Comparative Analysis of Dyanamic Routing Protocol using Packet Tracer 6.0.2 with Dyanamic BW

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Abstract: *In a computer network, the transmission of data from source to destination is based on the routing protocol which selects the best routes between any two nodes. Different types of routing protocols are applied to specific network environment. Three typical types of routing protocol are chosen as the simulation samples: RIP, OSPF and EIGRP. RIP (Routing Information Protocol) is one of the oldest routing protocols still in service. Hop count is the metric that RIP uses and the hop limit, limits the network size that RIP can support. OSPF (Open Shortest Path First) is the most widely used IGP (Interior Gateway Protocol) large enterprise networks. OSPF is based on the Shortest Path First (SPF) algorithm which is used to calculate the shortest path to each node. EIGRP Enhanced Interior Gateway Routing Protocol) is Cisco's proprietary routing protocol based on Diffusing Update Algorithm. EIGRP has the fastest router convergence among the three protocols. In this research paper we are going to study the effect of BW, Delay, communication mode and configuration scenario and also analyze the performance of IGP based RIP,OSPF and EIGRP routing protocol using CISCO proprietary simulator tool CISCO packet tracer-6.0.2 with dynamic BW .*

Keywords: IGP routing protocol, RIPv2, OSPF, EIGRP, IPv4, *CISCO packet tracer*

1. Introduction

Routing protocols are based on routing algorithms, which rely on various metrics to find the best path to transmit data across networks. Metrics include cost, bandwidth, maximum transmission unit (MTU), packet delay, and hop count. Routing protocols utilize a routing table to store the results of these metrics. Based whether the routing is within an Autonomous System (AS) or between ASs, there are two types of routing protocols: Interior Gateway Protocols (IGP) and Exterior Gateway Protocol (EGP). RIP, EIGRP, and OSPF are three commonly used IGPs. A typical EGP is the Border Gateway Protocol (BGP).

Routing is the process of selecting paths in a network. In packet switching networks, routing directs traffic forwarding of logically addressed packets through intermediate nodes from their source to their ultimate destination. Routing protocols are designed to select and determine the best path to each router in the network. Routers should learn the next hop to send the packets. Forwarding data should be efficient and effective. Consequently, the routing decision of a protocol is very important for network performance.

Among many routing protocols, RIP, EIGRP, and OSPF have been most widely used. In this paper, we use Packet tracer Modeler to simulate performance of the RIP, EIGRP, and OSPF TCP/IP Internet routing protocols and compare about configuration scenario, Bandwidth effect MTU,HOPs, Administrative distance and metrics Value etc.

In this paper, we compare performance of RIP, EIGRP, and OSPF using Packet tracer simulator 6.0.2. In Section 2, we describe routing protocols. Simulation models and network configuration scenario of routing protocols are described in Section 3 while Result and Discussion of simulation results is given in Section 4. We conclude with Section 5.

2. Classification of Routing protocol

The classification of routing protocol is depicted in below. Where there are some dynamic routing protocol can be used to configuring routing tables in the router. There is Interior Gateway Protocol (IGP) than should be used for the routers in same domain network such as Routing Information Protocol (RIP), Enhanced Interior Gateway

Figure1: Classification of Dynamic Routing protocol

Both types of routing protocols have advantage and disadvantages. For the distance vector type, EIGRP (Enhanced Interior Gateway Routing Protocol) will be used. And for the link-state type, OSPF (Open Shortest Path First) will be used. Both of these dynamic routing protocols can be used in both IPv4 and IPv6 networks.

2.1 Dynamic Routing Protocols Overview

Dynamic routing protocols play an important role in today's networks. They are used to facilitate the exchange of routing information between routers They dynamically share information between routers, automatically update routing table when topology changes, and determine the best path to a destination. Compared to static routing, dynamic routing protocols have better scalability and adaptability and require less *administrative* overhead. Dynamic routing protocols allow routers to dynamically advertise and learn routes, determine available routes and identify the most efficient routes to a destination. Dynamic routing protocols have the capability to maintain the network operation in case of a failure or when network configuration or topology change [1].

