International Journal of Engineering Research and Development
e-ISSN: 2278-067X, **p**-ISSN : 2278-800X, www.ijerd.com
Volume 5, Issue 1 (November 2012), PP. 18-24

Analysis of Energy Drain Rate for Selfish Scheduler in Manets

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Abstract:- The projected work be composed of mechanisms for distinguish the selfish node as well as an attitude called rehabilitate-before-malicious behavior for justifying against the malicious behavior of nodes having self-centeredness. The parameter namely the packet weighted energy drain rate provides a direct solution for sorting out the selfish nodes. If packet weighted energy drain rate selfish scheduler is installed in an ad hoc environment it not only presents a lively and direct solution to become attentive of malicious nodes but also can discriminate selfish nodes which may be fruitless due to the scarce energy available, since the limited battery power is one of the key constraints for all the mobile nodes. The efficient and effective performance of planned work are done in ns-2 simulations. The limitations are computed based upon varying the packet size transmitted. The parameters used are the Packet delivery ratio, Throughput, Control overhead, Total overhead and End to end delay. The outcome projects that the designed mechanism executes well.

Keywords:- Adhocnetworks, Selfishness,Reliability,Energy drain rate.

I. INTRODUCTION

Mobile ad hoc networks avails a cooperative and limited wireless medium which is engaged by all the wireless nodes in the network providing well-organized and successful control over this wireless medium is always important. Several resource allocation attitudes have been added for achieving this task [1]. Although there are several such a resource scheduling algorithm, one of the packet scheduling strategy which believes the bandwidth for packet relay through multiple lines are expected [2]. The above stated solutions principally targets on get rid of the troubles that could occur with multiple sessions while sharing a common wireless links [3].Our Planned mechanism takes into account about the subjects that are distinct to MANET's namely dynamic topology and multihop environment[7] . The word "Packet Weighted" in our scheduler scheme concludes the suggestion about the consumption of energy, which is directly proportional to the number of packets that are onward by an individual node. The scheduler considered is mostly used in the context of the selfish nodes, which refers to a mobile node that drops the packet that approach from other mobile nodes that drops the packets of its own node [5,6]. When we consider the routing of packet through Ad hoc On- Demand Distance Vector (AODV) routing protocol, the selfish node could show any one of the subsequent possible actions in Ad hoc network [8].

The stability of the MANETs communication normally depends upon the implied trust between the nodes clearly trust in the sense refers to the full support which is create between nodes of the network so as to ensure correct routing establishment techniques, through which the construction of routing information could be provided [11].

II. RELATED WORK

Ad hoc networks are attributed with the implementation of various routing protocols in the recent past. Many researchers [9,10] .Most of the ad hoc mobile devices does its routing purely supported by the battery power. Hence the energy consumed for each and every routing deserves definite cost and significance.

The load based scheduling algorithm [4] was installed based on an individual node's own load while forwarding the packets. The Packets on warded are allocated with some main concern based on the forwarding node's load level. When a node is in ideal state, they assist the other nodes in route establishment. The transmission delay may be prohibited by forbidding the construction of new route when the route's load level is high.

Distributed packet scheduling algorithm, [5] in which the both the bandwidth sharing plus the scheduling results are taken based on the scheduler which is be inherent in locally in each and every node.

The researchers of [11] highlighted that the monitoring algorithm (PCMA) which can detect node misbehavior in term of selfishness (i.e. none forwarding nodes). Because most of the other mechanisms give the distrustful node, i.e. self-centered node, some degree of faith, we entirely avoided any confidence for the selfish node by relying only on in sequence from the neighboring nodes of the distrustful node, and not all of the adjacent nodes, but only neighboring nodes that sent/received a straight information from or to the suspicious node. As a result of this, we will save power which is important in MANET.

Furthermore some researchers considered both the congestion state and end to end path duration for forwarding the packets [12]. This packet scheduling scheme utilizes only the local channel information attained from their neighbor nodes. In this approach the packets with high probability of reaching the destination are consigned more priority so that link break may be avoided.

III. PACKET WEIGHTED ENERGY DRAIN RATE BASED SELFISH SHEDULER

In our projected work, the main focus is on the reactive routing based protocols in which the route discovery is executed only when a node wants to establish a connection to transmit a data to another node. The routing protocol used for our study is the AODV, an On demand routing protocol.

