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Energy Level Load Balanced Multi Path Routing in Bee-Ad Hoc MANETs

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Abstract:
MANET nodes have partial power for vital operations due to connection of the network when energy of node gets exhausted. Due to power constraints node fails which leads to system failures & then reduces end-to-end connectivity in network. Due to this congestion & mobility of nodes frequent link failures occurs and packet losses takes place that affects the QoS performance of protocol. The best technique for load balance we introduce Bee-Ad-Hoc-system in MANET to maximize energy efficiency. In this work, proposed scheme is effective, Energy Efficient & Load Balanced Bee-Ad-Hoc Multipath Routing with Robust Transmission in MANET to come across above limitations in MANET (Mobile Ad-Hoc Network). Our proposed scheme for network it maximizes the E-2-E (end-to-end) connection & near link level for node has reducing the faults. By using the mechanism used to select a neighbor node we accepts a group of multiple paths which has energy efficient from source to destinations of multicast. Later finding for a static path among source & destination which meets the conditions of delay and it also offers effective load balancing at node. Simulation results show proposed protocols results are like E-2-E delay (end-to-end delay), energy consumption, & throughput.

Keywords: *Load balancing, Energy level Routing, Multipath routing, Bee-Ad Hoc, MANET.*

I. INTRODUCTION

MANET is self-organizing and rapidly deployed in network, it doesn't require any fixed infrastructure. Over a radio links to form network here full mobile nodes are self-organized by themselves [1]. As nodes are battery operated in MANET, so it has possibility of failure for the node communication in between them, for which we take of MANET's energy efficient [2, 3, 5].

In this purpose swarm intelligence concept is considered as one of best way [4]. SI (Swarm intelligence) [6] is a collection of self-organized systems, decentralized, and natural or artificial. Bio inspired, Swarm Intelligence approaches are more promising for Ad-Hoc and wireless Ad-Hoc networks depends on locality of interactions, Accessibility of multiple paths, Self-organizing behaviour, & Failures backup. MANETs it is proved recently that we have efficient routing methods by both multipath and clustering communication. Clustering is used widely to extend achieve network scalability & network lifetime. In this paper we discussed regarding architecture & working of the bee-Ad-Hoc network required for energy efficient MANETs. Ultimately we have tried to get best protocol for energy efficient MANETs as Bee-Ad-Hoc-C with proposed algorithm minimizes CH changing.

In our previous paper to transfer the data in stable process, the best path is chosen for cluster Bee Ad-Hoc MANET in MANET. Reason to choose Bee Ad-Hoc MANET which working accordingly to concept of the swarm intelligence here full nodes categorised based on task [7, 8]. Bee group's bees mainly classified like Scouts Packers & Foragers same as in Clustered Bee Ad-Hoc MANET nodes classified as Scouts, Foragers, & Cluster head.

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MANET has multipurpose structure which has various applications like office space and defense. Various researches based on energy efficient which carried out to enable the MANET. Structure of MANET is dynamic in the nature [9, 10, 11] accordingly it is important for having a hierarchical architecture for routing in a very systematic way. Previously various things are related to this technique but now we give more importance to MANET for balancing in case of multipath for data transfer. Earlier techniques [12–15] introduced for MANET structure to get more efficient load balancing by using routing protocols. Initially swarm intelligence is used for routing in MANET [16, 17] where total MANET structure has classified into clusters name as the Bee Ad-Hoc-C. By utilizing BCN's (Border Cluster Nodes) technique, routing between more systematic by itself for cluster & parallel cluster. Further techniques improved are based on proper load balancing.

II. Literature Survey

According to current researches for efficient MANET network we find multipath to transfer a data with low usage of energy [18, 19]. For this we consider clustering process as best method achieves network scalability & extend network lifetime [7]. Clustering multipath mechanism is used to transfer a data to reaches destination in two more than paths. It also helps batteries in transport power up to longer time in resulting in network and it prolong its life time & also it justify load balancing between nodes is completed.

LBAR [21] is an on-demand for routing protocol is applied specifically aimed at application of delay sensitivity. Finding route path for source node with least loaded having in traffic in routing protocol. Source node will broadcast the setup messages to neighbor nodes with the cost (among from source and current neighbors). Cost function value depends on the activity of node [21]. Cost function is addition between source and destination which is summarized number of paths are in active and neighboring nodes activity of them of recent node. Due to cost function, it imagines the packet have same in size & the traffic is a data constant rate.

