IMPLEMENTATION, ANALYSIS & COMPARISION OF ROUTING PROTOCOL (RIP & OSPF) USING NETWORK SIMULATOR EDUCATION VERSION OPNET

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ABSTRACT

We wish to investigate the behavior of existing rip & ospf routing protocol using opnet simulator. opnet educational version simulation only can be implemented on first three layers Via physical, data link and network layer and support all the protocol and rules encountered in these layers.

In present scenario the information is available easily but the information lies in accessing the medium. The rip and ospf protocol both the protocol used in autonomous system. We just to compare the result in term of efficiency, throughput, delay, and failure etc and try to improve the existing parameters.

Practical implementation of Network layer protocol is inefficient and expensive which also required curing of some other parameters. For this reason we choose opnet network simulator (educational version) which is easily available to simulate these protocol and provide ease to study the behavior of the network under good efficiency and performance.

Keywords: *Network, Routing Protocols, RIP, OSPF.*

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INTRODUCTION

Efficient and scalable routing is one of the key challenges in the design and performance of a large scale intra-domain network .Intra-domain routing protocols are basically dynamic routing protocols that are classified into two categories: distance vector routing protocol and link state routing protocol. The link state routing protocol and the distance vector routing protocol differ in that the former considers entire topology for routing decisions, whereas the latter considers only the information update

Computer network, often simply referred to as a **network**, is a collection of computers and devices connected by communications channels that facilitates communications among users and allows users to share resources with other users. Networks may be classified according to a wide variety of characteristics. This article provides a general overview of types and categories and also presents the basic components of a network.

Routing

Routing is the process of selecting paths in a network along which to send network traffic. Routing is performed for many kinds of networks, including the telephone network, electronic data networks (such as the Internet), and transportation networks. This article is concerned primarily with routing in electronic data networks using packet switching technology.

There are various routing algorithm among we choose RIP & OSPF for our research:

Routing Information Protocol

The routing algorithm used in RIP, the Bellman-Ford algorithm, was first deployed in a computer network in 1967, as the initial routing algorithm of the ARPANET. The **Routing Information Protocol** (**RIP**)

RIP is a dynamic routing protocol used in local and wide area networks. As such it is classified as an interior gateway protocol (IGP). It uses the distance-vector routing algorithm.

RIP is a distance-vector routing protocol, which employs the hop count as a routing metric. The hold down time is 180 seconds. RIP prevents routing loops by implementing a limit on the number of hops allowed in a path from the source to a destination. The maximum number of hops allowed for RIP is 15. This hop limit, however, also limits the size of networks that RIP can support. A hop count of 16 is considered an infinite distance and used to deprecate inaccessible, inoperable, or otherwise undesirable routes in the selection process.

Open Shortest Path First

Open Shortest Path First (OSPF) is a dynamic routing protocol for use in Internet Protocol (IP) networks. Specifically, it is a link-state routing protocol and falls into the group of interior gateway protocols, operating within a single autonomous system (AS). It is defined as OSPF Version 2 in RFC 2328 (1998) for IPv4. OSPF is perhaps the most widely-used interior gateway protocol (IGP) in large enterprise networks; IS-IS, another link-state routing protocol, is more common in large service provider networks. The most widely-used exterior gateway protocol is the Border Gateway Protocol (BGP), the principal routing protocol between autonomous systems on the Internet.

The topology determines the routing table presented to the Internet Layer which makes routing decisions based solely on the destination IP address found in IP datagrams. OSPF was designed to support variable-length subnet masking (VLSM) or Classless Inter-Domain Routing (CIDR) addressing models. OSPF detects changes in the topology, such as link failures, very quickly and converges on a new loop-free routing structure within seconds. It computes the shortest path tree for each route using a method based on Dijkstra's algorithm, a shortest path first algorithm.

The **link-state information** is maintained on each router as a link-state database (LSDB) which is a tree-image of the entire network topology. Identical copies of the LSDB are periodically updated through flooding on all OSPF routers.

RELATED WORK

The performance of routing protocols has already been explored in earlier research given in (Huitema, 2000; Bellman, 1957; McQuillan *et al.*, 1977; Malking, 1998). The authors emphasize the fact that the routing protocol selection is a key component in determining the performance of a network. However, these studies never consider the context as given in our simulation framework.

