Batch: D-2 Roll No.: 16010122151
Experiment / assignment / tutorial No. 08
Grade: AA / AB / BB / BC / CC / CD /DD
Signature of the Staff In-charge with date

Experiment No.:8

TITLE: Study and configure RIP protocol using Cisco Packet tracer

AIM: To study and configure RIP protocol using Cisco Packet tracer

Expected Outcome of Experiment:

CO: Understand RIP protocol configuration, observe routing table updates, and analyze network performance using Cisco Packet Tracer.

Books/ Journals/ Websites referred:

1. A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition
2. B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition

Pre Lab/ Prior Concepts:

IPv4 Addressing, Subnetting, Distance Vector Protocol, Router configuration Commands.

New Concepts to be learned: RIP Protocol and its configuration.

RIP (Routing Information Protocol)

RIP is a standardized Distance Vector protocol, designed for use on smaller networks. RIP was one of the first true Distance Vector routing protocols and is supported on a wide variety of systems.

RIP adheres to the following Distance Vector characteristics:

- RIP sends out periodic routing updates (every 30 seconds)
- RIP sends out the full routing table every periodic update.
- RIP uses a form of distance as its metric (in this case, hop count).
- RIP uses the Bellman-Ford Distance Vector algorithm to determine the best "path" to a particular destination

Other characteristics of RIP include:

- RIP supports IP and IPX routing.
- RIP utilizes UDP port 520
- RIP routes have an administrative distance of 120.

• RIP has a maximum hop count of 15 hops.

RIP Versions

RIP has two versions, Version 1 (RIPv1) and Version 2 (RIPv2).

RIPv1 (RFC 1058) is ***classful***, and thus does not include the subnet mask with its routing table updates. Because of this, RIPv1 does not support **Variable Length Subnet Masks (VLSMs)**. When using RIPv1, networks must be contiguous, and subnets of a major network must be configured with identical subnet masks. Otherwise, route table inconsistencies (or worse) will occur.

RIPv1 sends updates as broadcasts to address 255.255.255.255.

RIPv2 (RFC 2543) is ***classless***, and thus does include the subnet mask with its routing table updates. RIPv2 fully supports VLSMs, allowing discontiguous networks and varying subnet masks to exist.

Other enhancements offered by RIPv2 include:

- Routing updates are sent via multicast, using address 224.0.0.9
- Encrypted authentication can be configured between RIPv2 routers
- Route tagging is supported.

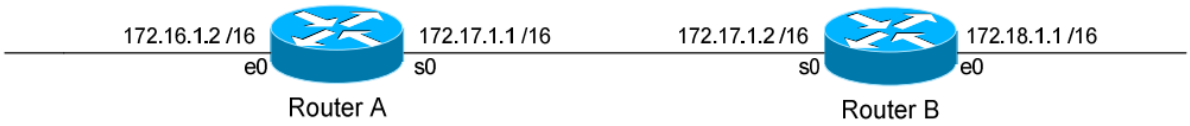
RIPv2 can interoperate with RIPv1. By default:

- RIPv1 routers will send only Version 1packets
- RIPv1 routers will receive both Version 1 and 2 updates
- RIPv2 routers will both send and receive only Version 2 updates

We can control the version of RIP a particular interface will "send" or "receive."

Unless RIPv2 is manually specified, a Cisco will default to RIPv1 when configuring RIP.

RIPv1 Basic Configuration



Routing protocol configuration occurs in Global Configuration mode. On Router A, to configure RIP, we would type:

Router(config)# router rip
Router(config-router)# network 172.16.0.0
Router(config-router)# network 172.17.0.0

The first command, router rip, enables the RIP process.

The network statements tell RIP which networks you wish to advertise to other RIP routers. We simply list the networks that are directly connected to our router. Notice that we specify the networks at their classful boundaries, and we do not specify a subnet mask.

To configure Router B:

Router(config)# router rip
Router(config-router)# network 172.17.0.0
Router(config-router)# network 172.18.0.0

The routing table on Router A will look like:

RouterA# show ip route

Gateway of last resort is not set

C 172.16.0.0 is directly connected, Ethernet0
C 172.17.0.0 is directly connected, Serial0
R 172.18.0.0 [120/1] via 172.17.1.2, 00:00:00, Serial0

The routing table on Router B will look like:

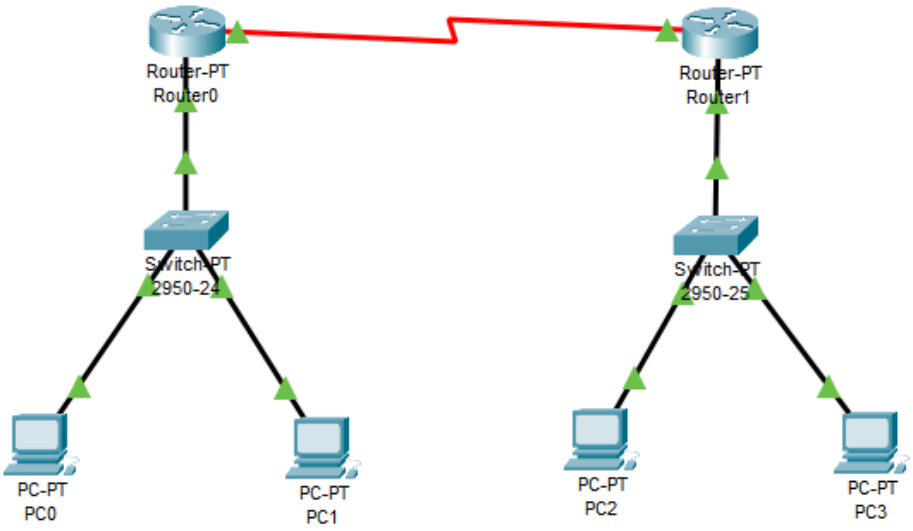
RouterB# show ip route

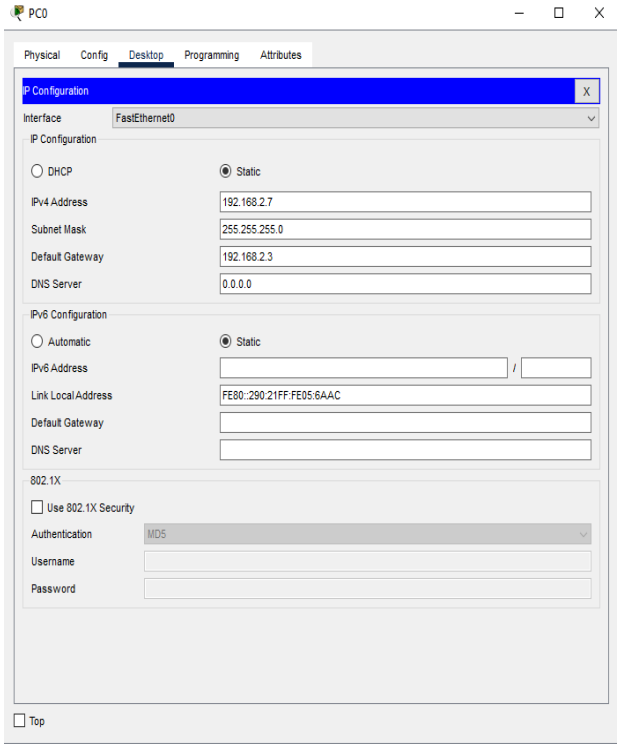
Gateway of last resort is not set

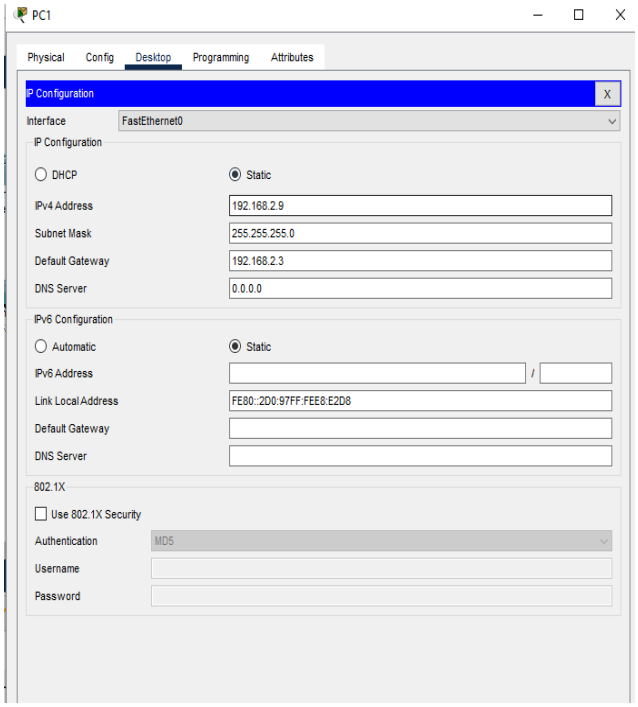
C 172.17.0.0 is directly connected, Serial0
C 172.18.0.0 is directly connected, Ethernet0
R 172.16.0.0 [120/1] via 172.17.1.1, 00:00:00, Serial0

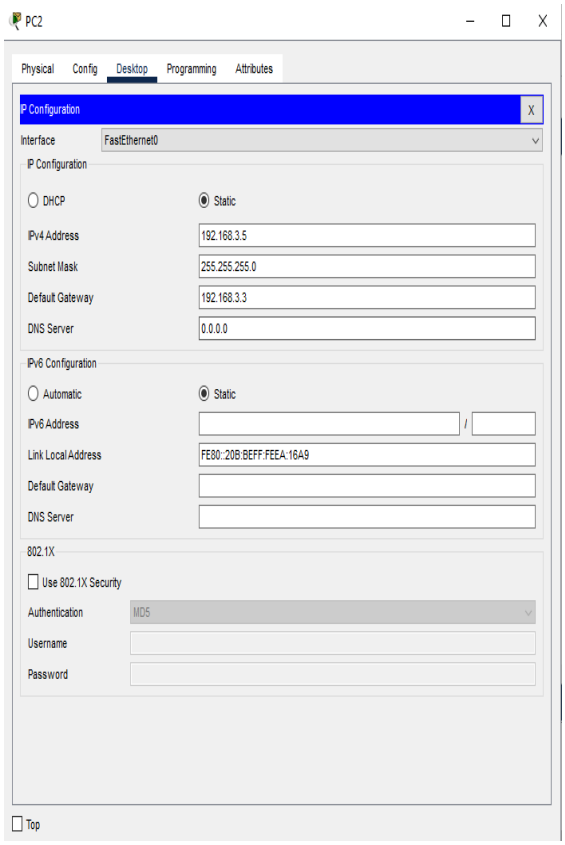
IMPLEMENTATION:

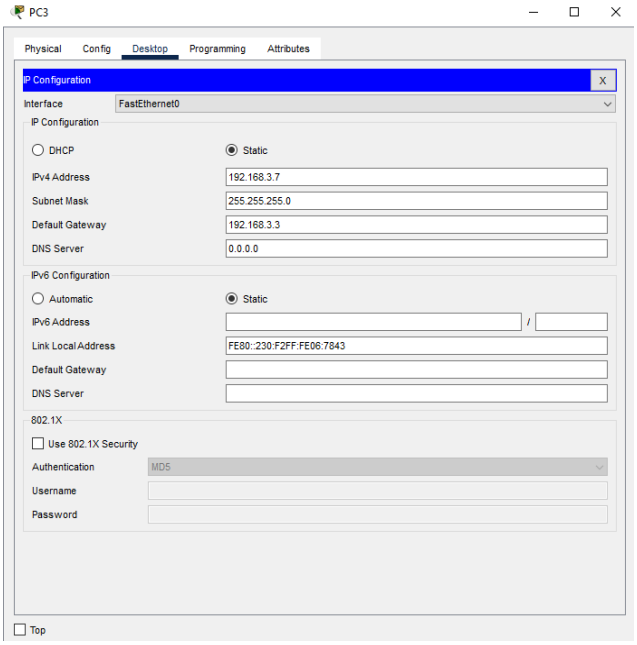
1] Using GUI:

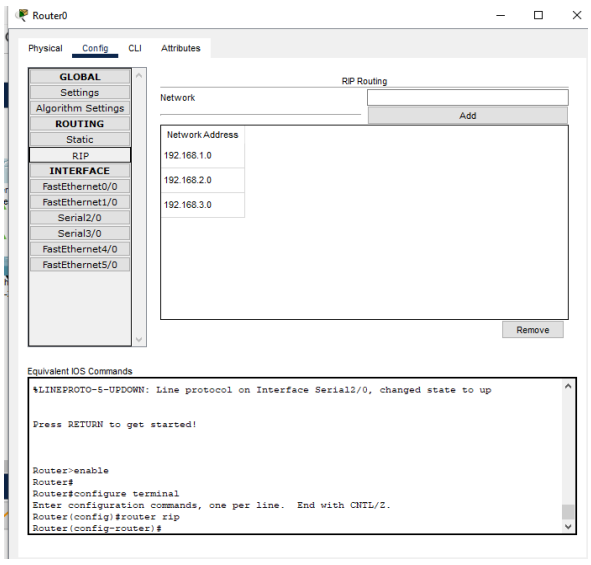


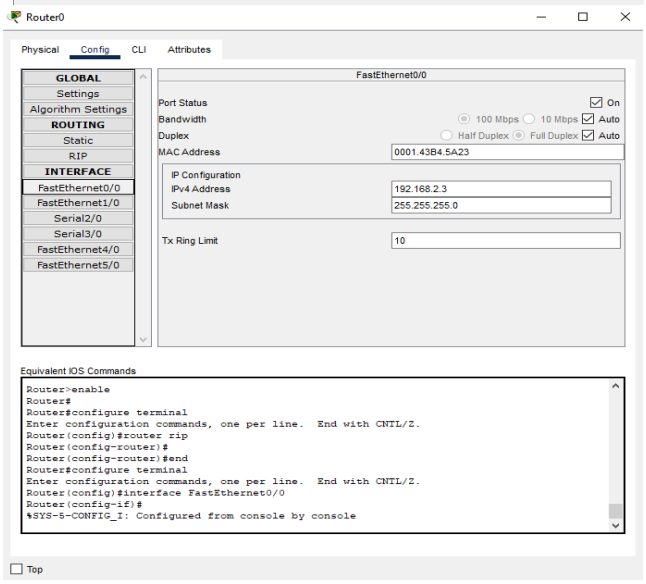

PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.2.7
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.3
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::290:21FF:FE05:6AAC
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

