

## **Network Based On EIGRP Routing Protocol And Comparison Between OSPF and EIGRP Using Network Simulator**

**Dr. Vijay Kumar Samyal<sup>1</sup>, Nitesh Kumar<sup>2</sup>, Kiran Pratap Singh<sup>2</sup>**

1. Associate Professor, Department of CSE, MIMIT, Malout

2. Students, MIMIT, Malout

### **Abstract**

One of the important computer networking system is the Internet. In building a networking system a routing is required in order to work efficiently and flexibly. Methods of routing are the backbone in providing Network performance. There are so much existing protocols which network Administrators need to administer in order to compare them on the basis of comparison. The protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF). The objective of this paper is to emphasize on the EIGRP and OSPF protocol performance on hybrid network topology. Network services provide an average access speed up to 8.0 KB/sec to 2 MB bandwidth. In this study Cisco Packet Tracer 6.0.1 (student version) simulator is used for evaluating its results.

### **Keywords**

***Network; EIGRP; OSPF; dynamic PAT; Simulator: Performance***

### **Introduction**

Now a day computer networks are used as mean of communication and also used for sharing the resources which optimize the cost as well as time. Requirements consist of number of hardware devices such as switches, routers as well as various IP addressing assigning and routing methods. The approach for sending a data packets from sender side to receiver side is basically depends upon the routing methods which are performed by router implicitly.

One of the forms of network system is the internet. To construct an internet system, requirement of hardware, software and protocol. TCP/IP protocol is one of the important protocols to be used when applied to a network construction. Routing is basically categorised into two parts Static Routing and Dynamic Routing [3, 5].

The growths of the internet have impact on internet connection and existing data connection. The objective is to construct a network design on a simulator with a GUI in which the user can build network as per the requirement by using hardware components such as PC, servers, routers, switches, and different cable. With the help of this simulator user can view the graphical representation of networks on single screen and also analysis the equipment installed in the network. After that user analysis how packets are routed over the

network using OSPF and EIGRP[1]. These two are the mostly used Interior Gateway Protocol (IGP).

### **Related Work**

The tools required for research in networks are the network simulators that create, develop administer present computer networks. The existing networks can be easily testing by implementing new protocols or new hardware by using these simulators, researchers and developers also prefers to use simulators to analysis the performance of networks.

### **Routing Protocol**

Routing protocols works on the basic idea of providing the most efficient route in networks. These protocols show how the communication and information exchange with one another by routers and also select the best route to send the data packets to destination in the network. The information provided by these protocols are:

- Network Discover
- Routing table maintenance and its updating

There are some types of method.

- Distance Vector Routing Protocol (DVR)

DVR protocol in data networks determines the shortest distance or best route for data packets between source and destination.

- Link-State Routing (LSR) Protocol.

It is called Link based because of the determination made based on information obtained from other routers.

#### **a) OSPF (Open Shortest Path First)**

OSPF is a LSR protocol, which finds the shortest path between sender and receiver. LSR (Link-State Refreshment) are sent periodically to the router that are around to see if the router is still active and still from a link to the router. LSA (Link-State advertisement) refreshed after 30sec which shows updates when any changes are made on the network. Firstly OSPF router is turned on, the respective router will send a multicast LSA. The receiving router will copy the information then forward of the LSA. Information will be stored in any topological database.

#### **b) EIGRP (Enhanced Interior Gateway Routing Protocol)**

It is a routing protocol owned and maintained by CISCO that clearly works on routers and the internal route processors contained in the core as well as distribution layer switches. CISCO EIGRP is a distance vector protocol that enhanced and classes [4].

**c) Switch**

The packets which are missed in LAN are filtered by switches. On Data Link layer of OSI model Switches work and sometimes switches also work on Network layer also (layer 3). In switched LANs, switches are used for communication. The Switch and the hub have the same functionality. The real difference is that a Switch can work on the full duplex mode and track the packet flow between sender and receiver while the hub cannot filter and divert the path of relationship.

**Research Method****A. Development Method****1) Need Analysis**

The process of finding the problem and then try to find alternative solutions to that which are relevant.

**2) Designing**

It is an initial stage in deployment a basic design is presented which will further be seen as the product.

**3) Modelling**

This is a stage which is dependent of designing which might be integrated into more useful work. A limited scale is perfected in the earlier scale.

**4) Examination**

This stage is for monitoring technique which allows discussion on basic design and the model that essentially conduct trials.

**B. Data Collection Technique****1. Observation**

An Observation is conducted on the MIMIT engineering college in order to do the observation.

Following are the noted points: -

- Network conditions.
- Network data used.
- Traffic in the network by observing the timing and other valued factors such as convergence.

