International Journal of Engineering Inventions
e-ISSN: 2278-7461, p-ISSN: 2319-6491
Volume 2, Issue 11 [Jul 2013] PP: 81-86

Qos Aware Multihop Based Routing Strategy for Mobile Ad Hoc Network

SURESH .V[1], A YASHWANTH REDDY[2], P.PRASHANT KUMAR[3]
[1,2,3]*Assistant Professor,Sree Dattha Institute of Engineering & Science*

Abstract : Here in this paper a MAC layer level clogging detection system has been projected. The planned model aims to explore a system to compute the degree of clogging at victim node with maximal accuracy. This clogging detection apparatus is integrated with a Two-Step Cross Layer Clogging Control Routing Topology. The proposed model involves controlling of clogging in two steps with effective energy capable blocking detection and optimal cost of routing. Packet drop in routing is mostly due to link crash and clogging. Most of the existing clogging control solutions do not have the ability to distinguish between packet loss due to link collapse and packet loss due to clogging. As a result these solutions aim towards action against packet drop due to link malfunction which is an unnecessary effort and ends with of energy resources. The other limit in most of the available way out is the utilization of energy and resources to detect clogging state, degree of clogging and alert the source node about blocking in routing path. This paper explores a cross layered model of clogging recognition an control mechanism that include energy efficient clogging detection, Multicast Group Level Clogging Evaluation and Handling Algorithm [MGLCEH] and Multicast Group Level Load Balancing Algorithm [MGLLBA], which is a hierarchical cross layered base clogging recognition and avoidance model in short can refer as Qos Optimization by cross layered clogging handling (MGLCEH). This paper is supported by the investigational and simulation results show that better store utilization, energy efficiency in clogging detection and clogging control is possible by the proposed topology.

Keywords: *Ad-hoc networks, MANETS, clogging, cross-layer design, optimization, random access, wireless network*

I. INTRODUCTION

The regular TCP clogging control mostly adapted for internet is not an opposite for MANETs because MANETs are known to affect topology and topology stacks of control mechanisms .also the MANETs are environmentally irreconcilable with standard TCP.

The packet salvage setbacks and losses in MANETs are primarily due to their node mobility combined with intrinsically unexpected medium which is a direct consequence of the common wireless multi hop channel cannot be construe as clogging losses.

The primary individuality of a wireless multi hop channel is that within interfering range of one node only a single data is transmitted. In MANETs' networks in a complete area are congested due to shared standard where as internet clogging is single router. A note valuable point is that in a MANET the nodes are not overcrowded.

The main reason for the incompatible of a regular TCP and a MANET is the fact that package losses in MANET may not always be due to network clogging and the transmission times (including the round trip times) vary highly making the package losses quite difficult to observe.

It is difficult to find the source of clogging in a multi hop network because a single user has the capability to produce a clogging resulting in comparatively lower bandwidth of mobile ad-hoc networks. The wireless networks are more susceptible to clogging problems when compared with the traditional wire line network. Therefore a balanced clogging control system is to be employed compulsorily for the stability and superior performance of a wireless network.

The non homogeneous nature of the application topologies in the multi hop wireless networks, a single and unified solution for the clogging related problems cannot be obtained. Instead a suitable clogging control depending upon the properties and functions of the related network can be designed. As a result, these proposals majorly form a subset of solutions for the identified problems rather than a complete, instantly used topology. They pose as a parent for application-tailored topology stacks. Exceptionally, few of the topology properties serve wide range of applications.

The recent years have witness a much more focus on the clogging control methods directed on the modeling, analysis, algorithm development of closed loop control schemes (e.g. TCP) making them sympathetic for adaption to the mobile hoc networks under the provision of constraints of routing path and bandwidth algorithms possessing the ability to unify and stabilize operation have been evolved. Another major constraint to

be painstaking in a wireless hoc network is due to the MAC [Media access Control) layer. Majority of wireless MACs possess a time constriction permitting a single user to access a physical channel at a given time.
The sections in the paper are organized to provide the following details as regards. The section2 explores the most cited works in the area of text section3 gives a detail discussion of the projected topology and section 4 relies on the simulation and their results to be consummate by conclusion and references.

