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Execution, Evaluation and Comparison of Dynamic Routing Protocols

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Abstract:- In the communication network the data or packets sent from Source to Destination by choosing the Best route. To do so finding the best path from source to destination is called routing. In the OSI layer the routing process was done by network layer, it can understand only IP address of the devices. The process of choosing the best path is done by dynamic routing protocols which are Routing information protocol (RIP),Open Shortest path first(OSPF) and Enhanced interior gateway protocol(EIGRP).in this paper we will discuss the performance evaluation of these dynamic Routing Protocols and to show the which protocol performs better in real time application.

Keywords:- *RIP, EIGRP, OSPF.*

I. INTRODUCTION

The process of routing is done by router which is layer 3 device, sending the packets from one network to another network by choosing the best path. And it is done based on routing algorithm, which contains cost, Delay, Bandwidth, and hop Count. In Routing there are three types, Static Routing, Default Routing and Dynamic Routing. In Static Routing, the routing table is created and updated manually by network administrator. But in Dynamic Routing the Routing Table is created and maintained by routing protocols, they are 1) Routing Information Protocol, 2) Open Shortest Path First, 3) Enhanced interior Gateway Protocol.Interior Gateway protocols conventions both distance vector and connection state directing protocols utilized inside a self-governing framework to trade directing data, whereas Exterior Gateway Routing Protocols are utilized between various self-governing frameworks arranged by trading directing data. Every dynamic Routing Protocols employment its own measurements to locate the best route for sending from source to goal.

II. LITERATURE SURVEY

Shortest path selecting from source to destination is an important thing in the network and it is happened by using routing. RIP, OSPF, EIGRP and other protocols keeps the track of flow of packets by using routing alogorithms for performance.The authors compare the performance of Dynamic routing protocols in different scenario[1].

The interior gateway protocol which increase the network performance within autonomous system by assigning speed to the e links between the routers. The cost factor was applied based on the metrics. These incorporate separation to a switch, most extreme conceivable throughput of the connection among switches, and the accessibility of a connection. Utilizing these measurement loads is alloted to that interface which is a solitary unit-less number. OSPF is one of the ordinarily utilized IGP steering conventions. [2]

IPV4 andIPv6 are the two kinds of internet protocols. IPV4 is generally utilized one of the current network communication and IPV6 is convention of cutting edge web which will at last supplant IPv4, however up to that point the two conventions need to coincide for quite a while. The fundamental issue is both conventions are not perfect with one another. To design a situation with IPV4 and IPV6 extraordinary kinds of directing conventions are required which have distinctive exhibitions. Directing isn't a simple assignment, particularly if there should be an occurrence of remote systems. This paper presents an execution assessment of a few dynamic steering conventions like Routing Data Protocol (RIP), IPv6 Routing Data Protocol (RIPng), Open Shortest Path First (OSPFv2), and IPv6 Open Shortest Path First (OSPFv3) over Mobile Ad-hoc Networks is finished utilizing Exata Cyber 1.1 test systems. The execution of systems is estimated dependent on the bundle conveyance proportion, jitter, end-to-end delay and throughput that is done on 100 hubs utilizing four CBR applications with changing parcel sizes of 256, 512, 1024 and 2058 bytes. Furthermore, from the assessment held, execution of RIPng is best among all the conventions as it has greatest throughput and parcel conveyance proportion with least deferral and jitter.

III. DYNAMIC ROUTING PROTOCOLS

Dynamic Routing is a routing technique which enables the router to selecting the best path to the destination based on logical real time network.in this type of routing the routing protocol is creating, managing and updating the routing table by its own.

➢ *Advantages*

- The destination network is does not need to know
- No need to do the administrative work by manual

- Only advertise the directly connected networks
- Effective for big organization.
- The routing table is created automatically by neighbour routers by exchanging their Routing information

A. Types of dynamic routing protocols

- Distance Vector Protocol
- Link state protocol
- Hybrid protocol.

- *Distance Vector Protocol*

This protocol works with bellman ford algorithm to find the shortest path to the destination. The routing protocol exchange the entire routing table if any updates are happened.it is a classful routing protocol. Updates are sent through the broadcast address. Less overhead and easy to configure. Example: RIP V1, RIP V2, IGRP.

