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ABSTRACT

Ad Hoc Network is a multihop wireless network where all nodes cooperatively maintain network connectivity without a centralized infrastructure. The nodes participating in Ad Hoc Network operate both as hosts and as routers. The success of TCP in wired networks motivates its extension to wireless network.

In Ad Hoc network the standard TCP faces server performance degradation over multihop networks given the noise nature of wireless media as well as unstable connectivity conditions in place. This research presents a study for a modified TCP protocol in order to enhance the behavior of the protocol in Ad-hoc wireless networks.

Proposed two modification of the standard TCP by adjusting TCP's behavior during slow start and congestion avoidance phase's .The throughput of the proposed protocols has increased over the throughput of the standard TCP protocol. Glomosim simulator was used, which is one of known simulators for Ad-hoc wireless networks.

ملخص الرسالة

في مجال شبكات الحاسب تعرف الشبكات اللاسلكية ذاتية التنظيم بأنها عبارة عن شبكات مؤقتة تستخدم لربط عدة مستخدمين دون الحاجة إلى تحكم مركزي فكل حاسب بالشبكة يكون له القدرة على العمل كمضيف ومحدد مسار كما يكون عنده الاستعداد لتمرير الرسائل الأخرى.

ويعد بروتوكول نقل البيانات TCP من أهم البروتوكولات المستخدمة حاليا في الشبكات السلكية ونظرا للكفاءة العالية لهذا البروتوكول فإن العديد من الأبحاث تهتم بتحسين آداء هذا البروتوكول للعمل على الشبكات اللاسلكية ذاتية التنظيم.

ولقد تم تقديم مقترحين في هذه الرسالة لتحسين آداء بروتوكول نقل البيانات TCP للعمل على الشبكات اللاسلكية ذاتية التنظيم وخاصة تحسين عامل النفاذية Throughput وتم التأكد من الفاعلية من خلال المحاكي Glomosim الذي أعد خصيصا لمحاكاة الشبكات اللاسلكية ذاتية التنظيم.

وتم اختبار النتائج باستخدام بروتوكولين من أشهر بروتوكولات تحديد المسار وهما

١. Dynamic Source Routing (DSR)
٢. Ad Hoc on-demand Distance vector (AODV)

وقد أثبتت الدراسة أن آداء ابروتوكول نقل البيانات TCP قد تحسن تحسنا ملحوظا نتيجة التعديلين المقترحين في آداء البروتوكول، مما يسهم في دفع كفاءة عمل البروتوكول على الشبكات اللاسلكية ذاتية التنظيم.

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List of Abbreviations, Acronyms and Symbols

AP	Access Point
ACK	Acknowledgment
AODV	Ad-hoc On-demand Distributed Vector
AQM	Active Queue Management
ARQ	Automatic Repeat Request
ATCP	Ad hoc TCP
BER	Bit Error Rate
CF	Contention-Free
CFP	Contention-Free Period
CP	Contention Period
CRC	Cyclic Redundancy Check
CSMA/CA	Carrier Sense Multiple Access with Collision Avoidance
CTS	Clear to Send
CW	Contention Window
CWR	Congestion Window Reduced (CWR)
CWND	Congestion Window
DAA	Dynamic Adaptive Acknowledgment
DAAP	Dynamic Adaptive Acknowledgment plus
DCF	Distributed Coordination Function
DNS	Domain Name Server
DS	Distributed System
DSR	Dynamic Source Routing
ECN	Explicit Congestion Notification
ELFN	Explicit Link Failure Notification
FCS	Frame Check Sequences
FEC	Forward Error correction
FEDM	Fuzzy-based Error Detection Mechanism
FILO	First In Last Out
FTP	File Transfer Protocol
HMM	Hidden Markov Model
HTTP	HyperText Transfer Protocol
ICMP	Internet Control Message Protocol
IDD	Inter-packet Delay Difference
IED	Improved Error Detection
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IFS	Interframe Space
IP	Internet Protocol
ISN	Initial Sequence Number
LAN	Local Area Network
LDA	Large Delayed Acknowledgment

LRED	Link RED
MAC	Medium Access Control
MANET	Mobile Ad hoc Networks
MSS	Maximum Segment Size
NDUP	Number of duplicate ACKs (threshold)
NH	Number of Hops
OSI	Open Systems Interconnect
PC	Point Coordinator
PCF	Point Coordination Function
PER	Packet Error Rate
PLR	Packet Loss Rate
POR	Packet Out-of-order delivery Ratio
RED	Random Early Detection
RFC	Request For Comments
RFN	Route Failure Notification
RR	RTT increase Rate
RRN	Route Re-establishment Notification
RREP	Route Reply
RREQ	Route Request
RTO	Retransmit Timeout
RTS	Request to Send
RTT	Round Trip Time
RTTVAR	Round Trip Time Variation
RWIN	Receiver Window
SANET	Static Ad hoc Networks
SMTP	Mail Transfer Protocol
SRTT	Smoothed Round Trip Time
STT	Short Term Throughput
SWS	Silly Window Syndrome
TCP	Transport Control Protocol
TTL	Time to Live
WI-FI	Wireless Fidelity
WLAN	Wireless Local Area Network
WWW	World Wide Web
r	Transmit rate in Bytes/second
s	Packet Size in bytes
R	round-trip time in seconds
P	the loss event rate
tRTO	TCP retransmission timeout value in seconds
b	number of packets acknowledged by a single TCP acknowledgment