

# E-SQUARE RBNC PROTOCOL IN MANET USING MAC LAYER DESIGN

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**Abstract**— In MANET, stable packet transmission plays a virtual role and have best quality of service, frequent change in position of node causes data loss and routing cannot be constant, probability of re-broadcasting cause high redundancy in neighbour coverage and radio signal produce congestion in mac layer and delay the transmission , our *Rebroadcasting Neighbour Coverage protocol (RBNC)* reduce the congestion and improve the rate of transmission and find best routing to reach destination. Energy efficient (*E-square*) routing mechanism is proposed in network with existing routing protocol, it selects the trusted forwarding nodes having higher energy. Simulating the comparison of routing and energy efficient mechanism in NS2 and the performance is evaluated and rebroadcasting is analytically discussed.

**Keywords**— **Rebroadcasting Neighbour Coverage Protocol, Mac Layer, Broadcast, Mobile Ad Hoc Network (Manet).**

## I. INTRODUCTION

In Mobile Ad hoc Network (MANET), each node satisfies their service using their own mobility in the network. No centralized and distributed service, user defined service. Here random mobility is the main issue which affects the data delivery; it depends on coverage of neighbors and causes link failure. If network depends on the routing protocol, each and every node works according to the request and response of radio signal broadcasting.

On demand routing protocol works with the basic schema of route selection from source to destination, here delay as to be reduced. Broadcasting is the main problem in MANET (to search neighbor using radio signal with re-broadcasting probability under NCPR protocol. This explains the covered neighbor and un-covered neighbor (forwarding node selection) in transmission. In this RBNC protocol is proposed which improve the service under congestion control (CRCN mechanism) [1]. In packet transmission channel allocation of Mac layer leads to clear transmission in network, without

congestion and reduce rebroadcasting probability etc.[1] . Rebroadcasting delay as to be find in order to reduce the probability of broadcasting , repeated selection of neighbor reduce the routing hop delay in transmission , if neighbor is not selected delay will affect the coverage ratio.[2] Additional coverage ratio of the RREQ packet in transmission calculate the rebroadcast probability in our NCPR protocol [2], it reduce the routing overhead in route discovery , dynamic route discovery affect the Mac layer , where packet is split according to the channel estimation of packet size and reduce the congestion in transmission.[2]

Gossip based ad hoc routing increase the false adversary message and confuse the routing , here destination find the best and shortest routing in network [3] Change in method as broadcasting like using Omni bi directional antenna to cover the radio signal range of 350 meter. [4] Extra rebroadcasting causes energy loss in network and affect the node life time. Robust Broadcast Protocol (RBP) provides reliability in broadcasting and communicates with MAC and routing layers. Network density defines the retransmission process and increase the reliability. [5] If a link breakage does not affect packet transmission no global broadcast occurs to find neighbor, AODV reduces the network wide broadcasts to the extent possible of selecting forwarding node in transmission. [6]. Forwarding node selection and rebroadcasting process shows point-to-point communication is replaced with many-to-many cooperative communication, energy efficient routing is defined [7].

Till now we got a survey for rebroadcasting and neighbor coverage protocol, now we are going to discuss that, energy consider network will improve the route discovery efficiently in network and reduce overhead in transmission. EARQ - Energy aware routing provide the reliability in network. It maintains the routing table like proactive routing protocol in

manet. [8]. Link utility of routing as to constant. [9] Energy dependent routing improves the service in network.

**Main contribution of this paper as follows:**

We propose an E-square RBNC protocol, which improve the quality of service, reduce redundancy and use best energy routing to reach destination.

Section I explains about the broadcasting, rebroadcasting and finding the covered neighbor with energy, and the issues discussed with reference etc. And proposed an E-square RBNC protocol improve the quality of service. Section II explains the proposed approach and section III directly show the simulation setup and performance evaluation in IV section. And the result is discussed in rest of the paper.

**II. PROPOSED APPROACH**

In this section we are going to discuss about our RBNC protocol and how we add energy to result E-square routing in MANET.