- *Link State Protocol*

This protocol works with Dijkstra algorithm to find the shortest path to the destination. the routing protocol exchange the incremental updates to the routing table if any updates are happened.it is a classless routing protocol. Updates are sent through multicast address. More Overhead and Difficult to configure. Example: OSPF, IS-IS.

- *Hybrid Protocols*

It is also called as advance distance vector protocol, works with DUAL algorithm, the routing protocol exchange the incremental updates to the routing table if any updates are happened. it is a classless routing protocol. Updates are sent through multicast address. Less overhead and easy to configure.

The classification of dynamic routing protocols is shown in figure.1

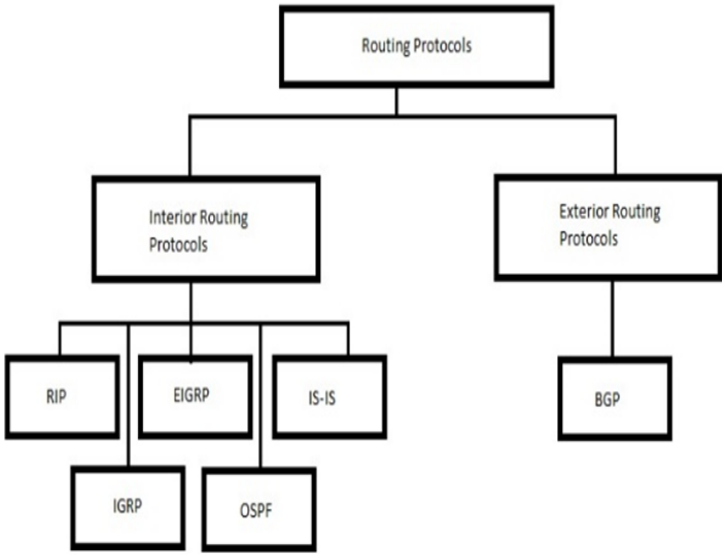

Fig 1:- Classification of Routing Protocols.

B. Routing Information Protocol

RIP is as distance vector routing protocol, chooses the best path based on distance. It is a open standard, it supports only classful addressing. It makes use of belmonford algorithm to find the cost of the link. The administrative distance of this protocol is 120. Hello packets are sent through broadcast address i.e. 255.255.255.255, the hop count of this protocol is 15, maximum it supports only 15 hops, the 16^{th} router is unreachable. At the same time, it supports four equal paths for load balancing. It is suitable for small industries, hello timer is 30sec, dead timer is 180 seconds. It exchanges the entire routing table, even when only one information is updated. For every 30 seconds hello packets are sent between the routers and dead timer is 180 seconds. Till 180 seconds it waits to get the reply from the neighbor router, if not it deletes the routing table of that router. The ration to hello and dead timer is 1:6.

C. Open Shortest Path First Protocol

OSPF is a link state routing protocol, chooses the best path based on the bandwidth. It is interior gateway routing protocol, it supports both classful and classless addressing. It makes the use of Dijkstra algorithm to find the cost of the link. The administrative distance of this protocol is 110. Hello packets are sent through multicast address 224.0.0.5 and 224.0.0.6,

In OSPF selecting the best path, takes 7 states, they are Down, initialization, two-way, exstart, exchange, loading and full state.

- *Down State*: in this state ospf is configured but hello packets are not yet sent.
- *Initialization State*: In this state hello packets are sent via multicast address 224.0.0.5.
- *Two-way State*: In this state the routers will exchange hello packets.
- *Exstart State*: In this state adjacency is formed which means it allows to exchange the hello packets. Adjacency is formed based on 3 different types of network which are point to point network, Broadcast multi access network and non-broadcast multi access network.
- *Exchange State*: In this state routers will exchange their routing information with neighboring routers.
- *Loading State*: In this state all, possible routes will be sent to the neighboring routers.
- *Full State* : In this state the best route is decided and packets will sent from this route to the destination. And cost of the link is calculated by using the formula 10^8 /Bandwidth.

