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Improved link Stability using Energy Efficient Transmission State MAC Protocol in MANET

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Abstract: *A MANET can be defined as an autonomous system of nodes or MSs(also serving as routers) connected by wireless links, the union of which forms a communication network modeled in the form of an arbitrary communication graph. The self configuring means that any mobile nodes can join or leave the network when they want .It is the decentralized type of network in which mobile nodes can move from one location to another. Due to random movability of the mobile nodes, the two factors route establishment, route maintenance becomes the major problem of MANET networks. This main Spotlight of this research paper is the route establishment & route maintenance which are properties of MANET network. The EETC protocol is the route establishment and route maintenance protocol in which broker route will be recovered on the basis of node connectivity. The node, which has maximum connectivity, is selected as the best node for route recovery in EETC Protocol. In this research work, the EETC protocol is further improved by adding buffer size parameter for route recovery which also maintains & improves quality of service like better throughtput, Less Energy Consumption, High Packet Delivery Ratio , Low End to end delay and Less Packet loss & Less Overhead in the network The proposed IEETC protocol simulation results perform well as compared to existing EETC protocol in terms of certain parameter*s.

Keywords: AODV, EETC, IEETC, LINK STABILITY, OH, PL, E2E DELAY, EC PDR.

I. INTRODUCTION

Mobile adhoc Network may process on an independently or they can be part of larger internet. They form a highly adaptive autonomous topology with the presence of one or multiple different transceivers between nodes. The major problem for the mobile adhoc network is to equip each device to continuously maintain the information required to properly route traffic. These networks face various problems the reason is they do not have any central maintainer within them. There are many resources present within these networks and a very cryptic line of defense if present [1]. Another issue that arises within these networks is the reliability of radio link in several cases there is a link breakage found. In order to forward the data packets to other nodes, each node acts as a router within MANETs. There is a need of higher security within these networks due to the self-organization of nodes within these networks. However, security within these networks is difficult to be provided because of the limited communication and communication resources available. Due to the rapid change in topology, the links broke as well as re-establish within these networks. It is to be proved that the immediate change within the topology is responded by the routing protocol [2]. Each node acts are a router within these networks. The source and destination might communicate through the intermediate nodes due to the limited bandwidth available within the nodes. Asymmetric links, routing overhead, interference as well as dynamic topology are the major issues arising within routing. There are various advances being made within the routing techniques provided within MANETs and many new routing

protocols have been introduced As per of need of user, the routes are generated within the reactive or on-demand types of routing protocols [3]. The Dynamic Source Routing Protocol & the Ad-hoc on-demand Distance Vector Routing Protocol (AODV) are the two reactive routing protocols. Up-to-date information of routes is maintained for each node to every other node present in the network within the proactive types of routing protocols. An immediate availability of the route information is given when route is to be established towards the destination [4]. By making some enhancements within the classical Bellman-Ford Routing algorithm, the Destination-Sequenced Distance-Vector (DSDV) Routing protocol is developed. Because of the issues such as count to infinity and bouncing effect, the distance vector routing is less robust in comparison to link state routing. Entries from all devices present within the network are maintained within the routing table for every device through this protocol. A point-to-point proactive type of routing protocol in which multipoint relaying is performed is known as OLSR the Optimized Link State Protocol. OLSR is a pure link state routing protocol in which there are two methods in which the optimizations are performed. The width of control packets is either diminished or the numbers of links thatare utilized for forwarding the link state packets are reduced. Through exchange of link-state messages between other nodes periodically, the topology information for each node is maintained [5]. The minimization of routing overhead on the basis of location information is the prior objective of LAR Location-Aided Routing (LAR) protocol. By restricting the flooding to specific regions, the information of location will be utilized by LAR. The protocols in which the various properties of both proactive and reactive types of routing protocols are included are known as hybrid routing protocols. There is either flat or hierarchical type of routing possible between which hierarchical routing is provided by hybrid types of routing protocols. The organization of networks as per the parameters involved is impossible within these routing protocols. The nodes in which high level of topological information is present are responsible for maintaining higher amount of routing information. Due to this, the storage & power consumption is elevated, which is a major cons of these routing protocols. The the adaptation of a need to meet the needs of a particular of nodes into sub- networks or zones is done by applying Zone Routing Protocol which is a hybrid type of protocol [6]. The advantages of on-demand and proactive routing protocols are transmission between the nearest-neighbours, proactive routing is applied within each zone. In order to minimize the unnecessary communication, on-demand routing is utilized by inter-zone communication. The combination of routing with QoS is provided by a partitioning protocol named as Core Extraction Distributed Ad hoc Routing (CEDAR). A dominator node which is a core node is present within each partition made through this protocol [7]. So, all such types of protocols have their own advantages and disadvantages on the basis of which they can be applied to certain applications.