1.1 Related Work:

QoS centric clogging control solution can be found in [1]. was Yung Yi et al [13] proposed few metrics for clogging aware routing] Xiaoqin Chen et al [2] introduced metrics to evaluate data-rate, MAC transparency and buffer delay, which helps to identify and deal the blocking contention area in network. Hongqiang Zhai, et al., [3] projected a solution by arguing that clogging and severe medium debate is interrelated. Tom Goff et al., [5] discussed a set of algorithms that initiates different path usage when the quality of a path in use turns out to be suspect. A cross-layer hop-by-hop clogging control scheme projected by Xuyang et al., [6] to improve TCP performance in multi hop wireless networks. Dzmitry et al [7] presents the impact blocking on transport layer that decreases the performance. Duc et al [15] proposed that current designs for routing are not adjustable to clogging.

The existing models aim at identify clogging losses in routing path .The packet loss generate a link failure. Making efforts to manage the packet losses that cause link failure are in effective. Another exclusive approach is regularizing the outflow at all nodes participating in routing. In majority of cases of control the clogging at hop level [13] [8]. Henceforth outflow regularization at each node of the network involves operation of expensive wealth. Here in this paper we argue that it is an important to identify the reason for packet loss. Hence we can avoid the clogging control process via outflow regularization under the status of link failure. And also we continue the spat that hop level blocking control alone is not plenty when the hop levels are unable to normalize themselves. The outflow load to control the blocking by utilizing the same resources can be done as in spring level outflow regularization models. Here we propose a cross layer based clogging control routing topology that contains Clogging detection and clogging control models.

II. GROUPS STRUCTURE BASED MULTI CAST ROUTING: AN ORDERED CROSS LAYERAPPROACH FOR QOS PROVISIONING BY CLOGGING CONTROL

2.1 Measuring degree of clogging at Relay hop level node:

Unlike conventional networks, nodes in the ad hoc network exhibit a high degree of heterogeneity in terms of both hardware and software configurations. The heterogeneity of the relay hop nodes can reflect as varied radio range, maximum retransmission counts, and barrier capacity. Hence the degree of communication load, packet drop frequency, and degree of buffer consumption at relay hop level node is minimum combination to find the degree of clogging. The usage of these three purposeful values supports to decouple the clogging measure process from other MAC layer behavior.
The degree of channel load, packet drop rate and degree of buffer operation together provide a scope to envisage the blocking due to inappropriate ratio between collision and retransmission count. When retransmissions compared to collision rate are significantly low then outflow delay of relay hop node will increase proportionally, which leads to clogging and reflected as clogging due to buffer overflow.

2.2 Measuring degree of clogging at path level traffic

The degree of clogging at each relay hop together helps to identify the degree of clogging at path level traffic from source to goal node. Each relay hop level node receives the degree of clogging from its neighbor node in hierarchy. Since the destination node, which is last node of the routing path is not outlet the emptiness status. Hence the destination node initiates to assess the degree of clogging at path level traffic. The interrupted updates of clogging status at each relay hop level node to it's heir in routing path is significantly energy consuming activity. Hence to conserve the energy, the clogging update strategy considers two restricted behavior, which follows:

1. Degree of blocking $d_c(h_i)$ at relay hop level node h_i will be sent to its successor h_{i+1} iff the ' $d_c(h_i)$ ' is greater than the node level clogging threshold $d_c(\tau)$. Hence the energy conserves due to conditional transmission.
2. If degree of blocking at path level traffic $d_c(rp)$ that received by node h_i from its doorway initiator h_{i-1} is smaller than $d_c(h_i)$ then it update the $d_c(rp)$ else it remains same, hence energy conserve due to prevention of $d_c(rp)$ update.

III. CROSS LAYERED MODEL FOR CLOGGING CONTROL

The packet dipping often occurs in MANETs. The reasons for this packet plummeting are as below

- Transmission Link failure.
- Inferred Transmission due to weighed down Inflow that leads inflow balancing ability to low. This also can claim as packet dropping due to blocking at routing.

The clogging control can be evaluated in two stages by turning over of the zonal head with the network partitioned into Cells as follows

- The Status of blocking at intra Group level
- The status of clogging at inter Group level

This helps in minimization of source level outflow balancing cost and balances the power consumption.

3.1 Network and Node activities under projected topology:

The network is to be crack into Cells

For each Group i where $i = 1..|Z|$; ($|Z|$ is entirety number of Cells)

Select Group-head for each Group i

Find spread load threshold ζ_n for each Group i

By using ζ_n of each Group spread load threshold for entire network can be measured.

