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EXPERIMENT 4



The Aim

Connecting Computers in a LAN



Procedure: On the Host Computer

Follow the following steps to Share the Internet Connection:

- Log on to the Host Computer as Administrator/Owner
- Click **START** and go to **Control Panel**
- Click **Network and Internet Connections**
- Go to, **Network Connections**
- Right-Click the connection that you use for internet connectivity, and click **Properties**
- Go to, **Advance** Tab
- Under the **Internet Connection Sharing**, select:
 - *"Allow other network users to connect through this computer's Internet Connection"*
- If you are sharing a Dial-Up connection, select:
 - *"Establish a dial-up connection whenever a computer on my network attempts to access the Internet"*
- Select **OK**, and you'll receive a message similar to:
 - *"When Internet Connection Sharing is enabled, your LAN adapter..."*
- Just Click **Yes**, and the connection to the internet is shared to other computers on the LAN.

*The Network Adapter connected to the LAN is configured with a static IP Address of **192.169.0.1** and a Subnet mask of **255.255.255.0***



EXPERIMENT 4



On the Client's Computer



To connect to the internet using the shared connection, you must confirm the LAN adapter IP Configuration, and then configure the client computer. To confirm the LAN adapter, IP Configuration, follow these steps:

- Log on to the client computer as Administrator or as Owner.
- Click **Start**, and then select **Control Panel**.
- Click **Network and Internet Connections**.
- Go to **Network Connections**.
- Right-click **Local Area Connection** and then click **Properties**.
- Click the **General** tab, click **Internet Protocol (TCP/IP)** in the connection uses the **following items** list, and then click **Properties**.
- In the **Internet Protocol (TCP/IP)** Properties dialog box, click **Obtain an IP address automatically** (if it is not already selected), and then click **OK**.

Note: You can also assign a unique static IP address in the range of 192.168.0.2 to 192.168.0.254. For example, you can assign the following static IP address, subnet mask, and default gateway:

- IP Address 192.168.31.202
 - Subnet mask 255.255.255.0
 - Default gateway 192.168.31.1
- In the **Local Area Connection** Properties dialog box, click **OK**.



EXPERIMENT 5



The Aim

Network Configuration Commands



Apparatus: Command Prompt, and Packet Tracer

Procedure: Follow the following procedure

In this experiment—we will understand basic networking commands e.g., ping, tracert etc.

All commands related to network configuration, which includes how to switch to privilege mode and normal mode and how to configure router interface and how to save this configuration to flash memory or permanent memory.

These commands include:

- Configuring the Router commands
- General Commands to configure network
- Privileged Mode commands of a router
- Router Processes & Statistics
- IP Commands
- Other IP Commands e.g., show IP route etc.

Ping: Sends an ICMP ECHO_REQUEST packet to the specified host. If the host responds, you get an ICMP packet back. We can “ping” an IP address to see if a machine is alive. If there is no response, you know something is wrong.



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```
PS C:\Users> ping google.com

Pinging google.com [216.58.207.14] with 32 bytes of data:
Reply from 216.58.207.14: bytes=32 time=42ms TTL=112
Reply from 216.58.207.14: bytes=32 time=61ms TTL=112
Reply from 216.58.207.14: bytes=32 time=51ms TTL=112
Reply from 216.58.207.14: bytes=32 time=39ms TTL=112

Ping statistics for 216.58.207.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 39ms, Maximum = 61ms, Average = 48ms
PS C:\Users> |
```

Traceroute: *Tracert* is a command which can show you the path a packet of information takes from your computer to one you specify. It will list all the routers it passes through until it reaches its destination, or fails to and is discarded. In addition to this, it will tell you how long each 'hop' from router to router takes.

