International Journal of Scientific & Engineering Research, Volume 4, Issue 5, May-2013 1256
ISSN 2229-5518

A REFINED PERFORMANCE CHARACTERIZATION OF LINK SCHEDULING AND DATA SECURITY IN WIRELESS NETWORKS

[#1]Sathishkumar.P, [#2]Parsuvanathan.J, [#3]Samathisvaran.J, [#4]vivek.A

Abstract— *A foremost challenge in the operation of wireless networks is scheduling the link of data transmission. In broadcast and multiple access channel the data are transmitted simultaneously a single node to multiple and multiple node to single node respectively. In this paper address the problem of link scheduling and reduce the no of transmission by minimizing the average long path. Due to the complication of link scheduler, introduce the multiuser greedy maximum weight algorithm for link scheduling in wireless networks. And also add the hop optimal algorithm for minimizing the average long path. In a given network graph the associated parameter, multiuser local pooling condition is derived for without losing in the transmission process. The main concept of this paper is without packet loss. But in wireless network the packet will be hacked by some hackers. So here apply the encryption algorithm for security purpose. Based on this condition derived additional parameter i.e., local pooling factor for select the path analyzed by the greedy maximum weight algorithm in wireless network graph.*

Keywords- local pooling condition, greedy algorithm, hop optimal algorithm, queuing scheduling , wireless network.

I. INTRODUCTION

In wireless network the common term is the data transmitted from one node to another. In wireless the data are transmitted single node to multiple node and same as multiple node to transmit data to single node simultaneously. In multi-hop wireless network the most complicated problem is link scheduling. The transmission of the data from source to destination of the data is not directly transmitted in the multi hop wireless network. The node which act as intermediate node is in between the source and the destination. The intermediate is acting as a bridge between the transmission path. But in single hop or peer to peer network the transmission from the source to destination is directly transmitted without any help of any intermediate node and it is not in all transmissions.

1.1 limitations of the intermediate node

In multi hop wireless node has some fixed capacity or some fixed range for storing the incoming transmission instruction in the network. And the range of the capacity is fixed by the administrator of assigning the network. If the incoming the transmission instruction is more than the fixed capacity range the data loss or the transmission path is critical condition due to high traffic in the network graph in that case the transmission is failing. So the problem of the high traffic in the network is based on the link scheduling process is not derived according to the traffic in the transmission of data in wireless networks. So in this paper introduce the multiuser greedy maximum weight algorithm for fully reduced the link scheduling in the wireless network and overcome the packet loss.

1.2 multiuser greedy maximum weight algorithm

The effective operation in wireless network analysis the proper solution of packet scheduling problem. The centralized solution of the wireless network is mainly based on the greedy maximal scheduling algorithm (also termed as maximal weight scheduling or longest queue first –LQF). The GMS algorithm analyzes the all paths in the given network and selects the set of several links according to the queue length of the data transmission. The GMS algorithm selects the heaviest link that is a long path queue link with which it interference from the list of other available links in the network.

The GSM algorithm is only analysis the weight that is the length of the graph not solve the link scheduling problem. The GSM achieves the performance of primary interference constraints. And also in arbitrary topology the performance in the worst case of the GSM can be very low as the same and there are available of some topologies in which achieved 100% throughput.

1.3 local pooling conditions and the factor

To overcome or centralized this problem by introducing the local pooling condition. The local pooling condition applies to all intermediate nodes in the proposed interference model to store all data arriving. The local pooling condition is the buffer storage algorithm. The condition is applied to all intermediate nodes in the network graph. So the data arriving to the intermediate the process are stored in the buffer storage. And the aim of the algorithm is to send the data to the destination. And it analysis the destination of data travel on the wireless network. The local pooling factor is derived based on the local pooling condition. This factor in the given network graph chooses the maximum weight of the available path. The local pooling condition applies to all the intermediate nodes. Because in the given network graph does not know which node is sent and which node is received. In the given network all nodes are sender and also received when the node transmits the data from one node and also receive the data from another node. As the same as all nodes in the network graph act as an intermediate.

II. Related Work

The link scheduling in wireless networks is categorized into Centralized and Distributed approach. The idea behind this scheme is to have nodes report location claims that identify their positions and to detect conflicting reports that signals one node in multiple location. For this it requires every node to sign and send a location claim, verify and store signed location claim of every other node.