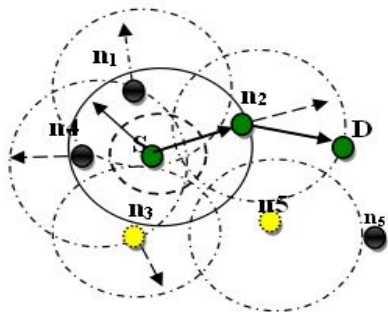


Fig 1: E-Square RBNC Routing

**2.1 RBNC Protocol**

Rebroadcasting neighbor coverage protocol (RBNC) reduces the redundant in MAC layer by finding the covered neighbor in transmission. From the figure 1, we can tell that Source, S node broadcast the radio signal and search the neighbor to select the best forwarding node, S send RREQ to neighbor and which response (RREP) reach Source, select as forwarding node in transmission, again for next route another forwarding node as be select in that source re-broadcast the radio signals and select the best node in the covered neighbor, here n5 is un-covered neighbor, which is not participating in transmission. Cognitive radio congestion network (CRCN) mechanism is used to reduce the redundancy in re-broadcasting and reduce the collision in packet transmission ie., MAC layer , channel assignment and selection process will take place according to the node density and size of the packet.

Here, congestion and redundancy is reduced but efficient forwarding node selection delay the quality of service to

improve the ratio of packet delivery. We proposed an E-Square RBNC Protocol which satisfy the energy efficient routing in the network.

**2.2 E-Square RBNC Protocol**

Energy Efficient Rebroadcasting Neighbor coverage Protocol (E-Square RBNC) improve the rate of packet delivery in network by choosing the higher precedence energy level in the forwarding node and allow it in transmission. From the fig 1, we can tell the Source have two neighbour to reach destination , in this by rebroadcasting find that n2 is the forwarding node but E-Square RBNC will select that n2 is having higher precedence or not, if it have then n2 will again reselected for transmission, this process will deliver the data efficiently to destination.

TABLE I : Performance evaluations

Parameter	AODV	RBNC	ES-RBNC
Packet Delivery Ratio ( byts /sec )	690	820	930
End to end Delay (sec)	0.56	0.21	0.17

In other case n5 is selected as forwarding node having less energy and no way to change the routing, surely packet loss will occur, because n5 is not having ability to transmission to destination, here it fails in energy level and randomly showing as un-covered neighbor, as n5 (un-covered neighbor- not able to participate in broadcasting as well as in transmission).

**E-Square RBNC Mechanism**

```
#define esrbnc_LOCAL_REPAIR
#define esrbnc_LINK_LAYER_DETECTION

for (i in finalenergy) {
    consumenergy[i]=initialenergy-
        finalenergy[i]
    totalenergy +=consumenergy[i]
    if(maxenergy<consumenergy[i]){
        maxenergy=consumenergy[i]
        nodeid=i
    }
}
```

TABLE II SIMULATION PARAMETERS

PARAMETER	VALUE
Simulator	Ns2 - 2.31
Number of nodes	50
Simulation Time	15 min
Packet Interval	0.01 sec
Simulation Landscape	1000 x 1000
Background Data Traffic	CBR
Packet Size	1000 bytes
Queue Length	50
Energy	100 Joules
Transmission Range	100 Kbytes
Node Transmission range	250 m
Antenna Type	Omni directional
Mobility Models	Random-waypoint (0-30 m/s)
Radio Frequency	150-350 MHz
Routing Protocol	AODV , RBNC , ES-RBNC
MAC Protocol	IEEE 802.11

Combining both the RBNC mechanism with the energy estimation of nodes to participate in transmission. Initial energy assumed as 100 Joules and the consumption of energy level is the difference of transmission energy to its initial state. The loss of energy will occur more in re-broadcasting the radio signals, it will be reduced in MAC channel assignment of packet transmission in network.

### 2.3 E-Square RBNC in Mac layer

In packet transmission, flooding and unwanted signals, rebroadcasting as to be reduced by channel assignment in MAC layer, It distribute the packet with the scheduling algorithm under MAC distribution in transmission. If MAC channel assignment is not performed in transmission, packet loss will occur and affect the rebroadcasting in search of neighbor coverage. To avoid those subsequences Mac channel assignment is preceded in Mac layer as E-square RBNC.