3.2 Splitting the network into Groups:

We opt to the approach described by Mohammad M. Qabajeh et al [15]. With the knowledge of the presented nodes the region is divided into equal partitions. Hexagon is mostly chased for the zonal shape because it covers a highest surface and also provides the improvement of communicating with more neighbors as they have near circular shape of the transmitter. The availability of small, economical low power GPS receiver makes it possible to apply position-based in MANETs. The communication range of node is denote as R and the side of hexagon as L.As the nodes should be able to correspond with each other the R and L are related as L=R/2.

Each Group has a Group characteristics (zid), Group Header (zh) and Group Leader Backup (zh'). The zh node maintains in sequence about all the nodes in a Group with their positions and IDs. Also, maintain information about the zh of the neighboring Cells as shown in the figure 1. The CLB node keeps a copy of the data stored at the zh so that it is not lost when the zh node is off or touching the Group. By knowing the coordinates of a node location, nodes can execute our self-mapping algorithm of their present locations onto the current Group and calculate its zid easily. Figure 1.shows the general overview of the network architecture.

3.3 Selecting Group Heads

A Group-Head selection occur under the pressure of the
Following metrics:

a. Node positions: A node with a position *p* that is close to the centre is more likely to act as a Group head.
b. Optimum energy available: a node with higher energy e more probably acts as a Group head.
c. Computational ability: the node with high computational ability c is more possible to act as a Group Head.
d. Low mobility: the mobility *m of* a node is inversly proportional to its selection as a Group head.

Each node of the Group broadcasts its (p, e, c, m). The node that identified itself as most optimal in (p, e, c, m) metrics, announces itself as Group head zh. The next optimal node in sequence claims itself as reserve Group head zh'.

3.4 Information sharing within multicast group [between Node and group head]

Each node n that is a subset to Group Z verifies the Inflow load and shares degree of inflow load dil_n with Group head. Once received from each node k of the Group i, the Group head zh calculates the degree of inflow load at Group level $zdil_i$.

$$zdil_{z_i} = \frac{\sum_{k=1}^{zn_i} ndil_k}{zn_i}$$

$ndil_k$

3.5 Multicast Group Level Clogging Evaluation and Handling Algorithm (MGLCEH)

Multicast Group Level Clogging Evaluation and Handling Algorithm abbreviated as MGLCEH is presented in this section. MGLCEH is an optimal algorithm that helps in locating the packet dropping under clogging. This evaluation occurs under Mac layer and then alerts network layer.

3.6 Multicast Group Level Load Balancing Algorithm (MGLLBA)

This event occurs if Mac-layer alert indicates the clogging circumstance. Once the routing topology [4] gets an alert from the Mac layer a propos the blocking at a node i , it alerts the fellow citizen node which is the source node s for conflict node i . Hence s evaluates it's dil_s by comparing with $zdil$ of Z_c (Group of the node s). If dil_s is more in magnitude than $zdil_{z_c}$ the variation between dil_s and $zdil_{s_z}$ should be either greater or equal to the outflow threshold ε then node s regularizes the outflow load by manipulate its buffer time BT_s such that $ndil_s \geq zdil_{s_z} + \varepsilon_{s_z}$.

Here ε can be calculated with following equation

$$\varepsilon_j = \frac{\sum_{k=1}^{zn_j} zdil_j - dil_k}{zn_j}$$

In case that the node s not able to normalize its outflow so that disagreement node i terminates blocking then it alerts the zh_{s_z} (Group-head of the Z_c , $s \in Z_c$). Subsequent that event zh_{z_c} alerts all the nodes in the network building the all nodes in the upstream of source node to way out load using the above stated slant. Then all nodes update their $ndil$ and send to Group-head zh_{z_c} , then Group-head zh_{z_c} calculate $zdil$ and confirms integrity of the $zdil$ by evaluation with dil . $zdil_{z_c} \geq dil + \overline{\varepsilon}$ concludes that clogging at contention node maintained by outflow regularization at current Group level. If $zdil_{z_c} < dil + \overline{\varepsilon}$ then CEA will be started at Z_p , which is adjacent upstream Group to Z_c in transmissible. In this process Group head of the Z_c firstly alerts the Group head of the counterpart Z_p then zh_{z_p} alerts all nodes that belongs to Z_p , of the route path. The above procedure of outflow regularization at Group level can be referred as BGLLBA (Multicast Group Level Load Balancing Algorithm). Hence the nodes belong to Z_p regularize their outflow load by utilize BGLLBA and alert Group-head about their efficient degree of inflow load $ndil$. Then zh_{z_p} measures $zdil_{z_p}$ and verifies the result of $zdil_{Z_p} \geq dil + \overline{\varepsilon}$ .True indicates the elimination or minimization of clogging at the Group due to the outflow regularization at Group Z_p , if false then Group head of the Z_p performs the action of alerting all other Group heads using a broadcasting[12] instrument about the clogging at adjacent Group in downstream of the hereditary. Hence all Cells in the upstream side of the Z_p apply BGLLBA and the Cells in downstream side of the Z_p fill in their $zdil$. Then all Cells broadcast $zdil$ to resource Group. Hence the source Group revaluates the dil . Basing on the dil , source node regularize its outflow load.