"Distance vector" and "link state" are used to describe routing protocols used by routers to forward packets. There are two groups of routing protocols, based on whether the routing protocol selects the best routing path based on a distance metric (the distance) and an interface (the vector) or selects the best routing path by calculating the state of each link in a path and finding the path with the lowest total metric to the destination. Distance vector protocols evaluate the best path based on distance, which can be measured in terms of hops or a combination of metrics calculated to represent a distance value. The IP Distance vector routing protocols in use today are RIP and IGRP. In link state routing, every node constructs a map of the connectivity to the network in the form of a graph showing connectivity of the nodes to each other. Each node then independently calculates the next best logical path to every possible destination in the network [2]. The collection of best paths forms the node's routing table. Link state protocols have the routers announce their closest neighbors to every router in the network. Only a part of the table pertaining to its neighbors is distributed. EIGRP, OSPF, and *Intermediate System-Intermediate System* (IS-IS) are link state routing protocol.

2.2 Routing Information Protocol (RIP)

Routing Information Protocol (RIP), is one of the most commonly used routing protocols for small homogeneous networks. As a distance-vector routing protocol, RIP is used by routers to exchange topology information periodically by sending out routing table details to neighboring routers every 30 seconds. 4]These neighboring routers in turn forward the information to other routers until they reach network convergence. RIP uses the hop count metric with the maximum limit of 15 hops, anything beyond that is unreachable. Because of this, RIP is not suitable for large, complex networks. RIP available in two versions of RIPv1 and RIPv2. RIP version 1 uses classful routing and does not include subnet information while sending out periodic routing table updates. RIPv2 is classless and includes the subnet information supporting Classless-Inter Domain Routing (CIDR). Unlike RIP version 1, version 2 multicasts the routing updates to the adjacent routers using the address 224.0.0.9. Network convergence happens much faster in RIPv2 [4].

RIP – Advantages and Disadvantages
Routing Information Protocol has its own advantages in small networks. It's easy to understand, configure, widely used, and is supported by almost all routers. Since its limited to 15 hops, any router beyond that distance is considered as infinity, and hence unreachable. If implemented in a large network, RIP can create a traffic bottleneck by multicasting all the routing tables every 30 seconds, which is bandwidth intensive. RIP has very slow network convergence in large networks. The routing updates take up significant bandwidth leaving behind very limited resources for critical IT processes. RIP doesn't support multiple paths on the same route and is likely to have more routing loops resulting in a loss of transferred data. RIP uses fixed hop count metrics to compare available routes, which cannot be used when routes are selected based on real-time data. This results in an increased delay in delivering packets and overloads network operations due to repeated processes.

2.3 Open Shortest Path First (OSPF)

OSPF uses a link state routing algorithm that operates within a single AS. OSPF is an efficient IGP and may exhibit faster routing compared to RIP [6]. OSPF maintains the routing table for all connections in the network while RIP only maintains the routing table of the best path for every destination. Each OSPF router stores the local network connection state with *Link State Advertisement* (LSA) and advertises to the entire AS. Each router receives the LSA generated by all routers within the AS. The LSA collection then forms *Link State Database* (LSDB). Each LSA is the description of the surrounding network topology of a router. Hence, the LSDB reflects the AS network topology [5]. When a new router is added to the network, it will broadcast *hello* messages to every neighbor and will receive the feedback *hello* messages from its neighbors. Eventually, routers establish connections with newly added router and synchronize their routing databases. Every router broadcasts link state update messages when network topology changes. Consequently, all routers may keep same information of network topology. Every router calculates the best paths to all destinations and indicates the closet router for each transmission. OSPF is the most widely used IGP in large enterprise networks[6].

OSPF Message Types
OSPF doesn't send information using UDP. Instead, it builds IP datagram's directly, packaging them using protocol number 89 for the IP protocol field. Different message types of OSPF include.
- **Hello Packet** – Sent by routers to set up relationships with neighbors and communicate frequently to keep the connection alive. Hello Packet shares key parameters on how OSPF is to be used within the network.
- **Database Description** – The description of the link state database for autonomous systems are transmitted from one router to another.
- **Link State Request** – This is requested when a portion of the network needs to be updated with current information.