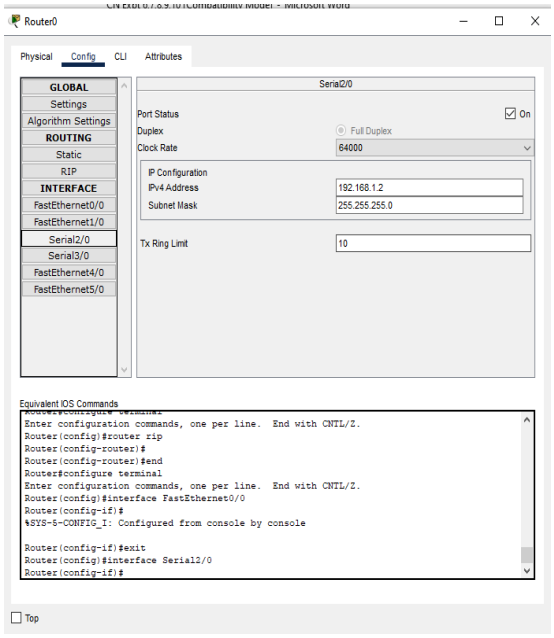

PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.2.9
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.3
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2D0:97FF:FEE8:E2D8
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password

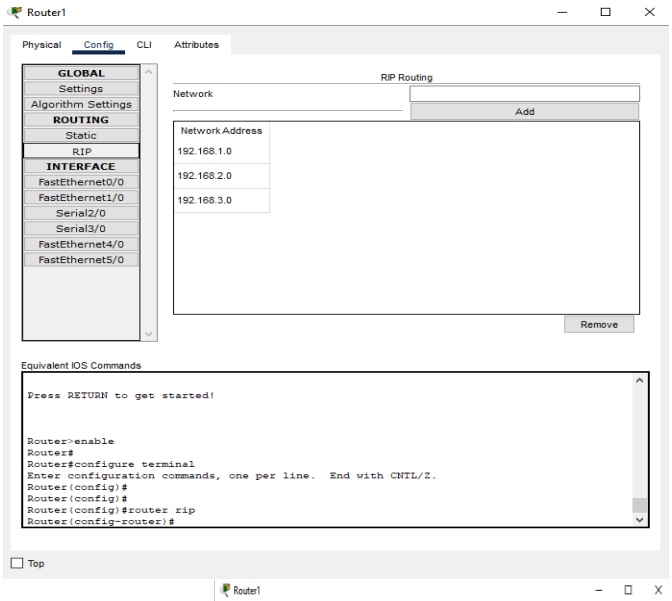

PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.3.5
Subnet Mask
255.255.255.0
Default Gateway
192.168.3.3
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::20B:BEFF:FEEA:16A9
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

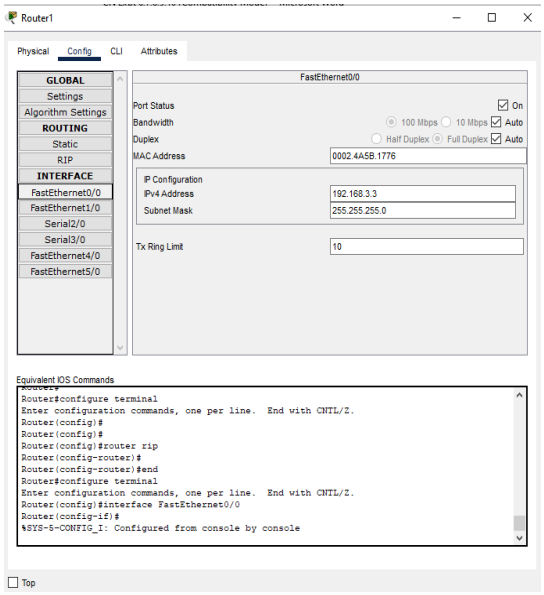

PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.3.7
Subnet Mask
255.255.255.0
Default Gateway
192.168.3.3
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::230:F2FF:FE06:7843
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
RIP Routing
Network
Add
Network Address
192.168.1.0
192.168.2.0
192.168.3.0
Remove
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
Press RETURN to get started!
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#


Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0001.43B4.5A23
IP Configuration
IPv4 Address
192.168.2.3
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)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
Top


Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
64000
IP Configuration
IPv4 Address
192.168.1.2
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Top


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
RIP Routing
Network
Add
Network Address
192.168.1.0
192.168.2.0
192.168.3.0
Remove
Equivalent IOS Commands
Press RETURN to get started!
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#router rip
Router(config-router)#
Top


Router1
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Config
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Settings
Algorithm Settings
ROUTING
Static
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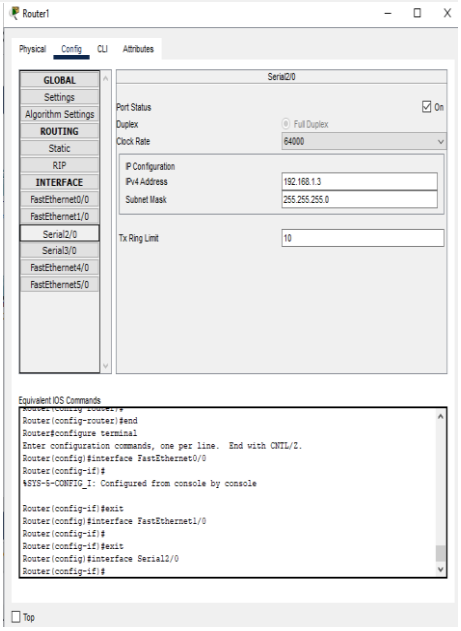
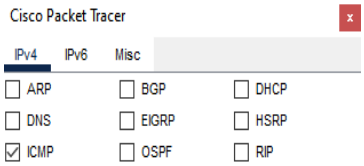
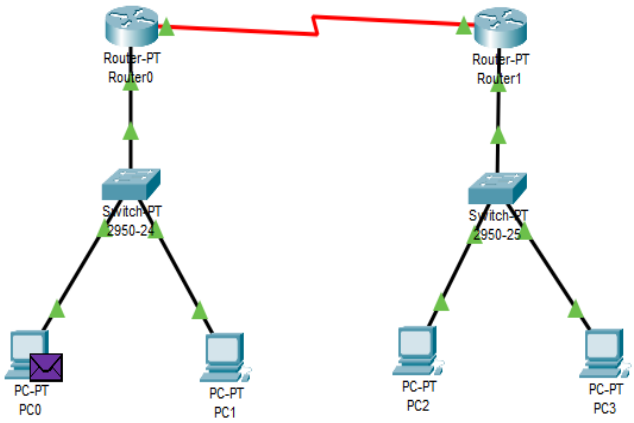
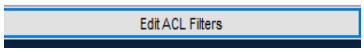
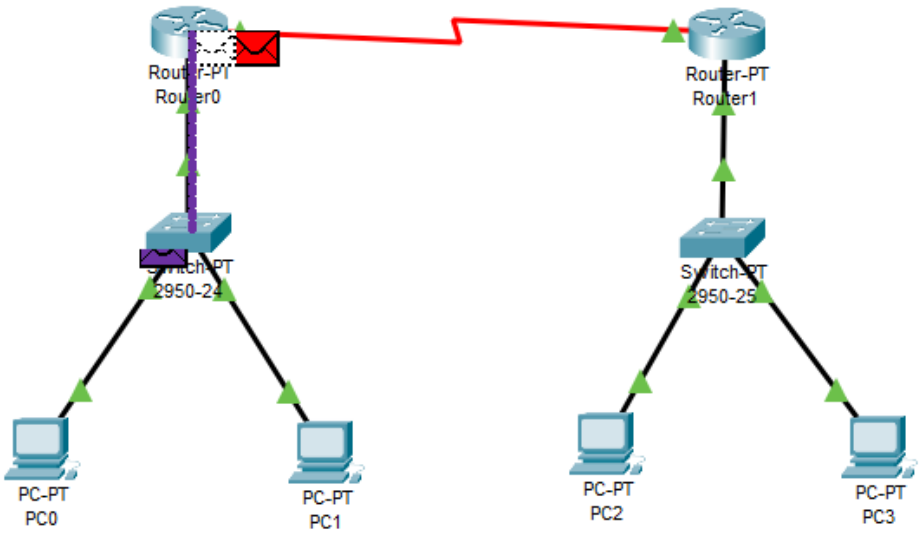
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0002.4A5B.1776
IP Configuration
IPv4 Address
192.168.3.3
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
Top