II. RELATED WORK

M. Malathi, et.al presented in this paper the need of introducing reliable route within the dynamic MANETs. Between these nt/wks which are truly adaptive in nature, genuine communication is required. So, Power Proficient Reliable Routing protocol is a novel protocol proposed in this paper [1]. Channel Quality, Link Residual Life and Residual Energy are these three reasons are the 3 factors due which route failure happens. The route failure which occurs during transmission can be minimized due to link residual life during the path discovery. The overall throughput of the system is enhanced due to the channel quality involved during the route discovery process.

C Dhakadh, et.al proposed a new technique for minimizing association, node crash, packet loss and other issues arising within MANETs [13]. An alternate path is provided due to link failure on the basis of localization due to which the efficiency and reliability of MANET can be enhanced linear factor AODV. A new technique is proposed here in order to provide a genuine and steady route for Transmission. Comparisons are made against Steady factor AODV in order to pick up the shortest path. It is seen that the proposed protocol provides the shortest path for communication and ensures better connectivity degree amongst the nodes. Further, the issues related to node failure are also eliminated by applying the proposed technique and the results achieved have been enhanced in terms of accuracy and path failure has also been minimized.

Deepika V., et.al proposed an Efficient Backbone Based Quick Link Failure Recovery Multicast Routing Protocol for avoiding any kinds of link failures within the MANETs [7]. The multicast groups are generated in order to create virtual backbone within the proposed mechanism. A different path is provided due to link failure on the basis of standardization due to which the effectiveness of mobile adhoc network can be improved. In order to attain minimum control overhead, higher packet delivery ratio and throughput, less jitter (delay time variation) and packet loss ratio, this network model is proposed. It is seen as per the simulation results and comparisons

that the proposed protocol provides enhancement in results. The node failure during data transmission can be minimized because of residual energy involved during the routing process. As per the simulation results, the performance of proposed protocol is enhanced for several mobility speeds by applying the proposed protocol.

Sedrati Maamar, et.al proposed a novel protocol on the basis of AODV which is named as (PF_AODV) [12]. The QoS of the MANETs is enhanced with the application of this protocol. The prediction of future disconnection of road that is being used and providing new segment before the disconnection occurs is done by utilizing signal strength. Various simulation experiments are performed by applying this novel protocol and the results are evaluated. It is seen that in terms of parameters like throughput, loss and delay, the proposed PF_AODV provides better results.

Abedal Motaleb Zadin et.al presented a node protection protocol through which stable connections have been established within MANETs which face several node failures [15]. There is higher network stability as well as packet delivery ratio provided by pro- posed protocol as per the simulations performed. In the simulations, it is also seen that the communication reliability of MA- NETs is affected due to the time various locations and velocities of the mobile users as per this model. Against the link protection protocol, the protocol is validated and compared through which enhancements have been seen in terms of number of packets de- livered and there is occasional failure of the nodes which affects the delivery rate. The graphs that have less nodes can notice the advantages of GBR-NP.

S Brahmbhath, et.al [18] under this we see that Network performance can be increased using multicast networks that transmit data to various receivers. They are transmitted on the basis of their node energy, network congestion and bandwidth consumption. Link failure is caused due to the availability of high mobility in the application of the MANETs. Author mainly focused on the issues and their solution that occurred in the multicast network. This can be done by selecting stable links in route construction process. When the data is transmitted the maximum signal strength has been utilized that lead to the availability of higher rate of node in the process of communication flow. In order to solve the issue of the route and link failure author enhanced the existing On demand Multicast routing protocol (ODMRP) that was utilized for the communication of multi-media. These existing protocols follow the first come first serve (FCFS) method that lead to route failure.

S.A. Jain, et.al., in this paper [17], they presented the ad hoc connections, which opens many opportunities for MANET applications. In ad hoc network, nodes are movable and there is no centralized management. Routing is an important factor in mobile adhoc network that not only works well with a small network, but also it can also work well if network get expanded dynamically. Multi hop routing have many challenges such as limited wireless bandwidth, low device power, dynamically changing network topology, and high vulnerability to Failure. To answer those challenges, many routing algorithms in Manets were proposed. But one of the problems in routing algorithm is congestion which decreases the overall performance of the network so in this paper we are trying to identify the best routing algorithm which will improve the congestion control mechanism among the entire Multipath routing protocols.

