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New Design Strategy of a MAC protocol algorithm for wireless networks for better throughput

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Abstract:

Main focus of this paper is to design a new MAC protocol algorithm for better spatial reuse , better throughput and a smaller packet loss. It can be achieved by adjusting power if the number of neighbors increases. It has achieved with power adjustments by calculating number of neighbors in the one hop neighborhood. Existing IEEE standards and other related works are compared with our work and it concludes the proposed work is more adaptable.

Keywords: IEEE 802.11, neighboring nodes, MAC Protocol, Control Channel, bandwidth management method, distributed coordination function, transmission range.

Introduction

IEEE 802.11 is the basic standard for wireless networks in ad hoc mode.Wireless terminals are generally connected by batteries which provide limited transmission power and limited amount of energy. So it is proved to be essential for energy consumption in ad hoc networks. Many research methods suggested that power control protocols can achieve better power conservation. [1],[2],[3].

The simple method of energy conservation is to allow a node to enter a doze state by powering off its wireless network interface. A simple power control protocol is explained based on an RTS-CTS handshake of IEEE 802.11.[3]. With this scheme RTS/CTS are transmitted with DATA / ACK as the output.

The main aim of the proposed work is to adjust power if the number of neighbors increases in ordered to achieve better

Throughput, better spatial re use and smaller packet loss. If the number of neighbors are different from desired number of neighbors [$N_{m]}$,

Then we can adjust the power. This idea use power control instead of topology control specified in [4]. If the number of neighbors is greater than the desired number then the closest neighbors are retained as neighboring nodes. The proposed algorithm did not use any purging techniques but adjust the power. The proposed work we have made comparisons of the proposed MAC protocol algorithm with IEEE 802.11 and the other research work [4].

Materials and Methods:

Many power control mechanisms are identified but each one had own drawbacks. The work specified in [5] allows a node to specify its present transmit power level in the transmitted RTS and allows other receiver node to include a desired transmit power level in the CTS. In the protocol specified in [6] used to send RTS and CTS packets at the highest power level while the data and ACK may be sent at the lowest power level. The power control protocol mentioned in [7] uses one control channel and multiple data channels. A control channel is used to assign data channels to nodes. PARO[8] chooses a cost function based on the transmit power level at each hop on a route to determine a low energy consuming route between a paid of nodes. COMPOW [9] selects a common power level at all nodes in the network to ensure bi-directional links. IEEE 802.11 leads to unfairness for nodes which use lower transmission power then these neighbor nodes. Poojary et al [10] propose a scheme to improve the fairness. The protocol [11] achieves energy conservation by dynamically adjusting the transmission range on fly at each

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node and thereby increasing spatial re use of the spectrum.

A Acharya et al [12] proposed an adaptive solution in which RTS – CTS packets are transmitted with lower power level on the first t attempts. Algorithm [13] proposes an efficient bandwidth management method on channel allocation procedure. Giridhar et al [14] proposed bandwidth allocation for wireless data multi cell environment and has explained different optimization techniques.

Power control protocol

Generally Power control can reduce energy consumption. Power control may introduce different transmit power levels at different hosts, creating an asymmetric situation where a node P can reach node Q, but Q cannot reach P.

When P is transmitting a packet to Q, this transmission may not be sensed by R and S. So, when R and S transmit to each other using a higher power, their transmissions will collide with the on-going transmission from P to Q.

One basic solution is to transmit RTS and CTS at the highest possible power level but transmit DATA and ACK at the minimum power level necessary to communicate. The RTS-CTS handshake is used to decide the transmission power for subsequent DATA and ACK packets.

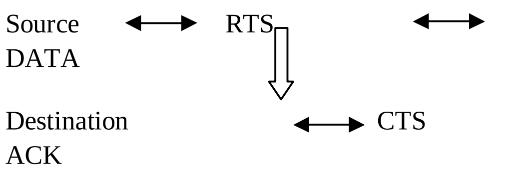

Fig: Source and Destination nodes transmit RTS and CTS

IEEE 802.11 MAC Protocol

IEEE 802.11 MAC protocol uses two medium access protocols namely, distributed coordination function and point coordination function. Distributed coordination function is developed based on Carrier Sense Multiple Access with Collision Avoidance. Distributed Coordination function defines the following terms in a fully distributed scheme.

1. Carrier sensing zone:

In this zone the node sense the signal but can not decode it correctly. Carrier sensing zone does not include transmission range.

