

# Cost-Aware Reliable Routing Protocol for Wireless Ad hoc Networks

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**Abstract**— Two of the energy awareness based routing algorithms which are known as the reliable and minimum energy and cost-based routing (RMECR) and reliable minimum energy-based type of routing (RMER) are proposed for the wireless ad hoc networks. The RMECR deals with the important requirements of the wireless ad hoc networks and they are energy based efficiency in the system, reliability of the network and also increasing the network life time. It utilizes the energy factors like remaining and utilized energy values level in the nodes and also the quality of links in network to find the most energy efficient routes and also the reliable routes which increases the total lifetime of working network. RMER is the energy-efficient routing algorithm it searches the routes by minimizing the sum of energy required for the transfer of data packets originated from the source to the end destination. It will make easy to increase the life time of the wireless ad hoc networks and also ensures reliability. It also considers utilize of energy by the nodes of the network and limited retransmissions. By considering these two algorithms, data is transferred from source to destination by finding cost-aware, energy-efficient reliable routes which increases the life time of the network.

**Key words:** Energy Efficiency, Reliability, Ad Hoc Networks, Cost-Aware, Reliable Minimum Energy-Based

## I. INTRODUCTION

Network is the connection between two end systems which are used for the data exchange or node communication. This can be done by the use of the each node capability in network. Energy based cost based type of routing are the most effective type of routing in network system. Hence the Energy-efficient routing is proven best mechanism with the effective results. The system is set for reducing the total energy cost of total transmission of the data in communication of the wireless ad hoc. Ad hoc means 'for this', hence the use of the ad hoc network is always a specific use. The network consists of the multiple hosts and the structure may be centralized or the distributed type. It uses the sensor nodes for the sensing of the data, energy distance and so on, the sensor systems are for the most part obligation cycled to draw out the system total lifetime.

Generally energy based data transmission embraced low energy transmission of the data get to the transmission of the low power tuning in network. During the specific energy based routing, it is considered initially the network is strong, it kills the wireless to rest for a specific period.

The sender likely needs to invest much energy sitting tight for its comparing data-forwarder to wake-up, the holding up time, the dispatcher ceaselessly communicates similar information bundle until the point that the preset clock terminates or an the energy values in the nodes required exhausted. Therefore, if the data-forwarder node is strong enough in terms of the total energy remaining, the delay will be less.

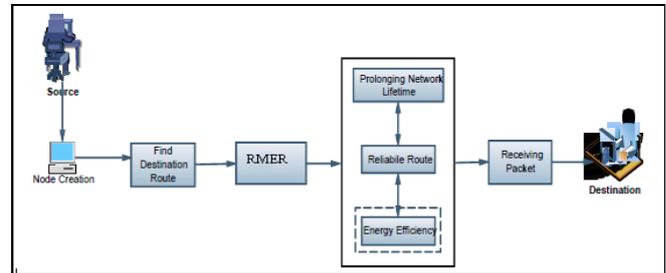


Fig. 1: General system Design

The above figure 1 shows the general system design of the working of the algorithms. Wireless ad hoc networking systems have been fetched into effective action increasingly very fast in data rate, which are to get reshape. In proposed network the total cost is combined with the remote type of the data of the networks which are able to actually provides the universal type of the data based delivery to nodes and also services to type of the end users in the remote locations of area which of them could not reached using the traditional wired type of the networks.

## II. PROBLEM STATEMENT

Transmission of data packet has the main issue in transferring data through the link nodes if the paths are unreliable which includes large number of retransmission of data, which consumes more energy of the nodes that result in packet loss due to insufficient energy left out in the nodes, negatively effects on working if the network. It should be able for trace back the data routes, in case of the link failure the data sent from the one system user should be finally delivered to the other system user in single or multiple paths without the loss of data packet.

## III. LITERATURE SURVEY

In [1], the author describes about the problem of energy-efficient type of reliable routing in their wireless communication in the presence of any type of unreliable or loss of wireless route link layers in more than one system based hops in wireless networks. Author has provided the total optimal based energy based efficient system routing solution to the problem in which the links are considered to be completely reliable. A common scenario in the link level layer which is not completely reliable, which has dropped he problem.

Here author has proposed the two algorithms which has solved the problem in the instance of presence of unreliable transmission links. He has distributed DAMER, which estimates the performance of the centralized system based algorithm which is for the improvement over the multiple compared to the single path.

In [2], Author addressed the present algorithms for less energy aware routing in the wireless networks has been typically selected minimum-cost based multi-hop based type paths only. Such type scenario where the system has

transmission power of all nodes is static, in every link which has the same cost and hops are selected

During such situations the ability of the every nodes which can be varied accordingly to the distance of all link, each link cost is higher for the transmission over hop distant. The proposed type energy based routing, which choose the total large number of small set distance based hops. Author has argued that in such a formulation network energy used per transmission of the data is wrong.

In [3], Author has proposed the expected count for the transmission metric which gives the higher level throughput in every single paths on based of multiple hop based wireless system networks. ETX (Embedded Technology Extended) has minimized the expected total packet in every possible transmissions needed the total acknowledgement of each packet which has been sent through the network. ETX adopts the issue of total link loss based ratios, in the asymmetry loss ratios in the between ever possible two type of the directions in every link.

