



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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WORKSHEET 2.4

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Branch: CSE

Section/Group: 808/B

Semester: 4th

Date of Performance:

Subject: Computer Networks

Subject Code: 21CSH-256

1. Aim:

Configure a network using Link State Routing Protocol using Packet Tracer or NS2.

2. Software Requirements:

Packet Tracer

3. Hardware Requirements:

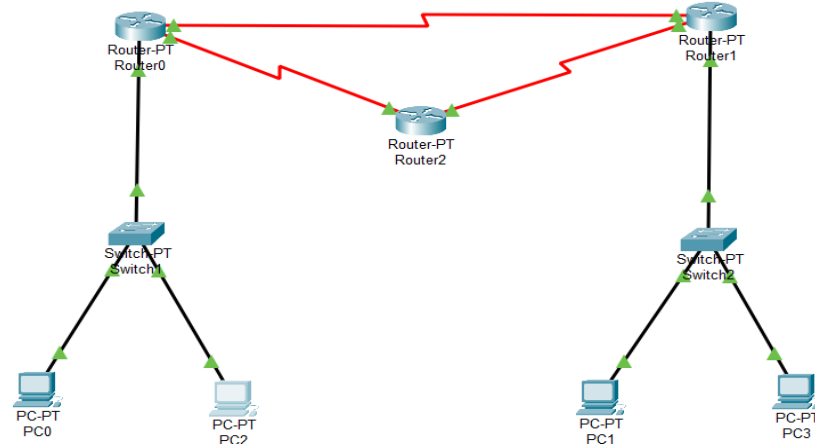
- Processor – Any suitable Processor e.g., Celeron
- Main Memory - 128MBRAM
- Hard Disk – minimum 20 GB IDE Hard Disk
- Removable Drives – 1.44MB
- Floppy Disk Drive – 52X IDE CD-ROM Drive
- PS/2 HCL
- Keyboard and Mouse

4. Method:-

Open Shortest Path First (OSPF) is an open standard protocol developed by IETF due to limitations with the Routing Information Protocol (RIP). OSPF's major advantages over RIP and other distance vector routing protocols include fast convergence, support for large scalable networks etc. OSPF uses cost as the metric which is much more robust than RIP's hop count which puts the limit to maximum 16 hops and also allows for equal cost load balancing for more efficient use of multiple paths.

OSPF uses the Hello protocol to form and keep track of neighborships, and it builds adjacencies with neighbors by exchanging link-state information using link state advertisements.

Configuration:



OSPF Configuration

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

```
Router(config)#router ospf 1
```

```
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
```

```
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
```

```
Router(config-router)#network 20.0.0.0 0.255.255.255 area0
```

```
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
```

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

```
Router(config)#
```

```
00:20:53: %OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial2/0 from LOADING to FULL,
```

```
Loading Done
```

```
00:24:09: %OSPF-5-ADJCHG: Process 1, Nbr 155.168.1.1 on Serial3/0 from LOADING to FULL,
```



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Loading Done

```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#no shutdown
Router(config-if)#clock rate 64000
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)# router ospf 1
Router(config-router)#10.0.0.0 0.255.255.255 area 0
^
% Invalid input detected at '^' marker.

Router(config-router)# network 10.0.0.0 255.0.0.0 area 0
Router(config-router)#
00:20:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from
LOADING to FULL, Loading Done

Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:25:02: %OSPF-5-ADJCHG: Process 1, Nbr 155.168.1.1 on Serial3/0 from
LOADING to FULL, Loading Done

Copy Paste
```

OSPF configuration is also very simple, we enter the routing protocol configuration mode by entering the command ‘router ospf 100’, 100 is the OSPF process number, and then we enable the ospf process on our

links using the network command. OSPF uses the concept of areas to logically divide the network for scalability

Modifying OSPF Update

OSPF uses cost as the metric which is based on the interface bandwidth. The formula to calculate cost is shown below

$$\text{COST} = \text{REFERENCE_BANDWIDTH} / \text{INTERFACE_BANDWIDTH}$$

Where, REF_ BANDWIDTH = 100 Mbps

So Router B will have an OSPF route in its routing table for the prefix 10.10.1.0/24 with a metric of 2 (1+1) since both links are Fast Ethernet (100 Mbps). This can be confirmed by viewing the Router B’s routing table.