The message specifies exactly which links are requested by the device that wants more current information.

- **Link State Update** – This contains the updated information for the requested links. It's sent in response to the LS request.
- **Link State Acknowledgement** – This acknowledges the link-state exchange process for link state update message.

OSPF – Pros and Cons OSPF routing protocol has a complete knowledge of network topology allowing routers to calculate routes based on incoming requests. Additionally, OSPF has no limitations in hop count, it converges faster than RIP, and has better load balancing. A downside with OSPF is that it doesn't scale when there are more routers added to the network. This is because it maintains multiple copies of routing information. An OSPF network with intermittent links can increase traffic every time a router sends information. This lack of scalability in OSPF makes it unsuitable for routing across the Internet.

2.4 Enhanced Interior Gateway Routing Protocol (EIGRP)

EIGRP is a Cisco proprietary routing protocol. It is based on a new route calculation algorithm called the *Diffusing Update Algorithm* (DUAL). It has features of both distance vector and link state protocols. EIGRP metrics are based on reliability, MTU, delay, load, and bandwidth. Delay and bandwidth are the basic parameters for calculating metrics [4]. EIGRP collects data from three tables. The first is the neighbors' table, which stores data about neighboring routers that are directly accessible through interfaces that are connected. The second is the topology table, which contains the aggregation of the routing tables that are gathered from all neighbors that are directly connected. It contains a list of destination networks in the EIGRP routed network and their respective metrics. The third routing table stores the actual routes to all destinations. EIGRP differs from most distance vector protocols because it does not rely on periodic route dumps. Hence, it is capable of maintaining its topology table. Information that is to be routed is only exchanged when the new neighbors adjacencies is established. The EIGRP router maintains its own routing table and tables of its neighbors [5]. The EIGRP router broadcasts to other neighbors if it cannot locate a router based on its routing database.

EIGRP Packet Types
Hello Packet – The first message type sent when EIGRP process is initiated on the router. Hello packet identifies neighbors and forms adjacencies while being multicast every 5 seconds by default (60 seconds on low bandwidth network).

- **Update Packet** – Contains route information that is only forwarded when there is a change. They are only sent to the routes that have partial updates. If there's a new neighbor discovered, the packet is then sent to the router as a unicast.
- **Acknowledgement** – This is unicast as a response to Update packet by acknowledging when they receive an update.

- **Query** – This packet is sent to query routes from neighbors. When a router loses a route while sending the multicast, Query packet is sent to all neighboring routers to find alternate paths for the router.
- **Reply** – These are unicast by routers that know alternate routes for the neighboring routers queried on a network.

EIGRP – Pros and Cons Speedy network convergence, low CPU utilization, and ease of configuration are some of the advantages of EIGRP. The EIGRP routers store everything as routing table information so they can quickly adapt to alternate routes. The variable length subnet mask reduces time to network convergence and increases scalability. EIGRP also includes MD5 route authentication. Compared to RIP and OSPF, EIGRP has more adaptability and versatility in complex networks. EIGRP combines many features of both link state and distance-vector. Since EIGRP is mostly deployed in large networks, routers tend to delay sending information during allotted time, which can cause neighboring routers to query the information again, thus increasing traffic.

3. Simulator methodology and Network Scenario

Cisco Packet Tracer is a powerful network simulation program that allows experimentation with network behaviour and asks "what if" questions. Packet Tracer provides simulation, visualization and authoring, assessment and collaboration capabilities and facilitates the teaching and learning of complex technology concepts. Packet Tracer supplements physical equipment by creating a network with an almost unlimited number of devices, encouraging practice, discovery and troubleshooting. Although, it is not a substitute for real equipment, it allows practice using a command-line interface. This "e-doing" capability is a fundamental component of learning how to configure routers and switches. Packet Tracer's simulation mode can demonstrate processes that were formerly hidden. These simulation capabilities can help simplify the learning process by providing tables, diagrams and other visual representations of internal functions such as dynamic data transfers and packet content expansion. With the utilization of this e-learning software, the performance of the three dynamic routing protocols shall be simulated for results to be used for authentication in real time situation using HyperTerminal Emulator.