Sreenivas B.C G.C., et.al, in this paper [19], they introduced about congestion control is a key problem in mobile ad-hoc networks. Throughput, routing and performance are badly affected by congestion. Identifying the occurrence of congestion in a Mobile Ad-hoc Network (MANET) is a challenging task. This paper considers design of Link-Layer congestion control for ad hoc wireless networks, where the bandwidth and delay measured at each node along the path. Based on the cumulated values, the receiver calculates the new window size and transmits this information to the sender as feedback. The sender behavior is altered appropriately. The proposed technique is also compatible with standard TCP.

S Nandgave talk about the problems faced by the mobile adhoc net/ws in which main cause is Routing due to its moveable feature [20]. There are various reasons that hamper the functioning of MANETs that is interference, congestion and mobility that cause link failure in a network. The occurrence of interference is due to hidden node and collision. When the two nodes far from each other's radio range and transmit data to the intermediate node within the range of the sending nodes is known as hidden node. Nodes are free to move within its transmission range is known as mobility. The collision occurs at the intermediate node as the sending node is not aware of the presence of other node while transmission that cause collision in a network. The RTSCTS handshake method of 802.11 MAC has been utilized as the solution to overcome the issue of interference problem at the hidden node. The parameter of the cross layer interaction is signal strength where it is analyzed when received from the physical layer and evaluated at the MAC layer

whether it is above certain threshold. Link is weak if it is less than threshold and vice-versa. Due to weak signal strength a route cause link failure therefore an alternate path is found. Author concluded that proposed protocol AODV has better mechanism to avoid congestion and it is useful signal strength based congestion control.

Mohammad Amin, et.al introduced [24] standard congestion control cannot detect link failure losses which occur due to mobility and power scarcity in multi-hop Ad-Hoc network (MANET). The importance of detecting and responding link failure losses is to prevent sender from remaining idle unnecessarily and manage number of packet retransmission overhead. It has two phases. First, threshold-based loss classification algorithm distinguishes losses due to link failure by estimating queue usage based on Relative One-way Trip Time (ROTT). Secondly it adopt new route of RTO by comparing calibirity of new route to the broken route using available information such as ROTT and number of hops in Transport layer.

K. Anish Pon Yamini, et al. (2019) recommended a novel routing protocol for wireless ad hoc networks [21]. The proposed routing algorithm was called TSMP (Time Synchronized Mesh Protocol). This protocol conserved energy and used existing nodes efficiently. The first routing path towards destination was chosen on the basis of minimum distance by the recommended algorithm. The remaining nodes moved to the idle state. The transferring nodes updated their energy level (despite the destination) to their predecessor nodes after every transmission. The predecessor nodes used threshold of every node for validating the transmission energy level. The transmission remained continue in case of existing energy level of the node above the threshold. In the other case, node could be replaced. The achieved simulation results depicted that recommended routing algorithm showed lower average delay with minimum overhead and less energy expenditure. The future work would involve the implementation of recommended algorithm in field programmable gate array (FPGA) based networks.

Y. Neeraja, et al. (2017) stated that MANETs were quite popular in ad hoc communication networks [22].The new energy efficient medium access control protocol had been proposed .The main aim of this protocol was to save energy and improve the lifespan of MANET. These netw/ks mainly focus on routing, energy balancing & MAC layer management. The ACO optimization approach had been considered in this work for selecting best route and lowering the overhead at node level. In such netw/ks, the revamp information sharing schemes were more crucial .Different parameters played vital role in improving the efficiency of the netw/ks. These factors included delay, throughput and average power utilization.

Chaker Abdelaziz Kerrache, et al. (2017) proposed a novel monitoring approach based on distributed time division [23]. Achieving required security levels along with optimizing energy consumption was the main aim of proposed approach. The proposed approach included both trust and link period amid truthful peers for moderately dividing the monitoring time. Sharing Hello messages were used in this work constantly for making this technique completely dispense. The achieved simulations results demonstrated the energy efficiency obtained by the proposed approach. The proposed approach made energy consumption constant. No increase in energy consumption was noticed with the increase in number of nodes. This methodology also confirms of malignant nodes at the same time with the high detection ratio.

Aqeel Taha, et al. (2017) highlighted the power consumption in mobile ad hoc network [16]. In order to optimize the power consumption in ad hoc on demand multipath distance vector (AOMDV) routing algorithm, the fitness function method had been applied in this work. The recommended algorithm was called FF-AOMDV (AOMDV with the fitness function). Finding best route from source node to the destination node for reducing power consumption in multipath routing was the main aim of fitness function. This work used a simulation tool called NS2 (network simulator version 2) for evaluating the performance of the recommended routing algorithm. With the help simulator tool, the proposed routing algorithm was performed & compared with various other current routing algorithms. The performance of proposed algorithm was evaluated in terms of different parameters. These parameters included energy consumption, throughput, packet delivery ratio, end-to-end delay, network life span and routing overhead ratio, packet size, and simulation time etc. The tested results proved the supremacy of proposed algorithm over other existing routing algorithms.

