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DESIGN AND IMPLEMENTATION OF IPV4 ROUTING INFORMATION PROTOCOL

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ABSTRACT

This paper describes the concept of Routing Information Protocol(RIP) provides the standard IGP protocol for local area networks and provides great network stability, guaranteeing that if one network connection goes down the network can quickly adapt to send packets through another connection.RIP uses Hop Count as it's only metric. The maximum number of hops allowed for RIP is 15. Comparison of different parameters of the network such as total number of updates for the routing table, time between updatesare discuss in this paper. Comparative results also show that the failure of one node has a greater impact over the performance of the network. Computer simulations for all the cases are carried out using OPNET software and experimental resultsare presented. Hence, it is found that this protocol is very useful application layer protocol used in IPv4 routing for the tracking packet routing information.

KEYWORDS: Computer Labs, Graphical User Interface (GUI), Optimized Network Engineering Tool (OPNET), Routers

INTRODUCTION

Internet Protocol is part of the Internet suite of communications protocols that provides globally unique addresses in dotted quad notation, transmits data in packets and performs routing between IP based networks. Every machine on the Internet has a unique identifying number, called an IP Address. . The Routing Information Protocol (RIP) is a distance-vector routing protocol. The hold down time is 180 seconds.

Jukka Manner et.al (2002) discussesabout the quality of service (QOS) in providing internet protocol (IP) based service in wireless and wired networks [1]. Hongzhi, Qin Wang (2006) introduced a kind of SS (star-subnet) NOC architecture. Based on CLICHE structure NOC in which all the nodes are organized in regular grid topology constant shape as well as orientation.Authors concluded through OPNET simulation results shows that SS NOC has less end-to-end delay than CLICHE NOC and the load of routers in SS is less than twice of that of CLICHÉ [2].. Therefore, when the inputs are non-stationary, the adaptive filtersJing-Bo-Xia et.al (2008) realized that there has been some disadvantage in traditional "special line" networking, IP network, frame relay and the ATM network [3].OPNET is used to investigate the various parameters of routing information protocol, due to its user friendly interface using graphical user interface

METHODOLOGY

A network is designed using the OPNET Simulator for the analysis of Routing Information protocol consisting of computer labs having 10 computers in each lab connected to routers, which are connected to another routers. The network for the problemis as shown in figure 1.

Here, four routers router1, router2, router3 and router4 are connected to each other in a sequence as shown below in figure1. Router1 is connected to router2 and router4, router2 is further connected to router1 and router 3.Router3 is again connected to router4 and router2.

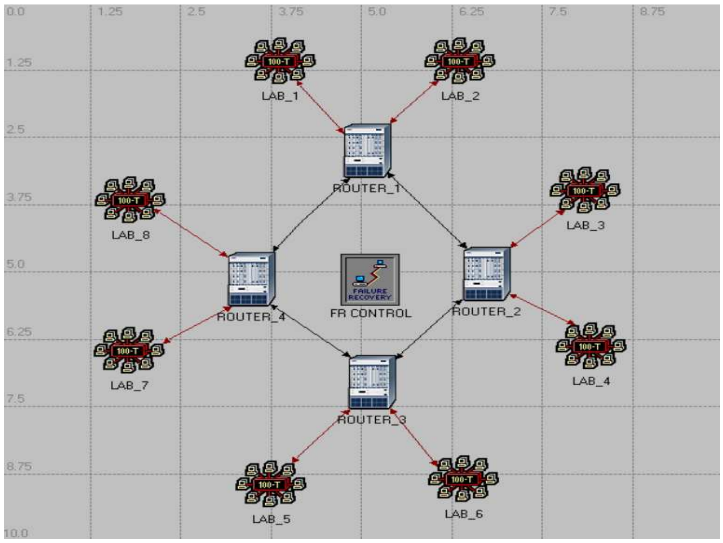

Figure 1: Network Design

Lab1 and Lab 2 each consisting of 10 computers are connected to router1. Lab3 and Lab4 consisting of 10 computers each are connected to router2. Lab5 and Lab6 consisting of 10 computers each are connected to router3. Similarly, Lab7 and Lab8 consisting of 10 computers each are connected to router4.

The two network scenarios namely scenario1 and scenario2 have been compared in this work. In scenario1 Failure Recovery control is set to disabled. In scenario2, Failure Recovery Control is enabled with Failure time set at 100 seconds and recovery time at 200 seconds to analyze the effect of collision and node failure due to varying network load conditions and their effect on the performance of the network.

Figure 2.shows the time average of Total number of updates of routing table for all routers of Scenario 1.In scenario 1Failure Recovery Control is set to disabled.

