

A Comparative Analysis of Multimedia Traffic over MPLS Communication Network with Traffic Engineering: A Review

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Abstract— Now days MPLS technique are being used to improve the performance of IP networks. Data packets can be switched on the basis of destination address. Different features like traffic engineering (TE), QoS, and VPNs. TE is a key feature of MPLS. This feature plays a vital role in minimizing the congestion by efficient load balancing. This paper is comparative study between the conventional IP and MPLS in terms of delay variation, delay, page response time, throughput and packet drops.

Key words: Multiprotocol Label Switching (MPLS), Traffic Engineering (TE), Voice Over IP (VoIP), Internet Protocol (IP), Multiprotocol Label Switching Traffic Engineering (MPLS-TE), OPNET

I. INTRODUCTION

Now-a-days Internet is playing a vital role in most of the people's life due to wide variety of applications and services provided on Internet. The increased number of Internet users made the popular services Television and Telephone to use the Internet as a medium to reach their customers. However providing the Real-time applications on Internet is a challenging task for the conventional IP networks as it uses best-effort services which doesn't provides guarantee of services and Traffic Engineering (TE).

Multi-Protocol Label Switching (MPLS) is an emerging technology which plays an important role in the next generation networks by providing Quality of service (QoS) and TE. It overcomes the limitations like excessive delays and high packet loss of IP networks by providing scalability and congestion control. Due to the low latency and low packet loss during routing of packets MPLS is considered ideal for VoIP applications.

II. LITERATURE SURVEY

Yan Chen et al. proposed dynamic hierarchical mobile MPLS (DHMM) protocol for micro mobility management, at the same time facilitating the system with traffic engineering and QoS provisioning capabilities. [1]

Er. Sourabh Jain et al. propose a traffic aggregation based SIP over MPLS network architecture to integrate SIP protocol with the traffic engineering (TE) function of MPLS network seamlessly. [2]

Junaid Ahmed Zubairi et al. proposed we shift away from this overlay approach and address native IP multicast traffic engineering based on link state routing protocols. The objective is that, through plain Protocol Independent Multicast-Sparse Mode (PIM-SM) shortest path routing with optimized multi topology IGP (MT-IGP) link weights, the resulting multicast trees are geared towards minimal consumption of bandwidth resources. [3]

Aruna Kapoor et al. proposed a novel framework to provide an integrated QoS provisioning, where packet loss probability is guaranteed for the video traffic. The design

and implementation prototype is based on hyper chip PBR 1280 core router system. [4]

Mohanand Maswady et al. proposed a new mobility management scheme designed to track host mobility efficiently so as to minimize both handoff latency and signaling cost. Building on and enhancing Mobile IP and taking advantage of MPLS traffic engineering capability, three mechanisms (FH-, FC- and MFC-Micro Mobile MPLS) are introduced. [5]

III. IP NETWORKS

Internet Protocol (IP) allows a global network among an endless mixture of systems and transmission media. The main function of IP is to send the data from the source to destination. Data is sent in the form of packets. All the packets are routed through a chain of routers and multiple networks to reach the destination.

In the Internet each router takes independent decision on each incoming packet. When a packet reaches a router, depending on the destination address in the packet header the router forwards the packet to the next hop by consulting its forwarding table. The process of forwarding the packets by the routers is done until the packet reaches the destination.

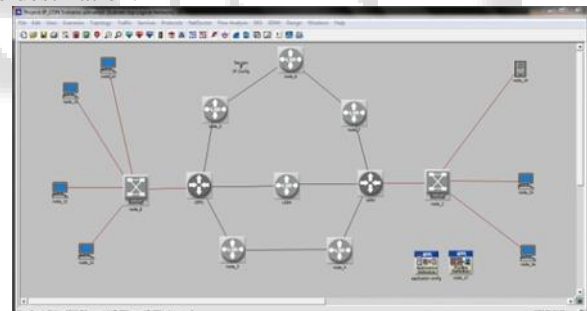


Fig. 1: Architecture design of Traditional IP

IV. MPLS NETWORK

Multiprotocol Label Switching (MPLS) is an evolving technology for high performance packet control and forwarding mechanism for routing the packets in the data networks.

MPLS has evolved into an important technology for efficiently operating and managing IP networks because of its superior capabilities in providing traffic engineering (TE) and virtual private network (VPN) services. MPLS is not a replacement for the IP but it is an extension for IP architecture by including new functionalities and applications. The main functionality of the MPLS is to attach a short fixed-label to the packets that enter into MPLS domain.

A label is a short fixed entity with no internal structure. Label is placed between Layer2 (Data Link Layer) and Layer3 (Network Layer) of the packet to form Layer 2.5

label switched network on layer 2 switching functionality without layer 3 IP routing.

V. METHODOLOGY

Research work mainly focuses on comparative analysis of MPLS over non-MPLS networks. Our contribution is to design a network model using OPNET modeler for comparing VoIP and video Conferencing traffic performance in addition to normal data FTP(File Transfer Protocol) on both MPLS and non-MPLS networks.