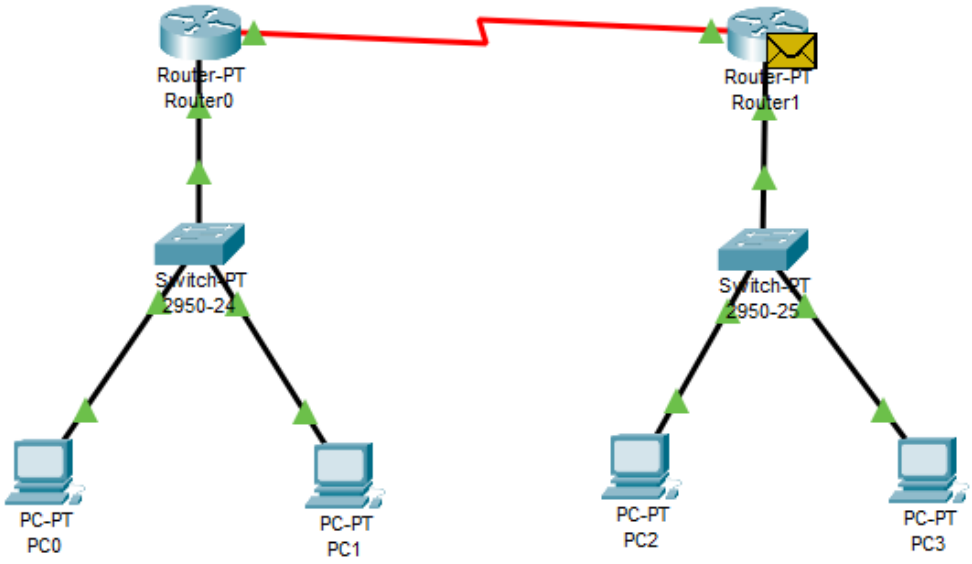

Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
64000
IP Configuration
IPv4 Address
192.168.1.3
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Top

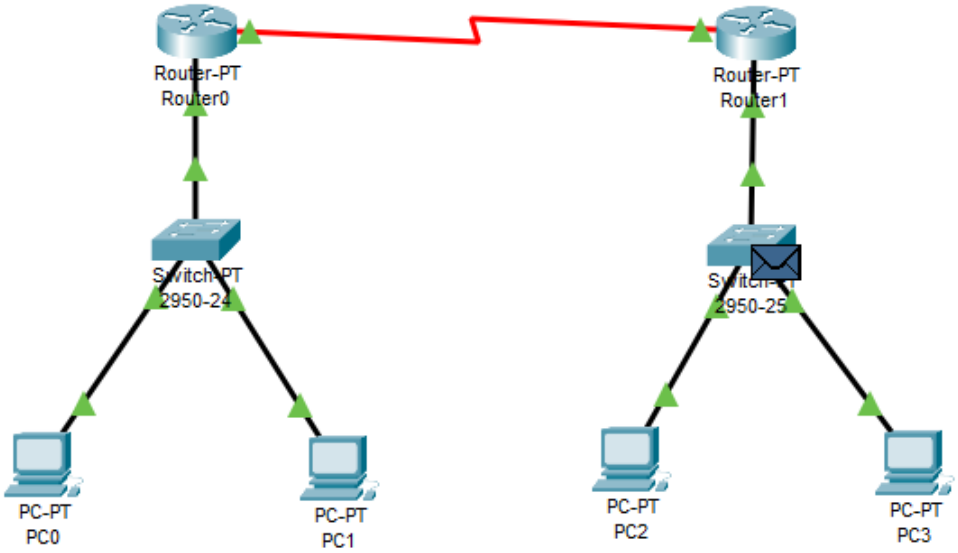

Cisco Packet Tracer
IPv4
IPv6
Misc
ARP
BGP
DHCP
DNS
EIGRP
HSRP
ICMP
OSPF
RIP

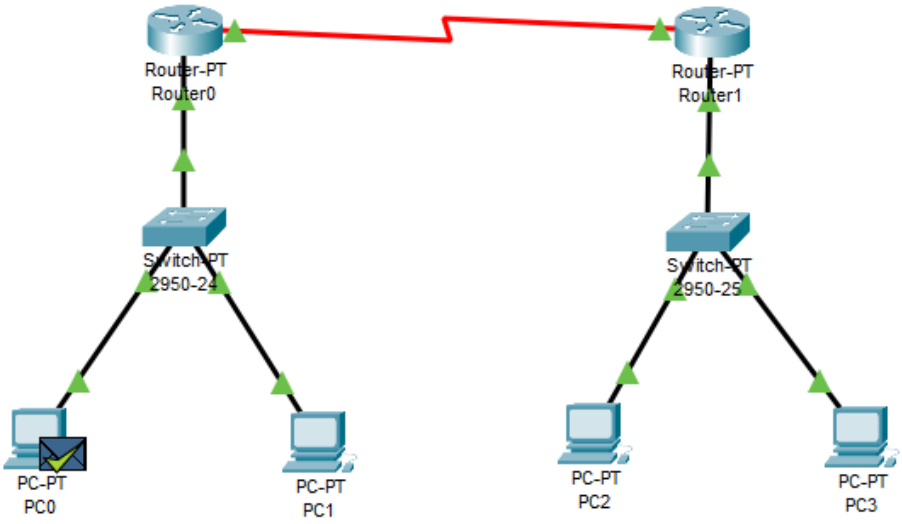

Router-PT
Router0
Router-PT
Router1
Switch-PT
2950-24
Switch-PT
2950-25
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