Parno et al. [10] Proposed Centralized approach; each node sends a list of its neighbor nodes and their claimed locations to a base station (BS), which acts as a centralized entity. The clone node can be identified when the base station finds that there are two far distant locations for one node ID. There are several drawbacks in this solution, such as single point of failure (BS) or any compromise to BS and high communication cost due to the relevant number of exchanged messages.

G.zussman at al. [3] Proposed a distributed scheduling throughput maximization queue in a wireless network. The basic idea is that the distributed algorithm has sent the packet in maximum length of the path in a wireless network. The paper is first analysis all paths of the graph and choose the best path in the network. The drawback of this solution is all data are not transmitted in the same manner because different source node send the different packets to the same destination.

Ness B. et al. [11] proposed a greedy maximal matching, for multi hop wireless networks. The performance is optimal because the worst case ratio is throughput. In this exits a polynomial time optimal solution called maximal weighted matching. The idea behind this issue developed a suboptimal solution called the greedy maximal matching for reducing the scheduling complexity.

III. Problem Formulation

The main problem addressed in this paper is formulated as follows: The link scheduling problem for multi hop wireless networks have received significant attention in the past few years. The data are travelling all the available link to reach the destination. Data loss may take place at the destination, while multiple sources send data to same destination node cannot simultaneously transmit and receive and also cannot communicate simultaneously with more than one node.

IV. NETWORK MODEL

In the deployment of nodes, it is assumed that they are uniformly distributed. Using various location algorithms [3], [10] it's assumed that each node knows their location information and also the nodes are stationary or static. The communications between any two nodes are protected by pairwise keys [8]. Each node has a private key and it's used to sign its location claim with the private key.

Other nodes are also able to verify the signature. We model a wireless network by a graph G= (V, E), where V is the set of nodes and E is the set of links. Nodes are wireless transmitters/receivers, and there exists a link between two nodes if they can directly communicate with each other.

V . PROPOSED SYSTEM

In this existing approach the data are travelling or transmitted in all available paths to reach the destination in the given network graph. In this approach the greedy maximal matching algorithm is used to find the maximum weighted path that is its analysis which path is longest queue in the given network graph. And the local pooling factor is derived based on the local pooling condition it applied to all intermediate nodes. The local pooling factor is order the link of data travel according to the maximum weighted path. In this all path the data is traveled, so the transmission time is large to reach the destination. The proposed system the hop optimal algorithm is applied in this transmission. This algorithm is first analysis all paths in this transmission line. And it filters the path due to reduce the average length path for rejecting the unwanted path in the given network graph. The number of transmission is also reduced because the data are travel only which path is reach the destination at the average or correct time. The traffic occurs in the network is cleared because the traffic is not overflow in the transmission path. The md5 algorithm is applied to source node in the proposed system. The data are encrypted before the transmission is started. The data are encrypted during this transmission because during the transmission some of the software hackers hack the transmission for knowing what data is travelling on the path.

The weight of the scheduled link is analyzed by the GMM & the property that each time slot, the sum of the weight of the scheduled links is no less than a fraction 1\2 of the maximum weight. However, the performance of the GMM scheme turns out to be far better than this lower bound in many scenarios. The authors in characterizing the performance of the GMM scheme using a parameter called the local pooling factor, which is obtained from the knowledge of the network topology, and interference constraints. It was shown using this local pooling factor that GMM was in fact throughput-optimal for many classes of network graphs including all three networks, under the node exclusive interference model.

