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A STUDY ON OPTIMAL ROUTING PROTOCOL FOR VANETs

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ABSTRACT

In wireless Ad hoc Networks the packet transmission or scheduling is major problem. So Back pressure routing mechanism is one of the strong approach for such networks. It is a method to directing traffic everywhere a Queuing network that can get maximum network throughput, actually is established using concepts of Lyapunov drift. However it suffers from increased delays. So we implementing two holistic approaches for improve the throughput by reducing delays of Backpressure algorithms. The two holistic approaches are first one is voting backpressure and second one is layered backpressure routing, which are throughput optimal. We practically compare the implemented methods against of state of the art delay-aware backpressure policies. Which gives maximizing network throughput, backpressure routing with guarantee on the no network delay, using of layered backpressure packet scheduling algorithm for WANETs? Our experimental results show that implemented work shows efficiency in Qos and better throughput. The QoS is usually measured in terms of the average packet delay, and the main system resource to be saved is the node's energy so as to prolong network lifetime.

Keywords: *Back pressure routing, network throughput, layered backpressure routing.*

1. INTRODUCTION:

Resource allocation in wireless networks is complicated due to the shared nature of wireless medium. One particular allocation algorithm called the back-pressure algorithm which encompasses several layers of the protocol stack from MAC to routing was proposed by Tassiulas and Ephremides, in their seminal paper [1].Wireless ad hoc network or MANET is a Decentralized type of wireless network in wireless ad hoc network, with the absence of a central control infrastructure, data is routed to its destination through the multi-hop routing needs on demand routing discovering or route maintenance. Since the messages are distributing in wireless channels and through dynamic routing path, mobile ad hoc networks are not as reliable as infrastructure wireless networks. Furthermore, because of the multi-hop networks are only suitable for local area data distribution. Wireless mobile ad hoc networks are self-configuring, dynamic networks wherein nodes are free to move. Wireless networks lack the complexities of infrastructure setup and administration, permitting devices to create and be part of networks "on the fly" – everywhere, anytime. Packet delivery scheduling in this type of structures is a fundamental effect since it is promptly related to the achievement of a prescribed Quality of Service (QoS) and a minimum use of system assets. QoS is usually consistent in terms of the common packet delay, transmission rate and maximum delay, and the main structure resource to be saved is the nodes' strength so as to prolong network lifetime. In addition to delay and strength optimization, any packet scheduling/routing algorithm for Adhoc networks must be resilient to topology changes and strive for throughput optimality. The stability of a queuing network with interdependent servers is considered. The dependency among the servers is described by the definition of their subsets that can be activated simultaneously. Multi-hop radio networks provide a motivation for the consideration of this system. The problem of scheduling the server activation under the constraints imposed by the dependency among servers is studied. The performance criterion of a scheduling policy is its throughput that is characterized by its stability region, that is, the set of vectors of arrival and service rates for which the system is stable. A policy is obtained which is optimal in the sense that its stability region is a superset of the stability region of every other scheduling policy, and this stability region is characterized [2].

2. RELATED WORK:

The portion of packet Scheduling protocol has been proposed in the relevant literature. The algorithms for packet scheduling or routing can be divided as data centric, hierarchical, location based and they based on network flow or quality of service awareness. Recent advances in wireless sensor networks have led to many new protocols specifically designed for sensor networks where energy awareness is an essential consideration. Most of the attention, however, has been given to the routing protocols since they might differ depending on the application and network architecture. This paper survey recent routing protocols for sensor networks and presents a classification for the various approaches pursued[3]. In existing approaches The Data Centric routing is one. It varies from traditional address based routing in which every routes are addressable nodes. In this approach the sink sends queries to particular regions and then looks for data from the sensors positioned to particular areas. Attribute based naming is important to Define the features of data requested in queries. Hierarchical routing protocols assign different roles to nodes. The nodes are divided into clusters and cluster-heads are assigned with the role of data aggregation and reduction in order to save energy [4]. Location-based protocols on the other hand use the position information of the nodes in order to forward the information to the desired region rather than the whole network. In some approaches, route setup is modeled and solved as a network flow problem. System stability and throughput maximization based on have been exclusively studied. Related work on delay-efficient backpressure algorithms is developed [5].

3. The original Backpressure algorithm:

Backpressure [6] is a joint scheduling and routing policy which favors traffic with high backlog differentials. The backpressure algorithm performs the following actions for routing and scheduling decisions at every time slot t.