A number of recent papers (Malking, 1998; Moy, 1998; Talal, 2006) have analyzed the performance of routing protocols in multi-hop networks. In our study, we use a ring topology based framework to analyze the performance of intra-domain routing protocols and observe how RIP and OSPF are affected by link failures.

SIMULATION STUDY AND ANALYSIS

This section presents our simulation results to compare performance of the intra-domain routing protocols.

A. Experimental Tool: OPNET:

We choose opnet network simulator (educational version) which is easily available to simulate these protocol and provide ease to study the behavior of the network under good efficiency and performance.

B. Simulation Framework for Routing Protocols: For RIP protocol two different scenario:-

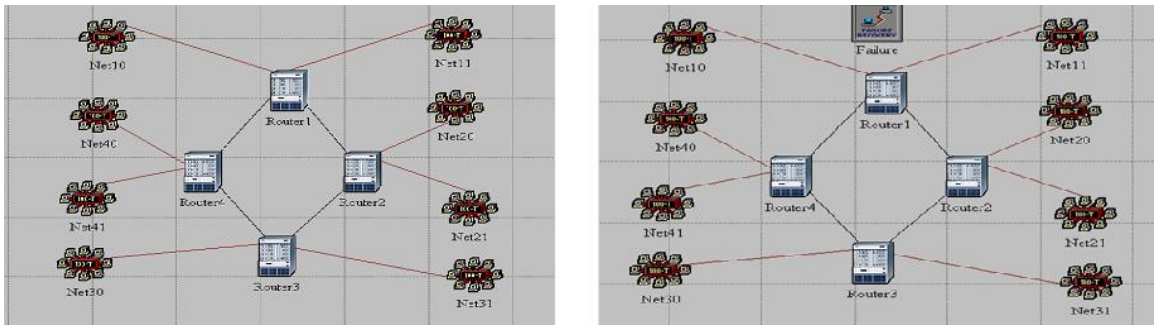

Fig. 1: Simulation Framework for RIP protocol

For OSPF protocol:

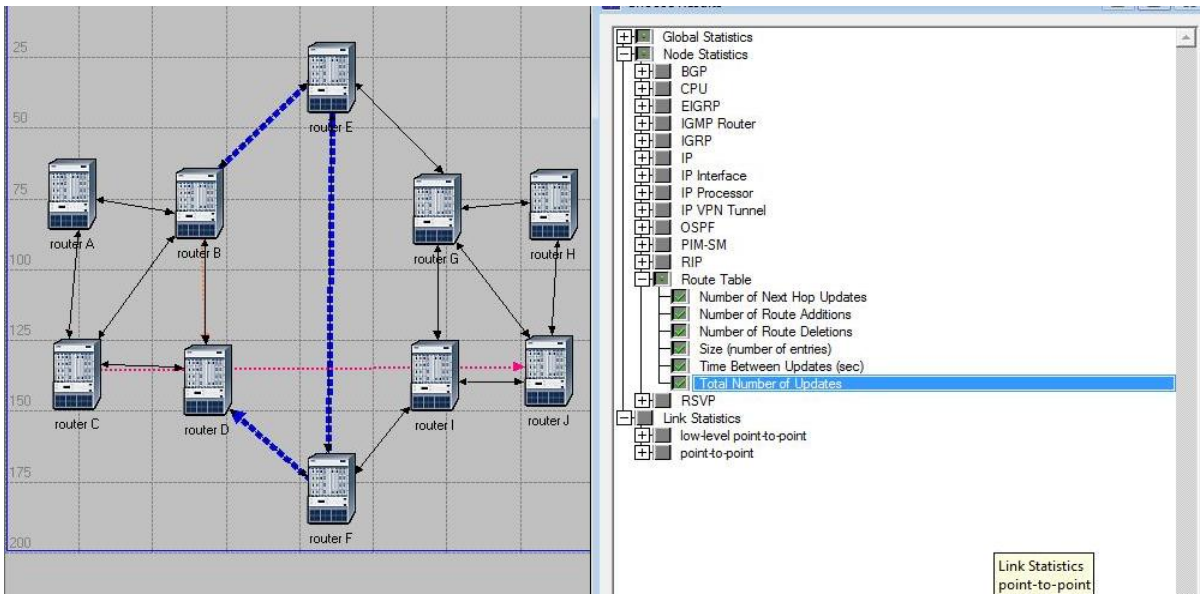

Fig. 2: Simulation Framework for OSPF protocol

Results:

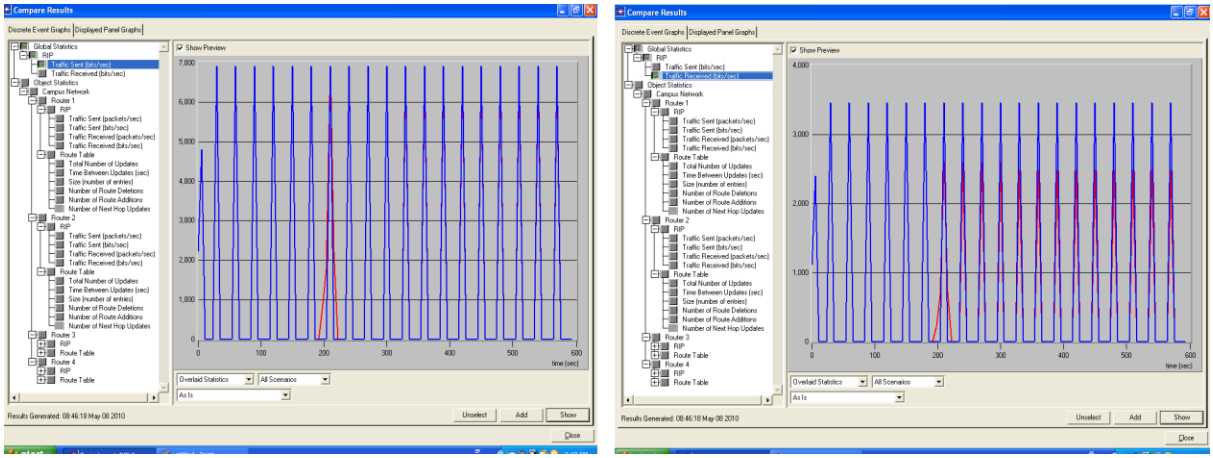

Fig. 3: RIP traffic sent and received

For Router 1 in RIP:

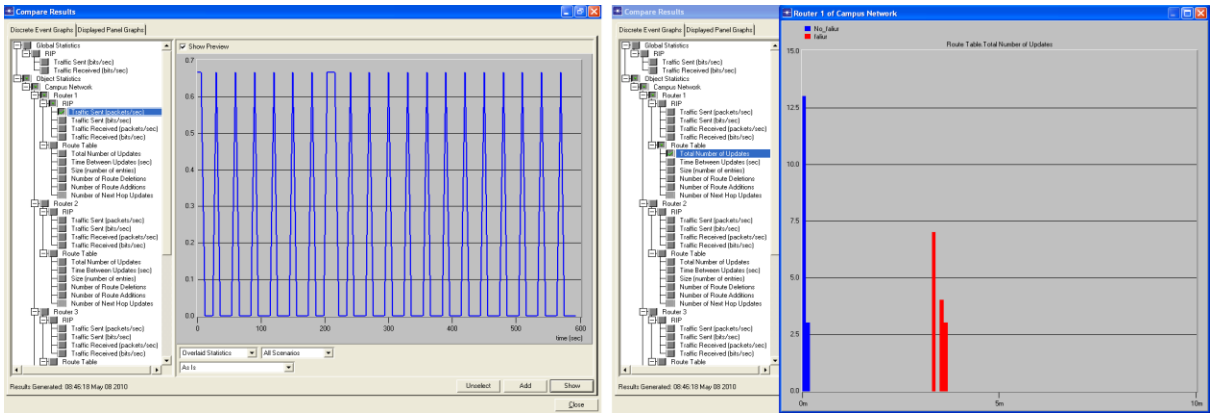

Fig. 4: RIP traffic sent and Total No of update for Router1

For Router 2 in RIP:

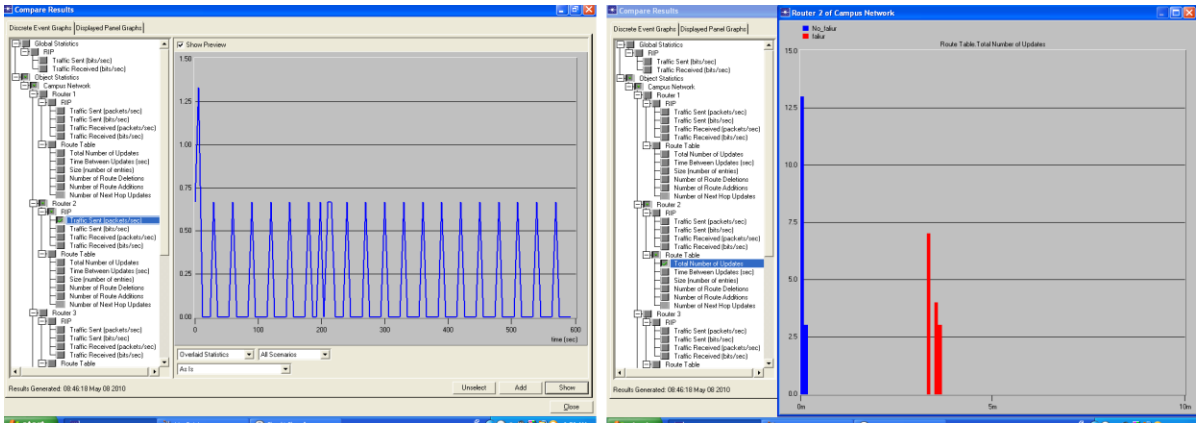

Fig. 5: RIP traffic sent and Total No of update for Router2

For Router 3 in RIP:

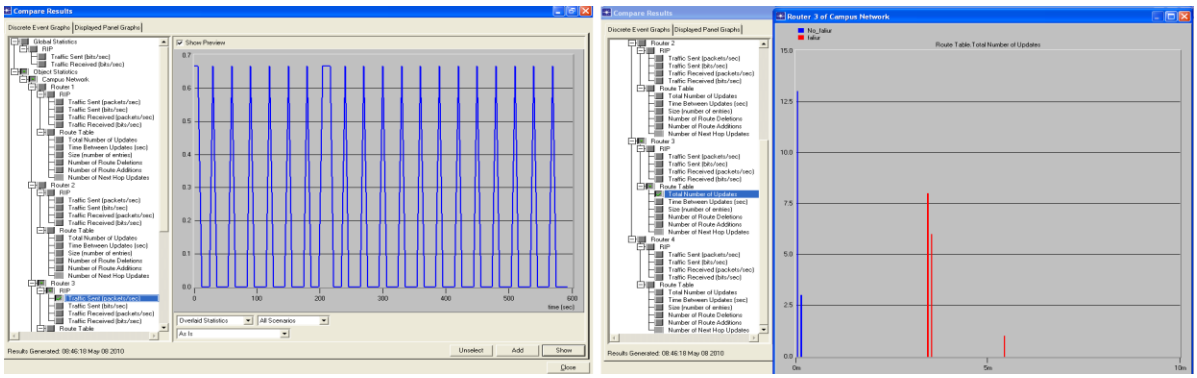

Fig. 6: RIP traffic sent and Total No of update for Router3

For Router 4 in RIP:

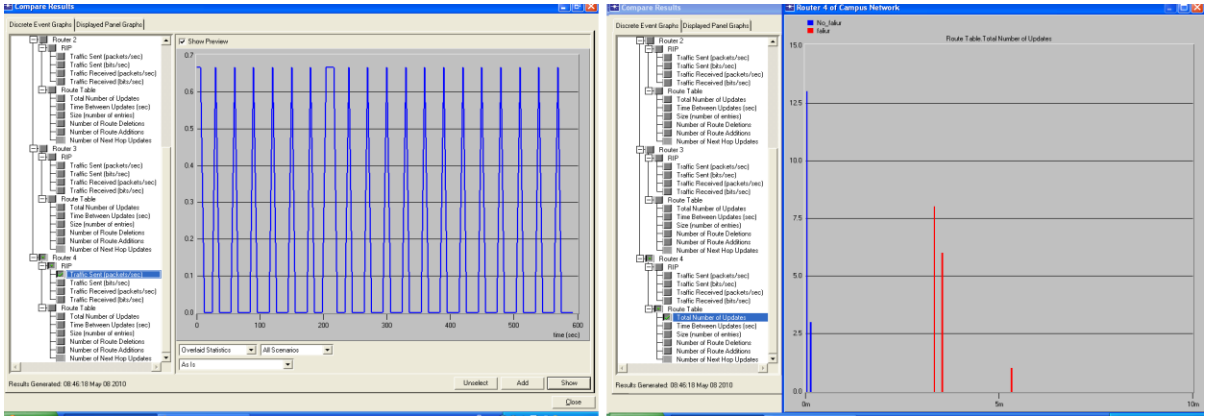

Fig. 7: RIP traffic sent and Total No of update for Router4

COMPARISON BETWEEN RIP AND OSPF RESULTS

Total no. of Updates:

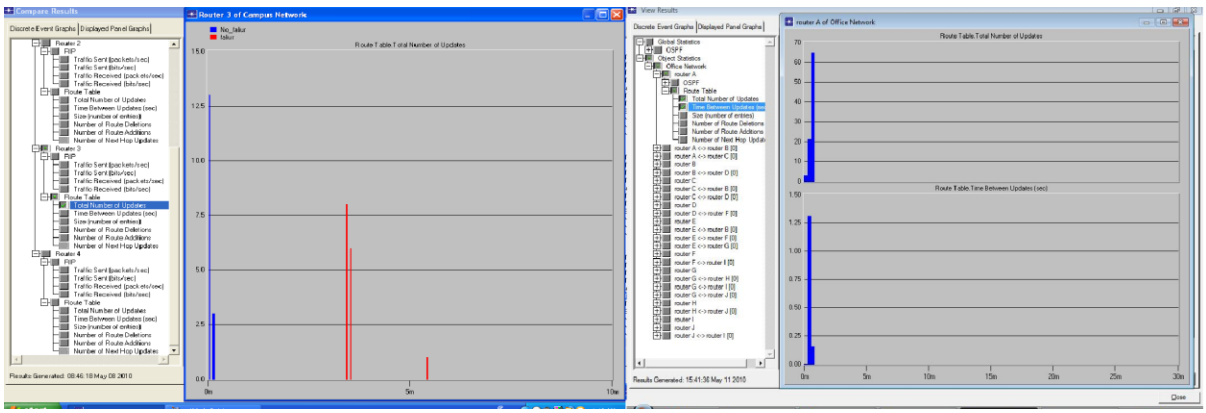

Fig. 8: Comparison between RIP and OSPF :-Total no. of Updates

Traffic Sent and Received (Global):

