ASSOCIATION OF MPLS_TE AND DIFFSERV TO AMELIORATE THE QOS IN MPLS ARCHITECTURE

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Abstract- MPLS is a network architecture that ensures data forwarding by using a system of « label » which allows to provide a system based on packet switched service and unifies data transport. The power of MPLS is to offer several applications, for example QOS, TE and VPN etc. The QOS involves ensuring the expected performances for a given traffic network. There are several kinds of performances such as throughput, transmission delay jitter, etc. As for Diffserv model, it consists in gathering the flows classes so as to associate them with predefined QOS. Through this research after defining the quality of service , presenting the specificities of MPLS technologies and their impact on the protocols, we will present a solution to MPLS problem with efficient quality of service based on current protocols and their extension (LDP, CR- LDP, RSVP, RSVP-TE etc.) Finally, we will present different solutions corresponding to the following models : MPLS, MPLS-DiffServ, MPLS-TE and combination of(MPLS_DiffServ and MPLS-TE).

Index Terms- QOS,MPLS- LDP,RSVP- RSVP-TE- DiffServ CR-LDP.

I. INTRODUCTION

THe evolution of telecommunications world towards the new generation of networks and services, is nowadays, a strong tendency which arouses most actor's interest. The techniques used in network cores and the backbone networks, have been in permanent evolution until the MPLS [1] protocols were standardized and developed. Multiprotocol label switching (MPLS) is often considered as one of the main technologies which implement the quality of service in the networks at packet-switch However, MPLS was initially developed by IETF to establish a common standard for IP packages transport on sub-networks using switched mode. MPLS networks are positioned so as to make possible a traffic engineering (MPLS-TE) [2] of networks of packet-switch the aim of MLPS is to give IP routers higher power of switching in this operation the routing decision as based on information of a label (tag) inserted between layer2and layer3.

II. OVERVIEW

MPLS network architecture uses LSR (label switch router) and LER (label edge router), the LSR is an equipment of MLPS network core. This is a router or a switcher which carry-out the switching on the labels . LER is an LSR that Do the interface between an MPLS field and the outside world. There are two types of LER .In MPLS architecture a FEC is the representation of the whole packages transmitted by the same manner and follow the same way within the network and have the same priority The packages of the same FEC will be routed on the way called label switched path (LSP)[3] by employing signaling protocols like LDP [4]. The introduction of Multi-Protocol Label Switching (MPLS) as a part of the Internet forwarding architecture has immediate applications in traffic engineering (TE) By employing signaling protocols like RSVP-TE [5] or CR-LDP [6] and Quality of Service (QOS) with Diffserv [7] or Intserv[8] .

III. STIMULATION

In this paper, we have evaluated the QOS[10] performance measures such as delay variation, delay, response time, throughput, for different types of traffics (data, voice[11] and video) for MPLS and MPLS/DiffServ and combining(MPLS_DiffServ / MPLS-TE) platforms. It would be interesting to compare QOS performance of MPLS networks and MPLS_DiffServ networks and combination of(MPLS_DiffServ /MPLS-TE) networks given their particular constraints, using the well known network simulator application "OPNET MODELER 14.5 [9]" .

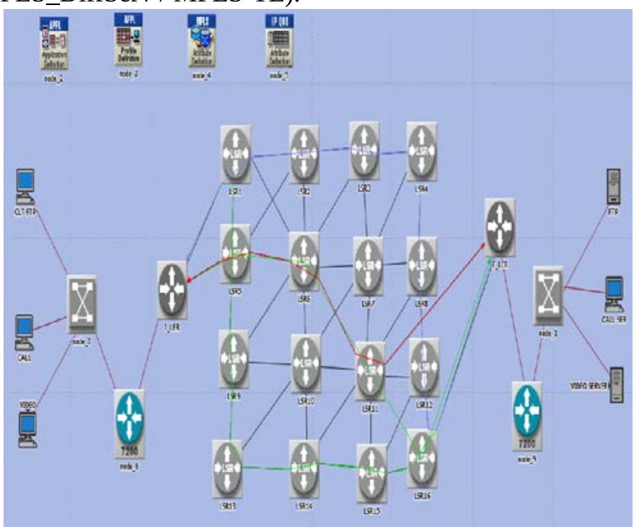
Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