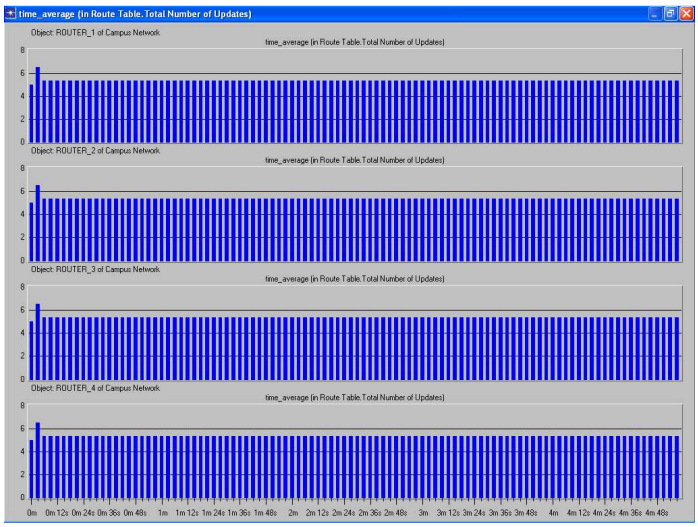

Figure 2: Shows the Time Average of Total Number of Updates of Routing Table for All Routers of Scenario1

Figure 3. Shows the time average of Total number of updates of routing table for all routers of Scenario2.In scenario 2.It is considered that the working of one router fails due to congestion in network after 100 seconds of the simulation run time. The failure of a node may occur due to the congestion in the network or due to overload in the network. There are few other reasons like network structure or prevailing environment variables which may force the network node to failure.

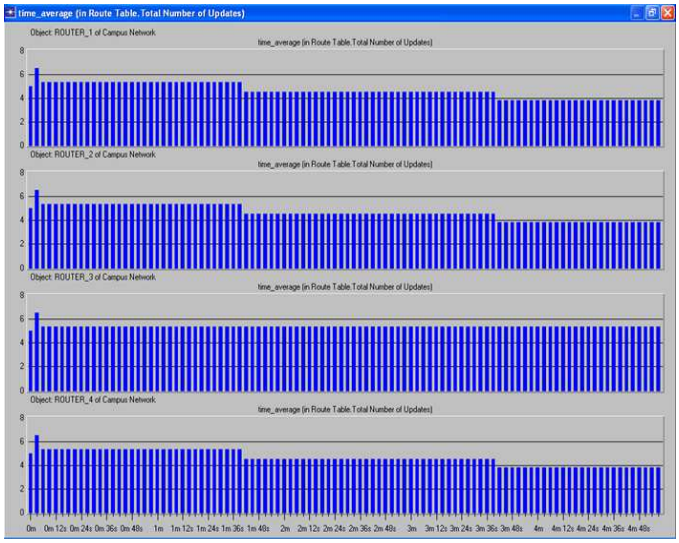

Figure 3: Shows the Time Average of Total Number of Updates of Routing Table for All Routers of Scenario2

SIMULATION TECHNIQUES

Optimized Network Engineering Tool (OPNET) modeler is the commercial network simulator tool that works on Pseudo Random Number Generator (PRNG) algorithm for carrying out simulations. The tool provides a Graphical User Interface (GUI) and works on Windows and UNIX environment. It supports three levels of modeling example that includes process level for analyzing different networking objects, node level that helps to connect objects to form a communicating device, network level to build network of communicating devices and project level that beholds different scenarios of same network and helps comparing them for most efficient and robust network designing.

In this work, OPNET is used to investigate the various parameters of routing information protocol, due to its user friendly interface using graphical user interface. It is built on C++ platform and provides a virtual environment for modeling, analyzing and predicting the performance of networks. It includes scope for accurately modeling applications, servers and a wide variety of networking technologies.

RESULTS AND DISCUSSIONS

A network is designed using the OPNET simulator for the analysis of Routing Information protocol.

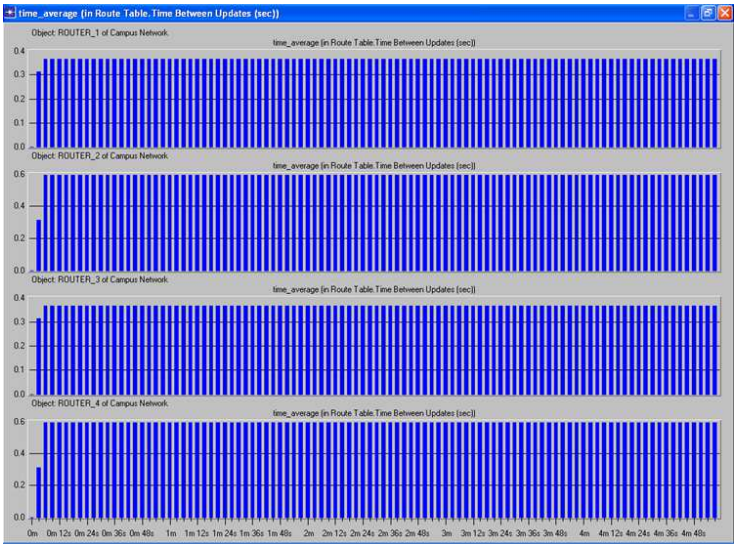

Figure 4: Shows the Time Average of Time between Updates of Routing Table for All Routers of Scenario1

