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REACTIVE LINK INTERFERENCE MONITORING TO IMPROVE NETWORK CAPACITY IN MANETS

Mohammed Jawaharin Basha
PhD Research Scholar (ECE) -PP ECE.0088
Rayalaseema University, Kurnool, AP, Indian

Dr. Shah Aqueel Ahmed
Professor (ECE)

***Abstract*— Mobile Ad hoc networks is a wireless infrastructure less network composed of mobile wireless heterogeneous devises communicated each other through radio communication channel. If communicating nodes in a radio a range of each other communicate directly, but if they are not in a radio range then they rely on neighbor nodes for communication by forming multi hop peer to peer network model. Radio communication channels are frequency bands and are disparate from one another by guard bands. If more than one device transmits data through identical channel simultaneously, then the data could not properly received at destination end due to interference. This situation network greatly effect on network performance. In this paper we enhance the network throughput by link status based on power consumption. Performance results shows that our work is enhance the network performance by forwarding the packets through the appropriate link, which has less congestion and energy consumption.**

Keywords— **MANETs, Capacity, Interference, Power**

I. INTRODUCTION

A wireless mobile ad hoc network [8, 10] is an infrastructure less, multi hop, peer to peer and distributed heterogeneous network. Devises in a network are placed with network intelligence with self configuration and organization capabilities. Communication between devises is 2performed through radio communication channel either directly or using multi-hop depends on their locations. Devises in a network contains constraint recourses such as bandwidth, memory, processor and power. Due its characteristics, MANETs could deploy the place where network infrastructure difficult to deploy and cost and time effective and application includes military area and disaster recovery. Transmitted packets in MANET received by number of nodes in its vicinity, which may create signal interference at transmitting node's neighbors. Interference is the phenomena, when multiple signals received by receiving node simultaneously from different transmitters. Interference causes the quality degrades of signals, collision, congestion and network performance degrading with respect to throughput and energy. Devises in MANETs are energy powered and tolerate from network lifetime and it could not be possible to recharge or replace the batteries during the communication mission. Therefore, energy consumption is much challenging topic and it is directly affect and control by interference. Managing interference will leads to quality of signal strength, decrease the collision and improve the network throughput.
Paper organization is as follows

II. INTERFERENCE IN MANETS

As nodes in a network are heterogeneous, and thus transmission ranges of each nodes are vary depending on their attributes. Variations in these transmission ranges of different nodes introduce the issue of interference. Much interference is caused by high transmission range devises; however less transmission range devises may not participate in communication. Mutual interference [1] is caused from simultaneous transmission & received signal intensity enclose with the MANETs. The major performance degradation of MANETs is resolute by mutual interference. Throughput of MANETs extremely reduces by bottleneck interference, and it is enhanced by implementing multiple antennas over radio nodes.
Interference is a prime considerable factor in MANETs, as network performance enhance by reducing the level of interference. In order to reduce interference one of the effective mechanisms is to electing the appropriate transmission power for commendation. Previous work demonstrates that multi channel communication reduces the interference and consequently increase the throughput of MANETs, however in distributed environment it is difficult to maintain. Another approach is to mitigate interference is the use of power control mechanism, which not only increases the network throughput but also enhance the network capacity. Power control mechanisms should be constructed such a way that it should guarantee network wide connectivity by selecting low level transmitting link for communication.

In literature interference in MANETs is not defined identically, as MANETs contains resource constrained environment with absence of central coordinator. Every node present in MANETs equipped with energy and corresponding radio range. Radio communication range of mobile nodes further divided into two parts i.e., transmission range (T_x) and carrier sensing range (S_x) . If there is no interference and Nodes present less than their transmission range then they communicate each other. Thus the transmission range is the range, where packets communication happens successfully. Nodes present with in a sensing range also receive the signals, but not decode the signals so as for communication, however they are influenced. The nodes present in a carrier sensing range are yields interference signals & behave negatively. Total of theses interference signals are considered as the interference of the node, we consider in this work it as residual interference. If the residual interference signal is smaller than actual signal, then receiver receives the packets successfully. Moreover, if the residual interference signals are more than the actual valid signal, then the valid signals are distributed in network and nodes present in carrier sensing range generate noise signals. Thus, work [3] defines the interference rang of mobile nodes in MANETs along with transmission and carrier sensing ranges. Work [4,5,6,7] defines the residual interference range causes by node is slightly smaller than carrier sensing range and 1.78 time larger than the transmission range. In this work we are monitoring the path interference by transmission power levels of node when it sense the channel, such as transmission power level, sensing power level and interference power level.

