FINAL YEAR INTERNSHIP REPORT ON NETWORKING

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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DHAKA, BANGLADESH

MAY 2021

APPROVAL

This Project/internship titled **"Internship on Computer Networking"** , submitted by Md. Rakibur Rahman, ID No: 181-15-10499 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 3-6-2021.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Sazzadur Ahamed, Senior Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ACKNOWLEDGEMENT

First of all, I would like to thank the name of the great God who has kept me healthy and is always showering His mercy on us. I would like to thank my supervisor Sir Respected **Sazzadur Ahamed, Senior lecturer**, Department of CSE Daffodil international university, Dhaka. Who has encouraged me to take myself forward and help me with the right guidance. I would like to sincerely thank Technology palli for giving me the opportunity to do an internship in their company. I would like to thank my instructor Sohail Naz Sir for giving me the opportunity to work with him. I would like to thank my colleagues, with whom I have worked to solve the real problem. I would like to thank head, all the staff at Daffodil University who have made it easy for us to do everything right. finally, we must acknowledge with due respect the constant support and patients of our parents. I would like to thank Daffodil International University for arranging an internship program for their students, through which we can get a good idea of the actual work process and prepare our future for it. I would like to thank head, Department of CSE who have made it easy for us.

ABSTRACT

In this report, I am trying to highlight what I have done and what I have learned from doing an internship. In internship as a Network engineer, my main focus was to developing my skill on networking and knowing about the switching, Routing IP addressing and different kind of routing and there are protocols. Now a day, there are lots of network engineers working on new technology. I want to learn the difference routing and switching protocols also internet protocol version 4 (ipv4) and upcoming internet protocol version 6 (ipv6) and why internet protocol version 6 (ipv6) and also know how work internet protocol version 4 (ipv4) and upcoming internet protocol version 6 (ipv6). I would need to learn about real life project. I need to learn how an actual project will manage. I am very much interested to start my carrier as a network engineer. That is why I choose the internship as s **"Network engineer"**. Working in **Technology palli** added huge experiences in my future or upcoming careers. Working with the actual problems of the client, was another key point to gain experiences. This report takes us through all the details of an actual project and experience gathered during this internship at 4 months' time.

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CHAPTER 1

Introduction

1.1 Introduction of Internship

An internship is a medium through which we work on some real projects under a particular company. This is basically a 4 month program. During these four months a student gets a chance to work on a real project and how the work is done and if there is a problem it gets a chance to be solved. With this we can make ourselves worthy in the competitive world of the future.

1.2 Objective of Internship

This Report Has Been Created for Requirement for Internship Program. The report describes my successes during internships, project partnerships and work life.

1.3 Motivation of Internship

Working at Techno Pally Ltd. I learned how to create an original project, how to control the system. They encouraged me to build my career in network engineering and learn more about new technologies. Working with them has given me a better idea about networking. In addition to working there, I got new ideas about networking and how to manage clients.

1.4 Report Layout of Internship

In this report, I have given a description of the initial concept of my work which I have learned and it has been working continuously for 4 months. In "Chapter 1" I have tried to describe the role of internship, the purpose of internship and the motivation of internship. In "Chapter Two" I tried to describe the company I completed my internship. In "Chapter 3" I tried to describe my working procedure during the internship. I wrote about the work there and gave examples of that work. In "Chapter 4 and chapter 5" I tried to describe the reference and conclusion. I wrote about the work there and gave examples of that work.

CHAPTER 2

Company Profile

2.1 About technology palli Limited

First of all, Technology Palli Trust and Purpose that a student/Employee who is made as a worthy person is what the industry wants. Technology palli to prepare all student in such a path through a device because a student is not limited to just studying in theory or academies, our Key objective is Bangladesh. The rest is up to almighty Allah to take him to a worthy place in the network industry. Our Vision If we want to say a little, Technology Palli as a full-fledged networking based learning center by 2031, we are working for that goal. we want to know about our Network Palli training to the students of Technology Palli in each and every industry of the country. Technology Palli is a name in Bangladesh, Neither a brand nor a name in everyone's heart.

2.2 Technology palli limited services

1: Corporate Office & Full Building Network Structure desing and implementation : What Technology Palli will give you is that you will be able to gift a job to the fullest, because the skills team that has worked in the technology industry will play a role in designing and completing your work throughout the project, far ahead of other companies in the real field. Every engineer who works and we will be able to explain the job to you at the right time because we have a lot of experience working in the network industry before. That is why you can choose Technology Palli for this project. 1. There is no discount on quality at all times Handed Percent Quality Insure. 2. You will be able to understand the work like time within the time given in the Vedas. 3. Don't hesitate to provide you with one hundred percent support even after the project is over.

2: CCTV Surveillance System, Fire & Security Alarm System, Time attendance & Access Control System, Business, Agriculture Firm, Fish Frim, All Security Solutions CCTV Surveillance System, Fire & Security Alarm System, Time attendance & Access Control System, Business, Agriculture Firm, Fish Frim, All Security Solutions. What Technology Palli will give you is that you will be able to gift a job to the fullest, because the skills team that has worked in the technology industry will play a role in designing and completing

your work throughout the project, far ahead of other companies in the real field. Every engineer who works and we will be able to explain the job to you at the right time because we have a lot of experience working in the network industry before. That is why you can choose Technology Palli for this project. 1. There is no discount on quality at all times Handed Percent Quality Insure. 2. You will be able to understand the work like time within the time given in the Vedas. 3. Don't hesitate to provide you with one hundred percent support even after the project is over.

3: Complete ISP solution

For example, if you want to create an ISP, our team will give you a complete calculation of how much the entire budget will cost and how much money your company will run in a year, how many engineers, and how many fiber people it will take. We will keep you informed through our service for months, our team will provide you with the complete configuration of what configuration you need, InshaAllah. What Technology Palli will give you is that you will be able to gift a job to the fullest, because the skills team that has worked in the technology industry will play a role in designing and completing your work throughout the project, far ahead of other companies in the real field. Every engineer who works and we will be able to explain the job to you at the right time because we have a lot of experience working in the network industry before. That is why you can choose Technology Palli for this project. 1. There is no discount on quality at all times Handed Percent Quality Insure. 2. You will be able to understand the work like time within the time given in the Vedas. 3. Don't hesitate to provide you with one hundred percent support even after the project is over.

CHAPTER 3

I have designed routing protocols for some small organizations in these four months and are implementing different routing and protocols. I have also solve some hardware problems

3.1 : Basic ip routing and types

Transfering packet from one network to another network.

Types :

- Static routing
- Default routing
- Dynamic routing

3.2 : Static routing

Seleted best path by admistrator

Advantages:

- Admininidtrator set best path manualy
- Must be need destination network id
- Secure and fast
- Disadvantage:
- Everything configure manualy
- It's only use small network
- If any network change effect on hole Netwok
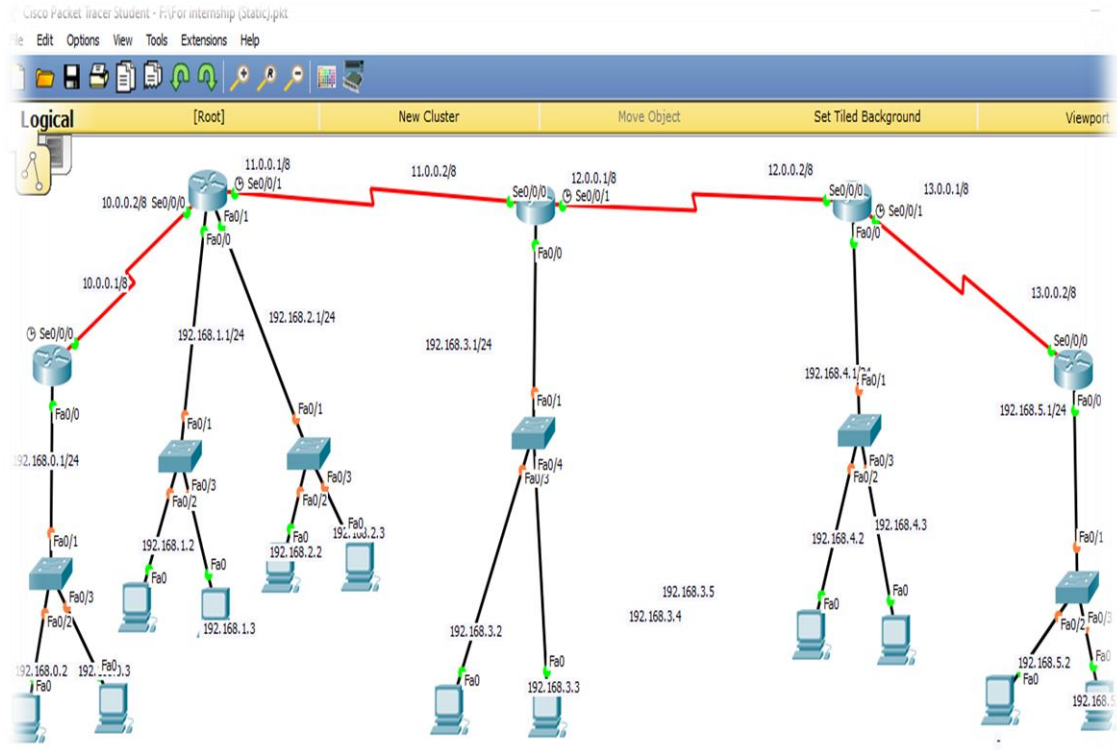
The following figure shows static routing:

Figure 3.2.1 : Static routing Model

Figure 3.2.2 : Static routing table and path selection

3.3 Default routing

- Used to route Traffic for unknown destination
- It's also use is end of the router
- It's helps to reduce routing table

Configure routing table :

