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Optimal Path Selection in Dynamic Source Routing

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Abstract-Mobile Ad-hoc Network (MANET) is a collection of independent mobile nodes that can communicate with each other via radio waves. The mobile nodes that are in radio range of each other can directly communicate, whereas others need the aid of intermediate nodes to route their packets in multi-hop fashion. MANETs are used in disaster recovery, rescue operations, military communication and many other applications. In multi-hop wireless ad hoc networks, designing energy-efficient routing protocols is critical since nodes have very limited energy, computing power and communication capabilities. Existing on-demand ad hoc network routing protocols continue using a route until a link breaks. Dynamic Source Routing (DSR) protocol provide better path from source to destination but it does not consider the quality of the path. Due to lake of quality like available bandwidth and power path break during the transmission. In this paper, we use bandwidth and hop count as quality factor of the path to reduce the path brake during transmission.

I. INTRODUCTION

Ad-hoc wireless networks are a comparatively new paradigm in multi-hop wireless networking that is increasingly becoming popular and will become an essential part of the computing environment, consisting of infra-structured and infrastructure-less mobile networks [1]. Mobile ad hoc network (MANET) is an infrastructure-less multi-hop network where each node communicates with other nodes directly or indirectly through intermediate nodes. The credit for growth of ad-hoc network goes to its self-organizing and self-configuring properties.

Routing protocols were based on flooding the routing packets in all directions irrespective of the location of the destination node, result increase bandwidth[3][4] consumption whereas table driven protocol maintains a large amount of information as well as they perform large computations in order to select the best node which results in premature loss of battery life and bandwidth. In this paper, we are proposing a bandwidth based concept to reduce the overhead created when available bandwidth is very low on intermediate node of the path. Our protocol select optimal path in terms of bandwidth and hop count.

II. RELATED WORK

Zhenqi Wei et al [1] Server-terminal based distributed speech recognition (DSR) applications are widely adopted on mobile devices. In this paper, we have implemented a power-efficient DSR solution of high performance for real-time speech processing. The DSR frontend algorithms are elaborately optimized in assembly codes utilizing accelerating techniques provided by a previously released audio DSP, such as binary scaling operations in a deep instruction pipeline, automatic memory addressing method, and parallel processing of packaged data.

Istikmal et al [2] Mobile Ad hoc is a network that does not have the infrastructure and have the ability to manage its network independently, in the future this network predicted to be the key to the development of network applications. In this research we use optimized routing protocols in mobile ad hoc network (MANET), the optimization is done on the routing protocol DSR

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(Dynamic Source Routing) which is reactive routing protocol using ant algorithm. Then analysis and evaluated the performance of this routing protocol in various scenario and compared the result with standard DSR routing protocol.

G. Rajkumar, R. Kasiram et al [3] the main objective of the paper is to increase the throughput thereby reducing the Network Load and end to end delay between nodes. To achieve this, it is proposed to go for reactive routing protocols. Proactive routing protocols use table-driven strategy that is the routing tables are exchanged periodically between nodes which lead to more bandwidth and power consumption. To overcome these problems, we go for DSR and AODV. These routing protocols use on-demand strategy that is the routes are established from source node to destination only on demand which minimizes the delay and packet loss. Using "Network Simulator 2.35" the performance of AODV and DSR protocols are compared for large number of nodes in the presence of ambient noise level whereas in the existing works lesser number of nodes is only considered. From our results it is evident that AODV protocol consumes lesser power than DSR and in the presence of high network load, AODV outperforms DSR by yielding higher throughput with less delay.

Isaac Woungang et al [4] from a security design perspective, MANETs have no clear line of defense; i.e. no built-in security. Thus, the wireless channel is accessible to both legitimate network users and malicious attackers. A black-hole attack is a severe attack that can be easily employed against data routing in MANETs. A black-hole is a malicious node that can falsely reply for any route requests without having an active route to a specified destination and drops all the receiving data packets. A novel scheme for Detecting Black-hole Attacks in MANETs (so-called DBA-DSR) is introduced. The BDA-DSR protocol detects and avoids the black-hole problem before the actual routing mechanism is started by using fake RREQ packets to catch the malicious nodes.

G. Rajkumar et al [5]the main objective of the paper is to increase the throughput thereby reducing the routing overhead and jitter between nodes. To achieve this, it is proposed to go for reactive routing protocols. Proactive routing protocols use table-driven strategy that is the routing tables are exchanged periodically between nodes which results in more energy consumption. To overcome these problems, go for DSR and AODV.