III. PROPOSED WORK (REACTIVE INTERFERENCE MONITORING)

Communication link between source to destination used simultaneous for different communication simultaneously for wired network, but in wireless network simultaneous use of link for communication cause interference. This implies that only one of these interfering links can be active at one time, thus reducing the available throughput in the network. The adverse effects of interference are further compounded by the fact that the interference range is typically much larger than the transmission range.

Potential source to form residual interference signal is due to nodes present within the carrier séance range of node. In other words, node residual interference is due to the neighbor nodes present within the interference range of node. If the neighbor nodes are presented more than the interference range then the residual interference would be small, and the strength of this signal is less than the transmission range signal then packets received successfully by neighbor's node. In MANETs there is no central coordinator, communication is happen by relaying on neighbor node to from multi hop communication. Thus single hop residual interference signal strength is not enough to communicate in multi hop communication, but also complete path interference is necessary for successful communication. Thus we introduce the concept of reactive path monitoring algorithm with respect to interference signal strength. This metric not only improve the network performance but also reduce the packet loss and conserve the energy as well as enhance the network capacity. In order to calculate the path residual interferes, we consider the interference signal range is 1.73 times the transmission range of node.

In mobile ad hoc networks, heavy traffic through identical link results in interference. Due to simultaneous request to one link cause the large packet drop and blockage of link and effect the network performance with respect to throughput, this could be observed in network as follows.

Consider a MANETs , in which a packet is received at node (i) with received power of (P_i) , at the same time there is (N) number of interference caused by sensing power of node, then the received power of residual interference is (P_N). Quality of reception is calculated by energy to noise spectral density ratio (μ^i) for asynchronous (BPSK) is given by

$$\mu^{(i)} \triangleq \left(\frac{2\sum_{N=1}^{K} P_N}{3WP_i} + \frac{1}{\mu_0}\right)^{-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots..1$$

Where, μ0 is Eb/N0 effective ratio at receiver, when there is no interference and W is the processing gain. Equation 1 clearly demonstrates that the interfering power and $\mu^{(i)}$ are reciprocal of each other. Consider the MANETs, which using the BPSK modulation & convolution code with rate of 0.5, length of constraint is seven and processing gain 100. In order to achieve the probability of bit error in acceptable range with Eb/N0eff is 5.0 dB, equation 1 must satisfy the power is calculated by

$$\frac{\sum_{N=1}^{K} P_N}{P_i} \leq 47.43 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots2$$

In MANETs due to mobility every node present at different location, the distance between source to destination is vary time to time. Let consider a situation with transmission power of nodes are homogeneous. Consider communicating entities, communicating each other by two-ray propagation model and the separation between them is distance d_0 , and there is only one residual interference is (K = 1) present with distance d_1 from receiving node. In this case it is simple to satisfy desired bit error rate by having d1 ≈ 0.38d0. It is clearly showing that collision will occur in network, with one interference with distance less than 0.38d0 from receiver node. Distance (far near) is one of major criteria to affect the network performance (majorly packet reception there by throughput), and we considering it as far near problem. Thus, enhancing the throughput of network is achieved by expected forward progress (ERP)

A good measure of network throughput is given by the expected forward progress (EFP) per transmission, described as the product between local throughput and distance between communicating nodes.

In literature, MANETs uses the scheduling algorithm to overcome the interference by utilizing radio resources of node based on priority, such as power level. However, this algorithm not well suited with interlinks interference. As Source node does not have idea or control over the total proportion power at receiver end made up by different interlink interference. This situation leads to interference outage & poor utilization of resource. Moreover, one cannot predict how many scheduled nodes willing to access the channel simultaneously. Since the number of channels are scarce most of the time and the number of nodes willing to access the network cannot be predetermined simply, it is mandatory to reuse the limited number of channels in the network. Simultaneous communication is possible when nodes are placed far enough such a way that interference level is below some threshold value. In MANETs received signal power can be calculated by

$$P_r = P_0\left(\frac{d}{d_0}\right)^{-\eta} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\, 3$$

Where, P_r received power of signal at distance d from transmitter, P_0 is the calculated power distance from d_0 and η is the path loss exponent. Let consider the situation with all available channels in network are in use, and then all the nodes present in a equal distance receive the equal power level. In any other far location, one of the nodes will be dominant. In near, there will exist locations, in which none of the nodes will dominate and communication is not possible. To achieve successful communication, the sender node signal levels should be large enough to other nodes which are using identical links. Every node in a network maintains the table with entry as total offered link power with respect to residual interference power, .Moreover communicating packet also processed by power limit. To create the path between communicating entities offered link power is used. Finally we used the threshold link power to create the link between communicating entities. We have implemented our protocol with the help of AODV [2] (Ad hoc on demand distance vector) routing protocol, instead of hop count we have used the reactive link status for communication. Flowchart of our proposed algorithm shown in figure1. L_{path} is the recorded path from source to destination and L_p is the threshold level of path.