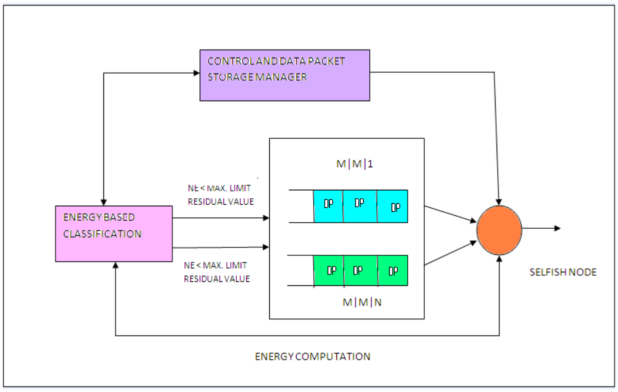


Fig. 1. selfish scheduler scheme based on packet weighted energy drain rate

Packet weighted Energy drain rate based selfish scheduler:

If the source needs to communicate to a destination node, it generates data packets and broadcast them through the Network layer, if there is no possible route from the source to the destination, and then it commences a route discovery process. We take into contemplation that communication time is known. A node accepts to communicate the packet as shown in figure 1 only if it has at least Maximum-limit of Residual value.

Packet weighted Energy drain rate Computation:

Packet weighted energy drain rate (PWEDR) is calculated as the difference between the product of number of packets and the energy E_a of the node and the product of number of packets and the energy E_b of the node between a session divided by time interval .

$$PWEDR\ (E_{a\text{-}b}) = \frac{P_a * Engy_a - P_b * Engy_b}{t_b - t_a}$$

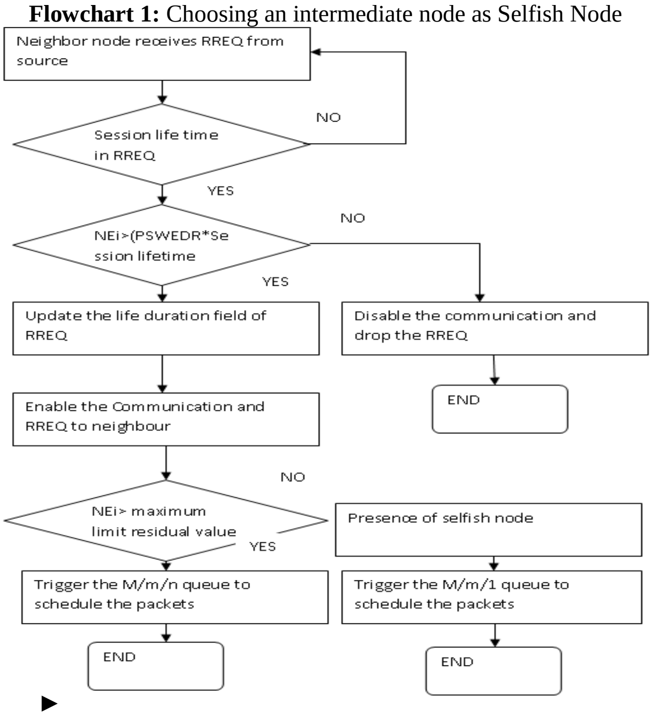
When $Engy_a$ and $Engy_b$ are namely the nodes energy at t_a and t_b respectively. The PWEDR is averaged based on exponential averaging with α =0.75.

To manipulate the Average Packet weighted energy drain rate (APWEDR) we use the formula:

$APWEDR\ (E_{a\text{-}b}) = \alpha * PWEDR(t) + (1-\alpha)*PWEDR(t-1)$

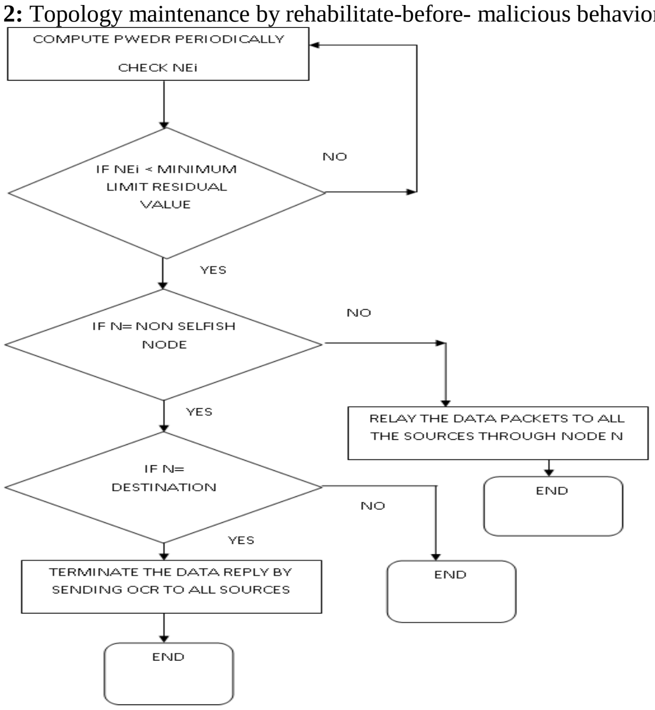
At the end, when the RREQ packet reaches the destination, it chooses a route that would maximize the life-time of the route by decide on the one with maximum life-time of the node.

