Available Energy Aware Multipath Routing for Reliable Service Discovery in MANET

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ABSTRACT: Sensor mobile ad hoc communication is uncertain topology changeable nature, because they not follow the rule of static or dedicated connected nodes behaviors i.e. static topology. MANET also survive energy issue problem so that many researcher work done in the field of power optimization related issue to resolve the sudden loss of network connection. In this proposal we apply the algorithm to aware the power of each nodes and select best optimum energy based multipath route to provide reliable service for mobile ad hoc communication. This methodology is efficient to resolve the energy problem. Our methodology are aware each node energy at the time of routing and also calculate the require energy of each node (transmission, receiving power consumption per packet) and established the multipath from sender to destination whose require power is minimum and reliability is maximum. In this paper we mention our proposed work and algorithm and compare our proposed approach with multipath routing protocol and identifies that define methodology gives better result with respect of network parameter i.e. throughput, data receiving, overhead and packet delivery ratio.

***KEYWORDS*: MANET, E-AOMDV, AOMR-LM, PDR, ZD-AOMDV**

I.INTRODUCTION

Wireless mobile nodes are resource constraint devices due to portability and lightweight equipped peripherals. The mobile ad hoc network is a form of collection of portable devices where all the mobile devices capable to take the route discovery through multipoint routing methodology. Energy is a crucial issue for mobile devices because without the battery power we cannot operate any application, in this paper our objective to study about various energy based routing strategy that helps to designing new routing protocol to improve the efficiency of the network. Node energy consume due to transmission power, receiving, sensing, sleeping and ideal case so that initially analyse their consumption rate in per packet bases and identify higher energy node to separate from other node. That energy aware parameter helps to find out energy base routing strategy and increase the network life time. Energy based routing approach enhance the network reliability because selected path are more stable as compare to generic routing strategy [6].

A Wireless mobile ad hoc network (MANET) may be a network consisting of a set of nodes able to human action with one another while not facilitates from a network infrastructure. Applications of MANETs [2] embody the field applications, rescue work, additionally as civilian applications like an out of doors meeting, or Associate in ad-hoc device communication. With the increasing range of applications to harness the benefits of unexpected Networks, additional considerations arise for security problems in MANETs.

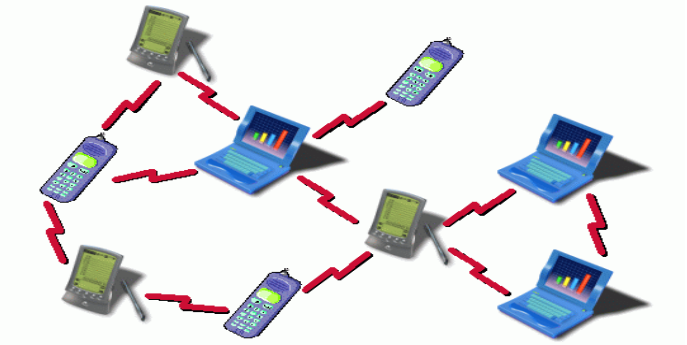

Figure 1: Mobile Ad-Hoc Nodes

Mobile ad hoc network is a collection of dynamic movable node whose topology dynamically change and each node capable to generate routing table. Those type of network useful for the military service and remote located area, where wired and static wireless communication is not possible. In the figure [1] shows that all the devices are movable which capable to perform routing decision using multipoint manner [3].

Due to lack of central management the MANET is vulnerable [4] to many type of attack. Moreover the energy of the nodes is also a major issue. For providing secure and energy efficient transmission the research specifically works on the energy and security features. This research is based on the adaptive multipath routing based on the energy for load balancing so as to utilize the nodes energy in a convenient manner.

II. RELATED WORK

In this section describe various energy aware routing which is suitable to provide reliable routing for mobile ad hoc network. Out of those some of the authors enhance the routing strategy to improving the network performance and some of them combine the multiple strategies in single system, which provides guaranteed delivery service. Those works describe as follows.

Umair Rashid et. al. develop a module for mobility and energy aware routing in mobile ad hoc communication [1] in this work author focus in two primitive one is node mobility and another residual energy parameters which is important to finding network stability. For the node energy they design MAODV-X that evaluate the link stability, similarly RAODV design for prediction the node mobility which is useful to selecting the reliable route from source to destination.

Akhtar Husaina et. al. Design the protocol to compare the performance of destination routing effect agent module

(DREAM) and location aided routing (LAR) for the ad hoc communication [5] in his work they simulate the network with the help of network simulator -2 and apply all the NS-2 tools such as tcl, trace and awk language and to evaluate the network performance. Those metrics are packet delivery ratio, throughput, delay, routing overhead, packet drop analysis and found that LAR outperform as compare to DREAM routing protocol.