IV. Performance Analysis

Performance analysis of proposed work is carried out by network simulator 2 by necessary extensions and compared it with work [9]. Simulation parameters are shown in table 1. Performance analysis metrics are as follows

i. Packet delivery fraction: The ratio of number of data packets successfully received by CBR (constant bit rate) destination to the number of packets generated by the CBR sources multiple by hundred.

ii. Energy consumption: The energy consumed by the nodes while transmitting and receiving data and control packets.

iii. Reliability of routes: The maximum the number of data packets successfully received by the destination, the high is the reliability of routes.

Table1. Simulation parameters for analysis

Simulation Parameter	Values
Number of Nodes	20-100
Path loss Model	L=128.1+37.6 Log10(R)
MAC	802.11 e
BS antenna gain plus Cable Loss	14 dBi
Propagation type	Two ray grpoung
Carrier Frequency Rx antenna	2 GHz 1
Queuing	LL (Priority Queue)
Tx antenna User antenna gain Maximun user EIRP	1 0dBi 21dBm
Maximum B S EIRP	24 dBm
Mobility	Random way
CL Power Control Transmission Rates (kbit/s)	1 dB step size 8,16,32,64,128,256,384
TTI Scheduling Period	10 ms Every 10 TTI
Traffic	CBR
Target	5.23 dB (- % 70 load factor)

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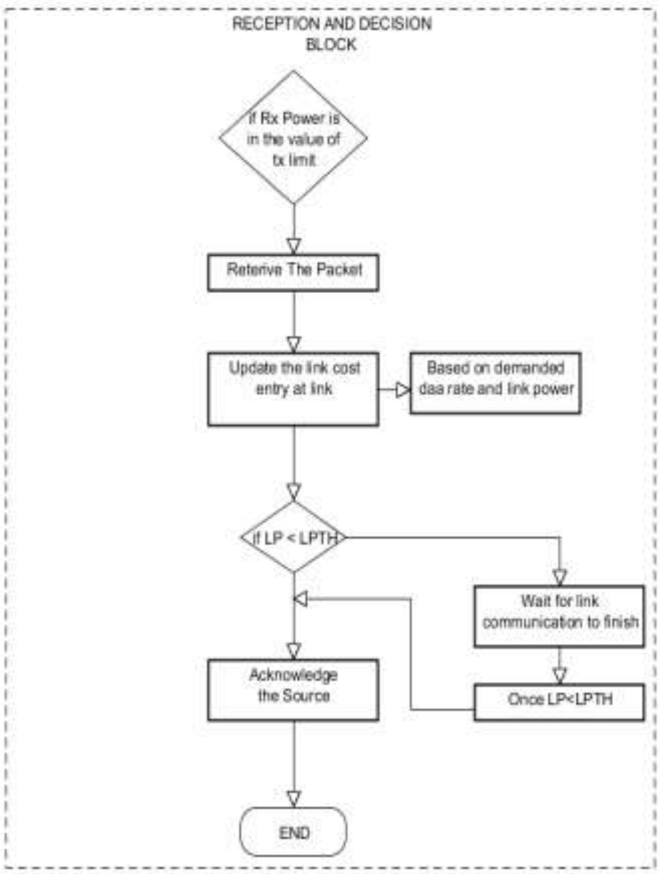

Figure1. Algorithm of proposed approach

Scenarios of our work are as follows:

Scenario 1:- We analyses the average energy consumption of nodes in a network with respect to packet delivery fraction, range of nodes is from 100 to 200.

Scenario 2:- We analyses the average energy consumption of nodes in a network with respect to reliability of links, range of nodes is from 100 to 200

Figure 2 and 3 shows the better performance of proposed algorithm with respect to packet delivery fraction as well as in link reliability, thus using our proposed approach, MANETs scalability will increase with maximum throughput.