Fig 3: Multicast Group Level Load Balancing Algorithm

IV. SIMULATIONS AND RESULTS DISCUSSION

In this section we discuss the outcome acquired from simulation conducted using a simulation model developed by using MXML in this section. We evaluated concert using ad hoc with the following considerations:

The simulations are conducted on three routes differing by the no of hops and length.

a. Short length path: A route with 15 hops
b. middling length : A route with 40 hops
c. Max Length: A route with 81 hops

The same load is given to all the paths with regular intervals. The figure 3 indicates the load given in simulations. The fig 4 concludes the improvement of MGLCEH over clogging control topology [8] in clogging control cost. A. The clogging detection cost evaluation between MGLCEH and clogging control topology[8] is explore in fig 5 that elevates the energy good organization achieved under.
The process of capacity of clogging control and clogging detection cost is as follows:
Based on the resource ease of use, bandwidth and energy, for individual operation a threshold value between 0 and 1 assigned. In the mechanism of clogging detection and control the total cost is calculated by summing the cost threshold of every involved event. In fig 5 the judgment between clogging costs observed for MGLCEH and clogging and contention control model [8] are shown.

$$\cos t_{ch} = \sum_{e=1}^{E} ct_e$$

Here $\cos t_{ch}$ is the price of a clogging controlling activity ch , E is total amount of events included. ct_e is the threshold cost of an event e . The example events are:
1.” alert to source node from Mac layer”
2. “Alert from node to Group head”, “propagation by Group head to other Group heads”
3. “Inflow judgment and outflow regularization”.
4. Alert about $d_c(h_i)$
5. Bring up to date $d_c(rp)$

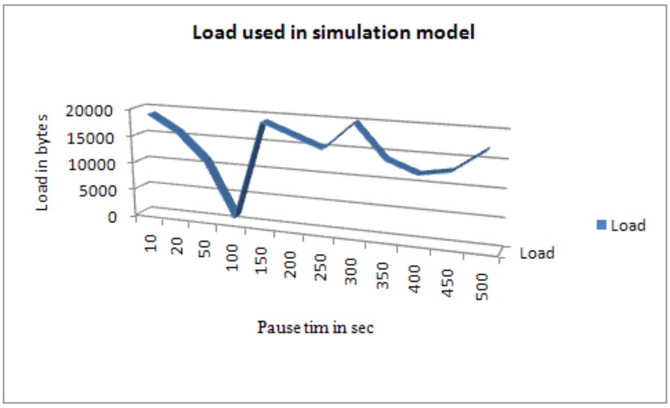

Fig 3: Load in bytes drive by source node of the routing path [in regular interval of 10 sec]

V. CONCLUSION

This manuscript discussed about proposed “Hierarchical Cross layered blocking Detection and Control Routing Topology” in short referred as “Clogging Detection and have power over with Control seaplane Functionality”, which derived a cross layered clogging detection mechanism with energy effectiveness as primary criteria that included as clogging detection.