```
PS C:\Users> tracert google.com

Tracing route to google.com [216.58.207.14]
over a maximum of 30 hops:

  1  <1 ms    <1 ms    <1 ms    192.168.42.129
  2   2 ms     2 ms     6 ms     192.168.100.1
  3   3 ms     2 ms     4 ms     10.10.5.1
  4   4 ms     3 ms     3 ms     broadband-103-147-87-102.multicitypk.com [103.147.87.102]
  5   5 ms     5 ms     5 ms     58-27-161-201.wateen.net [58.27.161.201]
  6  18 ms     4 ms     7 ms     110.93.224.14
  7  40 ms    26 ms    28 ms    110.93.254.86
  8  41 ms    23 ms    23 ms    110.93.253.22
  9  35 ms    34 ms    35 ms    72.14.194.14
 10 1192 ms   36 ms    34 ms    108.170.246.114
 11  39 ms    39 ms    39 ms    142.251.225.200
 12  53 ms    42 ms    39 ms    108.170.247.1
 13  38 ms    38 ms    40 ms    216.239.62.225
 14  60 ms    38 ms    38 ms    fjr02s03-in-f14.1e100.net [216.58.207.14]

Trace complete.
```



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NSLookup: Displays information from Domain Name System (DNS) name servers.

Note: If you write the command as above, it shows as default your pc's server name firstly.

PathPing: Better version of tracert that gives you statistics about packet lost and latency.

```
Computing statistics for 350 seconds...
Hop  RTT      Source to Here   This Node/Link   Address
    0                               [192.168.42.7]
    1   0ms      0/ 100 =  0%     0/ 100 =  0%     192.168.42.129
    2   9ms      0/ 100 =  0%     0/ 100 =  0%     192.168.100.1
    3   5ms      0/ 100 =  0%     0/ 100 =  0%     10.10.5.1
    4   4ms      0/ 100 =  0%     0/ 100 =  0%     broadband-103-147-87-1
    5   5ms      0/ 100 =  0%     0/ 100 =  0%     58-27-161-201.wateen.n
    6   7ms      8/ 100 =  8%     8/ 100 =  8%     110.93.224.14
    7  26ms      0/ 100 =  0%     0/ 100 =  0%     110.93.254.86
    8  27ms      0/ 100 =  0%     0/ 100 =  0%     110.93.253.22
    9  37ms      0/ 100 =  0%     0/ 100 =  0%     72.14.194.14
   10  40ms      0/ 100 =  0%     0/ 100 =  0%     108.170.246.114
   11 ---      100/ 100 =100%   100/ 100 =100%   142.251.225.200
   12 ---      100/ 100 =100%   100/ 100 =100%   108.170.247.1
   13 ---      100/ 100 =100%   100/ 100 =100%   216.239.62.225
   14  39ms      0/ 100 =  0%     0/ 100 =  0%     fjr02s03-in-f14.1e100.