TSA is a protocol [21], extends the multipurpose path routing based on the traffic size. By flooding the path discovery of packets, we invent multiple routes among source to destination node. When a packet moves with the help of intermediate nodes towards destination, we calculate total path load. Current load is added to every intermediate node in its path and load stored inside packet. Destination node reply every path discover messages by appending the information of path load. When more than one path is obtained for source, to transfer a data it chose the path which having minimum load [20].

The DLAR protocol [22] one of the on-demand routing protocol. Here source wants to transfer packet, firstly floods ROUTE REQUEST packet in accordance in determining the route. Rather than destination will receive the non-duplicate ROUTE REQUEST for the nodes, that built entry for routes for pair of source to destination & records earlier hop for the entry. Destination holds up to receive at time to total ROUTE REQUEST packets and they study total the routes having possibility. While destination chooses the path having loaded with least & transfer ROUTE REPLY packet to the source back through routing which is selected only [22]. Author has proposed 3 schemes: depends on complete least load we select a path, average least load and intermediate nodes with least number which load exceed the threshold value.

In [23, 24, 25] Bee Sensor-C introduces works on sensor networks due to its multipath routing protocol & scalability. We considered MANET utmost dynamic structure in versatile has an algorithm, having a novel protocol which is designed for routes among nodes in MANET structure. Based on few algorithms are presented for more systematic and energy efficient for routing. Based on this, previously three routing algorithms are presented as Bee Ad-Hoc-C, unplanned Bee Ad-Hoc-C & Load Balanced Energy Enhanced Bee Ad-Hoc-C.

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III. PROPOSED FRAMEWORK

Here an effective proposed scheme is used, Energy level Load balanced Multi Path Routing in MANET, to overcome limitations present in Mobile Ad-Hoc Network. Our proposed scheme will maximize the end-to-end connection in network & reduced at link with the level of node for the faults. Group of multiple paths are recognized from source to destinations for multicast by selecting the mechanism which uses the energy efficient neighbor node. By offering effective load balancing at nodes & find static path in among source and destination which meets the requirement of delay. Further betterment we calculate every path of the neighbor during multipath routing takes an initiate in the algorithm. The active neighbors, forgery/hacker may decide by node which previously received RREQ signal. In proposed work focused on finding zone disjoint route in among source and destination. Current technique doesn't required any node which maintains the table of Route Cache. Signal from Cluster Head to Foragers to the Scouts has sent every forager & scout keep RREQ described in table as RREQ_Seen table which helps to respond queries for neighbor nodes. To count neighbor in active node from RREQ_Seen table those particular node should fill up in the table which is called "number of neighbors are in active after sending RREQ". We introduced table is After_A_N_C. For Scout or Forager nodes aware of neighbors in active, then Active Neighbor Count space is summed to the RREQ & the RREP signal. To process query in finding the node are free for the novel two packets like RREQ_Query, RREQ_Query_Reply used in discovery of path. The Cluster Head maintains current RREQ data into RREQ_Query packet transfer to Forager's. It wants same query signal which is tranfer from Scouts and Foragers. If the node want to reply either Forager/Scouts they turns back an RREQ_Query_Reply which respective to node from Scouts to the Forager & from Forager to the CH. Simulation results shows proposed protocol results in average E-2-E (end-to-end) delay, packet delivery ratio (PDR), throughput, & routing overhead (RO).

Here considering main issues & proposed energy efficient load balanced QoS depends on routing protocol, which mechanism like route discovery the AODV is modified involves in various metrics of delay, queue length, drain rate & signal strength. Protocol find static path which depends on received signal strength between source and destination & also by adding some constraints we provide a load balancing at every node (queue length and drain rate) previously we find a path between source & destination.

Establishing between source node & destination by multiple routes node is called as multipath routing. During fault tolerance also we maintain a route and connections between source nodes without any fail, due to this multipath routing, by the possibility for data transmission to reduce failures & delay times caused by the route disconnection.

A. Route Discovery

In network for every node we compute transmission power. We receives RREQ message at next node, in route list entries we update the transmission power & residual energy. In this phase, initiation is taken by source node to extend RREQ message to destination node. After destination received RREQ packet (Route Request), then produces RREP (Route Reply packet) & it transfer back to source. Within range of wireless transmission through intermediate nodes it receive RREQ packet. If destination is not node, then it receives with same packet ID for RREQ, then forward RREQ. In this phase, the proposed system for route discovery we apply the energy threshold functions, for lower residual energy we filter the nodes & to minimize broadcast operation in the discovery of route.