1. Simulation model and Platform

In this paper, CISCO packet tracer-6.0.1 simulator tool are used to evaluate and analyze the performance of different routing protocol like RIP,OSPF and EIGRP and study how IP packet travel in network.

In this paper we have taken three scenarios and run dynamic routing protocol on network first is RIP and second is OSPF and last configured EIGRP routing protocol.

In below network scenario we have taken 6 router and each one connected through cross-over cable at last end devices

connected through switch using straight-through-cable. Network related parameter given below on table to describe network scenario.

Table1: Specification of Network Devices

Sr. No.	Devices	No. of devices	Device Version
1	Router	7	Cisco-2911
2	Switch	2	2960-24TT
3	Server	1	Facebook server
4	End device	3	PC

Table 2: Router Configuration specification

Sr. No.	Router	Interface	IP Address	Bandwidth	Coomunacation mode
1	Bhopal	G0/0	192.168.1.1	1Gb	Full Duplex
2	Bhopal	G0/1	10.1.1.1	1Gb	Full Duplex
3	Bhopal	G0/2	10.1.7.1	10Mb	Full Duplex
4	Delhi	G0/0	10.1.1.2	1Gb	Full Duplex
5	Delhi	G0/1	10.1.2.1	1Gb	Full Duplex
6	Delhi	G0/2	10.1.4.1	1Gb	Full Duplex
7	Kolkata	G0/0	10.1.2.2	1Gb	Full Duplex
8	Kolkata	G0/1	10.1.3.1	1Gb	Auto
9	Bangalore	G0/0	10.1.3.2	1Gb	Full Duplex
10	Bangalore	G0/1	10.1.5.2	1Gb	Full Duplex
11	Bangalore	G0/2	10.1.6.1	1Gb	Full Duplex
12	Mumbai	G0/0	10.1.4.2	1Gb	Full Duplex
13	Mumbai	G0/1	10.1.5.1	1Gb	Full Duplex
14	Canada	Fa0/0	10.1.7.2	100Mb	Auto
15	Canada	Fa0/1	10.1.8.1	100Mb	Full Duplex
16	USA-California	G0/0	10.1.6.2	1Gb	Auto
17	USA-California	G0/1	172.16.1.1	1Gb	Full Duplex
18	USA-California	G0/2	10.1.8.2	10Mb	Full Duplex

Table 3: Server/PC configuration specification

Sr. No	Server/PC	IP Address
1	Facebook-NMS	172.16.1.2
2	Facebook-Server	172.16.1.3
3	Shahdab-PC	192.168.1.2
4	College-pc	192.168.1.3

Figure 2(a) and Figure 2(b) shows the proposed network scenario on packet tracer 6.0.2 and second figure shows network attribute that define performance of QOS. . The network topology consists of seven Cisco-2911 Router, two 2960-24TT CISCO switch, 1 Facebook server and 3 PCs. In this scenario we designed a network where 2 end device Shahdab and HOD-PC connected with computer network to whole over world to access Facebook service during this scenario college switch taken a leased line through Reliance JIO and connected to the reliance JIO router placed on Bhopal. End devices access Facebook server using HTTP protocol through provided Public IP by JIO and IP packet passes from router to router till Facebook server.
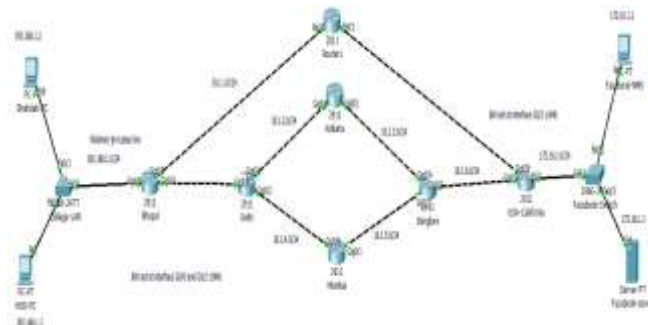
Figure2 (a): Proposed Network Scenario
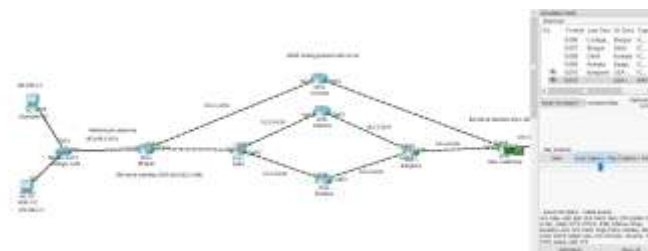
Figure 2(B): Real time packet transmission from Shahdab-PC to Facebook server

Configuration of network scenario can be classified on two step first step is to configure hostname and assigning of IP address to connecting interface device and last step to run routing protocol.