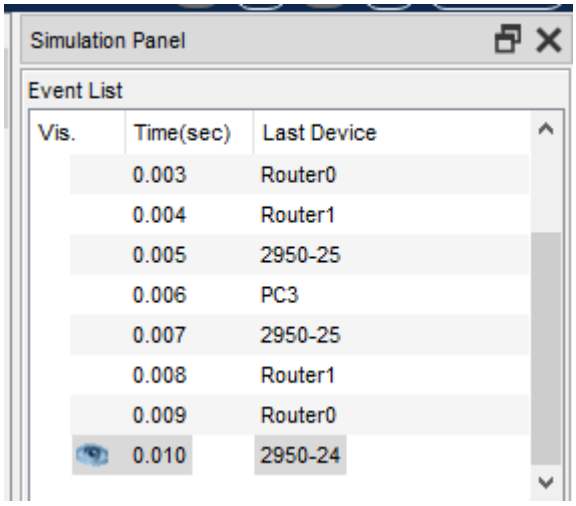

Edit ACL Filters


Router-PT
Router0
Router-PT
Router1
Switch-PT
2950-24
Switch-PT
2950-25
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

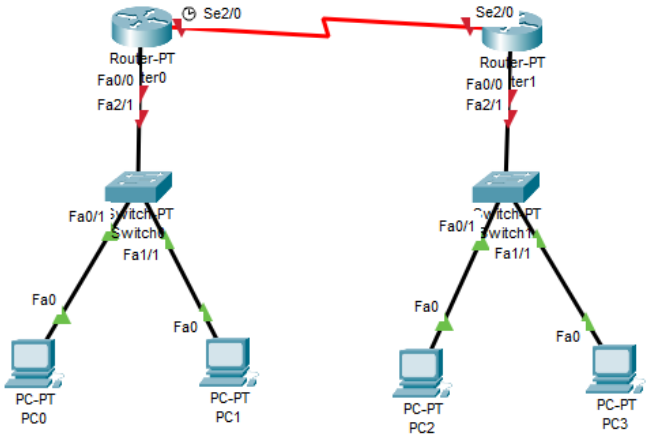

Router-PT
Router0
Router-PT
Router1
Switch-PT
2950-24
Switch-PT
2950-25
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

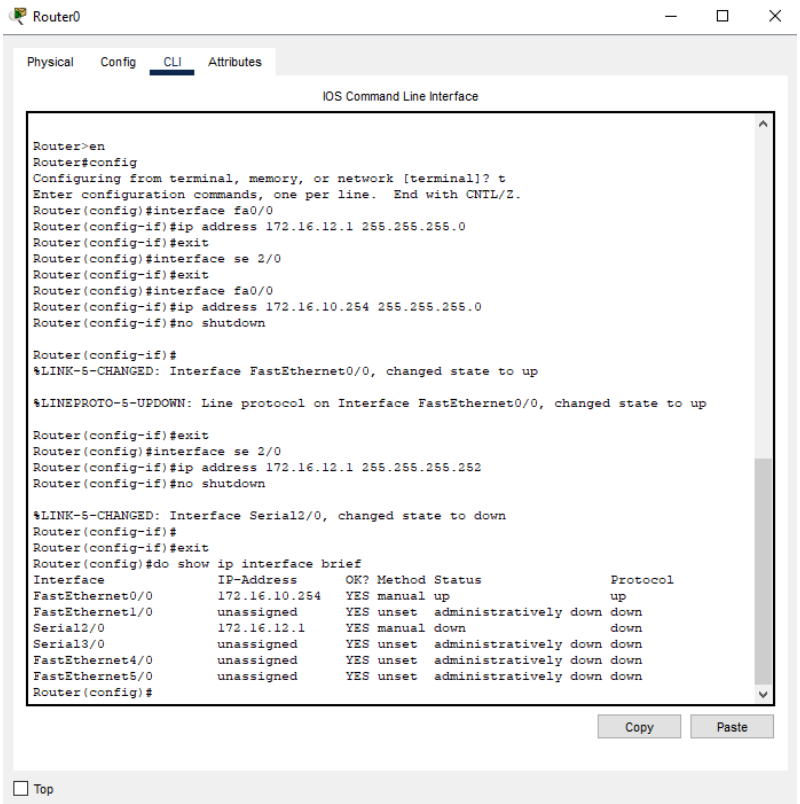

Router-PT
Router0
Router-PT
Router1
Switch-PT
2950-24
2950-25
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

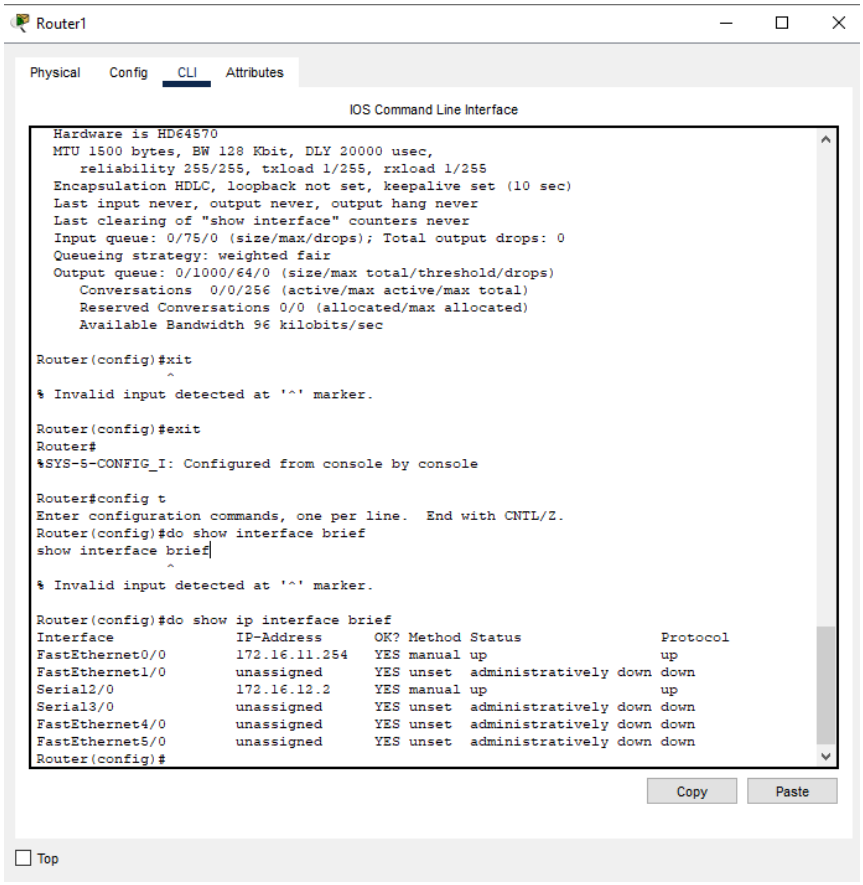

Router-PT
Router0
Router-PT
Router1
Switch-PT
2950-24
Switch-PT
2950-25
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