2. Transmission Range:

Here the node can receive and correctly decode packets from the sender node. The proposed work uses 265 m as the transmission range.

3. Carrier Sensing Range:

Nodes in this range can sense the sender's transmission.Generally carrier sensing range is greater than the transmission range [15].

Every node specified in IEEE 802.11 maintains Network Allocation Vector which defines the left over time of the on going transmission sessions. Generally nodes used to update their Network Allocation Vectors whenever they receive a pocket.

Proposed work:

This paper can estimate how many neighbors it has in its one hop neighborhood based on selectively detected signals are by the table created by routing mechanism. If the number of neighbors increases we decrease our power and with the number of neighbor's decreases we increase our power. The proposed algorithm is specified as follows

If $[N_C<=N_M)$

$P_{TR}=P_{MAX}$

IF $(N_C> N_M)$

$X=N_C/N_M$

$PD=IF(N_M <N_{M-1})$

$P_{TR}=P_M-P_{DS}$

else $if(N_M==N_{n-1})$

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break;

Where NC = number of current neighbor

N_M =number of maximum neighbor

N_M =number of m neighbor

N_{n-1} =number of n-1 neighbor

P_{TR} =transmission power history

PD =desired transmission power

P_{MAX} =maximal transmission power

Results:

This work has been implemented on network simulator version 2 and the results has been specified with simulation charts. The performance of the proposed work is analyzed with the existing methods.

The proposed work includes the following performance metrics:

1. Packet loss

2. Average throughput measured in Mbps

3. Average delay and

4. Total packets received.

Our work is compared with IEEE 802.11 's distributed coordination function. It is noticed from our work that our work proves to be fair then the IEEE 802.11 protocol with a packet size of 524.

	Proposed work	IEEE 802.11
1.Throughput (Mbps) Pockets received	0.01462 9203	0.00261 2453
Delay in Sec	0.0267	0.6520
Pocket Loss	0.00423	0.22277
2.Throughput(Mbps) Pockets received	0.07234 7590	0.05789 6320
Delay in sec	0.0457	0.1762
Pocket Loss	0.03467	0.08862
3.Throughput (Mbps) Pockets received	0.12386 8990	0.06369 7770
Delay in Sec	0.0222	0.0846
Pocket Loss	0.00156	0.04622
4.Throughput (Mbps) Pockets Received	0.12578 8899	0.05412 6010
Dealy in sec	0.00147	0.14672
Pocket Loss	0.00903	0.14221

Table: Results of the proposed work compared with IEEE 802.11

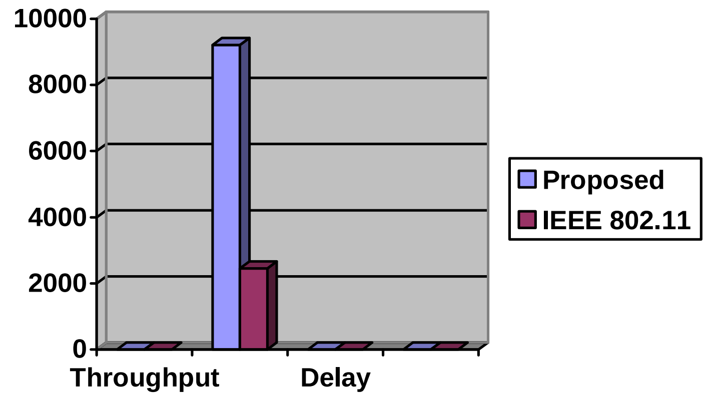

Chart 1 for sample1

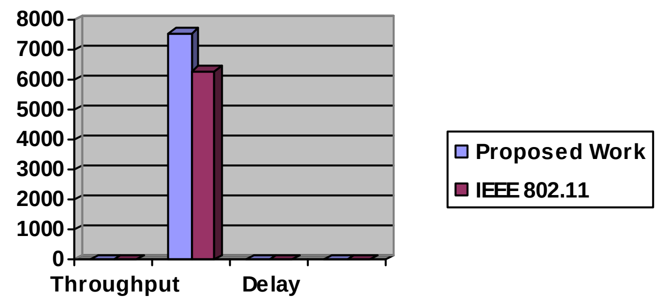

Chart 2 for Sample2

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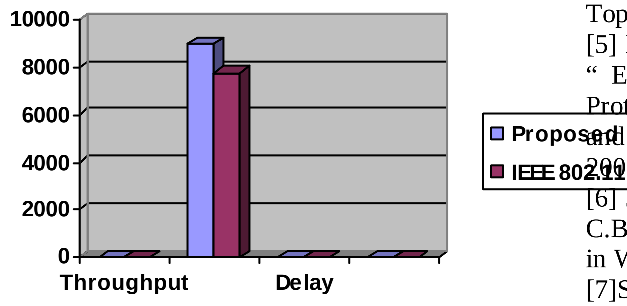