A. OPNET MODELER 14.5 MODELER 14.5

OPNET MODELER 14.5 MODELER 14.5 is a modeling and simulation software family of networks addressing itself to different public such as the companies and the operators researchers. OPNET MODELER 14.5 MODELER 14.5 is the academic version of this family, it makes possible modeling and studying communication networks, equipment, protocols and applications with ease and upgradability. OPNET MODELER 14.5 MODELER 14.5 is used by the most performant technological companies, to speed up their processes of researches and development. The directed approach associated object to integrate graphic editors of OPNET MODELER 14.5 MODELER 14.5 makes easy the equipment and network composition, which allows to realise easily a correspondence between a system of information and a corresponding model. OPNET MODELER 14.5 MODELER 14.5 is based on a series

B. Tobology

In this paper,is that we have designed and built a MPLS network with 16 LSR and 2 LER (Fig1) ,and 3 applications: Voice , FTP and video conferencing, to simulate a 3 real scenarios : MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE).



C. Configuration

- Source of traffic

3 applications: Voice , FTP and video conferencing

- DSCP to EXP Mapping

We use the table of mapping DSCP to EXP in order to ensure a continuity of service between networks IP (representing the lans) and MPLS network (representing the Opérateur network).

- Definition of the FEC

The ToS field of packages IP can also be configured with approach DSCP(Tab1) (Differentiated Services Do not code) [RFC 2474] used with networks IP supporting the architecture of Diffserv quality of service.

Type of flow	DiffServ	Codepoint DSCP	commercial Name
Traffic network (routing,control	CS7, CS6	56, 48	Critical/network
voice	EF	46	Premium
video conferencing	AF41, AF42, AF43	34, 36, 38	Platinium
Road marking voice	AF31, AF32, AF33	26, 28, 30	Gold
Critical	AF21, AF22, AF23	18, 20, 22	Silver
Priority	AF11, AF12, AF13	10, 12, 14	Bronze
Standard	CS0	0	Best effort

Tab1

- Definition of the Trunk Traffic

The Trunk Traffic is a concept bound to TE, the FEC associates a traffic to a Trunk Traffic which itself is associated to LSP.

- Association of FECs or traffic trunk to LSP

FTP Traffic will be conveyed through the LSP: LSP 1 (I_LER1→LSR2→LSR3→LSR4→LSR8→LSR12→LSR16→E_LER)

Voice Traffic will be conveyed through the LSP 2 (E_LER→LSR1→LSR5→LSR6→ LSR11→LSR→E_LER)

video Traffic will be conveyed through the LSP 3(E_LER→ LSR5→LSR9→LSR13→LSR14→LSR15→LSR16→E_LER

- Activation of MPLS

The activation of MPLS differs according to the site from the router in the backbone, in the 16 routers P we activated MPLS on all the interfaces while in the 2 routers PE, MPLS is activated only on the interfaces binding this router to the routers P. We chose protocol LDP to distribute labels MPLS for MPLS without QOS, MPLS_diffserv and CR_LDP for MPLS_TE.

IV. RESULT

Some of the results are presented against simulation time and some against network load. The results of comparing and evaluating these three core networks (MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)) through well know QOS parameters . Choosing the performance parameters such as End-to-End delay, throughput, voice jitter, packets sent and packets received. All the results are analyzed and shown graphically.

