Analysis of IG DV Protocols in MPLS Network for Quality of Video Conference

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Abstract. This paper analyzes the different Interior Gateway (IG) Distance Vector (DV) protocols like Routing Information Protocol (RIP), Interior Gateway Routing Protocol (IGRP) and Enchanced Interior Gateway Protocol (EIGRP) for MultiProtocol Label Switching (MPLS) network in video conference application. In telecommunication networks, delay is one of the major problems which leads the network to discard packets and in turn having a negative impact on a quality. The combination of MPLS prominent execution packet carrying technology along with IG protocol can reduce the packet delay in the network. The simulation results show that Enchanced Interior Gateway Routing Protocol (EIGRP) can be used for achieving better quality.

Keywords: IGP, MPLS, Video Conference, Routing Protocols.

1 Introduction

With increase in usage of computers, the number of users has also increased intensely. As a result, the users' demands of Type of Service (ToS) have also risen. Particularly services like Internet broadcasts; video conferencing etc have become one of the significant services in the users demand. Nevertheless, with increase in usage of internet the traffic has lowered the Quality of Service (QoS). This effect in turn has also affected the services that required guaranteed QoS like video conferencing. Even though Internet Protocols (IP) networks are very expandable and cheap, QoS and the embodiment of traffic engineering are problematic [1].

Multi-Protocol Label Switching (MPLS) is a new technology which provides a solution for effective traffic engineering to manage the growing bandwidth demands. In order to streamline and advance the process of exchanging of IP packets MPLS merges the layer-2 information of bandwidth, latency and utilization of network links with the control protocols used in layer-3 of IP. MPLS uses label switching for effective differentiation and forwarding of packets through pre-calculated routes in the network [2].

This paper analyzes the behavior of different Interior Gateway (IG) protocols which uses Distance Vector (DV) algorithm on MPLS network. It recommends which IG-DV protocol provides a better performance in MPLS network.

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The paper is structured as follows: Section II demonstrates with the background. Section III describes with the problem statement and main contribution. Section IV deals with problem solution and conclusion are presented in Section V.

2 Background

MPLS implemented networks enhance the video quality by reducing reasonable amount of packet delay. MPLS utilize the channel capacity efficaciously. It further increases the overall throughput thus results the efficiency of the network [1].

To increase QoS in a network under heavy load condition, a priority technique is applied to handle traffic in real time application such as Voice and Video Streaming [2].

The Fast Self-healing Distance Vector Protocol (FS-DVP) suppresses network failure via exchanging routing information within the network. In case of any network failure, it reroutes the packets to the destination. Thus it effectively handles the link problems and thereby increasing the routing stability [3].

3 Problem Statement and Main Contribution

Demands of real time application are increasing dramatically in MPLS networks like Voice over Internet Protocol (VoIP) and Video. The performance of the MPLS network is measured by the amount of traffic that is being carried by the link and utilization of network bandwidth. The routing techniques lay a way to achieve good performance in video conference application in the MPLS network. Which IG DV protocol gives a better performance for a video conference application in MPLS network? On analyzing the different IG DV protocols like RIP, IGRP, and EIGRP in MPLS network better performing protocol is selected based on the different parameters like throughput and end-end packet delay.

The main contribution of this paper is to implement different IG DV protocols like RIP, IGRP and EIGRP in the MPLS network and analyze the two different parameters like throughput and End to End packet delay for video conferencing application. This research idea is validated with help of network simulation tool called OPNET (Optimized Network Evaluation Tool).

4 Problem Solution

4.1 Modeling

The network model is implemented in OPNET presented in Fig.1. The MPLS network contains Label Switching Router (LSR) and Label Edge Router (LER). LSRs are core devices that switch packets, and LERs are edge devices that are connected

with external networks like R1 (Router 1) and R2 (Router 2) and determine the routes. When the server sends a packet to client, the packet reaches LER1 in MPLS network, after the addition of label it is forwarded through LSR1 and LSR2. When the packet leaves each MPLS router, the label of packet is replaced and forwarded to next hop address according to label information which is mentioned in the packet. The same process is done in a client to server communication.

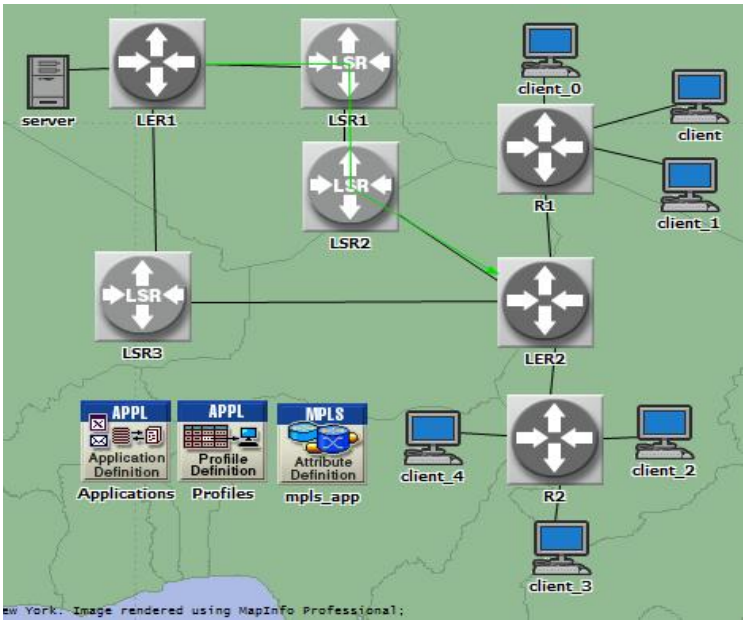

Fig. 1. MPLS Network Topology

4.2 Implementation and Validation

In the designed network, the RIP is activated first and then the simulation is started. The traffic in the network is observed for 40 minutes. Later, the other protocols like IGRP, EIGRP are activated one by one and the traffic in the network is observed for a time period of 40 minutes.