Andrea Lupia, et al. (2017) proposed a novel monitoring approach based on distributed time division [9]. Achieve high security levels with less energy consumption was the main motive of proposed algorithm. The proposed approach included both trust and link period amid truthful peers for moderately dividing the monitoring time. By Sharing Hello messages were used in this project constantly for making this method fully distributed. The achieved simulation results proved the worthiness of recommended algorithm in terms of energy efficiency, particularly for high density conditions. In such conditions, consumption became constant and did not

increase with the number of nodes while making certain high identification ratio of malevolent nodes.

Problem formulation

The mobile ad-hoc network is the decentralized type of network in which mobile nodes join or leave the network when they want. Due to which quality of service is the major issues of the network. AODV is a kind of reactive protocols. Its methodology is hop-to-hop routing. In Initial step node signify the Route Request (RREQ) if it wants to know the route to a particular destination. Then the intermediary nodes forwards the route request and simultaneously, these intermediary nodes create a reverse route to the destination. When the node receives the request that has the route to the destination, it signify a Route Reply (RREP) which includes numeral of hops which are required to arrive the destination. Each node that cooperates in sending this reply to the source node, it creates a forward route to the destination .The EETC is the improved version of AODV protocol for path recovery in mobile ad-hoc networks. In the EETC protocol when the mobile node change its location then link failure occurred in the network.

The EETC protocols works on the node connectivity factor for the link recovery. When any node detects link failure in the network, then the code with which maximum number of nodes is connected is selected as the best node for link recovery. The EETC protocol performs well in terms of certain parameters but for the link recovery it does not include quality of service parameters. In this research methodology, the Improved EETC protocol will be proposed by applying Qos parameters for better path recovery in mobile ad-hoc networks.

Below Figure 1 & Figure1(i) shows the routing of RREQ and RREP in AODV protocol. This route that has been formed from source to destination.

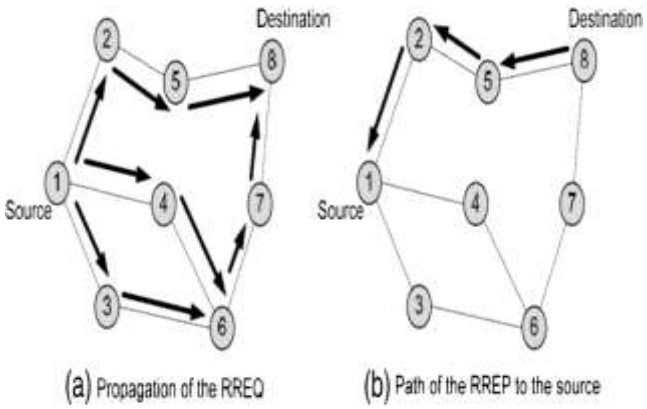

Figure 1: Routing of RREQ and RREP in AODV protocol

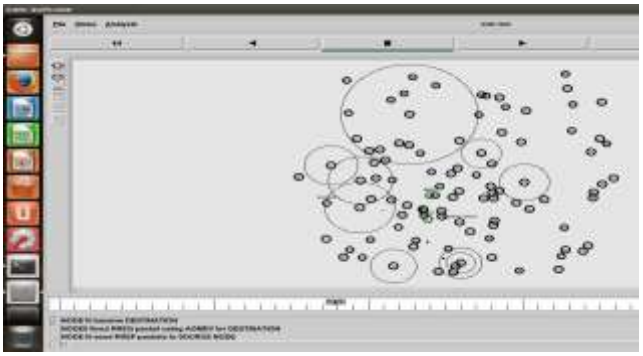

Figure 1 (a): Routing of RREQ and RREP in AODV protocol

To overcome the Flooding of RREQ & Un-Stability of Network which leads to link failure, we proposed the Improved Technique of EETC which increase their Efficiency at Greater Extent.

