TheMR

SINCE 2001

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Experiment 4

CONNECTING COMPUTERS IN A LAN

Procedure:

On the Host Computer
Follow the following steps to Share the Internet Connection:

Steps

- 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

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On 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

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.

EXPERIMENT 5

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Network Configuration Commands (Cont.)

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements!

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

Pinging google.com [216.58.207.14] with 32 bytes of data:
Reply from 216.58.207.14: bytes=32 time=40ms TTL=112
Reply from 216.58.207.14: bytes=32 time=58ms TTL=112
Reply from 216.58.207.14: bytes=32 time=40ms TTL=112
Reply from 216.58.207.14: bytes=32 time=38ms 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 = 38ms, Maximum = 58ms, Average = 44ms
PS C:\Users\mshah>
```

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\mshah> 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    18 ms     2 ms     3 ms  192.168.100.1
  3     4 ms     3 ms     3 ms  10.10.5.1
  4     4 ms     4 ms     3 ms  broadband-103-147-87-102.multicitypk.com [103.147.
  5    24 ms     5 ms     5 ms  58-27-161-201.wateen.net [58.27.161.201]
  6     6 ms     5 ms     5 ms  110.93.224.14
  7    24 ms    24 ms    24 ms  110.93.254.86
  8    98 ms    27 ms    23 ms  110.93.253.22
  9    36 ms    42 ms    36 ms  72.14.194.14
 10    37 ms    36 ms    36 ms  108.170.246.114
 11    47 ms    43 ms    40 ms  142.251.225.200
 12    38 ms    40 ms    38 ms  108.170.247.1
 13    52 ms    38 ms    37 ms  216.239.62.225
 14    55 ms    38 ms    38 ms  fjr02s03-in-f14.1e100.net [216.58.207.14]

Trace complete.
PS C:\Users\mshah>
```

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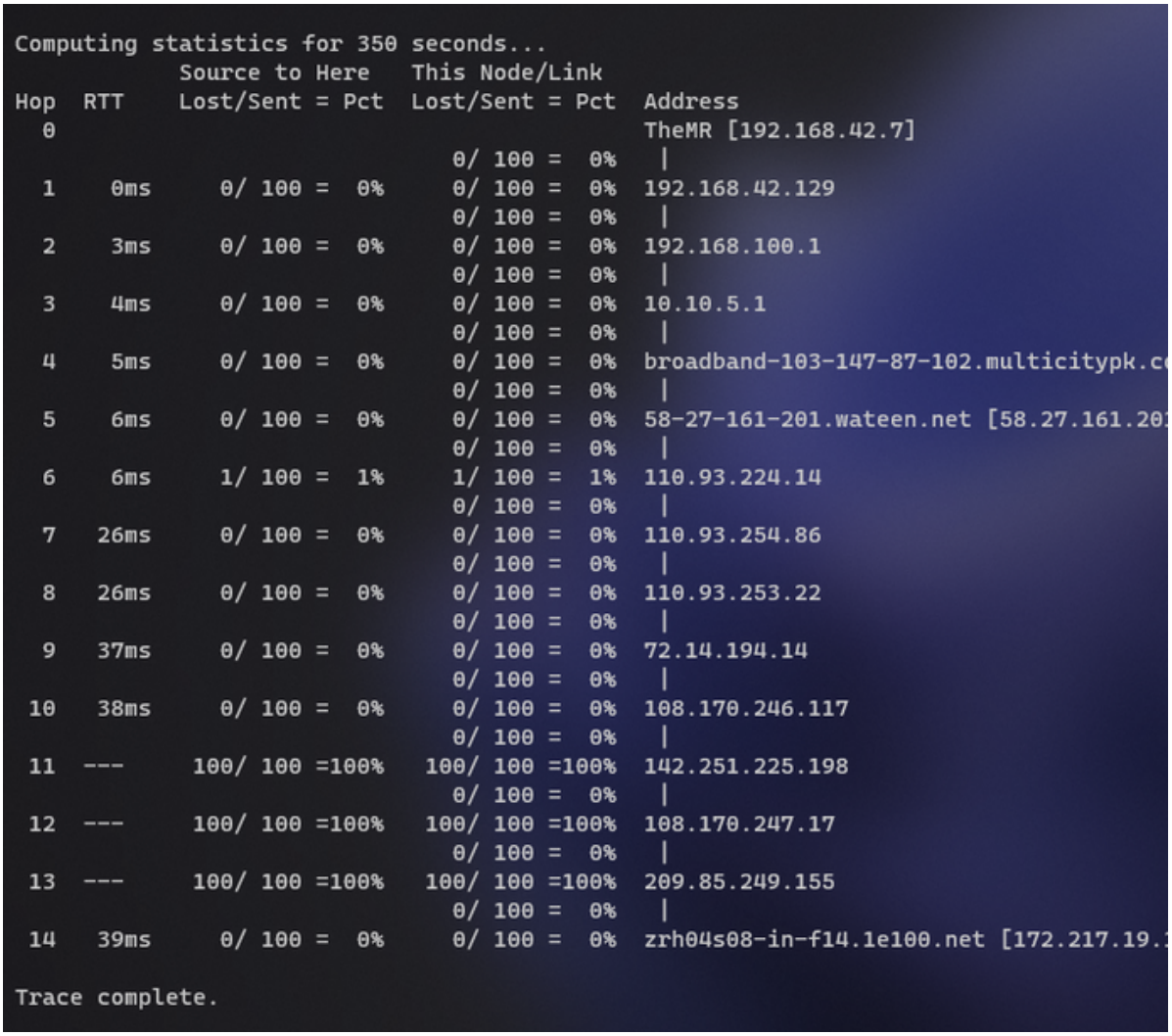
Network Configuration Commands (Cont.)