- First and last router configure default but, in the middle must configure static
- First and last router. IP route 0.0.0.0 0.0.0.0 <Gateway>
- Middle on static, IP route<destination network id><Subnet mask><Gateway>
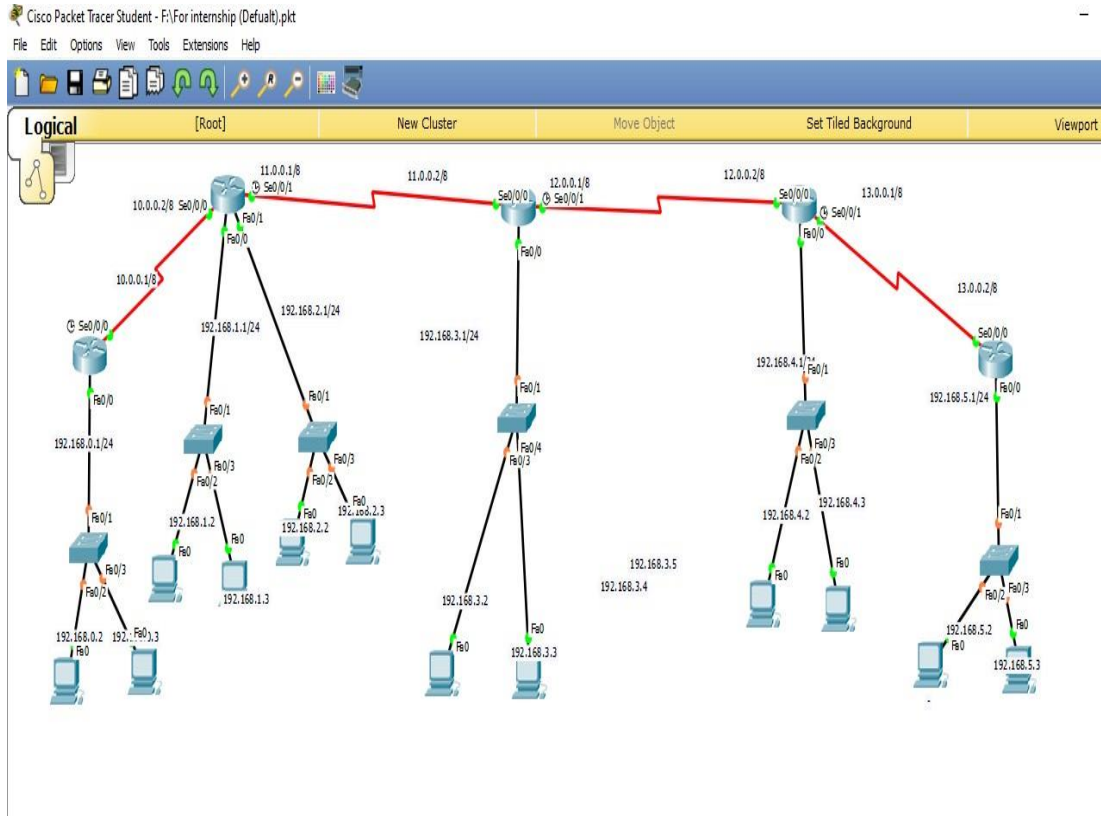
The following figure shows default routing
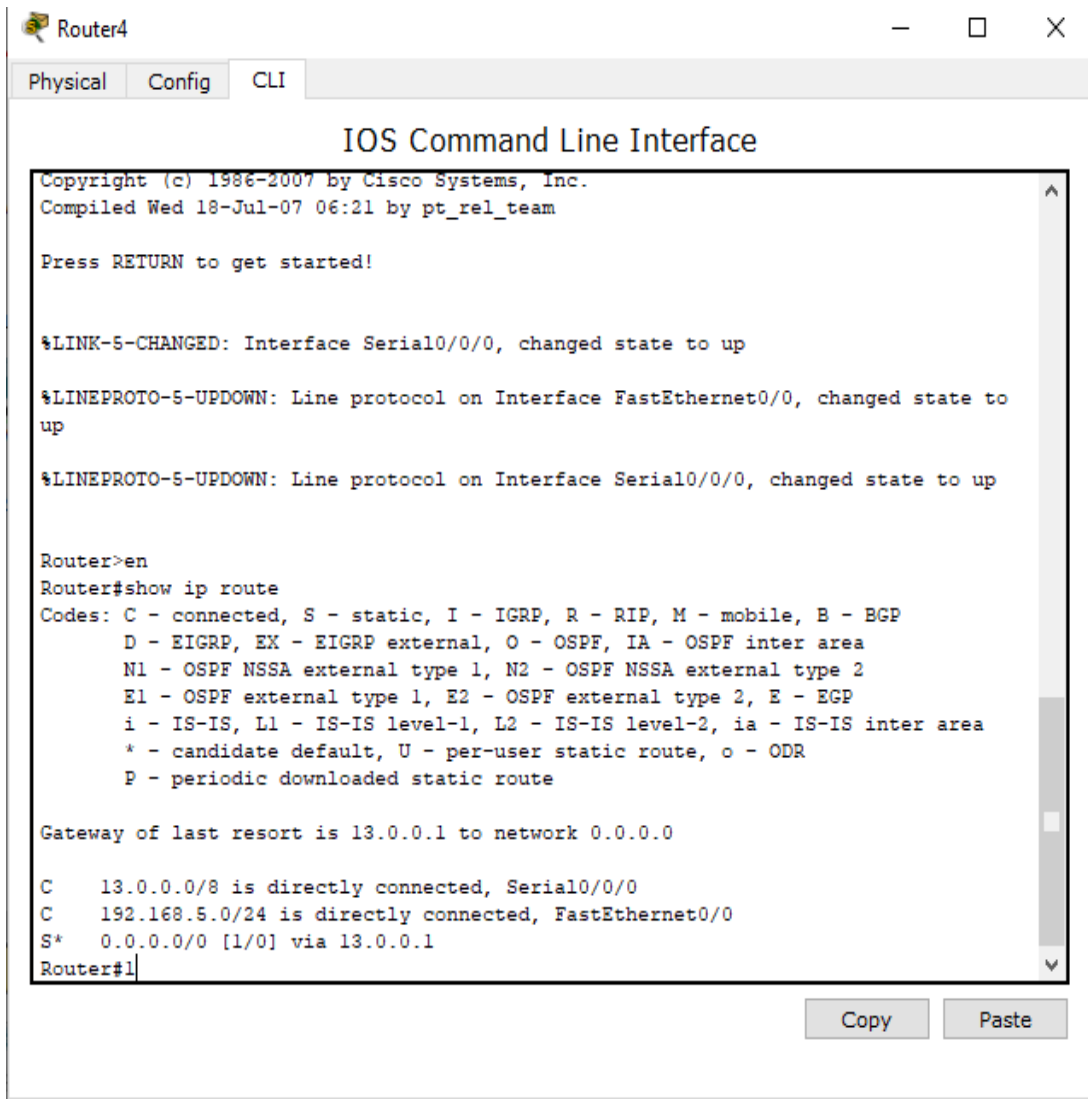

Figure 3.3.1: Model on default routing

Figure 3.3.2: routing table and path selection default routing

3.4 Dynamic routing

3 Types of dynamic routing

- RIP routing
- EIGRP routing
- OSPF routing

Advantage of dynamic routing:

- No need to manual configuration
- Learn about other network via advertisement
- Automatically select best path
- No need to select destination network
- Administrative work reduces
- Update the topology dynamically
- Applicable for large organization

Dynamic routing protocols

- Distance vector protocol
- Link state protocols
- Hybrid protocols

3.5 Rip routing protocol (Router information protocols)

- It's open standard protocol (Use cisco and without CISCO)
- Class full routing protocols (Not carry subnet mask)
- It's use broadcast for updating table
- Maximum hope count 14
- Metrix: hope count
- Max routers 15
- Load balancing equal 4 path
- Administrative distance 120
- Exchange routing table every 30 second (Periodically update)

Advantage rip routing:

- Easy to configure
- No design constraint
- Less overhead

Disadvantage rip routing:

- Bandwidth utilization very high for broadcast

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- Maximum hope count 15

- Use for small organization

- Slow coverage

Two types of rip routing:

- Rip version 1 and Rip version 2

- Now days we use rip version 2

- Configure   rip   version   2   for   small

organizationConfigure:

Router(config)#Router   rip

Router(config-if)#network
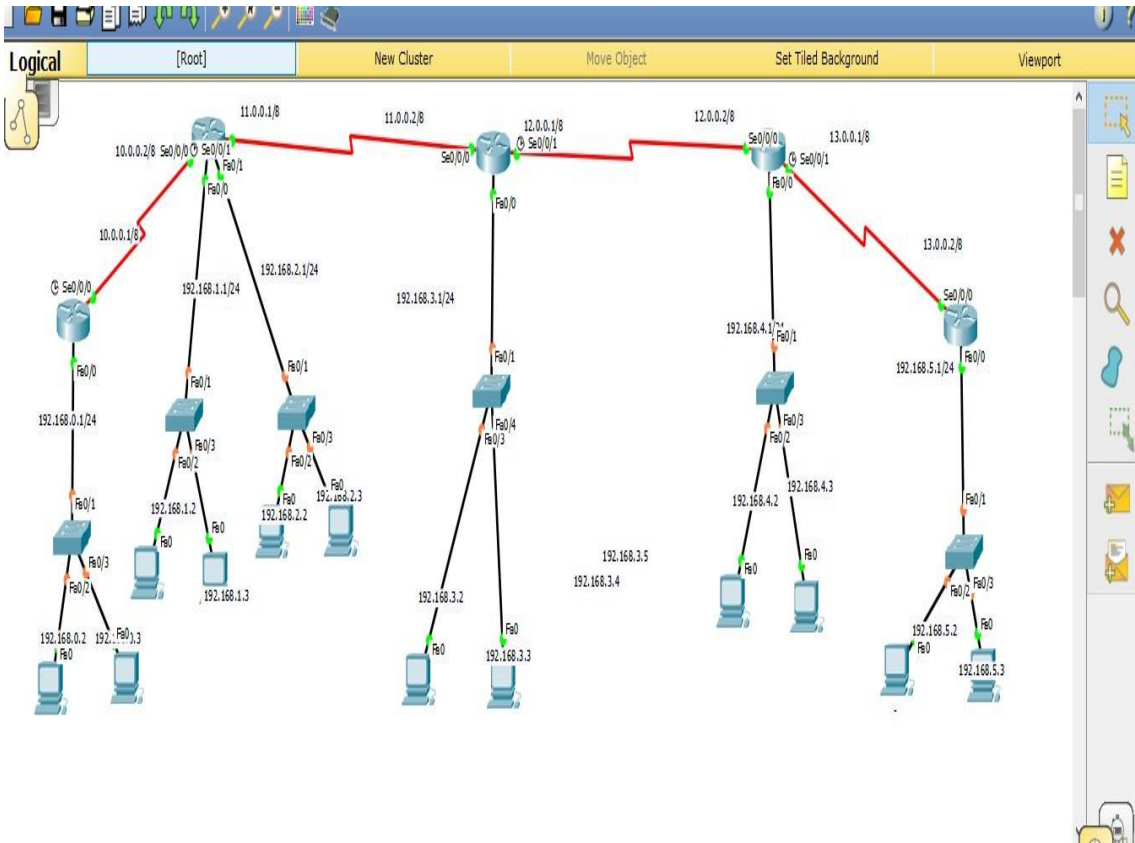
Router(config-if)#version 2

Model rip version 2:

Figure 3.5.1 : Model on rip routing
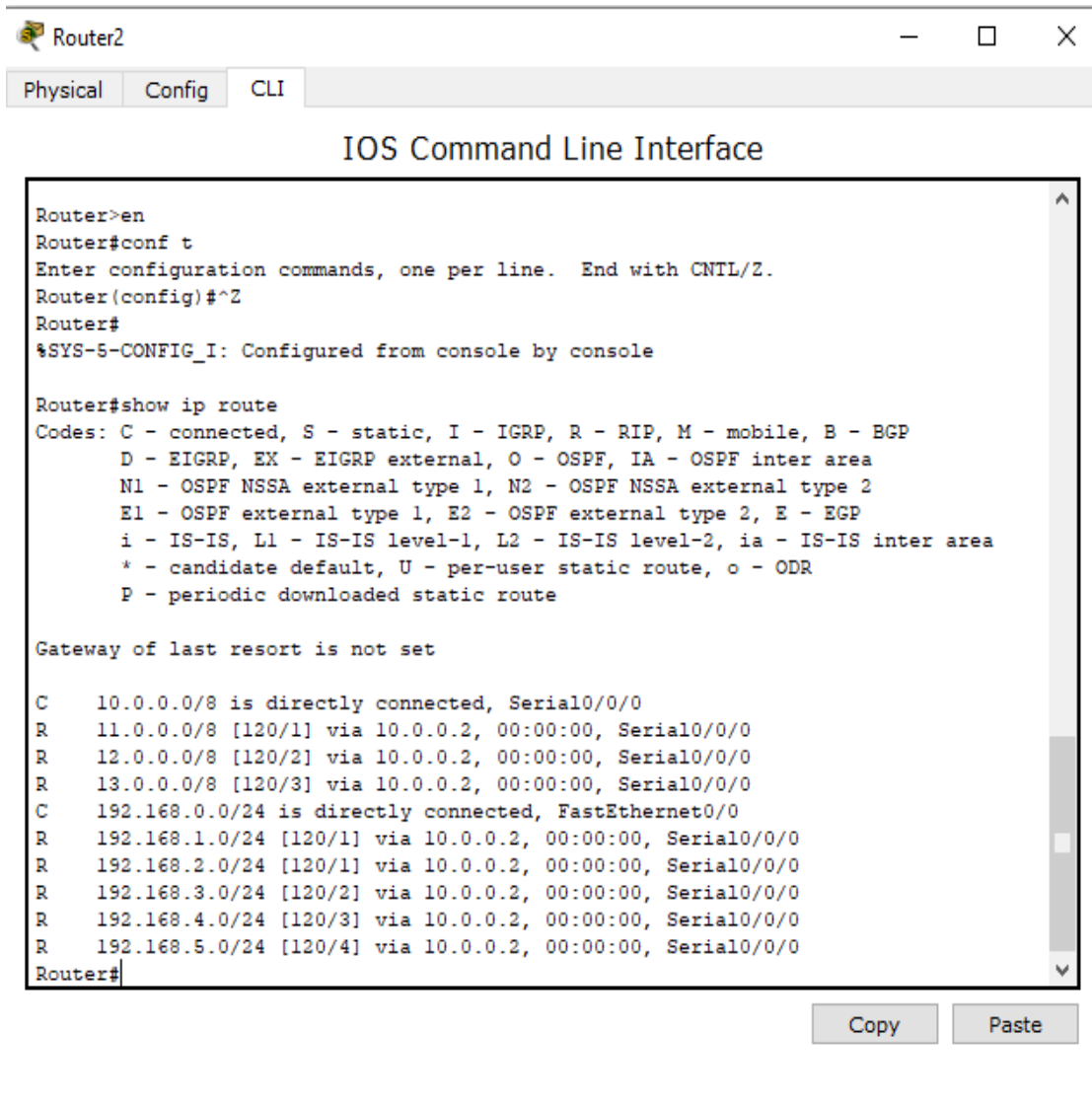
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Figure 3.5.2 : routing table and path selection rip routing

3.6. EIGRP (Enhanced interior gateway routing protocol)

- Advance Distance vector (Hybrid protocol)
- Standard protocol (Only use cisco)
- Classless routing protocols
- Maximum hope count 255(Default 100)
- Administrative distance 90
- Easy and flexible network design
- Using multicast (224.0.0.10) and unicast for initial neighbor discovery process.

EIGRP Converge:

- Incremental updates
- Periodically Sending hello packet every 5 second (Dead 15 sec)
- Converge fast (5 sec)
- Also calculate second best route
- Best route = successor
- Second best route=Feasible successor

EIGRP metric calculation:

- Bandwidth K1=1
- Delay k3 =1
- Load k2=0
- Reliability k4=0
- MTU k5=0

Configure EIGRP

Router(config)#Router EIGRP (AS Number)
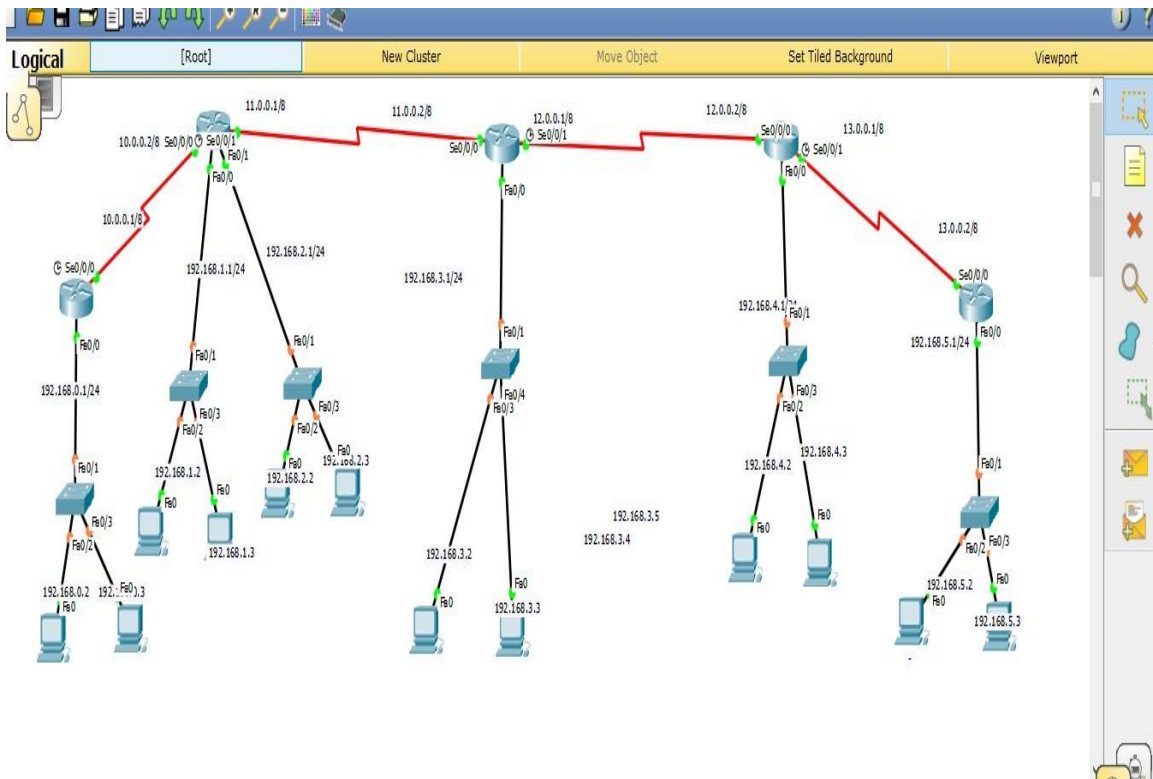
Router(config-if)#network

Model on EIGRP:

Figure 3.6.1 : Model on EIGRP routing

```
Router2                                                               —    □    ×
Physical    Config    CLI
                        IOS Command Line Interface

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#^Z
Router#
%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

C    10.0.0.0/8 is directly connected, Serial0/0/0
R    11.0.0.0/8 [120/1] via 10.0.0.2, 00:00:00, Serial0/0/0
R    12.0.0.0/8 [120/2] via 10.0.0.2, 00:00:00, Serial0/0/0
R    13.0.0.0/8 [120/3] via 10.0.0.2, 00:00:00, Serial0/0/0
C    192.168.0.0/24 is directly connected, FastEthernet0/0
R    192.168.1.0/24 [120/1] via 10.0.0.2, 00:00:00, Serial0/0/0
R    192.168.2.0/24 [120/1] via 10.0.0.2, 00:00:00, Serial0/0/0
R    192.168.3.0/24 [120/2] via 10.0.0.2, 00:00:00, Serial0/0/0
R    192.168.4.0/24 [120/3] via 10.0.0.2, 00:00:00, Serial0/0/0
R    192.168.5.0/24 [120/4] via 10.0.0.2, 00:00:00, Serial0/0/0
Router#

                                              Copy        Paste
```

Figure 3.3.2 : routing table and path selection routing

3.7 OSPF (Open shortest path first)

- It's link state protocols

- Standard protocols

- Max hope count unlimited

- It's use shortest path first algorithm or dijkstra algorithm

- Metric is cost(10^8/B.W.)

- It's classless routing protocols

- Support VLSM

- Administrative distance 110

- Support equal cost load balancing

Basic OSPF process

- Down

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- Initial

- Way

- Extract

- Exchange

- Loading

- Full

OSPF converge:

- Incremental updates

- Periodically Sending hello packet every 10sec (Dead 40 sec)

- Converge fast (10 sec)

OSPF area :

- Area is a logical group of router

- All the router maintain same database in the same area

- Any change all the router impact same area

- Minimize size of the database

- OSPF area rules:

- One area must call area 0 (It's the backbone area)

- All the non, backbone area must connect area 0

Advantage OSPF:

- Open standard

- No hope count limitation

- First convergence

Disadvantage OSPF:

       Consume more CPU resources

       Complex design rules

Configure OSPF:

Config# router OSPF (Process id)

Config-router# <network > <wild card mask> area <area id>

Model on OSPF:

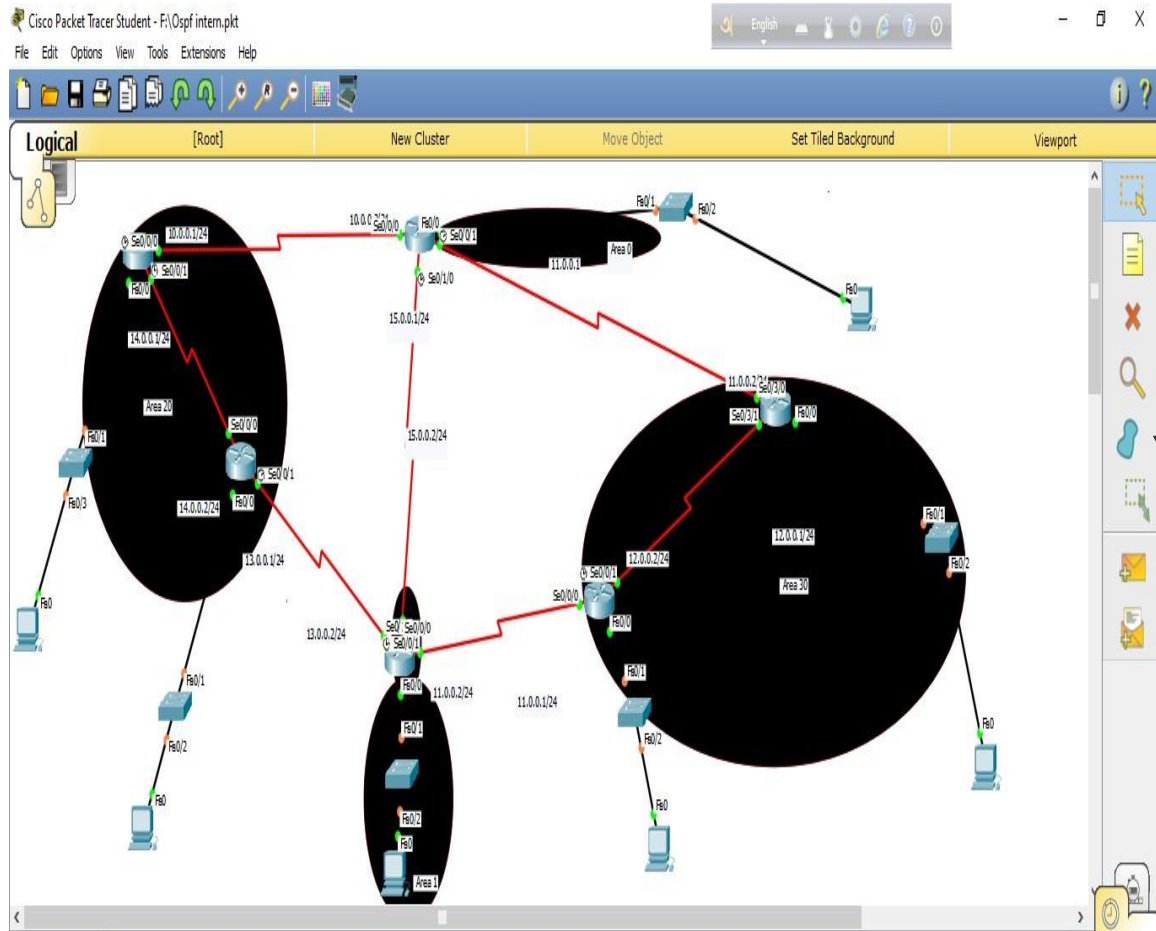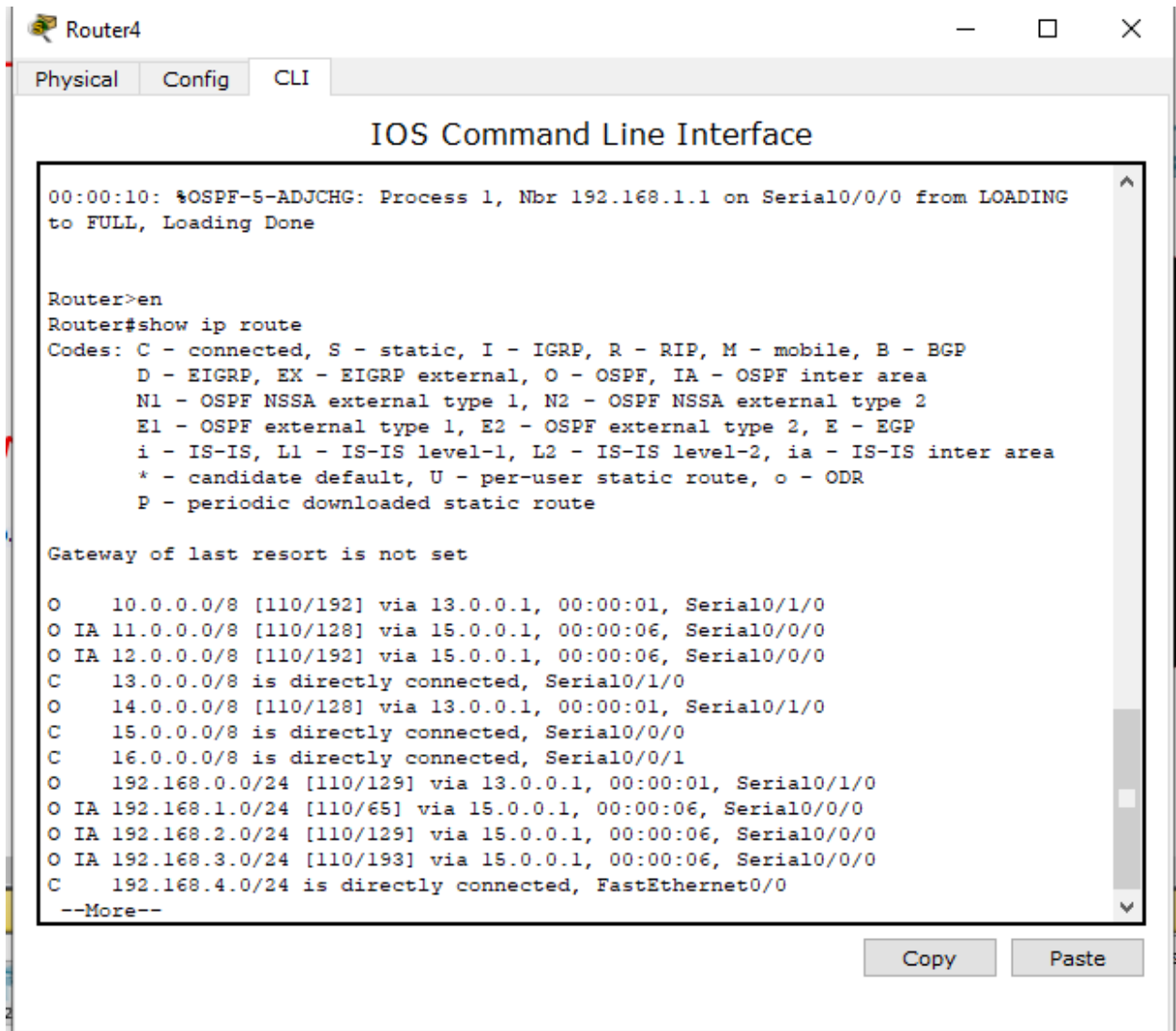Figure 3.7.1 : Model on OSPF routing

Figure 3.7.2: routing table and path selection OSPF routing

3.8 BGP protocols(Border gateway protocol)

In BGP protocols we have must need an as (autonomous system number)

AS: AS is a collection of network under a single administration

It's range 1-65535

Two types of as:

- Private as (Used with in the same service provider)
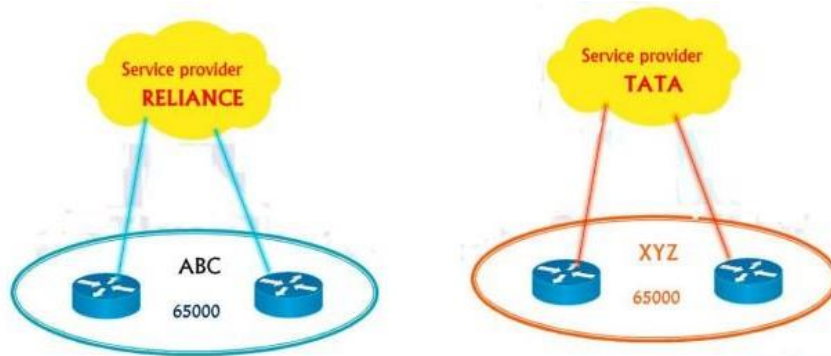- Unique with the service provider

Figure 3.8.1 : Private AS service provider

3) Range 64513-65535

Public as:

- Used with in multiple service provider
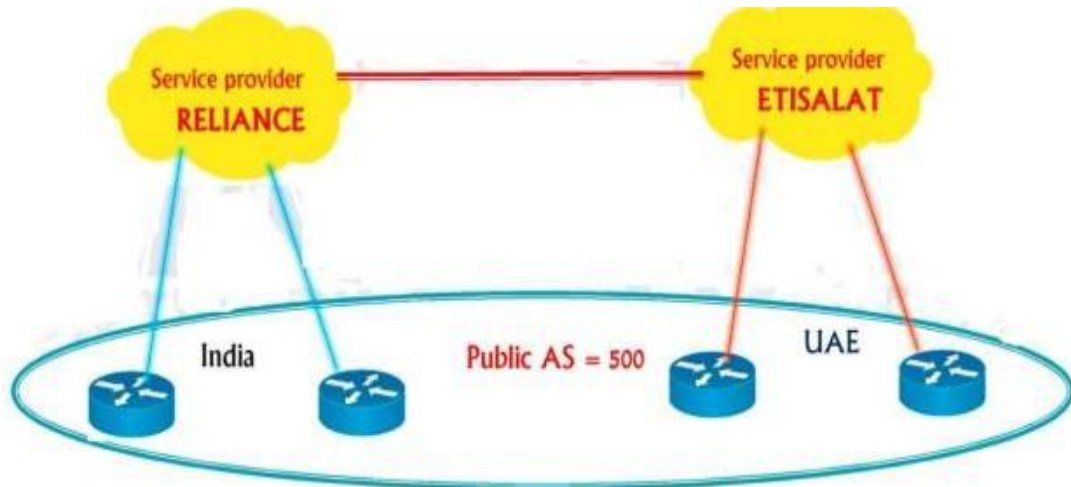- Its globally unique
- Range 1-64512

Figure 3.8.2 : Public AS service provider

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BGP feature:

- Open standard

- Exterior gateway protocols

- Design for inter –AS domain routing

- Design to scale huge inter-network (Like internet)

- Class less routing protocols (Support FLSM VLSM CIDR)

- Update incremental and trigger.

- Path vector protocols

BGP is use application layer protocol use TCP for reliability

- Administrative distance

- External 20 update (EBGP)

- Internal 200 update (IBGP)

BGP basically use for multi home. Where a host can get two or more links in a single ISP or multiple ISP.