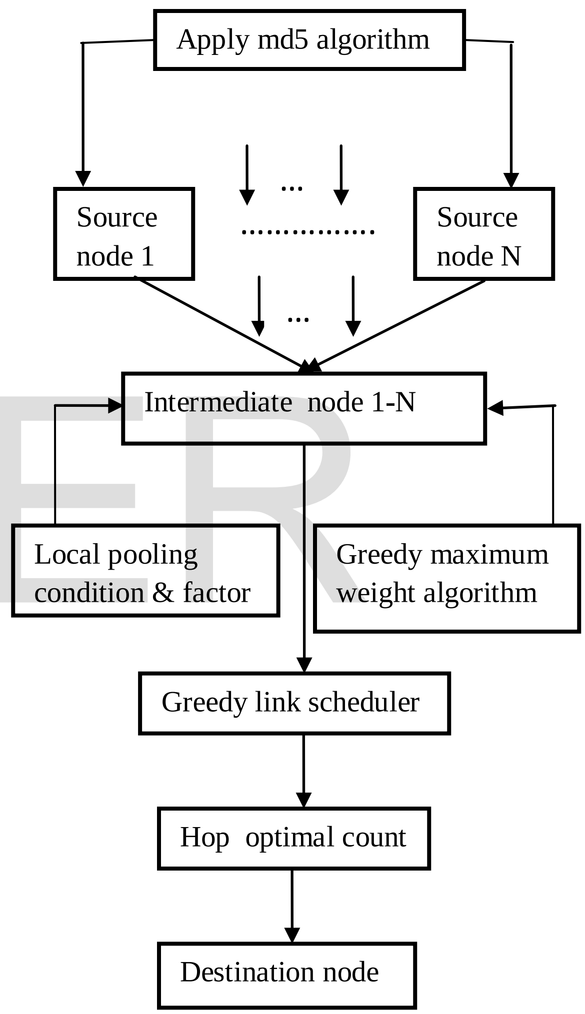

Figure 1 Outline of Proposed System

The best work on scheduling mainly focused on orthogonal resource sharing if a link is active, no other interfering link can be active simultaneously. And we show that the efficiency ratio of MGMV, defined as the largest fraction of the network stability region that can be stabilized by MGMV, cannot be less than. And also show that the efficiency ratio of

MGMV cannot be larger than another parameter derived from the local pooling condition. While the generalization to the -user case is straightforward, the corresponding local pooling conditions are mathematically cumbersome; consequently, do not present them here.

The number of transmission is also reduced because the data are travel only which path is reach the destination at the average or correct time. The traffic occurs in the network is cleared because the traffic is not overflow in the transmission path. The md5 algorithm is applied to source node in the proposed system. The data are encrypted before the transmission is started. The data are encrypted during this transmission because during the transmission some of the software hackers hack the transmission for knowing what data is travelling on the path.

The local pooling condition is applied to the intermediate node to store the transmission process. Because intermediate node or the base station has some limited capacity, if the arriving process is overflowing the data or the link failure is occurring. The greedy maximal matching algorithm is used to find the maximum weighted path in the given network graph.

Let in the multi hop wireless network link (x,y) be a fixed for (c_{xy},c_{yx}) on the boundary of the fixed capacity region. So that cxy(t)=cxy and cyx(t)=cyx. R is the set of all rate allocation vector infinite set of link. The multiuser greedy maximum weight algorithm which selects the rate allocation vector in the time slot. In this process each link is assigned a weight, which is basically weighted – queue link rates

Let L denote the set of all links, i.e,

$$l = \{\varepsilon \cup \{(x,y) \in \varepsilon^2 | x \in k_x \text{ and } y \in k_y\}\}.$$

For any element m ∈ l defines the weight of the link W_m (t) as follows:

$$W_m(t) = \begin{cases} q_j(t)c_j, & m \text{ is a point to point link } j \\ q_x(t\}c_{xy} + q_y(t)c_{yx}, & m \text{ is a MAC/BC link } (x,y) \end{cases}$$

VI EXPERIMENTAL RESULT

The main focus of this paper is to focus on the detection of packet loss in a particular network. And also show the performance of data transmission, comprise of delay and receiving of packet delay.

6.1. PERFORMANCE OF VARIABLE-RATE MGMW

In this section, we illustrate the performance of the variable rate mgmw scheme using some examples. (Fig 2) shows the creation of access point for the node.