The intrusion among the multiple scheduled successive links of network of any path should have the minimum hop-count metric has been chosen arbitrarily in and all among different multiple paths having minimum length, that has a longer path.

In [4], this author presents new power aware metrics for determining the possible routes in the wireless ad hoc network system. He has used the multiple type of the system based on the multiple routes available. It has been observed that using the shortest-cost routing system that packet has total delays do not increase in the system.

In [5], the author addressed RMER and RMECR which are of the type in the network which runs in hop by hop based on the end to end systems. The use of the algorithms allows the authors to transmit the data based on the energy and also based on the total cost spent of the data transmission. It will allow the system to be more efficient and also more reliable as it uses the dynamic re-routing also.

In [6], the author presents a case for using new metrics in determining the routes in the wireless ad hoc networks. Author describes about the use of the battery life which is monitored in the form if the metric. The proposed work by the author utilizes the least amount of energy 5 to 20% only in hop by hop transmission.

In [7], the author presents a new power aware routing protocol for the optimal data delivery. He compared with multiple cost-aware routing protocols to give the final conclusion he confirm the afflict of a balanced service availability in the view of the network performance to lifetime of the mobile devices.

This protocol has higher set of overheads which is more often than not bring about higher battery power. In the present task is to reduce the higher battery value.

In [8], Author describes new path in the MANET used the distance based system in CMDR. MDR increases the battery based life and also the duration of the selected paths, but the CMDR utilizes less energy to every transmission of the packet.

#### IV. METHODOLOGY

A network model (topology) is set of nodes in network which consists of number of nodes, each of which is considered to be battery powered. Initially all the nodes are set to have equal

energy the remaining energy of the node shown by  $C_u$ . If the energy level of the nodes drops below specific threshold value  $C_{th}$  then node assumed to be inactive.

A data link in the system is  $(u,v)$ ,  $u$  is considered as the source and ' $v$ ' is considered as the destination node and rest other nodes are considered to be intermediate nodes which transmits the data packet from source to destination. Let  $x$  be the size of data in bits, the data that is transmit through link. Let ' $J$ ' denotes the energy consumed by the node to transfer data packet to the destination node.

The data packet is sent from the source it is then transferred through the number of nodes first by considering the energy of the nodes, it sets path according to the maximum energy cost then the data packet is transferred through these cost-aware based routing paths. Later it checks for the energy level of the each node of routing path, if it is less than the packets starts dropping, RMECR then changes the path considering energy-based routing path which has the maximum energy to transfer the data packet. Then data packet is transferred and it is delivered to the destination.

#### V. MODULES

The proposed system consists of the main four modules are given below with the description of these modules used in the project is as follows:

- Setting Networking Model
- Energy Consumption for the data Packet Transmission
- Minimum Energy Cost for the Path
- Sinkhole attack and the Wormhole Attacks

##### A. Setting Networking Model

The system network model can be described as follows; initially the topology of the wireless ad hoc network system is created which are represented as;

- Graph-  $G(V, E)$ ,  $V$  -set of nodes (vertices),  $E$  - links (edges) of the nodes respectively.
- Each node is initially assigned with ID range 1 to the  $n$ . Assume that all nodes are battery powered. And the Residual energy of each node  $u \in V$  is  $C_u$ .
- If the battery energy falls under the threshold -  $C_{th}$ , node is assumed to be dead. Assume that  $C_{th} = 0$ . A link allow to exchange data between  $u, v$ .

##### B. Energy Consumption for Data Transmission

It is the energy required by the nodes for the transmission of the data packet along the route till it reached the destination.  $X$  indicates the total size of a data packet which is sent over the established link  $L$ , edge  $E$ . The total amount of the energy utilization from the system for transmitting the data over the specific link is assumed to be the real energy used for processing, receiving an, verifying and interacting with all the nodes.

##### C. Minimum Energy Cost for the Path

Energy required to transmit the data between the source and the destination is the link path uses less energy for transmission of packet transmit. As it is an additive type metric, shored routing path has to be used and choose between the lining paths.

- Energy Awareness based Reliable Routing (RMER Algorithm). This is the finest path selection among the

prechosen paths. It has to verify the energy level of the paths or nodes after the transmission has been begun.

- It stated that the total amount of remaining energy in the node has to verify after every cycle of operation..
- The RMER algorithm makes use of the Dijkstra's algorithm to find reliable path.
- The process is carried in two considerations those are the energy level considerations and reliability of data considerations. The system works on both and chooses the path required by the user.

#### D. Sink Hole Attacks and The Worm Hole Attacks

These are the type of attack which performs functions listed below:

- It Prevent base station to get complete and correct data. It only attack on severe networks
- Few of the secure and geographic level routing type to resist to the sinkhole attacks in certain level structure
- Many of the existing routing systems in sensor node networks are susceptible for the sinkhole attack

The role of the trust manager is allowing user to change the path in case of the route is having least energy and need to change the route. By using the reliable route the node can be traced and the data is delivered to the required destination through the proper route.

## VI. CONCLUSION

By the proposed work of transmitting the data packets through the links using the sink node, will allow us to use both energy based as well as reliable based network design. With the help of the work are able to transmit the data easily without worrying about the link or node failure and its increases the life time of the network because there is no need of retransmission of the packets. Future work of system will be that it has to overcome the problem of transmitting multiple data packets at once and also the energy loss by using the energy aggregator technology to stabilize the node and also link of the transmission.

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