EvjolaSpaho et al [6] Vehicular Ad-hoc networks (VANETs) are expected to be massively deployed in upcoming vehicles, because their use can improve the road safety and comfort. The effective implementation of vehicular communication could improve traffic management system. This effectiveness could be achieved by designing and implementing efficient vehicular network protocols. Implemented two routing protocols: DSR and DYMO and investigated the performance of these routing protocols using PDR and goodput metrics. The simulation results shows that DYMO protocol performs better than DSR protocol.

N. Javaid, A. Bibi et al [7] To evaluate the effect of these probabilities of VANETs in routing protocols, select Dynamic Source Routing (DSR), Fish-eye State Routing (FSR) and Optimized Link State Routing (OLSR). For Finally, this paper deduce that enhanced DSR (DSR-mod) outperforms other protocols by achieving 16% more packet delivery for all scalabilities and 28% more throughput in selected mobilities than original version of DSR (DSR-orig).

Lawal Bello et al [10] a technique is proposed to evaluate the effect of ambient noise and path loss have on received signal strength of mobile node in a mobile ad hoc network environment using optimized network (OPNET) simulator while comparing the performance of Ad-Hoc on demand distance vector (AODV) and dynamic source routing (DSR) protocols

K. Amjad et al [11] I have analyzed the performance of a Mobile Ad-hoc Network (MANET) using the Dynamic Source Routing (DSR) protocol with groups of nodes moving according to the Reference Point Group Mobility (RPGM) model. Four different random mobility models, Levy-Walk, Probabilistic Random Waypoint, Random Direction and Random Walk were selected for group leader's mobility and the effects of changing communication load and transmission ranges were investigated.

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Mohamad Rizal Abdul Rejab et al [19] the behavior of TCP-friendly Rate Control (TFRC) protocol over Ad-Hoc on Demand Vector (AODV) routing protocol and Dynamic Source Routing (DSR) protocol. The aim are first, to measure the performance of TFRC in terms of throughput, delay and jitter. The second objective is to identify which Mobile Ad-Hoc Network (MANET) routing protocols work well with TFRC.

Shakeel Ahmad, Irfan Awan et al [20] The Ad hoc network is group of wireless nodes to establish a network without any fixed infrastructure or centralized supervision/management. In such a network, topology changes dynamically and due to limitations of bandwidth, transmission range and power routing becomes an important issue. A lot of work has been done in field of routing in ad-hoc network since 1990. Dynamic Source Routing protocol (DSR) provides simple and efficient routing for multihop ad-hoc network of mobile nodes. This paper presents a simulation based performance analysis and comparison between traditional DSR and extended DSR.

M. Rajabzadeh et al [21] A Mobile Ad-Hoc Network (MANET) is a collection of wireless mobile nodes forming a temporary Network. These networks do not require any existing infrastructure or central administration. To make MANETs adaptive to different mobility and traffic patterns, this paper proposes a novel routing scheme which is utilized mobile agents and attempts to develop DSR routing protocol in MANETs with simple node level management behavior resulting in overall system optimization. Develop a probabilistic multi-path routing algorithm and incorporates factors like signal strength into the route metrics so as to predict link breaks before they actually occur. In addition to signal strength and shortest path metrics, our algorithm updates the goodness of choosing a particular path based on congestion measurement and energy level in each node.

Hongsheng Lu, Jun Zhang et al [22] the paper advances a proactive link switch strategy for high dynamic Ad Hoc wireless network named Dynamic Source Route Link Switch mechanism (DSR-LS). In order to envoy packet transmission, DSR-LS utilizes RTS/DATA or CTS/ACK embedded with link switch request or reply option to find a new link in one-hop range of the node at the time of detecting a link breakage trend.

M. Rajabzadeh, F. Adibniya et al [23] the autonomous character of mobile ad-hoc networks (MANET) poses significant challenges on network communications. Some of the main challenges in this area related to routing protocols. To make MANETs adaptive to different mobility and traffic patterns, proposes a novel routing scheme which is utilized Cross Layer design and attempts to develop DSR routing protocol in MANETs with simple node-level management behavior resulting in overall system optimization. Develop a probabilistic multipath routing algorithm and incorporates factors like signal strength into the route metrics so as to predict link breaks before they actually occur.

III. PROBLEM DEFINITION

In MANETs, when information is sent from the source to the destination then this information packets travel through all the nodes which come across the path from the source to the destination. If path is break due to any reason then we need to find out better path between source to destination. Solution of this problem has been proposed in many paper but they cannot consider quality of the path in terms of bandwidth and hop count. In this paper we are going to propose a new technique to select the beat path if available else it select alternate path.