Supriya Srivastava et. al. Develop a method to efficient energy routing to perform reliable communication [7] in his work they enhance the utilization of link bandwidth and node capacity using balancing energy consumption in between utilized and non-utilized mobile nodes to meet the ad hoc network requirement. The methodology deals numerous network parameters such as remaining energy, network bandwidth utilization, number of hop count for route discovery process. The route failure during the data transmission leads the performance degradation which directly affected the network quality service (QoS), To resolve the problem of route failure they apply two method for maintenance the route such as utilized and non-utilized node based route selection.

Chi Zhang et. al. Proposed a network device energy and their load aware relaying framework which is useful for the heterogeneity mobile ad hoc environment [8]. In this work they apply cross layer designing approach to maintain the route such layer are data link and network layer. In the data link layer they identify multiple facts of energy conservation which include real time energy aware of nodes, data scheduling, energy utilization by per data transmission and energy utilization control. Similarly network layer each node performs the routing which is useful to tracking route utilization and load of the particular nodes. In his work they develop a hybrid module for data transmission scheduling which combine the reservation and contention based medium access control technique that coordinate the data transmission of source node. However they also introduce the mini routing under the data link control layer and apply asymmetric media access control (A-MAC) scheme within the unidirectional path cause by asymmetric transmission power levels in between efficient and normal mobile nodes that reduce the delay of the network.

Ying Zhu et. al. Design a system for efficient energy based topology control in cooperative mobile ad hoc network [9] in this paper they introduce a newer topology control approach based on node energy aware methodology. In this technique monitor the node movement and real time aware the node energy which depends on consumption rate in per second manner. The define method feasible for local and global efficient to control the network topology and provide efficient energy based route selection. In the simulation they found their mechanism is outperform in every respect of network dependent parameters.

Vinay rishiwal et. al. Proposed power aware routing for ad hoc wireless communication [10]. In his work they develop a algorithm to scale up the network life time with the help of minimization of power consumption by the mobile node. Power consumption are minimize based on route flooding minimization and packet header minimization. Authors are take the case study with the help of network simulator and compare the routing strategy of AODV, DSR and proposed method and they found their system perform well in terms of network life time improvement, node aliveness, node termination rate and average energy consumption rate etc.

Dahai du et. al. Has proposed a location aided routing protocol which use the geographical positing system (GPS)[11] and provide low cost mobile communication. Author conclude that GPS system minimize the energy consumption of mobile node because the network is a semi ad hoc environment and use the LEER protocol that require the low energy for route selection and data transmission. In his work GPS helps to finding the path in between source to receiver in efficient way because it gives the location information of every located node within the zone. Location aided and efficient energy aware routing protocol (LEER) search the all possible path from source to receiver and select low energy consume route.

Natarajan Meghanathan et. al. Proposed a device location predication base routing which reduce the number of route request message and provide efficient path between source to receiver node [12]. In his work they track the node location based on global positing system (GPS), node location track in real time manner and synchronized in every updating that increase the accuracy of location information. Those work compare with dynamic source routing [13] protocol and found that number of route overhead is lower as mentioned in DSR and ABR [14] routing strategy. It also compare with flow oriented routing protocol (FORP) [15] and lifetime aware based routing (RABR) [16] and conclude that proposed location predication outperform in terms on network parameters. The simulation is done through network simulator -2 and analyse the performance.

Niranjan kumar ray et. al. Investigate various energy efficient technique for mobile ad hoc network [17]. In his study they found that reduce the number of route message and overcome the problem of energy consumption and routing overhead, similarly another approach control the power utilization based on power level route selection which achieves the life time of network.

Jangsu lee et. al. Proposed a location and energy aware based routing scheme in mobile ad hoc network [18]. Their proposed method modified of location aided routing (LAR) in virtual grid ad hoc communication and select the higher energy contained node for the route selection which is treated like header node in the particular grid layout. In his work transmission power control based on distance of neighbour connected node. Author found that distance and transmission power requirement is directly propositional to each other it means distance is greater than energy requirement is also higher.

Naghma Khatoon et. al. proposed node motion aware energy efficient cluster approach for mobile ad hoc network [19]. In his work, they use the particle swarm optimization for the cluster head selection and predict the node motion so that the network reliability is maintained. These works minimizes the energy consumption and provide better cluster head selection method to improve the network performance.