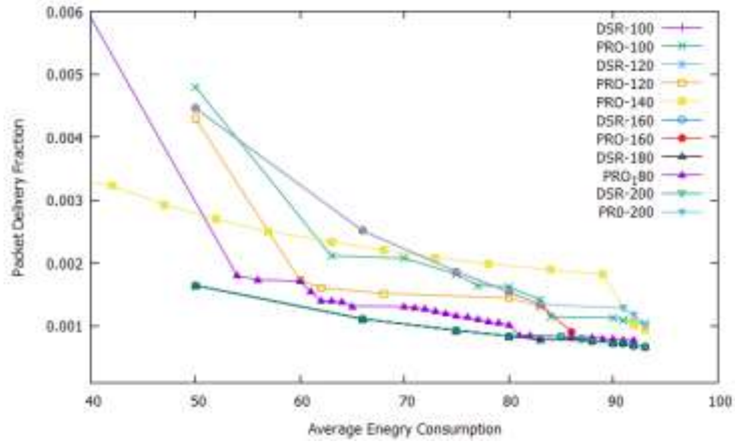

Figure 2. Comparison of Average energy consumption of nodes with respect to packet delivery fraction

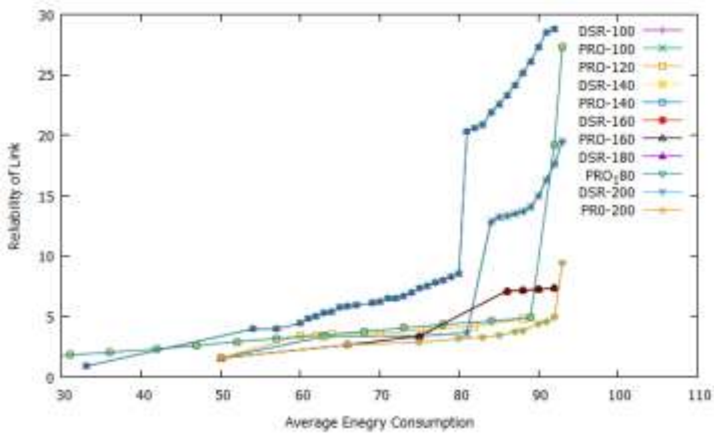

Figure 3. Comparison of Average energy consumption of nodes with respect to reliability of routes

V. CONCLUSION

In this paper we proposed a reactive link power monitoring algorithm, which presents an effective way of communication in multi hop mobile ad hoc networks. This algorithm enhances network performance by transferring the data based on link status. Packets are transmitted over link when link contains enough capacity to handle them with less congestion. Results shows that proposed algorithm enhance the network capacity by improving energy consumption. However, our approach provides the link optimization to enhance the capacity of network, but in MANETs there is strong demand for monitoring method to detect the power consumption per node to reduce power interference, which is our future work.

VI. REFERENCE

[1] Singh, Shrawan Kumar, Ashutosh Sharma, and P. K. Pandey. "Optimization Algorithm for Online Link Power Management." International Journal on Emerging Technologies 6.1 (2015): 19.

[2] Barma, Mrinal Kanti Deb, et al. "Comparison of Performance Metrics of ModAODV with DSDV and AODV." Proceeding of International Conference on Intelligent Communication, Control and Devices. Springer Singapore, 2017.

[3] Zhang, Xinming, et al. "An average link interference-aware routing protocol for mobile ad hoc networks." Wireless and Mobile Communications, 2007. ICWMC'07. Third International Conference on. IEEE, 2007.

[4] Zadin, Abedalmotaleb, and Thomas Fevens. "Neighborhood-based interference minimization for stable position-based routing in mobile ad hoc networks." Future Generation Computer Systems 64 (2016): 88-97.

[5] Park, Neung-Um, Jae-Choong Nam, and You-Ze Cho. "Impact of node speed and transmission range on the hello interval of MANET routing protocols." Information and Communication Technology Convergence (ICTC), 2016 International Conference on. IEEE, 2016.

[6] Han, Guangjie, et al. "A survey on mobile anchor node assisted localization in wireless sensor networks." IEEE Communications Surveys & Tutorials 18.3 (2016): 2220-2243.

[7] Das, Banee Bandana, and Saswat Kumar Ram. "Localization using beacon in wireless sensor networks to detect faulty nodes and accuracy improvement through DV-Hop algorithm." Inventive Computation Technologies (ICICT), International Conference on. Vol. 1. IEEE, 2016

[8] Mohammad, Arshad Ahmad Khan, Ali Mirza, and Srikanth Vemuru. "Analytical Model for Evaluating the Bottleneck Node in MANETs." Indian Journal of Science and Technology 9.31 (2016).

[9] Amir, Mohammad, Dhanroop Mal Nagar, and Vinay Baghela. "Secure DSR Routing Protocol Based on Homomorphic Digital Signature." Proceedings of the International Conference on Advances in Information Communication Technology & Computing. ACM, 2016.

[10] Mohammad, Arshad Ahmad Khan, Ali Mirza, and Srikanth Vemuru. "Cluster based mutual authenticated key agreement based on chaotic maps for mobile ad hoc networks." Indian Journal of Science and Technology 9.26 (2016).

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