- ***Resource allocation***

  For each link (name) assign a temporary weight according to the differential backlog of every commodity (destination) in the network:

$$wt_{nmd}(t) = max(Q_n^d - Q_m^d, 0).$$

Then, define the maximum difference of queue backlogs according to:

$$w_{nm}(t) = \max_{d \epsilon D} wt_{nm}(t).$$

Let be the commodity with maximum backpressure for link (n,m) at time slot t.

- ***Scheduling***

  The network controller chooses the control action that solves the following optimization problem:

$$\mu^*(t) = \underset{\mu \epsilon \Gamma}{argmax} \sum_{(n,m) \epsilon L} \mu_{nm} w_{nm}(t),$$

Let ד denote the set of all schedules subject to the one hop interference model.

In our model, where the capacity of every link μ_{nm} equals to one, the chosen schedule maximizes the sum of weights. Ties are broken arbitrarily.

- ***Routing***

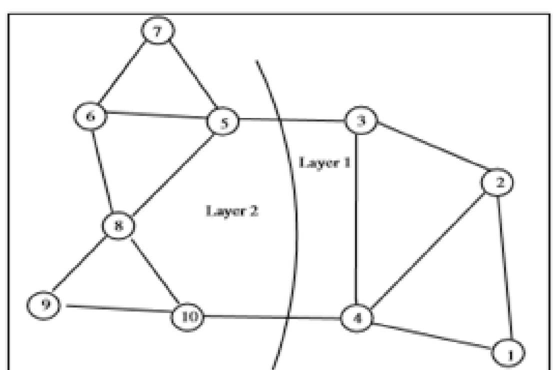
At time slot t, each link (n,m) that belongs to the selected scheduling policy forwards one packet of the commodity $d^*_{mn}[t]$ from node n to node m. The routes are determined on the basis of differential queue backlog providing adaptivity of the method to congestion [7].

Backpressure algorithm is throughput-optimal and discourages transmitting to congested nodes, utilizing all possible paths between source and destination. This property, leads to unnecessary end-to-end delay when the traffic load is light. Moreover, using longer paths in cases of light or moderate traffic wastes network resources (node energy).

3.1 The Enhanced Layered Backpressure policy:

Routing protocols must be dynamic in order to cope with mobility of nodes in modern wireless networks. Widely varying mobility characteristics are expected to have a significant impact on the performance of routing protocols that are based on node grouping (like CB−BP, Lay BP) in order to route packets even if links among nodes are updated. In case of grouping-based routing protocols, high mobility of nodes which lead them to change groups, degrades the performance of the methods since this 'wrong' information is used in the routing procedure. Although Lay BP doesn't use gateways, it still suffers from this behavior if the layer that the moving nodes belong to, are not updated [8]. The differential backlog of each link is computed according to the difference between current and destination's node layer. It is clear that Lay BP behavior can be affected of 'misplaced' nodes. In this case packet may be forwarded to layers different than the desired making the method inappropriate [9].

SYSTEM ARCHITECTURE:



T_0 : node 7 belongs to Layer 2, connected to nodes 5 and 6

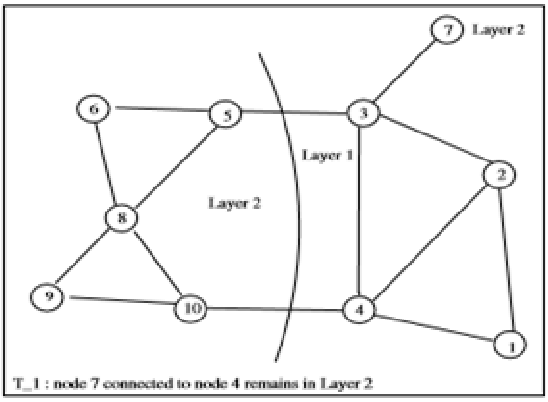


Fig.1 Example network with a moving node.

Looking at Figure.1 we see that node 7 (moving node) initially belongs to cluster 2 at moment T0. At moment T1 node 7 moved to cluster 1 but is agnostic of it. Packets destined to node 7 are still forwarded by the Lay BP to cluster 2 making it difficult to reach their final destination thus making the intermediate node's queues to grow up.

