Performance Modelling of AODV, Enhance DYMO and Proposed DYMO Routing Protocol in Communication Network

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Abstract - A mobile ad hoc network is not a wired network it's a wireless network that uses multiple hops, peer-to-peer routing in its place of motionless network infrastructure to present network connectivity which is used by consumer for communication. Here, we are discussing and designing newest MANET routing protocols along with is comparisons from previous routing protocol as well as discussed improve version of MANET routing protocols e. g. DYMO is the extended version of AODV and adaptive scalable Proposed DYMO is improved version of Enhance DYMO.It have adaptive and scalable feature; earlier than some routing protocols are synchronized by simulations. Network Simulator (Version 2) present a extremely modular platform intended for wired as well as wireless simulations following different - different network essentials, traffic, protocols, along with routing types. In this work, we get the simulation results in terms of various parameters like throughput, and PDR, for above mentions routing protocols. We also describe comparisons between AODV, Enhance DYMO and adaptive scalable Proposed DYMO in terms of given parameter.

***Key-Words*:- MANET, AODV, Enhance DYMO, PROPOSED DYMO, Adaptability, Scalability**

I. INTRODUCTION

A Communication network is a set of devices (often referred to as nodes) connected by communication links. It is used to transfer information between users located at various geographical points. The different types of communication networks available today are Wired and Wireless communication networks. Wired are differentiated from wireless as being wired from point to point [1].

1.1 Type of Network

In communication system two types of networks used for data communication first is wired network and second is Wireless networks.

1.1.1 Wired Networks

This type of networks is basically connected with one device to other device using cables & wires. Two type of cable is used CAT6 AND CAT5 cable for communication in this network. The connection is usually established with the help of physical devices like Switches and Hubs in between to increase the strength of the connection.

- In wired network give high speed for connection between of 100 Mbps to 1000 Mbps.
- If we see physically, in fixed wired network connections are not prone to interfering and fluctuations in accessible bandwidth size, which may affect a few wireless networking connections [5].

1.1.2 Wireless Networks

In Wireless communication technique signals spreads from Radio Frequency (RF) into satellites and it also process from cellular phones into walkie-talkies device. In Wireless networks technique it receives a few sort of signals radio frequencies in the air after that it communication process start to transmit and receive data it is done without using cables. The important benefit of these networks is that it totally eliminates dependency to use expensive cables and wired maintenance cost saves [4].

- The main advantage of wireless networks is for Mobile users where they can access their real-time information in any place even while they stay away from their house.
- In wireless network Set up of wireless system is very fast and easy. It eliminates the use of dependency for lying out ceilings and cables on the walls.
- Wireless Network can be covered all those places where wired network can't reach.
- It gives more reliability and flexibility along with extra unique quality adaptability it easily setup & changes in the configuration of the network.

1.2. Wireless Local Area Networks (WLAN)

WLANs are option of traditional LANs that associate nodes in wired conditions. Wireless local area network (WLANs) can send or transmit data over remote medium rather than wire. A WLAN is a mutual medium correspondence arrange that communicate data over remote connects to be gotten through the entire stations (e.g. figuring gadgets) [1].

Especially ad-hoc networks are appropriate for zones where it isn't conceivable towards setting up a settled framework. While the computer or nodes broadcast with one to other without using an infrastructure then they provide the ad-hoc network by transfer packets over themselves. For ad-hoc network some of the protocols used to assist its network, computer or nodes can use of some routing protocols for example like DSDV (Destination-Sequenced Distance-Vector), DSR (Dynamic Source Routing),AODV (Ad-hoc On-Demand Distance Vector) [9].

II. ROUTING PROTOCOL

A single method is handled by quite one routing protocol at the same time. This coordination of routing protocols creates a routing protocol family and these routing protocols family has been classified into two categories (figure 1).

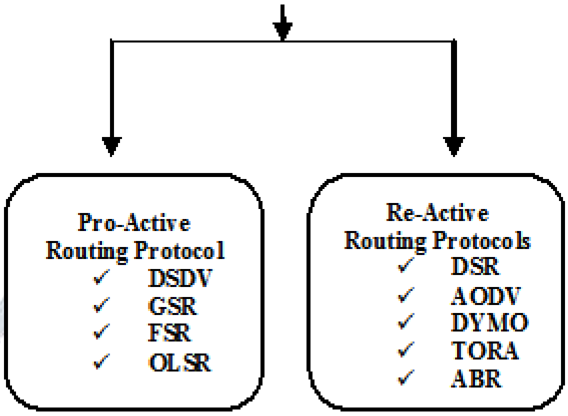

Figure 1: Shows taxonomy of Routing Protocols

2.1. Pro-Active Routing Protocols [14]

In proactive (table-driven) protocols, nodes sporadically seek for routing info inside a network. Every node keeps one or else spare tables have routing info toward each unusual node surrounded by the network. The entire nodes revise these table therefore on maintain a regular and up-to-date read of the network. Once the configuration changes the nodes spread revise messages all through the network so as to keep up consistent and up-to-date routing data regarding the total network. These routing protocols dissent within the methodology by that the topology modification info is distributed across the network and therefore the variety of necessary routing-related tables. There are some example of pro-active routing protocols like DSDR, GSR, FSR, OLSR and TBRPF.

2.2. Re-Active (On Demand) Routing Protocols

These protocols obtain an idle approach toward routing. In distinction toward table - driven routing protocols all up - to - date routes don't appear to be maintaining at each one node, in its place the routes are produced as also once needed. Once a supply needs to send toward a target, it appeals to the route finding method to search out the trail to the destination. The route remains valid until the destination is approachable or till the path (route) is not any longer required. There are some example of re-active routing protocols like DYMO, AODV and DSR[10].

2.2.1. AODV (Ad - Hoc On - demand Distance Vector) routing protocol

To discover routes, the AODV routing convention [16] utilizes a reactive approach and to distinguish the latest way it utilizes a proactive approach. That is, it utilizes the course disclosure process like DSR to discover routes and to calculate new routes it utilizes goal sequencing numbers. The two era of the AODV routing principle are depicted below.

- **Route Discovery**

In this stage, RREQ packets are passing on by the source node in a path like DSR. The parts of the RREQ packet integrate fields, for example, the destination identifier (DId), the source identifier (SId), the destination sequence(arrangement) number (DSeq), the source sequence(grouping) number (SSeq), the broadcast identifier (BId), as well as TTL. At the point when a RREQ packet is estimated through a middle node, it can either onward the RREQ packet or set up a Route Reply (RREP) packet if there is an accessible legitimate route to the destination in its reserve. To confirm if a specific RREQ has just been gotten to maintain a strategic distance from copies, the (Sid, Bid) match is utilized. However spread a RREQ packet, each transitional node enters the past node's address and it's Offer. A timer related with each and every entry is likewise kept up by the node trying to erase a RREQ packet in the event that the reply has not been gotten before it terminates.