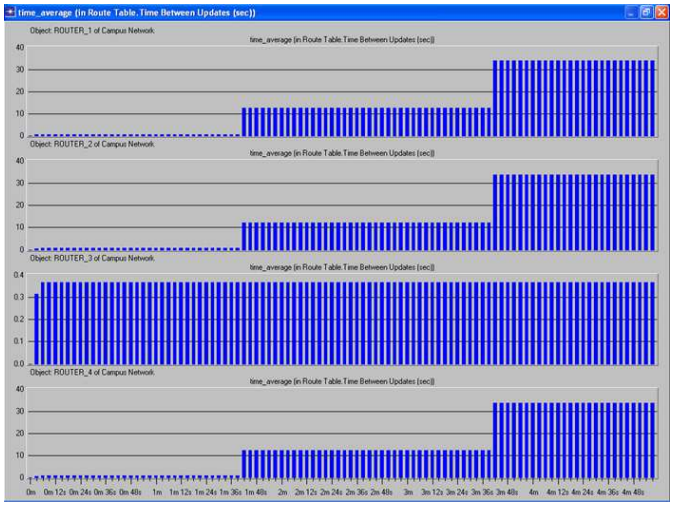

Figure 5: Shows the Time Average of Time between Updates of Routing Table for All Routers of Scenario2

Figure 4 & Figure 5 Shows the time average of time between updates of routing table for all routers of Scenario 1 and Scenario 2. Comparison of time between updates for different routers and the router with node failure shows the significant change in the time between updates. This shows that due to the failure of a node or link in the network, there are various types of changes that occur in the network.

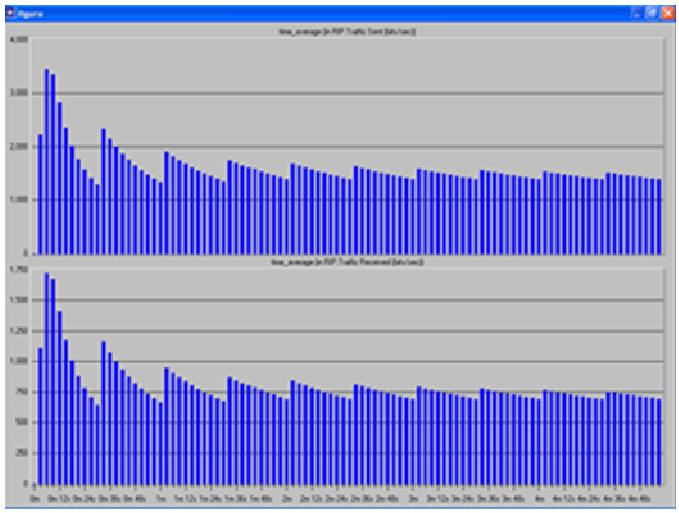

Figure 6: Shows the Time Average of RIP Traffic Sent and Received for Scenario1 in Bits/Sec

The comparison of different parameters of the network namely total number of updates for the routing table, time between updates has been done. The routing information protocol traffic sent and traffic received have also been compared. Comparison of routing information protocol traffic shows that almost 40 percent of the traffic is lost while reaching the destination.

The simulation results show that the traffic sent by the router in both the scenarios is same except for the router 3 which fails at 100 seconds simulation time. The result shows that due the failure of a network node, the traffic between the nodes in the network is affected considerably.

Comparison of time between updates for different routers and the router with node failure shows the significant change in the time between updates, which again shows that due to the failure of a node or link in the network, there are various types of changes that occur in the network.The failure of a node may occur due to the congestion in the network or due to overload in the network

CONCLUSIONS

In this study, we presented Routing Information Protocol compared for analyzing the performance of the given network. The comparative results show that the failure of one node affects the performance of the network.There is almost negligible effect on the traffic sent and traffic received in case of nodes where there is no failure, but there is a significant change in the traffic received and sent at the node, where failure occurs at given time interval. There is significant change in number of updates for routing table for failed node of the networkand similarly, due to the failure in the network, the total number of updates for all the routers in the network reduces. The failure of a node may occur due to the congestion in the network or due to overload in the network. Hence, it is found that this protocol is very useful application layer protocol used in IPv4 routing for the tracking routing information in computer networks.

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