When calculating values of energy if its threshold value of the energy is greater than then RREQ message forward to neighbour node of its next, or else rejected. In network for every node we compute transmission power. We update the routing entries

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list after the RREQ message comes at next node based on residual energy and power transmission.

B. Route Selection

In this stage, the source of node received RREPs packet neighbour nodes, it start the timer & collects RREPs during in this period. Source node starts to analyze value of P which are based upon the related records in RREPs on Eq. 2 & we chose path which have maximum value of P and it is selected as optimal route. Lastly, data packets will sent via only in the path having transmission power recorded in it is the RREP.

C. Route Maintenance

Failure of route is finds node, it transfer Route Error packet (RERR) to last node identifies route breakage. Intermediate nodes receive RERR message updates to source. Now source vanish corresponded items from the routing table & switches towards another path. Figure 1 shows the structure of proposed system.

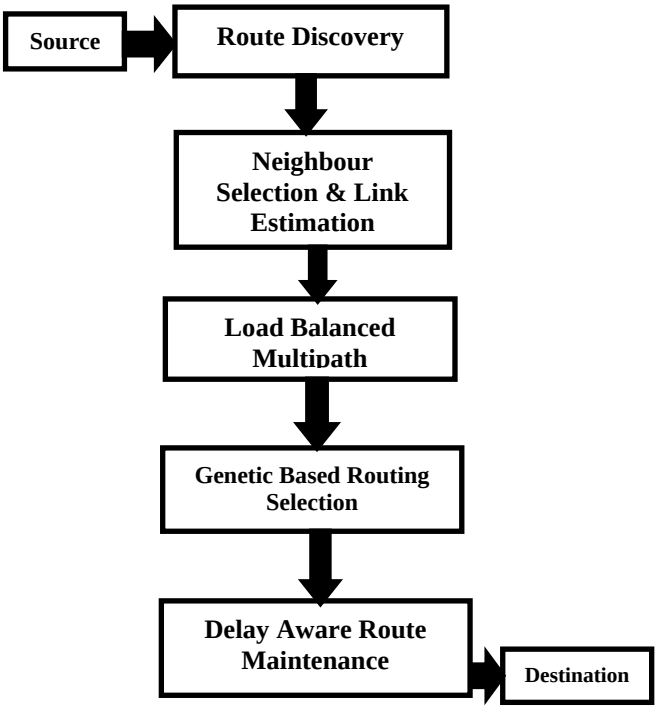

Figure 1: Proposed System Structure.

Proposed system contains following advantages over existing systems, like, 1) The outperforms –proposed end-to-end delay, throughput, energy consumption. 2) Here obtained motion parameters i.e. next_hop, weight, sequence no, expire time, residual energy. The network select path to transfer a data packet in between nodes based on these parameters only. 3) This approach gives the best path that can chose during route, based on all the factors. In network, level of battery for a nodes is also taken. The result in network is good by having a throughput and high efficiency.

IV. Result and Discussion

The proposed design is carried out making use of NS-2 and it's analyzed via for the reason that distinct parameters like E-2-E-Delay (end-to-end-delay), energy consumption & throughput. In proposed system selects stable direction to cut back the false role and Packet lost and there by means of increases the throughput and energy consumption. Applications of Network Simulator-2 are script is written in OTcL & simulations results are seen in visual by using network Animator (NAM) and Xgraph.

Parameters	Values
Application traffic	CBR
Number of sensor nodes	40
Communication range	250m
Data Packet size	8000 bits
Transmission rate	1000 bytes / 0.5ms
Number of simulation iterations	180
Initial energy	100j
Network area	1000x1000
Transmission Protocol	UDP
Routing methods	ELBMR-MANET, LBEE, IBAC
Routing protocol	AODV

The simulation is implemented within the community Simulator 2. In Linux working method with Ubuntu as the interface software. The mobility mannequin uses the random waypoint model. There

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are forty nodes defined in a simulation field of measurement 1000m x1000m. The mobility of nodes is limited to 8ms. The site visitor's mannequin chosen is steady Bit expense (CBR) connections with packet measurement of one thousand bytes to emulate traffic over the network. Each and every packet begins at random location and to random destination with random place.