BGP configure:

Config# Router BGP <AS number>

Config-router# neighbor < IP address> remote AS<As number>

Config-router# network <Network id> mask<subnet mask>

BGP model:

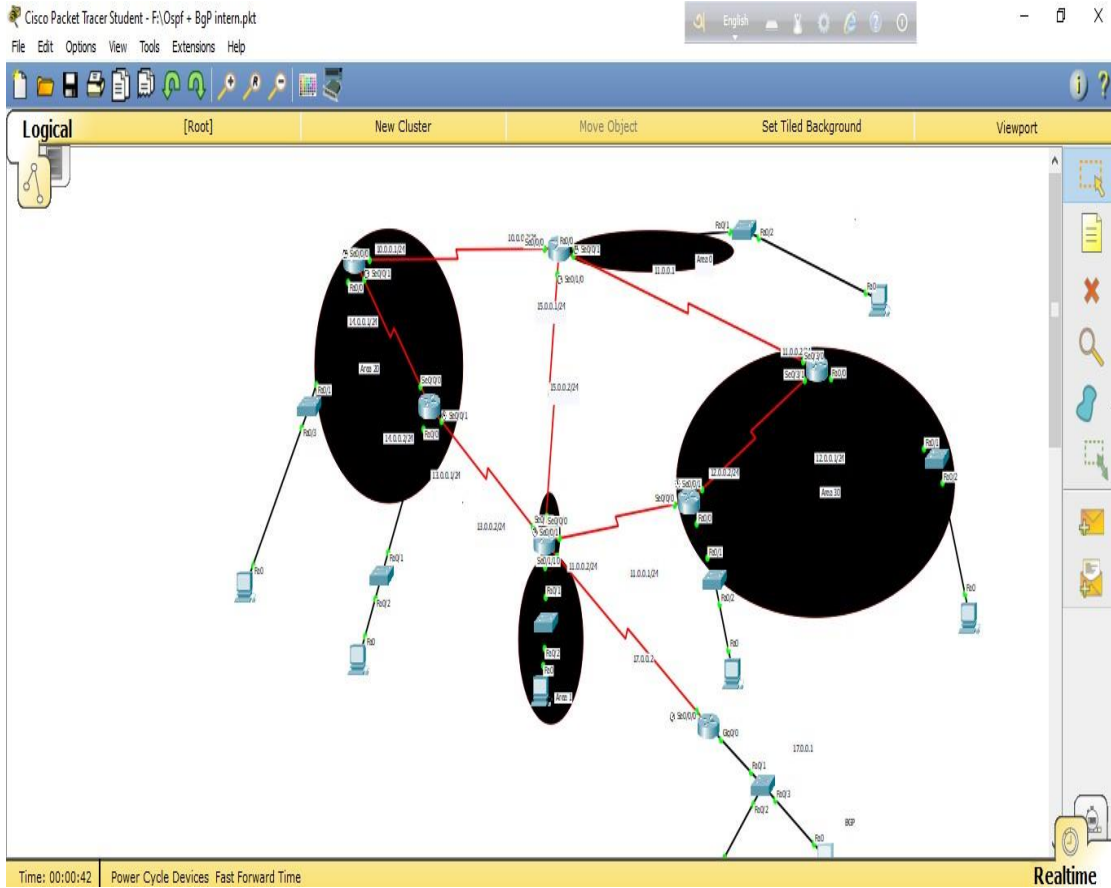Figure 3.8.3 : Model on BGP protocols with OSPF routing

```
Router6                                          —    □    ×

Physical   Config   CLI

                  IOS Command Line Interface

Press RETURN to get started!


%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up


Router>en
Router#show ip route
Codes: L - local, C - connected, S - static, 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

     17.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        17.0.0.0/8 is directly connected, Serial0/0/0
L        17.0.0.1/32 is directly connected, Serial0/0/0
     192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.6.0/24 is directly connected, GigabitEthernet0/0
L        192.168.6.1/32 is directly connected, GigabitEthernet0/0
Router#

                                           Copy        Paste
```

Figure 3.8.4 : Path selection and routing table for BGP protocols with OSPF

3.9 Switching :

Switching is provide centralize location and connect with the LAN.

ARP: (Address resolution protocols) ARP works on Mac address. Switch identify device based on mac address.
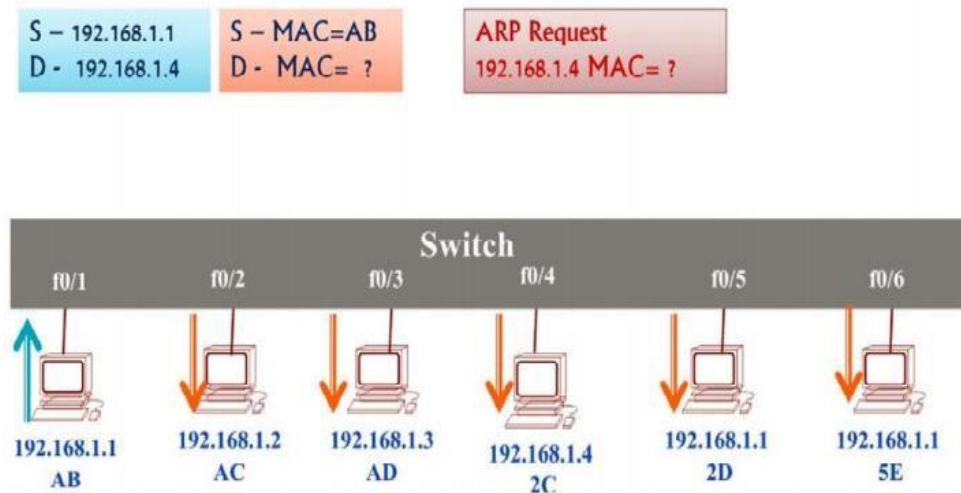

Figure 3.9.1 : Switching port interface.

Generally, mac address is 48 bit, first 24 bit is serial number for company and last 24 bit is device number. Switch basic function: If destination address present in mac table switch do unicast otherwise it's do broadcast. Max-age time for mac-entries is 300 seconds of inactivity

Type of switch:

1) Unmanageable switch
- Plug and play
- No configuration and verification can be done
- There is no console port
2) Manageable switch
- Also plug and play
- Configuration and verification can be done
- It has console port and cli classes

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3.10 VLAN (Virtual LAN):

Divides single broadcast into multiple broadcast

- It's layer 2 security
- VLAN 1 is default VALN
- We can create VLAN from 2-1001
- It's work based on port number

Trunk or inter VLAN: If we configure general VLAN than we can't connect other department so we need to configure inter VLAN.

Basically if we see that physically one wire to connect in router to switch but logically it has multiple connection .

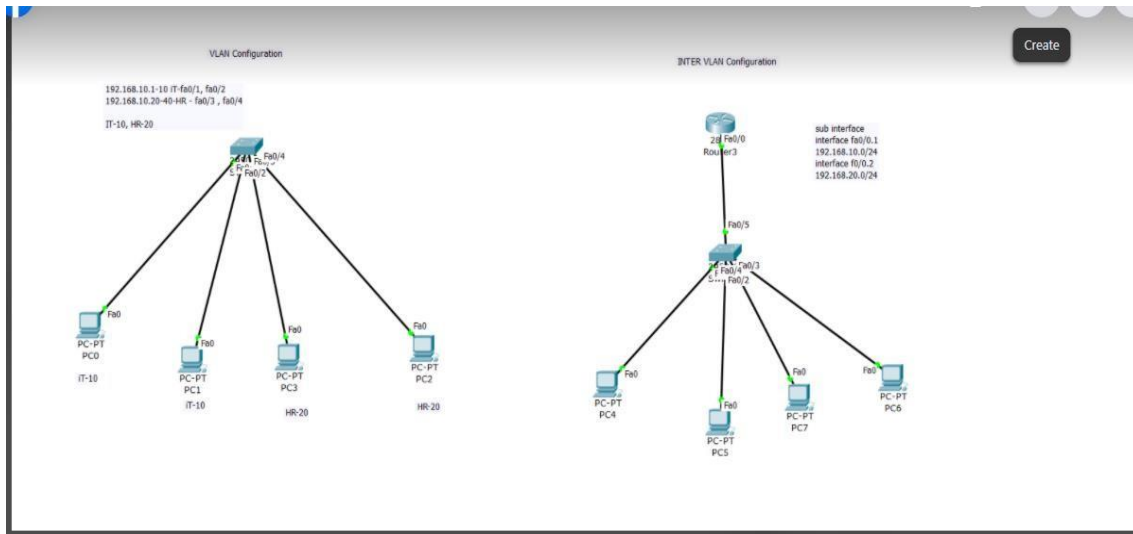It's work layer 3 security

Model VLAN

Figure 3.10.1: Model on VLAN

Step -1

VLAN Configuration :

Switch>enable

Switch# configure terminal

Switch(config)# VLAN10

Switch(config-VLAN)# name IT

Switch(config)# VLAN 20

Switch(config-VLAN) #name HR

Switch# configure terminal

Switch(config)#interface fast Ethernet 0/1

Switch(config-if)# switchport access VLAN 10

Switch(config)#interface fast Ethernet 0/2

Switch(config-if)# switchport access VLAN10

Switch(config)#interface fast Ethernet 0/3

Switch(config-if)#switchport access VLAN 20

Switch(config)#interface fast Ethernet 0/4

Switch(config-if)# switchport access VLAN20

(Then Verification same to same department pc IT to IT, pc HR to HR)

Step-2

Inter VLAN Configuration :

Router end :

Router>enable

Router# configure terminal

Router(config)#interface fast Ethernet 0/0

Router(config-if)#no shutdown

Router# configure terminal

Router(config)#interface fast Ethernet 0/0.1

Router (config-sub if) # encapsulation dot1Q 10

Router (config-sub if) # IP address 192.168.10.1 255.255.255.0

Router(config)#interface fast Ethernet 0/0.2

Router (config-sub if) # encapsulation dot1Q 20

Router (config-sub if) # IP address 192.168.20.1 255.255.255.0

Then Switch :

Trunk port configuration :

Switch# configure terminal

Switch(config)#interface fast Ethernet 0/5

Switch(config-if)#switchport mode trunk

3.11 ACL (Access control list)

ACL is a set of rules which will allow or deny the specific traffic moving through the router.

Control the flow of traffic from one network to other via router.