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 statics about packet lost and latency.



```
Computing statistics for 350 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           TheMR [192.168.42.7]
                                  0/ 100 =  0%   |
  1    0ms     0/ 100 =  0%     0/ 100 =  0%  192.168.42.129
                                  0/ 100 =  0%   |
  2    3ms     0/ 100 =  0%     0/ 100 =  0%  192.168.100.1
                                  0/ 100 =  0%   |
  3    4ms     0/ 100 =  0%     0/ 100 =  0%  10.10.5.1
                                  0/ 100 =  0%   |
  4    5ms     0/ 100 =  0%     0/ 100 =  0%  broadband-103-147-87-102.multicitypk.c
                                  0/ 100 =  0%   |
  5    6ms     0/ 100 =  0%     0/ 100 =  0%  58-27-161-201.wateen.net [58.27.161.20
                                  0/ 100 =  0%   |
  6    6ms     1/ 100 =  1%     1/ 100 =  1%  110.93.224.14
                                  0/ 100 =  0%   |
  7   26ms     0/ 100 =  0%     0/ 100 =  0%  110.93.254.86
                                  0/ 100 =  0%   |
  8   26ms     0/ 100 =  0%     0/ 100 =  0%  110.93.253.22
                                  0/ 100 =  0%   |
  9   37ms     0/ 100 =  0%     0/ 100 =  0%  72.14.194.14
                                  0/ 100 =  0%   |
 10   38ms     0/ 100 =  0%     0/ 100 =  0%  108.170.246.117
                                  0/ 100 =  0%   |
 11   ---     100/ 100 =100%   100/ 100 =100%  142.251.225.198
                                  0/ 100 =  0%   |
 12   ---     100/ 100 =100%   100/ 100 =100%  108.170.247.17
                                  0/ 100 =  0%   |
 13   ---     100/ 100 =100%   100/ 100 =100%  209.85.249.155
                                  0/ 100 =  0%   |
 14   39ms     0/ 100 =  0%     0/ 100 =  0%  zrh04s08-in-f14.1e100.net [172.217.19.

Trace complete.
```

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Network Configuration Commands (Cont.)

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**.

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Network Configuration Commands (Cont.)

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.

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Network Configuration Commands (Cont.)

Steps for IP Address Configuration

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

- Enter privileged EXEC mode:
  - Router > enable password
- Enter the **configure terminal** command to enter global configuration mode.
  - Router#config terminal
- 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**
- 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**
- Exit the configuration mode by pressing **Ctrl-Z**
  - Router(config-if) # [Ctrl-Z]