Trace complete.
```




EXPERIMENT 5



Getting Help



In any command mode, you can get a list of available commands by entering a question mark (?).

- Router > ?

To obtain a list of commands that begin with a particular character sequence, type in those characters followed immediately by the question mark (?).

- Router # co?

Configure connect copy

To list keywords or arguments, enter a question mark in place of a keyword or argument. Include a space before the question mark.

- Router # configure ?

Memory Configure from NV memory

Network Configure from a TFTP network host

Terminal Configure from the terminal

You can also abbreviate commands and keywords by entering just enough characters to make the command unique from other commands. For example, you can abbreviate the **show** command to **sh**.



EXPERIMENT 5



Configuration Files



Any time you make changes to the router configuration, you must save the changes to memory because if you do not, they will be lost if there is a system reload or power outage. There are two types of configuration files: the running (current operating) configuration and the startup configuration.

Use the following privileged mode commands to work with configuration files.

- **configure terminal** – modify the running configuration manually from the terminal.
- **show running-config** – display the running configuration.
- **show startup-config** – display the startup configuration.
- **copy running-config startup-config** – copy the running configuration to the startup configuration.
- **copy startup-config running-config** – copy the startup configuration to the running configuration.
- **erase startup-config** – erase the startup-configuration in NVRAM.
- **copy tftp running-config** – load a configuration file stored on a Trivial File Transfer Protocol (TFTP) server into the running configuration.
- **copy running-config tftp** – store the running configuration on a TFTP server.

EXPERIMENT 5

IP Address Configuration

Take the following steps to configure the IP address of an interface.

- **Step 1:** Enter privileged EXEC mode:
 - Router > enable password
- **Step 2:** Enter the **configure terminal** command to enter global configuration mode.
 - Router#config terminal
- **Step 3:** Enter the **interface** type slot/port (for Cisco 7000 series) or **interface** type port (for Cisco 2500 series) to enter the interface configuration mode. Example:
 - Router (config) # **interface ethernet 0/1**
- **Step 4:** Enter the IP address and subnet mask of the interface using the ip address ipaddress subnetmask command. Example,
 - Router (config-if)#**ip address 192.168.10.1 255.255.255.0**
- **Step 5:** Exit the configuration mode by pressing Ctrl-Z
 - Router(config-if)#[Ctrl-Z]

EXPERIMENT 6

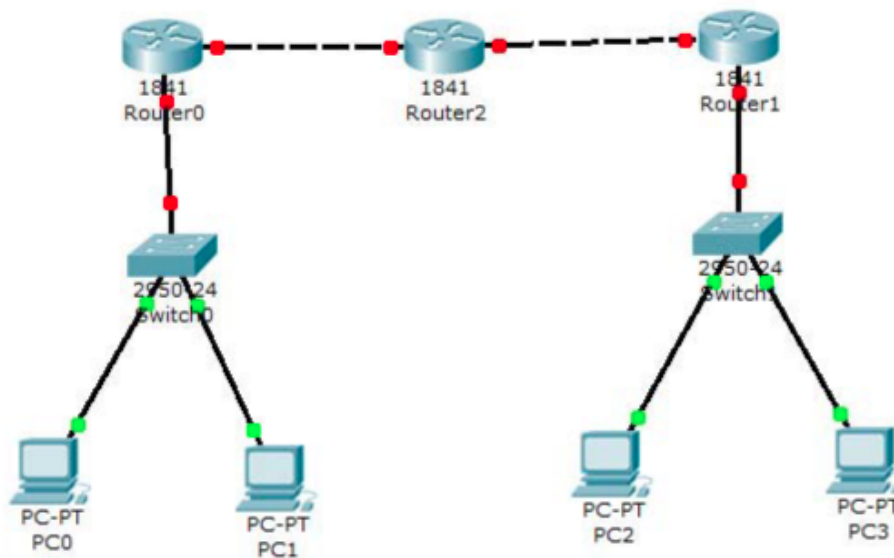
The Aim

Configuration of Network Topology

Apparatus: Packet Tracer

Procedure: To implement this practical, following network topology is required to be configured using the commands learned in previous practical.

After configuring the given network, a packet should be pinged from any one machine to another.



EXPERIMENT 6

Router0 Configuration Commands

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>

Router>Enable

Router#config t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname router0

router0(config)#interface fastethernet 0/0

router0(config-if)#ip address 192.168.1.1 255.255.255.0

router0(config-if)#description router0 fastethernet 0/0

router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

router0(config-if)#exit

router0(config)#interface fastethernet 0/1

router0(config-if)#description router0 fastethernet 0/1

router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

router0(config-if)#exit

router0(config)#exit

%SYS-5-CONFIG_I: Configured from console by console

router0#show running-config

Building configuration...

Current configuration : 437 bytes



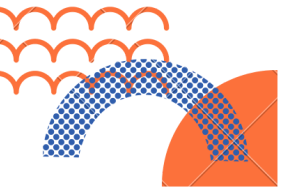
EXPERIMENT 6



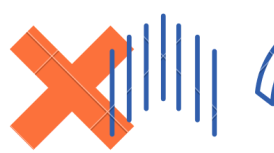
Router0 Configuration Commands (Cont.)



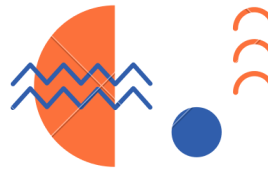
```
!  
version 12.4  
no service password-encryption  
!  
hostname router0  
!  
!  
!  
!  
!  
ip ssh version 1  
!  
!  
interface FastEthernet0/0  
description router0 fastethernet 0/0  
ip address 192.168.1.1 255.255.255.0  
duplex auto  
speed auto  
!  
interface FastEthernet0/1  
description router0 fastethernet 0/1  
no ip address  
duplex auto  
speed auto  
!  
interface Vlan1  
no ip address
```



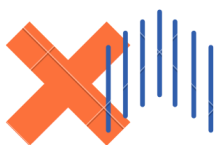
EXPERIMENT 6



Router0 Configuration Commands (Cont.)