We consider a network G = (V,L), where V is the set of nodes (vertices) and L is the set of links (edges). We consider the following generic properties:

- Nodes are static or mobile, the communication links are bidirectional, and nodes communicate in a multi-hop fashion.
- Topology changes may take place, due to nodes getting down or link failure.
- Network nodes are homogeneous and do not have GPS-like hardware. Links have equal to one capacity.
- Concurrent transmissions cause mutual interference since the transmission medium is shared. Matching's are the set of links that can be scheduled simultaneously. A max-weight scheduling policy is used.
- A node cannot transmit and receive at the same time.
- Time is slotted with a time slot t.

For each node i, there is an arrival process E_i such that $E_i(t)$ is the number of exogenous arrivals up to time t. We assume that packets arrive exponentially with mean arrival rate ʎ. The source and destination of each packet is randomly selected among all the nodes.

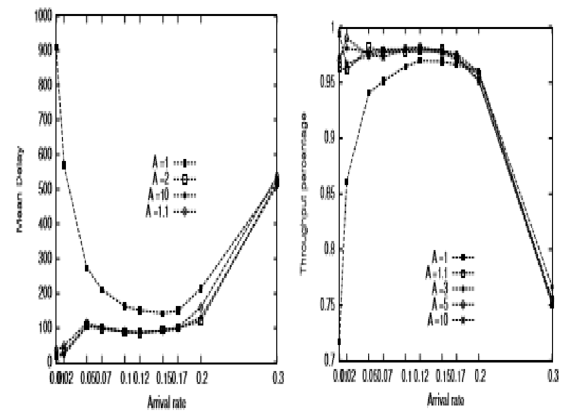


Fig.2Tuning of parameter A - delay performance of Lay BP

In the Fig.2 shows that proposed Lay BP method performs better as the network is divided in more clusters. This positive characteristic makes the proposed routing method more efficient when combined with most of the automated algorithmic network clustering algorithms.

4.0 CONCLUSION:

In this paper studied about problems of packet transmission and packet scheduling problem in WANET, and in order to overcome this proposed enhanced Backpressure algorithm, with this the major problem of packet scheduling and transmission are overcome and out proposed algorithm shows that how it allocates resource to successful transmission.

5.0 REFERENCES:

[1] *L. Bui, R. Srikant, and A. Stolyar. Novel architectures and algorithms for delay reduction in back-pressure scheduling and routing. In Proc. INFOCOM Mini, 2009.*

[2] L. Tassiulas and A. Ephremides. Stability properties of constrained queueing systems and scheduling policies for maximum throughput in multihop radio networks. IEEE TAC, 37(12):1936–1948, 1992.

[3] K. Akkaya and M. Younis. A survey on routing protocols for wireless sensor networks. Ad Hoc Networks, 3(3):325–349, 2005.

[4] S. Moeller, A. Sridharan, B. Krishnamachari, and O. Gnawali. Routing without routes: The backpressure collection protocol. In Proc. IPSN, 2010.

[5] E. Athanasopoulou, L. Bui, T. Ji, R. Srikant, and A. Stoylar. Backpressure-based packet-by-packet adaptive routing in communication networks, 2010. Available at: http://arxiv.org/abs/1005.4984.

[6] L. Maglaras and D. Katsaros. Layered backpressure scheduling for delay reduction in ad hoc networks. In Proc. WoWMoM, 2011.

[7] A. D. Amis and R. Prakash. Clusterhead selection in wireless ad hoc networks. US Patent 6,829,222 B2, 2004.

[8] S. Basagni, M. Mastrogiovanni, A. Panconesi, and C. Petrioli. Localized protocols for ad hoc clustering and backbone formation: A performance comparison. IEEE TPDS, 17(4):292–306, 2006.

[9] M. Dorigo, V. Maniezzo, and A. Colorni. Ant system: Optimization by a colony of cooperating agents. IEEE TSMC: Part B, 26(1):29–41, 1996.

[10] A. Manjeshwar and D.P. Agrawal. TEEN: A protocol for enhanced efficiency in wireless sensor networks. In Proc. IPDPS, 2001.

[11] Y. Xu, J. Heidemann, and D. Estrin. Geography-informed energy conservation for ad hoc routing. In Proc. MOBICOM, 2001.

[12] M. Neely, E. Modiano, and C. Li. Fairness and optimal stochastic control for heterogeneous networks. In Proc. INFOCOM, pages 1723–1734, 2005.