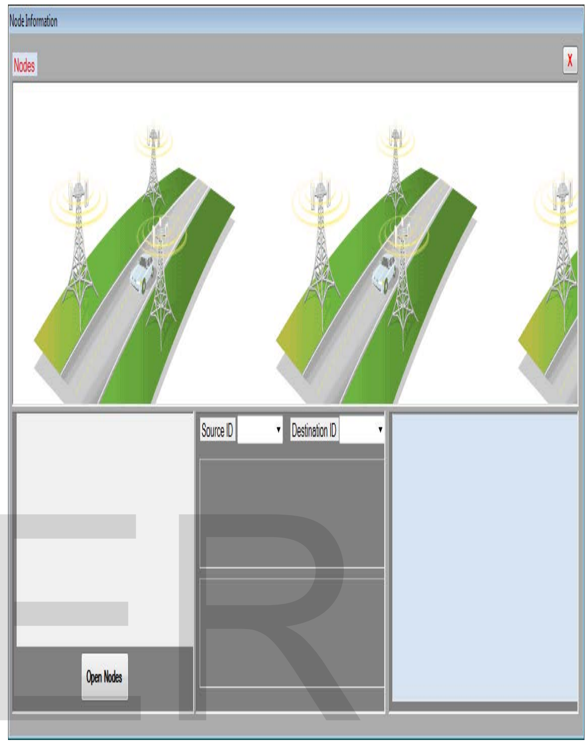

Figure 1: Creation Of Access Point For Node

Figure 2: Assign The Available Path

Sr. No.	Parameter/Speci	Value/Details
1)	Routing Protocol	AODV
2)	NS2 Version	NS2.34
3)	NAMConsole Version	1.14
4)	Channel Type	Wireless
5)	No. of Nodes	50
6)	Topology (Area)	1500*1500
7)	Radio Propagation Model	Two ray ground
8)	Network Interface	Phy/wireless PHy
9)	Simulation Time	200sec
10)	Maximum Packet	5000

Table 1. Ns2 Environment Specfication

We provide some cases in which the variable-rate mgmw performs much more poorly in terms of the efficiency ratio compared to the fixed-rate mgmw scheduler to the extent that certain arrival rates that are stabilizable by fixed-rate mgmw make the queues blow up for variable-rate mgmw. (fig 2 & fig3)

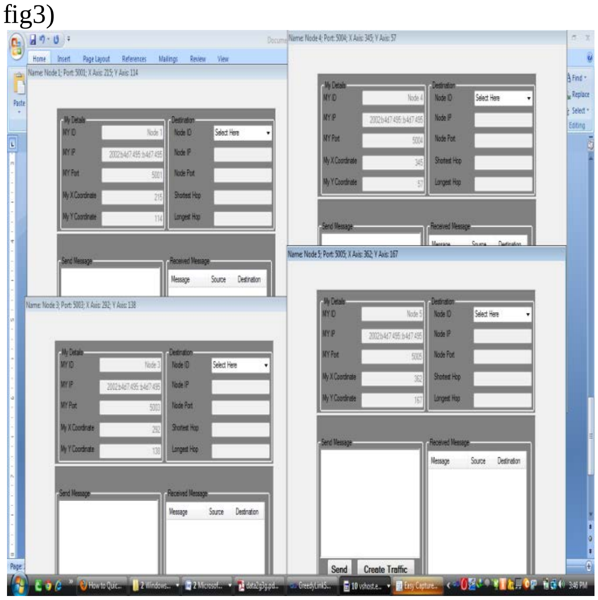

Figure 3: Traffic Creation To Intermediate

While the network stability region is larger when the rates are allowed to vary, we show that the variable-rate mgmw may perform worse relative to fixed-rate mgmw with regard to efficiency ratio. I observe that increasing the quantity decreases the upper bound on the efficiency of variable-rate MGMW to close to 0.5, and hence rate pairs in which at least one of the edges gets high rates dominate the performance of variable-rate MGMW.

Note that in the absence of multiuser links, GMS is throughput-optimal for both network graphs [3]. The above examples highlight certain scenarios where the variable-rate MGMW scheduler can perform poorly in terms of efficiency ratio, when compared to a MGMW policy whose links operate a fixed rate chosen carefully from the multiuser capacity region. Choosing a fixed rate point also reduces the coding complexity of the multiuser links by requiring fewer numbers of the code books.

We have used the NS-2 simulator with the following technical specifications. It shows the compress of the packet delay and packet received.

The results that we have found are related to delay, Throughput and packet received. Delay graph shows (fig 2) as the network node increases and the faulty nodes are introduced in the wireless sensor network then the delay also increases. Throughput provides the average rate of successful message delivery over a wireless sensor network. As the sensor nodes are increasing the time required for the packet to reach the node also increases (fig 3).