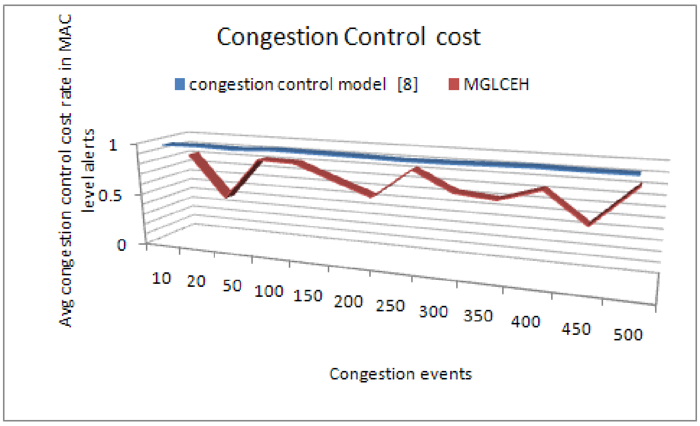

Fig 4: Clogging Control cost

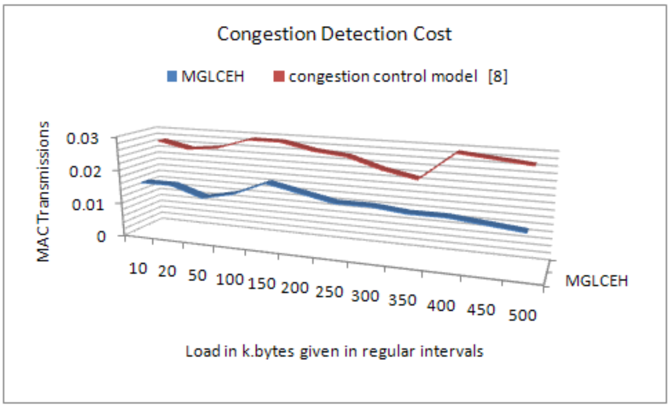

Fig 5: Clogging detection cost

REFERENCES

[1]. Michael Gerharz, Christian de Waal, and Matthias Frank, "A Practical View on Quality-of-Service Support in Wireless Ad Hoc Networks", BMBF.

[2]. Xiaoqin Chen, Haley M. Jones, A .D .S. Jayalath, "Cogestion-Aware Routing Topology for Mobile Ad Hoc Networks", IEEE, 2007.

[3]. Hongqiang Zhai, Xiang Chen, and Yuguang Fang, "Improving Transport Layer Performance in Multihop Ad Hoc Networks by Exploiting MAC Layer Information", IEEE, 2007.

[4]. Giovanidis, A. Stanczak, S., Fraunhofer Inst. for Telecommun., Heinrich Hertz Inst., Berlin, Germany This paper appears in: 7th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks, 2009. WiOPT 2009.

[5]. Tom Goff, Nael B. Abu-Ghazaleh, Dhananjay S. Phatak and Ridvan Kahvecioglu, "Preemptive Routing in Ad Hoc Networks", ACM, 2001.

[6]. Xuyang Wang and Dmitri Perkins, "Cross-layer Hop-byhop Congestion Control in Mobile Ad Hoc Networks", IEEE, 2008.

[7]. Dzmitry Kliazovich, Fabrizio Granelli, "Cross-layer Congestion Control in Ad hoc Wireless Networks," Elsevier, 2005.

[8]. Yingqun Yu; Giannakis, G.B.; , "Cross-layer congestion and contention control for wireless ad hoc networks," Wireless Communications, IEEE Transactions on , vol.7, no.1, pp.37-42, Jan. 2008

[9]. Nishant Gupta, Samir R. Das. Energy-Aware On-Demand Routing for Mobile Ad Hoc Networks, OPNET Technologies, Inc. 7255 Woodmont Avenue Bethesda, MD 20814 U.S.A., Computer Science Department SUNY at Stony Brook Stony Brook, NY 11794-4400 U.S.A.

[10]. Laura, Energy Consumption Model for performance analysis of routing topologys in MANET,Journal of mobile networks and application 2000.

[11]. LIXin MIAO Jian –song, A new traffic allocation algorithm in AD hoc networks, "The Journal of ChinaUniversity of Post and Telecommunication", Volume 13. Issue3. September 2006.

[12]. Chun-Yuan Chiu; Wu, E.H.-K.; Gen-Huey Chen; "A Reliable and Efficient MAC Layer Broadcast Topology for Mobile Ad Hoc Networks," Vehicular Technology, IEEE Transactions on , vol.56, no.4, pp.2296-2305, July 2007

[13]. Yung Yi, and Sanjay Shakkottai, "Hop-by-Hop Congestion Control Over a Wireless Multi-Hop Network", IEEE, 2007

[14]. Outay, F.; Vèque, V.; Bouallègue, R.; Inst. of Fundamental Electron., Univ. Paris-Sud 11, Orsay, France This paper appears in: 2010 IEEE 29th International Performance Computing and Communications Conference (IPCCC)

[15]. Duc A. Tran and Harish Raghavendra, "Congestion Adaptive Routing in Mobile Ad Hoc Networks", 2006