Chart 3 for Sample 3

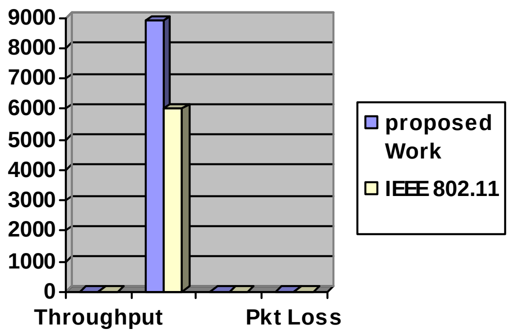

Chart 4 for Sample 4

Conclusion

In this paper we have proposed a new MAC protocol algorithm which is compared with the standard IEEE 802.11. Our simulation results shows that the multihop wireless network topology can be controlled with different transmission power on different power changes. Our work is compared with IEEE 802.11 's distributed coordination function. It is noticed from our work that our work proves to be fair then the IEEE 802.11 protocol with a packet size of 524.

References:

[1] P.Karn,MACA- a new channel access method for packet radio. ARRL/CRRL Amateur Radio 9th Computer Networking Conference, 1990.

[2] S Agarwal, S Krishnamurthy, R.H Katz, S K Dao, Distributed power Control in Ad-hoc wireless Networks, PIMRC, 2001.

[3] E.S Jung, N H Vaidya, A Power Control MAC Protocol for Ad Hoc Networks, MOBICOM, Sept,2002.

[4] P C Gurumohan, T J Toylor, V R Syrouiuk," Topolgy Control for MANETs", Atlanta,2004.

[5] M B Pursley, H.B Russel and J S Wysocarsi. " Energy- Efficient Transmission and Routing Protocols for Wireless Multiple-hop Networks and Spread – Spectrum Radios". EUROCOMM, 2000.

[6] J Gomez, A.T Campbell, M Naghshineh and C.Bisdikian. " Conserving Transmission Power in Wireless Ad Hoc Networks". ICNP, Nov 2001.

[7]S-L Wu, Y-C Tseng, C-Y Lin and J-P Sheu, " A Multi Channel MAC Protocol with power control for Multi-Hop Mobile Ad Hoc Networks". The Computer Journal (SCI) 45(1):101-110,2002.

[8]] J Gomez and C.Bisdikian. " Conserving Transmission Power in Wireless Ad Hoc Networks". ICNP, Nov 2001.

[9] S Narayanswamy, V Kawadia, R S Sreenivas and P R Kumar, " Power Control in Ad Hoc Networks: Theroy, Architecture, Algorithm and Implementation of the COMPOW Protocol". European Wireless 2002.

[10] N Poojary, S V Krishnamurthy and S Dao, " Medium Access Control in a Network of Ad Hoc Mobile Nodes with Heterogeneous Power Capabilities". IEEE International Conference on Communications(ICC 2001) Volume 3, Pages 872-877, 2001.

[11] E. Poon, B Li " smart Node: Achieving 802.11 MAC Interoperability in Power – efficient Ad HocNetworks with Dynamic Range Adjutments", ICDCS May 2003.

[12] A Acharya, A Mishra and S Bansal, " MACA-P: A MAC for concurrent Transmissions in Muti Hop Wireless Networks", IBM Research report, RC22528, July 2002.

[13] K Madhavi, K Sandhya Rani, P C Reddy and Dr Giridhar Akula," Bandwidth Allocation for wireless Data Dissemination in Multi- Cell Environments Using Optimization Techniques, International Journal of Advanced Networking and Applications, Vol03, Pages 1180-1183,2011.

[14]] K Madhavi, K Sandhya Rani, P C Reddy and Dr Giridhar Akula " An Approach for efficient bandwith management based on hands off channel allocation algoritm" , Indian Journal of Computing Technology, 2011.

[15] A Kamerman and L Monteban, " Wavw LAN –II: A High Performance Wireless LAN for the Unilicensed Band", Bell Labs Technical Journal, 2(3), Summer 1997.