Analysis of the traffic FTP

(Blue : MPLS_Diffserv, Red :MPLS,Green : combination ofMPLS_Diffserv /MPLS_TE)

The results shown in the Fig.2 and Fig.3 are the performance metrics obtained for MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

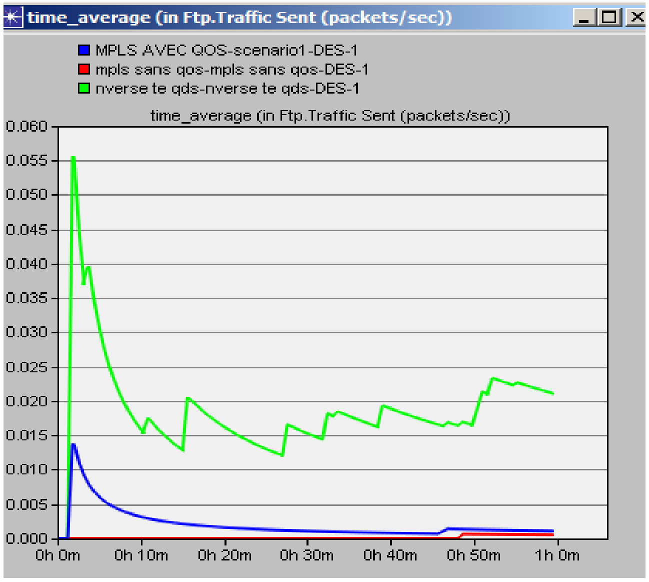


Fig.2 FTP traffic sent

The Fig.2 shows the traffic sent of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

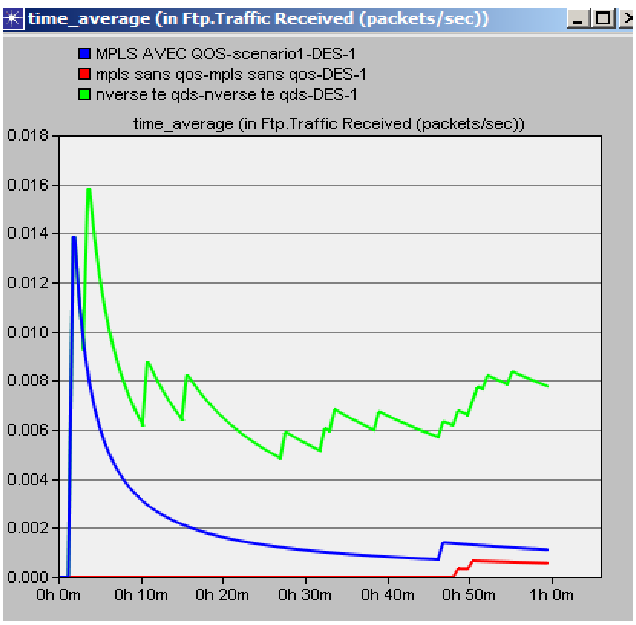


Fig.3 : FTP traffic received

The Fig.2 shows the traffic received of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

From the graphs Fig.2 and Fig3 it is observed that there is an increase in the performance when the FTP traffic is transmitted using combination of (MPLS_DiffServ / MPLS-TE).

Analysis of the traffic voice

(Blue : MPLS_Diffserv, Red :MPLS,Green : combination ofMPLS_Diffserv /MPLS_TE)

The results shown in the Fig.4, Fig.5 and Fig.6 are the performance metrics obtained for MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