III. PROPOSED METHODOLOGY

The Improved Energy Efficiency Transmission Control routing Protocol (IEETC) includes the several components in it which are discussed further. The main goal of this proposed technique is to reinstate the variables used within the netw/ks parameters by utilizing a new connectivity and buffer size estimation metric. Further, a novel dynamic connectivity factor is utilized in order to drop the extra RREQ packets. Due to this, the routing overhead of the net- work is minimized. In order to work within the three major stages which are route discovery, route reply as well as route maintenance, the AODV, the EETC, and the proposed improved EETC protocol are introduced. The broadcasting of packetdata from source node is initialized once the destination is detected. If the destination is not found, a route to the sink node is detected Route Request [11]. The flooding process however is the only technique through which the nodes that have path towards the destination can be located. In this process, each node that receives route request for the first time rebroadcasts route request in the netw/rk. Then, a Route reply is sent backwards as a reply from the sink node or any node that needs to establish route. How-ever, there is link breakage within the nodes as they move frequently. A Route ERROR message (RERR) is generated if any such event is detected by any node to the nearest-neighbours so that this breakage can be notified With the minimization of unwanted Route request packets, the flooding issue is addressed by EETC at initial stage. However, routing overhead still occurs due to the presence of these messages that are relevant to the flooding mechanism. The performance of the EETC degrades the performance when the link failure occurred in the network. The performance of system is enhanced by recovering the path in the least amount of time. There are many drawbacks of various protocols presented in this research. The performance of network is

deteriorated due to the over routing overhead caused by protocols. In order to solve all such issues occurring within the route discovery and link recovery method, a new protocol is proposed here [11]. The various measures utilized within the experiments are explained further. The main problem for various routing protocols like AODV is the aggregated routing overhead and link recovery. As shown in Eq.(one), in these protocols, the route discovery overhead and route maintenance overhead are caused.

$$RO_{aggregated} = RO_{discovery} + RO_{Maintainence} \quad \text{(Eq-1)}$$

In this research however, the routing overhead is only discussed in the initial part of route discovery. This is defined as the RREQ overhead and is shown in Eq .(two) below

$$RO_{discovery} = RO_{rreq} + RO_{rrep} \quad \text{(Eq-2)}$$

Here, the route reply overhead is denoted by RO_{RREP}. Further, for all nodes present within the network, the sum of all RREQ over- head is defined by $T_{RO-RREQ}$. These nodes involved here are all searching for a path such that the data can be transmitted at particular time (t). This is explained in Eq (three) below

$$TIME_{RO-RREQ} = \sum_{i=1}^{n} RO_{rreq} \; P_{(i)} \quad \text{(Eq-3)}$$

Here, for packet (Pi) the total number of RREQ is represented by n. On the basis of ECF, ECF(Pi), a new connectivity metric is utilized by EETC for each of the received RREQ packet (Pi). The forwarding decision of the received RREQ message is affected due to this metric. On the basis of average number of neighbors pre- sent within a network, this formula is proposed [11]. Thus, while making forwarding decision related to whether the RREQ packets are to be forwarded or dropped is made on the basis of average number of neighbors present in the network from an extensive run of 30 distinct environments for every point, the new formula for effective connectivity factor ECF is proposed. Here, the nodes are diversified between the ranges of 100 to 300. For all nodes present in the network, the total numbers of nearest-neighbours are calculated here after which the investigations are performed. After computing all these values, the average number of nearest-neighbours is calculated. On the basis of number of nodes & the information received from the investigations, a curve is drawn. In order to detect the best formula through which the similar relation amongst the average number of nearest- neighbours send the total number of nodes can be represented, this curve can be calculated. Further, in Equation (four), a new variable parameters known as is calculated.

$$NB(n_i) = 1 + \frac{N(n_i)y}{z} \quad \text{(Eq-4)}$$

By using EETC connectivity measures ECF as shown in Eq. (five), the total No. of nodes

$$ECF(n_i) = k + \frac{j-k}{[NB(n_i)]f} \quad \text{(Eq-5)}$$

Here, the fixed variables involved are ‘j’,‘k’ and ‘f’. a novel connectivity factor known as Productive connectivity Aware Factor (PAF) is thus proposed here. Through this, the route request of unwanted packets found in AODV protocols are reduced.

Eq.(six) shows this evaluation.

$$PAF(n_i) = \frac{ECF(n_i)}{N(n_i)} \quad \text{(Eq-6)}$$

The ratio of average number of neighbors to the number of current neighbors for a given node is computed for this. The node which has maximum connectivity factor which is calculated by the equation 6 is selected as the node which can recover the path from source to destination. The buffer size will be allocated to each node in the MANET based on EETC MAC as Represented by Eq. (SEVEN)

$$\text{Buffer allocated to each node} = \frac{\text{Total Buffer Space}}{\text{No.of Nodes}} \quad \text{(Eq-7)}$$

TBS is the area which is given for allocation & no. of nodes are the nodes which are present in the netw/k.

The EETC has the component ECF which can estimate the vacant buffer size on each node for the path recovery. To estimate the vacant buffer space on each node the Eq 8 is given

$$\text{Dvacant buffer} = \left[\frac{\text{Buffer of nods}(n-1)}{\text{Total Buffer Size}}\right] * nn \quad \text{(Eq-8)}$$

The DetermineVB Size is measured, when the neighbor node buffer size will be divided from the TBSize. This process will be repeated until vacant buffer size of each node will be calculated.

