Network Performance Enhancement Using Modified DREAM AOMDV Protocol

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Abstract- *MANET (Mobile Ad-hoc Network) is infrastructure dependent, collection of wireless mobile nodes that can communicate with each other directly or indirectly through intermediate nodes. Thus, all nodes in MANET behave as mobile routers and they decide and maintain the routes. Nodes in MANET have high mobility that makes difficult to find routes when message packets are routed.*
The location based DREAM Distance Routing Effect Algorithm for Mobility maintains information about location of each node in between sender and receiver. As this protocol works better with any energy efficient protocol so we need to consider it for its performance measurement. In our work we use location based scheme (DREAM) with multipath routing protocol AOMDV for better network performance.
In proposed work routing of the nodes is done by AOMDV protocol by using location based DREAM protocol. In case of link failure, if the node in the network which is selected for local repair have maximum unused bandwidth so that possibility of link failure again will decrease. It will leads to better throughput and high packet delivery ratio. Final result will lead to better throughput, increase the packet delivery ratio and decrease routing load. Simulation can be done using NS 2.

Keywords- DREAM, AOMDV, MANET, NS2, Network Performance.

I. INTRODUCTION

Mobile ad hoc networks (MANET) are characterized by multi-hop wireless mobile nodes that communicate with each other without centralized control or established infrastructure. There are various challenges in MANET such as routing, dynamic topology, scalability, bandwidth optimization. But the major challenge in MANET is link failure due to high mobility. Topology-Based routing protocols become unsuitable for MANET when the nodes are highly mobile and topology changes dynamically. Geographic routing protocols are regarded as efficient and scalable when mobility is high. Therefore, geographic routing protocols have attracted a lot of attention in the field of routing protocols for MANET. Position-based approaches have been proposed to address some drawbacks of topologic-based techniques by using information about physical or geographical position of nodes that can be obtained by positioning services such as GPS(Global Positioning System).

We focus particularly on energy aware geographic routing since it is the one of the research of geographic routing includes DREAM that proposed constrained flooding. The expected zone is defined by predicting the boundary of the destination node's movement. In this protocol, prediction is made based on the time difference between sending data and the location information's update, as well as the destination node's speed. In the DREAM protocol, however, according to the location information, the data packet is flooded in a restricted directional range without sending a routing packet. This kind of forwarding effectively guarantees delivery in large-scale networks.

We also focus on the improvement of the throughput of the network by providing higher CPU utilization in the network. The table for the throughput will maintain the information of the destination routing path. The next path should be selected in order to improve the throughput of the network.

The objective of this research is to improve the throughput by analysis of the following parameters:Packet Delivery Ratio**,**Throughput**,**Normal Routing Load

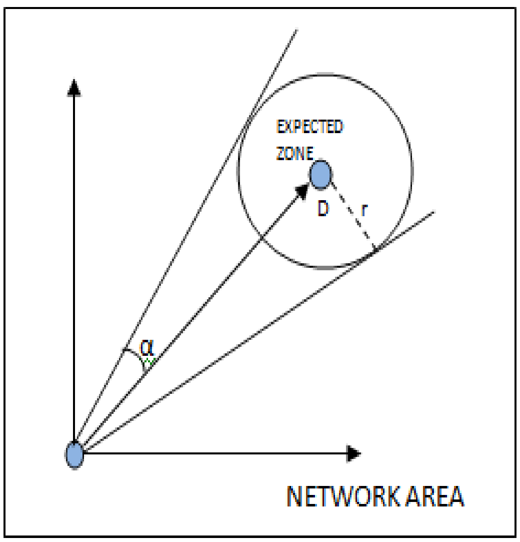
II. THEORITICAL BACKGROUND

Distance Routing Effect Algorithm (DREAM)

DREAM is an early example of a routing protocol which is completely location-based. The location service is also part of the same protocol. With DREAM's location service, every node proactively updates every other node about its location. The overhead of such location updates is reduced in two ways: First, distance effect (nodes move slowly with respect to each other as their distance of separation increases).

Second, each node generates updates about its location depending on its mobility rate fast moving nodes update more often whereas slow moving nodes generate updates less often. DREAM geographically forwards data packets in the form of a directional flood. [6]

In DREAM the sender S of a packet with destination D will forward the packet to all one-hop neighbors that lie "in the direction of D." In order to determine this direction, a node calculates the region that is likely to contain D, called the **expected region**. As depicted in figure, the expected region is a circle around the position of D as it is known to S. Since this position information may be outdated, the radius *r* of the expected region is set to ($t1$-$t0$)$v$max, where $t1$ is the current time, $t0$ is the timestamp of the position information S has a bout D, and *v*max is the maximum speed that a node may travel in the ad hoc network. Given the expected region, the "direction toward D" for the example given in figure is defined by the line between S and D and the angle α. The neighboring hops repeat this procedure using their information on D's position. If a node does not have a one-hop neighbor in the required direction, a recovery procedure has to be started. This procedure is not part of the DREAM specification.