Whilst a node collects a RREP packet, the information of the previous node is moreover stored within it in organize to forward the packet toward it as the subsequently hop of the destination. This plays a role of a “forward pointer” to the target node. Through doing it, all node have just the subsequently hop information; while within the resource routing, every intermediate nodes lying on the route towards the target are stored [15].

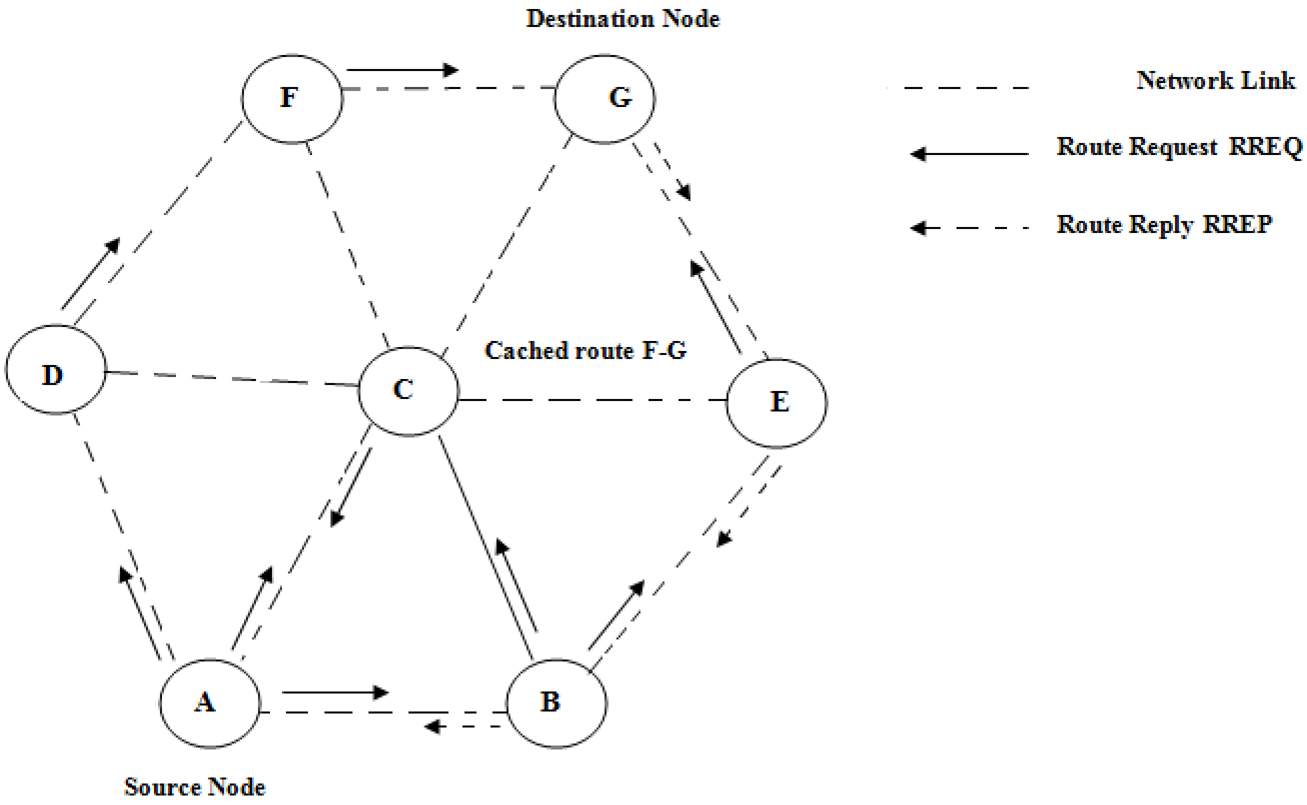

Figure 2: Route detection in AODV

Figure 2 illustrate an instance of route finding method in AODV. Assume that node A wishes to further a data packet toward node G however it has not an accessible route within its cache. It then begins a route finding process through spreading a RREQ packet toward every one of its adjacent nodes (B, C along with D). All they DId, SId, DSeq, SSeq, TTL, as well as Bid fields are implanted within the RREQ packet. At the end while RREQ packet compasses toward nodes B, C as well as D, these nodes immediately seem their exacting route caches intended for a present route. For the condition wherever no route is available, they onward the RREQ toward their neighbours; usually an assessment is made among the destination sequence number (DSeq) within the RREQ packet as well as the DSeq inside its compare packet inside the route preserve. It response to the source nodes through a RREP packets encompass of the route toward the target for the condition the DSeq inside the RREQ packets is further worth mentioning.

In Figure 2, nodes C acquire a route toward G inside its cache as well as its DSeq is further worth mentioning when contrast along with that inside the RREQ packet. Accordingly, it sends a RREP reverse toward the source node A. Through doing this, node A have previously store up the path A-C-F-G. A RREP is as well sent back through the destination node toward the source. One likely route is A-B-E-G. The middle nodes lying on the path starting source to target create an update lying on their routing tables through the latest DSeq within the RREP packet.

- **Route Maintenance**

The means that the route maintenance mechanism works is portrayed beneath. At whatever point a node discovers a link break (by link layer acknowledgements or HELLO messages [16], it broadcasts a RERR packet (in a route like DSR) to inform the source along with the end nodes. This procedure is represented in Figure 3. During the link that the relation among nodes C as well as F breaks lying on the manner A-C-F-G, RERR packets will be send through both F along with C toward inform the source as well as the destination nodes.

The major improvement of AODV is the avoidance of source routing toward reduces the routing overload inside a huge network. One greater characteristic of AODV is its utilization of extend ring-search toward manage the flood of RREQ packets along with appear for routes toward mysterious destinations [17]. In adding, it as well provisions destination sequence (arrangement) numbers, allow the nodes to have extra up-to-date routes. Though, a few nodes have to be in use into concern when with AODV. Initially, it needs bidirectional links as well as sporadic link layer acknowledgements toward identify broken down links. Secondly, distinct DSR, it wants to preserve routing tables intended for route protection unlike DSR [2].

