

# Red Congestion Control with Energy Aware Auction Based Route Selection in MANET

S. Shanthini, D. Devakumari

**Abstract:** Congestion is a very big issue in mobile ad hoc network. In MANET has various congestion control algorithm to solve this issue. RED algorithm is the one of the congestion control algorithm. It increasing buffer space of the queue and it reduce the packet loss and control transmission delay. In the proposed technique first fine out the energy aware auction based route selection then used the red algorithm to control the congestion. This techniques give a better result comparatively other techniques. Reduce the transmission delay so it increase the network throughput and avoid the packet losses and also give a better packet delivery ratio.

**Keywords:** Random earlier detection (RED), Congestion Control, Auction game theory, energy efficient, (Mobile Ad-Hoc Network (MANET)).

## I. INTRODUCTION

Mobile Ad-hoc Network is a structure less network [19]. The nodes location are temporary it can change frequently these are the heterogeneous nodes with a radio transmitters and receivers. Every node interactive with their neighbor node and it can't communicate with source to destination. It can communicate with the help of other nodes so every node depending their neighbor nodes. In MANET have many characteristics it's a dynamic network topology and it has communicate link with unidirectional. This network called self-organizing network.

In MANET facing two major issues called Energy and security [5]. Energy is main factor in wireless network. Every node have their own energy level it can be reduce the every single transmitting and receiving the packets. If there is no energy the packet are dropped. Even the nodes need an energy for changing their location. The security is also a main factor it control the network and every data transmission because now a day their many security issue are there. In MANET need to fine the secured routing to data transmission.

Congestion is big issue in the wireless network because increasing number of node [13]. It can create the three complications first one is delay, node take a time to fine a congestion free network. Second one is overhead, network need a multiple path to maintain the congestion free. Finally

Packet loss, congested network facing these big problem of packet loss. Here need to fine the congestion control techniques to solve this problem give a good packet delivery ratio and reduce the end to end delay, increasing the network performance better.

There are many congestion control algorithms available in MANET [3] like Drop Tail, CHOKe algorithm, Blue algorithm, Adaptive virtual queue algorithm, EXACT algorithm, etc., In the Random Early Detection called RED algorithm it mainly developed for congestion control. An active queue management algorithm suitable or congestion avoidance.

Auction is one of the most important part in economical world. Starting stage of the auction facing many problems then the economist find the solution [15]. The economist design a set of rules and instructions. It gives a very efficient and trustable auction methods. In an auction divided by two types of auction one is sealed bid auction another one is open bidding auction. The sealed bid auction method bidder bidding the amount very secretly no one know the bidding amount. Finally the auctioneer fined the best bidding amount and announce the winner. But the open auctioning method ever bidder bidding their amount openly everyone know bidding amount.

## II. RELATED WORKS

Cheten Batra and vishal Arora reviewed on minimizing the packet losses to the help of RED Algorithm [3]. Here also using two differenced techniques Active queue management (AQM) and Virtual output Queue (VOQ). Generally congested network facing three types of problems long delay, high overhead and many packet losses. Here the red algorithm focused on this three issues. In traditional drop tail algorithm wasting a time to buffering but our RED algorithm control the queueing system scheduler suited for blockage avoidance. Red algorithm prevent the congestion.

Neelam Sharam, Shyam singh Rajput, Anmit Kumar Dwivedi and Manish Shrimali are analysed Probability based Random Early Detection Algorithm (P-RED) modified RED Algorithm its separated the unfollow packets or kind of different from other packet to be isolated to protect the large amount of packets [10]. In the P-RED algorithm fix, the maximum and minimum queue threshold value. This value monitored the throughput value of the network. Sometime delay value decreased that means the data flow is under the control it's going normally.

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Deependra kumar jha, Anurag Jain and susheel Jain analysed here using the AODV protocol and RED Algorithm with enhanced RED algorithm focused on the packet delivery ration and throughput values [4]. Enhanced RED algorithm to reducing the parameter sensitivity of RED it helps to calculate the accurate packet drop ratio and also fix the max and min threshold queue values. This algorithm transmitting the packet to congested route to non-congested route it calculate the average queue length and packet drop probability. It gives better result the RED algorithm.