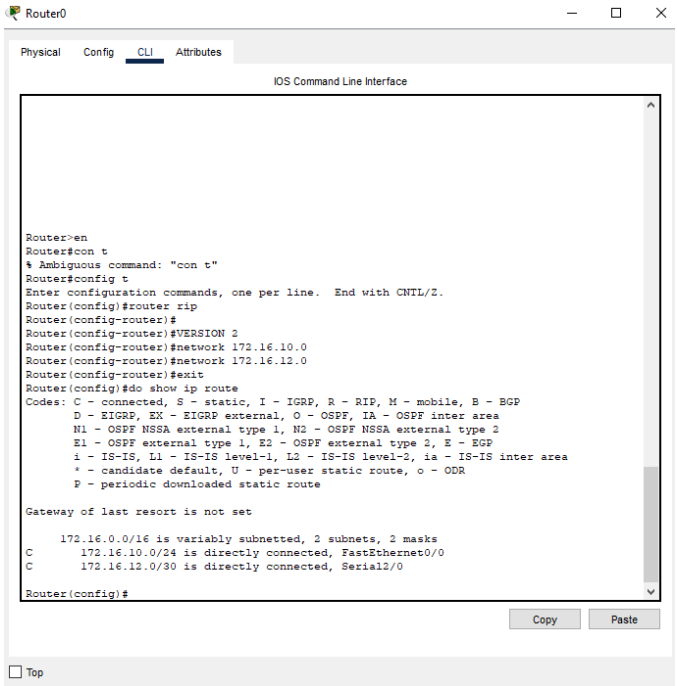

Simulation Panel
Event List
Vis.
Time(sec)
Last Device
0.003
Router0
0.004
Router1
0.005
2950-25
0.006
PC3
0.007
2950-25
0.008
Router1
0.009
Router0
0.010
2950-24

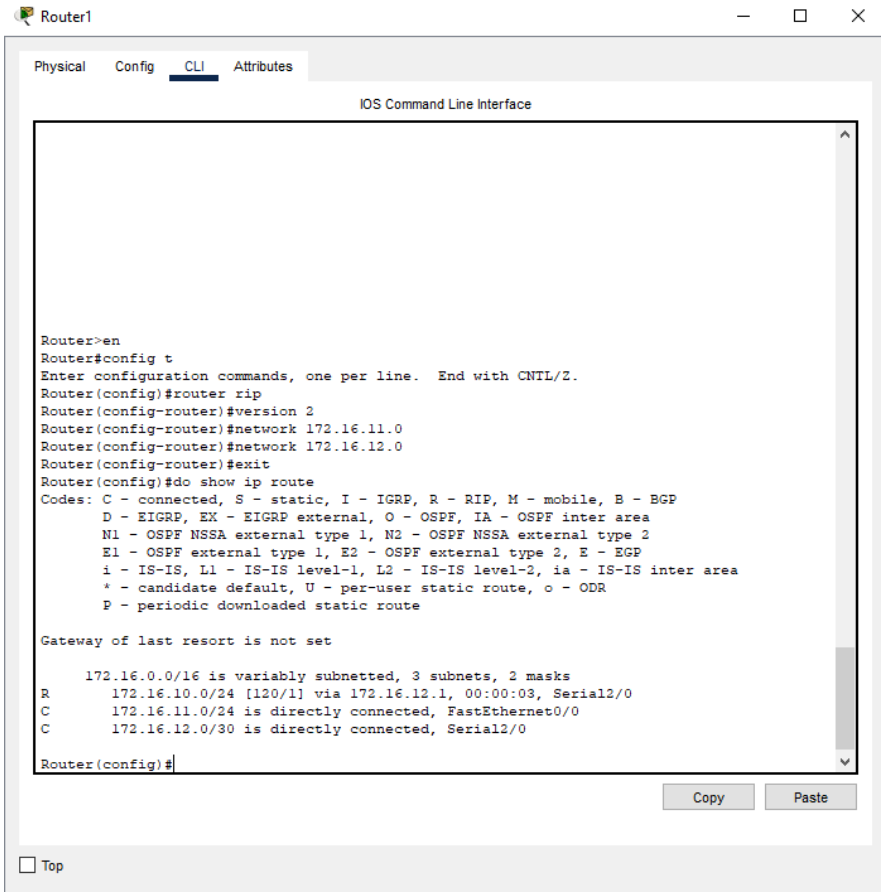
2] Using CLI:

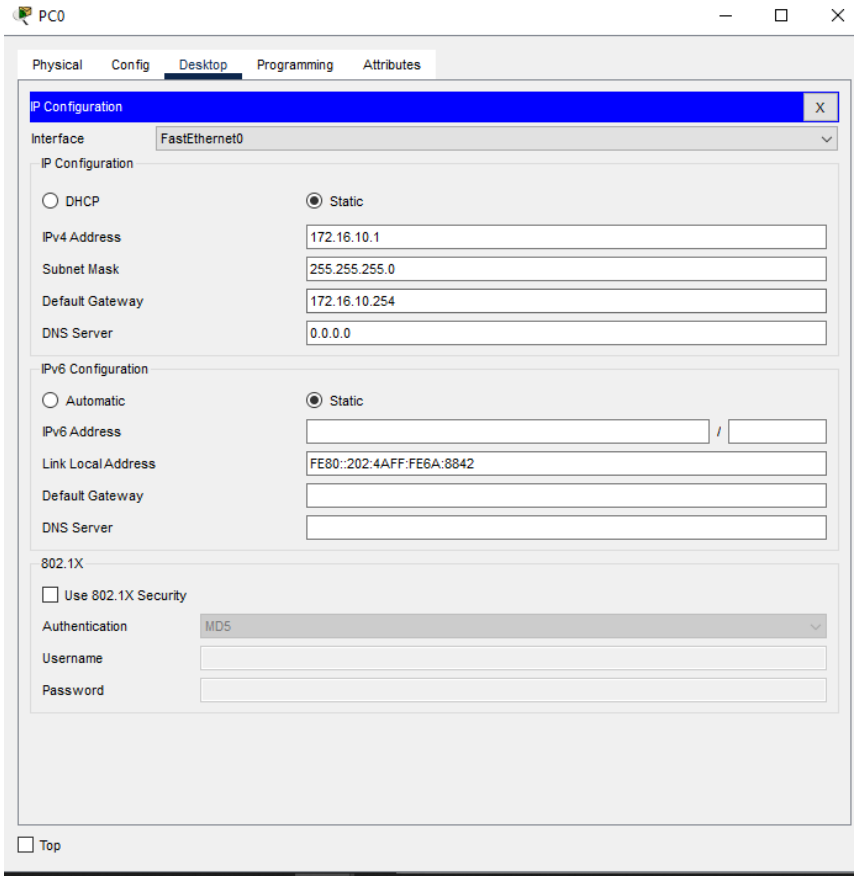

Se2/0
Se2/0
Router-PT
Router-PT
Fa0/0
Fa0/0
Fa2/1
Fa2/1
Fa0/1
Fa0/1
Fa1/1
Fa1/1
Fa0
Fa0
Fa0
Fa0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3