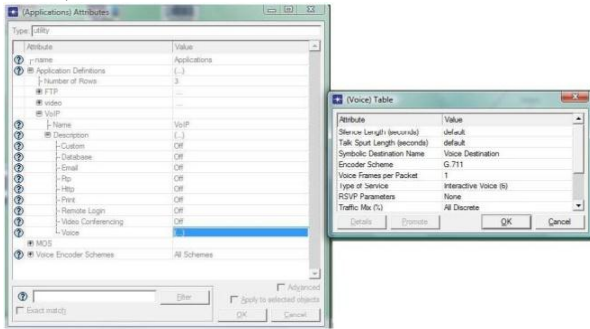


Fig. 3: Application configuration settings

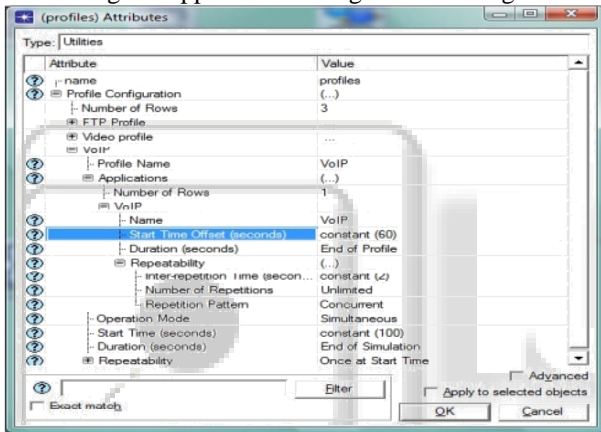


Fig. 4: Application configuration settings

VI. RESULT

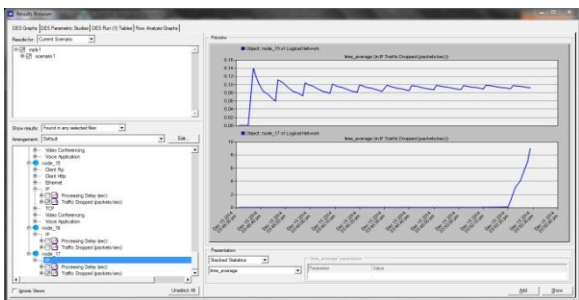


Fig. 5: Node 17(comparative analysis)

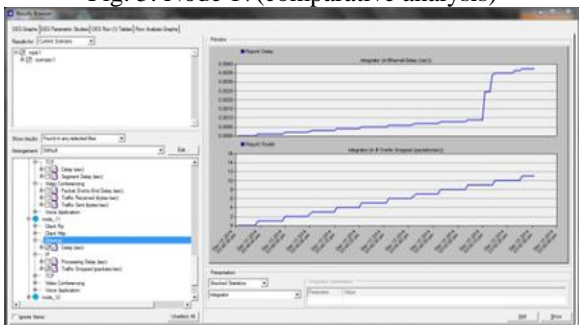


Fig. 6: Node 11(comparative analysis)

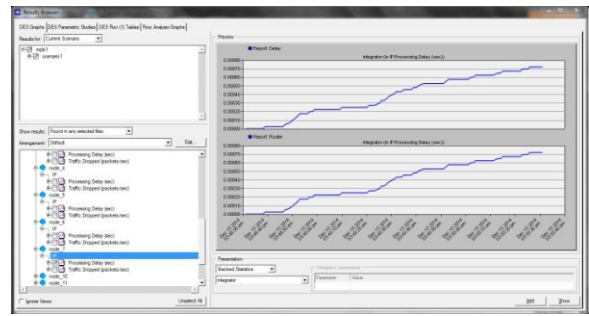


Fig. 7: Node 7(comparative analysis)

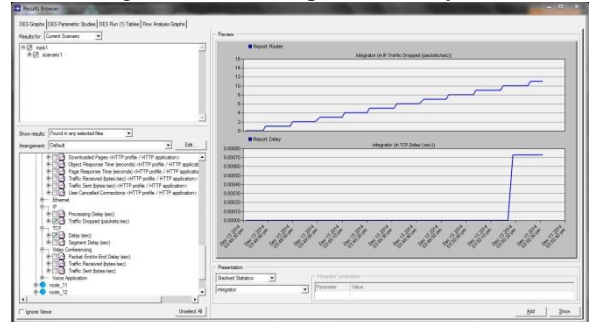


Fig. 8: Node 10(comparative analysis)

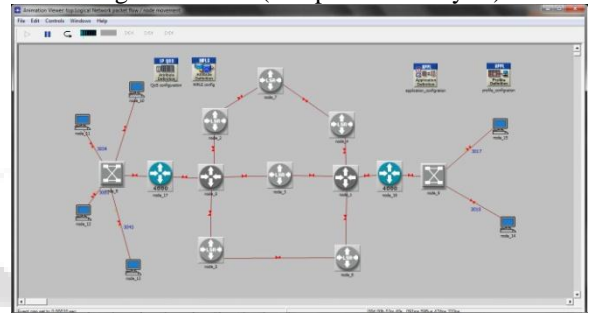


Fig. 9: 2-D animated scenario- showing data packets flow

VII. CONCLUSION

The main objective of the thesis is based on the performance analysis of conventional IP network and MPLS network in respect of VoIP traffic. Routers in MPLS take less processing time in forwarding the packets. Implementing of MPLS with TE minimizes the congestion in the network. MPLS suffers minimum delay and provides high throughput compared to conventional IP networks.

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