III. PROPOSED WORK

Our proposed work is energy base adaptive multipath routing for load balancing as well as better utilization of all mobile nodes' energy, for that proposal. We use multipath routing approach such as ad hoc on demand multipath distance vector routing (AOMDV), whose use multiple paths for data transmission between source to destination device and AOMDV routing balance load of heavily loaded

node or devices into multiple nodes. However, that protocol not gives very reliable, because each mobile node works through limited battery. If sends the data without aware of energy than that protocol give unreliable data delivery for that point support to promote the work progress in the platform of energy base multiple path routing. In our proposed scheme very first we design energy base multipath routing and inbuilt that module into NS-2 and after that analyze the behavior of the mobile ad-hoc network. In our approach if we initiate route request so in that time we also check the node energy and if we get low energy, so we discard that path and treat as un-reliable path. After finding node energy information we select all efficient energy paths as communicator links, send data packet through them, and get better result as compare to without energy aware multipath technique.

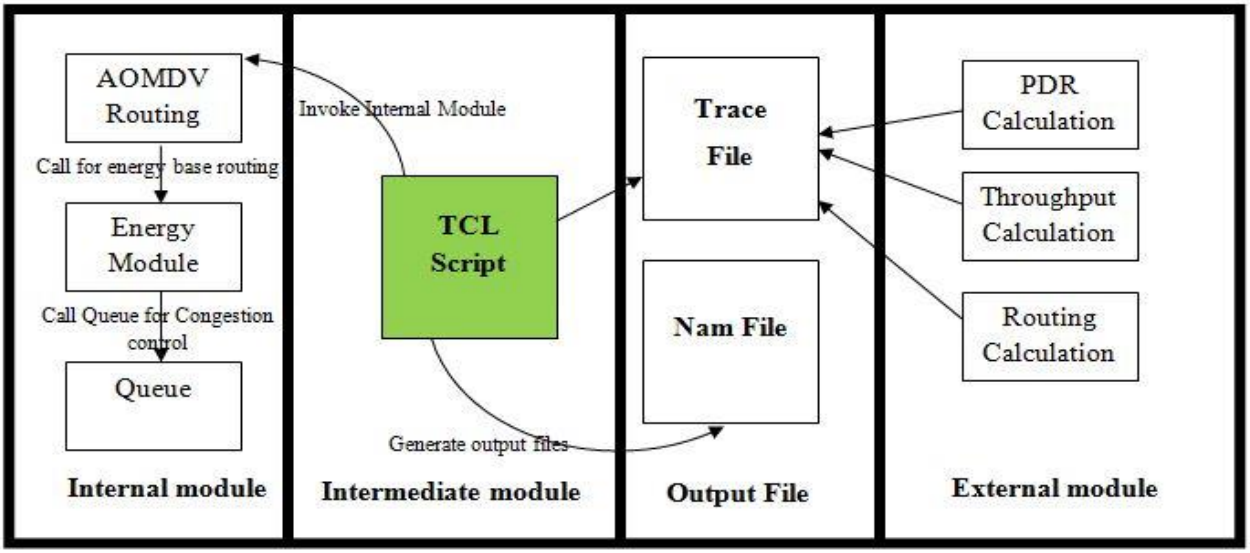

Figure 2: Proposed Architecture

In our proposed scheme we also use drop tail queue technique at each node that technique manage the queue and save some data drop if heavy congestion occur in the network, after that all internal module we analyse energy utilization of each node and load at each node. Here we design working architecture for achieve our proposed result. We divide our architecture in three module internal module, intermediate module and external module, in internal module, we use AOMDV routing, energy module and queue technique and after the internal NS-2 file compilation. We design network through TCL (Tool command language) and invoke internal module through generated object file and generate two different file trace and network animator file, in external module we analyse number of parameter through AWK (abstract window tool kit)

IV.PROPOSED ALGORITHM

A. Informal Description of Algorithm

In our proposed algorithm apply energy aware routing and for that, we retrieve energy of each node during routing time. While broadcast routing packet for search multipath from source to destination than we retrieve the energy from all connected nodes and select higher energy path with minimum transmission power requirement that work provide better reliability as well as overcome the problem of congestion.