Flowchart 1: Choosing an intermediate node as Selfish Node



The second flowchart facilitate the protocol to route the packet and to regenerate quickly to link breakage due to presence of non-co-operating nodes when the energy of a node is fully drained i.e. when the current energy of the node goes below a minimum limit of residual value. The routing protocol reacts to this event, and its feature depends in whether the node is a selfish node or a Destination Node. If the node is a selfish node, it sends OCR (Optimal Change Request) packets to all the source nodes through the neighbor's hops towards their respective destinations. The source node on receiving the OCR packet, Originates a new route discovery process for the communication session and hence with high chance obtains a fresh route before an actual link break occurs on the established original route. This could make the packet drops and increase the delay in time and hence enables the protocol to enhance rapidly to the network topology changes, if an alternate route to the desired destination exists. If the node being drained is a destination node, then it sends a request the source to stop all data routing to itself. When the request reaches the source, further replay of the data are prohibited. This may reduce the number of packet to be lost in the network and thus increases packet delivery ratio, and reduces resource usage by avoiding packet transmissions to unavailable destinations.

Flowchart 2: Topology maintenance by rehabilitate-before- malicious behavior at node N



IV. SIMULATION AND RESULTS

The Network Simulator used for our study is ns-2.in our simulation 50 mobile nodes were placed randomly in a terrain area 1000 m×1000 m.2 Mb/s is the wireless channel capacity used in our simulations. Each of the simulations are run for 50 seconds.

The Packet Weighted based Energy drain rate scheduling scheme are applied by varying the packet size. The proposed methodology is compared with the selfish aware queue scheduler. A node transmits varying number of packet size. The random way model is used for simulation. The maximum allowed speed for a node is 10 meters per second. The following performance metrics are used to compare the scheduling algorithm are the packet delivery ratio, control overhead , total overhead , End-End delay and through put

PERFORMANCE METRICS

For performance estimation of this scheme the succeeding metrics are used:

A. PACKET DELIVERY RATIO

Packet delivery ratio is the relation of the total number of data packets sent to the receivers to the total number of data packets received by the receivers.

B. CONTROL OVERHEAD

Control overhead is the relation of the total number of the control packets transmitted by the sender to the number of data packets delivered to the receivers.

C. TOTAL OVERHEAD

Total overhead can be defined as the total number of data packets and control packets transmitted to the total number of the data packets delivered.

D. THROUGHPUT

It may be defined as one of the dimensional parameter which represents the fraction of channel capacity utilized for reliable transfer of data from the source node to the destination nodes.

E. END TO END DELAY

It may be defined as the time gap between the time of packet origin to the time upto the last bit arrival of the packet to the target.

TABLE I Simulation Parameters

Parameter	Value	Description
Number of Mobile Nodes in the terrain	50 Nodes	50 nodes are placed in the network
Channel type required	Wireless ad-hoc Channel type	Channel Type
Propagation Type	Two Ray Ground model	The Radio propagation model
Network interface type	Phy/WirelessPhy type	Network interface type
Interface Queue type	M/M/1 and M/M/n	Interface queue model
Antenna Type	Omni-directional Antenna	Antenna model
Protocol Type	AODV	Ad-hoc on Demand distance vector
Simulation time	50 secs	Maximum simulation time
Size of the packet	512bytes	Variable Data packet size
Dimensions of the terrain	1000m x 1000m	X and Y dimensions of the motion

V. PERFORMANCE EVALUATION OF SSQM

A. PACKET DELIVERY RATIO

Fig. 2 depicts the shows the comparison chart between the Packet delivery ratio and the packet size transmitted to the destination for two strategies, they are without PWEDRSS and with PWEDRSS. The graphical illustration actually describes that the decrease in Packet Delivery ratio due to the increase in selfish behavior. When the reactive scheduling mechanism is deployed Packet delivery ratio increases.