**C. Need Analysis**

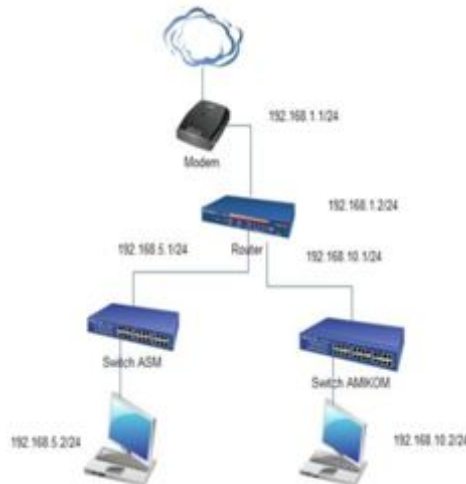
This phase generally encompasses on the development of computer network design at the Institution which is MIMIT here. In this, scenario an analysis of all the data that already collected in finding a particular solution to that particular problem. The ultimate task of this process or stage is to achieve interactions from the user end.

Problems and alternatives measures will be used in the next step.

**D. Stage Design****1) Old scheme**

Fig. 1 represents an old schematic network in which number of clients approx. 2500 whose data accessing speed is 8.0KB/sec per client. .

The network provides overall activities for all the staff members, students and faculties.



**Fig 1. Old network topology**

### **Proposed Scheme**

There are certain variations found on various other location that can make a difference in the way and equipment as well as implementation of various another network. Differences can be seen in the information required by the routers which in turn help the network administrators to work and choose the efficient routing protocol required in order for seamless connectivity.

#### **a) Flowchart for Network Design**

In this study ring topology will implemented for simulation by using EIGRP and OSPF routing protocol. Fig. 2 shows a flowchart of network design and also show stages of EIGRP and OSPF protocol.

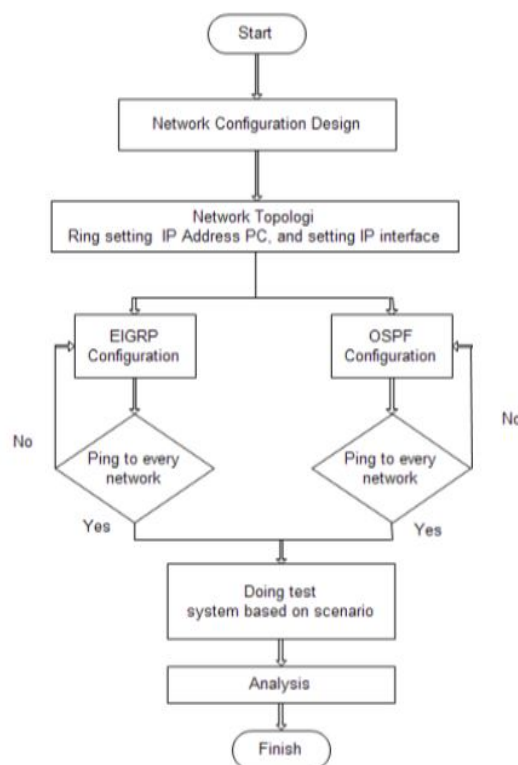


Fig 2.Network Design Flowchart

The packet tracer 6.0.1 is used for simulation and the topology used in network is ring topology, setting IP Address and assigning interface IP addresses.

### b). Network Topology

In this study a Cisco Packet Tracer 6.0.1 simulator is used which helps in designing the network. The backbone of this network is a particular type of protocols will be used by the two buildings which will further help in enhancing the network OSFP as well as EIGRP.

The topology shown in fig. 3 is the private to public topology which uses 2 router, 2 switches 1 server and 3 computers for every permutation.