```
shutdown
!  
ip classless
!  
!  
!  
!  
!  
line con 0  
line vty 0 4  
login  
!  
!  
end  
router0#  
router0#  
router0#copy running-config startup-config  
Destination filename [startup-config]?  
Building configuration...  
[OK]  
router0#
```



EXPERIMENT 8

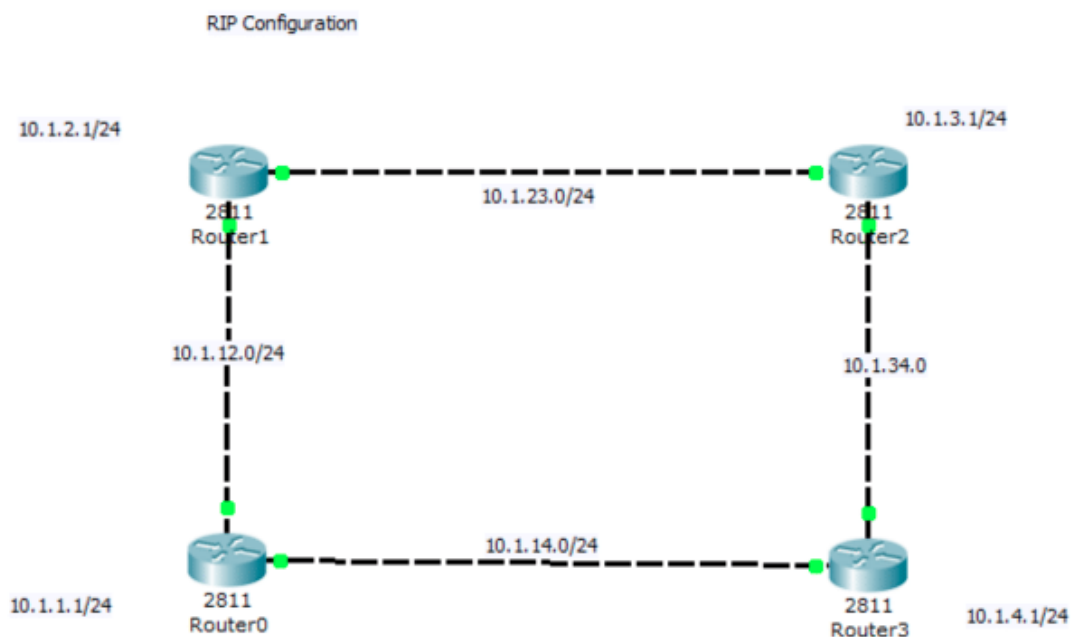
The Aim

Configuration of RIP

Apparatus: Packet Tracer

Procedure:

- Develop a Topology shown in figure given below.
- Configure all Routers
- Implement RIP protocols in Router to configure Network.



EXPERIMENT 8

Router0 Configuration Commands

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>

Router>en

Router#config t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname router0

router0(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up

router0(config-if)#ip address 10.1.1.1 255.255.255.0

router0(config-if)#int f0/0

router0(config-if)#ip address 10.1.12.1 255.255.255.0

router0(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

router0(config-if)#int f0/1

router0(config-if)#ip address 10.1.14.1 255.255.255.0

router0(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

router0(config-if)#end

%SYS-5-CONFIG_I: Configured from console by console

router0#wr

Building configuration...

[OK]

EXPERIMENT 8

Router0 Configuration Commands (Cont.)