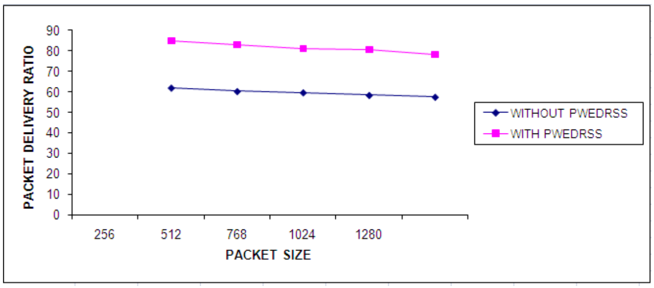


Fig. 2. Packet delivery Ratio for pwedrss

The chart reveals that the packet delivery ratio get decreased in the network when the selfish node behavior takes place but can be increased on an average by 28% when the PWEDRSS strategy is provided to isolating selfish node using weighted energy drain rate for the packet.

B. CONTROL OVERHEAD

Fig.3 shows the comparison chart between the Control Overhead and the delivered packet size of selfish nodes for two strategies, they are without PWEDRSS and with PWEDRSS. The graphical illustration apparently describes that the increase in Control overhead due to the increase in selfish behavior. When the reactive scheduling mechanism is deployed Control Overhead decreases.

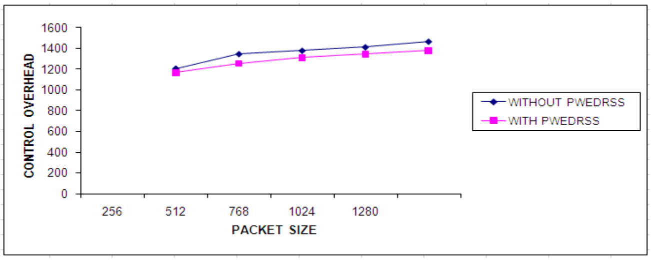


Fig.3. control overhead for pwedrss

The graph portrays that the control overhead get increased in the network when the selfish node behavior takes place but can be decreased on an average by 18% when the PWEDRSS strategy is provided to prevent the attack.

C. TOTAL OVERHEAD

Fig 4 depicts the shows the comparison chart between the Total Overhead and the delivered packet size of selfish nodes for two strategies, they are without PWEDRSS and with PWEDRSS. The graphical illustration apparently describes that the increase in Total overhead due to the increase in selfish behavior. When the reactive scheduling mechanism is deployed Total Overhead decreases.

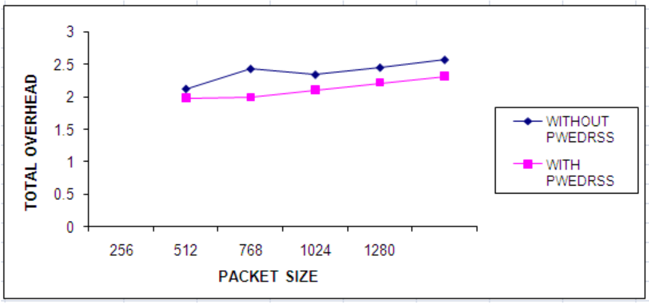


Fig 4. Total overhead for pwedrss

The graph portrays that the Total overhead get increased in the network when the selfish node behavior takes place but can be decreased on an average by 19.4% when the PWEDRSS strategy is provided.

C. THROPUGHPUT

Fig.5 shows the comparison chart between the throughput and the packet size of the selfish nodes for two strategies, they are without PWEDRSS and with PWEDRSS. The graphical illustration apparently describes that the decrease in throughput due to the increase in selfish behavior. When the reactive scheduling mechanism is deployed throughput increases.

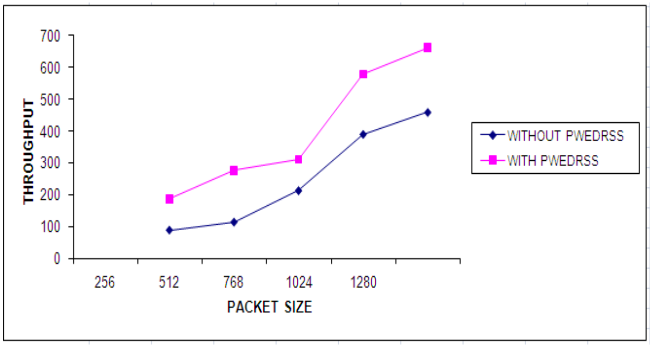


Fig. 5. Throughtput for pwedrss

The graph portrays that the throughput get decreased in the network when the selfish node behavior takes place but can be increased on an average by 34% when the PWEDRSS strategy is provided.