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D. Enhanced Interior Gateway Routing Protocol

EIGRP is a Hybrid steering protocol, having highlights of both Distance-Vector and Link- State steering protocols. According to distance vector characteristics EIGRP utilizes Routing by rumors‟ and according to the connection state trademark doesn't‟ t send entire routing table updates however send updates just when there is a topology change. EIGRP utilizes Diffusing Update Algorithm (DUAL) to decide the best path among all "attainable" paths. DUAL additionally guarantees a loop free routing environment. EIGRP will shape neighbor relationships with nearby routers in the equivalent Autonomous System (AS). • EIGRP traffic is either sent as unicasts, or as multicasts on location 224.0.0.10, contingent upon the EIGRP packet type. Reliable Transport Protocol (RTP) is utilized to guarantee delivery of most EIGRP packets. EIGRP is a classless protocol, and in this way bolsters VLSMs. EIGRP underpins IP, IPX, and AppleTalk routing. EIGRP applies an Administrative Distance of 90 for courses starting inside the neighborhood autonomous System. EIGRP applies an Administrative Distance of 170 for outer routers originating from outside the neighborhood Autonomous System. EIGRP utilizes Bandwidth and Delay of the Line, as a matter of course, to ascertain its distance metric. It likewise supports three different parameters to figure its metric: Reliability, Load, and MTU. EIGRP has a most extreme hop-count of 224, however the default greatest hop-count is set to 100. EIGRP fabricates three separate tables:

- Neighbor Table:- list of all neighboring routers. Neighbors must belong to the same Autonomous System
- Topology Table:- list of all routes in the Autonomous System
- Routing Table:- contains the best route for each known network.

IV. EXPERIMENTAL RESULTS

In this the try different things with network system is done on the Cisco parcel tracer 6.2. Cisco Packet Tracer is a ground-breaking system recreation program which enables understudies to explore different avenues regarding the system network. Bundle Tracer goes about as an enhancement for physical hardware in the classroom as it is enabling understudies to make a PC coordinate with an any number of gadgets, empowering the training, revelation and the investigating. At first a physical system is made with PCs, switches, switches, server and associations utilizing Cisco bundle tracer 6.2. Then the routers are designed by composing order in CLI. We exclusively arrange RIP, OSPF and EIGRP on the switches and end-to-end conveyance of parcels is checked.

The network topology is created by using the packet trace to analyses the performance of RIP, OSPF and EIGRP. The network topology and IP route when different protocols applied is shown below.