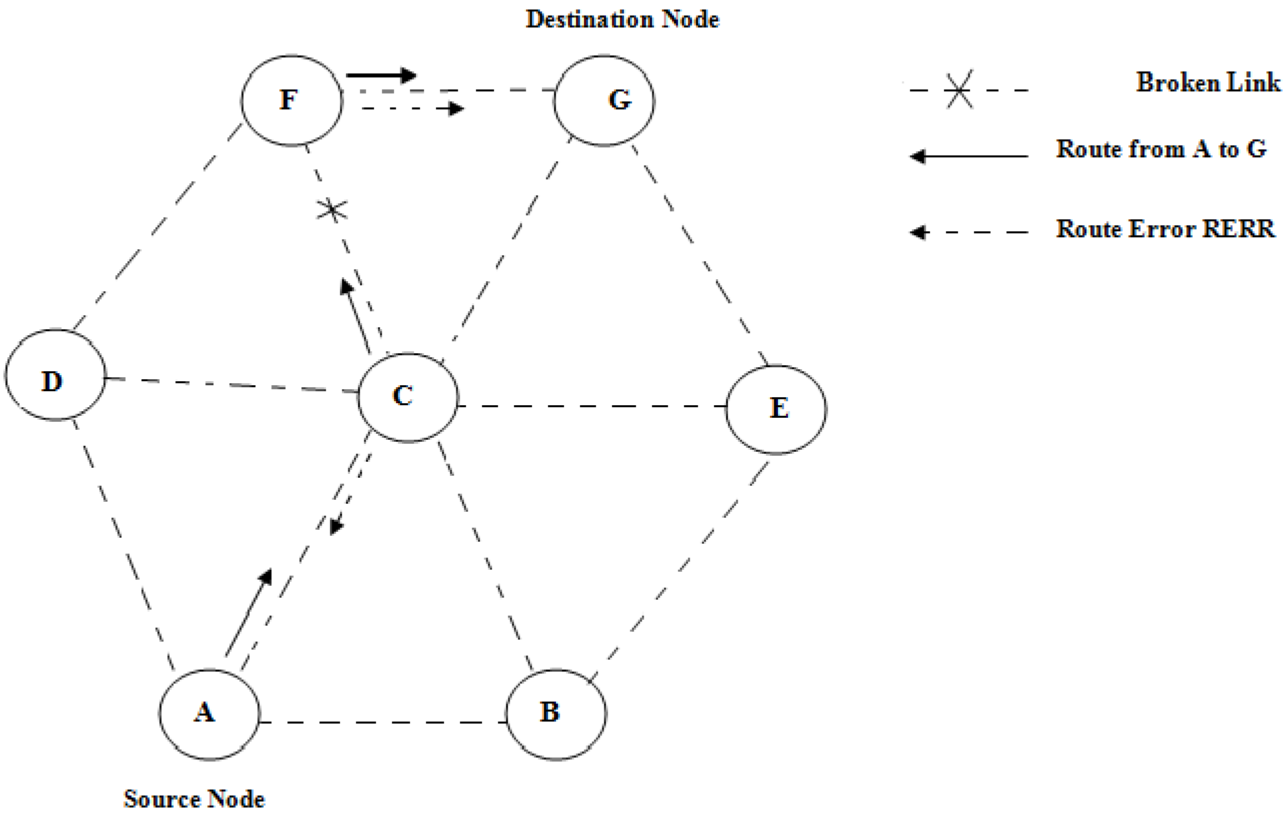

Figure 3: Route maintenance in AODV

2.2.2 Advantage and Limitation of AODV [18]

The Ad – hoc based On Demand Vector (AODV) routing protocol would be similar to every essential body scheme toward handle the routing methods. Reactive protocols similar to AODV be likely to decrease the manage traffic messages (information) overhead on the assessment of improved latency toward discover fresh routes AODV reply likewise speedy to the topological modify within the network as well as updates completely the node partial through these alteration [19].

It is feasible that a suitable route is expiring. Influential of a sensible finishing time is not easy, since those nodes are mobile; along with sources' transfer rates may possibly change generally furthermore can modify dynamically as of node towards node. Furthermore, AODV be able to get together just an extremely restricted quantity of routing information and also route learning is imperfect simply towards the source of several routing packet individually forwarded.

III. DYMO PROTOCOL

Here in this study, we are discussing a new reactive routing protocol which is a successor of AODV i.e. DYMO [20]. Intermediate node inside the direction between a supply (source) and a destination to save the paths (routes) to all of the predecessor nodes (intermediate nodes), consequently lessening the routing overhead. Basically DYMO does not preserve routing tables after topology adjustments, as a result keeping off sending a number of control packets otherwise useless if particular transmissions are not wished for a given topology alternate. The tracking of route most effective takes place when traffic is available for transmission. However, the nodes check the status popularity of the hyperlinks with their associated through a fixed of timers.

The DYMO (recently renamed as AODV- V2) is a reactive routing protocol that doesn't send control packets until its far acting routing or transmitting obligations or task. It routes hop via hop. If a node desires to transmit and there's some acknowledged path to the destination, it just makes use of it earlier than anything else. If a path or route direction isn't always stored or the saved path or route course fails, the node starts the system of path or route direction discovery by broadcasting messages of RREQ in which the nodes detailed address is mention. Once the destination node gets the request RREQ it replies with as RREP message which addressed to the source node; as soon as the RREP is acquired at the foundation the route direction is mounted and to be had in each methods as shown within the figure 4.

Here in this paper an acquisition of latest dynamic routing protocol in mobile ad-hoc network i.e. (DYMO) dynamic MANET on demand routing protocol. The network having large number of routers need dynamic routing protocol like DYMO and its DYMO routing protocol shows or gives very appropriate (desirable) results. So that the DYMO protocol is appropriate for those networks who having large number of routers and it has only the appropriate choice [21].

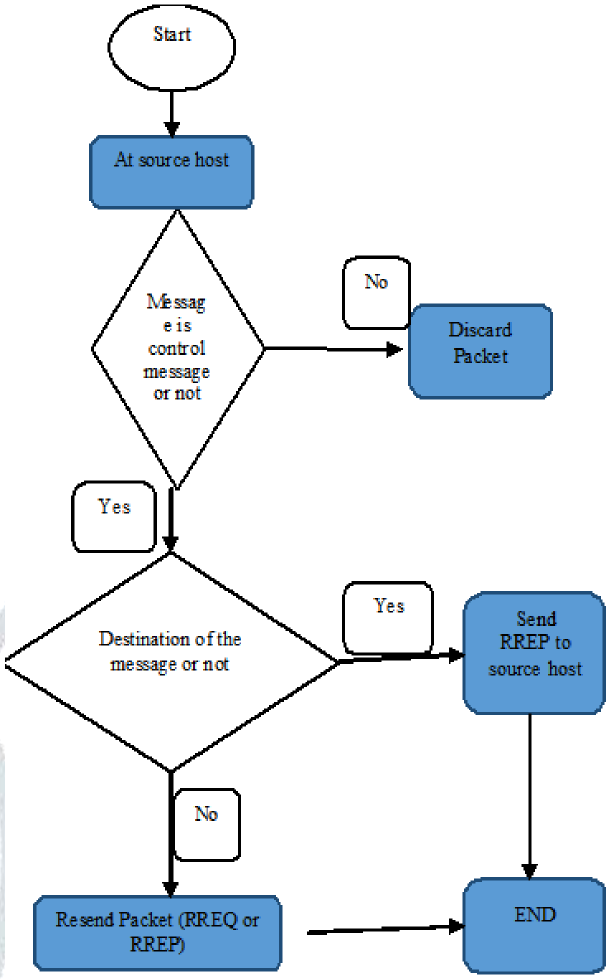

Figure 4: Working Flow Chart of DYMO Protocol

Some of the characteristics of DYMO are:

- DYMO has decrease routing overhead than AODV, using path or route direction accumulation feature it simplifies the protocol implementation.
- As a reactive routing protocol, it does not keep the network topology.
- Since DYMO keeps a very little routing statistics, it is therefore considered as reminiscence means memory efficient protocol because a far lesser quantity of reminiscence (memory) is used.
- The fundamental routing procedure of DYMO involves route (path) discovery and path (route) direction protection or maintenance.