Experiment 6

CONFIGURATION OF NETWORK TOPOLOGY

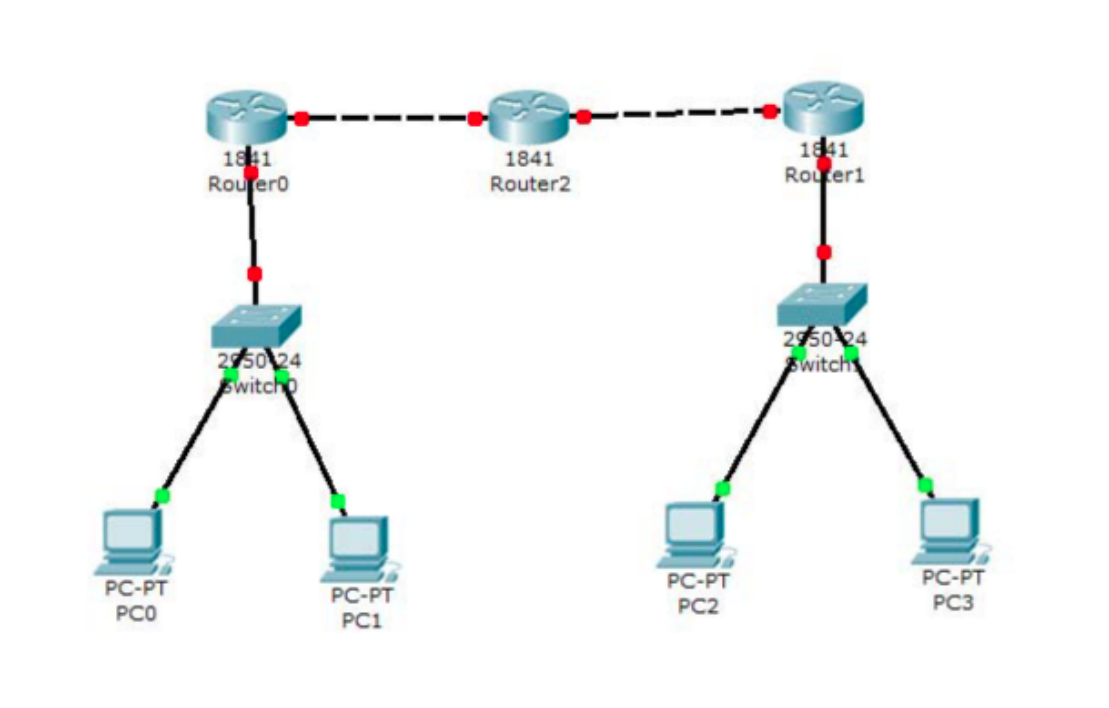
Procedure:

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

Apparatus:

Packet Tracer

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



Router0 Configuration Commands

Experiment 6

```
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
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
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

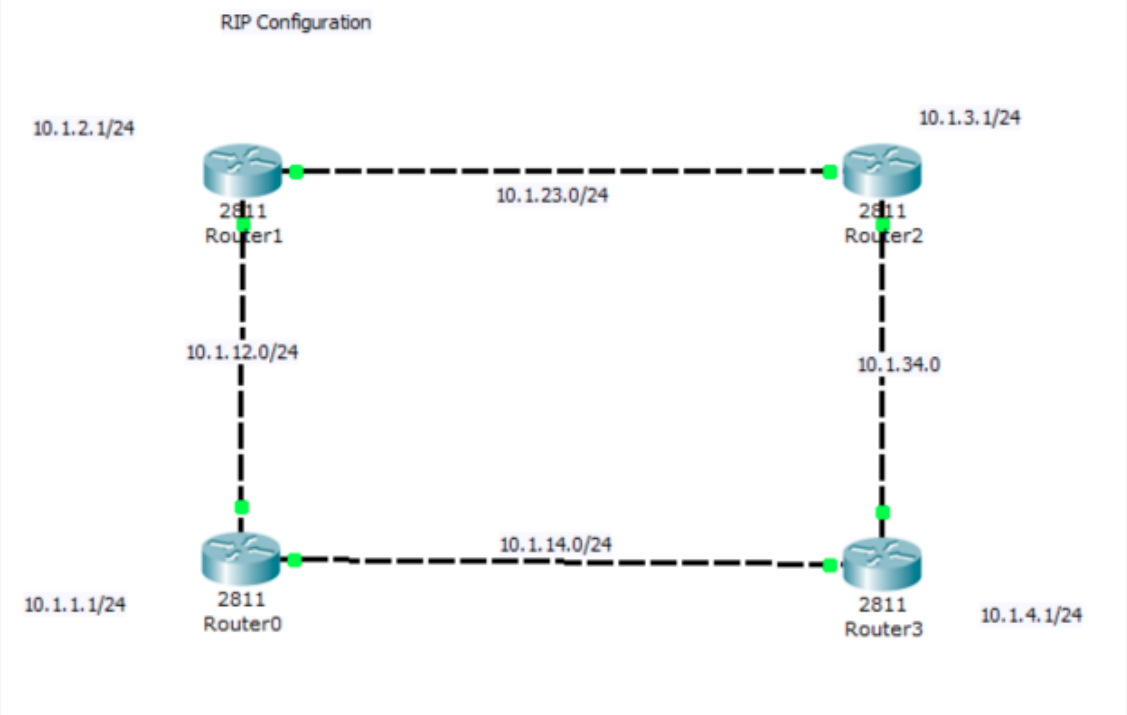
CONFIGURATION OF RIP

Procedure:

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

Apparatus:

Packet Tracer



Router0 Configuration Commands

Experiment 8