DREAM protocol [6]

Advantages of DREAM

- As far as control information is concerned, only location information is exchanged which are in form of short sized location packets. So, it saves bandwidth.
- Due to directed flooding, possibility of loops is minimized as packets travel in the direction of the destination.
- It efficiently adapts to dynamic topologies (or mobility in the network). This is because of the mobility effect.
- This Kind of packet forwarding effectively guarantees packet delivery.

Disadvantages of DREAM

- It works efficiently with only some energy efficient protocols.

AOMDV Protocol

One of the most commonly used AOMDV is a multipath routing protocol provides loop-free extension to another multipath routing protocol AODV. It ensures about disjoint alternate paths at every node, so that it can achieves path disjointness without using source routing. AOMDV with a route tables contain a list of paths for each destination, to support multipath routing. All the paths have the same destination sequence number to a destination. All the routes with the old sequence number are removed, once a rout advertisement with higher sequence number is received. Two additional fields, hop count and last hop, are stored in the route table entry to help address respectively the problems of loop freedom and path disjointness. The loop freedom guarantee from AODV is no longer required here, because the multipath routing protocol implement multipath discovery. AOMDV having two table fields hop count field and last hop field, in which hop count field initialized once at the time of the first advertisement for that sequence number and contains length of the longest path for a specific destination sequence number. That's why hop count field remain unchanged till a path for a higher destination sequence number is received. To ensure disjointness of that path in the route table, a node discards a path advertisement that has either a common last hop or a common next hop as already stored in the route table.
AOMDV is invariant of AODV routing protocol, which maintains multiple paths during route discovery.

III. PROBLEMSTATEMENT

Due to the mobility of mobile nodes, it has been difficult to maintain link connectivity. In case of link failure local repair overhead increases. There are some single path algorithms to solve such problem but Multipath protocols have definitely sort the problem of single path by providing alternative route in between sender and receiver. AOMDV can find the alternate route in case of link failure but that route can be possibly fail again. AOMDV has more message overheads during route discovery due to increased flooding and since it is a multipath routing protocol, the destination replies to multiple RREQs those results are longer overhead. For this overhead improvement the location based scheme DREAM is used with improved AOMDV protocol with throughput and packet delivery measurement.

IV. PROPOSEDALGORITHM

A MANET can be realized by an undirected graph G(V,E), where V is the number of nodes and E is the total possible edges. Here, we associate a definite weight representing the amount of energy that gets consumed for the transfer of a single fixed length data packet between a pair of nodes. So, each edge in the given network graph will have a weight WEij representing the amount of energy consumed for a single hop transfer from node i to node j. The amount of energy for a single hop transfer between the given two network nodes can be calculated by a trivial function given in Equation:

$$\mathrm{WE}_{ij} = E\left(V_i,\ V_j\right)$$

The set of WEij values for all the possibilities of edges of the given network graph G(V,E) can be represented by a weighted adjacency matrix below.

	1	2	3	....	V-1	V
1	0	WE_{12}	WE_{13}	....	$WE_{1,j-1}$	WE_{1j}
2	WE_{21}	0	WE_{23}	....	$WE_{2,j-1}$	WE_{2j}
3	WE_{31}	WE_{32}	0	....	$WE_{3,j-1}$	WE_{3j}
....	....	....	....	0	....	....
V-1	$WE_{i-1,1}$	$WE_{i-1,2}$	$WE_{i-1,3}$	....	0	$WE_{i-1,j}$
V	WE_{i1}	WE_{i2}	WE_{i3}	....	$WE_{i,j-1}$	0

The value of the weight WEij of a given edge may be zero, in case a direct link is not available between a node pair Vij. A given path "Rij" from a source node Vi to a destination node Vj can be comprised of n nodes and n −1 multiple hops where $1 \le n \le V$.

The amount of energy required for the transfer of a single data packet from Vi to Vj can be calculated by the summation of weights WEij of all participating hops and can be given by Equation:

$$\mathrm{PE}_{ij} = \sum_{i=1}^{n-1} E(W_i)$$

The value PEij represents the amount of energy consumed in the transfer of a single packet of data along the given path Rij. A message "M" to be transferred from a source to destination node can have "Q" number of packets. So, the amount of energy "E" required for transferring a message "M" from source to destination node along a given path Pij can be calculated as given in Equation:

E=Q(PEij)

The amount of unused bandwidth (UB) is:

UB = L−T, Where L=node capacity

T=link traffic

Minimum unused bandwidth (MUB):

$$\mathrm{MUB}_{ij} = \min_{i=1 \text{ to } j}(\mathrm{UB})$$

The basic path finding technique given in the AOMDV protocol is used exactly in the LBAOMDV protocol based on the flooding of route request packets (RREQ) across the whole network. Each reverse route is established on reception of positive route reply packet (RREP). A set of multiple disjoint paths are established by interleaved exchange of the RREQ and RREP route establishing packets. Among these multiple discovered routes or paths, the final set of paths for actual data transfer is selected based on effective energy utilization assessment.