The DYMO route (path) direction discovery may be very similar to that of AODV besides for the route (path) direction accumulation feature. If a source has no route (path) access (entry) to a destination spot, it publicizes or broadcast a RREQ message to it's on the intermediate node acquaintances. If a neighbour has an access (entry) to the destination, it replies with an RREP message else it broadcast the RREQ message. While broadcasting the RREQ message, the intermediate node will attach its deal with to the message. Every intermediate node that disseminates the RREQ message makes an observer of the backward path.

The path preservation manner or path (route) maintenance process is honestly finished with the help of RERR messages. The RERR message should be generated with the aid of a node if and when a hyperlink to another node breaks. The producing node multi-casts the RERR message to simplest those nodes which are worried (concerned) with the hyperlink failure. Upon reception of a RERR message, the routing table is updated and the access (entry) with the damaged link is deleted.

The proposed methodology dynamic routing protocol DYMO following steps:

- Start with initialize the node.
- Source host node has to be checked whether is it control message or not by handlerlowerRM( ) function.
- If it is not a control message, discard this packet message.
- If it is a control message, proceed further (myAddr ()) to the several procedures node and send this message to all nodes (RREQ).
- Destination node sends the RREP to the source host. Otherwise again resend the RREQ or RREP to the neighbouring node and to the source host.

- END.

3.1. Route Discovery Phase in DYMO environment

The proposed new reactive routing protocol i.e. DYMO perform route discovery phase as following steps:

- Begin the environment with sending control message through source host node.
- If there is any stored information about destination route, send the RREQ to the destination node from the source host node.
- If according to information about destination node, checked by the system whether really it is destination node, if yes then send RREP to source node through destination node.
- Finally new connection is established and data or message transferred to the destination.
- If there is no information about destination route, send RREQ to their intermediate neighbour's node.
- Intermediate neighbour's node have any entry or info about the destination route node, send an acknowledgement to the source i.e. RREP.
- If also intermediate neighbour's nodes have no info about the destination node, an intermediate neighbour's node broadcast the RREQ (route request) with the destination address.
- Every intermediate node that disseminates the RREQ message makes a note of the backward path.
- End.

3.2. Route Maintenance Phase

The path preservation manner or path (route) maintenance process is honestly finished with the help of RERR messages. The RERR message should be generated with the aid of a node if and when a hyperlink to another node breaks. The producing node multi-casts the RERR message to simplest those nodes which are worried (concerned) with the hyperlink failure. Upon reception of a RERR message, the routing table is updated and the access (entry) with the damaged link is deleted.

3.3 Limitation of DYMO

The DYMO protocol, however, does not perform well with low mobility. The control message overhead for such scenarios is rather high and unnecessary. Another limitation lies in the applicability of the protocol as stated in the DYMO Draft which states that DYMO performs well when traffic is directed from one part of the network to another. It shows a degraded performance when there is very low traffic random and routing overhead outruns the actual traffic.

IV. LITERATURE SURVEY

In ad hoc networks is able to work without existing infrastructures by using multi-hop transmission techniques. This can be useful for disaster area communication. When using mobile terminals as relay nodes, one of the problems is that if some relay nodes run out of batteries, the resulting network will consist of separate parts unable to converse among each other. We are discussing various papers here:

Per Johansson, et al. [6] proactive protocol under examination (AODV and DSR) acted comparatively as far as delay and throughput. Based on this examination both ought to be viewed as reasonable for versatile especially in MANET. In any case, various contrasts between the conventions do exist. The source routes utilized by DSR give expanded byte overhead contrasted with AODV when routes have numerous bounces and bundle rates are high. DSR is, then again, proficient in discovering (learning) routes as far as the quantity of control packets used, and does not utilize periodic control messages. In AODV technique packets of data take the final or destination address only, and not source routes.

David A. Maltz et al. [7] the ability for nodes to form ad hoc networks in the lack of communication infrastructure is a critical area. There are existing communication needs which ad hoc networks (MANET) be capable of to meet up such as commercial & military applications. & the development or expansion of (MANET) ad hoc network technology will permit latest program or classes of applications. With the possible for lower cost use and higher availability, together with the sinking costs of the wireless transceivers, ad hoc networks (MANET) are appropriate economically and technologically enough right now. Ad-hoc network (MANET) is a group or no of wireless movable nodes or terminal dynamically structure a short-range network with no the make use of numerous pre existing network communications or infrastructure and inner administration.

C. Mbarushimana[8]: analyzed the various type of protocol performance by using the data end-to-end delay and delivery ratio. Performance metrics Reactive routing protocols DSR, PRP OLSR & AODV. To analyzed the performance of selected protocol he used. In his Results has been better performance accomplished in compare to PRP OLSR is have improved performance than reactive routing protocol DSR and AODV. The major reason of poor performance in reactive protocols is for due to the higher chance of barrier overflow & also the other reason is packet drops more in network layers.

T. Arvind Ramrekha et.al [11] MANETs are cooperative dispersed or distribution of networks that is suited for communication needs where autonomic architectures are allowable so that network operation is possible. It is mainly significant in next generation the entire IP networks during this the emergency communication network protocol structure and necessary part. Here, the model establishes a theoretical upper bound for routing cost and E2E delay soft QoS guarantees that are achievable in free space and urban disaster scenarios. When OLSR and AODV were investigated using this model, it was found that for smaller networks OLSR was less costly with better QOS than AODV and that there exist a set of connections size threshold beyond which AODV is more cost efficient and could provide better E2E delay for both scenarios.

Rolf Ehrenreich Thorup [20], Routing in a MANET must be efficient in a broad set of imaginable scenarios and the two types of category of MANET mobile ad hoc network routing protocols were introduced: first one is on-demand/reactive protocols & other is table-driven/proactive protocols. The experiments provided practical evidence that throughput in a MANET routed with DYMO is similar to throughput in a MANET routed with AODV. We performed the first practical experiments to estimate the ad hoc horizon which is intended to capture the limit on the no of hops and number of nodes when TCP based network services stop being useful in a MANET. Experiments involving the ad hoc horizon are important because they try to get into account the usage patterns of everyday use like web browsing with a concurrent long-standing download session. Our small-scale experiments confirmed the limits previously reported using simulation and furthermore show that experiments evaluating the practically applicability of MANETs are important.