```
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]
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
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

Experiment 8

```
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
%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#
%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
% 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_I: Configured from console
by console
Router#
```

Router2 Configuration Commands

Experiment 8

```
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
%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_I: Configured from console
by console
Router#wr
Building configuration...
[OK]
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>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
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
```

Router2 Configuration Commands

```
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#
```

Router3 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)#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
Router#wr
Building configuration...
[OK]
Router#
Router#
Router#show ip route
```

Router3 Configuration Commands

Experiment 8

```
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
%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

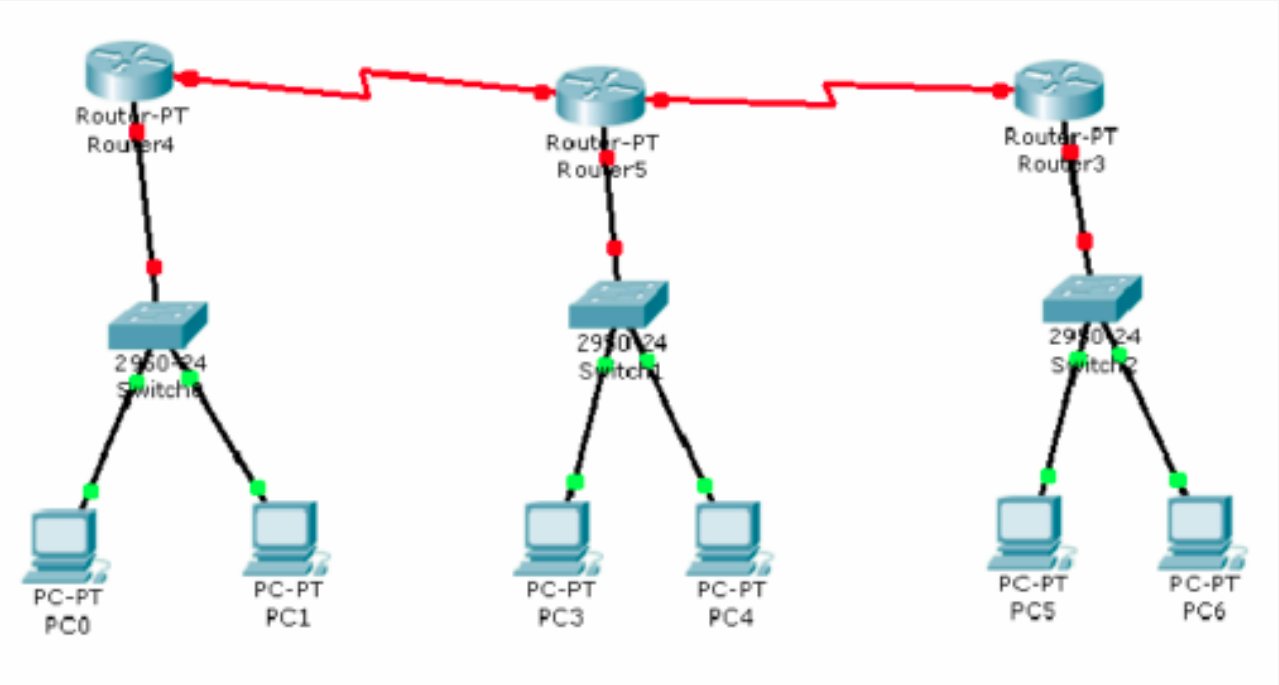
CONFIGURATION WITH OSPF

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.

Apparatus:

Packet Tracer



ASSIGNMENT BY

TheMR

PRESENTED TO

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The End

DATED: 7TH FEBRUARY, 2022