P. Dhivya and S. Meenakshi discussed various techniques of congestion control. Problem of the congestion network high data loss, long delay and waste of resource [11]. Drop Tail (DT) algorithm suitable for the decentralized network environment. Less packet loss at the same time there are some drawback its lack of fairness, less link efficiency and non-responsive flow. RED algorithm suitable for long term network not for a short term network. Robust random early detection (RRED), weighted Random Early Detection (WRED), Adaptive Random early detection (ARED) this algorithm maintains a predictable average queue size and reduces RED parameter sensitivity advantage is altering load, low delay and high link utilization. Disadvantage the choice of the target queue size to network operation. Fair random early drop (FRED), Choke algorithm, BLUE algorithm, adaptive virtual queue (AVQ) algorithm, Dynamic congestion detection and control routing (DCDR) it gives warning message to nodes about congestion.

Yeta Mai, Fernando Molina Rodriguez and Dr. Nan Wang proposed a congestion control AODV is called (CC\_AODV). The techniques works better because the packet delivery ratio bitterly increases [20]. The performance of CC\_AODV generate the RREQ, check the congestion counter in the routing table if it greater than. The request will drop otherwise it reach the destination. Then destination generate the flag this flag congestion counter flag this flag carry a congested route information. It update the route able the find the path (or) route.

S. Leemaroselin analysis the various congestion control algorithm find out the strength and weakness of every algorithm, these algorithm main used in the MANET area [14]. This algorithm gave good packet delivery and decreases the delay packet loss of network. It also control the network congestions special on MANET.

Mr.Navaid Ahmad Khan, Prof. Pravin D. Soni analysis various congestion algorithm and finally find the best algorithm RED (Random early Detection) among the other algorithm [9]. Because this algorithm using AQM (Active queue management) techniques to control congested network.

Sakshi Sharma and manjot sidhu implementing based on the RED algorithm [17]. RADNET is a protocol it communicate with the hardware and he electronic Interface its can communicate with the nodes. Then the adaptive RAD protocol is working to reduce the congestion of network and improve network performance it gave a better result. RADNET is basically UDI/IP protocol but it can also use to TCP/IP.

Abinash Mohan Borah, Bobby Sharma and Manab Mohan Borah analysing various congestion control algorithms and its techniques then how it reduce the congestion in the network

[1]. Here proposed topology using Random walk mobility (RWM) and lavy walk mobility (LWM) models. These models monitoring the network performance packet delivery ratio is greater than the threshold values. In this case delay threshold level is increased and the same time throughput level is decreased means our network affected on congestion. Otherwise our network is stable.

Kinjal Vahhela implemented modified random early detection (MRED) algorithm [8]. A traditional red algorithm have same limitations high packet drop and frequent link failure and it can't give various queue size. In the new modified RED algorithm solve this problems by using an ECN (Explicit congestion notification). The propose work is TRED based on red algorithm it divide packet drop probability into three part low, medium, high load. TRED structure with ECN window "when the network must be need the ECN then use it otherwise use old one".

Jinhua Zhu and Xin Wong implements a peer protocol to reduce the energy consumption [7]. Discovery a low overhead and efficient path maintains in the mobile network environment. This protocol working in mobile scenario and static scenario. So it can perform all circumstance node mobility, network density and load.

Florian De Rango, Franeesca Guerriero and Peppino Fazio evaluated a link stability and energy aware routing protocol call LAER [6]. This protocol power efficient protocol has three metrics to find a route. First calculating the nodes energy level. Second nodes residual energy and finally find the path stability. It gives better results from other energy efficient techniques.

Prasenjit Chanak, Indrajit Baherjee and R.Simaon Sherratt evaluate a cluster algorithm for wireless network called DEEHC – Distributed energy efficient heterogeneous cluster [12]. Here elected cluster head based on residual energy and deployed nodes with second timer. And also it's depending on the neighbor node energy level. Here using the K-Vertex disjoint path routing algorithm.

Anshu Chaturvedi and D.N Goswami Shivjay singh analysis an energy based node selection algorithm using cross layer design [2]. This algorithm reduce energy consumption of node. When the node are in sleep mode. It saving their energy it helps to increasing the network lifetime and network performance.

Vipin Kumar and Sushil Kumar implemented increasing the network lifetime using a new position based route algorithm [18]. It controls unwanted data transmission and failure utilize the forward search space called (FSS). Node selection based on the residual energy, nodes degree of the network distance and angle the network. It can balance the energy consumption among the nodes.

Shanthini implementing the auction based nodes position update strategy in geographical routing [16]. In this method using the auction game theory because games every move has a value and also using some techniques. Here simple using three steps, first nodes whose movements are harder to predict. Second nodes frequently update their forwarding paths and finally forwarding nodes selected based on the

residual energy and distance this are the bidding values.

This method gave a better packet delivery ratio but it facing little bit of delay.