Zainab Senan Mahmod et.al [12] a plan and execute a routing protocol that enhances the scalability of the WMNs. The (DH-AODV) Directional Hierarchical AODV network routing protocol is planned to exploiting the current fields in the AODV's control packet with a specific end goal to lessen the stack on network bandwidth and to rapidly recognize route breakage. Wireless mesh networks (WMNs) are progressively self sorted out and self designed, with the nodes in the network thusly setting up an ad hoc network protocol & keeping up the work accessibility. To survey the execution of the proposed DH-AODV protocol in a mix Wireless interconnect networks & differentiation it and AODV protocol, and simulation done using Qual Net Simulator was done. Wireless meshes networks (WMNs) comprise emerge as beneficial technology for the next-generation of wireless networking. Nevertheless, some challenging research issues need to be resolved. One of the majority successful factors to be enhanced is the network routing protocol use to be scalable, secured and robust well-organized protocol is to implemented, designed & evaluated by using Qualnet Simulator. The results of simulation specify an development of DH-AODV in excess of the standard AODV.

Anuj K. Gupta et.al [21] studies of MANET that can communicates with all other nodes exclusive of have any central domain or say fixed infrastructure. Terminal Nodes are open to move at random within the network & distribute the information of nodes dynamically. To achieving a competent routing network various protocols that have been developed so far which differ in their nature & have possess salient properties. In his research paper, he discussed latest protocols. Dynamic MANET on demand (DYMO) routing network Protocol. To analysed & implemented its performance with other similar protocol against different parameters. In last comparison which is presented among all of them. In his research paper successfully simulated the existing DYMO network routing protocol & analyzed their performance which is mainly based on different simulation metrics. The simulation has been performing with changing pause times. It is observed that DYMO has the successor of AODV get superior in all sense. In his research paper will act like various researchers universal to work upon the DYMO network protocol & in near future and effort will be completed and to improve the performance of DYMO by means of AI techniques & simulations will be perform under changing network scenarios.

Koji Saito et.al [13] We focused on routing protocol to solve this disruption of service problem in the entire network, as many researches often do not think about the superiority of the whole network. In this study, we first define a network lifetime to evaluate service in the entire network, and propose routing algorithms considering residual electric power of each node. This way we can select routes to avoid using low residual electric power nodes. His results prove that this method we use can prolong network lifetime compared to conventional AODV routing protocol. In this study, we used a simulation of a temporary emergency network. When using mobile terminals as relay nodes, one of the problems in this network may become fractured into separate parts if the nodes are running out of battery power. We defined a network lifetime to evaluate service of the entire network. He proposed improvements for the AODV network routing algorithm by considering residual battery power use for each node. Our two proposals can avoid usage of nodes with little residual power when making route selections. The result is that they can equally balance the energy usage around a sink node and extend the network's lifetime. The downside is that the no of received packets in our proposals is smaller than in the conventional method. While the no of hops increases energy or power consumption in the entire network increases. To alleviate the drawback, we proposed a PowerAndHops2, which also takes into account the number of hops. This is an intermediate algorithm solution between the PowerOnly1 and conventional (AODV) methods.

V. ENHANCE DYMO PROTOCOL

As know about the new intended dynamic routing i.e. DYMO routing protocol has less overhead as compare to other dynamic routing protocol. But today's scenario technology wants more secure protocol as compare to their better performance in terms of throughput.

The method dynamic routing protocol improves or enhances DYMO has following steps:

- Start with initialize the node.
- Source host node has to be checked whether is it manipulate or control message or now not through handlerlowerRM( ) characteristic.

- If it is not a control message, discard this packet message.
- If it's control or manipulate message, continue similarly (myAddr ()) to the several techniques or procedures node and send this message to all nodes (RREQ).
- Destination node sends the RREP to the source host. Otherwise again resend the RREQ or RREP to the neighbouring node and to the source host.
- If it isn't always a RREP, decide or calculate distance of the node (own distance) and determine is it candidate forward node.
- If it is not a candidate forward node discard the packet. But it's far still a ahead or forward node resend or forward RREQ to neighbouring nodes.
- Calculate dynamic ahead delay and begin timer, then the packet has been ahead or forward until timer expired.
- End.

The proposed methodology dynamic routing protocols enhance DYMO protocol working flow chart shown in the figure 5.

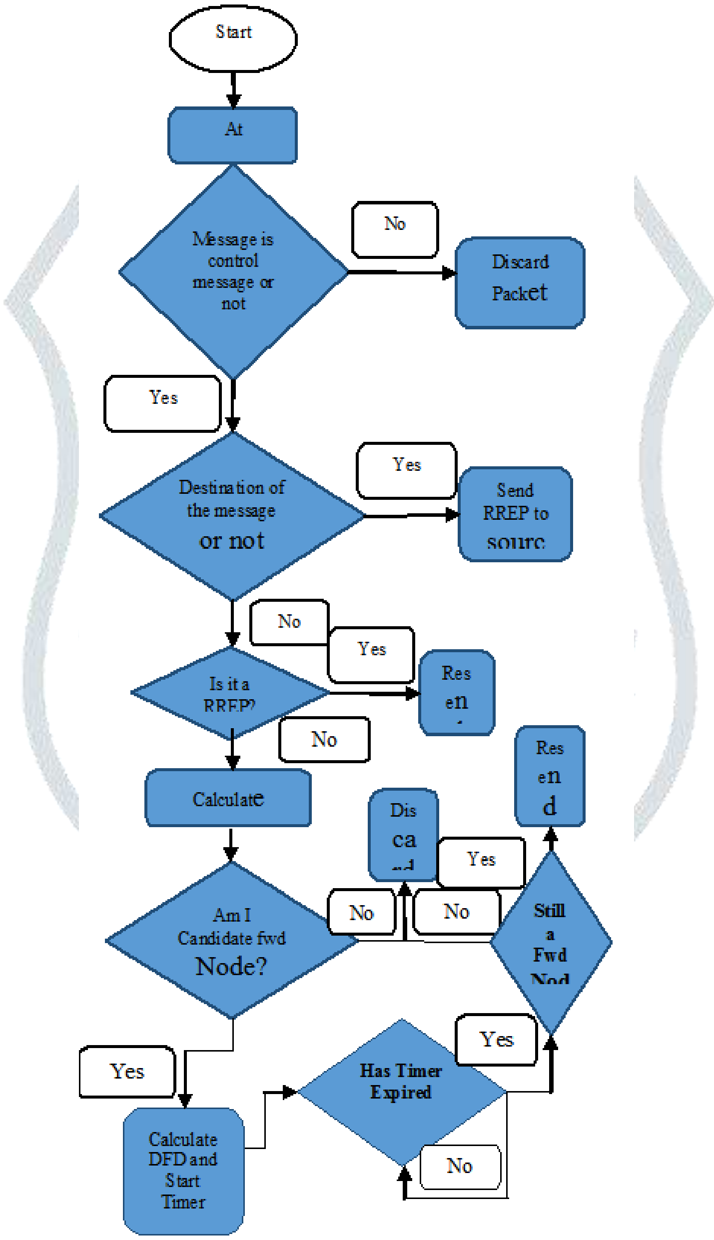

Figure 5: Flow Diagram (Working of Enhance DYMO)