IV. PROPOSED WORK

Proposed approach is called Optimal path selection in DSR. To obtain an Optimal Path Selection in DSR routing protocol we uses bandwidth control approach and load balancing approach. In our proposed OPSDSR, a hop-by-hop bandwidth control mechanism is used to adjust the total bandwidth consumption of the network.

In OPSDSR, the route which is having the tendency to break early is detected and avoided by adding a Min BW field in the RREQ packet. This Min BW field is used to hold the available bandwidth of a node. When a node accepts a RREQ packet from its neighbor it compares the Min BW value in the packet with its

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available bandwidth. If the available bandwidth is less than Min BW, this bandwidth is assigned as the Min BW. This process will continue up to the destination. The destination which accepts more than one RREQ from different route, select the route which is having the highest value in the Min BW field and have minimum hop count, send RREP to the source. That means we are selecting a route by avoiding the node which is having a tendency to increase delay due to low bandwidth.

Procedure for Sender Node

1. Create a rout request packet with Source Address, Destination Address and TTL.
2. Send it to available rout from rout cache.
3. If rout is not available then flood RREQ packet to all neighbor and wait for response.
4. Receive response from destination with best available path or alternative path.
5. Send data packet to destination according to receive path.

```
if(TTL<=0)
{
   drop the packet;
}
else if (Node_id ==Dest_id)
{
Consume the RREQ packet;
Calculate total delay ;
Calculate maximum available bandwidth on current path;
Send RREP to source with best path or alternative path;
}
else
{
Add node id into visited node list;
Add available bandwidth of the nobe.
Flood the RREQ packet to his neighbors;
}
```

When a node receive RREQ packet form its neighbor then it process the RREQ on the basis of above algorithm.

Proposed technique select alternative path based upon hop count and available bandwidth.

- For best case scenario, path have Lowest Hop Count (LHC) and Higher Bandwidth (HB)

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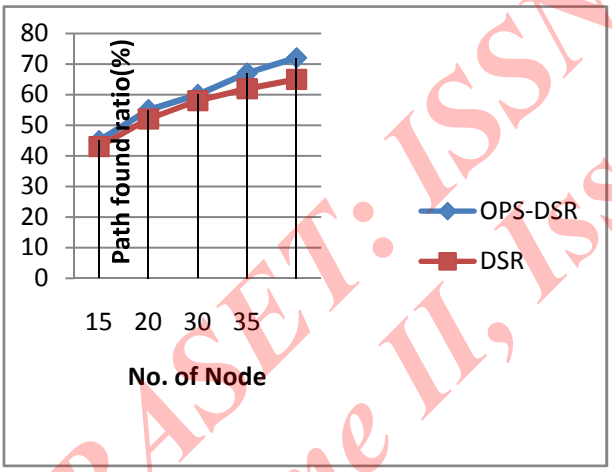
- For west case scenario, path have Maximum Hop Count (MHC) and Minimum Bandwidth (MB)

V. PERFORMANCE EVALUATION

We have done simulation work for our proposed OPSDSR in Mat-lab. The simulation result shows that the proposed method is more efficient than the existing method. In order to validate the proposed protocol and show its efficiency we present simulations using MATLAB. MATLAB is a very popular network simulation tool. MATLAB is an interactive software package which was developed to perform numerical calculations on vectors and matrices. Initially, it was simply a Matrix Laboratory. However, today it is much more powerful:

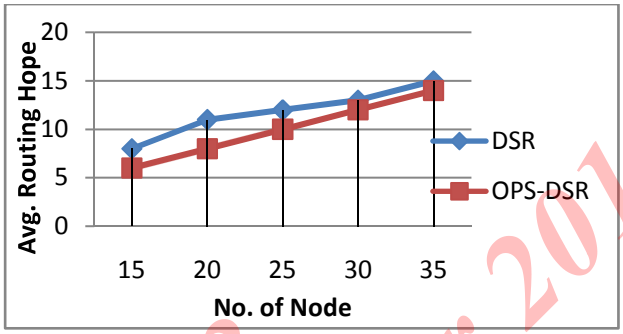
The network area is 35x 35 that includes variable number of mobile nodes ranging from 15 to 35.

The radio transmission range is assumed to be 5 to 7s. The scenario of nodes mobility is generated randomly based on random way point model where a mobile node moves to a new position.