### III. DESIGN AND IMPLEMENTATION

In this paper implementing the red algorithm with energy aware auction based route selection in MANET. First using the sealed bid auction based energy efficient route selection algorithm [15].

*Initialization:-*

FDN = Forwarding Node Destination,  
NL = Neighbour List,  
NHL = Next Hop Node = 0,  
CNL = Candidate Neighbour List = 0,  
MW = Maximum Weight = 0,  
RE = Residual Energy,  
DR = Drain Rate,  
DRT = Drain Rate Threshold Value,  
P = Progressive Value.

*Update the neighbour list:-*

```
FOR (i = 0 to i < NL.count)
FND ← NL.count
     $DR = \frac{\text{Node Previous Energy} - \text{Node Current Energy}}{\text{Current Time} - \text{Previous Time}}$ 
    DRT ← DR/2
    IF (DRT <= 2.0)
        CNL ← CNL + FND
    END IF
END FOR
```

*Find the best Forwarding Node:-*

```
FOR (j = 0 to j < CNL.count)
MW ← RE + P
    IF (MW < Best)
        NHN ← Best
    END IF
END FOR
```

Here source node broadcast the hello message throughout the network. Then the nodes are sending their information like nodes current location, energy level and their neighbour node information. Here the neighbour node information called bidding value. Now fix the threshold value based on nodes drain rate then find the best forwarding nodes. Second the RED algorithm performed it compute the average queue length using this formula [13].

$$\text{Avgq} = (1 - Wq) \times \text{Avgq} + q \times Wq$$

Here  $Wq$  denotes the weighted queue value and  $q$  denotes the actual queue length. Now fix the two average queue length threshold values minimum and maximum. If the queue is minimum of the threshold value the packets are include the queue. If the queue length is maximum of the threshold value the packets are dropped. Then the RED algorithm calculate the dropping probability using the packet drop probability formula.

$$P_b = \text{maxp} \times (\text{Avgq} - \text{minth}) / (\text{maxth} - \text{minth})$$

$$P = P_b / (1 - \text{count} \times P_b)$$

In case the probability value is high the RED algorithm can modify the queue length. This the main advantage of the RED algorithm it possible to reduce the delay.

### IV. EXPERIMENTAL RESULT

The implementation of our proposed technique is red congestion control algorithm with energy aware auction best route selection in mobile ad hoc network. Here our proposed technique called as RED\_EARS the result compared with the AODV, RED and SBA\_EERS “Sealed-Bid Auction based Route Selection Algorithm” this algorithm is exiting one here implementing with red algorithm. The analysing parameters are packet delivery ratio, Throughput, End to End Delay and Energy Consumption. The simulation tool is Network simulator (NS2) and the parameters are given a table

PARAMETERS	VALUES
Dimension	800 × 800
Channel Frequency	2.4GHZ
Data Rate	2 MBPS
Routing Protocol	AODV
Nodes	50
Simulation Time	1200 m/s
Packet Size	512 bytes
Nodes Energy	500 Joule