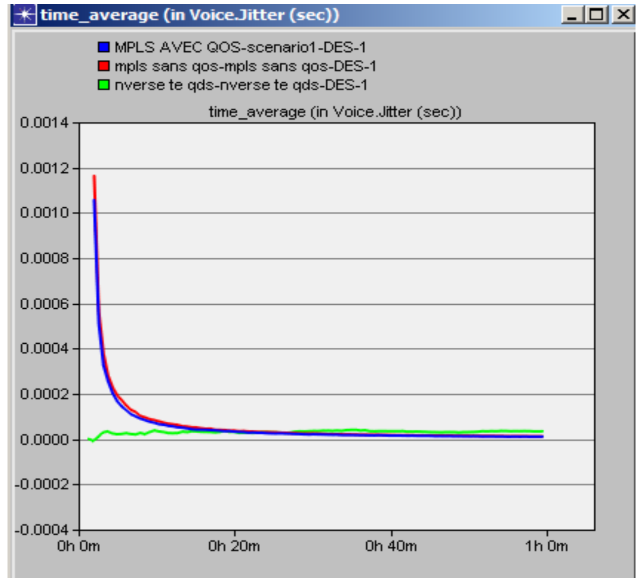


Fig.4: Voice packet jitter

The Fig.4 shows the packet jitter of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

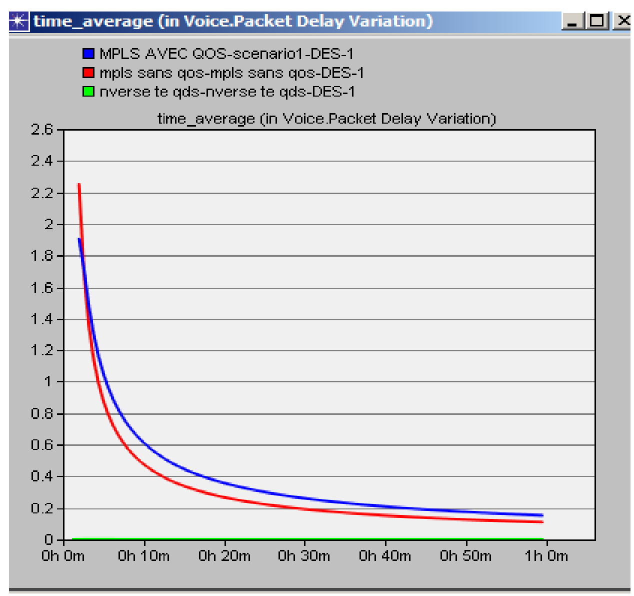


Fig.5: Voice packet delay variation

The Fig.5 shows the packet delay variation of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

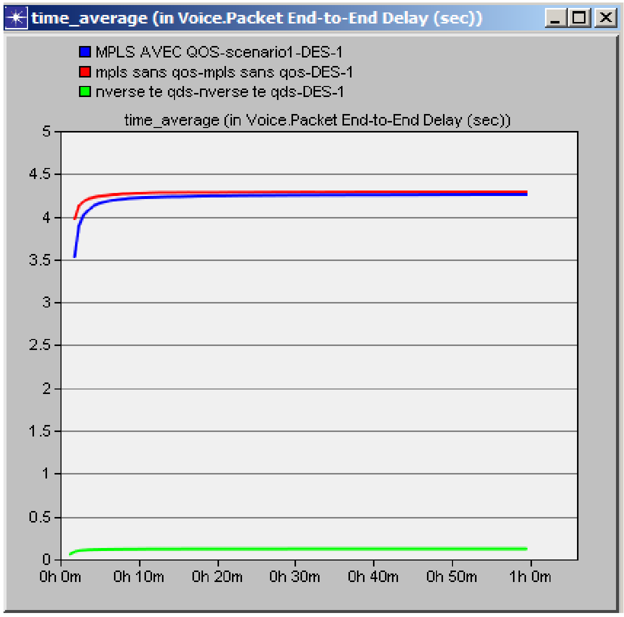


Fig.6:Voice packet End-to-End Delay

The Fig.6 shows the packet end-to-end delay of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

The results shown in the Fig.4, Fig.5 and Fig.6 are the performance metrics obtained for MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE). From the graphs it is observed that there is an increase in the performance when the voice traffic is transmitted using combination of (MPLS_DiffServ / MPLS-TE)

Analysis of the traffic video conferencing

(Blue : MPLS_Diffserv, Red :MPLS,Green : combination ofMPLS_Diffserv /MPLS_TE)