Basically two types of ACL

1) Standard ACL
2) Extend ACL

Standard ACL:

Can be name or number

- The access list number range is (1-99) $ (1300-1699)
- Can block a network, Host and subnet (Not a selected service)
- All service are blocked
- Filter is done only based on IP source address.
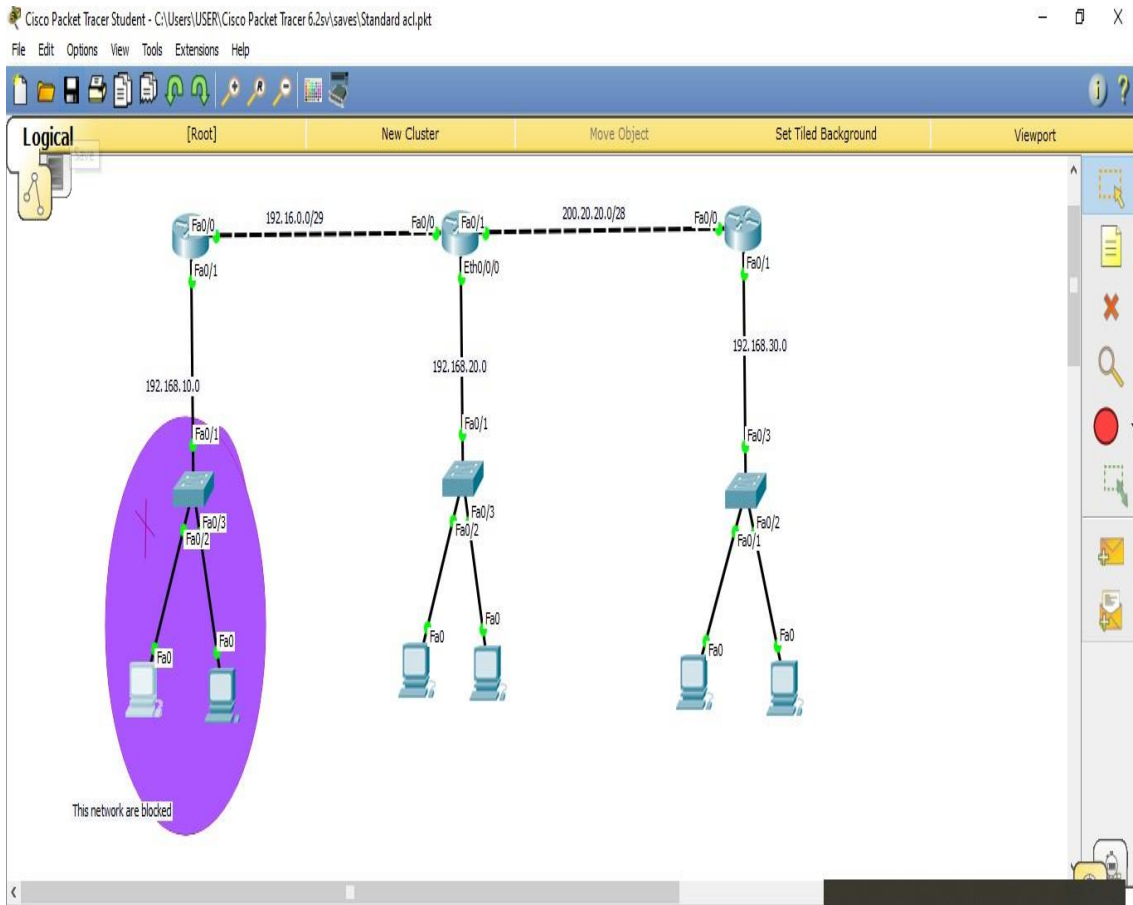
Model and configure Standard ACL

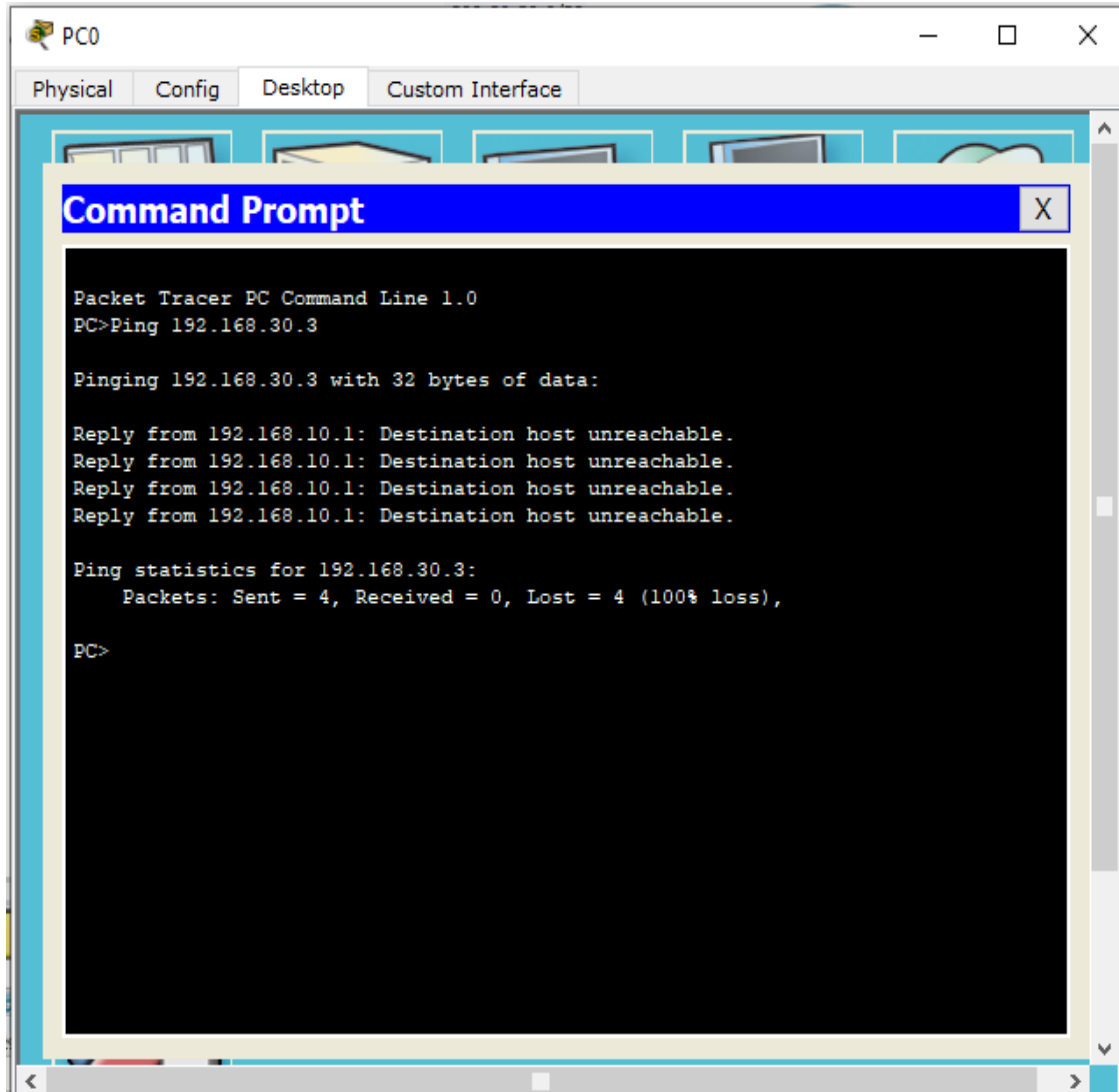Figure 3.11.1 : Model on Standard ACL

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Figure 3.11.2: Ping one network to another on Standard ACL

Extended ACL:

Can be named or number

- The access list number range is (100-199) and (2000-2699)
- Allow and deny a network, host, Subnet and service
- Selected service can be blocked

- Filtering is done by IP, destination IP a Protocols and port number.
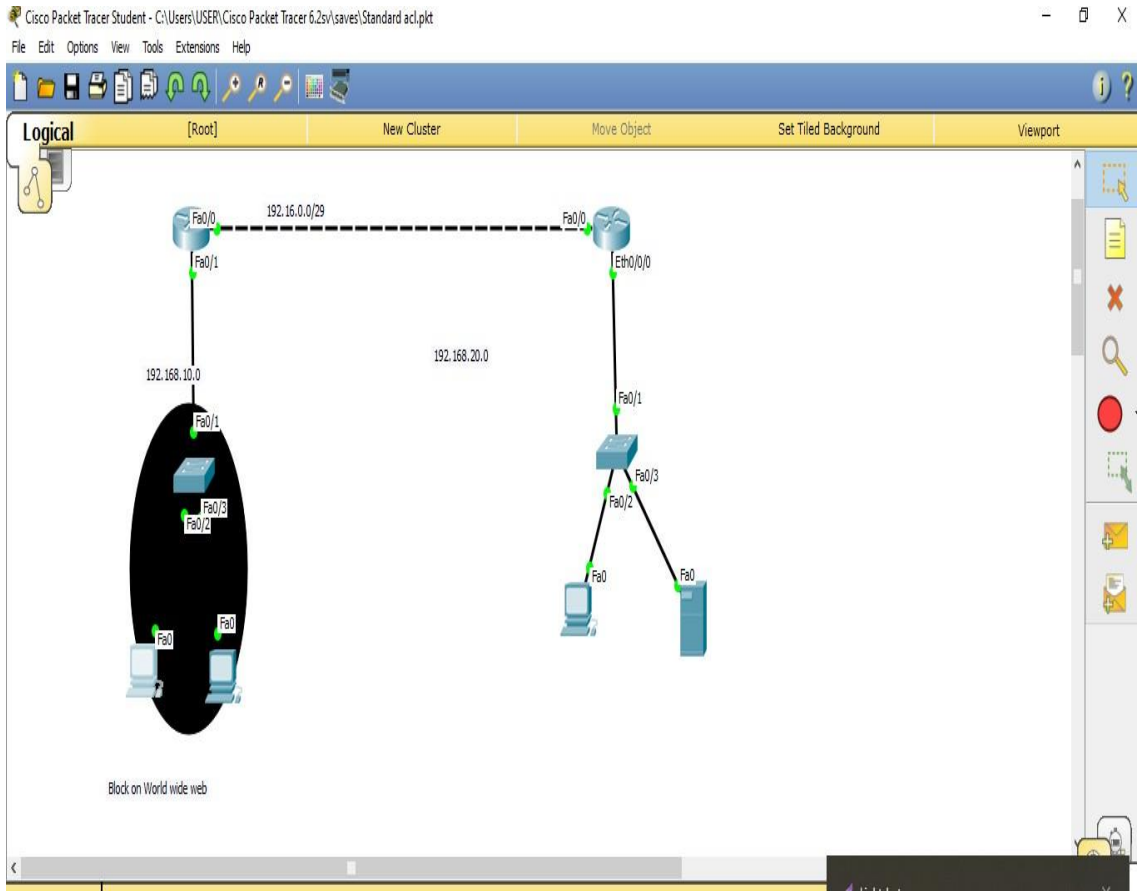
Model On extend ACL:

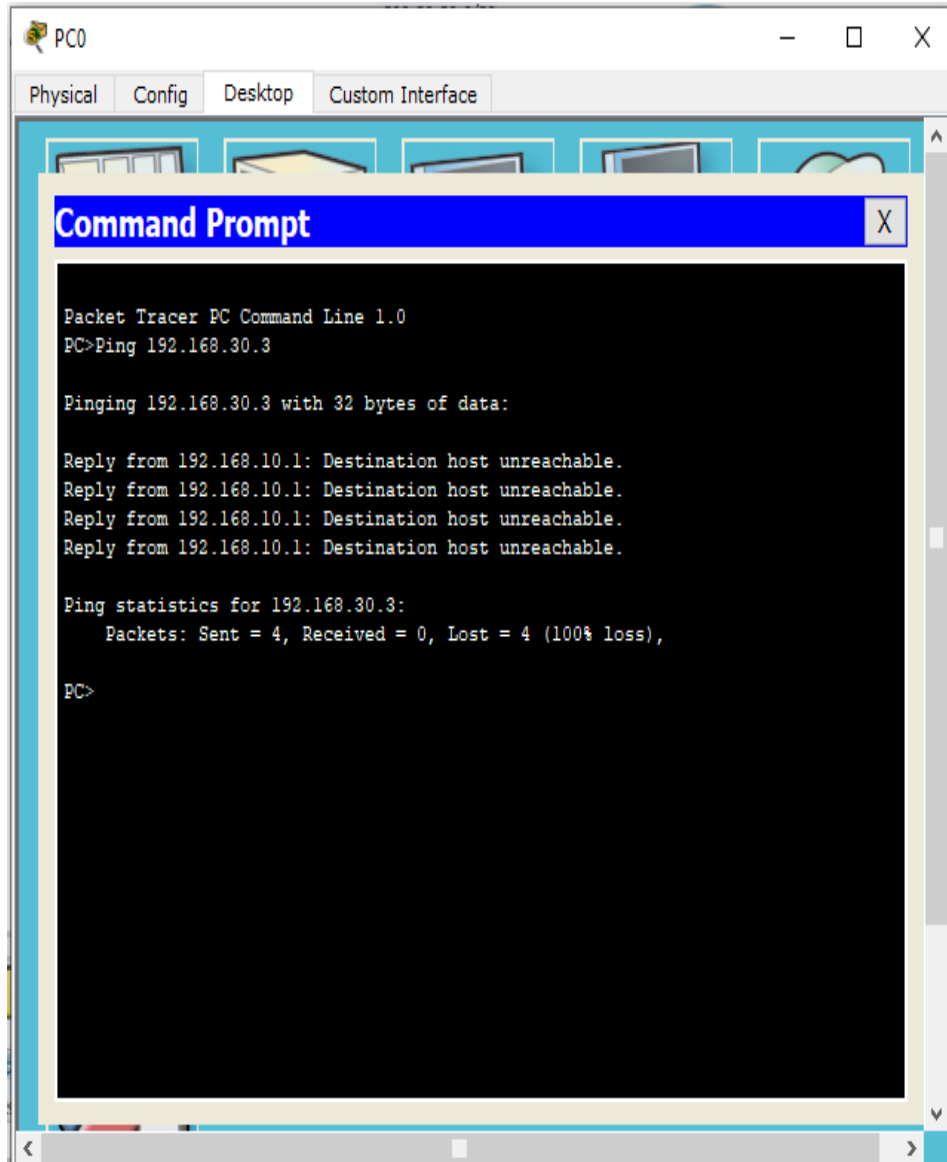Figure 3.11.3: Model on Extended ACL

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Figure 3.11.4: Ping one network to another on Extended ACL

3.12 DHCP (Dynamic host routing protocols)

DHCP works in daynamically on the protocols site. Its very easy to configure.We need to configure only router.For configure we need to layer 3 switch and router. End device gets ip autometecly.Daynamically assing ip address to host. Also provide DNS and gateway if needed.
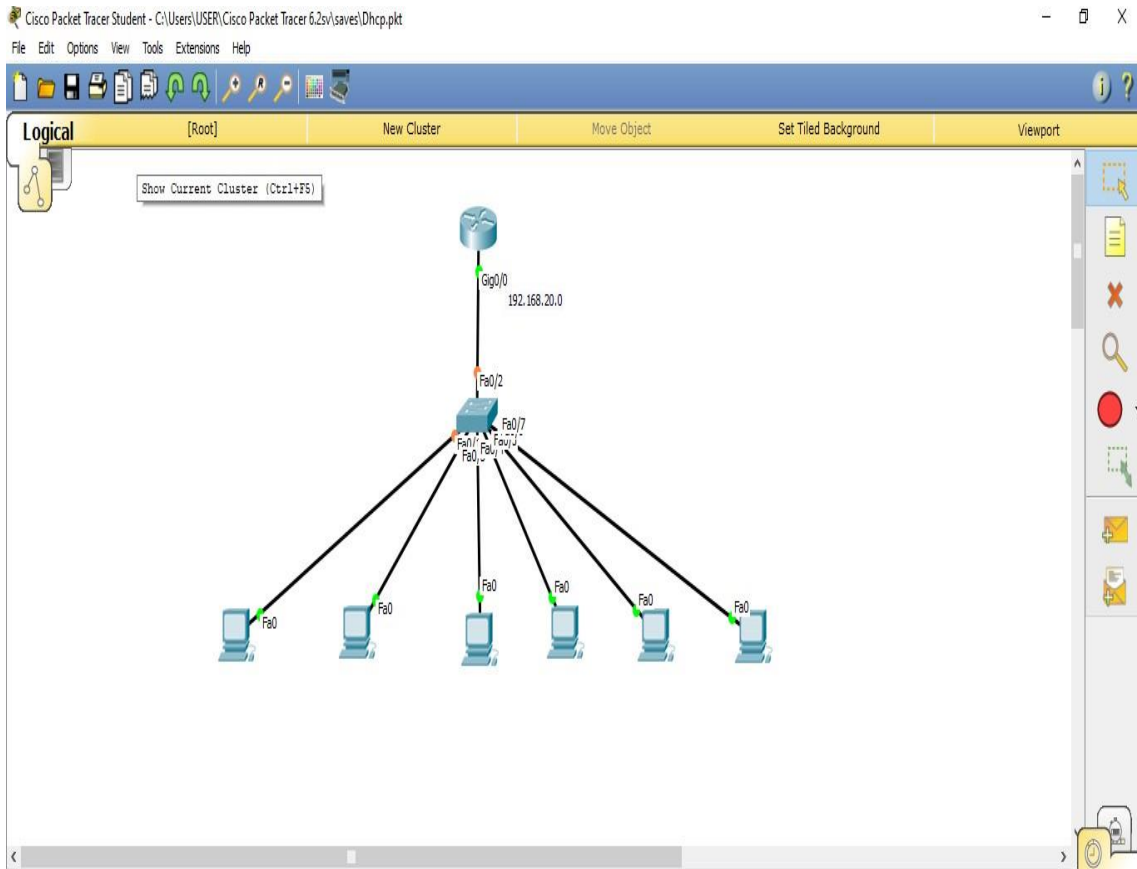
Model on DHCP:

Figure 3.12.1: Model on DHCP

Figure 3.12.2: Routing table on DHCP

3.13 Ether channel (aggregation redundant link)

Ether channel allows to convert multiple link to a single link . If one link is down then data or packet can be pass other link. This is Ether channel.

Here we use Two Negotiation Protocol

1) (PAGP) Port Aggregation Protocol

- Cisco Proprietary
- Port Mode: Auto, Desirable, On

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2) (LACP) Link Aggregation Control Protocol

- It's use for connected non cisco property router.
- Port mode: Passive

Model on Ether channel:

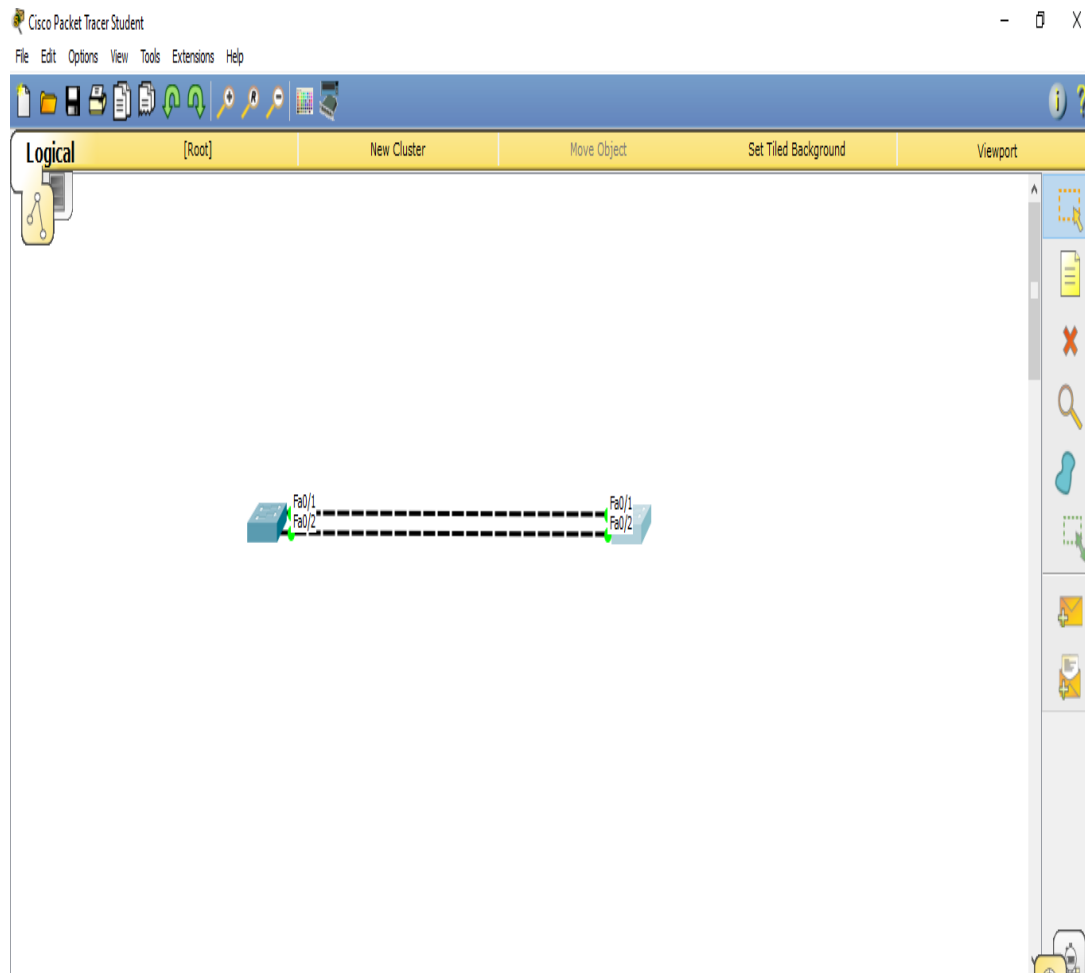

Figure 3.13.1: Model on Ether channel

```
Switch1                                                  —   □   X

Physical   Config   CLI

                    IOS Command Line Interface

Switch#Show ethechannel port-channel
              ^
% Invalid input detected at '^' marker.

Switch#Show etherchannel port-channel
              Channel-group listing:
              ----------------------


Group: 1
----------
              Port-channels in the group:
              ---------------------------


Port-channel: Po1
------------


Age of the Port-channel   = 00d:00h:00m:50s
Logical slot/port   = 2/1        Number of ports = 2
GC                  = 0x00000000      HotStandBy port = null
Port state          = Port-channel
Protocol            =   PAGP
Port Security       = Disabled


Ports in the Port-channel:

Index   Load   Port    EC state         No of bits
------+------+------+------------------+-----------
  0     00    Fa0/2   Automatic          0

                                         Copy      Paste
```
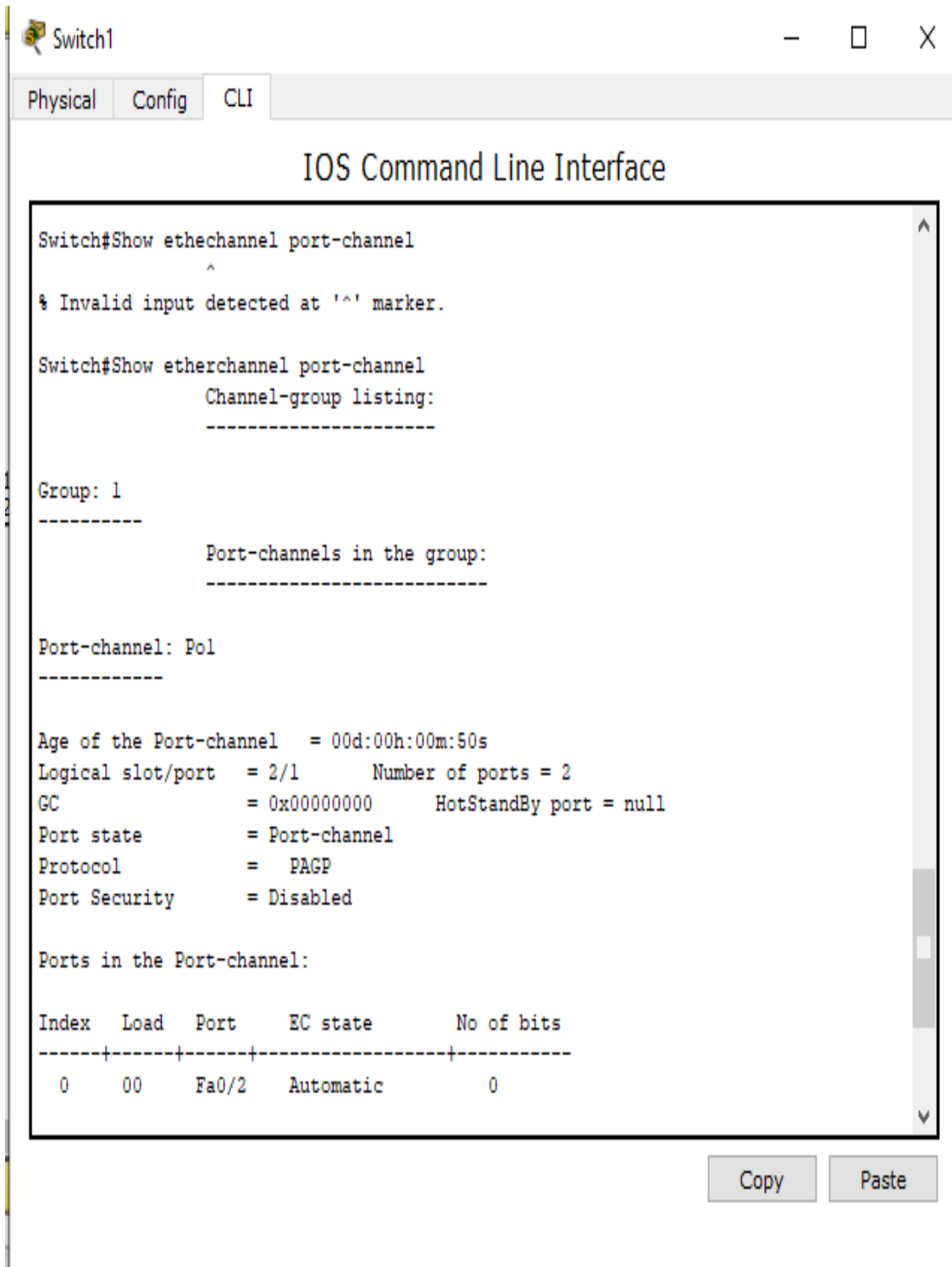
Figure 3.13.2: Port-channel on Ether channel

3.14 : NAT (Network address translation)

It's method of translation private IP to public IP address.

Types of NAT :

- Static NAT
- Dynamic NAT
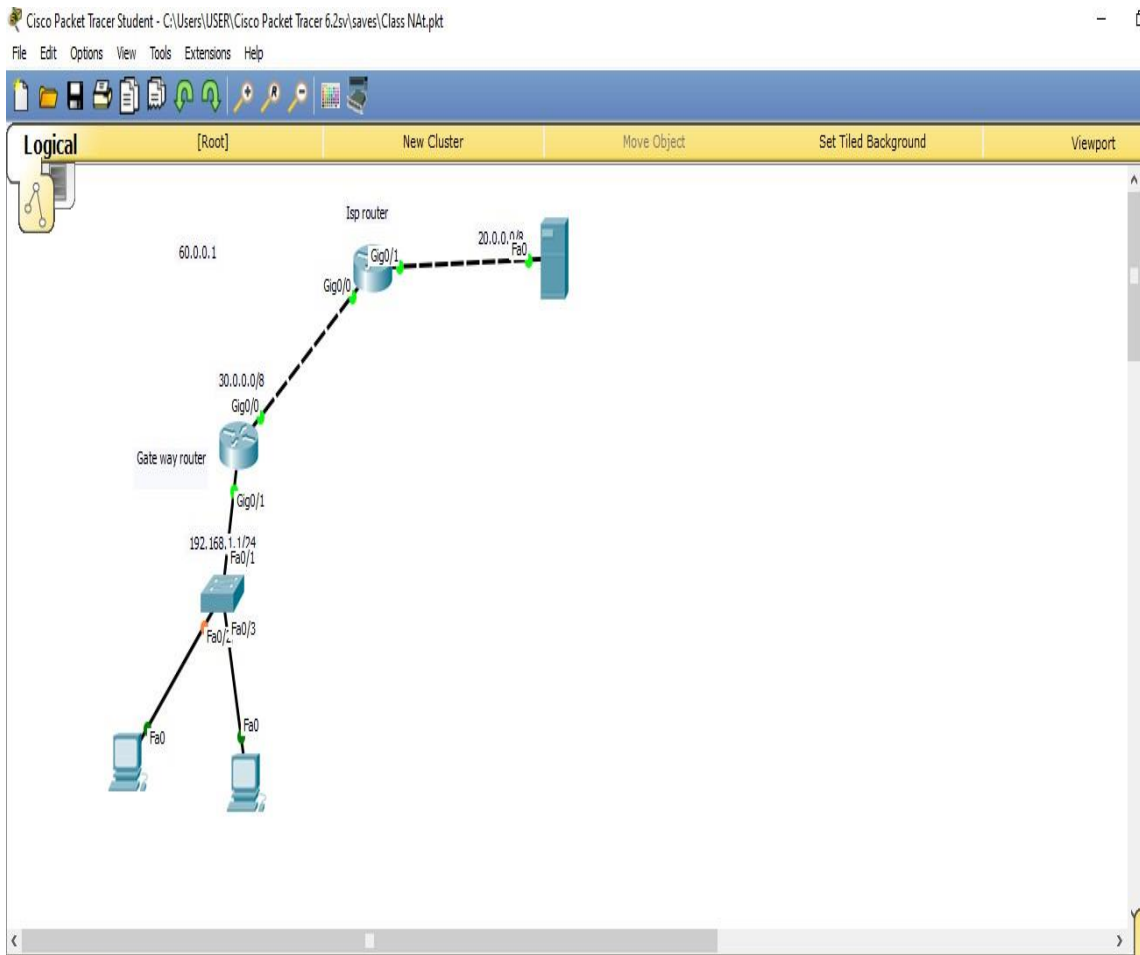- Port address translation (PAT)

Model on PAT:

Figure 3.14.1: Model on PAT

```
Router0                                          —  □  ✕

Physical   Config   CLI

                    IOS Command Line Interface
Press RETURN to get started!


%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state
to up


Router>en
Router#sh ip route
Codes: L - local, C - connected, S - static, 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 0.0.0.0 to network 0.0.0.0

      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        30.0.0.0/8 is directly connected, GigabitEthernet0/0
L        30.0.0.1/32 is directly connected, GigabitEthernet0/0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, GigabitEthernet0/1
L        192.168.1.1/32 is directly connected, GigabitEthernet0/1
S*    0.0.0.0/0 is directly connected, GigabitEthernet0/0
Router#

                                              Copy        Paste
```

Figure 3.14.1: Routing table for gateway router on PAT

CHAPTER 4

Professional growth

4.1 Networking and tools that I learn

I was assigned to a team where we worked on a networking platform. All I learned was different networking protocols, switching, design, hardware problem. Networking is very popular in Bangladesh. Most of us have to use the internet in our daily lives. This is unimaginable.

4.2 **Tools**

In my internship at Technology palli Limited, I have used the following tools in my regular tasks.

i) Cisco packet tracher

ii)Router

ii)Switch

iii)Cableing

4.3 Networking technologies :

I have gained knowledge of the following networking technologies in my internship time.

i)Static riuting

ii)Daynamic routing

iii)Defualt routing

iv)Rip routing

v)Eigrp

vii)OSPF

vii)BGP

CHAPTER 5

Conclusion

5.1 Conclusion

I have gained a good knowledge of networking companies, their working methods and networking through this internship program. Working as a team with team members and solving various problems, always thinking well and gaining knowledge about how to prioritize work. By completing this internship and working as a team, my team-based work skills have improved and I have learned to respect the planning and advice of teammates. In general, doing this internship program has increased my networking understanding and I am becoming self-reliant and optimistic that I can work in the field of networking. After learning the basic ideas of this course, it will help me to establish myself in the field of employment. The things I learned earlier will help me a lot when I learn more about networking in the future. The reason I chose networking is because it is in great demand all over the world including Bangladesh. In the future I will develop myself as a networking engineer. I've seen everyone work in tandem with team leaders. Personally, I have made a lot of mistakes in the last four months. But my instructor never misbehaved with me**.**

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