5.1. Functions used for Adaptive Scalable proposed DYMO Modification

Besides the preceding adjustments that had been important in order to assure a behaviour in step with the draft, distinct capabilities have been introduced or changed for the implementation of Enhance DYMO self beforehand protocol:

- **Receive Change Notification:** This feature allows the DYMO module to take movements while given notifications are obtained, accordingly permitting the implementation of the adjustments proposed by using DYMO self ahead.

- **Calculate Distance:** This feature calculates an own distance for the given node. The output is a drift that is used by the node for figuring out whether or not it's far a candidate node and for calculating the DFD.

- **Forward Node:** This feature compares very own distance with the gap many of the previous sending node and the destination (own distance previous of node) and determines whether or not the node is a candidate for retransmission of the RREQ.

- **Waiting Time:** This feature calculates the DFD, this is, and after that the candidate node has to attend before in the long run retransmitting the RREQ.

- **Check Sequence Number:** This feature checks whether a trendy RREQ for the identical destination and with a better collection variety has been acquired thru the node throughout the ready time.

- **Add-Own Distance:** This function modifies the sending node discipline in the RREQ packet through substituting own distance previous node with own distance.

5.2 Proposed Adaptive Scalable Routing Protocol:

This routing protocol improve the performance by consider the performance by using a battery and traffic parameters. Route request and route reply system for adaptive scalable proposed DYMO dynamic protocol with power and traffic parameter contain into the enhance performance following steps:

- Start the surroundings with initialization at the source host.
- Identified sending message is control (or manage message) or not on the source host end.
- If it's far control manipulates messages then process method precede further otherwise discard the message packet at the supply host end.
- Initialization power and traffic discipline with the starting supply node.
- Send route request to the neighbouring nodes to get the information about the destination node, if neighbours recognize the destination route respond as RREP otherwise broadcast the route request to their neighbour's nodes updates with new energy or power and traffic parameter.
- Calculate path or route strength (energy) and traffic parameter with path or route priority; find best path or route to the destination node consistent with most energy with minimal traffic.
- Send the route respond and recognized as destination node.
- End.

5.2.1 Energy Field

As discusses above in this chapter, consider an example for communication between source and destination node. Suppose that there are N numbers of routes and shows the Mi number of nodes in i^{th} route i.e. $Route_i$. In enhance DYMO, each node, $Route_i$ have k^{th} node and battery power (BP_k) level and critical battery power level (CBPL). Total $Battery_i$ define as the summation of total battery power level of all nodes of $Route_i$. Minimum $Battery_i$ cell in energy field of $RREQ_i$ shows the minimum value of BP for all nodes in Routei.

$$Total\ Battery_i = \sum_{k=1}^{k=M_i} BP_k \tag{1}$$

5.1.2. Traffic Field

If the queue size of interface of node k located in $Route_i$ is AQ_k and the maximum size of interface queue of node k is MQ_k, then the traffic parameter of node k in Enhance DYMO (i.e. TP_k) is defined as:

$$TP_k = \frac{AQ_k}{MQ_k} \tag{2}$$

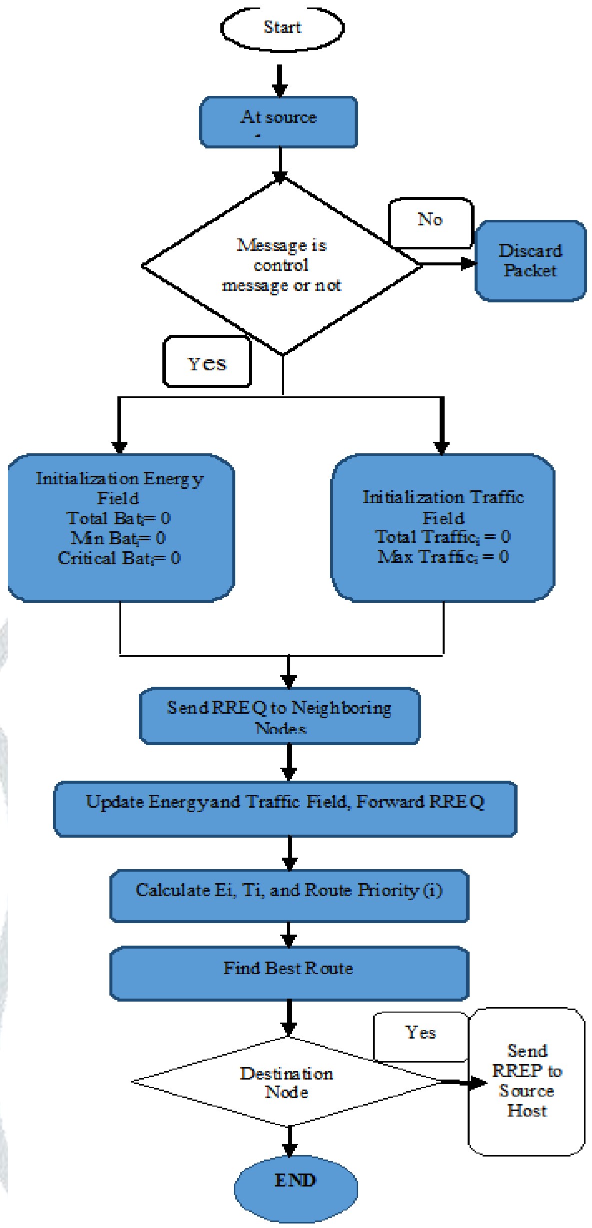

Figure 6: Process working flowchart of proposed DYMO protocol (Energy and Traffic)

The Traffic field of RREQ has two cells:

1) Total Traffic.
2) Maximum Traffic.

Total Traffic is the TP (Traffic Parameter) summation of all nodes of Route$_i$, as defined,

$$Total\ Traffic_i = \sum_{k=1}^{k=M_i} TP_k \tag{3}$$

Maximum Traffic c_i is the maximum traffic parameter (TP) values of Route$_i$.