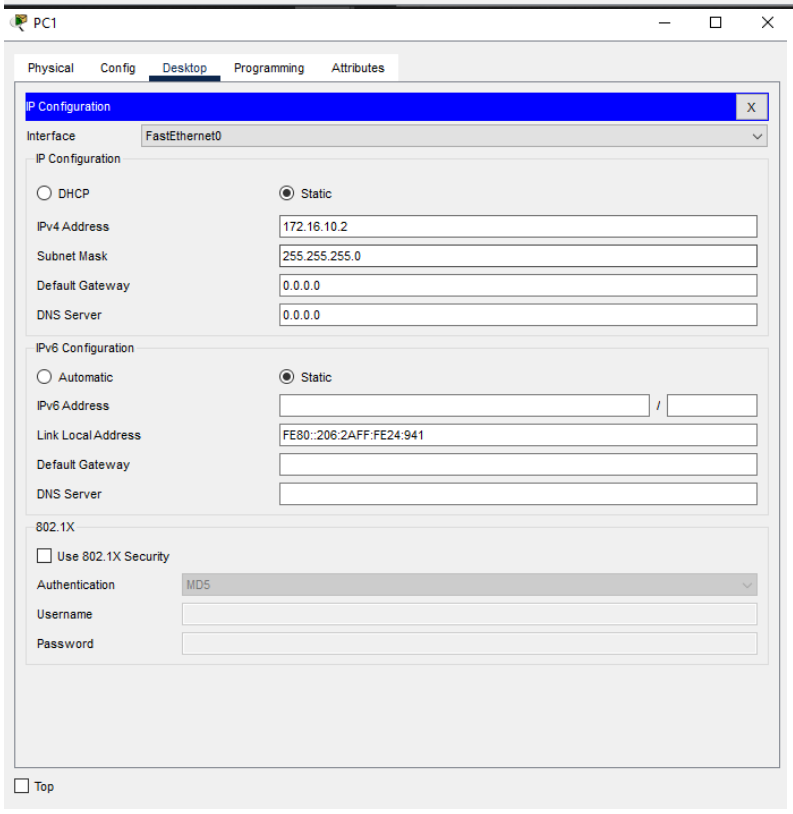

Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>en
Router#config
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 172.16.12.1 255.255.255.0
Router(config-if)#exit
Router(config)#interface se 2/0
Router(config-if)#exit
Router(config)#interface fa0/0
Router(config-if)#ip address 172.16.10.254 255.255.255.0
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 se 2/0
Router(config-if)#ip address 172.16.12.1 255.255.255.252
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
Router(config-if)#exit
Router(config)#do show ip interface brief
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 172.16.10.254 YES manual up up
FastEthernet1/0 unassigned YES unset administratively down down
Serial2/0 172.16.12.1 YES manual down down
Serial3/0 unassigned YES unset administratively down down
FastEthernet4/0 unassigned YES unset administratively down down
FastEthernet5/0 unassigned YES unset administratively down down
Router(config)#
Copy
Paste
Top

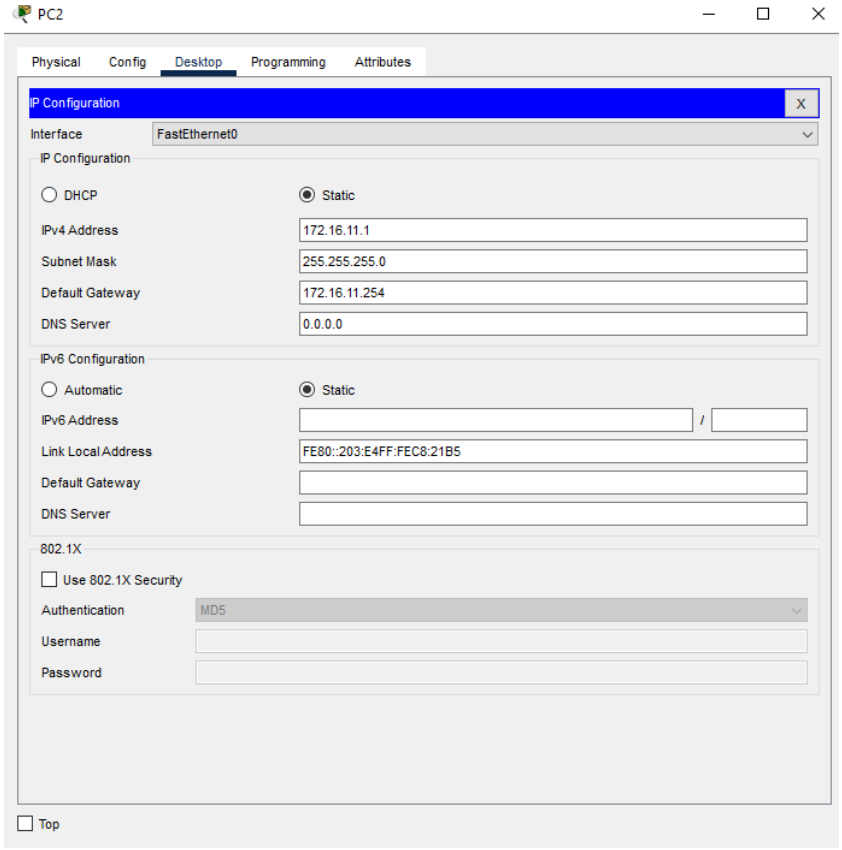

Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Hardware is HD64570
MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations 0/0/256 (active/max active/max total)
Reserved Conversations 0/0 (allocated/max allocated)
Available Bandwidth 96 kilobits/sec
Router(config)#xit
^
% Invalid input detected at '^' marker.
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do show interface brief
show interface brief
^
% Invalid input detected at '^' marker.
Router(config)#do show ip interface brief
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 172.16.11.254 YES manual up up
FastEthernet1/0 unassigned YES unset administratively down down
Serial2/0 172.16.12.2 YES manual up up
Serial3/0 unassigned YES unset administratively down down
FastEthernet4/0 unassigned YES unset administratively down down
FastEthernet5/0 unassigned YES unset administratively down down
Router(config)#
Copy
Paste
Top

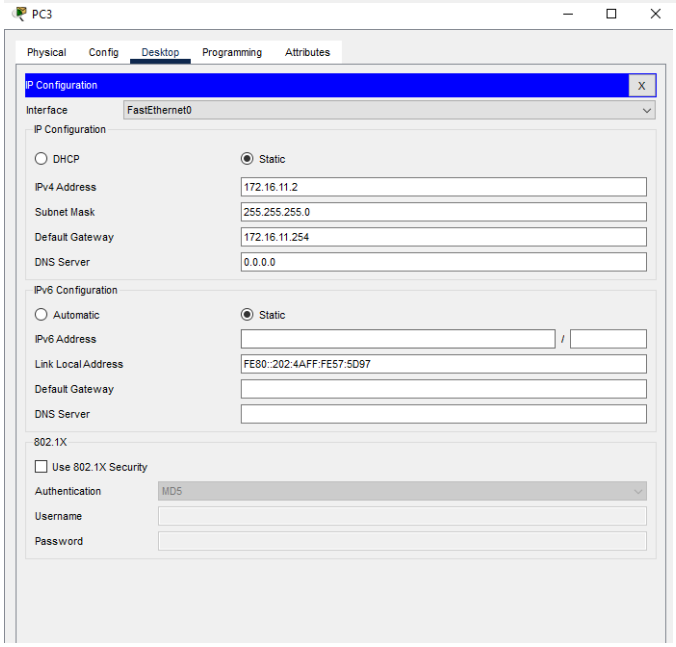

Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>en
Router#con t
% Ambiguous command: "con t"
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#
Router(config-router)#VERSION 2
Router(config-router)#network 172.16.10.0
Router(config-router)#network 172.16.12.0
Router(config-router)#exit
Router(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.16.10.0/24 is directly connected, FastEthernet0/0
C 172.16.12.0/30 is directly connected, Serial2/0
Router(config)#
Copy
Paste
Top