The eq. 8 specifies node which is measured with highest Determine vacant buffer (Dvacantt buffer) & eq. 7 specifies the best link recovery node with highest connectivity from src to destination.

Algorithm: Improved EETC Protocol for Link Recovery

1) Initialization:

NN specifies No. of Nodes in the network

2) Establish path from source to destination, if path exits from source to destination Else Source send route request packets. When node receive route request message Path established from source to destination, if source receive route error message

Calculate NB(n_i) =1 + $\frac{N(n_i)y}{z}$

Calculate ECF(n_i) = k + $\frac{j-k}{[NB(n_i)]f}$

Calculate D vacant buffer =[$\frac{\text{Buffer of nods}(n-1)}{\text{Total Buffer Size}}$] * nn

If ECF(n_i) > ECF(n_{i+1}) && Dvacant buffer(n_i) > Dvacant buffer(n_{i+1})

Recovery Node = Ni
Else
Recovery Node = Ni+1
End;
End;
End;

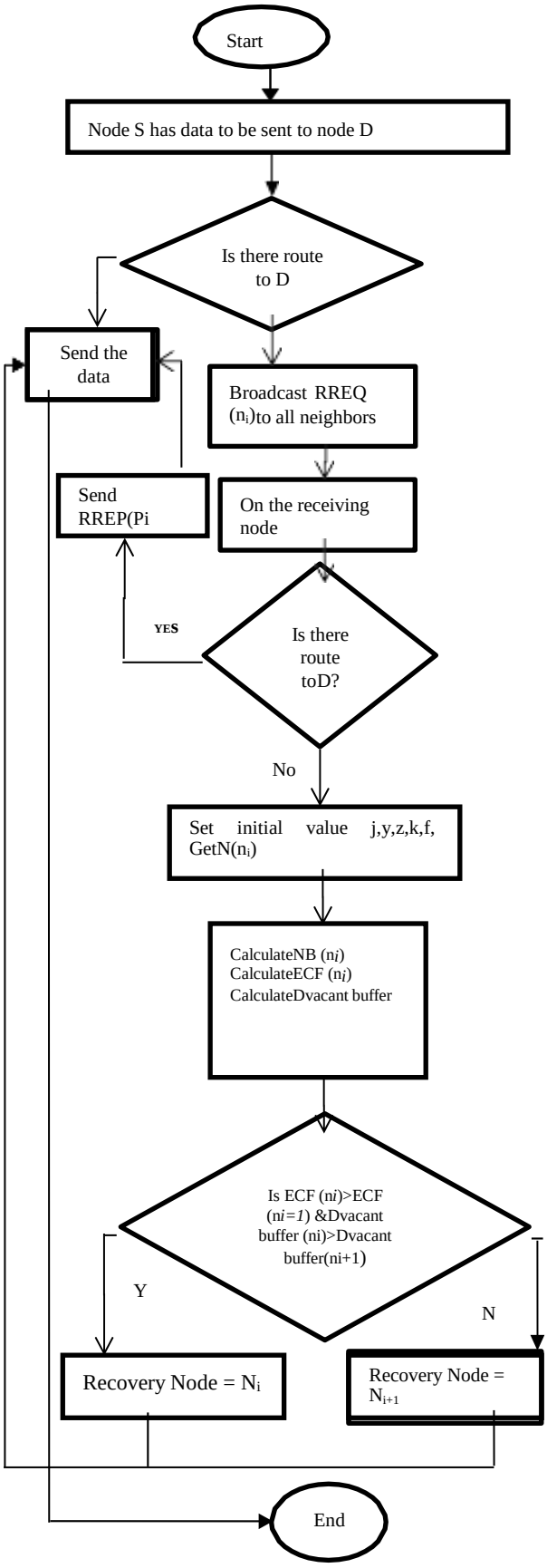

Figure 2: Proposed Flowchart

IV. IMPLEMENTATION & RESULT ANALYSIS

By using the latest version of NS2, which is version 2.35, the improved EETC protocol is implemented. The connectivity factor and buffer size is modified in order to improve the source code of AODV, EETC protocol such that the improved EETC protocol can be implemented. For updating the intermediate nearest or adjacent a command of "hello" message is generated.

The Improved EETC Evaluation: Comparisons are made amongst the EETC protocol [14] and the improved EETC Protocol within MANETs in order to evaluate the performance.

The process to reduce the unwanted packets send in network and to reset the value of total no. of nodes.