B. Description of Formal method of the algorithm

M: represent the mobile devices or nodes
S: set of source devices
R: set of destination devices
AOMDV: ad-hoc routing strategies
E: initial energy // that is initial energy of individual devices

Outcomes: Throughput, *UDP* data receives, *UDP* data loss

AOMDV execute by S node
S sends route packet for searching the R node
While route found S to R
Do
Count = number of route
If count > = 1 **then**
Multiple route exist from *S* to *R*
Compute energy of each device whose participate in route
Select three best route based on higher energy and minimum power required
Sends acknowledgement from best three selected route
Else
R un-reachable
Route not found
End if
End while
S generate data and sends from shortest path to *R* devices

$$\text{Perecntage of load from each path} = \frac{\sum Xi}{\sum Xij} * 100$$

Where represents X_i Capacity of processing each intermediate device
X_{ij} capacity of processing all devices whose participate in route

End

V. SIMULATION RESULT

In this section, we evaluate our result through experiment with the help of network simulator-2 bases and describe point by point in below.

1. Routing Load Analysis:

Routing Load Analysis is actually the control packet flooded by sender to finding destination node. Destination is not always directly in range of sender that is why hop-to-hop communication takes place. The figure 3 shows the overhead analysis in case of normal and proposed the routing technique. The red line in the graph shows the Routing Load Analysis for the AOMDV and the green line shows the Routing Load Analysis for the E-AOMDV. The result analysis shows that for E-AOMDV the no of routing packet generation for per data packet is less as compared to the AOMDV. The minimum the no routing packet the minimum will be the congestions in the network.

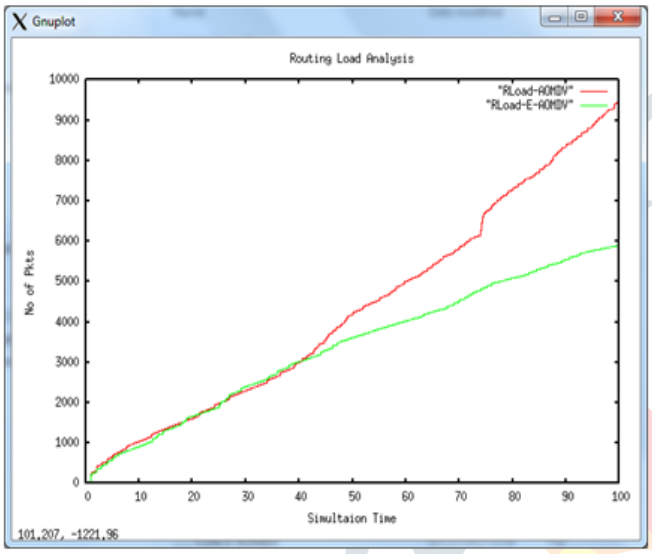

Figure 3: Routing Load

2. UDP Data Analysis:

UDP Packet Received Analysis figure 4 and UDP Packet Loss Analysis figure 5 shows the no. of packet received and lost with simulation time. The use of drop tail queue technique at each node manages the queue and save some data drop while in the condition of the heavy congestion. The analysis shows the Simulation time in X-axis compared with no. of packets received in figure 4 and no of packet loss in figure 5 delivered to the destination.

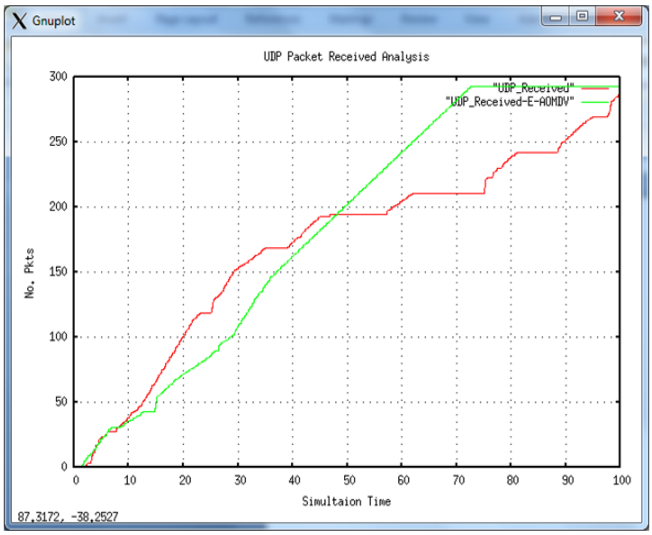

Figure 4: UDP Packet Received

The red line in the graphs shows the no. of packets received in figure 4 and no of packet loss in figure 5 for the normal AOMDV routing protocol. The green line in the graphs shows the no. of packets received in figure 4 and no of packet loss in figure 5 for the E-AOMDV. In figure 4 the packet received analysis shows the overall comparison of the packet received by the nodes in the network.