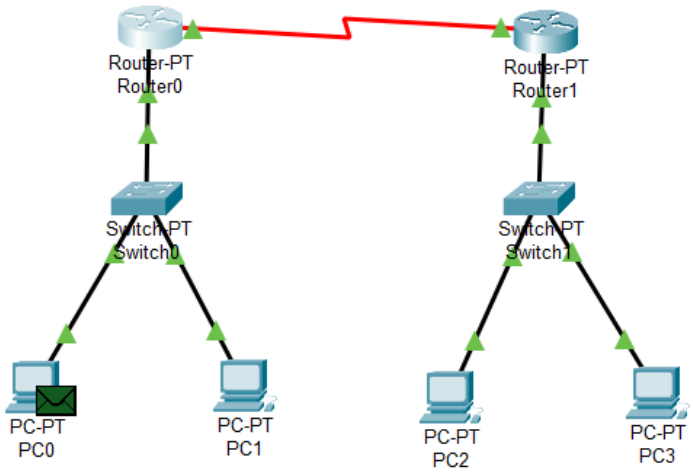

Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 172.16.11.0
Router(config-router)#network 172.16.12.0
Router(config-router)#exit
Router(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
R 172.16.10.0/24 [120/1] via 172.16.12.1, 00:00:03, Serial2/0
C 172.16.11.0/24 is directly connected, FastEthernet0/0
C 172.16.12.0/30 is directly connected, Serial2/0
Router(config)#
Copy
Paste
Top

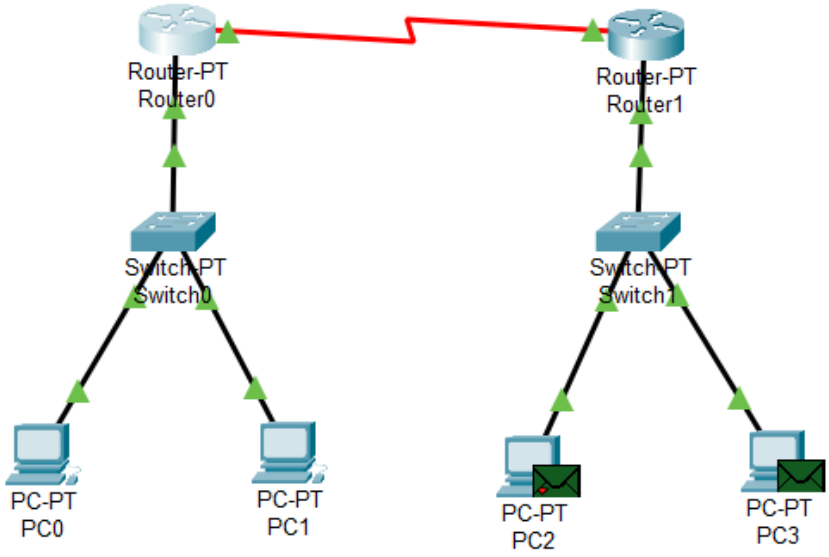

PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
172.16.10.1
Subnet Mask
255.255.255.0
Default Gateway
172.16.10.254
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::202:4AFF:FE6A:8842
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

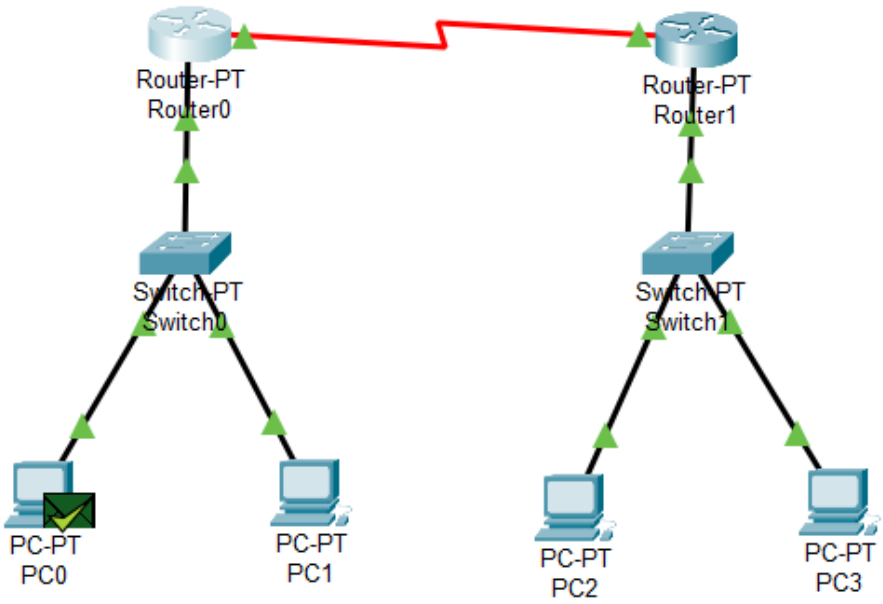

PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
172.16.10.2
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::206:2AFF:FE24:941
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
172.16.11.1
Subnet Mask
255.255.255.0
Default Gateway
172.16.11.254
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::203:E4FF:FEC8:21B5
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
172.16.11.2
Subnet Mask
255.255.255.0
Default Gateway
172.16.11.254
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::202:4AFF:FE57:5D97
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password


Router-PT
Router0
Router-PT
Router1
Switch-PT
Switch0
Switch-PT
Switch1
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3


Router-PT
Router0
Router-PT
Router1
Switch-PT
Switch0
Switch-PT
Switch1
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3



CONCLUSION:
Configured RIP, demonstrating dynamic routing capabilities and the protocol's impact on network efficiency and stability in Cisco Packet Tracer

Post Lab Questions

1. ..... are two popular examples of distance vector routing protocols.
A. OSPF and RIP
B. RIP and BGP
C. BGP and OSPF
D. BGP and SPF

2. A ..... routing table contains information entered manually.
A. static
B. dynamic
C. hierarchical
D. non static

3. A ..... routing table is updated periodically using one of the dynamic routing protocols.
A. static
B. dynamic
C. hierarchical
D. non static

4. Which of the following is not the category of dynamic routing algorithm.
A. Distance vector protocols
B. Link state protocols
C. Hybrid protocols
D. Automatic state protocols

5. In ..... forwarding, the mask and destination addresses are both 0.0.0.0 in the routing table.
A. next-hop
B. network-specific
C. host-specific
D. default

6. Differentiate between Distance Vector Routing and Link State Routing.

Distance Vector Routing:

Distance Vector Routing:

- Routers share their routing tables (which contain distances to all nodes in the network) with **directly connected neighbors**.
- Each router maintains a vector of distances (hence the name "distance vector") to all other routers.
- Information is propagated periodically or when a change occurs, but routers only know about their neighbors and their distances to other routers.

Link State Routing:

- Routers gather a complete map (or topology) of the entire network by sharing **link state information** with all routers in the network.
- Each router builds its own routing table using **Shortest Path First (SPF)** algorithms, like Dijkstra's, by calculating the shortest path to every other router.
- Information is propagated when there are changes in the network, such as link failure or new links.

Date: 11-11-2024 **Signature of faculty in-charge**