Comparative Analysis Between Dynamic Shrink Route Optimization Algorithm (DSRO) and AODV Routing Protocol

S. Mahalakshmi
M.Phil., Research Scholar,
Department of Information Technology,
Bharathiar University,
Coimbatore,India.

R. Vadivel
Assistant Professor,
Department of Information Technology,
Bharathiar University,
Coimbatore, India.

***Abstract*—These MANET nodes are erected based on battery power with a definite limit. This may drain due to node locomotion and other transmission operations. Since the channel in the vitality level of nodes, cause the nodes to move away from the range with no affirmation. Because of this vitality channel, there happens a tremendous change in the topology. This change influences the general execution of the alive nodes in the system. The node lifetime and link lifetime prediction method with the Shrink mechanism to prevent and overcome the link breakage is compared with the AODV routing protocol. The Dynamic Shrink Route Optimization (DSRO) outperforms better with the DSR protocol then AODV, when combined with the shrink mechanism in the node and link lifetime prediction algorithm and it is simulated using the network simulator NS2**

Keywords*— *MANET, AODV, DSR, Topology, TORA, CGSR.

I. INTRODUCTION

Mobile Ad-hoc networks (MANET) is said to be dynamic since they don't incorporate any physical infrastructure or base stations[1]. In MANET, the nodes combine to form a network and these nodes function both as router and route to the other corresponding nodes in the respective range. Mobile Ad-hoc Network is developed based on mobile nodes which do not depend upon an centralized base station. MANET is an autonomous system where each node itself acts routers for their neighboring nodes from source to destination. Often, the nodes in the Mobile Ad-hoc Network (MANET) operates with batteries and can move freely, and thus, node may exhaust its energy or move away from the range [2]. In the infrastructure less network rerouting is costly and time consuming. In MANET, the route are constructed using the series of multiple nodes link and the lifetime of a route relies on the lifetime of each adjacent nodes in the MANET. The main contribution in this paper is that, it combines both node lifetime and route lifetime prediction using DSRO technique, which explores the dynamic nature of mobile nodes. The continuous mobility state of the nodes causes random changes in the network topology. The change in the network topology causes change in network connection of nodes. In this paper, the existing Ad-Hoc network routing protocols AODV and the proposed DSRO technique in DSR routing protocol are compared using network simulator NS2.34. The performance of the above mentioned AODV and the proposed DSRO technique in DSR routing protocols are compared. The performance metrics compared here are packet delivery ratio, end to end delay, and throughput and energy consumption.

II. AD-HOC ON DEMAND DISTANCE VECTOR (AODV)

Ad-Hoc on Demand Distance Vector (AODV) is a on-demand routing protocol in MANET. This routing protocol is search for route on demand and they broadcast their message to their adjacent nodes next to next to attain the destination node existing in the belonging range. The broadcast message is sent as route request (RREQ) message to the adjacent nodes in the respective range. The source node is from where the route request message is sent and the flow across all the nodes in the way to the destination. When a apt destination node is obtained with the same destination address then the route reply (RREP) message is sent back through the same way from source back to the destination. Once the route is obtained, the varies routes from destination to source is recorded in the route table for their future purpose [12].

From the entire received route from source to destination, the shortest path is always prepared for packet transmission. All the nodes in the varies routes that belongs to the specific source address and destination address are recorded in the route table. These recorded routes are used in the future as alternate path for that specific address in case of any inactive nodes in the route or link breakage. In this case, the route error (RERR) message is broadcasted to all the nodes in the route to change their route table with the alternate path. The route error message (RERR) sent to the nodes in the routes prevent from delivery ratio and data packet loss. When source node receives the route error message (RERR) , its looks for the available path in route table else reinitiates for route discovery again.

III. DYNAMIC SHRINK ROUTE OPTIMIZATION IN DYNAMIC SOURCE ROUTING

Dynamic Source Routing convention is one of the significant steering conventions in MANET [4]. The proposed Dynamic Shrink Route Optimization (DSRO) instrument is actualized on DSR convention. On account of the on-request nature of the DSR convention, it sits tight for the course at whatever point required and checks for accessibility of the ideal way to arrive at goal. In the event that no courses are accessible, at that point it begins with

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

course disclosure system for discovering course through flooding in communicates way.