Route Selection Process: As we understand destination node or spot could be receive message packet from numerous routes as consistent with the RREQ. So there are numerous routes for accomplishing supply to destination spot node. In this condition routing protocol run the route selection process on the premise of energy and traffic parameter i.e. Minimal traffic and most energy.

$$E_i = \frac{Total\ Battery_i}{M_i \times Initial\ Battery} \tag{4}$$

In some situations, a path or route can also have a few nodes with very low strength (energy) stages. These nodes have a battery power level of less than crucial or critical battery power level but an excessive normal strength (i.e. High Total Battery). This route direction should be avoided in order that the bad effect of Minimum Battery$_i$ (the node which has the minimum battery strength degree in Route$_i$) ought to be carried out to E_i:

$$E_i = \frac{Total\ Battery_i \times Minimum\ Battery_i}{M_i \times Initial\ Battery^2} \quad (5)$$

As in step with the method, destination node gets a route request it routinely calculate the energy parameter via the strength discipline of route request. The traffic parameter of Route$_i$ is proven by means of T_i and is described as:

$$E_i = \frac{Total\ Traffic_i \times Maximum\ Traffic_i}{M_i} \quad (6)$$

Hereby an extra function has to be decide by means of the gadget i.e. Priority of given path (Route$_i$) rely on strength (energy) and traffic of precise route define as Route_Prio characteristic.

$$Route\ Priority_i = \frac{E_i}{T_i} \quad (7)$$

5.2. Mobile Node Parameters

It would be helpful to take a look at the example scripts in **ns/tcl/ex** on wireless networks (for ex: **wireless.tcl**). A list of all parameters is given below table 1.

Table 1: Network Mobile Node Parameter

Sr. No.	**Parameter**	**Value**
1	Channel Type	Wire Less Channel
2	NS-2 Version	NS-2.35
3	Radio Propagation	Two way Ground
4	Number of Nodes	50
5	Routing Protocol	E-DYMO
6	Protocol MAC	802.11
7	Interface Queue Type	Queue/Drop-Tail/Pri-Queue
8	Network Interface Type	Phy/ Wirelessphy
9	Link Layer Type	LL
10	Antenna Model	Omni Antenna
11	Frame Size	512
12	Mobility Model	Random Way Point
13	Coverage Radius	71 m
14	Shadowing	0db
15	Frequency Band	2.4 GHz
16	Sending Rate	1 frame every 250 ms
17	Bit Rate	54 Bps

This must deliver a few ideas of the different parameters that want to be configured for a typical simulation. A wireless simulation is made from some variety of Mobile Nodes. Each such mobile node wishes some alternatives to be configured like routing protocol, MAC layer protocol, and antenna type, channel type and so forth.

VI. ENHANCE DYMO PROTOCOL

The network simulator NS-2 is an object–oriented, discrete event-pushed network simulator developed on the OC Berkley and ISC ISI as part of the VINT assignment. It is a completely beneficial tool for engaging in network simulations involving nearby and extensive location networks. In the current years its functionality has grown to consist of wireless and ad hoc networks as properly.

6.1. Performance Evaluation

In this section, we've defined simulation parameters and the simulation effects for the examiner of power intake, scalability, and adaptableness of Enhance DYMO and Adaptive scalable proposed DYMO schemes. We have compared throughput, electricity intake according to a success transmission. We have observed their performance conduct by way of various network loads and the node density within a given location.

6.1.1. Throughput

Network load is the price of era of packets inside the network and throughput is calculated as variety of kilobytes facts obtained via the destination spot node per second.

Table 2: Throughput value of proposed DYMO protocol with increasing number of nodes

Number of Node	Throughput
10	260.25
20	510.35
30	370.68
40	610.48
50	320.08

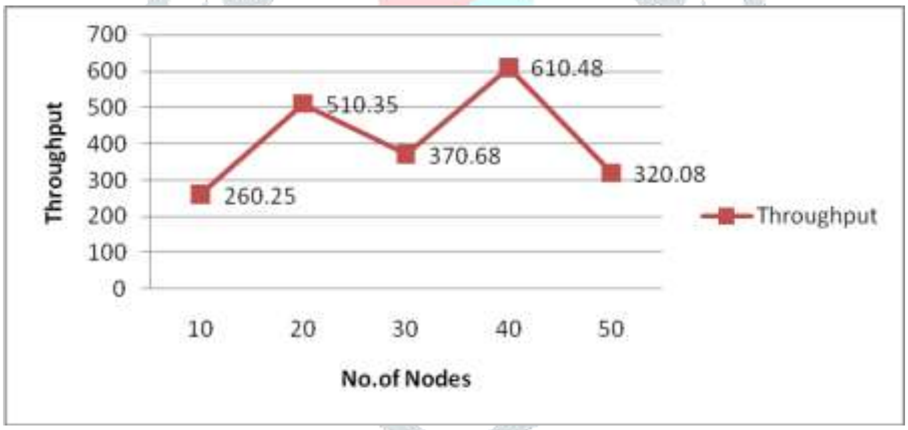

Figure 7: Shows graph between number of nodes and throughput

As in line with the table 2 depicted that the value of proposed Adaptive Scalable proposed DYMO protocol throughput with growing number of nodes as much as 50 nodes. According to those values we plot the graph among variety of nodes and throughput as proven in the figure 5.14. Here from the table and depicted discern concluded that value of throughput simulated by the proposed dynamic protocol adaptive scalable DYMO has a one of a kind price at every node. As shown within the figure 7 shows the unique throughput value at one of kind nodes, the value of throughput has been maximal at forty nodes and less variant between 20 and 40. Basically the values of throughput depend on traffic and power (energy) parameter of course (source to destination spot node).

6.1.2 Packet Delivery Ratio (PDR):

As in line with the table 3 depicted that the value of adaptive scalable proposed DYMO protocol PDR with increasing number of nodes as much as 50 nodes. According to these values plot the graph between variety of nodes and PDR as shown inside the figure 7. Here from the table and depicted figure concluded that value of PDR simulated by way of the adaptive scalable proposed DYMO has a different value at every node.

Table 3: PDR value of adaptive scalable proposed DYMO with increasing number of nodes

Number of Node	PDR
10	0.47
20	0.648
30	0.55
40	0.64
50	0.32

As according to proven in the figure 7 shows the special PDR value at extraordinary nodes, the value of PDR has been maximum at 40 nodes and much less variant between 20 and 40. Basically the fee of PDR relies upon traffic and energy (power) parameter of direction (supply or source to destination spot node).

Figure 7: Shows graph between number of nodes and PDR

6.1.3 END to END (ETE) Delay

As in keeping with the table 4 depicted that the value of adaptive scalable proposed DYMO protocol ETE delay in m-Sec with growing wide variety of nodes up to 50 nodes. According to these values plot the graph between numbers of nodes and ETE delay in m-Sec as proven in the figure 8.