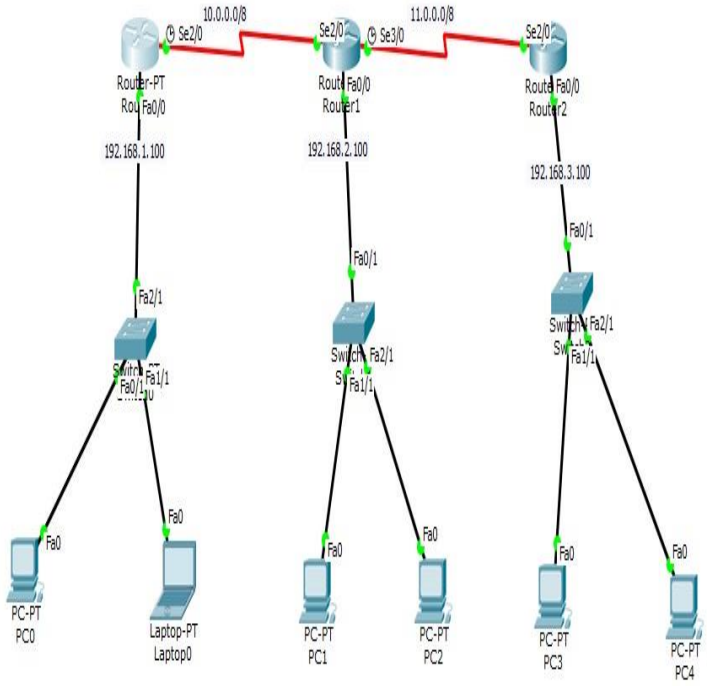

Fig 2:- Creating a network using Packet Tracer

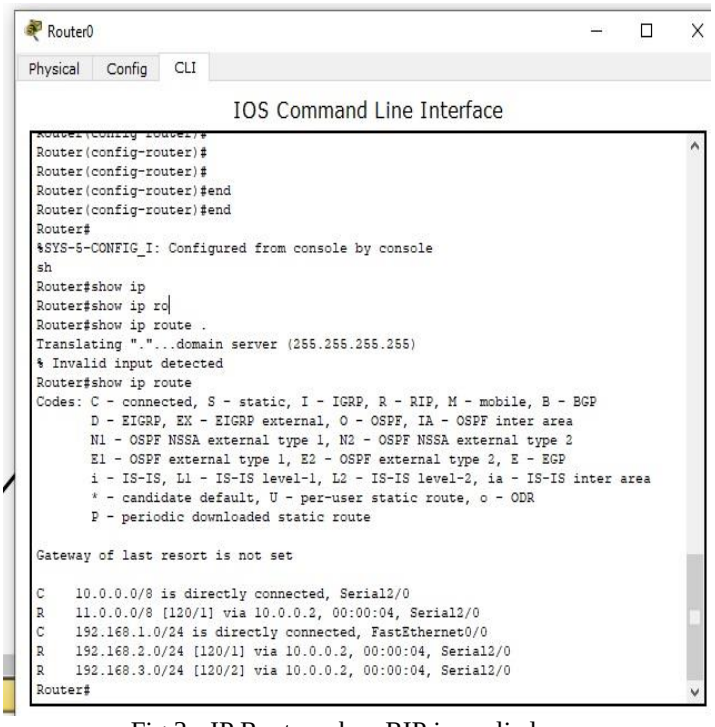

Fig 3:- IP Routes when RIP is applied

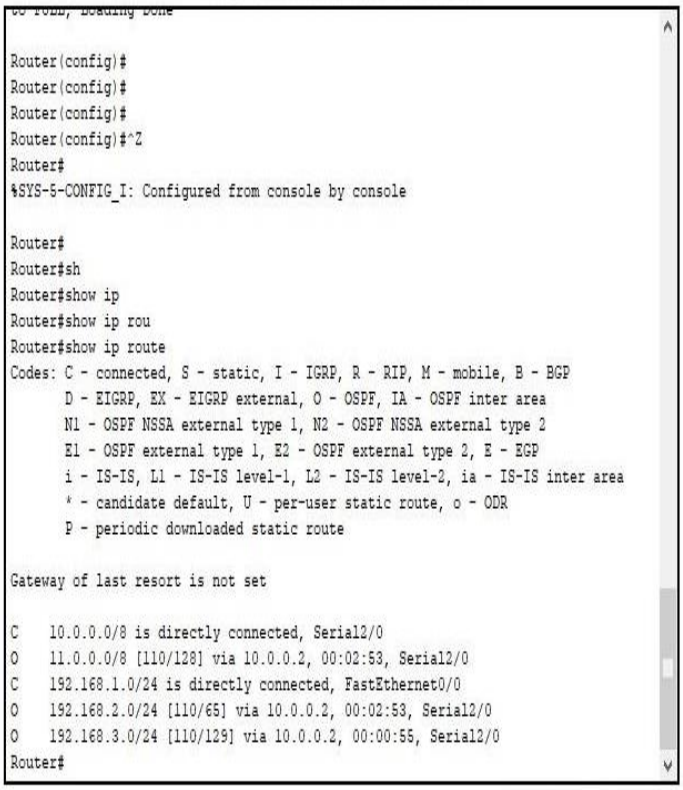

Fig 4:- IP Routes when OSPF is applied

V. CONCLUSION

The process of sending the packet of information from one network to another is called as routing. The type of routing is discussed in this paper by using dynamic routing protocols. The advantages and disadvantages of the protocol is also discussed, RIP protocol is unreliable and outdate so hence currently we are using OSPF protocol for our real time scenario. And experimental result also shows the administrative distance and metric values of the protocols.

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