Sudan University of Science & Technology

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QOS Performance Analysis in deployment Differentiated Service with Multiprotocol Label Switching for Voice over IP

أداء وتحليل جودة الخدمة عند تطبيق تميز الخدمة مع تقنية التبديل متعدد البروتكولات بأستخدام المؤشرات لحزمة الصوت عبر بروتوكول الانترنت

A thesis submitted in partial to fulfillment of the requirements for the degree M. Sc in Electronics Engineering (Communications)

By:

Nura AbdAlrhman Alhaj Alsharief Mahmoud

Supervisor:

Assoc. Prof. Rashid A. Saeed.

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الاية

(يرفع الله الذين آمنوا منكم والذين أوتوا العلم درجات)

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Dedication

I dedicate this project to my family whom strongly stand with me in every step without surrender.

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It is great pleasure to acknowledge the help of many individual whom their afford and advice strongly support this research.

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Abstract

Multiprotocol label switching is a technology use to forward traffic by using a label added to packet header, it's better than routing protocols which do not use network resources efficiently, DiffServ has ability to prioritize traffic depends on packet header information. MPLS and DiffServ are independent techniques, but they can work together to improve the performance of network.

The aim of thesis is to enhance the QOS for voice over IP packets to facing minimum delay and minimum loss, this achieve by prioritize voice packet in MPLS network.

Scenarios are designed by using a simulator called OPNET, three scenarios are simulated, first scenario is Multi-Protocol Label Switching, second is MPLS with Differentiated Services (DiffServ) with weight fair queuing, the third is MPLS-Differentiated Services FIFO queuing.

The study prove that MPLS-DiffServs WFQ is better than MPLS and MPLS-DiffServs FIFO in performance, bandwidth, minimum end to end delay, minimum loss, jitter and high throughput.

المستخلص

التبديل متعدد البروتكولات بإستخدام المؤشرات هي تقنية تستخدم لارسال البيانات بإستخدام المؤشرات التي تضاف لعنوان الحزمة, هي افضل من بروتكولات التوجية التي لا تستخدم المصادر الشبكة بكفاءه. تميز الخدمة لديه الامكانية لإعطاء اولويه للبيانات اعتماداً علي معلومات عنوان الحزمة. التبديل متعدد البروتكول بإستخدام المؤشرات وتميز الخدمة تقنيتان مستغلاتان عن بعضهما لكن يمكن ان يعملا مع بعضهما لتحسين الاداء في الشبكة.

الهدف هو تحسن من جودة الخدمة لحزمة الصوت عبر بروتكول الانترنت لكي تواجه اقل تاخير واقل فقد, وذلك ينجز باعطاء اولويه لحزمة الصوت في شبكة تبديل متعدد البروتكولات بإستخدام المؤشرات.

صمننا النماذج بإستخدام برنامج محاكاه يسمي الابونت. ثلاثة نماذج صممت, اول نموذج تبديل متعدد البروتكولات بإستخدام المؤشرات والثاني تبديل متعدد البروتكولات بإستخدام المؤشرات و تميز الخدمة ونوع صفوف الوزن العادل و الثالث هو باستخدام تبديل متعدد البروتكولات بإستخدام المؤشرات مع تميز الخدمة وصف الواصل اولاً يخدم اولاً .

اثبتت الدراسة ان تبديل متعدد البروتكولات بـإستخدام المؤشرات مع تميز الخدمة و صفوف الوزن العادل افضل من تبديل متعدد البروتكولات بإستخدام المؤشرات و تبديل متعدد البروتكولات بإستخدام المؤشرات مع تميز الخدمةوصف الواصل اولاً يخدم اولاً من حيث الاداء,وافضل في عرض النطاق, اقل زمن تاخير في الحزم , اقل اختلاف في زمن التاخير , الفقد في الحزم و اعلي انتاجية.

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Abbreviation

CR-LDP	Constraint Based Label Distribution Protocol
CR-LSP	Constraint Based Label Switch Path
DiffServ	Differentiated Service
FEC	Forward Equivalence Class
FIFO	First in First Out
IETF	Internet Engineering Task Force
IPv4	Internet Protocol version 4
LDP	Label Distribution Protocol
LER	Label Edge Router
LFIB	Label forwarding information base
LIB	Label Information Base
LSP	Label Switch Path
LSR	Label switching Router
MPLS	MPLS Multiprotocol Label Switching
OSPF	Open Shortest Path First
QOS	Quality of Service
RSVP	Resource Reservation Protocol
TCP/IP	Transmission Control Protocol/ Internet Protocol
TE	Traffic Engineering
VOIP	Voice over Internet Protocol
WFQ	Wight Fair Queuing