## III. SIMULATION SETUP AND PARAMETER

To evaluate the performance of proposed protocol which improve the data delivery rate and reduce the congestion in network. In NS2 simulator , we have simulate the basic routing protocol AODV and congestion and routing protocol RBNC and our proposed approach is evaluated and compared the results to show the improvement in quality of service. Energy is the main role which selects the best routing in

network without the congestion and link failure to reach destination. Each neighbor with higher energy will be selected as forwarding node. From the Table II, we can tell that, our network scenario is designed with the area of 1000x1000 and randomly 50 nodes are arranged, radio signal range covers 250 meter in the Omni directional antenna, node random way point varies up to 30m/sec. Transmission takes with CBR, with **minimum packet interval of 1000 bytes, transmission energy** starts with 100 joules. Routing protocol is changed with the same scenario and compared the results.

### 3.1 Packet Delivery Ratio

Packet Delivery Ratio is defined as the ratio of packets send and received in the transmission and the unit is bytes per sec . From fig 2 we can tell that E-Square RBNC is having high delivery ratio when comparing with AODV and RBNC.

### 3.2 End to End Delay

Time difference between the starting and ending time of transmission in the network is called end to end delay. Fig 3 shows minimum delay in E-Square RBNC transmission.

### 3.3 Energy in Network

Energy consumption in network is defined as the difference between the initial energy to the individual energy (node having energy after the complete the transmission), it is denoted by joules

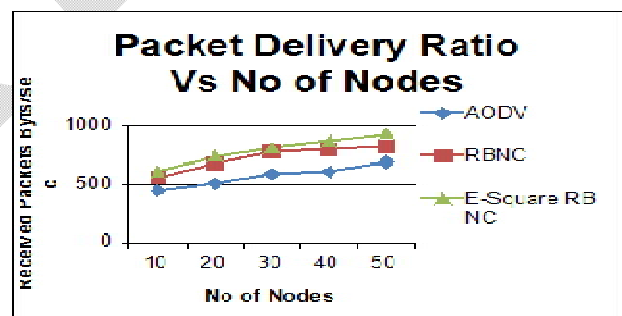


Fig 2: Packet Delivery Ratio

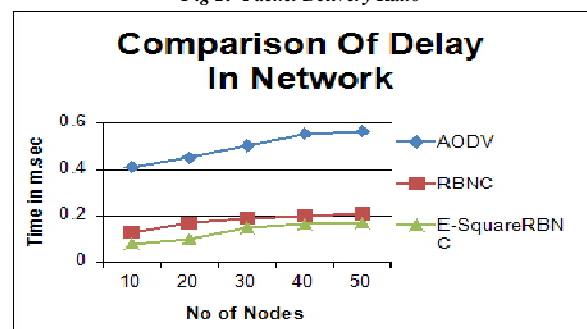


Fig 3: Comparison of Delay

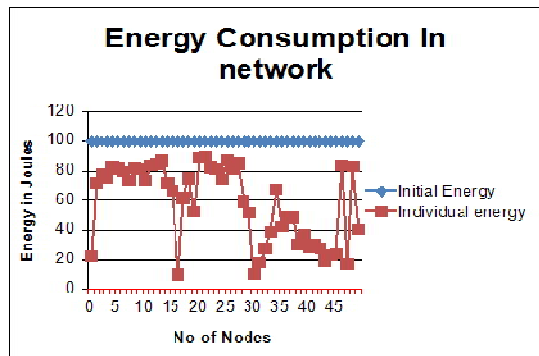


Fig 4: Energy Consumption in Network

#### IV. CONCLUSION

Thus we have implemented an energy efficient RBNC protocol, which reduce the congestion, redundancy and choose best energy routing in transmission. We improve the quality of service in network and compared with proposed protocol and solve the MANET issues. Our simulation results show the better achievements in the improvement of Qos. 20 % of service is better than RBNC protocol with E-Square Mechanism.

#### V. FUTURE ENHANCEMENT

Our E-square RBNC protocol can be verified with the scalability, and location based devices like, GPS, GPSR, WIMAX, and LTE. External energy can be used to improve the lifetime of the node.(batt power) Future enhancement of RBNC protocol mainly concentrate on the radio signal frequency coverage methodology like ellipse, parabola, and by probability distribution with geographic information of the nodes in the network with dynamic topology.

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