The main goal of this Improved EETC protocol is to overcome the problem link failure. Thus, there will be reduction of routing overhead, end-to-end delay, energy consumption as well as MAC collision rate in the network. Also there will be increment in the network connectivity by maintaining packet delivery ratio.

The scenario in which such enhancements are made is a high-or low-density network and high or low traffic loads. Within the simulation scenario, for each node, the transmission range taken is 18 meters and in order to create the mobility as well as node position, the random waypoint model is utilized. The latest command version 2 from NS-2 is utilized in order to include the usage of tools.

The constant distribution is followed and from 1400 trails given in the created mobility models, two scenarios are selected.

The speed of node can change from range 1 to 6 given in simulation table. The pause time involved here is (0 s), across the region of 1,100 meters X 1,100 meters the nodes are deployed in random manner, 512 bytes of packet size and 2.2Mbps of bandwidth is used. The value of Constant Bit Rate (CBR) can vary from 12 to 22 which are applied during the connection of nodes.

Table 1 shows simulation parameters involved within the simulation.

Tablel for Performance Parameters

No.	Simulation Parameters	Value(s)
1	Simulator	NS-2 version (2.35)
2	Number of Nodes	100, 150, 200, 300
3	Topology Size	1100 m X 1100 m
4	Node Transmission Range	18 m
5	Connection Type	CBR
6	The Packet Size	512 bytes
7	Min Speed of the Node	1 m/s
8	Max Speed of the Node	6 m/s
9	Pause Time	0 s
10	The Number of CBR Connection	12, 14, 16, 18, 20,22
11	Packet Rate	4 packets/Sec
12	Route Bandwidth	2.2 Mbps
13	Interface Queue length	50
14	Performance Measures Metrics for link Stability in MANET	PDR, Throughput, Delay, PacketLoss, OH,EC

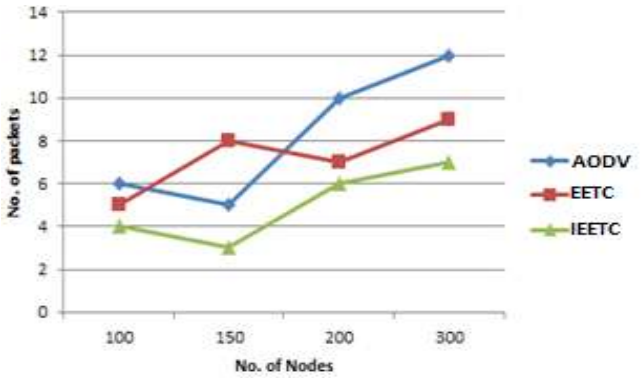

Figure 3: Packet Loss Comparison (PL)

As shown in figure 3, the packet loss of the AODV, EETC and IEETC protocol is compared for the performance analysis. The Packet loss of the IEETC protocol is 10 % less as compared to AODV and EETC protocols.

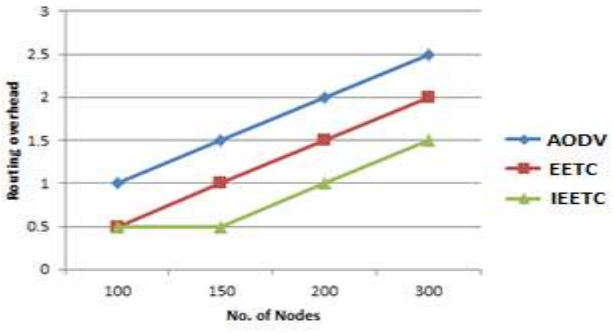

Figure 4: Overhead Comparison (OH)

As shown in figure 4, the routing overhead of improved IEETC protocol is compared with existing EETC protocol. By Comparing new technique Improved-EETC the ROverhead is reduced as compared to existing EETC Protocol. The routing overhead of AODV protocol is also compared with

other two protocols EETC & IEETC and performance analysis is done versus number of nodes.

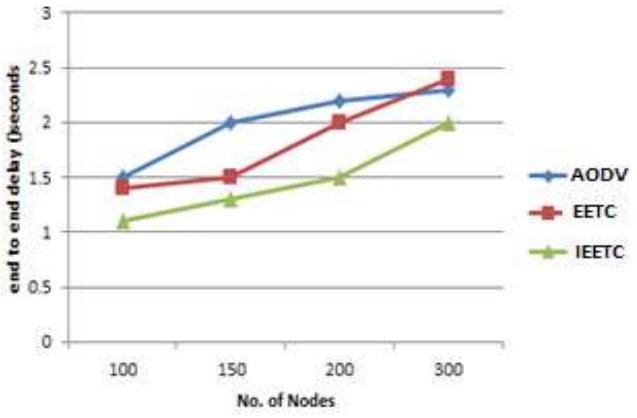

Figure 5: Delay Comparisons

As shown in figure 5, the delay of improved EETC Protocol and existing EETC Protocol is compared and due to route maintaining property of IEETC Protocol delay is less as compared to existing EETC Protocol. The above fig show the between e2e & no. of nodes.