Step 1: Configuration and assign hostname and IP address

For Bhopal router configuration and assign IP address.
Router > enable
Router # configure terminal
Router (config) # hostname Bhopal
Router (config) # interface GigabitEthernet 0/0
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/1
Router(config-if)# ip address 10.1.1.1 255.255.255.0
Router(config-if)# no shutdown

For Delhi router configuration and assign IP address
Router > enable
Router # configure terminal
Router (config) # hostname Delhi
Router (config) # interface GigabitEthernet 0/0
Router(config-if)# ip address 10.1.1.2 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/1
Router(config-if)# ip address 10.1.2.1 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/2
Router(config-if)# ip address 10.1.4.1 255.255.255.0
Router(config-if)# no shutdown

For Kolkata router configuration and assign IP address
Router > enable
Router # configure terminal
Router (config) # hostname Kolkata

Router (config) # interface GigabitEthernet 0/0
Router(config-if)# ip address 10.1.2.2 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/1
Router(config-if)# ip address 10.1.3.1 255.255.255.0
Router(config-if)# no shutdown

For Banglore Router configuration and assign IP address
Router > enable
Router # configure terminal
Router (config) # hostname Banglore
Router (config) # interface GigabitEthernet 0/0
Router(config-if)# ip address 10.1.3.2 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/1
Router(config-if)# ip address 10.1.5.2 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/2
Router(config-if)# ip address 10.1.6.1 255.255.255.0
Router(config-if)# no shutdown

For Mumbai Router configuration and assign IP address
Router > enable
Router # configure terminal
Router (config) # hostname Mumbai
Router (config) # interface GigabitEthernet 0/0
Router(config-if)# ip address 10.1.4.2 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/1
Router(config-if)# ip address 10.1.5.1 255.255.255.0
Router(config-if)# no shutdown

For USA-California Router configuration and assign IP address
Router > enable
Router # configure terminal
Router (config) # hostname Mumbai
Router (config) # interface GigabitEthernet 0/0
Router(config-if)# ip address 10.1.6.2 255.255.255.0
Router(config-if)# no shutdown
Router (config) # interface GigabitEthernet 0/1
Router(config-if)# ip address 172.16.1.1 255.255.255.0
Router(config-if)# no shutdown

Server/PC Configuration and assign IP Address.
Ip address can be assign to host through manually and DHCP server . In this scenario static method are used to assign IP add to host like this.
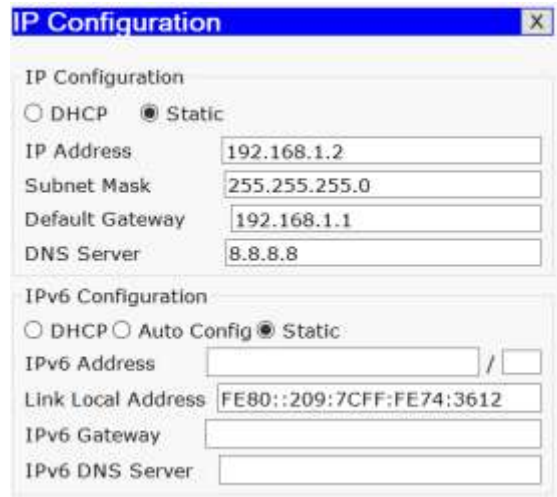
Figure 3: IP configuration on PC

Configuration of Routing information protocol on Network
Configuration of RIP on Bhopal router
Router (config) # router rip
Router(config-router)# version 2
Router(config-router)# network 192.168.1.0 255.255.255.0
Router(config-router)# network 10.1.1.0 255.255.255.0