```
router0#
router0#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
router0 con0 is now available
Press RETURN to get started.
router0>
router0>en
router0#config t
Enter configuration commands, one per line. End with CNTL/Z.
router0(config)#router rip
router0(config-router)#net 10.0.0.0
router0(config-router)#
router0(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
router0#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
```

EXPERIMENT 8

Router0 Configuration Commands (Cont.)

Gateway of last resort is not set
10.0.0.0/24 is subnetted, 3 subnets
C 10.1.1.0 is directly connected, Loopback0
C 10.1.12.0 is directly connected, FastEthernet0/0
C 10.1.14.0 is directly connected, FastEthernet0/1
router0#
router0#

Router1 Configuration Commands

Continue with configuration dialog? [yes/no]: no
Press RETURN to get started!
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int lo0
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up
Router(config-if)#ip address 10.1.2.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int f0/1
Router(config-if)#ip address 10.1.23.1 255.255.255.0
Router(config-if)#no shut

EXPERIMENT 8

Router1 Configuration Commands (Cont.)

```
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.12.2 255.255.255.0
Router(config-if)#no shut
%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)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building configuration...
[OK]
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
Router con0 is now available
Press RETURN to get started.
Router>
Router>en
Router#con t
```

EXPERIMENT 8

Router1 Configuration Commands (Cont.)

```
% Ambiguous command: "con t"
Router#co t
% Ambiguous command: "co t"
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)#
Router(config-router)#
Router(config-router)#end
%SYS-5-CONFIG_1: Configured from console by console
Router#
```

Router2 Configuration Commands

```
Continue with configuration dialog? [yes/no]: no
Press RETURN to get started!
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int lo0
```

EXPERIMENT 8

Router2 Configuration Commands (Cont.)