Table 4: ETE Delay value of adaptive scalable proposed DYMO with increasing number of nodes

Number of Node	END to END Delay (sec)
10	0.089
20	0.295
30	0.290
40	0.289
50	0.223

Here from the table and depicted figure concluded that value of end to end delay in m-Sec simulated by the proposed dynamic protocol proposed DYMO has a different value at every node.

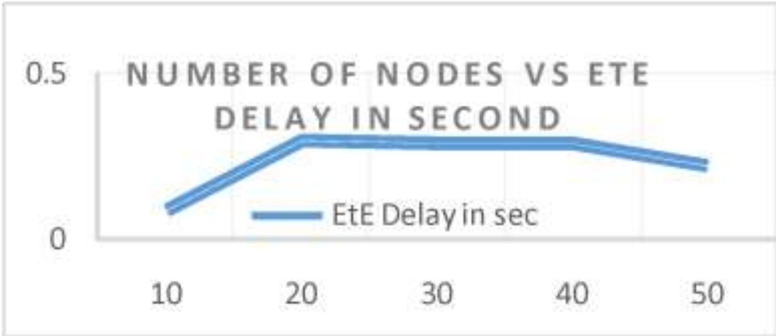

Figure 8: Shows graph between number of nodes and end to end delay in second

As in step with shown within the figure 8 indicates the different ETE delay in m-Sec value at specific nodes, the value of ETE delay in Second has been approx same at 20 to 50. Basically the values of ETE delay in Second rely upon site visitors means traffic and energy (power) parameter of direction (source to destination spot node).

6.14 Performance Analysis of Average Throughput

In table 5 represent the comparative performance of average throughput parameter for the given AODV, Enhance DYMO and Proposed DYMO routing protocol.

Table 5: Average Throughput Comparison of AODV, Enhance DYMO and Proposed DYMO protocol with increasing number of nodes

Number of Node	Average Throughput		
	AODV	Enhance DYMO	Proposed DYMO
10	215.53	249.183	260.25
20	389.80	502.008	510.35
30	320.67	367.570	370.68
40	495.56	610.292	610.48
50	270.65	316.016	320.08

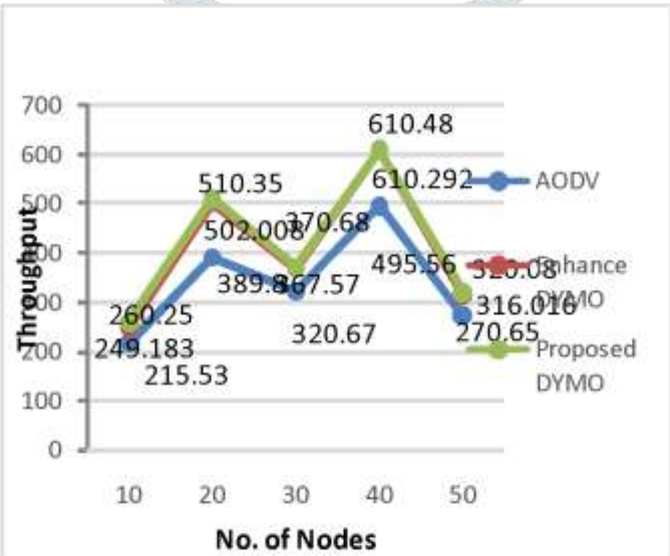

Figure 9: Average Throughput Comparison between AODV, Enhance DYMO and Proposed DYMO

6.15 Performance Analysis of Packet Delivery Ratio

In table 6 represent the comparative performance of packet delivery ratio parameter for the given AODV, Enhance DYMO and proposed DYMO routing protocol.

Table 6: Comparison performance parameter PDR of AODV, Enhance DYMO and Proposed DYMO Protocol

Number of Nodes	AODV	Enhance DYMO	Proposed DYMO
10	0.251	0.341	0.47
20	0.389	0.539	0.648
30	0.354	0.473	0.55
40	0.365	0.497	0.64
50	0.287	0.318	0.32

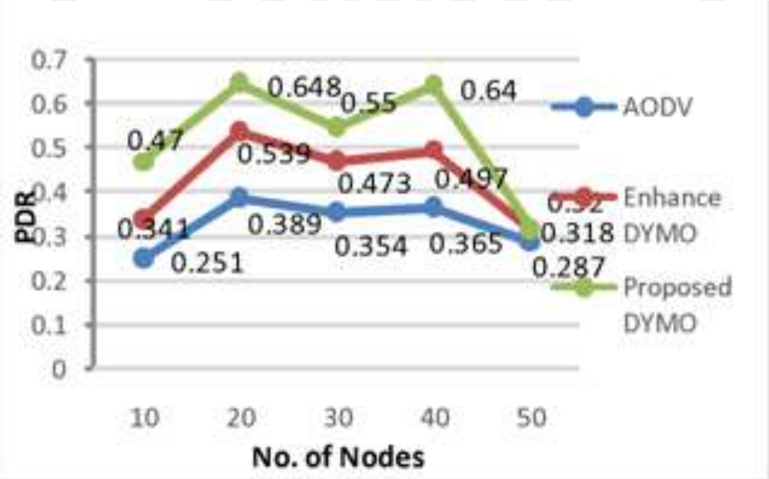

Figure 9: PDR Comparison between AODV, Enhance DYMO and Proposed DYMO

VII. CONCLUSION AND FUTURE WORK

Mainly wireless network is used for data transfer to other devices without using wired technology. We can transmit and receive data using wireless network through electromagnetic waves. Here, Network Simulator (Version 2) is used for network simulation which is a discrete event driven simulation tool intended for studying the active environment of communication networks. In commonly, NS-2 provides consumer among a way of identify network protocols along with simulating their performance. The outcomes of the simulation are accumulating within a trace file and other recorded data about all measures that come about throughout the simulation process. In this paper, we have used Network Simulator (Version 2) to simulate performance of the user over wireless network consisting of 10 nodes or more than 10 nodes proposed for packet delivery ratio, throughput for the nodes. In this learning, we have effectively simulated the existing AODV routing protocol, DYMO routing protocol along with adaptive, scalable Proposed DYMO routing protocol and analysis of its performance based on different simulation metrics. This simulation has been executed within altering pause era. It has been noticed, that DYMO life form the successor of AODV, perform well within the entire conditions. Here, we have also discussed about adaptive scalable Proposed DYMO routing protocol which is extended version of Enhance DYMO routing protocol and its performance is better in terms of all parameters. This paper will act like as foundation for several researchers universal to work ahead the Enhance DYMO protocol and also proposed DYMO protocol and in future we could try to improve the performance of proposed DYMO protocol through using AI (Artificial Intelligence) techniques as well as simulations will be execute under altering network development. In this study discusses the a few enhancements within the dynamic on call for protocols (Proposed DYMO), this enhancement of system consist of the procedure which is “Consideration of Energy and traffic parameter”.

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