By sending RREQ, ideal course is found from beginning node to goal node. RREQ parcel is send to all its neighboring nodes by utilizing flooding strategy. Every single node explains the RREQ ID whether it is new and the goal address is same as its very own location. On the off chance that if the location differs, attach the present node's location and send it to the following neighboring node. Once RREQ arrives at the goal node, RREP parcel is send by the goal node which annexes the whole way data in the header of the bundle. At the point when modifications happen in the way, the course support deals with this change [9]. Each time when connection breakage occurs because of psychologist system, the data about connection breakage is communicated to make the update in course store memory. Since a route is composed in series of multiple links, it is said to be broken if any single node link among its links is broken, and thus, the lifetime of the route is reduced when a single link is broken. In MANET two or more adjacent nodes are linked within a range. MANET nodes are limited in battery power. This link between nodes can break anytime due to out of range movement of nodes and energy drain [8]. In this paper the energy usage and link breakage rate is minimized by using modified shrink mechanism

A. Node Lifetime Prediction

In the proposed Dynamic Shrink Route Optimization strategy, the node lifetime are predicated to dodge interface breakage in MANET. An connection of two nodes is built up utilizing join and the connection itself, and the connection lifetime is between reliant on both the node lifetime and the connection lifetime [6]. A connection Li comprises of an connection Co and two nodes (Nd−1, Nd). Where Co speaks to the connection between nodes Nd−1 and Nd and it is kept up until the contiguous nodes (Nd−1, Nd) move out of one another's correspondence extend under the suspicion of no vitality issue in the two nodes Nd−1 and Nd.

The connection lifetime βCo to speak to the assessed lifetime of the connection Co, and it just relies upon their relative versatility and separation of nodes Nd−1 and Nd at a given time [1]. The term βNo signifies the assessed battery lifetime of node Nd. At that point, the lifetime of the connection Li is communicated as the base estimation of (βCo, βNd−1, βNd). The ρ in condition (1) speaks to the quantity of nodes in the range.

$$\beta Li = \rho \min(\beta Co, \beta Nd-1, \beta Nd) \quad (1)$$

B. Route Lifetime Prediction

The estimation of the lifetime of the two nodes and connection engaged with course is communicated as the lifetime of course R. Accept that Ω speak to the all out scope of nodes [7]. The expected Ω=2π/t, which speaks to the range with time to anticipate the course lifetime. Lifetime of Route R is suggested in condition (2).

$$\beta R = \Omega \min (\beta Nd, \beta Co) \quad (2)$$

C. Shrink mechanism in Dynamic Source Routing

The proposed DSRO procedure depends on contracting methods [10]. The target of the Shrink mechanism is to diminish the course length by dropping the least lifetime node from the course, making an alternate way with the nearby neighboring node in the ideal course. Such an operation has many potential advantages, including

(i) By diminishing bounce tally, delay is step by step decreased
(ii) By decreasing connection breakage, information lose is additionally extensively diminished.
(iii) The general vitality devoured for bundle transmission is diminished.

The Shrink mechanism is started with every transmission of information packet. The therapist instrument is send alongside the information parcel. The Shrink mechanism goes alongside the information bundle computing Shrink-α. It is dynamic until the source node is associated for the information stream with goal. The objective Shrink mechanism is to diminish the bounce tally to decrease from 2 hops association with 1 hop association by killing least or excess hop in the way. In Shrink mechanism, the nodes trade their course table data when they come in a similar scope of one another. When two nodes run over a similar course they are recognized as friend node [2]. Contracting is the way toward dispensing with least lifetime nodes that cross the equivalent steering way from source to goal. The Shrink mechanism handles the long way where a few nodes come nearer to connect one another, taking into account a conceivable alternate route determined from condition (3).

$$\alpha = \beta Li > \min(\beta Co, \beta Nd) \quad (3)$$

D. Residual energy of nodes

At whatever point a packets is transmitted from source to destination, certain measure of vitality is loosed by the nodes from their underlying battery control. Because of this, the vitality of a nodes gets diminished. The rest of the vitality is determined as leftover vitality after a nodes finishes its transmission. The leftover vitality determined are put away in the course store and utilized for the future reason.

This determined lingering vitality can decrease the future vitality utilization for foreseeing node lifetime. To gauge the vitality channel rate, assess the distinction of introductory vitality and remaining vitality of the nodes [5]. The Rβ speaks to the leftover vitality, which is determined from starting vitality and consumed vitality in condition (4).

$$R_\beta = ([I_\beta^{(\beta Nd)}] - [\beta Nd]) \quad (4)$$

IV. PERFORMANCE EVALUATION

The proposed DSRO method is actualized in NS2.34. The proposed work was contrasted and AODV in various execution measurements. The recreation system comprises of 100 nodes that are haphazardly sent in a

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 10, October-2019

1000m× 1500m. The simulation time is 1000 seconds. The nodes move arbitrarily in the conveyed zone at the speed between 4m/s to 24m/s in the adjusted versatility model [11]. Subsequent to moving to an objective situation, there is a respite time before the node begins another development. At the point when respite time is set to 0, there is a development in the nodes, and when the interruption time and the reproduction time are equivalent, the nodes are in rest.