1) Throughput: Number of packets that successfully received within a unit time and represented in BPS (bits per second).

2) End-to-End-Delay: Common time elapsed through offering the knowledge packet within a victorious transmission from source to destination.

3) Energy consumption: Energy consumption for entire network, it's together with transmission and processing energy consumption for both the data and manage packets.

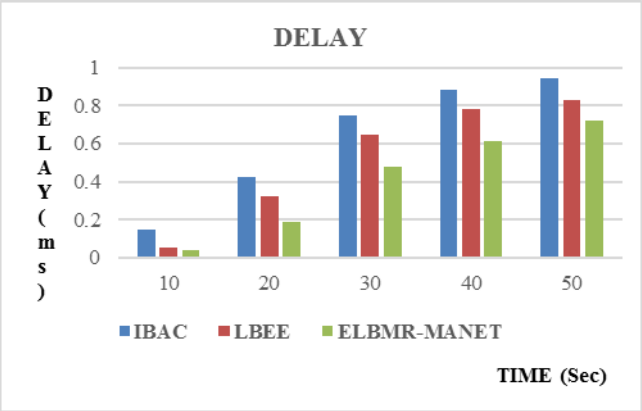

Fig 3: Performance on Delay

In fig 3, this graph would be showing and representing the Delay. It shows the delay in the network. Here, in IBAC, LBEE and ELBMR-MANET, the verification of this says that ELBMR-MANET shows the reduction of delay in the network, than the previous.

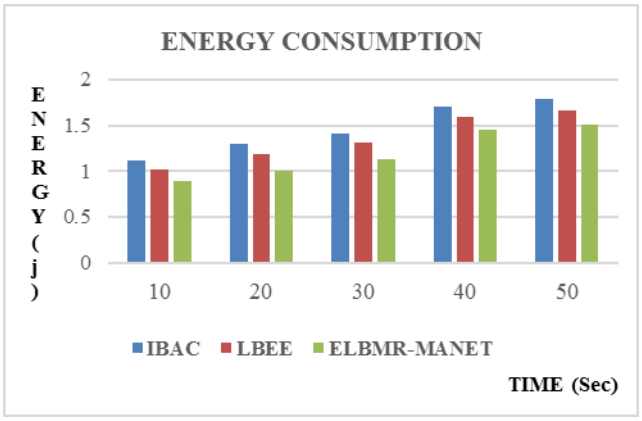

Fig 4: Energy Consumption

In fig 4, this graph would be showing and representing the Energy Consumption. Which shows energy consumed in network. Here, in IBAC, LBEE and ELBMR-MANET, the verification of this says that ELBMR-MANET shows the less consumption of energy in network, than previous.

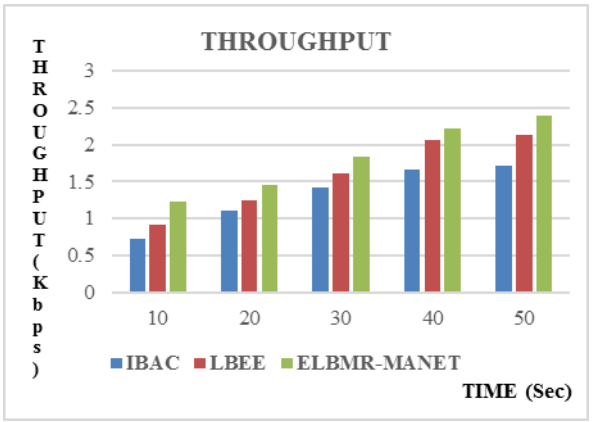

Fig 5: Network performance

In fig 5, this graph would be showing and representing the Throughput (Network performance). It shows the network performance. Here, in IBAC, LBEE and ELBMR-MANET, the verification of this says that ELBMR-MANET shows the better performance than the previous.

V. Conclusion

In our work, we used an effective proposed scheme, Energy level Load balanced Multi Path Routing in MANET to overcome limitations in Mobile Ad-Hoc Network (MANET). Depending on

energy efficient for neighbor node selection mechanism, it sets and established the multiple paths that are between source to the multicast destinations. It provides us efficient load balance near node & also searches the constant path among source & destination which meets delay requirements. According to carried results for the simulation which are discussed parameters it has better performance that is observed for the ELBMR-MANET compared with existing IBAC and LBEE.

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