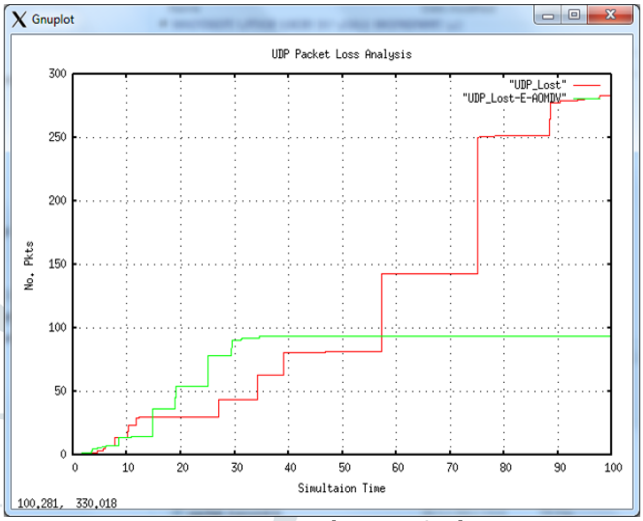

Figure 5: UDP Packet Loss Analysis

The result shows that the E-AOMDV receives more no packets as compared to the AOMDV.

The figure 5 is the proposed work analysis for the E-AOMDV. The no of packet loss is less in E-AOMDV as compared to the normal AOMDV. The result is shows that the loss of packet is fixed after the particular time interval for the E-AOMDV whereas the packet loss increases with the increase in the simulation time for the normal AOMDV.

3.Throughput Analysis:

Throughput is another performance metrics used in measure performance in per unit of time is mentioned in figure 6. The proper transmission and receiving of in network is showing better throughput performance continually without any hindrance like congestion and collision.

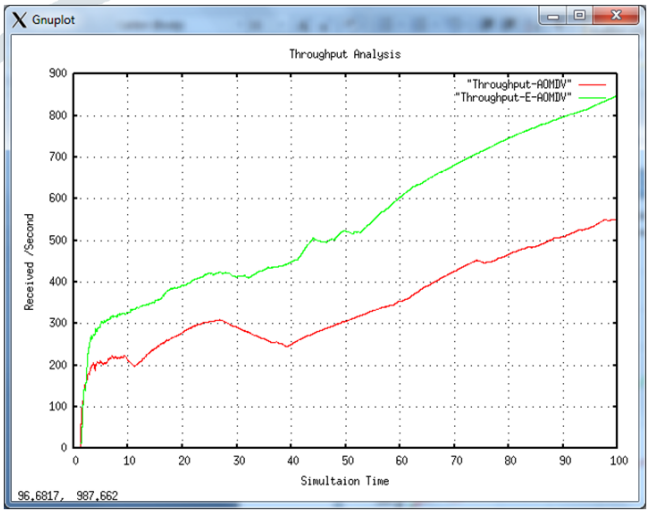

Figure 6: Throughput Analysis

The result analysis shows that the packet receives per seconds for the different simulation time. The red line represents the AOMDV through put analysis for the different simulation time. The E-AOMDV is represented by the green line shows that the performance of the network is high as compared to normal AOMDV. At the stating of the simulation the throughput is similar for the proposed and old methodology. The throughput for the proposed methodology is greater than the other condition. This shows the proposed methodology work with less hindrance in the network. The overall analyses represents that the better performance of proposed routing as compare to old AOMDV condition.

VI. CONCLUSIONS AND FUTURE WORK

The MANET is wireless network and in wireless communication not possible to improve existing standard resources of communication like bandwidth capacity. The nodes are also sending data and forward to other node if not a sender or receiver. The limited processing and computational capacity is bounded the performance of network. The nodes join and leave the network dynamically that leads to topological changes. The demands for quality based multipath routing have resulted in considerable attention by researchers in the area of energy aware in MANETs. There is a tendency in traditional Mobile ad hoc routing protocols to use intermediate nodes for large number of routes. This route selection is based on the routing protocol connection establishment procedure. The novel proposed routing approach with AOMDV protocol establish multiple path between source and destination nodes using intermediate nodes which are contain higher energy and low energy consumption etc. This scheme is based on the energy aware multipath approach and provides reliable communication between sources to destination. The proposed scheme is improve the routing ability of AOMDV protocol by improving the capability to energy awareness of nodes. The proposed scheme ensures that the reliable communication. The results comparison of both the protocol is declare that in proposed E-AOMDV efficiently handle the load as compare to AOMDV protocol. The proposed E-AOMDV routing scheme are provides enhanced routing performance as compare AOMDV routing in all contrast of network matrices i.e. throughput, control overhead etc.. in further work we apply location based routing approach and minimized the delay and routing overhead of the network.

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