Table 1: Ns 2 Simulation Parameters

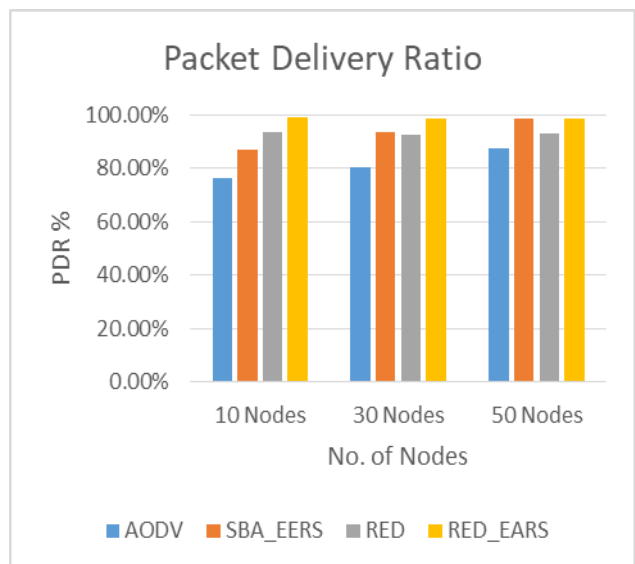


Fig 1: Packet Delivery Ratio Vs Nodes

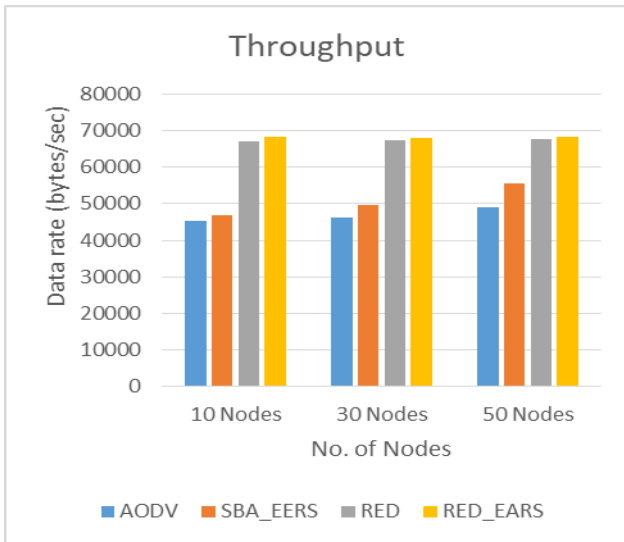


Fig 2: Throughput Vs Nodes

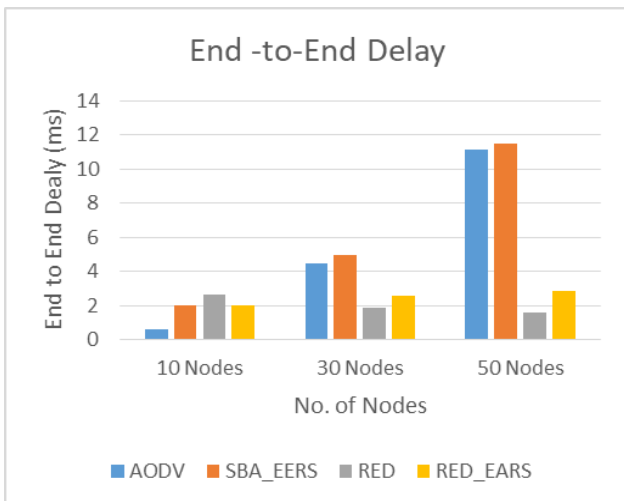


Fig 3: End-to-End Delay Vs Nodes

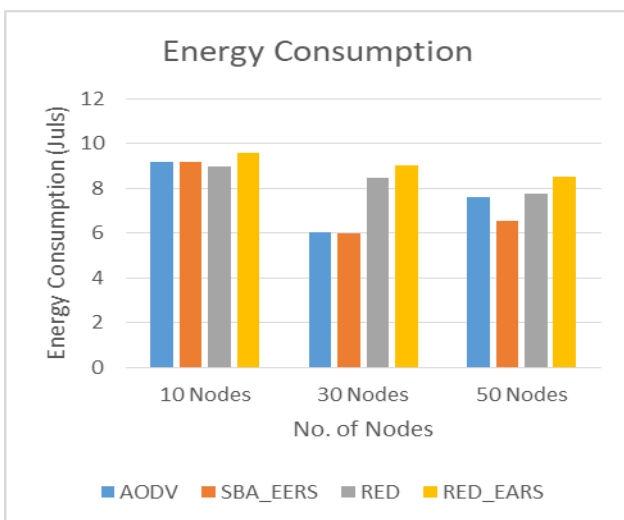


Fig 4: Energy Consumption Vs Nodes

Here analysing the results it compare with the AODV, SEA\_EERA, RED, RED\_EARS and analysing a 10, 30 and 50 nodes Fig 1: shown as packet delivery ratio is give a 98.66% of result it comparatively higher the other. Fig 2: shown as Throughput it increased the transmission data rate.

Fig 3 shown as End-to-End Delay is lower than the AODV and the SBA\_EARS but it little bit higher than the RED because here using the sealed bid auction based energy efficient route selection algorithm. it takes some time to process its create a little bit delay but it's not affect the throughput. Fig 4: sown as Energy consumption here the proposed technique save the average amount of energy in the node selection processing is little harder so it take some energy but it save the good amount of energy. Finally in the proposed techniques give better packet delivery ration, increase the network throughput, and maintain the average delay and nodes use the reasonable amount of energy.

V. CONCLUSION

Now a days Congestion is a very big issue in mobile ad hoc network. In the proposed technique RED\_EARS first fine out the energy aware auction based route selection then used the red algorithm to control the congestion. This techniques give a better result comparatively AODV, RED and SBA\_EERS. Reduce the transmission delay so it increase the network throughput and avoid the packet losses, it give better packet delivery ratio.

In future in this techniques to implementing the secured aspects because it also facing many security issues. Also compared other congestion control techniques.

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