RB# show ip route include 10.10.1.0/24



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```
10.10.1.0
```

```
[110/2] via 192.168.1.1, 00:10:06, FastEthernet0/0
```

We can modify the cost of an OSPF enabled interface using the command ‘ip ospf cost [cost]’

```
RouterA(config)# interface fastethernet 0/1
```

```
RouterA(config-if)# ip ospf cost 10
```

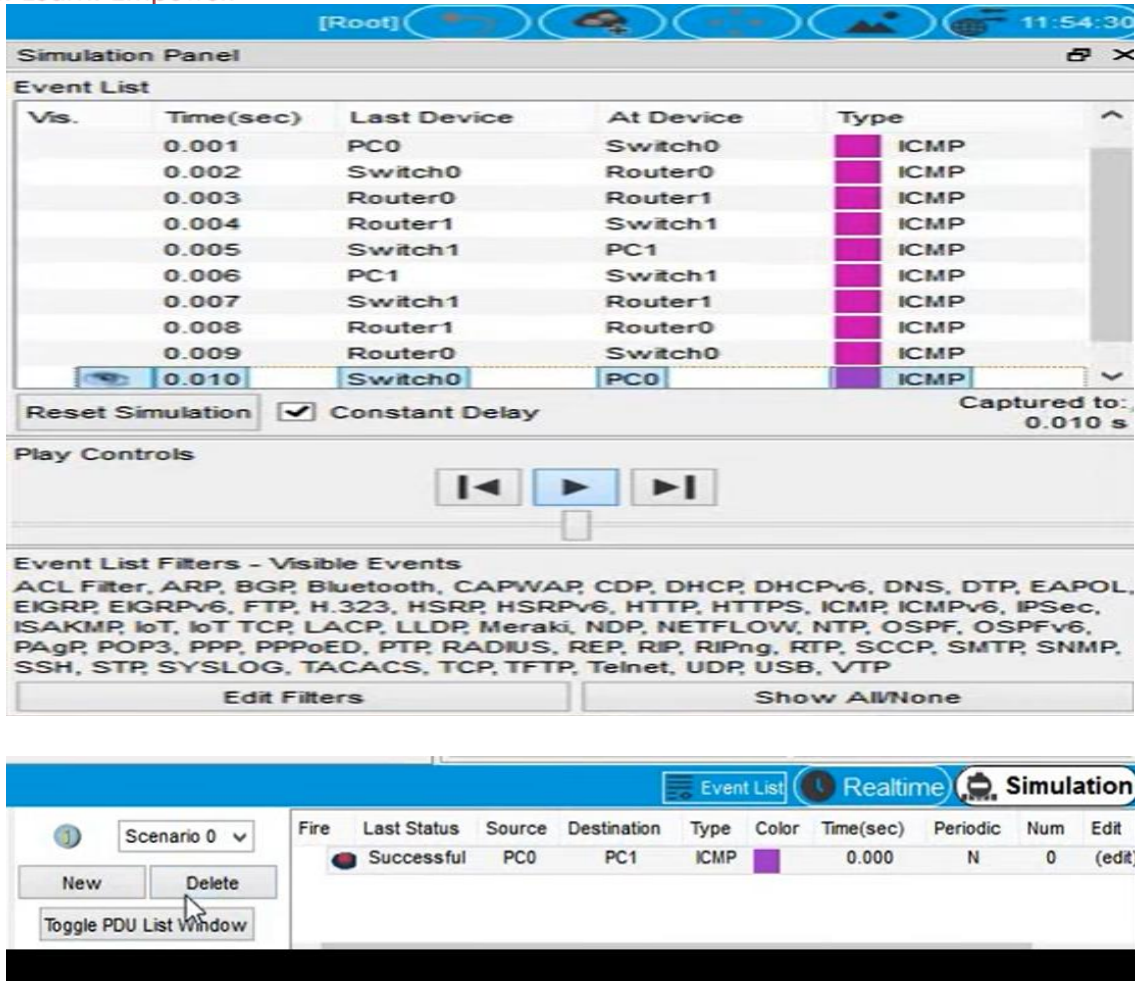
We have modified the cost of Fast Ethernet 0/1 Interface on Router A to 10, and now the routing table on Router B will have the following information.

```
RB# show ip route | include 10.10.1.0/24
```

```
10.10.1.0 [110/11] via 192.168.1.1, 00:2:05, FastEthernet0/0
```

5.Result:

Event List		
Vis.	Time(sec)	Last Device
	0.011	Switch1
	0.011	--
	0.012	PC0
	0.012	Switch1
	0.012	Router0
	0.012	Router2
	0.012	--
Visible	0.013	PC0
Visible	0.013	Switch1
Visible	0.013	Router1
Visible	0.013	Router0
Visible	0.013	--



Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.001	PC0	Switch0	ICMP
	0.002	Switch0	Router0	ICMP
	0.003	Router0	Router1	ICMP
	0.004	Router1	Switch1	ICMP
	0.005	Switch1	PC1	ICMP
	0.006	PC1	Switch1	ICMP
	0.007	Switch1	Router1	ICMP
	0.008	Router1	Router0	ICMP
	0.009	Router0	Switch0	ICMP
	0.010	Switch0	PC0	ICMP

Reset Simulation ☒ Constant Delay Captured to: 0.010 s

Play Controls

Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Simulation Panel

Scenario 0

New Delete Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC0	PC1	ICMP		0.000	N	0	(edit)

6.Learning Outcomes:

Learnt and understand the concept of Distance Vector Routing Protocol.

And able to perform it on the Cisco Packet Tracer platform