Configuration of RIP on Delhi router
Router (config) # router rip
Router(config-router)# version 2
Router(config-router)# network 10.1.2.0 255.255.255.0
Router(config-router)# network 10.1.1.0 255.255.255.0
Router(config-router)# network 10.1.4.0 255.255.255.0

Configuration of RIP on Kolkata router
Router (config) # router rip
Router(config-router)# version 2
Router(config-router)# network 10.1.2.0 255.255.255.0
Router(config-router)# network 10.1.3.0 255.255.255.0

Configuration of RIP on Mumbai router
Router (config) # router rip
Router(config-router)# version 2
Router(config-router)# network 10.1.4.0 255.255.255.0
Router(config-router)# network 10.1.5.0 255.255.255.0

Configuration of RIP on Banglore router
Router (config) # router rip
Router(config-router)# version 2
Router(config-router)# network 10.1.3.0 255.255.255.0
Router(config-router)# network 10.1.5.0 255.255.255.0
Router(config-router)# network 10.1.6.0 255.255.255.0

Configuration of RIP on USA-California router
Router (config) # router rip
Router(config-router)# version 2
Router(config-router)# network 172.16.1.0 255.255.255.0
Router(config-router)# network 10.1.6.0 255.255.255.0

Below figure 4.0 shows that IP route on Bhopal router. from figure it is clear that administrative distance of RIP is 120 where C means directly connected route and RIP means router connected from RIP routing protocol.

Figure 4: RIP IP route on Bhopal router

Figure 5.0 shows the trace route from source shahdab PC to Facebook server which show that best path selection based on HOP count in RIP and respectively figure 6.0 show the ping connectivity is proper and Facebook serer is reachable from PC to server

Figure 5: Trace route from Shahdab PC to Facebook-server Using RIP

Figure 6: ICMP ping connectivity from PC to Facebook server

Configuration of Routing information protocol on Network
Configuration of OSPF on Bhopal router
Router (config) # router ospf 50
Router(config-router)# network 192.168.1.0 0.0.0.255 area 0
Router(config-router)# network 10.1.1.0 0.0.0.255 area 0
Configuration of OSPF on Delhi router
Router (config) # router ospf 50
Router(config-router)# network 10.1.2.0 0.0.0.255 area 0

Router(config-router)# network 10.1.1.0 0.0.0.255 area 0
Router(config-router)# network 10.1.4.0 0.0.0.255 area 0
Configuration of OSPF on Kolkata router
Router (config) # router ospf 50
Router(config-router)# network 10.1.2.0 0.0.0.255 area 0
Router(config-router)# network 10.1.3.0 0.0.0.255 area 0
Configuration of OSPF on Mumbai router
Router (config) # router ospf 50
Router(config-router)# network 10.1.4.0 0.0.0.255 area 0
Router(config-router)# network 10.1.5.0 0.0.0.255 area 0
Configuration of OSPF on Banglore router
Router (config) # router ospf 50
Router(config-router)# network 10.1.3.0 0.0.0.255 area 0
Router(config-router)# network 10.1.5.0 0.0.0.255 area 0
Router(config-router)# network 10.1.6.0 0.0.0.255 area 0
Configuration of OSPF on USA-California router
Router (config) # router ospf 50
Router(config-router)# network 172.16.1.0 0.0.0.255 area 0
Router(config-router)# network 10.1.6.0 0.0.0.255 area 0

Figure 8.0 shows the OSPF IP route on Bhopal router which route connected from Bhopal router indirectly represented by O and directly connecting route is represented by C. In OSPF AD is 110.

Figure 7: OSPF IP route on Bhopal router.

Figure 8.0 shows the trace route from source shahdab PC to Facebook server which show that best path selection based on Cost in OSPF and respectively figure 9.0 show the ping connectivity is proper and Facebook serer is reachable from PC to server

Figure 8: Trace route from Shahdab PC to Facebook-server

Figure 9: ICMP ping connectivity from PC to Facebook server.