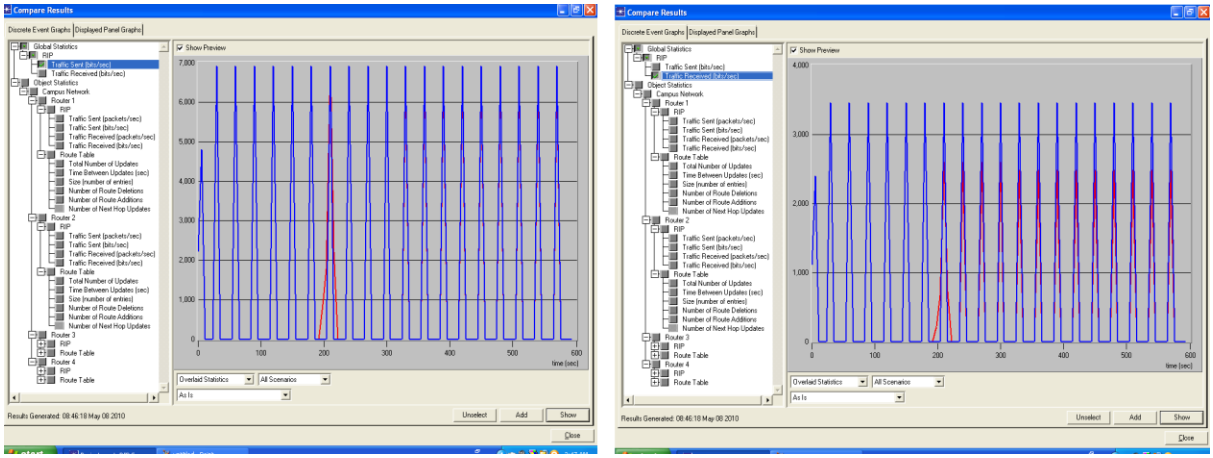

Fig. 9: Traffic Sent and Received for RIP protocol

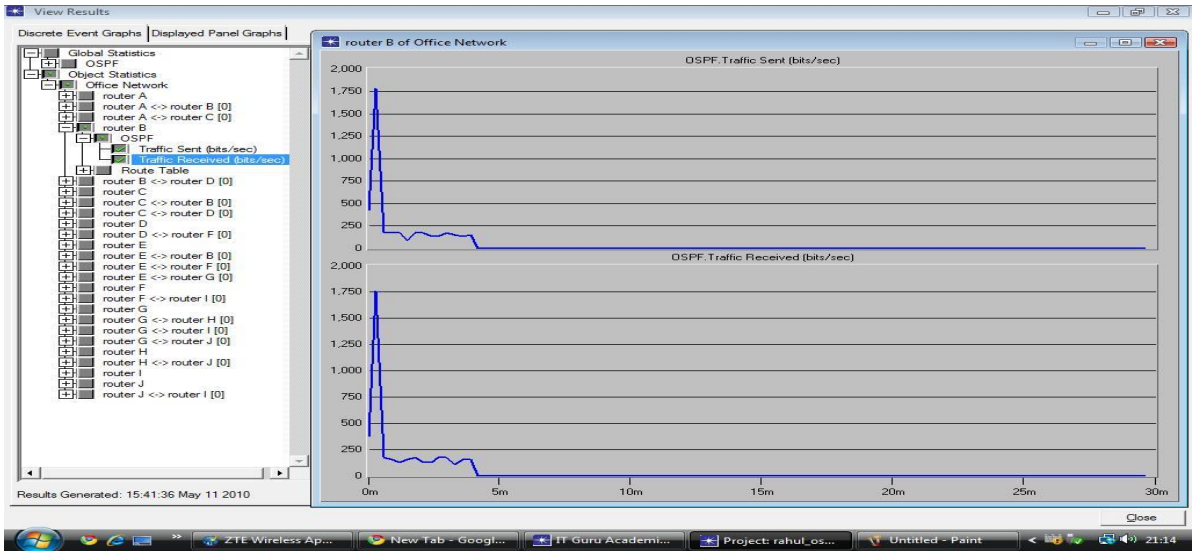

Fig. 10: Traffic Sent and Received for OSPF protocol

FUTURE WORK

1- Here we are using opnet educational version, we extend to implement this project work on other simulator such as NS2,qualnet,opnet version 14 etc to monitor some parameter like delay,thoughput,failure etc .

2- With these parameter we can extent to compare this work on other simulators and compared various factors and we are able to announce which simulators are best suited for network layer protocols.

CONCLUSION

Parameters	RIP	OSPF
Traffic sent(global)	linear	Non linear
No of route addition	less	More
No of route delection	less	more
Type of routing	Distance Vector routing	Link State routing

Table 1: Conclusion

REFERENCES

1. http://www.atis.org/tg2k/_computer_network.html Computer network definition.
2. http://www.bellevuelinux.org/network.html Computer networks defined.
3. http://www.pcmag.com/encyclopedia_term/0,2542,t=internet&j=54184,00.asp "internet " defined.
4. Andrew S. Tanenbaum, Computer Networks (ISBN 0-13-349945-6).
   The Synchronization of Periodic Routing Messages, S. Floyd & V. Jacobson, April 1994.
5. www.opnetstudy.com.
6. www.opnettools.com.
7. http://www.cisco.com/en/US/docs/ios/iproute/command/reference/irp_osp2.html#wp10 12171.
8. http://web.bilkent.edu.tr/Online/Gated/copyright-ospf.html | GateD R3_5_6 OSPF Copyright.
9. http://www.opnet.com/university_program/itguru_academic_edition/
10. http://www.cisco.com/
11. http://www.webopedia.com/TERM/D/diffusing_update_algorithm.html.
12. http://www.hoggnet.com/Documents/RoutingProtocolComparison.doc.
13. http://technet.microsoft.com/en-us/library/cc758398.
14. Wikipedia.com.