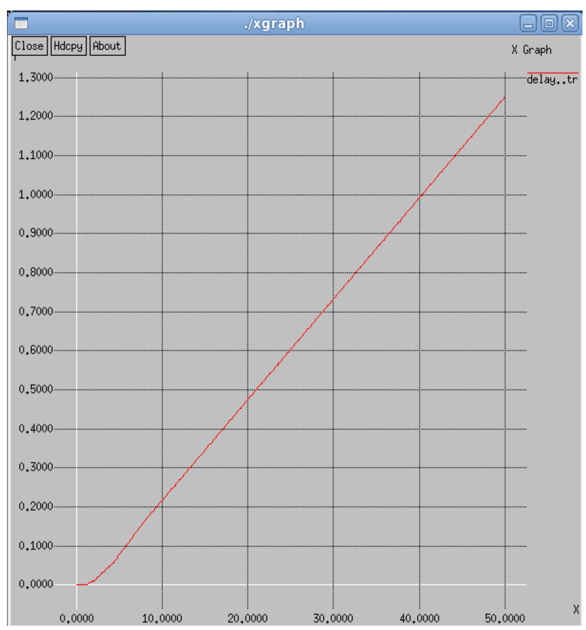

Figure 4: Packet Delay

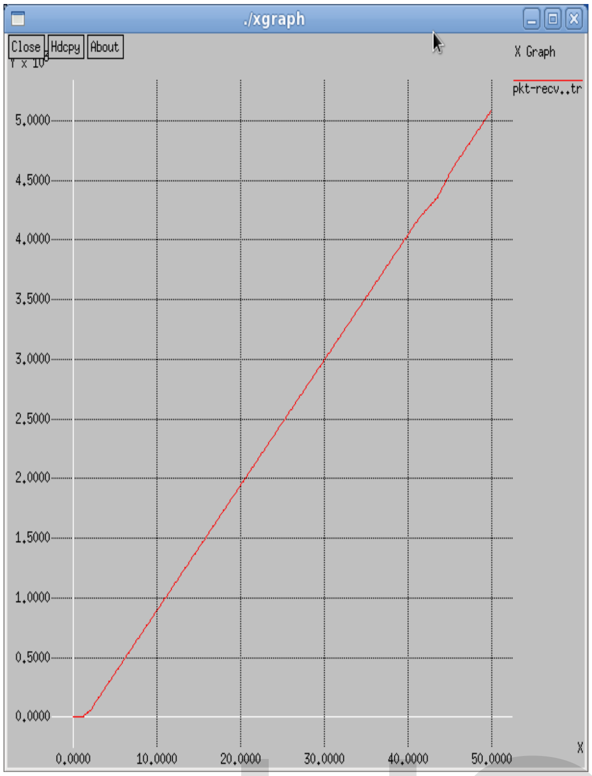

Figure 5: Packet Received

The first priority of MGMW is point to point with the highest weight link. If then removes all interfering links and select the maximum weighted path from remaining available links from the selected links used in the transmission process. The interfering links are removed because the path does not reach the destination. But the selected links have reached the destination various available path. The hop optimal algorithm is applied to the proposed system it reduce or minimize the average long path. So it decreases the transmission time to reach the destination. Recall that the motivation to develop a hop-optimal algorithm is that such an algorithm will not only minimize the number of transmissions required to support the traffic, but also reduce the average end-to-end transmission delay.

VII. CONCLUSION AND FUTURE WORK

In this paper, the problem of link scheduling in a multi hop wireless network is explored. The local pooling condition holds the transmission process under greedy maximum weight algorithm. The MGMW is guaranteed to achieve 100% to analysis the maximum weight path. Based on this algorithm the local pooling factor is ordered the link for transmitting the data. In this paper a modified version of the hop optimal count algorithm is introduced to reduce the average transmission length. Finally, observed the performance of MGMV and the hop optimal count algorithm is a low complexity scheduling algorithm to achieve very good performance.Based on the description the hop optimal technique for minimizing the average long path can be more vigorous in future technology such as more the clients more challenging the data transmission will be. This can be a more implanted inbuilt system itself for future groups to come. The system can overcome issues like congestion while sending large amount of data and our security enhanced dynamic routing could be used with cryptographic based system design to further improve the security of data transmission over networks. These issued will be tackled accordingly in the future.