Configuration of EIGRP on Bhopal router
Router (config) # router EIGRP 50
Router(config-router)# network 192.168.1.0 0.0.0.255
Router(config-router)# network 10.1.1.0 0.0.0.255
Router(config-route)# no auto-summary
Configuration of EIGRP on Delhi router
Router (config) # router EIGRP 50
Router(config-router)# network 10.1.2.0 0.0.0.255
Router(config-router)# network 10.1.1.0 0.0.0.255
Router(config-router)# network 10.1.4.0 0.0.0.255
Router(config-route)# no auto-summary
Configuration of EIGRP on Kolkata router
Router (config) # router EIGRP 50
Router(config-router)# network 10.1.2.0 0.0.0.255
Router(config-router)# network 10.1.3.0 0.0.0.255
Router(config-route)# no auto-summary
Configuration of EIGRP on Mumbai router
Router (config) # router EIGRP 50
Router(config-router)# network 10.1.4.0 0.0.0.255
Router(config-router)# network 10.1.5.0 0.0.0.255
Router(config-route)# no auto-summary
Configuration of EIGRP on Bangalore router
Router (config) # router EIGRP 50
Router(config-router)# network 10.1.3.0 0.0.0.255
Router(config-router)# network 10.1.5.0 0.0.0.255
Router(config-router)# network 10.1.6.0 0.0.0.255
Router(config-route)# no auto-summary
Configuration of EIGRP on USA-California router
Router (config) # router EIGRP 50
Router(config-router)# network 172.16.1.0 0.0.0.255
Router(config-router)# network 10.1.6.0 0.0.0.255
Router(config-route)# no auto-summary
Figure 9.0 shows the OSPF IP route on Bhopal router which route connected from Bhopal router indirectly represented by O and directly connecting route is represented by C.
In EIGRP AD is 90.

Figure 10: IP route on Bhopal router

Figure 11: Trace route from Shahdab PC to Facebook-server

Figure 12: ICMP ping connectivity from PC to Facebook server

4. Result and Discussion

In proposed network scenario number of route from Shahdab PC to Facebook-server are three first listed below.
- PC >> Bhopal >> Canada >> USA-California >>Facebook-server
- PC >> Bhopal >> Delhi >> Kolkata >> Bangalore >> USA-California >> Facebook-server
- PC >> Bhopal >> Delhi >> Kolkata >> Bangalore >> USA-California >> Facebook-server.

From Figure 5,8 and 11 it is clear that best path selection in RIP routing protocol is based on hop count and less number of HOP will be based path for packet transmission show if we run the RIP routing protocol on network then beast path will be
- PC >> Bhopal >> Canada >> USA-California >>Facebook-server

While in case of OSPF best path selection is based on COST and AD value. i.e Bandwidth, so from result it is clear that best cost path will be the best path and best path according to Bandwidth.

Because Bandwidth of Bhopal interface G0/0 and G0/2 is 10 Mb and Canada router BW is in fast-ethernet range so on the basis of BW cost best path will be.
- PC >> Bhopal >> Delhi >> Kolkata >> Bangalore >> USA-California >> Facebook-server

Whereas in EIGRP best path selection is based on FIVE metrics parameter like Bandwidth, load, delay, reliability MTU and most important is in AD value. Bandwidth. So on the basis of these parameter best path using EIGRP will be
- PC >> Bhopal >> Delhi >> Kolkata >> Bangalore >> USA-California >> Facebook-server

On the basis of result it is clear that each EIGRP and OSPF

routing protocol is more effective, stable and flexible to select best path with managing capability for big network.

5. Conclusion

In this paper we have analyzed the performance of three IGP routing protocol RIPv2,OSPF and EIGRP using Packet tracer 6.0.2 simulator. After analyzing it is concluded that rip routing protocol select best path on the basis of HOP count, OSPF routing protocol select best path on the basis of cost only Bandwidth whereas in EIGRP best path through 5 metrics parameters Bandwidth, load, delay, reliability MTU.. Simulator result shows that EIGRP and OSPF routing protocol is better as compared to RIP routing protocol but for small network less than 15 HOP RIP is flexible and fast convergence than OSPF and EIGRP because both routing protocol share network, topology, neighbor information between each router in network that consume more memory but as per overall performance wise OSPF and EIGRP are better than RIP.

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