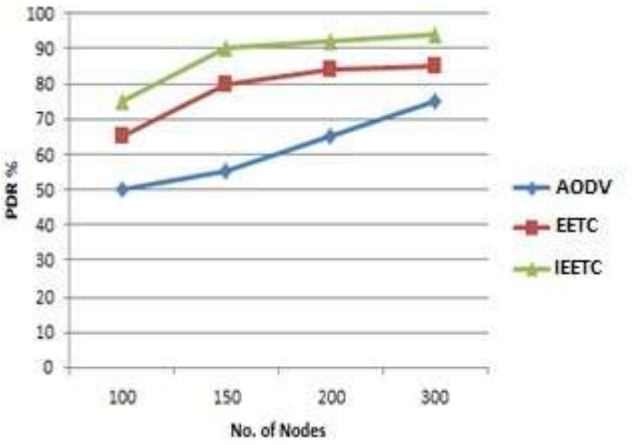

Figure 6: Packet Delivery Ratio

As shown in figure 6, the PDR values of AODV, EETC and IEETC protocol is compared and it is analyzed that IEETC Protocol performs well as compared to other two protocols. It is analyzed that graphs are drawn versus number of nodes**.**

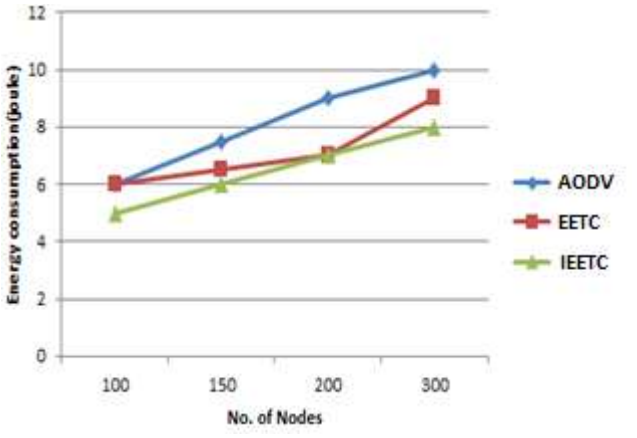

Figure 7: Energy Consumption (EC)

As shown in figure 6, the energy consumption of AODV, EETC and IEETC is compared for the performance analysis. The IEETC protocol has 10% less energy consumption as compared to EETC and AODV.

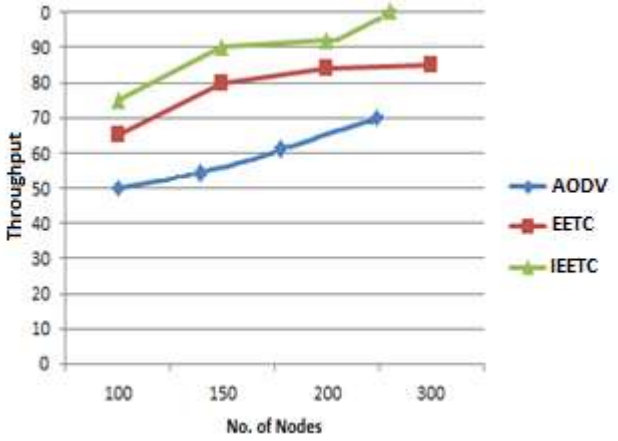

Figure 8: Throughput (TP)

As shown in fig 8, TP of AODV, EETC and Improved EETC is compared for the performance analysis. The IEETC protocol has 15% better Throughput as compared to EETC and AODV.

V. CONCLUSION AND FUTURE SCOPE

In this work, it is concluded that mobile ad-hoc network is the self configuring type of network in which mobile nodes join or leave the network any time. The EETC protocol is the routing protocol which helps in route establishment and route maintenance on the basis of node connectivity. In this research work, the buffer size parameter is further added for the route recovery. The node which has maximum connectivity factor and also has maximum buffer size is selected as the best node for path recovery from source to destination. The simulation of proposed IEETC protocol and existing EETC and AODV protocol are compared in terms of packet loss, routing overhead, e2e delay, throughput energy consumption. The simulation results shows up to 10 to 15 percent improvement in Improved-EETC protocol as compared to existing EETC Protocol. Future Scope the technique will be design which upgrade the security feature of Mobile adhoc by using enhanced Hash Algo which contains cryptosecuregraphic measures.

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