C. END TO END DELAY

Fig. 6 shows the comparison chart between the End to End Delay and the delivered packet size of selfish nodes for two strategies, they are without PWEDRSS and with PWEDRSS. The graphical illustration apparently describes that the increase in End to End Delay due to the increase in selfish behavior. When the reactive scheduling mechanism is deployed End to End Delay decreases.

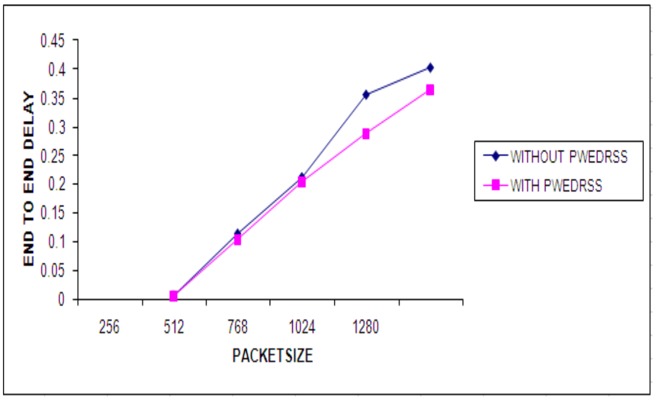
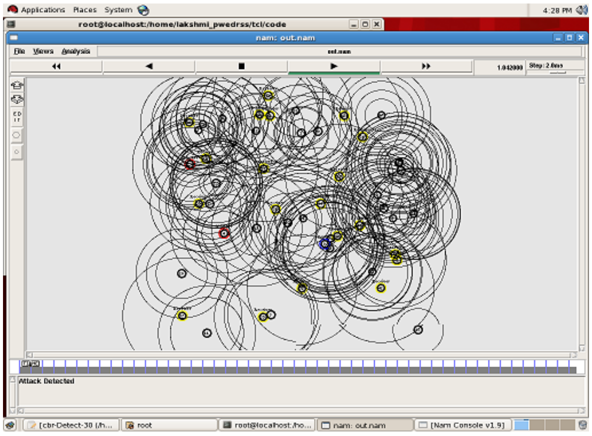


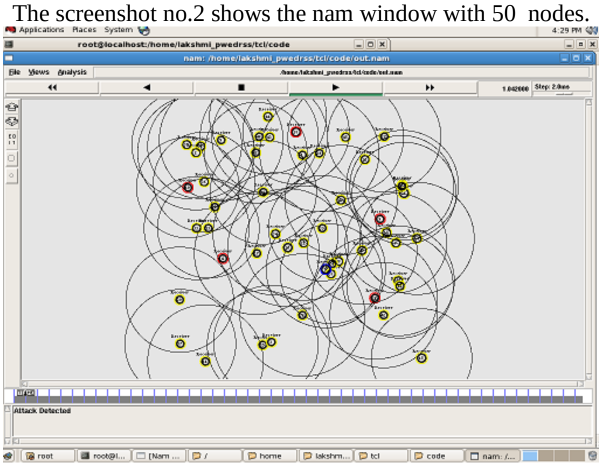
Fig 6. end to end delay for pwedrss

The graph portrays that the End to End Delay get increased in the network when the selfish node behavior takes place but can be decreased on an average by 23% when the PWEDRSS strategy is provided.
The ns-2 Nam screenshots are provided below: The screenshot no.1 shows the nam window with 30 Mobile nodes



SCREENSHOT NO 1. NAM WINDOW WITH 10 SELFISH NODES.

The screenshot no.2 shows the nam window with 50 nodes.



SCREENSHOT NO 2. NAM WINDOW WITH 20 SELFISH NODES.

VI. CONCLUSION

In this paper, Packet weighted energy based scheduling strategy is exposed. This method work out the energy based on the number of packets transmitted by a node, through which scheduling decision could be made. By means of simulation, the algorithmic presentation can be evaluated. Evolution analysis predicts that this solution performs better.

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