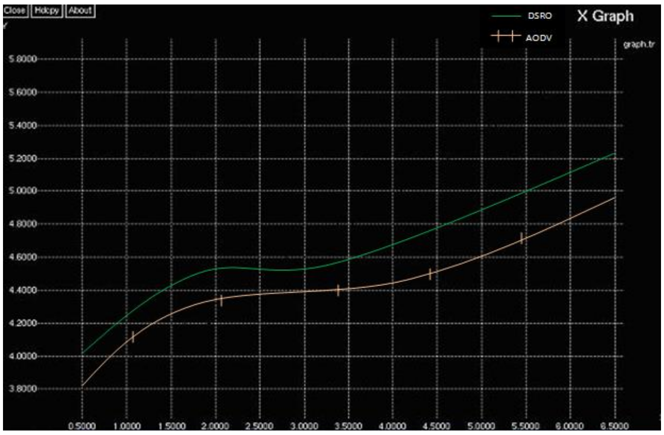
The table 1 briefs the reenactment parameters in DSRO system. The presentation assessment says that DSRO system works superior to the current AODV and the vitality devoured by the node are diminished by shrink mechanism and the node lifetime count. The vitality model speaks to the underlying vitality as 100 J. the transmit vitality and the get vitality are 0.4 w and 0.3 w. The proposed DSRO technique performs better with respect to energy efficiency and preventing link breakage [6]. The simulation results are shown in graphs which tell about the comparison of proposed DSRO technique with existing AODV method.

V. SIMULATION ASSUMPTION

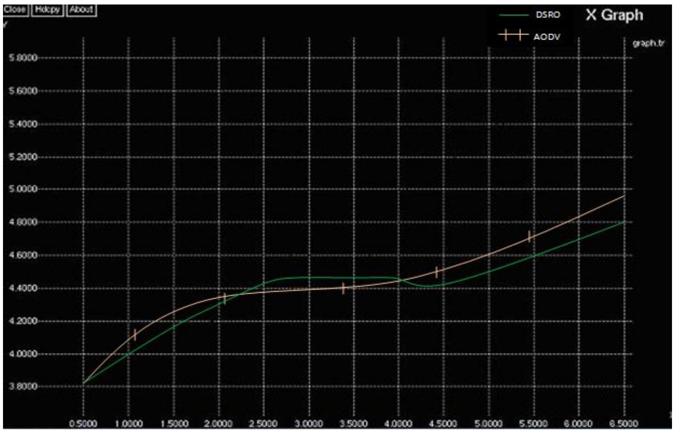
To assess the presentation of the DSRO, the exhibition of DSRO is contrasted and AODV regarding system throughput, Energy utilization, starts to finish deferral and packet delivery ratio[10]. In DSR routing protocol convention, the most limited way is chosen between source node and destination node without thinking about the lifetime of the node and the lifetime of the route. The DSRO strategy endeavors to find the node lifetime and route lifetime utilizing the proposed calculation. The Shrink mechanism decreases the route length by dropping the base lifetime nodes from the way and associates with the neighbors making alternate route. As a rule, the AODV component performs better in a low-versatility situation, while the DSRO procedure is by all accounts increasingly reasonable for a high-portability situation.

Table 1
Simulation Parameter

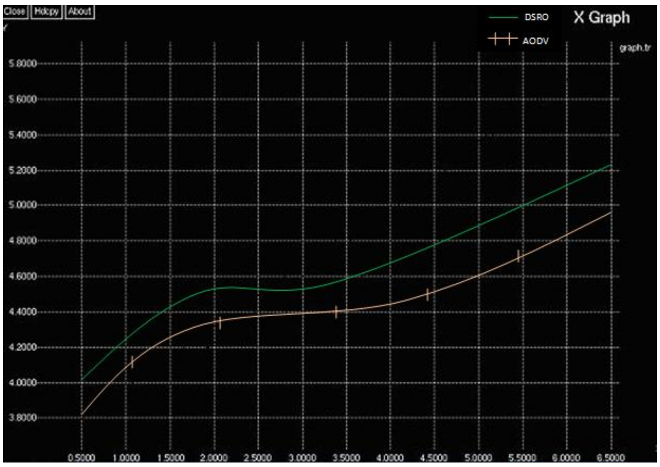
Parameter	values
Simulation time	1000 s
Topology size	1000m x 1500m
No. of nodes	100
MAC type	MAC 802.11
Radio propagation model	Two ray ground
Radio propagation range	250 m
Pause time	0s
Max speed	4m/s – 24m/s
Energy model	Energy model
Initial energy	100 J
Transmit energy	0.4 w
Receive ener	0.3 w
Idle energy	0 w
Traffic type	CBR
CBR rate	512 byte x 6/s
Max no. of connection	50



DSRO has an increase in the packet delivery ratio than AODV.
Fig. 1 Packet Delivery Ratio