This graph represent the path found ratio increases when number of node increases. Proposed work provide better result than DSR.

In second graph average routing hope is always less than the DSR when number of node varies between 15 to 35.



VI. CONCLUSION

In MANETs studied, its properties and challenges in the Routing. In MANETs also studied the different types of routing and its properties. It is studied and analyzed DSR algorithm and proposed a method to find optimal path. It is analyzed our new proposed OPSDSR and the simulation results shows that the performance is better than DSR. Finally concluded OPSDSR works far better than DSR in giving more lifetimes to the network.

Used hop-by-hop bandwidth control for making the OPSDSR to be more efficient. Load balancing approach is also used to avoid over utilized nodes.

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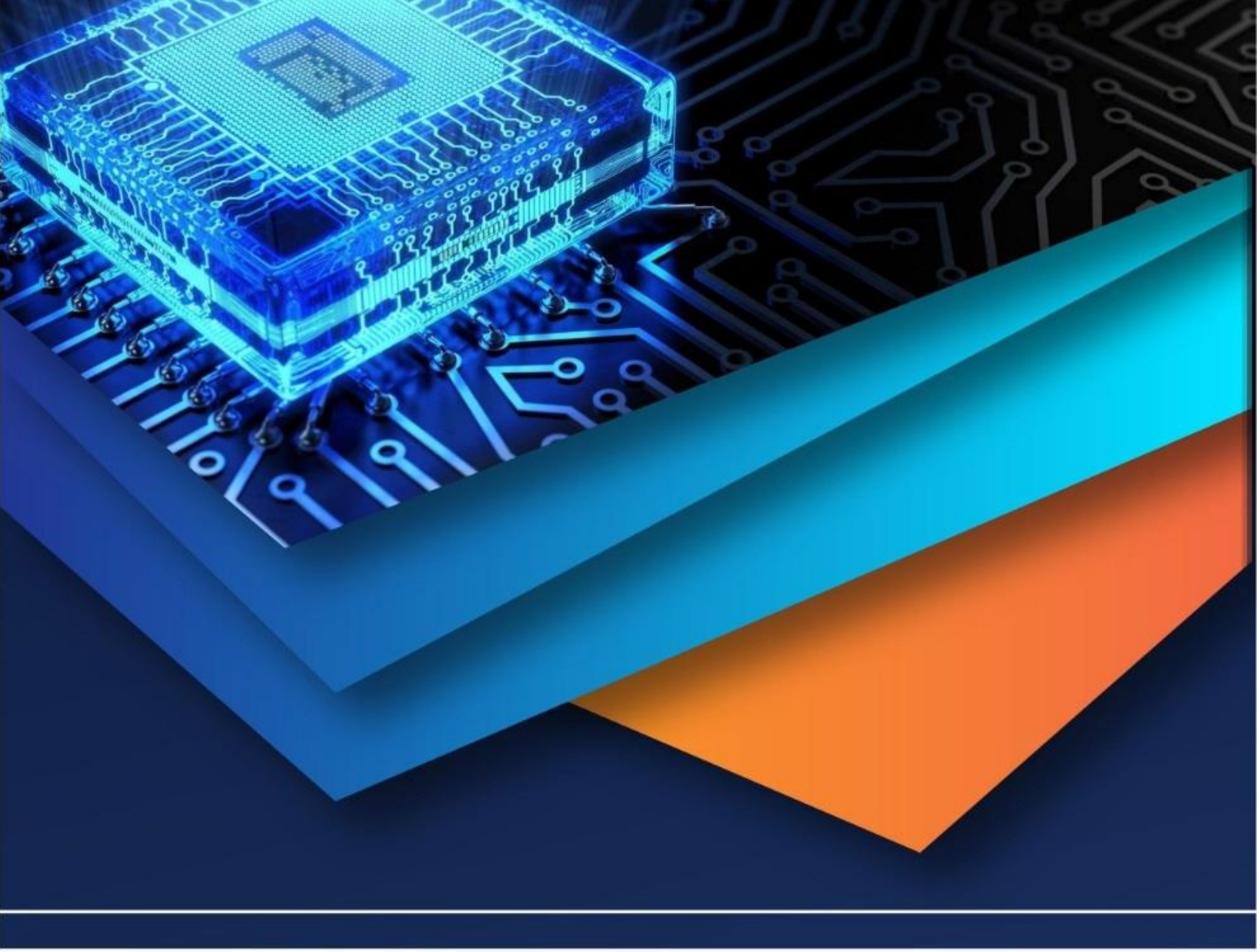
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