The results shown in the Fig.7 and Fig.8 are the performance metrics obtained for MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

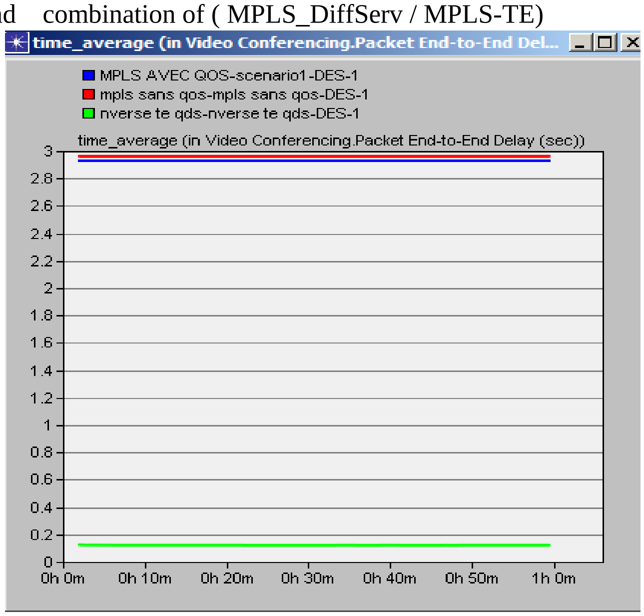


Fig.7: video conferencing packet End-to-End Delay

The Fig.7 shows the packet end-to-end delay of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

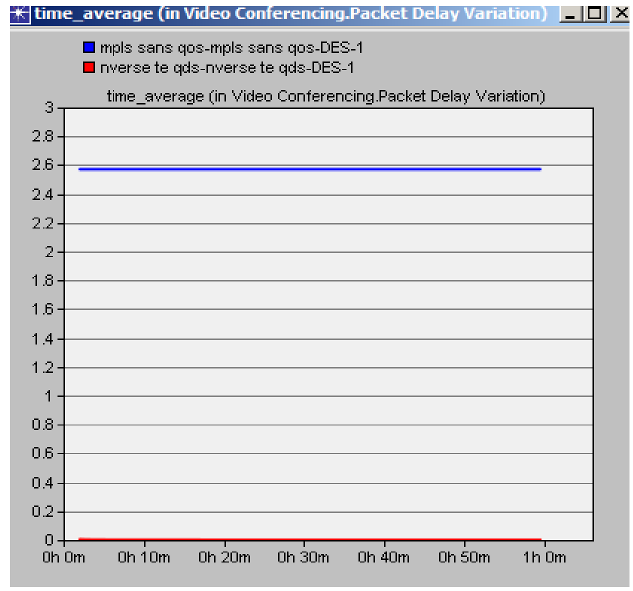


Fig.8: video conferencing packet delay variation

The Fig.8 shows the packet delay variation of MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE)

The results shown in the Fig.7 and Fig.8 are the performance metrics obtained for MPLS and MPLS/DiffServ and combination of (MPLS_DiffServ / MPLS-TE). From the graphs it is observed that there is an increase in the performance when the video conferencing traffic is transmitted using combination of (MPLS_DiffServ / MPLS-TE)

V. CONCLUSION

The performance analyzer three scenarios is made on focusing on the performance metrics such as Voice jitter, Voice/video conferencing packet delay variation, Voice/video conferencing End-to-End delay, FTP packet sent and received. Based on the simulation results it can be concluded that combination of (MPLS_DiffServ / MPLS-TE) provides a better solution for QOS in MPLS architecture , (MPLS_DiffServ / MPLS-TE) combination of presents a very attractive strategy for the service providers network because it is possible to ensure the division of load and the quality of service requested by the customers. However, the management of this type of network is not a simple task and cannot be realized manually.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

Acknowledgment

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments.

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