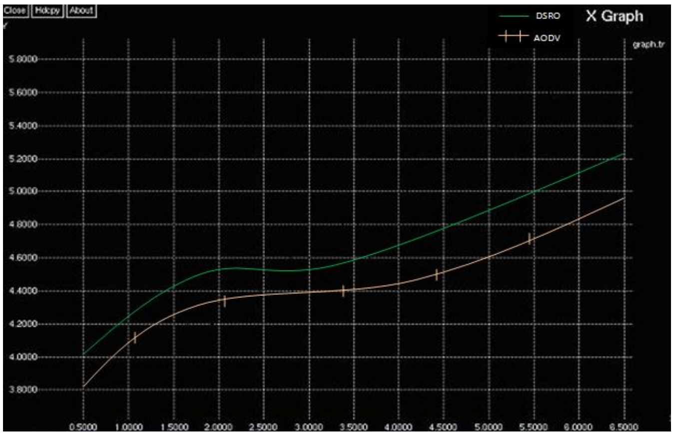
DSRO has decreased energy consumption than AODV
Fig. 2 Energy Consumption



DSRO has an increased throughput than AODV.
Fig. 4 Throughput

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 10, October-2019



DSRO has a decreased Delay than AODV

Fig. 5 Delay

VI. CONCLUSION

In this paper, by thinking about the Node lifetime and route lifetime, the ideal way is picked for staying away from connection breakage and shrink mechanism is utilized to limit the vitality devoured for packet transmission. A novel DSRO calculation is proposed. MANET comprises of nodes that are associated through a correspondence connect with constrained battery control. Because of their versatility, MANET nodes move out of their correspondence run. As the outcome, there are connecting breakages between the nodes. The vitality is likewise squandered to finish one transmission. The vitality channel rate is assessed utilizing the remaining vitality computation for sometime later which is put away in the course store. By utilizing the proposed DSRO method the longest lifetime nodes way for diligent information sending is chosen and therapist component to wipe out the least lifetime node is dropped, making an alternate route way with the adjoining neighboring node and furthermore to anticipate the leftover vitality. The exhibition aftereffects of the proposed DSRO calculation and AODV are thought about and it is demonstrated that DSRO performs superior to AODV system.

VII. REFERENCE

[1] Xin Ming Zhang, Feng Fu Zou, En Bo Wang, and Dan Keun Sung "Exploring the Dynamic Nature of Mobile Nodes for Predicting Route Lifetime in Mobile Ad Hoc Networks" IEEE Transactions on Vehicular Technology, vol. 59, no. 3, March 2010.

[2] Z. Bilgin and B. Khan, "A Dynamic Route Optimization Mechanism for AODV in MANETs," Proc. 2010 IEEE International Conference on Communications, ICC 2010.

[3] Liang Huang, "An Efficient Dynamic Route Optimization Algorithm for Mobile Ad hoc Networks," Procedia Environmental Sciences ,2011 , pp.-518-524 .

[4] V. Marbukh and M. Subbarao, "Framework for maximum survivability routing for a MANET," in Proc. MILCOM, 2000, pp. 282–286.

[5] C.-K. Toh, "Maximum battery life routing to support ubiquitous mobile computing in wireless ad hoc networks," IEEE Commun. Mag., vol. 39, no. 6, pp. 138–147, Jun. 2001.

[6] A. Misra and S. Banerjee, "MRPC: Maximizing network lifetime for reliable routing in wireless environments," in Proc. IEEE WCNC, 2002, pp. 800–806.

[7] M. Maleki, K. Dantu, and M. Pedram, "Lifetime prediction routing in mobile ad hoc networks," in Proc. IEEE WCNC, 2003, pp. 1185–1190.

[8] L. Qin and T. Kunz, "Pro-active route maintenance in DSR," ACM SIGMOBILE Mobile Comput. Commun. Rev., vol. 6, no. 3, pp. 79–89, Jul. 2002.

[9] Charles E. Perkins and Elizabeth M. Royer, "The Ad hoc On-Demand Distance Vector Protocol," Ad hoc Networking, Addison-Wesley, pp. 173–219, 2000.

[10] S. Park and B. Voorst, "Anticopated Route Maintenance (ARM) in Location-Aided Mobile Ad Hoc Networks." Globecom, San AntoNoo, TX, USA, 2001.

[11] M. Al-Shurman, S.-M. Yoo, and S. Park, "A Performance Simulation for Route Maintenance in Wireless Ad Hoc Networks," in ACM-SE 42: Proceedings of the 42nd annual Southeast regional conference. New York, NY, USA: ACM, 2004, pp. 25–30.

[12] Rahman AHA, Zukarnain ZA." Performance comparison of AODV, DSDV and I-DSDV routing protocols in mobile ad hoc networks." European Journal of Scientific Research 2009; 31(4): 566–576.

(This work is licensed under a Creative Commons Attribution 4.0 International License.)