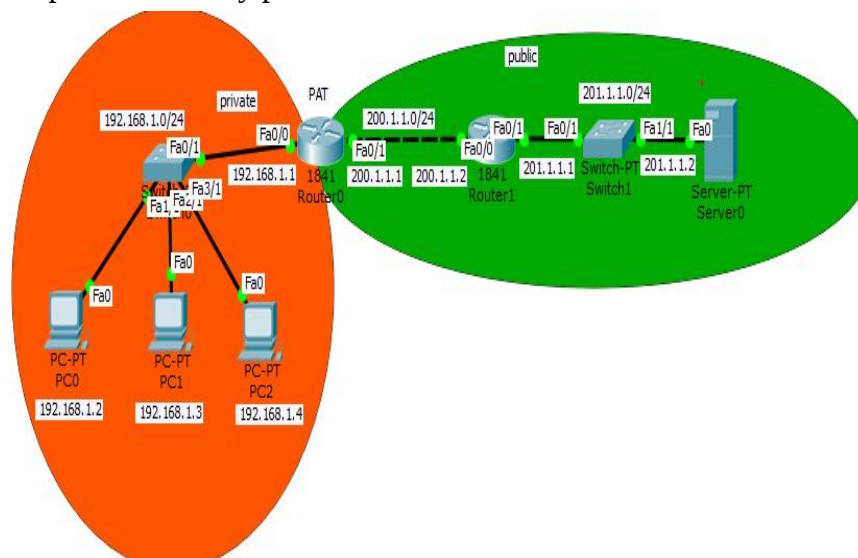


Fig. 3 Proposed network topology

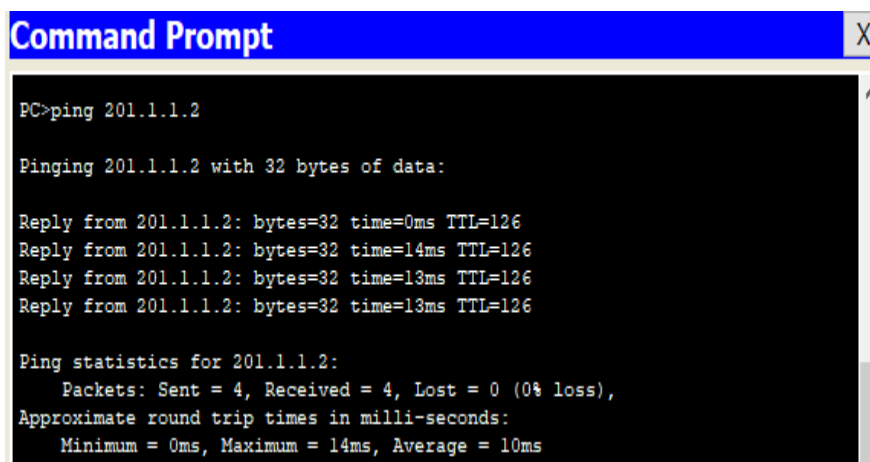
**c) IP Address Calculation**

The process of subnetting is done on the existing network i.e. network on private and networks on public.

**Result and Discussion**

Results of simulations are analysis on CiscoPacket Tracer 6.0.1 for each routing protocol [2]. The following points have been observed during simulation:

- 1) It is observed that there is a delay in data packets delivery from a PC to another PC when traffic is busy.
- 2) Observing the usual trace route path pass data packets during transmission, and then break the link that bypassed the usual data packets to determine these differences are skipped.



```
Command Prompt X
PC>ping 201.1.1.2

Pinging 201.1.1.2 with 32 bytes of data:

Reply from 201.1.1.2: bytes=32 time=0ms TTL=126
Reply from 201.1.1.2: bytes=32 time=14ms TTL=126
Reply from 201.1.1.2: bytes=32 time=13ms TTL=126
Reply from 201.1.1.2: bytes=32 time=13ms TTL=126

Ping statistics for 201.1.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 14ms, Average = 10ms
```

**Fig. 4. Screenshot of successful communication on EIGRP**

The packets are sent through ICMP for testing the results and it is founded delay on the first attempt and further it shows no delay when the packets are sent second time in the network.

**Table 1. Comparison of average value of Delay (in seconds)**

| Routing Protocol | Case 1   | Case2   | Case 3   | Case 4   | Case 5   |
|------------------|----------|---------|----------|----------|----------|
| Ring EIGRP       | 0,012507 | 0,01032 | 0,010345 | 0,01018  | 0,010515 |
| Ring OSPF        | 0,01303  | 0,01065 | 0,010725 | 0,010465 | 0,011205 |

**Conclusion**

Based on the testing the following results are as follow: -

1. Score of total delay in EIGRP is better than 390ms delay value in OSFP.

2. OSFP works on the link state so the same cost value of the following cannot always be a shortest route.
3. The average convergence time is 12.73 seconds in EIGRP and 35.27 in OSFP.
4. The dead time interval is 40 seconds faster than the convergence of EIGRP and OSFP.

**References**

- [1] A. Setiawan and N. Sevani, "Perbandingan Quality of service Antara Routing Information Protocol (RIP) Dengan Open Shortest Path first (OSPF),"pp. 196-207.
- [2] Cisco Certified Network Associate (5th Edition) by Todd lammle.
- [3] "PankajRakheja, Prabhjotkaur,Anjaligupta and Aditi Sharma, "Performance analysis of rip, ospf, igrp and eigrouting protocols in a network," vol. 48. No.18, p. 6, 2012.
- [4] E. Menggunakan, S. Jaringan, and O. Modeler, "SimulasiKinerja Routing Protocol Open Shortest Path first (OSPF) Dan Enhanced Interior Gateway Routing Protocol (EIGRP) Menggunakan Simulation jaringan Open modeller v. 14.5," pp. 1-6.
- [5] Tanenbaum, Andrew. Computer Networks. 3 ed (New Jersey, prentice-Hall Inc, 1996).