From Fig. 2, it is evident that there is a variation in delay in each scenario. With RIP, end to end packet has a delay of 4.7 seconds for the first 10 minutes of simulation run time and then there is a sudden increase in delay for 8 seconds and thereafter constant. While considering IGRP, end to end packet has a delay of 3.5 seconds for the initial 20 minutes of simulation run time. Consequently, it rises approximately to 7.2 seconds after which it remains constant. While considering the EIGRP, end to end packet delay maintains a constant value of 4.1 seconds after the first 2 minutes till the simulation run time.

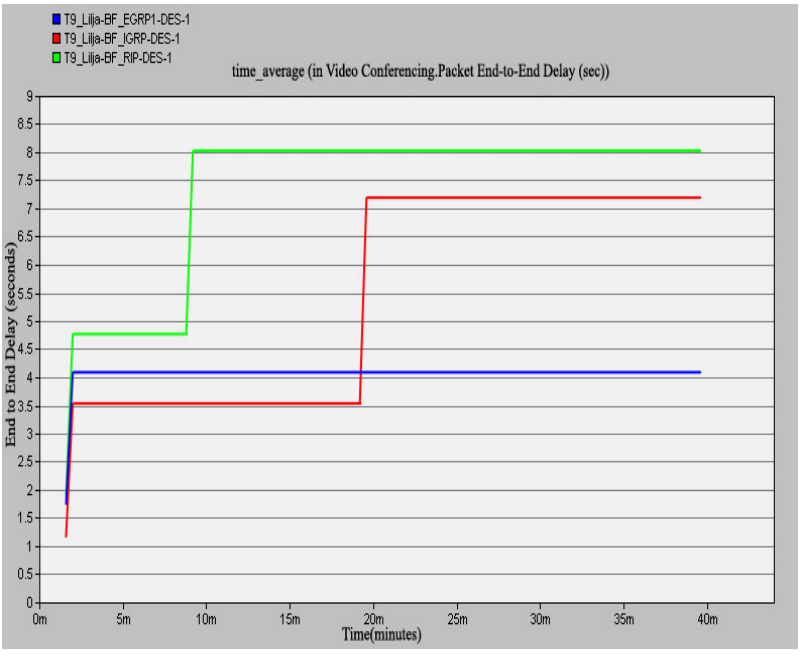

Fig. 2. Packet Delay in the network vs Run time of simulation

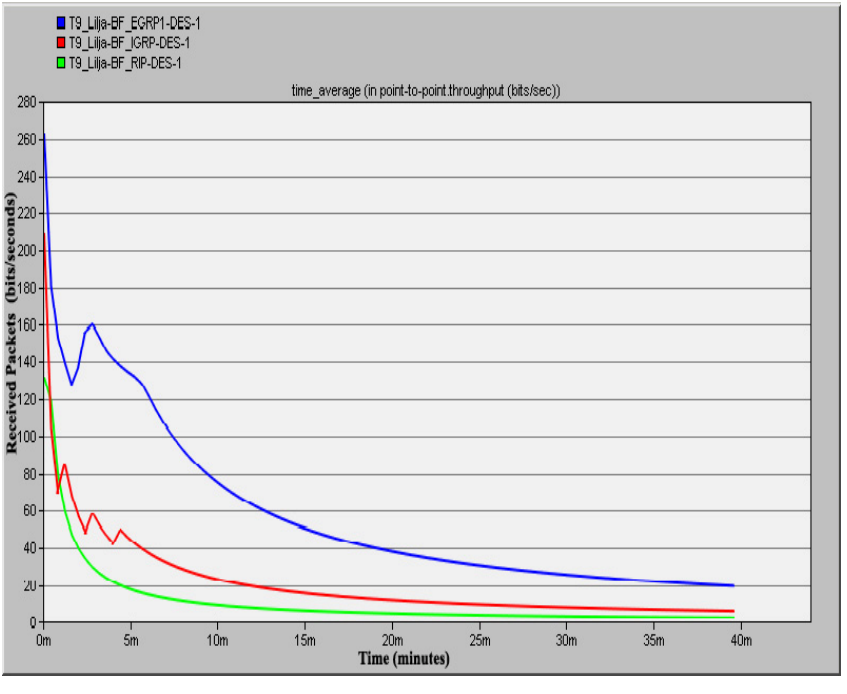

Fig. 3. Throughput vs Run time of simulation

From Fig. 3, it is noticeable that packet throughput is minified when embarking one of the simulations after traffic increased step by step. The packet forwarding is decreased as the traffic increases for RIP, IGRP and EIGRP. It can also be noted from Fig. 3 that EIGRP gives a better packet conduct when compared to the other two protocols namely RIP and IGRP.

5 Conclusion

This paper shows the performance analysis of MPLS network implemented with IG DV protocols such as RIP, IGRP, and EIGRP for video conferencing. From the simulation results it can be seen that EIGRP IG DV protocol provides less packet delay and better throughput than RIP and IGRP.

In Future this work can be extended in implementing the video conferencing application in the wireless networks and other real time applications like Multimedia, VoIP and Video Networks.

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