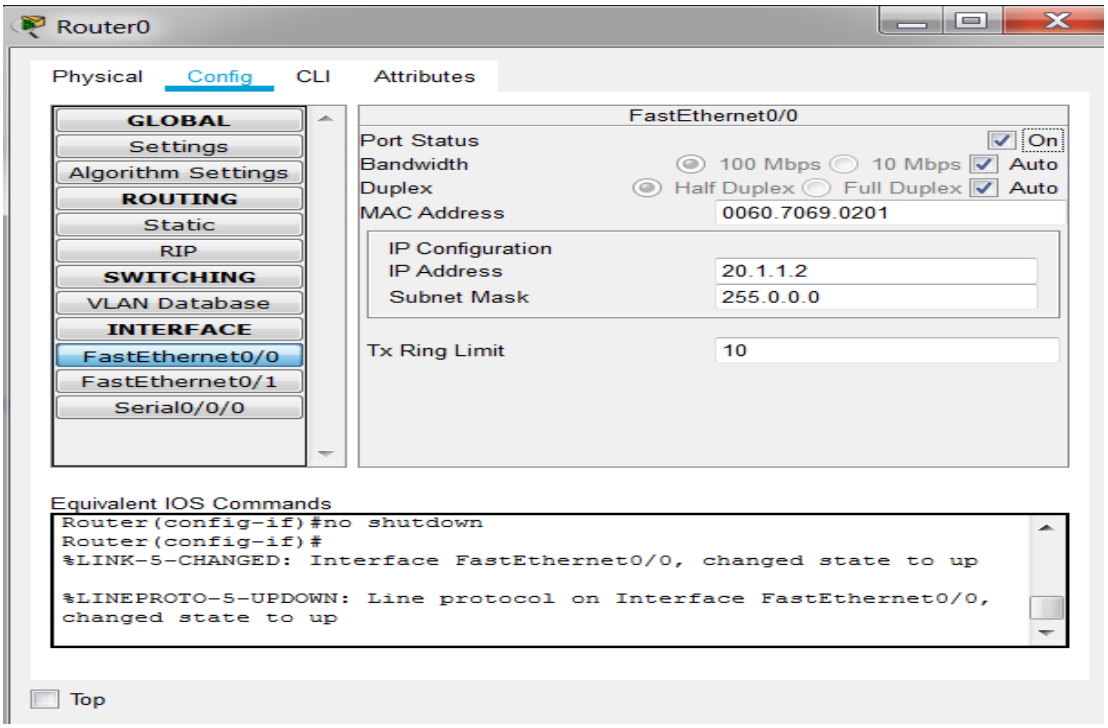


4) Click on wireless router.in config tab select internet.in internet choose ip configuration as

static and set ip address and default gateway.



5) Click on router 1841. In config tab select interface and give ip address.



6) Click on smartphone and ping router1841