ALGORITHM

Step1: Use selective flooding route request RREQ message seeking for the destination.

Step2: RREQ propagation from the source node to the destination node establishes multiple reverse paths both at intermediate nodes as well as destination.

Step3: Multiple RREPs traverse through these reverse paths back, to form multiple forward paths to the destination at the source and intermediate nodes.

Step4: For all, discovered routes Rij

If(PEij> E/K)

Add Rij to the qualified list List[] of paths, for data transfer.

Step5: Arrange the qualified list List[], in descending order of MUBij.

Step6: Transfer data packet over one of qualified list of paths which have maximum MUBij.

Step7: If(Path-Fails)

{

M=Cf; /*Assign failed data packet Cf to new message M*/

K=K-1; /*One qualified path fails*/

Goto Step2.

}

Step8: Exit():

End of Algorithm

V. IMPLEMENTATION STRATEGY AND RESULTS

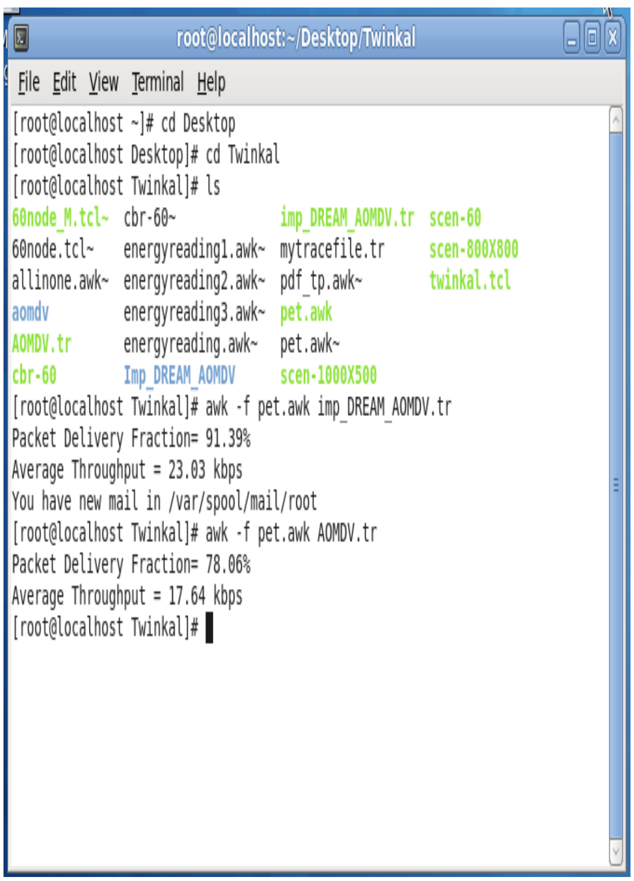
Network Simulator 2

Latest advances in processing, storage, and communication technologies have advanced the capabilities of small scale and cost effective sensor systems to support numerous applications. A sensor network is defined as an autonomous, multihop, wireless network with non deterministic routes over a set of possibly heterogeneous physical layers. The NS-2 simulation environment offers great flexibility in investigating the characteristics of sensor networks because it already contains flexible models for energy constrained wireless ad hoc networks. In this environment a sensor network can be built with many of the same set of protocols and characteristics as those available in the real world. The mobile networking environment in NS-2 includes support for each of the paradigms and protocols. The wireless model also includes support for node movement and energy constraints.

NS-2 has many and expanding uses including:

- To evaluate the performance of existing network protocols.
- To evaluate new network protocols before use.
- To run large scale experiments not possible in real experiments.
- To simulate a variety of IP networks.

SCREENSHOTS



V. CONCLUSION

There are various routing algorithms to minimize energy efficiency, one of which is AOMDV. It is an energy efficient, and a robust routing protocol. With addition to this, DREAM protocol, which is a location-based protocol. It uses load balance factor with AOMDV protocol so that is uses link that have maximum unused bandwidth. As a result less links are failed due to overhead. Therefore, the long lifetime of the nodes in the network is achieved, with reduced overhead and delay, and with an increased throughput and packet delivery ratio. So on simulation we conclude that the aomdv_dream give the best performance compare to aomdv. This paper implements DREAM_AOMDV with 60 nodes. In future we will try to implement this protocol using more number of nodes.

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