```
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up
Router(config-if)#ip address 10.1.3.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.23.2 255.255.255.0
Router(config-if)#no shut
%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)#int f0/1
Router(config-if)#ip address 10.1.34.1 255.255.255.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
Router(config-if)#End
%SYS-5-CONFIG_1: Configured from console by console
Router#wr
Building configuration...
[OK]
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
```


EXPERIMENT 8

Router2 Configuration Commands (Cont.)

Router con0 is now available

Press RETURN to get started.

Router>

Router>

Router>en

Router#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

10.0.0.0/24 is subnetted, 3 subnets

C 10.1.3.0 is directly connected, Loopback0

C 10.1.23.0 is directly connected, FastEthernet0/0

C 10.1.34.0 is directly connected, FastEthernet0/1

Router#config t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#router rip

Router(config-router)#net 10.0.0.0

Router(config-router)#end

%SYS-5-CONFIG_I: Configured from console by console

EXPERIMENT 8

Router2 Configuration Commands (Cont.)

Router#

Router#

Router#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

10.0.0.0/24 is subnetted, 7 subnets

R 10.1.1.0 [120/2] via 10.1.23.1, 00:00:19, FastEthernet0/0

R 10.1.2.0 [120/1] via 10.1.23.1, 00:00:19, FastEthernet0/0

C 10.1.3.0 is directly connected, Loopback0

R 10.1.12.0 [120/1] via 10.1.23.1, 00:00:19, FastEthernet0/0

R 10.1.14.0 [120/2] via 10.1.23.1, 00:00:19, FastEthernet0/0

C 10.1.23.0 is directly connected, FastEthernet0/0

C 10.1.34.0 is directly connected, FastEthernet0/1

Router#

Router#

Router#

EXPERIMENT 8

Router3 Configuration Commands (Cont.)

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>

Router>en

Router#config t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up

Router(config-if)#int f0/0

Router(config-if)#ip address 10.1.34.2 255.255.255.0

Router(config-if)#no shut

%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)#

Router(config-if)#int f0/1

Router(config-if)#ip address 10.1.14.2 255.255.255.0

Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

Router(config-if)#end

%SYS-5-CONFIG_I: Configured from console by console

EXPERIMENT 8

Router3 Configuration Commands (Cont.)

Router#wr

Building configuration...

[OK]

Router#

Router#

Router#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

10.0.0.0/24 is subnetted, 2 subnets

C 10.1.14.0 is directly connected, FastEthernet0/1

C 10.1.34.0 is directly connected, FastEthernet0/0

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#router rip

Router(config-router)#net 10.0.0.0

Router(config-router)#

Router(config-router)#end

EXPERIMENT 8

Router3 Configuration Commands (Cont.)

%SYS-5-CONFIG_I: Configured from console by console

Router#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

10.0.0.0/24 is subnetted, 7 subnets

R 10.1.1.0 [120/1] via 10.1.14.1, 00:00:09, FastEthernet0/1

R 10.1.2.0 [120/2] via 10.1.34.1, 00:00:14, FastEthernet0/0
[120/2] via 10.1.14.1, 00:00:09, FastEthernet0/1

R 10.1.3.0 [120/1] via 10.1.34.1, 00:00:14, FastEthernet0/0

R 10.1.12.0 [120/1] via 10.1.14.1, 00:00:09, FastEthernet0/1

C 10.1.14.0 is directly connected, FastEthernet0/1

R 10.1.23.0 [120/1] via 10.1.34.1, 00:00:14, FastEthernet0/0

C 10.1.34.0 is directly connected, FastEthernet0/0

Router#

EXPERIMENT 9

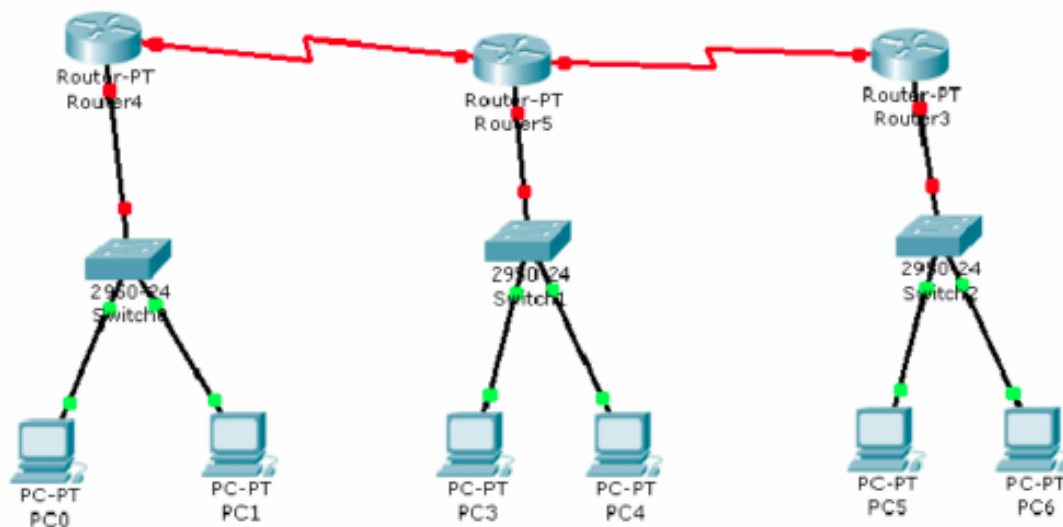
The Aim

Configuration with OSPF

Apparatus: Packet Tracer

Procedure:

- Develop a Topology shown in figure given below.
- Configure all the workstations
- Configure all switches
- Configure all Routers
- Implement OSPF protocols in Router to configure Network.





THANK YOU

hopefully, it'll be acceptable

SAIRA SAEED