REFERENCES

[1] Arun Sridharan, C. Emre Koksal and Elif Uysal-Biyikoglu, "A Greedy Link Scheduler for Wireless Networks With Gaussian Multiple-Access and Broadcast Channels" IEEE/ACM TRANSACTIONS ON NETWORKING, vol. 20, no. 1, february 2012

[2] Berk Birand, Maria Chudnovsky , Bernard Ries , Paul Seymour , Gil Zussman and Yori Zwols, "Analyzing the Performance of Greedy Maximal Scheduling via Local Pooling and Graph Theory" Columbia University, Electrical Engineering Technical Report #2009-07-30, July 2009

[3] G. Zussman, A. Brzezinski, and E. Modiano, "Multihop local pooling for distributed throughput maximization in wireless networks," in Proc. IEEE INFOCOM, Apr. 2008, pp. 1139 1147.

[4] X. Lin and N. B. Shroff, "The impact of imperfect scheduling on cross-layer congestion control in wireless networks," IEEE/ACM Trans. Netw., vol. 14, no. 2, pp. 302–315, Apr. 2006.

[5] B. Li, C. Boyaci, and Y. Xia, "A refined performance characterization of longest queue-first policy in wireless networks," in Proc. ACM MobiHoc, 2009, pp. 65–74.

[6] X. Wu, R. Srikant, and J. R. Perkins, “Scheduling efficiency of distributed greedy scheduling algorithms in wireless networks,” IEEE Trans. Mobile Comput., vol. 6, no. 6, pp. 595–605, Jun. 2007.

[7] Andrew Brzezinski, Gil Zussman Eytan Modiano “Local Pooling Conditions for Joint Routing and Scheduling”

[8] G. Sharma, C. Joo, and N. B. Shroff, “Distributed scheduling schemes for throughput guarantees in wireless networks,” in Proc. 44th Annu. Allerton Conf. Commun., Control, Comput., Sep. 2006, pp. 1396–1405.

[9] Berk Birand, Maria Chudnovsky, Bernard Ries, Paul Seymour, Gil Zussman and Yori Zwols “Analyzing the Performance of Greedy Maximal Scheduling via Local Pooling and Graph Theory” Columbia University, Electrical Engineering Technical Report #2009-07-30, July 2009

[10] B. Parno, A. Perrig, and V. Gligor, “Distributed detection of node replication attacks in sensor networks”, Proc. IEEE Symp.Sec. and Privacy, pp. 49-63, 2005.

[11], X. Lin and Ness. B. Shroff, "A Tutorial on Cross-Layer Optimizationin Wireless Networks,”' IEEE Journal on Selected Areas in Communications vol. 24, no. 8, pp.1452-1463, Aug. 2006.

[12] J. G. Dai, "On positive Harris Recurrence of Multiclass Queueing Networks: A Unified approach via Fluid Limit Models," Annals of Applied Probability, vol. 5, no. 1, pp. 49-77, 1995.

[13] D. M. Blough, G. Resta, and P. Santi, “Approximation algorithms for wireless link scheduling with SINR-based interference,” IEEE/ACMTran. Netw., vol. 18, no. 6,pp.1701–1712, Dec. 2010.

[14] P. Santi, R.Maheshwari, G. Resta, S. Das, and D.M.Blough, “Wireless link scheduling under a graded SINR interference model,” in Proc.FOWANC, New York, NY, 2009, pp. 3–12.

[15] S. Kompella, J. E. Wieselthier, A. Ephremides, H. D. Sherali, and G. D. Nguyen, “On optimal SINR-based scheduling in multihop wireless networks,” IEEE/ACM Trans. Netw., vol. 18, no. 6, pp. 1713–1724, Dec. 2010.

[16] A. Dimakis and J. Walrand, “Sufficient conditions for stability of longest-queue-first scheduling: Second order properties using fluid limits,” Adv. Appl. Probab., vol. 38, no. 2, pp. 505–521, 2006.

[17] T.David andV. Pramod, Fundamentals ofWireless Communication. Cambridge, U.K.: Cambridge Univ. Press, 2006.

[18] X. Wu and R. Srikant, “Regulated maximal matching: a distributed scheduling algorithm for multi-hop wireless networks with nodeexclusive spectrum sharing,” in Proc. IEEE CDC’05, Dec. 2005.